JOINT RESEARCH PROJECT

The Challenges for Brazil in the New Oil and Gas Landscape

A policy brief

by


and

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# Table of contents

1. **The Brazilian oil and gas sector: current status and potential** ................................................. 3
2. **The new and unfavorable external and domestic scenario** ....................................................... 5
3. **The attractiveness of the Brazilian upstream in the new scenario** ........................................ 7
4. **Roadmap to an attractive investment environment** ................................................................. 9
   4.1. Reducing current restrictions to private investment in the Presalt................................. 9
   4.2. Returning to regular E&P bidding rounds ................................................................. 10
   4.3. Reducing the regulatory costs associated with the diversity of contracts and fiscal regimes in the same field................................................................. 11
   4.4. Adjusting government take to the current international oil sector landscape....... 12
   4.5. Improving the local content regulatory framework.................................................. 13
   4.6. Addressing the natural gas challenge ........................................................................ 15
   4.7. The downstream challenge ...................................................................................... 16
5. **Potential economic impacts of increasing investment** ....................................................... 17
6. **Conclusions** .............................................................................................................. 19
7. **References** .................................................................................................................. 20
The Challenges for Brazil in the New Oil and Gas Landscape

The discovery of the Presalt bounty has repositioned Brazil in the global oil and gas scenery. From an oil and gas importer, Brazil has now the potential to become a large oil producer. Nevertheless, to turn this potential into reality, Brazil will have to face important challenges to mobilize the necessary financial, technological and human resources, in a new and unfavorable external and domestic environment.

After the liberalization of the Brazilian oil and gas (O&G) industry in the late 1990s, the level of investments has increased at a very fast pace until 2013. The investment dynamics during this period was characterized by the increase in the number of players in the industry, but maintaining Petrobras dominance. A new phase of the Brazilian oil and gas started after the dramatic decrease in oil and gas prices in second half of 2014. Petrobras’ severe financial crisis will give a larger role for private players in the Brazilian oil and gas sector. However, the future role of the private investors will depend very much on the attractiveness of Brazilian upstream sector.

This paper analyzes the necessary measures to restore a healthy investment environment in the Brazilian O&G industry. After analyzing the barriers to the investment in the O&G industry in Brazil, we set a roadmap to increase the country’s upstream attractiveness, which includes:

- Reducing the restrictions to the private investment in Presalt;
- Reducing the regulatory costs associated with the diversity of contracts and fiscal regimes;
- Adjusting government take to the current international O&G sector conditions;
- Returning to regular E&P bidding rounds;
- Improving the local content regulatory framework;
- Addressing some regulatory and market barriers for private producers to access the natural gas market; and lastly,
- Reducing the risk for private investors to enter the downstream sector with the introduction of competition within a transparent fuel price environment.

1. The Brazilian oil and gas sector: current status and potential

Brazil’s presence in the international oil market has dramatically changed in the last 20 years. In 1997, Brazil produced 869 thousand b/d of crude oil, while in 2015 it produced to 2.53 million b/d, an increase of 1.6 million b/d. In 1997, Brazil imported 554 thousand b/d of crude oil. In 2015 it imported 324 thousand b/d and exported 737 thousand b/d, becoming a net oil exporter (ANP, 2015 and 2016). Brazil is about to become the second largest oil producer in Latin America,

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as Mexico’s production decreased in 2015 to 2.6 million b/d and is expected to decrease further in the next three years and stabilize at around 2.4 million b/d in 2018 (IEA, 2016).

In 2015 Brazil imported 19.1 bcm of gas, 62% being piped natural gas and 38% LNG. Pipeline imports came largely (98.6%) from Bolivia and the remaining from Argentina (ANP, 2016). LNG imports are very variable in Brazil, as they are linked to the need to supply thermal power plants when there is not enough hydropower.

Today there are approximately 90 E&P companies in Brazil, half of which are foreign companies. Nevertheless, Petrobras is still the dominant player in the Brazilian O&G industry, producing, as an operator, over 90% of the oil and gas in the country (ANP, 2016). From 2010 to 2013 Petrobras investment was over US$ 40 billion yearly, these values are almost 10 times higher than the average investment made between 1997 and 2001 (PETROBRAS, 2016b).

In December 2015, proven reserves in Brazil were assessed at 13 billion of barrels for oil and 430 bcm for natural gas. Of these, 95% of the oil and 83% of the gas are located offshore. In 2015, Brazil occupied the 15º position in the world ranking of the countries with the highest proven oil reserves and the 32º position in proven gas reserves (ANP, 2016).

Brazil produced in 2015 circa of 890 million of barrels of oil and 35.1 bcm of natural gas. In 2015 the country occupied the 12º position in the rank of highest oil producers (ANP, 2016). Brazil’s O&G production is aligned with its reserves, thus having a strong focus on offshore, mainly deep-water.

Brazil is also active in the international O&G market: it exports a significant amount of oil and imports natural gas. In 2015, it exported a total of 269 million of barrels of oil and imported 19 bcm of gas, especially from Bolivia, through pipelines (ANP, 2016).

In the late 2000s, the discovery of very large oil and gas resources in the Presalt reservoirs encouraged optimistic views on the growth potential of the oil production in the country. For instance, the field development plans approved by the Brazilian oil and gas Regulator (ANP) indicate that oil production level in 2021 could reach 4.3 mmb/d (Graph 1). This projection was done before Petrobras’ severe investment cuts as a consequence of external and domestic crisis factors. In June 2015, Petrobras reduced its oil production target to 2020 from 4.2 mmb/d to 2.8 mmb/d, and in September 2016 it further reduced its production target for 2021 to 2.77 mmb/d (PETROBRAS 2015 and 2016). IEA (2016) predicts that Brazilian oil production will reach 3.4 mmb/d in 2021 (this includes Petrobras and others), a significant 36% increase in relation to its 2015 projection (2.5 mmb/d for 2020).

The resources are there, so the question is not “if” but “when” this growth potential materializes, and when this happens, Brazilian oil exports will be increase significantly global oil

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2 A significant amount of these projects were postponed.
supply. The IEA (2015) for example estimates that Brazil could export 2.3 million b/d in 2040, as its crude oil production expands at a higher pace than the refining expansion.

Graph 1 – Projected Oil Production According to Development Plans Approved by ANP

Source: ANP.

2. The new and unfavorable external and domestic scenario

The international oil and gas landscape has experienced dramatic changes in the last 5 years. The fast and unexpected development of the unconventional oil and gas in North America has completely transformed global oil and gas market fundamentals. From 2006 to 2015 the US was able to increase its oil, gas and natural gas liquids production by approximately 10 million barrels a day (DÍAZ, 2016). Meanwhile, from 2008 to 2014, demand for oil products in the US remained flat, mainly as a result of low economic growth and increasing efficiency, including for example a reduction of miles driven per capita. Therefore, the US was able to reduce significantly its oil imports (BORDOFF & LOSZ, 2015).

Regarding natural gas, US production increased by 34% since 2005 (BORDOFF & HOUSER, 2014). The fact that in 2016 the US exported its first LNG cargo to Brazil can be considered a sign of the changing patterns of hydrocarbons’ supply and demand worldwide. Indeed, these changes are fostering a complete redesign of global oil and gas geopolitics, with important shifts in fuel markets’ dynamics, as well as contributing significantly to the fall of the oil price since the end of the 2014.

Differently from previous occasions, OPEC, and especially Saudi Arabia, does not seem to be keen to play the historical role of swing producer to stabilize prices, as they would likely lose market share to US unconventional oil production (BORDOFF & LOSZ, 2014; and EIA, 2015).

The internal scenario for the oil and gas industry in Brazil has also deteriorated significantly in the last years. Problems started before the collapse of the oil and gas price in 2014, as business environment in the sector gradually deteriorated. The discovery of the Presalt has fostered a wave of resource nationalism in Brazil and some regulatory changes have been approved, such
as: i) the Presalt area has been declared strategic and it was defined that only Production Sharing Contracts (PSC) could be used for new projects; ii) a new state owned company was created to represent the State in the new PSC contracts (Presal Petróleo S.A. – PPSA); and it was decided that Petrobras had exclusive rights to operate new projects at Presalt Area, with a minimum 30% of participation on the blocks. In October 2016, the sole operator rule was changed by a “preference rule”, in which all new exploratory blocks in Presalt area will be offered to Petrobras to operate. Those where Petrobras is not interested to operate will be auctioned in a competitive process.

After the discovery of the Presalt the Government stopped the regular concession rounds in 2008, and only returned in 2013 with the 11th round. Other problems that Brazil has been facing in the petroleum sector, independently of the changes with the Presalt, are: the development of the supply chain with operators being fined heavily for not reaching the Local Content (LC) requirements; the Brazilian independent oil companies having difficult to find financing for their investment commitments after the international financial crisis of 2009; and the corruption scandal called “car wash operation” (contracts were being signed with overpricing), also breaking out in the end of 2014, that has been having serious negative consequences to the whole supply and especially to Petrobras.

Some of the consequences of the car wash operation so far are: shareholders in the US, including pension funds sued the company; Petrobras lost its investment grade, which made more expensive for Petrobras to get loans; the technical and economic rationality of the several big projects such as the construction of new refineries were biased, leading the company to huge losses; the banks ceased the funds to the company responsible for the administration of the construction and leasing of the drilling rigs, Sete Brazil, which stopped paying the shipyards, that also did not pay its sub-contractors; and the imagine of the company and the country has been severe damaged. The investigation has not been concluded and the number of high level politicians involved keeps increasing.

Another reason why Petrobras has been facing serious financial problems is the loss of dozens of billions of dollars due to arbitrary political influence in the management of the company in the downstream segment. After 2011, the Government tried to hold the inflation rate by preventing Petrobras to align domestic fuel prices with the international prices. This has occurred more significantly with the price of diesel and gasoline, generating a giant revenue loss for the company, estimated at US$ 55 billion at its peak (ALMEIDA et al., 2015).

As a strategy to faces the crisis, Petrobras has been decreasing successively its investment targets and also implementing an aggressive divestment plan. In March 2015, Petrobras announced a 37% reduction in the expected investments in its new Business Plan (BP) for the period 2015-2019. Total investment was reduced from US$ 220 billion in the 2014-2018 plan to

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3 Someway similar to the SDFI/Petoro in Norway.
In January 2016, this target was further reduced to US$ 98.4 billion. In September 2016, Petrobras launched its 2017-2021 BP, which reduced the investments in another 25%, to only US$ 74.1 billion\(^4\).

Petrobras divestment plan has been constantly increasing. In February 2014 the divestment plan was increased from US$ 5 to 11 billion, and further increased in March 2015 to US$ 13.7 billion for the years of 2015/2016. In August 2015 the divestment plan grew to US$ 15.1 billion for the same period 2015-2016. In September 2016, the divestment plan for the years 2017 and 2018 was set in US$ 19.5 billion\(^5\).This aggressive divestment plant is part of a strategy to reduce leveraging, preserving cash flow and prioritizing investments in areas of high productivity and return. Petrobras will face tough competition for implementing its divestment plan, as other IOC\(s\) are also selling between US$ 46 to US$ 54 billion in the next few years (ATKEARNEY, 2016).

In the mid-term, the increase in the oil production in Brazil will depend significantly on private investments. Presalt competitiveness will be crucial to attract private investments. How fast Petrobras recovers its investment capacity will be also very important for the future growth of oil production in Brazil.

3. **The attractiveness of the Brazilian upstream in the new scenario**

The attractiveness of Brazilian upstream for the private investors depends on the cost of production vis-a-vis the expected price of the oil. In this regard, we have a completely new business environment after 2014. It is more and more clear that it will be very difficult for the international oil market to come back to an equilibrium with high price levels. This market environment will be very challenging for Brazil, given the relatively high production cost of the Brazilian offshore, including the Presalt.

The Presalt reservoirs are mainly in deep offshore areas (about 2.000 of water depth) with a salt layer that can reach up to 2.000 meters. Drilling in this environment is extremely expensive. The first oil wells in the Presalt costed US$ 200 million. This cost has been falling for successive wells, due to technology and efficiency improvements, but it remains very significant (approx. US$ 80 million per well).

Since the drilling cost represents a large part of the total cost, the well productivity is key to determine the cost of Presalt oil production. Indeed, well productivity in the Presalt fields which have been developed so far is very high. Table 1 shows the average well productivity for the platforms currently in operation. Well productivity in the Presalt can be 3 to 5 times higher than that of Post-salt fields.

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\(^5\) Ibid.
Almeida et al (2016) analyzed the attractiveness of Brazilian offshore projects. Costs were estimated based on interviews with the Brazilian oil industry executives. The authors calculated the break-even prices for upstream projects using the GEE-IBP Upstream model considering three types of offshore projects, Presalt giant reservoirs (5 billion boe reserves), Post-salt large reservoirs (500 million boe reserve) and Post-salt small reservoirs (150 million boe reserve). Graph 2 illustrates the results. Presalt and large Post-salt projects have similar break even prices, although their composition is very different.

Graph 2 – Break even prices of Presalt, large Post-salt (500 MMbl) and small Post-salt projects (150 MMbl)

Note: The company take considers a 10% rate of return on capital.


Considering that Petrobras is now focusing on the best fields in the Presalt area, the costs associated with the break-even of 56 dollars per barrel can be considered relatively high to guarantee Presalt competitiveness in the current market environment. Therefore, it is very
important that players involved with Brazilian Presalt and the government work together to reduce production costs. The reduction of production cost in Brazil will require important changes in companies’ strategies and government regulations of the oil and gas market in Brazil.

4. Roadmap to an attractive investment environment

In order to allow the return of the pace of the investments in the oil and gas industry in Brazil, both in the upstream and the downstream, it is fundamental to address several economic and regulatory challenges, such as:

- Reducing current restrictions for private companies to operate in the Presalt area;
- Returning to regular E&P bidding rounds;
- Reducing the regulatory costs associated with the diversity of contracts and fiscal regimes in the same field;
- Adjusting government take to the current international oil sector landscape;
- Improving the local content regulatory framework;
- Improving natural gas regulation, to allow competition and market access to all producers;
- Attracting private investments in the downstream.

4.1. Reducing current restrictions to private investment in the Presalt

Even though Petrobras sole operator rule in the Presalt was transformed into a preferential clause, the company will continue to play a very significant role in the pace of the Presalt development. The operatorship of all new blocks to be awarded in Presalt should be offered to Petrobras. In case the company decides to operate the block, the company should have at least 30% of shares in all the consortia. There is also the possibility that the government award 100% of the block to Petrobras.

The preferential clause represents an important advance when compared to the sole operator clause, as it opens the possibility to award exploratory blocks to private companies. Nevertheless, the role of private companies in the Presalt development will be dependent of a complex political decision making process.

It is also important to mention that a very important volume of oil resources in the Presalt has been already awarded to Petrobras with contracts that do not allow the company to partner with the private sector. This is the case of the Transfer of Rights contracts and the PSC contracts. With the Transfer of Rights contracts, Petrobras has acquired 5 billion barrels of reserves from the Federal Government in a “shares for oil” deal. The government also awarded another 10 billion barrels of estimated reserves with PSC contracts to Petrobras, vetoes the possibility of farm outs in these blocks. Therefore, Petrobras is committed to a very large investment in order to develop the reserves it has already acquired. Petrobras projects portfolio already sums more
than 30 billion barrels of discovered oil. In this context, the company has limited ability tackle new investments.

The high concentration of the investment in Petrobras has two types of consequences for the Brazilian oil industry: i) it eliminates the competition in the upstream, making all the supply chain dependent on one operator (monopsony power); ii) it reduces the level of investments and contributes to slow the pace of development of the Presalt, and thus having negative effects in the country’s investment, stability of the taxes generation (in all levels) and also in the market for the suppliers.

The lack of competition in the upstream has a significant impact for reduce the pace of the technological development and cost reduction. As operators compete, different technological approaches and strategies would be confronted, possibly with vertical supply chain competition, accelerating the pace of innovations. In addition, a diversified number of operators contributes to reducing market risk for the players of the supply chain.

For all the reasons above, the way to recover the pace of investments in Brazilian upstream surely includes a larger role for private operators in the Presalt area. Therefore, two strategies will be crucial: i) relaxing current restrictions to Petrobras to partner with other private companies in current Transfer of Rights and PSC contracts; and ii) organizing new E&P bidding rounds for the Presalt area allowing the participation of private operators.

4.2. Returning to regular E&P bidding rounds

Apart from the initiatives on the Presalt fields, it is desirable that E&P bidding rounds should be organized on a regular base (preferably annually), as it was until the 10th round in 2008. Considering that the 10th bidding round ended up being cancelled and that the 11th round only happened in 2013, Brazil was 5 years without bidding rounds, and there was no round in 2014, it is still not back to a regular schedule. This resulted in a sea of lost opportunities to develop more new/risk frontiers in the country, outside the Presalt area, e.g. during the high oil prices from 2010 until 2013.

If offered in a bidding round, even areas outside the Presalt could have attracted investments from several oil companies already installed in the country or from new players, contributing to sustain the level of the investment in the sector, benefiting the Government and the supply chain. In a capital-intensive industry, such as in the production of big equipment and structures for the oil industry (shipyards and EPC companies), regularity in production is vital for developing and maintaining competitiveness (MEDEIROS et al, 2015). Thus, this long period without bidding rounds contributed to generate more inefficiencies in the supply chain and even hold its

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6 The Ministry of Finance in Brazil highlighted the excess of the country’s investments dependency in Petrobras, reinforcing our argument of vulnerability. The ministry also estimated that a reduction of 33% in Petrobras’ investments, announced recently, could have a negative impact (considering the direct and indirect effect) of more than 2% of the GDP in 2015 (Brasil, Ministério da Fazenda, 2015).
investments, with consequences that will materialize and be noticed with time, including lower future oil production.

Norway seems to be a good example of a country seeking to keep the pace of O&G production, using the regularity of its concession rounds (annually for mature parts) as one of the key instruments to reach this goal, which in turns avoids up and downs and structural imbalances in the economy (MEDEIROS, 2016).

4.3. Reducing the regulatory costs associated with the diversity of contracts and fiscal regimes in the same field

Some of the Presalt oil fields currently under the concession regime are undergoing a unitization procedure: part of the identified resources is located out of the field ring-fence in uncontracted areas, which are therefore under ownership of the Federal Government. The current law states that those resources must be developed under a production sharing contracts (PSC). In some cases, it will be necessary to combine two fiscal regimes in the same oil field, creating high negotiation costs and affecting the economic attractiveness of these projects.

The company that represents Federal Government interests in a PSC contracts has no assets and cannot invest in fields that requires unitization. Therefore, private concessionaries must invest and recover the investment relative to the uncontracted area in oil, when production starts. However, they cannot include the financial cost of anticipating capital. Therefore, the internal rate of return (IRR) is much lower than in projects where unitization is not necessary. IRR is also impacted by projects delays, due to the complex negotiation process.

Regulatory uncertainties about how to make the unitization process in fields with two types of fiscal regimes is delaying negotiations for farm-outs, which are crucial for allowing Petrobras and some partners to raise capital for the large amount of required investment to develop these fields.

We estimate that a total of 8.5 billion barrels of reserves are located in Presalt fields which will need to be unitized on these terms (part under concession, plus part without contract). The investment required for these projects is estimated at US$ 92 billion. The average share of the reserves that are not under contract is 13%, but it reaches 50% in some fields. The estimated IRR on the projects where 20% of the resources is out of the ring fence is 7.2%, which suggests that if the rules are not changed, some projects will not take place. The regulatory agency (ANP), the Ministry of Mines and Energy and PPSA are already taking some initiatives in order to promote these unitization procedures. Nevertheless, most of the unitization deals are still to be signed.
4.4. Adjusting government take to the current international oil sector landscape

A “fair share” of Government participation in the petroleum revenue is hard to define and can be different among countries. Nevertheless, this fair share is likely to vary with the oil price. Several of countries have changed their petroleum contracts or even entire fiscal regimes between 1999 and 2010, period when the oil price varied dramatically. As a general rule, when the oil price is high Governments try to increase their share in the petroleum revenue, and when the oil price is low there is limited scope for higher taxation, as the operators can either give up on their investment or choose other countries, with better perspective on investments returns (NAKHLE, 2016).

Even countries with a stable oil fiscal regime, such as Norway, reduced their taxation on oil companies during low oil prices shocks, trying to keep the country’s attractiveness and sustain investments in the sector (RYGGVIK, 2013 and NAKHLE, 2016). In addition to reducing taxation during low oil prices, Governments can also create fiscal incentives, or even direct subsides, to increase the country’s attractiveness for the scarce and selective investments of the oil companies in an unfavorable scenario.

Nevertheless, some Governments, which focus on short-term quick-fix solution to budgetary problems, do rise government take during periods of low oil price, going in the opposite direction of the global logic of the sector. One of the relevant problems of such a strategy is that its negative impacts will be seen only later in time and will have long term consequences. This seems to be the case of Brazil after the low oil price in 2014. For example, the Rio de Janeiro State, the largest oil producing state in Brazil is trying to create a new oil production tax, in a short-sighted attempt to pull through its big fiscal deficit.

Almeida et al. (2016) demonstrate that new Brazilian O&G upstream projects are not attractive when considering Rio de Janeiro new taxes and the removal of current taxes benefits for investments (Repetro\(^7\)). Those changes are particularly harmful for the attractiveness of projects under production sharing agreements, as the new taxes are not included in the definition of the “cost oil”. According to our simulations, with oil price at US$ 70/barrel, IRR falls from 11.6% to 2.6% when the new taxes are considered in Presalt projects.

In order to keep the attractiveness of its oil sector, in relation to other countries with different fiscal regimes, Brazil should do more than adapt the taxation level to current international landscape: it should consider adopting profit-based regimes that automatically correct Government share on the oil revenues in a progressive way considering the changing circumstances. Nowadays the royalties’ rates are fixed. Another fiscal problem in Brazil that

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\(^7\) The Repetro scheme prevents upstream investments to pay imports levy and some domestic taxes. This scheme ends in 2020 and there are uncertainties concerning its renewal.
could be hindering the attractiveness of its oil sector is that it taxes in a similar way projects with very dissimilar profitability, such as natural gas projects, heavy oil projects and mature fields.

Almeida et al. (2016) assert that government take adjustment is a crucial element for the attractiveness of Brazilian upstream, as this represents the main cost item of O&G projects. In the short term, the new production tax of Rio de Janeiro must be abolished and the fiscal benefits for investments must be extended. In the medium and long term, it is important to introduce a fiscal reform in the oil sector aiming at increasing progressiveness and reducing the complexity of the sectoral tax system. The regime must also be flexible as to adapt to the different type upstream environments and type of projects/products (oil and natural gas).

4.5. **Improving the local content regulatory framework**

The local content (LC) policy plays a fundamental role for Brazil. The Brazilian LC policy seeks to harmonize the expansion of the oil sector with its industrial development. Despite the significant evolution of this policy in recent years, several improvements are needed to balance the objectives, in order to promote the industrialization while maintaining the competitiveness of oil exploration and production activity in Brazil.

As the local content requirements are an integral part of E&P contracts, changes in the LC policy cannot be made retroactively, therefore will only affect the future concession rounds. Several factors point to the need of implementing changes in the LC legislation in the next concession rounds: the critical situation of the supply chain with bankruptcies of suppliers; shipyards and EPC companies being forbidden to participate in new bids, as consequences of the “car wash operation”; as well as the increasing volume of fines for non-compliance of LC commitments, as further discussed. However, there should be a strong conflict of views, by different players, on the way the changes on the LC must occur and here we present our perceptions.

Local content regulations are being increasingly perceived by investors in Brazilian upstream as an important risk factor. Local content commitments are assumed long time before the acquisition of the products and services for the projects. The risk of cost overruns, delays, and low quality of products is a key consequence of the current policy, thus affecting the attractiveness of Brazil’s oil and gas industry.

Until April 2015 ANP has applied 86 fines for non-compliance of local content commitments, totalizing around US$ 90 million in fines (MEDEIROS, 2016). However, operators expect that the value of fines could be over a billion dollars, if current LC compliance methodologies are not modified. Operators argue that complying with all LC commitments in the current context of the supply industry in Brazil is simply impossible. The upstream investment increased 5 fold between 2003 and 2013. Some segments of the domestic oil and gas supply industry were not able to cope with the demand growth in this period. In addition, the current macroeconomic economic crisis and the corruption scandal involving Petrobras and its suppliers have contributed to weaken even more the domestic supply chain.
Since 2013, the Brazilian government has been discussing alternatives to reduce the effects of LC regulation on oil and gas projects. Operators and other industry players have submitted suggestions to ANP. However, the LC regulations were not changed for 13th bidding round in 2015. Improvements in the current LC policy could include the following directions:

- More flexibility and less risk for local content commitments;
- Shifting from a local contact approach that penalizes to one that rewards;
- Turning possible contractual penalties into mechanisms that encourage the development of the oil industry.

4.5.1 More flexibility and less risk for local content commitments

It is essential to design and implement mechanisms that allow greater flexibility in establishing local content commitments. As an alternative to the current processes, where the full commitment must be established at the time of bidding for the E&P block, a more successful model would give space to define and refine local content targets in connection with the preparation of the production development plan. Thus, the companies could make feasible commitments based on the best knowledge of the goods and services they will need and the context of the supply chain in the domestic market.

The LC commitments could be separately addressed for the exploration and production phases. A previous negotiation between the government and operators would allow the parties to have a strict control about the compliance of their commitments. Government and operators would discuss the development plans, taking into account the strategies related to local content. Specifically, they could analyze the best manner of balancing the efficiency in terms of the projects costs and the participation of local supplier companies with high added value activities.

With the inclusion of local content as an important dimension of the field development plan, the regulator (ANP) would strengthen its monitoring capacity by knowing the local content strategy of the concessionaire. Moreover, ANP would have a better understanding of the local industry goods and services constrains, by empowering itself to address the task of assessing applications for companies with exemptions based on local purchase commitments, due to the lack of competitive offerings, as provided by the legislation.

4.5.2 Shifting from a local contact approach that penalizes to one that rewards

The main instrument to promote LC is the punishment clauses in concession contracts in case the company does not comply with minimum requirements. Therefore, LC is perceived as an important compliance risks for the E&P projects. However, the outcome could be improved by introducing new incentive mechanisms – strengthening local content policies through incentives to companies that exceed their commitments. Several incentives could be considered as a means to encourage operators to seek increasing levels of local content, such as: (i) reduction of specific duties; (ii) competitive advantages in the bidding rounds for exploration blocks; and
(iii) reduction in fines for non-compliance with commitments made in other concession contracts (Almeida and Martinez-Prieto, 2014).

4.5.3 Turning possible contractual penalties into mechanisms that encourage the development of the oil industry

Finally, it is important to consider the existing contracts. Many of them have included local content commitment levels that are not attainable and/or may result in high costs for E&P projects, given the current context of the goods and services market in Brazil. In this scenario, a pragmatic approach that considers the best path for the country becomes important. The simple application of heavy fines for non-compliance certainly will not contribute towards accelerating the development of a competitive goods and services industry in Brazil. Currently, fines are collected by the Treasury and do not generate any benefits for the supply industry, as the money has no specific destination. It is important to discuss how to turn possible contractual penalties into mechanisms that encourage the development of the goods and services industry. For instance, fines could be transformed into compulsory investment in the supply chain, including for example research and development, and could contribute to solve the bottle necks of the supply chain, either by the operators themselves or by independent organizations in suppliers’ development programs. Some studies suggest that for the LC to be more productive, it could focus for example on the supply chain segments that have more global competitive potential (PWC, 2015). Additionally, the local purchases for projects overseas could be considered for rebates in the commitments of projects in Brazil. Such mechanisms would help to reduce potential fines and promote exports of domestic goods and services.

4.6. Addressing the natural gas challenge

Brazil has an important challenge in the natural gas industry. The country has not been able to promote domestic supply to reduce its dependence on the imported gas. As the country cross the road from oil importer to oil exporter, natural gas imports dependence is a paradox. The country potential for both onshore non-associated gas and offshore associated gas is high, but the current gas regulation has been unable to attract the necessary investment to materialize this potential.

Increasing the attractiveness of investment in the Brazilian natural gas industry depends on addressing some regulatory and market barriers. Petrobras’ current market control represents the most important barrier to attract private investment into gas production and commercialization. Access to the final markets will require the advancement in market liberalization, allowing large gas consumers to buy directly the gas from producers. In addition, open access to the transportation pipelines needs to be enforced. Petrobras disinvestment in the natural gas segment represents an important window of opportunity to promote the necessary regulatory changes and increase competition along the natural gas chain.
The regulatory changes in the electricity sector also represent a key aspect to reduce market barriers for new gas producers in Brazil. In some isolated regions, gas-to-power is the only monetization option for natural gas production. In these cases, given the potential production volumes, only new thermal power plants could establish a market with adequate volume to justify the investments in gas production and transportation. Today, the electricity sector regulatory framework hinders the exploitation of natural gas reserves. This occurs because thermal power plants complement hydropower generation, and therefore have a very volatile dispatch. Under these conditions, thermal power plants cannot give purchase gas on firm basis and, therefore, they are unsuitable to act as anchor projects for the development of natural gas reserves. Thus, it is important to change the electricity regulatory framework allowing gas fired power plants to dispatch as baseload.

Finally, it is important to recognize that Brazilian onshore basins are much less attractive than the deep offshore basins. As the potential for non-associated gas is located in the onshore basins, it is important to implement regulatory changes that will attract investments to the onshore basins, in order to reduce the country’s dependence on imported natural gas.

Nevertheless, in addition to the regulatory changes regarding the market access mentioned previously, the promotion of onshore gas would require the following regulatory improvements:

- Regular bidding rounds for onshore blocks;
- Strong investment on terrestrial seismic to be made by ANP, to create a new exploratory prospects for further auctions;
- Adequate financing to reduce the cost of capital for independent operators;
- Free access to the existing transport infrastructures;
- Gas auctions to be developed by distributors and new thermal projects.

Thus, the development of a positive policy agenda for the natural gas industry in Brazil depends on a considerable effort of institutional coordination, to find a convergence for the government bodies involved in the planning process for the natural gas sector (EPE, ANEEL, MME, Petrobras and ANP). The Government shall carry out the planning, but it must take into account the natural gas producers and consumers’ interests, for they are those that will mobilize the resources, to make possible the expansion of production. In this respect, the Government must be able to dialogue with the production sector, protecting its independence to achieve its energy policy objectives.

4.7. The downstream challenge

The Federal Government can control fuels prices indirectly, although officially prices are freely set by the market since 2002. Through government control on the Board and the selection of Executive Directors, Petrobras has been used to control inflation by freezing the price of oil products, in particular diesel, gasoline and LPG (Almeida et al, 2015), as previously mentioned.
Between 2007 and 2014, there were several long periods during which fuels prices in Brazil were below international prices, leading Petrobras to forgo revenues of about US$56.5 billion (Almeida and Oliveira, 2016). Since October 2014, as fuel prices in Brazil did not follow the sharp decrease in international oil prices, Petrobras started to recover part of this lost revenue.

Due to financial deterioration, caused in a significant part by this fuel price control, and the need to focus in upstream investments, Petrobras decided to review its planning for new refineries. Petrobras cancelled two refineries projects (Premium I and Premium II) and postponed the conclusion of the COMPERJ and Abreu e Lima refineries. Therefore, the Brazilian refining capacity will stall and oil products imports will continue to increase.

The entry of private partners would be a solution for expanding refining capacity in Brazil. However, no investor would be attracted to a segment where prices can be lower than benchmark price for long periods. Therefore, it is essential to define a new transparent price mechanism for oil products, in order to avoid the use of these prices for anti-inflationary goals. It is important that the new pricing mechanisms allow refineries to align their prices to the international oil products prices, so that refining margin risk becomes acceptable for private investors.

With a transparent pricing policy, Petrobras would be able to raise an important amount of capital to invest in the Presalt, by selling participation in existing refineries, in addition to find partners to help the company to cope with the huge amount of capital necessary to finish the refineries under construction.

5. Potential economic impacts of increasing investment

To evaluate the impact of removing barriers to investments in Brazilian O&G industry we used the GEE-IBP upstream model to simulate the economic impacts of two scenarios for new Presalt bidding rounds.

In a first (reference) scenario, where we assume that barriers to investments persist, six Presalt auctions are carried out in the next 10 years. Each Presalt auctioned area would result in a 5 billion barrels discovery. According our modeling, US$ 250 billion would be necessary to develop a total reserve of 30 billion boe, considering capex of US$ 8.33/barrel. In 2030, investment would peak at US$ 20.5 billion. In 2035, oil production from this set of projects would reach 4.9 million barrels per day. Assuming oil price of US$ 70 and the current structure of government take in Brazil, total government take during the lifetime of the projects would be US$ 1,070 billion (Graph 3).

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9 It was considered a signature bonus of US$ 2 billion for each auction, 15% royalty tax, 34% Income Tax, 41.65% of government profit oil, which corresponds to the winning bid in Libra auction. We also considered a Opex of US$ 10/barrel.
In a second (alternative) scenario, barriers for investments are mitigated and Presalt auctions are carried out annually in the next 10 years. Considering the same assumption of 5 billion barrels discovered per auction, a total reserve of 50 billion boe would be added. Total investment would be US$ 417 billion, peaking at US$ 33 billion in 2030. Production in 2035 would reach 7.0 million barrels per day, i.e. 2.1 million barrels per day larger than in the reference scenario. Total government take during the lifetime of the projects would be US$ 1,783 billion, 67% higher than the reference scenario (Graph 4).

**Graph 3 – Government take from Presalt Production – Reference and Alternative Scenarios (US$ billion)**

Using an Input-Outcome Matrix methodology we can compare the scenarios in terms of jobs and income generation. We considered the structure of the investment in Brazilian O&G upstream projects suggested by Kupfer (2008). We compared the economic impact of the peak annual investment in the two scenarios. In 2030, 485 thousand jobs are created and US$ 10.6 billion income would be generated by the E&P projects in the reference scenario. In the alternative scenario 60% more jobs and income would be created (Table 2).

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10 The estimated investment vector by Kupfer (2008) results in a local content of 63%.
Table 2 – Economic impacts of investment in O&G upstream – Reference and Low barriers scenario

<table>
<thead>
<tr>
<th>Effects</th>
<th>Reference</th>
<th>Low Barriers</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Jobs</td>
<td>Income (US$ millions)</td>
</tr>
<tr>
<td>Direct</td>
<td>212,779</td>
<td>5,181</td>
</tr>
<tr>
<td>Indirect</td>
<td>272,047</td>
<td>5,431</td>
</tr>
<tr>
<td>Total</td>
<td>484,826</td>
<td>10,612</td>
</tr>
</tbody>
</table>

Source: Elaborated by the authors.

Our analysis indicates that the Brazilian economy will be strongly and positively affected by removing barriers to O&G investment. Government revenues would increase substantially. The O&G investments could boost the Brazilian economy, which is currently in a difficult situation.

6. Conclusions

The discovery of the Presalt resources in the late 2000s increased tremendously the growth potential of the oil and gas industry in Brazil. From an oil importer, Brazil has a potential to become an important oil exporter, if the country manages to create an attractive business environment for private capital. Once this is materialized, it should have positive spillovers effect on the sector -- on suppliers, on technological development, on tax generation -- as well as on the country’s investment and economy.

The current international and domestic oil sector context is hindering the necessary investment to tap the Presalt bounty in Brazil. The collapse of the oil price has reduced the Presalt attractiveness and the availability of financial resources for private investors. In addition, Petrobras financial crisis, partially created by the car wash scandal and also by the bad management of the company, caused a dramatic reduction in the company’s ability to invest.

Given Petrobras’ severe financial crisis, private players will have larger role in the Brazilian oil and gas sector, at least in the middle term. However, in order to private investors participation will depend very much on the attractiveness of Brazilian upstream sector. This paper has presented and discussed the policy changes necessary to increase the Brazilian upstream attractiveness. The paper has also shown that if the government succeeds to increase Brazilian E&P competitiveness, the oil and gas sector has the potential to be a game changer for Brazilian economy.
7. References


