Critical times for the future of Brazil’s upstream industry

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In the last decade, Brazil has been the most prolific offshore deepwater basin

168 discoveries representing 38 billion barrels of oil out of the 77 discovered globally

Source: Wood Mackenzie Exploration Service
However, the world has changed and operators are responding drastically to the prevailing oil price

Budget cuts, job reductions, project deferrals, efficiencies and supply chain wins

Global upstream spend (US$ bn)

- Exploration spend halves to US$45 bn 2016-18 – consequences?
- US$220 bn drop in annual development capex
- Conventional FIDs: • 6 in 2015 • similar in 2016?
- Some operators have given up deepwater exploration, e.g. Marathon, ConocoPhillips

Will Exploration spend pick up towards 2020?

L48: uncons flexibility: recovers 2017 with firming oil price?

Upstream investment to fall by 40% from peak

Deepwater developments have been hit hardest, with 16 Bboe in investments postponed.

Costs are clearly down in all regions but Deepwater has remained “sticky”.

Deferred reserves (Bboe) by theme

- Deepwater: +50%, +135%
- Oil Sands: +18%, -27%

Changes in Capex/boe (Q3 2014 v Q4 2015)

- Africa: Q3 2014, -6%; Q4 2015, -14%
- Europe: Q3 2014, -6%; Q4 2015, -21%
- Asia Pacific: Q3 2014, +50%; Q4 2015, +135%
Brazil’s offshore resources are cost competitive against other areas

Unconventionals have a competitive edge at low prices; LNG/deepwater challenged

**Resource cost curve: Breakeven Brent Price versus % investment in discretionary projects**

- Conventional
- Deepwater ex Brazil
- LNG
- Deepwater Brazil
- Tight Oil at NPV10
- Unconventional Gas at NPV10

Brazil’s offshore resources are cost competitive against other areas. Unconventionals have a competitive edge at low prices; LNG/deepwater challenged.

Source: Wood Mackenzie Q3 2015 dataset. % of investment in discretionary projects in each resource theme for the 2015-2030 period. NA onshore breakeven calculated using our base-case gas prices (US$3.75/mmbtu long-term real); excludes dry gas plays. Capital Spend is the net investment in probable developments and yet-to-drill wells onshore North America (nominal terms). It does not include investment in fields which are already onstream and newfield developments that fall under tax ring fences which are already onstream, with the exception of future expansions at Tengiz, Kashagan, Karachaganak, Lula, Shah Deniz, South Iototan, Haute Mer Zone D, ACG and Claire.
....but the country has been challenged in attracting non-Petrobras investment, even in periods of high-oil price

Although open since 1998, Brazil’s upstream continues to be one of the most highly concentrated

### Industry Concentration (% of country’s reserves owned by largest player) and Number of Players

#### 20% reserves owned by 62 others

#### 80% reserves owned by one company

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**Source:** Wood Mackenzie Upstream Data Tool. Excludes Russia & CIS, Rest of Europe and North America
From a fiscal perspective, REPETRO sustains the competitiveness of the concession regime.

Without REPETRO Brazil will stop being attractive in terms of investor returns.

**Deep Water Fiscal Regime Competitiveness**

<table>
<thead>
<tr>
<th>Net Present Value (USD per barrel)</th>
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- Brazil PSC Without Repetro
- Brazil PSC With Repetro
- Brazil Concession Without Repetro
- Brazil Concession With Repetro
- Angola
- Nigeria
- Norway
- Canada
- Mozambique
- US
- UK

Note: NPV(10%) per bbl to the investor of developing a 660 mmbbl deep water oil field under each fiscal regime. No exploration risk included.
Between 2010-2030, 29.5 billion barrels are economic at US$75/bbl with REPETRO, reducing to 17.8 billion barrels without.

REPETRO has a significant impact on economics at oil prices between US$50 – US$80/bbl.

**Break-Even Oil Price Estimate (10%) at FID date for Fields Onstream 2010-2030**

- **Sapinhoa**
- **Lula-Tracema**
- **Roncador**
- **Buzios**
- **Peregrino**
- **Carcara**
- **Berbigao**
- **Sururu**
- **Libra**
- **BM-C-33**
- **Iara Entorno**
- **Jupiter_TR**

**Recoverable Reserves, mmboe**

- Breakeven with REPETRO, $/bbl
- Incremental Breakeven No REPETRO, $/bbl

0 10,000 20,000 30,000

0 20 40 60 80 100

US$/bbl

17.8

29.5
Governments are adjusting their terms to remain competitive after the oil price decline

Several were already under study due to challenging high technical costs

Others change automatically…
Some countries have remained attractive and seen successful licensing round results

In spite of the depressed market, some countries continue to attract investment

**Canada 2015**
C$1.2B in work commitments, 9 companies participated

**Measures adopted**: longer analysis time prior to bidding, new royalty regime

**Ireland 2016**
Record bids, attracted 4 IOCs

**Measures adopted**: no drilling commitment, fiscal stability offered

**Mexico 2015**
Increased participation in each round, high interest levels from Asian companies

**Measures adopted**: changes in deductibility of costs, reasonable minimum bids, larger blocks, revised royalty rates
Local Content requirements will impact competitiveness and must be understood within the limits of the domestic supply chain.
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