The Oil and Gas Industry in Brazil

Décio Oddone
Director General

November, 2018
• The ANP’s institutional presentation is based on current and reliable information, but no representation or warranty is made as to its accurateness and completeness, and it should not be relied upon as such.

• Projections and estimated values are included without any guarantee as to their future realization.

• Forward-looking data, information, projections and opinions expressed during the presentation are subject to change without prior notice.
The O&G sector in Brazil since the 50’s

**Upstream**

1953
- Petrobras’ monopoly

1975
- Risk Contracts: minimal impact

2010
- New E&P policies
  - Petrobras’ repositioning
  - (focus on large offshore fields, mature fields divestment)

2018

**Downstream, logistics and natural gas**

1953
- Petrobras’ monopoly

1997
- End of monopoly
  - (Oil Act)
  - Bidding Rounds
    - (Concession contracts)

2009
- Repurchase of Repsol’s stake in REFAP

2018
- Petrobras’ repositioning
  - (in favor of an open and competitive market)
Petrobras’ repositioning

E&P: reduction in investments and resources concentrated in the pre-salt

Natural Gas: cut in investments, sale of assets

Downstream: investments decreased, partnerships in refineries

Petrobras’ repositioning (which started to seek to maximize its profit and no longer act as a government arm) demands regulatory actions so that investments in refining and logistics are resumed and the prices practiced reflect the action of market forces.
Future: a high speed of transition and an increase of competition

- Competitive pressures within global energy markets will intensify.
- The global energy mix will be 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.

Source: BP Energy Outlook 2018

The transition to a low carbon economy has already begun

- Choice of society and governments
- Technologies can accelerate
- Change in mobility (EV, autonomous, apps)
- Pick demand until 2040

Brazil has to boost O&G activities to produce its reserves while they have value.
It is necessary to unlock the oil and gas potential

Brazil has a continental-size, but...

- Less than 5% of the sedimentary areas are contracted
- 2 Basins without a single well
- Only 30,000 wells were drilled in Brazil

- 60,000 in Argentina
- 4 million in USA
Upstream
Current Scenario and Opportunities
Three different E&P environments

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

Production: 8%

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: 37%

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

Production: 55%

Average oil production per well

16,691 bpd
85 wells

1,702 bpd
627 wells

16 bpd
6,744 wells

* September/2018
Increasing exploration and revitalizing activities

Onshore oil Production
(September, 2018)
107,434

*Updated (10/30/18)
Measures needed to resume E&P activities

Blocks offered in the bidding rounds contain some of the 41 areas excluded from the 9th Bidding Round in 2007.

The postponement of the pre-salt exploration caused the loss of billions of reais in government revenues between 2008 and 2017.

- **R$ -520 Bi**
  - In Royalties, windfall profit tax, income tax, signature bonus and investments in R&D

- **-4,3 MM bpd**
  - additional in 2018

- **R$ -600 Bi**
  - Investments
  - new platforms up to 2017

The greatest opportunity lost in a generation.
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)
Improvements in LC rules: contracts signed until 2015

潜在结果

巴西的石油产量潜力来自发现的资源

巴西的石油产量潜力来自发现的资源，预计将在2017年达到500万桶/日。这将推动投资，锁定210亿美元的barrels，直到2027年。

潜在结果

- 更多的利用供应链，更快地开发210亿美元的barrels，提升 royalties collection 和 job creation。

**执行摘要**

**改善**

巴西本地内容（LC）规则的改善将于2018年实施，将为2018年至2027年的36艘FPSO增加投资210亿美元

LC罚款的显著减少将缓解国内供应链的瓶颈。FPSO船体可以在国际上建造，而选定的模块则在本地组装和集成。

改善提供了更高的产量潜力，不断增加的FPSO在2018年至2028年期间的产量。这将推动投资，锁定210亿美元的barrels，直到2027年。

**潜在结果**

- 更多的利用供应链，更快地开发210亿美元的barrels，提升 royalties collection 和 job creation。

**巴西的石油产量潜力来自发现的资源**

- 2018年至2028年期间的产量

**相关的工作创造和特许权收入到2027年**

- 2018年的特许权收入：28亿美元
- 2027年的特许权收入：28亿美元
- 2018年的就业岗位需求：230000个
- 2027年的就业岗位需求：95000个

生产是基于可见的开发项目的。没有调整因无法预见的项目延期和停工而做出的。它排除了从储量增长和未发现储量的额外生产。请参阅我们的**Oil Supply Tool**，了解当前的供应情况。

来源：Wood Mackenzie
Three main goals

01 Increasing the exploratory activities

02 Maximizing production and reservoirs recovery factors

03 Attracting the right player for each environment
The new pre-salt exploratory scenario

Before

After (including 6th pre-salt round)
## 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>Brazil 14th Round Oil &amp; Gas Bidding Rounds</td>
<td>37 (24 onshore e 13 offshore)</td>
<td>3.84</td>
<td>32</td>
<td>17</td>
<td>1,556%</td>
</tr>
<tr>
<td>ROUND Brazil 15 Oil &amp; Gas Concessions</td>
<td>22</td>
<td>8.01</td>
<td>17</td>
<td>12</td>
<td>622%</td>
</tr>
<tr>
<td>PRE-SALT Brazil 2 Production Share</td>
<td>3</td>
<td>3.3</td>
<td>10</td>
<td>7</td>
<td>261%</td>
</tr>
<tr>
<td>PRE-SALT Brazil 3 Production Share</td>
<td>3</td>
<td>2.85</td>
<td>14</td>
<td>6</td>
<td>202%</td>
</tr>
<tr>
<td>PRE-SALT Brazil 4 Production Share</td>
<td>3</td>
<td>3.15</td>
<td>16</td>
<td>7</td>
<td>202%</td>
</tr>
<tr>
<td>PRE-SALT Brazil 5 Production Share</td>
<td>4</td>
<td>6.82</td>
<td>12</td>
<td>8</td>
<td>170%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>72</strong></td>
<td><strong>~R$ 28</strong></td>
<td></td>
<td></td>
<td>High competition and record results!</td>
</tr>
</tbody>
</table>
And the potential results are...

- New Investments: US$ 112B, R$ 448B
- Tax Revenues: US$ 425B, R$ 1,700B
- Million bpd (peak production): 2.5
- New Platforms: ~20
- Hundreds of Wells

*Potential results for the following bidding rounds: Brazil 14th Round, Brazil 15th Round*

*Brent = US$ 70/bbl
Exchange Rate = R$ 4/US$*
Bidding rounds schedule

1st Wave
As from November

2nd Wave

1st Semester

3rd Q

To be confirmed:

2018

2019

2020

2021
Open Acreage

1st Wave

722 blocks in 9 onshore basins
162 blocks in 6 offshore basins

2nd Wave

85 blocks in 7 onshore basins
969 blocks in 13 offshore basins
Pre-Salt Bidding Rounds 2019-2021

Areas recommended by ANP
Yet to be approved by CNPE
(National Energy Policy Council)

1. Aram
2. Sudoeste de Sagitário
3. Bumerangue
4. Cruzeiro do Sul
5. Norte de Brava

PRE-SALT Brazil 6
1. Aram
2. Sudoeste de Sagitário
3. Bumerangue
4. Cruzeiro do Sul
5. Norte de Brava

PRE-SALT Brazil 7
1. Esmeralda
2. Agata
3. Água Marinha

PRE-SALT Brazil 8
1. Ametista
2. Tupinamba
3. Jade
4. Turmalina
Concession bidding rounds 2019-2021
Transfer of Rights Surplus Opportunities

Legend

- Transfer of Rights Fields

- $489B
- $1,956B
- 10 Fields
- 10.8 Billion boe
- 17 New Platforms

- Brent = US$ 70/bbl
- Exchange Rate = R$ 4/US$

(GCA P50 recoverable volumes)
Maximizing the recovery factor

- **Campos Basin**
  - Current O&G Recovery Factor: 14%
  - Final O&G Recovery Factor: 23%
- **Brazil**
  - Final O&G Recovery Factor: 21%
- **World**
  - Average Final O&G Recovery Factor: 35%

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

*Source: Annual Reserves Bulletin (12/31/2017)*
Potential results if investments began in CB

If investments began in 2019, redevelopment could add 230,000 boe/d and US$3 billion of additional royalty collected by 2025.

The extra investment in redevelopment could generate 30,000 more jobs through 2025 than the abandonment alternative, while delaying US$4.8 billion of decommissioning costs.

5% addition in Campos Basin RF:

US$38 Bi
New Investments

4.8 Bi boe
New Reserves
Onshore and Shallow Water indicators

- **Shallow Water Production**
  - Oil production
  - Gas production
  - 2012/2018
  - 40%

- **Onshore Production**
  - Oil production
  - Gas production
  - 2012/2018
  - 36%

- **Drilled wells in shallow water**
  - 2012/2017
  - 90%

- **Drilled onshore wells**
  - 2015/2017
  - 73%

- **Number of shallow water wells in production**
  - 550 547 522 471 472 454 469 412 353 328 323

- **Number of onshore wells in production**
  - 7775 7866 8188 8294 8213 8286 8101 7775 7219 6765 6765
Measures to resume onshore and shallow water activities

**01**

**RD nº 568/2018**

Deadline for divestment projects already started (Topaz and Arctic projects): first semester of 2019

**02**

Until 12/26/2018 for Petrobras decides which concessions will remain in its portfolio (the company must request the contract extension for onshore and shallow water fields that are of interest to Petrobras, accompanied by the Development Plans contemplating the resumption of investments in the concessions)

For other cases (when there is no interest in contract extension or approval by ANP), return of the areas or farm-out with the possibility to be an auction promoted by Petrobras, with the support of ANP, until March 2019

**03**

Official to CADE (antitrust body) to evaluate the existence of a monopsonic market in the commercialization, which could be a barrier to the creation of a diversified and competitive market in the E & P onshore and shallow water environments
Attracting the right players

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

- **>60 New FPSOs**
  - The most prominent deep water environment

- **Mature fields/basins**
  - Low recovery rate in average. High potential for attracting new investments

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

**Contracted or in progress**

**Need to be unlocked**
### Potential impacts on the Brazilian economy

<table>
<thead>
<tr>
<th>Bidding Round</th>
<th>Platforms*</th>
<th>Pick Production - (million bpd)</th>
<th>Nominal Investments (billion)**</th>
<th>Collection – nominal values (billion)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Until 2016</td>
<td>27</td>
<td>2.5</td>
<td>US$ 130</td>
<td>US$ 450</td>
</tr>
<tr>
<td>2017, 2018 and 2019</td>
<td>22</td>
<td>2.5</td>
<td>US$ 126</td>
<td>US$ 487</td>
</tr>
<tr>
<td>Transfer of Rights Surplus</td>
<td>17</td>
<td>2</td>
<td>US$ 105</td>
<td>US$ 489</td>
</tr>
<tr>
<td>Increase in RF of 5% (revitalization)</td>
<td>-</td>
<td>11 B boe new reserves</td>
<td>US$ 90</td>
<td>US$ 55 in royalties</td>
</tr>
</tbody>
</table>

* Planned to start production  
** considers investments for platforms planned to initiate production after 2020  
*** Brent at US$ 70/bbl; Exchange: R$4/US$  

### Potential collection (from 2018 to 2054)

- ~R$ 6 trillion
- (ANNUAL AVERAGE OF R$167 B)

### Investments

- Research, development and innovation  
  - R$ billion per year  
- ~R$ 1.8 trillion
Current infrastructure is limited to a continental-sized country

The NG Market is concentrated and has small relevance
## The NG market in Brazil

### August, 2018

### SUPPLY

<table>
<thead>
<tr>
<th>Source</th>
<th>Quantity</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Domestic Supply</td>
<td>92 Million m³/d</td>
<td>52%</td>
</tr>
<tr>
<td>Imports from Bolivia</td>
<td></td>
<td>26%</td>
</tr>
<tr>
<td>LNG Imports</td>
<td></td>
<td>22%</td>
</tr>
</tbody>
</table>

### DEMAND

<table>
<thead>
<tr>
<th>Sector</th>
<th>Quantity</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Industrial</td>
<td></td>
<td>45%</td>
</tr>
<tr>
<td>Power Generation</td>
<td></td>
<td>36%</td>
</tr>
<tr>
<td>Cogeneration</td>
<td></td>
<td>3%</td>
</tr>
<tr>
<td>Automotive</td>
<td></td>
<td>7%</td>
</tr>
<tr>
<td>Others</td>
<td></td>
<td>9%</td>
</tr>
</tbody>
</table>
Measures to increase competitiveness in the NG market

**Scenario**

- Petrobras’ repositioning
- Development of pre-salt fields
- Increase of renewables

Regardless of the gas bill approval, the ANP will continue to implement regulatory measures to modernize and open the gas market.

**Open-season for Bolívia-Brasil Pipeline capacity offering** (entry-exit regime)

**Ongoing public consultations**

- **Gas release** – periodic auctions
  Jan/17 to Mar/03/2019

- Open access to essential infrastructures
  Oct/05 to Dec/04/2018

- National pact between the Federal Government and the States to harmonize the rules
  Dec/03/2018 to Jan/17/2019

- Transparency of commercial transactions between related parties
  Dec/03/2018 to Jan/17/2019

- Unbundling
  Oct/05 to Dec/04/2018

Public consultation with EPE (public energy company) to define contract clauses for the replacement of LNG by domestic gas (regional energy auctions with NG in the base)

ANP received contributions from 8 institutions/companies.
Downstream
Ongoing measures
**Downstream**
2018 Average (until July)

- National Sales of Oil Products
  - ~2.3 Million bpd

- Imports (ethanol, naphtha, QAV, LPG, Gasoline e Diesel)
  - 454 Thousand bpd

- Refinery utilization factor in July/2018
  - 80%

- De facto monopoly
  - 98% of the installed refining capacity is owned by Petrobras

- Refineries
  - 17

- National Sales of Biofuels
  - 622 Thousand bpd

- Ethanol Mills
  - 378

- Biodiesel Plants
  - 51

Strong and growing participation of biofuels
Creating an open and competitive market

**Monopoly**
- Prices disconnected from the international market
- Investment needs
- Import dependency

**De facto monopoly**
- Import Parity
- Risk of new price controls or adoption of anticompetitive practices
- Investment needs
- Import dependency

**An open, diversified and competitive market with multiple players**
- Market and transparent Prices
- New Investments
- Increase in national production and reduction in import dependency
Petrobras' monopoly

End of monopoly
(Oil Act)
Remains Petrobras’ dominant

1953

2002
Start of practicing International Prices (import parity)

1997

2003
End of monopoly
(Oil Act)
Remains Petrobras’ dominant

2002

2003
Increase in exchange rate and oil price

2003

2004
Petrobras’s new pricing policy (October): monthly adjustments for diesel and gasoline prices

2016

2017
Petrobras’s new pricing policy (July): daily adjustments for diesel and gasoline prices

2018

Truckers Strike (May)

Truckers Strike (May)

Government’s subsidies (R0,46/l)

2018

Increase in exchange rate and oil price

2018

A new ordinance to bring transparency to the price formation
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.

### 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$

**Increase in Oil Exports**

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

<table>
<thead>
<tr>
<th>Refineries</th>
<th>Northeast</th>
<th>South</th>
</tr>
</thead>
<tbody>
<tr>
<td>RNEST and RLAM</td>
<td>60%</td>
<td>60%</td>
</tr>
<tr>
<td>REPAR and REFAP</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Processing capacity</th>
<th>Northeast</th>
<th>South</th>
</tr>
</thead>
<tbody>
<tr>
<td>430 kbpd</td>
<td>416 kbpd</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>% of total refining capacity</th>
<th>Northeast</th>
<th>South</th>
</tr>
</thead>
<tbody>
<tr>
<td>19%</td>
<td>18%</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Pipelines</th>
<th>Northeast</th>
<th>South</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 of crude oil</td>
<td>9 pipelines</td>
<td></td>
</tr>
<tr>
<td>13 of fuels</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Terminals</th>
<th>Northeast</th>
<th>South</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 inland</td>
<td>3 inland</td>
<td></td>
</tr>
<tr>
<td>2 waterway</td>
<td>4 waterway</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Other aspects</th>
<th>Northeast</th>
<th>South</th>
</tr>
</thead>
<tbody>
<tr>
<td>RNEST 2nd unit</td>
<td>Mature market</td>
<td></td>
</tr>
</tbody>
</table>

Source: Petrobras
Fuel Prices History

**Diesel (R$/liter)**
- Price levels in line with the international market.
- Prices above the international market.
- Prices below the international market.

**Gasoline (R$/liter)**
- Gasoline Prices:
  - Above the international market between 2008 and 2010 and between 2015 and 2017.
  - Below the international market between 2003 and 2008 and between 2011 and 2014.

**QAV (R$/liter)**
- QAV prices:
  - Basically aligned to the international market with lower correlation until 2015.

**LPG (R$/kg)**
- LPG Prices:
  - Misaligned with the international market.
  - Prices above the international market between 2008 and 2010 and from 2014.
  - Residential market closer to the international market as of 2014.

**Natural Gas (US$/MMBTU)**
- Prices of natural gas:
  - Misaligned from the main regional references.
Main fuel prices misaligned from international market for most of the time since liberation in 2002, particularly during the two recessive periods between 2008 and 2009, 2014 and 2016 and between 2011 and 2014.

Impacts of the practice of misaligned prices, for both fuel and biofuels sectors and for the productive sector as a whole. Should be subject to specific econometric analyzes.

The disclosure of arithmetic average prices by Petrobras makes it difficult to compete and to understand the dynamics of price formation. Need to create a transparent practice of price dissemination at all delivery points.
Final remarks on the fuel prices formation

Prices misalignment makes it difficult to schedule investments by the local fuel industry and impacts the external competitiveness of the productive sector, which is exposed to significant cost variations disconnected from the world market.

The alignment of prices to those practiced in international markets is fundamental for the success of the Brazilian oil and biofuels industry, for attracting investments and for reducing imports 'dependence.

For price formation has social legitimacy, in addition to being aligned with the international markets, it is necessary that it be established in a free, open and competitive market.
Downstream supply chain

The current regulation establishes a series of market reserves and restrictions that prevent commercial transactions, contribute to concentration and hinder competition.

Concentration hinders the transfer of consumer price changes.

The optional release of transactions between agents, in cases where it does not create new obstacles to competition or facilitates tax fraud, may stimulate competition.
Measures to increase competitiveness in downstream sector

Adopting measures to provide transparency in price formation, decrease concentration and increase competition creates the necessary conditions for the market to function without interference.

**Ongoing measures**

- New ordinance to bring transparency in price formation and disclosure.
- CADE's (antitrust body) analysis on the concentration in the refining market and CADE / ANP joint studies.
- Public Consultation: regulatory protection of brand loyalty
  - Sep/21 to Nov/19/2018
- Public Consultation: verticalization of the fuel distribution chain
  - Sep/21 to Nov/19/2018

**Ongoing studies**

- Elimination of LPG price differentiation and restrictions on use to incentive competitiveness in the LPG market
- Evaluation of ANP’s role in combating tax fraud
- Adoption of measures to inhibit tampering and tax evasion

Public Consultation: LPG fractionated filling and LPG commercialization in containers of other brands
- Oct/22 to Nov/20/2018
Conclusions
The greatest transformation in the Brazilian E&P sector, completing the opening which started in 1997.

**O&G Sector in Brazil**

**Current Scenario**

- Unique E&P opportunity: immediate reserves certification; fast production development; reserves and production growth
- First ever effective **opening** in the **natural gas** market
- Creation of a competitive, open, diverse and internationally refereed refining and fuels markets
- Development of a diverse and competitive **supply chain** and services market
**Potential Investments in the O&G Industry**

<table>
<thead>
<tr>
<th>Sector</th>
<th>Investments (US$ billion)</th>
</tr>
</thead>
<tbody>
<tr>
<td>E&amp;P</td>
<td>568</td>
</tr>
<tr>
<td>Refining, Processing and Petrochemical Plants</td>
<td>58</td>
</tr>
<tr>
<td>Biofuels</td>
<td>28</td>
</tr>
<tr>
<td>Pipelines</td>
<td>10</td>
</tr>
<tr>
<td>Logistics Supply</td>
<td>8</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>672</strong></td>
</tr>
</tbody>
</table>

How much investments in the Oil, Gas & Biofuels Industry would be necessary to develop all the Brazilian potential in the next 10 years? Investments far above the capacity of one company. Need to attract many companies to invest in the country.
National Agency of Petroleum, Natural Gas and Biofuels ANP

Av. Rio Branco, 65, 21st floor
Rio de Janeiro – Brazil

Phone: +55 (21) 2112-8100

More information:

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