Perspectives for the Oil and Gas Industry in Brazil

IAGC’S 46TH ANNUAL CONFERENCE

Houston, 21 Feb 2017

Jorge M. T. Camargo
IBP: the Home of the Brazilian Oil&Gas Industry.
Brazilian Downturn

The worst economic and political crisis of Brazil modern history

**November 2009**
Brazil avoided Global crisis’ effects. Rising credibility with boom of commodities process and e Pre-Salt discoveries

**December 2014**
US reduced its dependency from oil imports and OPEC review production strategies. Oil prices collapses.

**January 2016**
Political and economic worsening. Loss of investment grade and discredit of the government.

September 2013
Economic turmoil. Protests questioning political management, Word Cup and Olimpics.

February 2015
Economic recession, high inflation and corruption scandals (“Lava Jato”).

(…)

What next?
“Crisis is a time when old has not yet gone, new has not yet arrived” A. Gramsci
The E&P Agenda

- Mutiplicity of Operators
- Bid Rounds Calendar
- Gas Development
- Evolution of Local Content Model
- Regulatory and Tax stability
- Environmental Licensing

Foster the development of the industry:
New projects and orders
Offered Areas

- **Espírito Santo Basin**
  - SES-T4

- **Recôncavo Basin**
  - SREC-T2
  - SREC-T3
  - SREC-T4
  - SREC-C

- **Potiguar Basin**
  - SPOT-T3
  - SPOT-T4

Fonte: Elaboração IBP com dados ANP
2nd Pre-salt Bidding Round: PSC & Unitization

Offered Areas

Norte de Carcará

Entorno de Sapinhoá

Sudoeste de Tartaruga Verde

Sul de Gato do Mato

Source: Elaborated IBP with from ANP
14th Bidding Round: Concession

Offered Areas

**Onshore**
- **Espírito Santo Basin**
  - SES-T4
  - SES-T6
- **Paraná Basin**
  - SPAR-CN
- **Parnaíba Basin**
  - SPN-N
  - SPN-SE
- **Potiguar Basin**
  - SPOT-T1B
  - SPOT-T2
  - SPOT-T4
  - SPOT-T5
- **Recôncavo Basin**
  - SREC-T1
  - SREC-T2
  - SREC-T3
  - SREC-T4
- **Sergipe-Alagoas Basin**
  - SSEAL-T1
  - SSEAL-T2
  - SSEAL-T4
  - SSEAL-T5

**Offshore**
- **Espírito Santo Basin**
  - SES-AP1
  - SES-AP2
- **Pelotas Basin**
  - SP-AP4
  - SP-AUP4
- **Santos Basin**
  - SS-AR3
  - SS-AR4
  - SS-AP4
- **Sergipe-Alagoas Basin**
  - SSEAL-AP1
  - SSEAL-AP2
  - SSEAL-AUP2

Source: IBP with data from ANP
Brazil will be part of the future O&G supply

- **Fields in production** with moderate decline
- **Developing fields** replacing and increasing national production
- **Already discovered areas** with enormous potential just awaiting a tender
Cenários de produção nova conforme cenários de atendimento ao CL

**Brazil offshore oil production outlook**

- **Cenário de CL máximo**: FPSO inteiramente feita no Brasil e perfuração usando sondas nacionais (6 sondas da 7 Brasil).
- Com a limitação histórica da capacidade da indústria com os requisitos de CL.
- Flexibilizando o conteúdo local na unidade de produção e perfuração (modelo afretada) e a nossa previsão básica.
High Wells Productivity at Pre-Salt

Average oil daily production:

01
Well at Lula field (offshore)

x40
Non-conventional wells at U.S. (onshore)

20 a 30
Thousand barrels/day
(Wells at Santos Basin)

Other examples:

North Sea
~15,000 b/d

Gulf of Mexico
~10,000 b/d

Source: IBP with data from Petrobras e US EIA
20 Years of Marine Seismic Technologies in Brazil

- 1999: 4D seismic >20,000km² Campos basin
- 2004: OBC > 1,000km² Roncador (WD 1,800m)
- 2005: Ultra deepwater high density 14 streamer – 8 km Lula
- 2007: Full azimuth circular Iara
- 2011: Optical 4D4C Deepwater > 3,8 MMtr/km² Jubarte PRM
- 2012: OBS Pre-Salt reservoirs Lula
- 2014: OBS FWI > 10 km Búzios
- 2015: Pre-Salt reservoirs

1995: 1st Modern Six Streamers > 500,000 tr/km² Marlim Field

Johann et al, OTC 2016
Current trend of the Brazilian largest operator

Node acquisition also enables data recording in situations where a conventional streamer survey would not be possible.

Pre-salt carbonate reservoirs - outcrops

Seismic image of pre-salt carbonate reservoirs

2,000 km²
Expected Investments

Brazilian Industry 2016-2019

<table>
<thead>
<tr>
<th>Industry</th>
<th>Investments (Billion Reais)</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oil &amp; Gás</td>
<td>296</td>
<td>53%</td>
</tr>
<tr>
<td>Automotives</td>
<td>57</td>
<td>10%</td>
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<tr>
<td>Foods</td>
<td>46</td>
<td>8%</td>
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<tr>
<td>Minerals</td>
<td>27</td>
<td>5%</td>
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<td>Paper Industry</td>
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<td>Electronics</td>
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<tr>
<td>Sugar Industry</td>
<td>5</td>
<td>1%</td>
</tr>
<tr>
<td>Other industries*</td>
<td>77</td>
<td></td>
</tr>
</tbody>
</table>

*RIncludes beverages, chemicals, health industry, aeroespatial & defense and steel.

Source: IBP with data from BNDES

Updated - May 2016

**Upstream Opportunities:**
In the short term, IBP believes that Brazil can promote investments of **US$ 120 billion**, just with already discovered reserves in the Pre-Salt.

**Downstream Opportunities:**
To meet the demand for fuel in 2030, IBP estimates an required investment of around **US$ 30 billion in all areas of infrastructure.**
Brazil has 15.7 billion boe of proven O&G reserves:
- Oil: 13 billion barrels
- Natural Gas: 430 billion m³ (2.7 billion boe)

Oil Production, November 2016:
2,609 million barrels/day

Natural Gas Production, November 2016:
111,1 million m³/day (698,7 thousand boe/day)

Share of Pre-Salt, November 2016:
- 44% O&G production (1,4 million boe/day)
- 41,1% oil production (1,16 million barrels/day)
- 41% natural gas production (45,6 million m³/day or 286,8 thousand boe/day)

Largest oil fields, November 2016:
1) Lula (Pre-salt) [nov/2016 record: 663,2 thousand barrels/day];
2) Roncador;
3) Jubarte (Pre-salt);
4) Sapinhoá (Pre-salt);
5) Marlim Sul.

Largest gas fields, November 2016:
1) Lula (Pre-salt) [nov/2016 record: 29,2 million m³/day or 186 thousand boe/day];
2) Mexilhão;
3) Sapinhoá (Pre-salt);
4) Rio Urucu;
5) Leste do Urucu.

Note: 1 billion m³ of natural gas = 6,289 million boe.
Source: IBP with data from ANP
Brazilian Energy Matrix

Growing participation of oil & gas

**1995**
- Total: 115,497 10³ toe
- Biomass: 39%
- Oil: 31%
- Natural Gas: 7%
- Hydro Power: 19%
- Coal: 2%

**2005**
- Total: 200,523 10³ toe
- Biomass: 30%
- Natural Gas: 9%
- Oil: 42%
- Hydro Power: 14%
- Coal: 1%
- Uranium: 1%

**2015**
- Total: 286,471 10³ toe
- Oil: 44%
- Natural Gas: 12%
- Biomass: 26%
- Hydro Power: 12%
- Uranium: 0%
- Coal: 1%

Source: IBP with data from EPE
Brazil

Share in the world Oil and Gas industry

- 15th oil reserves, the Pre-Salt can improve our position
- 12th largest oil producer
- 6th largest consumer of oil, represents 3.2% of world demand.

Total Production
2016
3.228 thousand boe/day
Oil & Gas

*doesn’t includes natural gas

Source: BP (2016)
Update – January 2017
Source: IBP with data from ANP and Clarksons PLC
“We project that Brazil becomes a net energy exporter as increased production of oil, gas, hydro, nuclear and renewables outweigh growth in energy demand.”