Energy Policy in Brazil: What’s next for upstream, refining and LNG?

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Director-General
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What is ongoing in Brazil
and the need for competition

What we did, the results and what’s next

Opportunities

What is ongoing in Brazil
and the need for competition

Outline
A lot has been achieved...

**Main Adopted Measures**

**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 (Oil &amp; Gas Bidding Rounds)</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 (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><strong>Total</strong></td>
<td><strong>68</strong></td>
<td><strong>R$ 21.15</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

High competition and record results!
A great diversity of 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)
- **17 New Platforms**
- **Hundreds of Wells**

*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 debottleneck 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.

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: WoodMac

Brazil’s oil production potential from discovered resources

Associated job creation and royalties through 2027
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 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

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
- 3.3 Mboe/d of O&G production
- 2.6 Mbpd of oil
- 1 Mbpd of crude oil exports

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.

**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.

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

<table>
<thead>
<tr>
<th>Environment</th>
<th>Production</th>
</tr>
</thead>
<tbody>
<tr>
<td>Onshore</td>
<td>7%</td>
</tr>
<tr>
<td>Conventional Offshore</td>
<td>39%</td>
</tr>
<tr>
<td>Pre-Salt</td>
<td>54%</td>
</tr>
</tbody>
</table>

Average oil production per well:
- 16,547 bpd (86 wells)
- 1,654 bpd (641 wells)
- 17 bpd (6,792 wells)
Increasing exploration and revitalizing activities

### Development Wells Concluded

- **2015/2017:** 70%
- **2015:** 800, **2016:** 600, **2017:** 200, **2018:** 0

### Exploratory Wells Concluded

- **2004:** 91, **2005:** 94, **2006:** 108, **2007:** 116, **2008:** 196, **2009:** 176, **2010:** 163, **2011:** 94, **2012:** 85, **2013:** 39, **2014:** 26, **2015:** 10, **2016:** 59, **2017:** 20
- **2011/2017:** 89%

### Pre-Salt Oil Production

- **2012/2018:** 722%

### Onshore oil Production

- **(May, 2018):** 111,192
- **2012/2018:** 35%

### Pos-Salt Campos Basin Oil Production

- **2012/2018:** 38%

### Northeast Basins Offshore Oil Production

- **2014/2018 (SEAL):** 62%

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

14% 21% 23% 35%

Campos Basin  Brazil  Campos Basin  World
Current O&G Recovery Factor  Final O&G Recovery Factor  Final O&G Recovery Factor  Average Final O&G Recovery Factor

1% addition in Campos Basin:
985 Mboe New Reserves

1% addition in Onshore:
200 Mboe New Reserves

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

- **>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.
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**
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
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
Sectors for the future concession bidding rounds
Transfer of Rights Surplus Opportunities

- **10** Fields
- **US$ 489B**
- **R$ 1,809B** Tax Revenues
- **10.8 Billion boe** (GCA P50 recoverable volumes)
- **17 New Platforms**

*Brent = US$ 70/bbl
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01 UPSTREAM
What we did, the results and what’s next

02 REFINING
What is ongoing in Brazil and opportunities

03 LNG MARKET
Opportunities

04 FINAL REMARKS
National Supply

~2,3
Million bpd

515
Thousand bpd

538
Thousand bpd

Strong and growing participation of biofuels

51 Biodiesel Plants
Capacity: ~ 140 thousand bpd

383 Ethanol Mills
Capacity: ~ 570 thousand bpd (33 billion liters)

REFINERIES

REFINING CAPACITY IN BRAZIL: 2.2 Mbpd (80%)

Largest refiner park and 1st of LA

(only 2% of the capacity)
Refining: history of fuel pricing policy

1953: Start of practicing International Prices (import parity)

1997: End of monopoly (Oil Act) Remains Petrobras’ dominant

2002: Petrobras’s new pricing policy (October): monthly adjustments for diesel and gasoline prices

2003: Interference in fuel prices

2016: Truckers Strike (May)

2017: Increase in exchange rate and oil price

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)
Why the public hearing?

Brazilian society has questioned Petrobras’ price volatility. There is no room for investment in a country when the society is questioning the pricing policy.

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.

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.

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**

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

**PRESENT**

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

**EXPECTED FUTURE**

**An open, diversified and competitive market with multiple players**
- Market Price
- New Investments
- Increase in national production and reduction in import dependency
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)
RIOGRANDENSE 2nd Unit
RLAM (BA)
COMPERJ (RJ)
RECAP (SP)
MANGUINHOS (RJ)
RPBC (SP)
REDUC (RJ)
REMAN (AM)
LUBNOR (CE)
REGAP (MG)
REGAP (RS)
REFAP (RS)
REPLAN (SP)
REPAR (PR)
REVAP (SP)
RPCC (RN)
UNIVEN (SP)
DAX OIL (BA)
UNIVEN 2nd Unit
RNEST (PE)


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

FUTURE
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></th>
<th>Northeast 60%</th>
<th>South 60%</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></td>
<td>13 of fuels</td>
<td></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

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

02 REFINING
What is ongoing in Brazil and opportunities

03 LNG AND GAS MARKET
Domestic or imported gas?

04 FINAL REMARKS
The gas market in Brazil

**SUPPLY**

80 Million m$^3$/d

- Domestic Supply: 52 m$^3$/d (66%)
- Imports from Bolivia: 25 m$^3$/d (31%)
- LNG Imports: 2.4 m$^3$/d (3%)

**DEMAND**

73.5 Million m$^3$/d

- Consumption by Sector:
  - Industrial: 38.9 m$^3$/d (53%)
  - Power Generation: 23.4 m$^3$/d (32%)
  - Automotive: 6 m$^3$/d (8%)
  - Cogeneration: 2.8 m$^3$/d (4%)
  - Others: 2.4 m$^3$/d (3%)

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 Bolivia-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
The LNG market

Average LNG Import

- **01**: Opening of LNG terminals for third parties
- **02**: Project Opportunities with combined supplies (LNG, domestic gas)

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.

- **03**: LNG terminals: Pecem-CE, Bahia de Guanabara-RJ and Bahia

Opportunities for LNG in Brazil will continue to exist
What is ongoing in Brazil and opportunities

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04 FINAL REMARKS
### 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$3.70/US$*
The greatest transformation in the Brazilian E&P sector, completing the opening which started in 1997

**O&G scenario in 2018**

- Diverse and Competitive E&P Market
  - Petrobras divestment plan
  - Need of additional service companies
  - Improvements in the energy policy

- Unique E&P opportunity:
  - immediate reserves certification
  - fast production development
  - reserves and production growth

- First ever effective opening in the natural gas business

- Creation of a competitive, open, diverse and internationally referred refining and fuels market

- Development of a diverse and competitive supply chain and services market

- Bidding round schedule and open acreage

The greatest transformation in the Brazilian E&P sector, completing the opening which started in 1997