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OIL AND GAS ONSHORE ENVIRONMENT IN BRAZIL 2018

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With the release of ***Oil and Gas Onshore Environment in Brazil*** first edition, in 2017, Sistema FIRJAN started the structuring of a new dimension of operation in this market. In its second year, in a co-production with the **Brazilian National Organization of the Petroleum Industry – ONIP**, we aimed at a broader scope of the oil and gas onshore market evaluation.

The ***Oil and Gas Onshore Environment in Brazil*** is product of the joint work between the most varied institutions acting in this segment, with the objective of providing solidity to the analyses of opportunities in Brazil. We highlight here our expressions of gratitude to our Partners and Sponsors, who not only contributed to making this project a reality, but also added content to the end result.

To **ENEVA**, **SCHLUMBERGER** and **BOING GLEICH ADVOGADOS** our thanks for the close cooperation and great learnings with their experiences in the Brazilian market. We make known, as well, our gratitudes to external governmental partners, companies and institutions, which were essential in the development of the document.

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OVERVIEW

The ***Oil and Gas Onshore Environment in Brazil***, now on its second edition, brings a set of visions on the onshore market in Brazil. Combining efforts with government institutions, large players of this market and class entities, **Sistema FIRJAN** and **ONIP**, bring together qualified analyses with quantitative data, aiming to display the opportunities that Brazil presents to all those who are interested, both on a national and international level.

In the publication, the context in which Brazil is found in the onshore market segment will be presented, both from the point of view of the existing opportunities and from the positive agenda for us to boost our attractiveness.

In the sense of the actions for the country, **MME** highlights the results already observed by the **REATE – Onshore Area Revitalization Program**. While **EPE** presents the mapping of our land basins and the potential of wealth we can develop.

Adding to the document, **ANP** collaborates with an article on the national context of the onshore market and the opportunities from the implementation of the process of **Open Acreage of Areas**. Besides this, it was essential as a database source and complemented the project with the elaboration of a representative map of these opportunities.

ABPIP presents evaluations on the perspective of independent oil producers in the Brazilian market, while **ABESPETRO** analyzes the capacity of national suppliers to meet the investments in onshore E&P.

Then, **FIEAM, FIEB, FIEMA, FIEMG, FIERN, FIES, FINDES** and **FIRJAN** present assessments on the opportunities in the Brazilian regions. Yet **PETROBRAS** exposes the opportunities that its divestment plan brings to the market.

And, finally, we concluded the document with success experiences in Latin America, through **ENEVA** with its operation in Maranhão and through **ACIPET** with Colombia's history.

The publication ***Oil and Gas Onshore Environment in Brazil*** is a joint release of **ONIP** and **Sistema FIRJAN**, and comes to guide its associates with what oil and gas represents in Brazil beyond the offshore.

SUMMARY

NATIONAL CONTEXT OF THE O&G ONSHORE MARKET

REATE PROGRAM AND ITS RESULTS

MME's article

The Onshore Oil and Gas Exploration and Production Revitalization Program (REATE) was announced by the Ministry of Mines and Energy (MME) on January 27, 2017, in an event held in the city of Salvador – BA. It has the strategic objectives of: a) revitalizing the exploration and production (E&P) activities in onshore areas in the brazilian territory; b) stimulating local and regional development; and c) increasing the competitiveness of the national onshore oil industry.

REATE, which is developed by MME jointly with the Brazilian National Agency of Petroleum, Natural Gas and Biofuels (ANP) and the Energy Research Office (EPE), has as public of interest stakeholders and parties involved in the value creation chain. This encompasses the onshore E&P industry segment, which mainly includes oil and natural gas (O&G) E&P concessionary companies and suppliers of goods and services, municipal and state authorities and industry associations.

Within the scope of the Program, a situational diagnosis of this segment was initially carried out, based on documents sent to MME by companies associations and governmental entities and with data collected from government actions. In the diagnosis performed, which is included in the REATE technical report published on MME website in September 2017, it was established that the decline in the production of the onshore fields has strongly affected the producing regions of the states of Espírito Santo, Bahia, Sergipe, Alagoas, Rio Grande do Norte and Ceará. The decrease of Petrobras' investments in these areas, as well as the low oil prices in the international market, contributed strongly to the reduction in exploration activity and the aforementioned decline.

Based on this diagnosis, which raised the critical issues of this activity, priority actions have been established and put under development, classified in three dimensions: Government Policies, Regulation and Marketing, and Infrastructure. The actions foreseen in the present diagnosis deal with the elaboration of policies, regulatory adequacy, synergies in the process of environmental licensing of the states, infrastructure, as well as commercial and tax issues. That is, actions that aim at the increase of national competitiveness of the onshore E&P activity.

The creation of the REATE Executive Committee (CDR), established by MME Ordinance No. 17/2017, manifests the importance of the program for the Government. Through monthly meetings of the working group, the CDR aims to monitor the implementation of the priority actions to achieve the objectives of the program. The purpose is reversing the downward trend of the production curve of onshore areas, of increasing the recovery factor of hydrocarbons and the competitive production of natural gas, in addition to improving the E&P industry business environment, supporting the development of local and regional industry in the producing regions.

The CDR also aims to broaden the dialog in the sector, with the participation of regional forums, seeking to contribute towards the removal of local obstacles to E&P activities, but always in a democratic and transparent process, and with permanent support with the main players involved. The suggestions resulting from their operation may result in normative instructions, initiatives or guidelines, to be submitted as proposals to the National Energy Policy Council (CNPE), when appropriate, or even as bills for legal changes.

The implementation of governmental actions pointed within REATE is already contributing to generate synergies that will favor the improvement of regulation and the elaboration of sector policies as well as a business driven environment for the sector. For instance, the regulation established by ANP for the Open Acreage of Areas, which was approved by CNPE in Resolution no. 17/2017, the modeling for the establishment of royalties, the Reserve Based Lending – RBL (under regulation process by ANP), and the availability of data packages of the bidding rounds at more affordable prices, among others, is mentioned.

With regard to the increase in the number of onshore field operating companies, there are great expectations regarding Petrobras' Divestment Plan. The success of the initiative of sale of all fields listed by the Company has a direct impact on the objectives of the Program. The Company's repositioning in relation to refining and petrochemicals will also have an impact on the actions directed towards infrastructure and marketing issues, and the follow-up of this matter will fall on the CDR.

In summary, it can be stated that the Program maintains its focus on the development of onshore oil and natural gas E&P activity in all its stages, whether they are exploration, development, production, redevelopment and decommissioning, encompassing from mature areas to the areas of new frontiers, while maintaining even the strategic objectives of revitalization of E&P activities in the Country's onshore areas, the stimulus to local and regional development and the increase of the competitiveness of the national onshore oil industry.

FAR BEYOND PRE-SALT: BRAZIL HAS TO CREATE AN OIL INDUSTRY

ANP's article

In the presentations that I have made on the O&G sector panorama in Brazil, I have said that the greatest challenge for the Country currently is to create an oil industry. Not infrequently, I was asked about this statement. The extraordinary performance of the pre-salt, whose wells produce an average of 17,000 barrels of oil per day, with some reaching 45,000 barrels of oil equivalent/day, in case of the first well of Libra, overshadows the lack of a diversified industry in which companies can achieve positive results in the three E&P environments: pre-salt, traditional offshore and onshore. Unfortunately, we are still far from this.

The O&G production in Brazil would be in sharp decline, if it had not been for the pre-salt. On onshore, oil production dropped by 30% between 2012 and 2017. The number of wells drilled had a reduction of 73% between 2015 and 2017 (from 552 to 150). The blocks sold in the bidding rounds have also been dropping.

The situation of the traditional offshore (outside the pre-salt area) is not very different. Production in the Campos Basin dropped by 31% between 2012 and 2017. In the post-salt of the Santos basin, the drop was 41%, between 2014 and 2017. And in the Sergipe-Alagoas basin, it reached 61% in the same period. The growth of Brazilian production is due exclusively to the pre-salt blocks acquired in 2000. In addition, the recovery factor of our offshore basins is low. In the Campos Basin, for example, the recovered fraction is only 14% and declared reserves point to a final recovery of 24%, while the world average is 35%.

On a recent trip to Calgary (Canada), an industry executive told me that within a radius of 500 yards from the hotel we were in, were the offices of 500 oil companies. And, in the whole city, 700 companies. In Brazil, we only have one hundred concessionaires and about 40 of them produce. It is very little for a country with approximately 7.5 million square kilometers in sedimentary basins. As only 30,000 wells were drilled in Brazil throughout its history. And its almost nothing the 5% of the contracted sedimentary basins.

Pre-salt is the biggest discovery of the last decades. There is not one in the world today, a province with its potential and productivity to explore, but alone it will not create the industry we need to develop Brazil. To do this, traditional offshore and onshore must be made attractive to companies that are specialized in these market niches. In this sense, ANP is implementing two measures: the Open Acreage of Areas and the reduction to up to 5% of the royalties rate on the incremental production of mature fields.

The Open Acreage of Areas aims to allow companies to increase their portfolio of areas without the need for a bidding round. They will be able to acquire returned fields (or in the process of being returned) and exploratory blocks offered in previous tenders and not acquired or returned to ANP. The First Cycle of the Open Acreage will have 884 exploratory blocks and 14 areas with marginal accumulations in 15 sedimentary basins, totaling 346,034.94 km^2.

For a public session of the Open Acreage to happen, it is enough for a company to make a declaration of interest to one or more sectors, accompanied by an offer guarantee. Upon approval of this guarantee by the Special Bidding Commission, the bidding schedule, including the date of the public session, will begin within 90 days after approval.

I am sure that the Open Acreage of Areas will change the outlook for the sector in the coming years. With it, companies of various profiles will have the time needed to study the areas being offered, which does not occur when the bidding rounds are held annually, and the term for studies is only a few months. The Open Acreage will help Brazil to have a diversified and competitive sector in the onshore and the traditional offshore, bringing increase of the investments and the production of O&G, with impacts in the collection of taxes, government take and in the generation of employment and income in various regions of the country.

Equally important is the reduction of up to 5% in the royalties from the incremental production of mature fields. As it is well known, oil production in sea basins in Brazil began in the 1980s. Today, many of these fields have declining production, as it occurs in mature fields around the world. The same happens with the onshore production, where about 50% of the 312 fields have been producing for more than 25 years.

The proposal of ANP is that the rate of royalties for these fields is reduced from the one stipulated in contract (which reaches 10%) to up to 5% in incremental production – that is, the production that surpass the volume foreseen in the production curve. The objective is to foster activities in mature fields, leveraging short-term investments. This incentive prevents these areas from being abandoned by companies when they still have oil and/or gas whose exploitation is commercially viable with low royalties, technologies and costs that are appropriate to mature field conditions.

Extending the life of a field means income, investments and jobs for the regions where they are located. Our country, which lacks infrastructure, cannot afford to decommission of production platforms when there are still conditions for them to remain active. Around the world, companies focused in mature fields buy these areas from big companies and continue to produce for many years.

Another important measure to stimulate increased production in mature fields on onshore was the launching of the REATE Program, by the MME. The program, where ANP participates in its Executive Committee, aims to propose and monitor actions, projects and policies aimed at increasing onshore oil and natural gas E&P activities.

With only 1% growth in the onshore recovery factor, royalties will grow in BRL 3 billion, we will have BRL 5 billion in new investments and an additional production of 200 million barrels of oil equivalent.

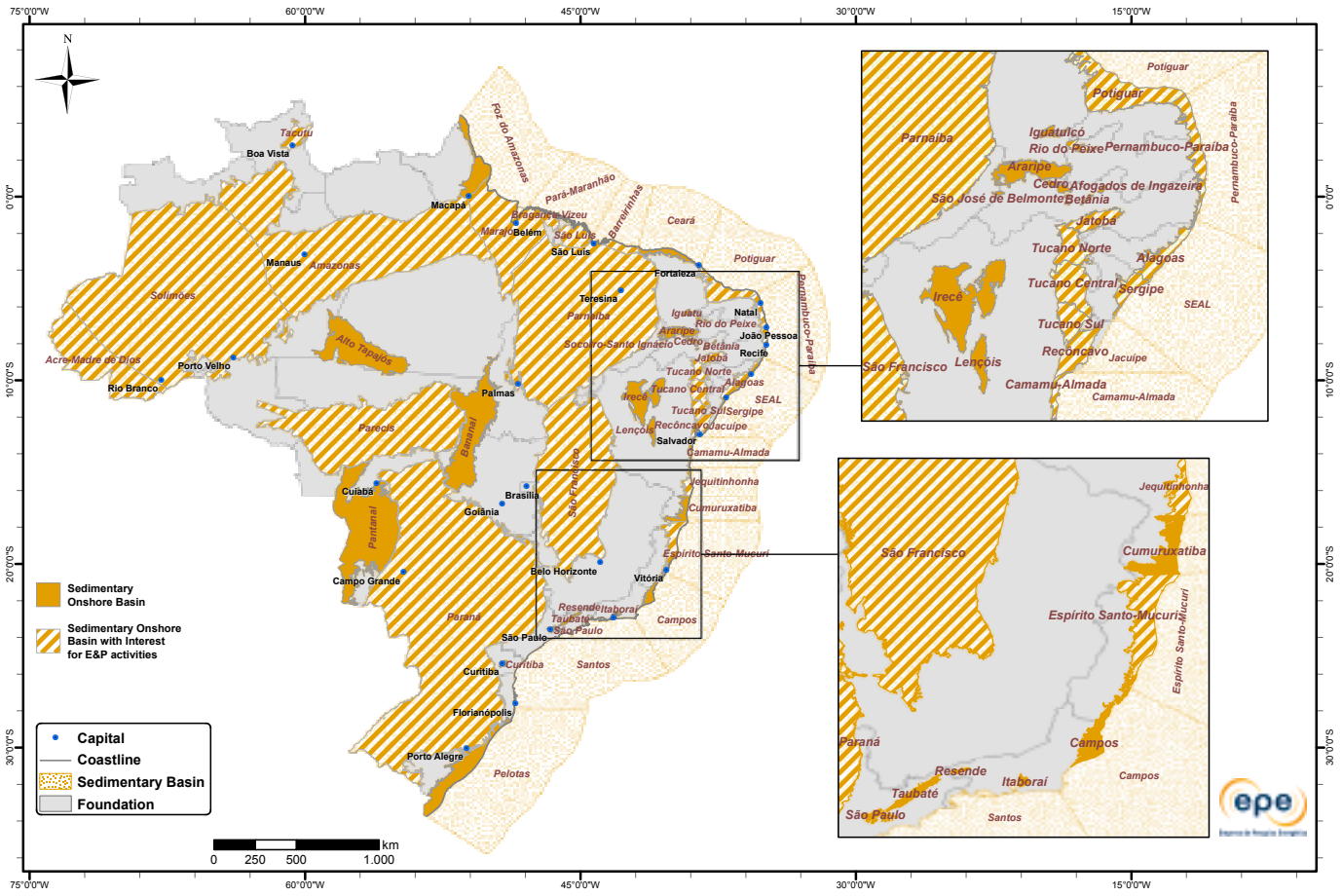
Brazil cannot afford to waste its wealth. When making decisions about the use of our natural resources we must take into account the risk of not having the conditions to withdraw millions of Brazilians from misery. We have the pre-salt, but we need the onshore and the traditional offshore to produce wealth and employment for our population. To do this, we must provide conditions for companies to invest. This is what ANP works for.

BASINS MAPPING AND RESERVES POTENTIAL

EPE's article

Brazil is a country of continental dimensions, with about 8 million km^2 of area, being 7 million km^2 of area with sedimentary deposits. Of the entire sedimentary area, 5 million km^2 are located on onshore, divided into 53 sedimentary basins. According to the National Zoning of O&G Resources, a study produced by EPE, of the total onshore sedimentary basins, 25 show some interest for O&G exploration and production activities (Fig. 1), with only 5 being considered as mature basins (Alagoas, Sergipe, Espírito Santo-Mucuri, Potiguar and Recôncavo), that is, densely-explored basins.

Figure 1. Onshore sedimentary basins, with interest for E&P activities



Source: EPE, 2018.

The commercial production of onshore oil and natural gas in the country began in 1941, at the Candeias field in the Recôncavo Basin. Currently, there are 242 onshore fields in production, distributed in 10 sedimentary basins. Brazilian onshore production in 2017 reached about 130,000 barrels of oil per day and 22 million cubic meters per day of natural gas, corresponding to 5% and 19% of the total national production, respectively.

The country's most productive onshore-based oil wells reached outputs of about 1.2 thousand barrels per day in 2017 and are located in the Recôncavo and Solimões basins. Regarding natural gas, in the same year, the most productive wells in the country reached approximately 450 thousand m^3/day in the Solimões Basin and 350 thousand m^3/day in the Parnaíba Basin.

The Brazilian onshore basins, despite being pioneers in oil and natural gas E&P in the country, still need more in-depth geological studies to foster a greater E&P activity and consequently greater use of potential resources. This is due to the shortage of bidding rounds over a period of time and the greater interest in offshore exploration, motivated by the success achieved in the 1980s with the discoveries of the giant fields of the Campos Basin and later with the discoveries of the pre-salt, in particular in the Santos Basin.

Most of the Brazilian oil reserves are found in the sedimentary sea basins. Total Brazilian Tested (1P) oil reserves in 2017 were 12.8 billion barrels and Tested, Probable and Possible (3P) reserves were 23.6 billion barrels, which represented, respectively, an increase of 1% and 4%, compared to the year 2016. However, for the onshore basins, there was a reduction of 7% for 1P oil reserves and 12% for 3P reserves. For natural gas, total 1P reserves of 370 billion m^3 and 3P reserves of 609 billion m^3 were declared. In this case, the onshore segment had an increase of about 6% and 3% for the 1P and 3P reserves, respectively.

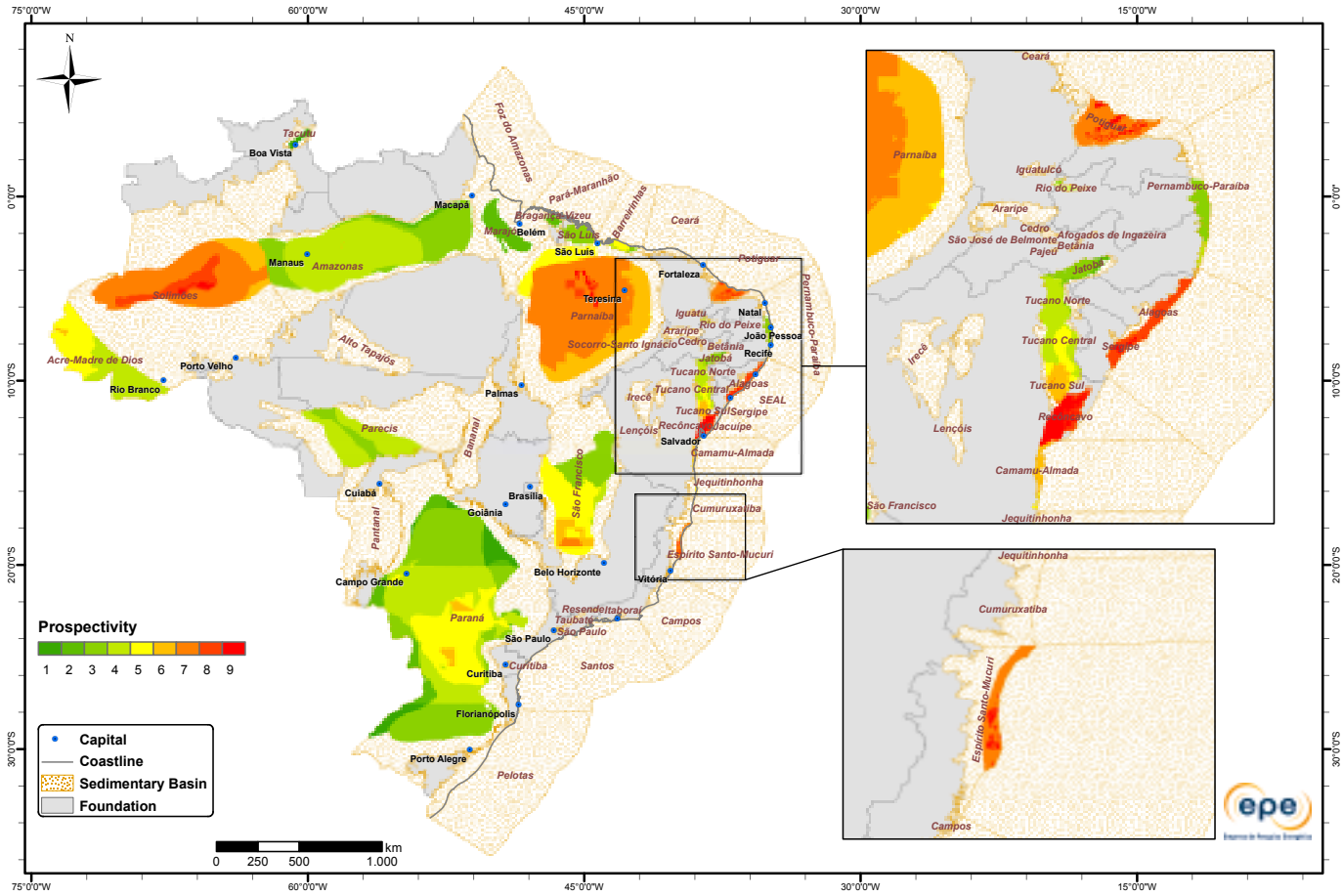
The volumes of the onshore sedimentary basins currently correspond to about 5% of the total 1P oil reserve and 18% of the total 1P reserve of natural gas. The 1P onshore reserves declared in 2017 are about 597 million barrels of oil and 66 billion cubic meters of natural gas. These numbers increase to 1.7 billion barrels and 82 billion cubic meters in the case of 3P reserves combined with contingent resources, which are potentially recoverable volumes of discovered reservoirs but whose production is not yet commercially viable.

EPE study called the National Zoning of O&G Resources indicates, through geological analysis of exploratory plays of the Brazilian sedimentary basins, areas with expectations regarding the existence of accumulations of hydrocarbons (oil and natural gas). The onshore areas that present the greatest chances of discovery are located in the basins of Parnaíba and Solimões, among the interior basins. In coastal areas, the most important are the Potiguar, Sergipe, Alagoas, Recôncavo and Espírito Santo-Mucuri basins. With intermediate expectation of discoveries, they are pointed to the southern portion of the São Francisco and Paraná Basin. In 2017 commercial discoveries were reported in five onshore areas, four in the Recôncavo Basin and one in the Potiguar Basin.

The National Zoning of O&G Resources also presents the potential of new frontier sedimentary basins and unexplored areas of mature basins (Figure 2), considering the exploratory risk in drilling of pioneer wells and the volumetric dimension of undiscovered O&G resources. The following basins are identified as having greater oil potential (greater prospectivity): Recôncavo, Sergipe, Alagoas, Solimões, Parnaíba, Potiguar and Espírito Santo-Mucuri.

EPE studies of volumetric estimation, carried out through prospects, based on statistical data of area and volume of resources already discovered, associated with each exploratory play of the onshore basins, in addition to other exploratory events (wells drilled, deposits, indicated prospects and identified, among others), allow the inference of recoverable volumes between 1.5 and 5.0 billion barrels of oil equivalent (boe) in the Brazilian onshore basins.

Figure 2. Prospectivity map of the Brazilian onshore basins.



Source: EPE, 2018.

Finally, it is important to point out that, since January 2017, the status of E&P oil and natural gas activities in onshore areas in the country is discussed by governmental initiative. This discussion culminated in the publication of MME Ordinance No. 17, dated January 17, 2018, which established the REATE Proram, with the purpose of proposing and monitoring actions, projects and policies aimed at increasing E&P of oil and natural gas on onshore. REATE represents the ratification of some of the Oil and Natural Gas E&P Policy guidelines, approved by CNPE Resolution No. 17 dated June 8, 2017. This Resolution is governed by guidelines aimed at promoting exploration in new frontier basins, increasing geological knowledge and discovery of new producing areas, and encouraging the exploration and production of O&G in onshore basins.

THE VISION OF INDEPENDENT O&G PRODUCING COMPANIES

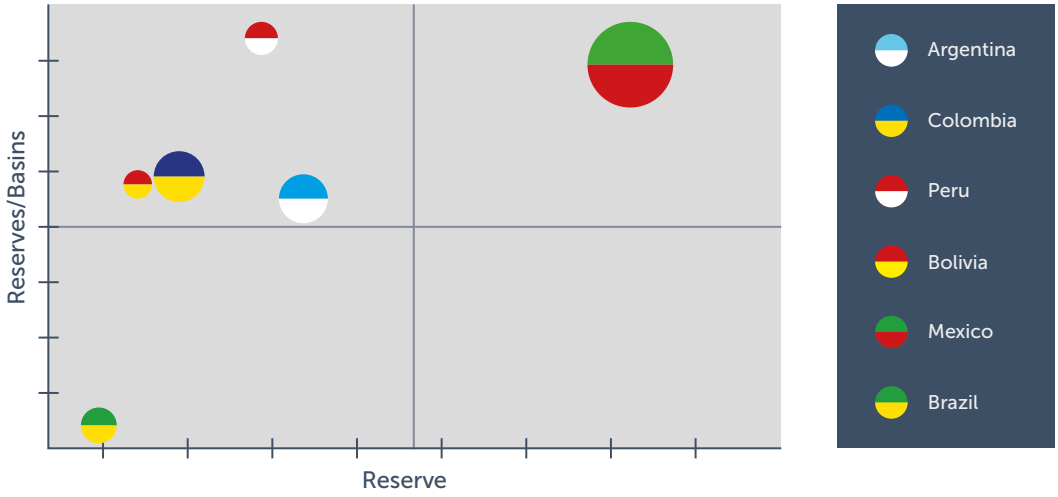
ABPIP's article

ABPIP, in March of this year celebrated its 11 years, continuing a struggle started since its foundation. In this journey, ABPIP, led and gathered together efforts from several other institutions that over the years have joined their cause. This trajectory has allowed ABPIP to be recognized as the entity that best represents the business vision of operators in the Brazilian Onshore E&P market. With the responsibility that this position imposes on us, we offer our vision on the current scenario of the sector.

Initially, it is important to note that, currently, only about 5% of Brazil's proven reserves are in onshore areas. This low participation explains in part because historically the Brazilian onshore fields and consequently their production have always been under exploited.

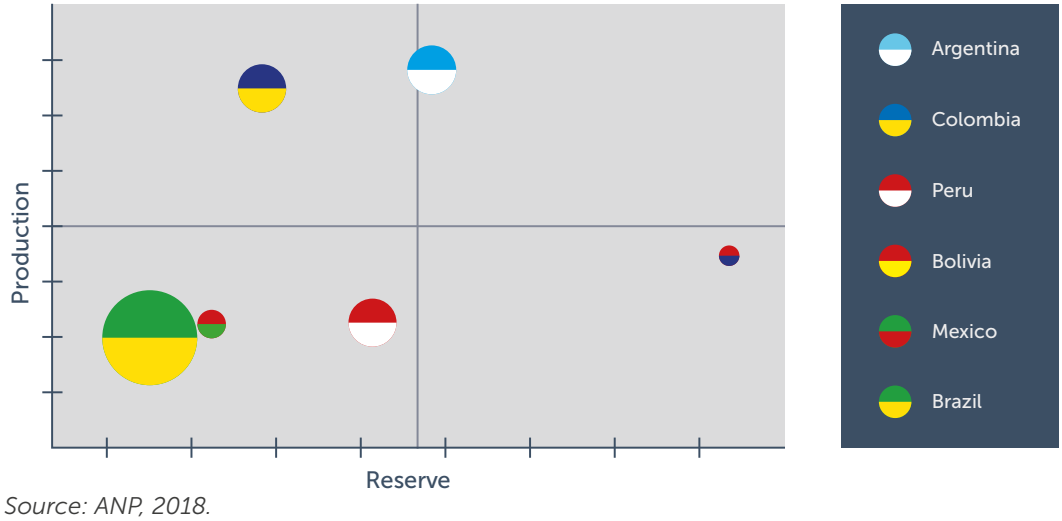
Comparative data between other countries in Latin America, drawn up by ANP and condensed in the Figures 3 and 4, show that Brazil, despite having a much larger geographical area, has smaller reserves and onshore production than almost all the producing countries of Latin America (Colombia, Argentina, Bolivia, Ecuador and Peru).

Figure 3. Comparison of reserves between Latin America countries and basins.



Source: ANP, 2018.

Figure 4. Comparison of reserves between Latin America countries and production.



Source: ANP, 2018.

Despite this reality of the Onshore segment, we are experiencing a positive moment in Brazil for the oil sector in general, as a result of the alignment of visions of MME, ANP and in a certain way of Petrobras, which in 2016 decided to include in its divestment program its onshore concessions to be sold to other companies.

Of this recent alignment, much has been done in the O&G sector and in recent months has been done much more than in the past 10 years.

We can say that, related to the oil and natural gas E&P sector, Brazil has once again been concerned with creating attractive investment conditions and has worked to remove the excess of interventions, especially regulatory matters, which, instead of stimulating productive investment generating employment and income, created obstacles and unnecessary difficulties as in the recent past.

However, the changes in this scenario are mainly concentrated in the conventional offshore and pre-salt environments, due to the obvious lack of proportionality of the realities of each environment, as can be seen in Table 1 below.

Table 1. Production and Wells in Three E&P Environments in Brazil

Environment	No. of Producing Wells	Oil Production (thousands of barrels/day)	Average oil production per well (barrels/day)
Pre-Salt	82	1,351	20,000
Conventional Sea	643	1,176	1,830
Onshore	7,390	125	17

Source: ANP, 2017.

However, regarding Onshore, much still has to be done and these measures require urgency, given the growing decline in production that each day generates more and more losses. According to ANP data, between 2010 and 2017 our oil production reduced around 30% while the drilling activity 80%.

In this context, we highlight 3 main ongoing initiatives that require a sense of urgency:

1. REATE Program, initiative of MME, through its Secretary of Petroleum and Natural Gas, which after diagnosis of the sector conceived this structuring program to unlock the sector through, for exemple, legal, regulatory improvement, identification of sources of financing. MME expects a production increase from 130 thousand barrels per day, the time of launching the program (Feb. 2017), to 500 thousand by 2030. However, after a year, especially due to the delay in the bidding of Petrobras' fields, the sharp decline that occurred during 2017 and that continues in 2018, caused that onshore production instead of growth, reached the level of about 95 thousand barrels.

2. The creation of the Onshore Area Coordination (CAT) within the scope of ANP, an old ABPIP plea, made possible in this current management, has greatly facilitated the sector's dialog with the regulatory agency. Within CAT, we have already presented a long regulatory agenda that, together with other demands arising from the rejection of REATE's demands in the regulatory sphere, constitutes a set of measures that need to be worked out. This Coordination will fit the internal articulation with the different superintendencies of ANP to reach these objectives. We have requested and alerted ANP to the need to expedite the processing of these regulatory adjustments necessary to unlock the sector and we are always willing to contribute with ANP in this sense.

3. And finally, we highlight the launch, by Petrobras, of the opportunities for acquisition of onshore fields under its concession. The initiative to sell these assets, besides allowing Petrobras to raise funds, will bring critical mass to the production of independent companies, with possible entry of new operators and obviously new investments that will recover the accumulated investment deficit in the last years that have generated job losses,

generation of taxes and incomes in deprived regions of the country. Conservative data indicate that we are facing an opportunity to generate 200 thousand jobs (direct and indirect), almost BRL 4 billion Royalties, about BRL 6 billion in investments.

In February 2016, Petrobras launched a 1st 10-pole batch with 104 concessions, 95 of which are onshore, 3 in shallow water, and 6 onshore exploration block concessions and a total production of about 36,000 barrels per day. Due to several factors, this bidding did not prosper. A re-launch was then made by dividing this 1st lot into two processes with 3 and 5 poles, respectively. Nevertheless, despite the fact that it has already passed more than two (2) years of the initial launch, it has not yet been concluded and is expected to occur in the second half of 2018.

On the other hand, launched in May/2017, the sale of Azulão field was recently completed, in a similar sale process, being slightly more simplified.

These initiatives have a high structuring impact and the country has to face the difficulties of each one of them and to deal with urgent solutions, especially for the supply of onshore fields.

ABPIP has always argued that onshore assets should be the subject of a government strategy that maximizes their historically underutilized socio-economic potential.

In order to change this reality, it is imperative that the processes of sale of the onshore fields of Petrobras be streamlined and, within this perspective, we defend that one of the ways to recover part of this wasted time is to bid these fields through ANP, with its well-established model that has always made sure that all the auctions he held went through normally, successfully and quickly completed. The Brazilian authorities are evaluating this alternative and we hope soon to adopt this complementary route to accelerate the process of transferring Petrobras' onshore assets.

We are optimistic, we believe and defend that economic logic will prevail to optimize the exploration and development of the Brazilian onshore basins with a plural market with companies of various sizes and expertises coexisting and complementing the architecture of the national O&G market.

BRAZIL'S OIL AND GAS: AN ONSHORE OF OPPORTUNITIES

Abespetro's article

Brazil offers today one of the most interesting scenarios for the development of onshore fields. Even though a lot of initiatives are ongoing, we can identify three main dynamics which are going to determine the future activity profile.

First, the rationalization of Petrobras' portfolio has brought to the market more than 70 fields that, with still low recovery factors, offer a significant opportunity for production rejuvenation through both OPEX & facility optimization, and well intervention & construction.

At the same time Petrobras, for the fields that it has decided to retain, has opened the door to service partners to come forward with new recovery methodologies using contracts frameworks that align operators and contractors on the final result.

In addition, the permanent offer of areas, just released from ANP, has several blocks with O&G production potential that can be acquired at very competitive terms. The large contractor footprint in the country, fueled by the growth of the offshore market, can be an enabler for these projects through the use of suppliers alliances and strategic initiatives with prospective operators.

Finally, the demand for gas for industrial and generation use is bound to increase in the coming years with the country economy going back into growth. Successful projects like the Eneva Maranhão development demonstrated the potential for this dynamic.

The reforms contained in the "Gas for Growth" regulatory package are to act as an enabler to increase gas demand and pull the entire supply chain forward.

It is also worthwhile to mention that Brazil has a very significant potential for unconventional production, not tapped today because of unclear environmental regulations. And, for its importance, the development of this resources is now a priority for Brazil's Minister of Mines and energy.

There is of course more in the works that complement these fundamental drivers and that has to be in place to increase further the attractiveness of Brazil onshore. The fiscal incentives for secondary recovery have now been released and the capability for operators to access based lending is about to.

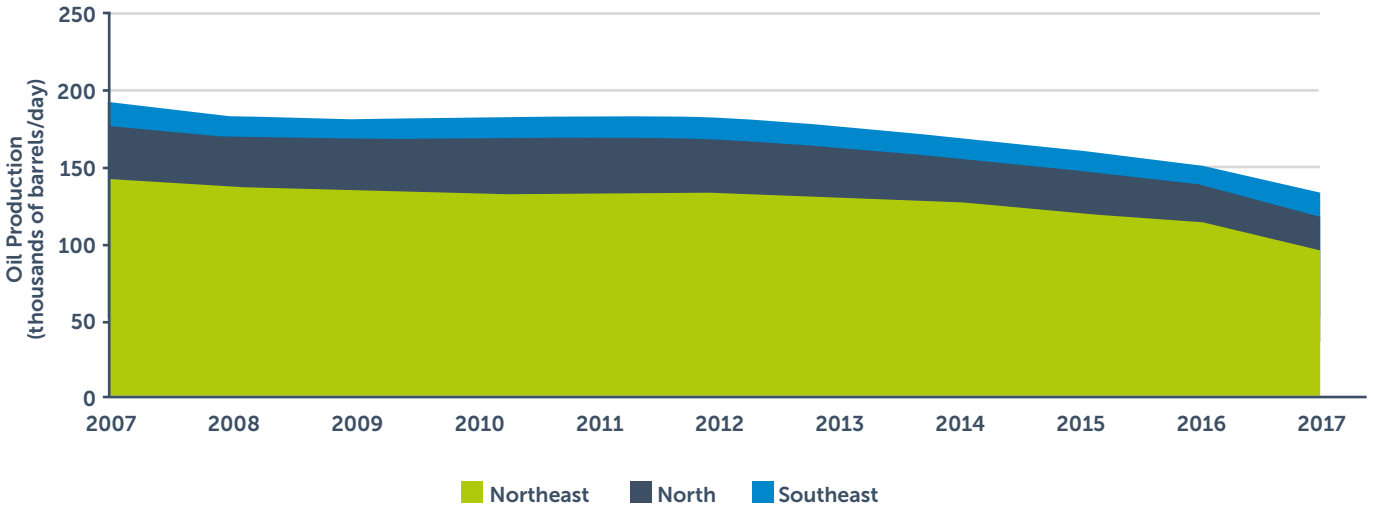
It remains of fundamental importance to have clear and consistent guideline on decommissioning both from a financial and technical standpoint to ensure that project are properly scoped.

Therefore, Brazil's onshore of opportunities is important not only to diversify the portfolio of operating companies, but to provide, as well, another important market for goods and services suppliers. For instance, a very simple calculation, based on the recovery to 2014 production of the main fields that are being divested by Petrobras, will demand the construction of over 200 wells.

Overall, we can say that of the Brazil onshore opportunities O&G growth are very material and, as the largest association of O&G contractors, we look forward to the years to come.

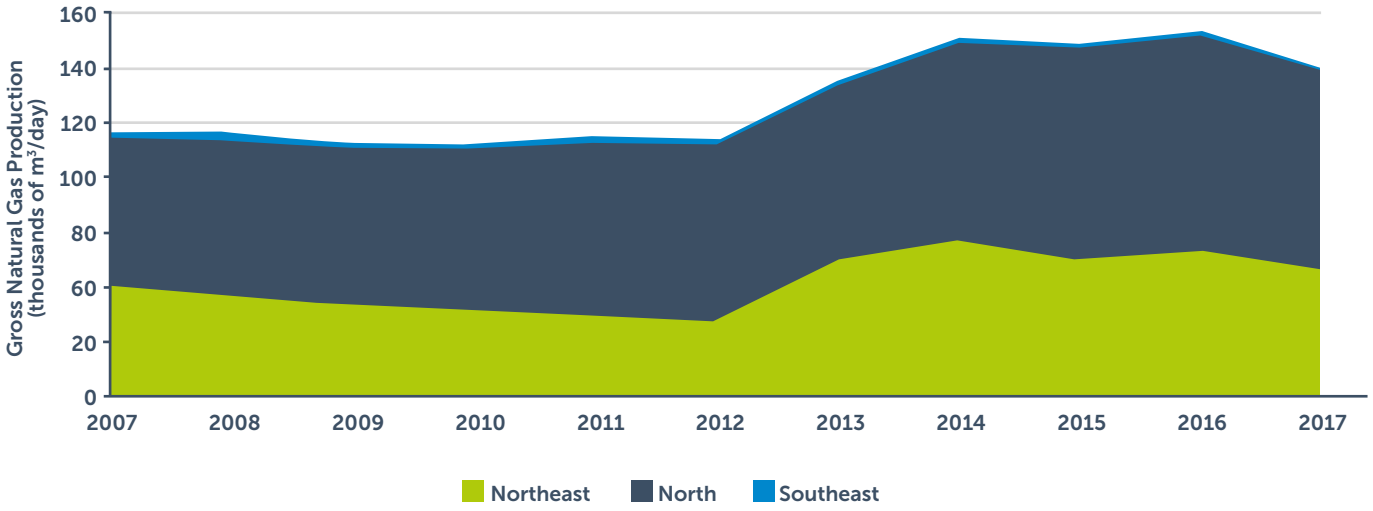
BRAZIL'S ONSHORE E&P NUMBERS

Graph 1. Oil onshore production in the last 10 years, by region.



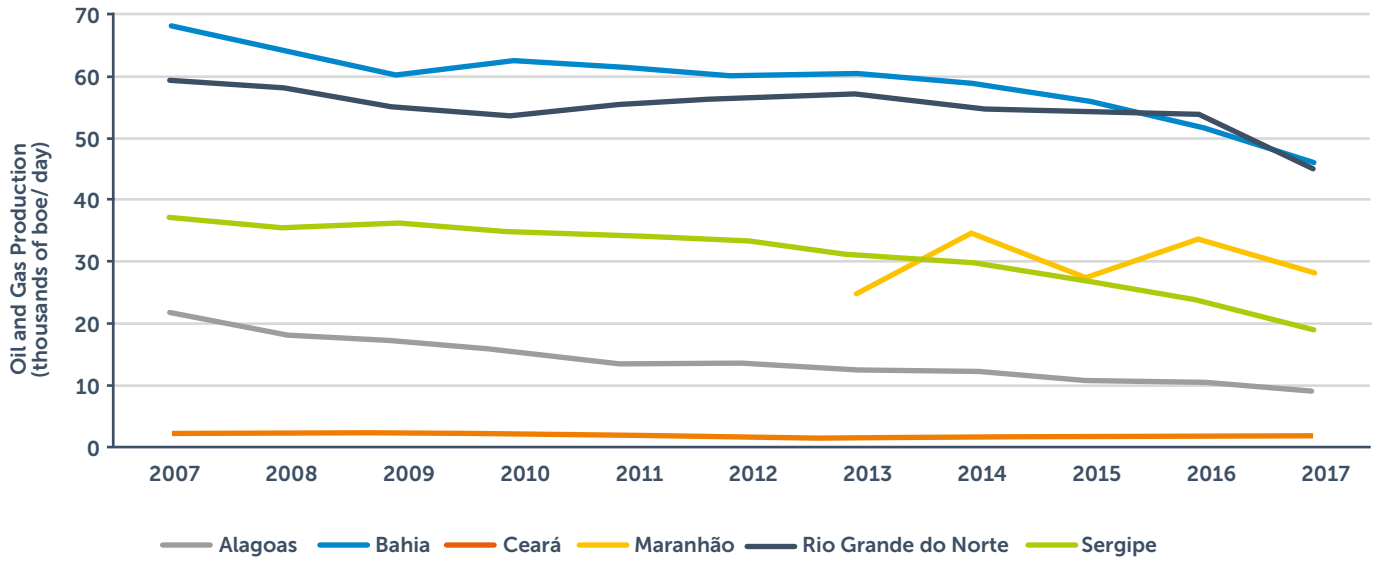
Source: ANP, 2018.

Graph 2. Natural gas onshore production in the last 10 years, by region.



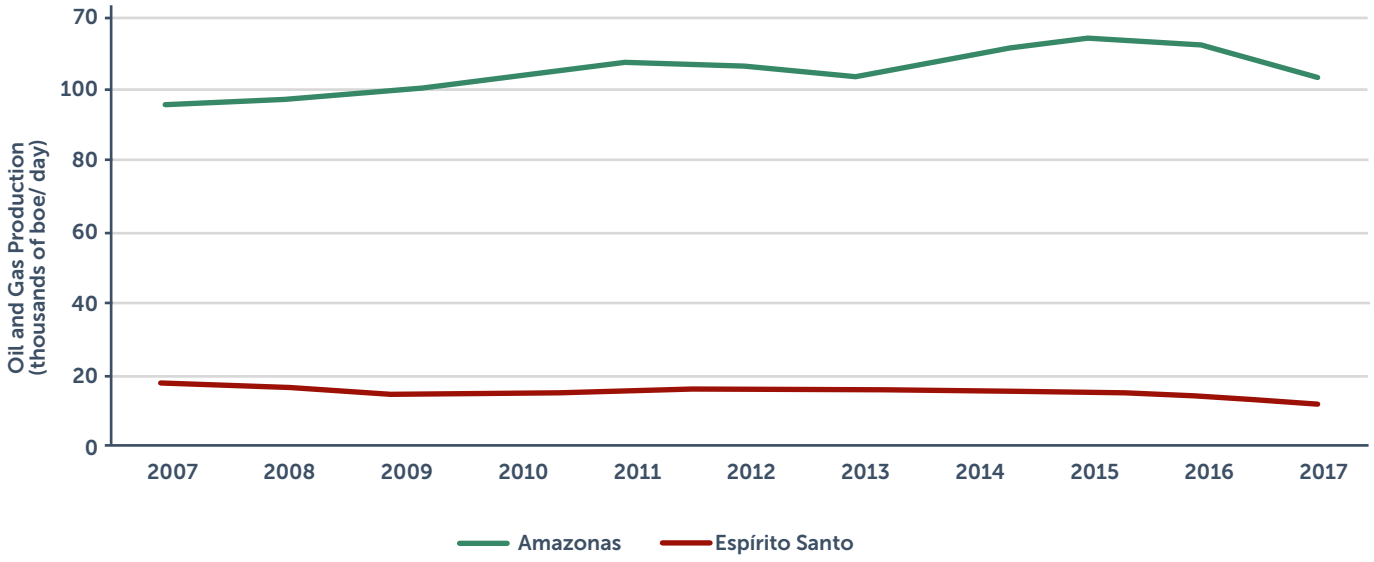
Source: ANP, 2018.

Graph 3. O&G onshore production in the last 10 years in the Northeastern states.



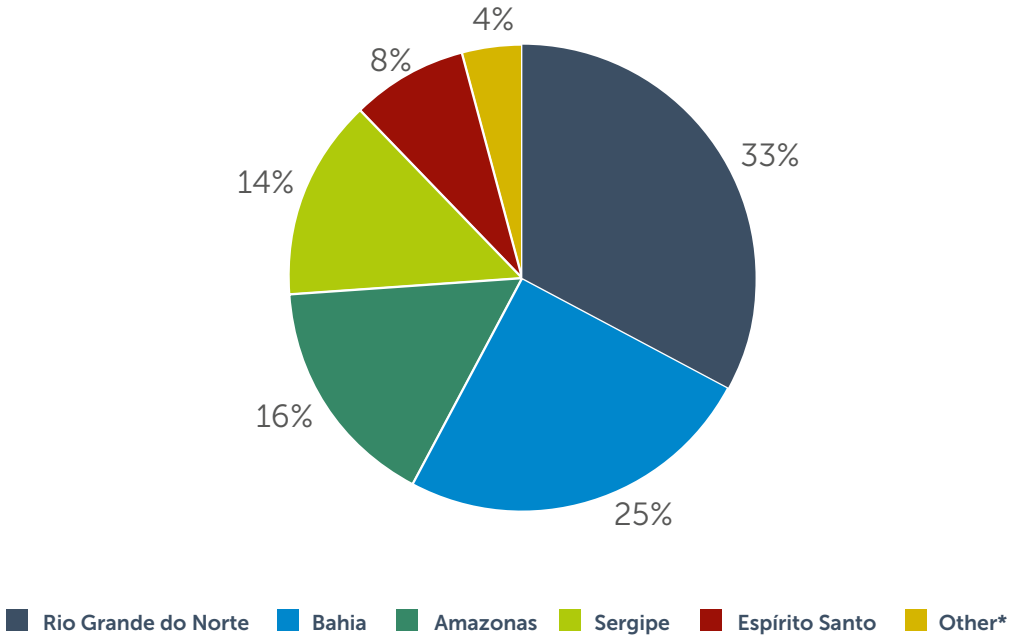
Source: ANP, 2018.

Graph 4. O&G onshore production in the last 10 years in the states of Espírito Santo and Amazonas.



Source: ANP, 2018.

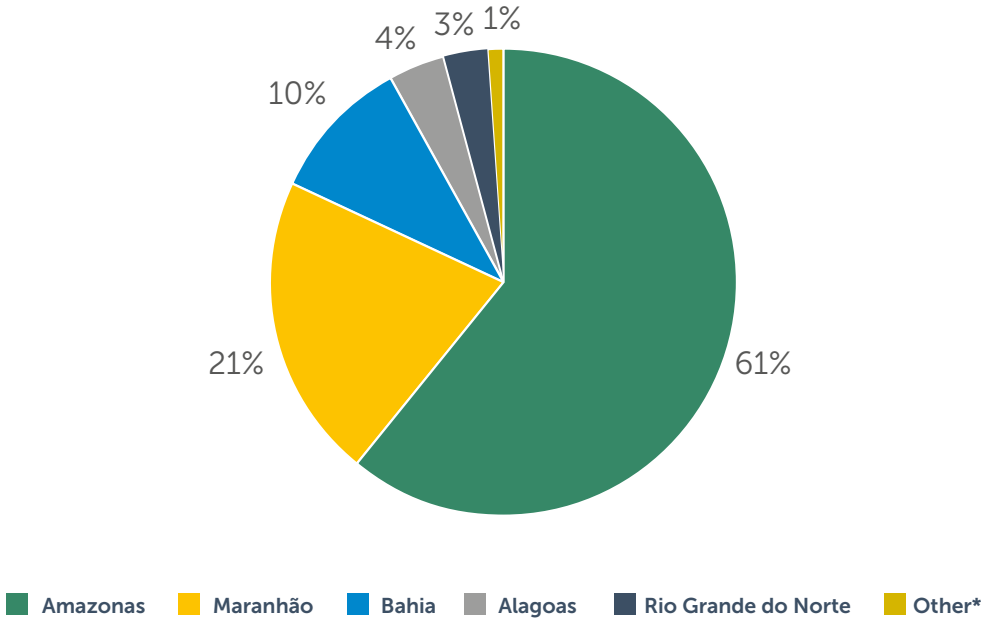
Graph 5. Percentage of oil onshore production in Brazil by state, in 2017.



*Other includes: Alagoas, Ceará and Maranhão.

Source: ANP, 2018.

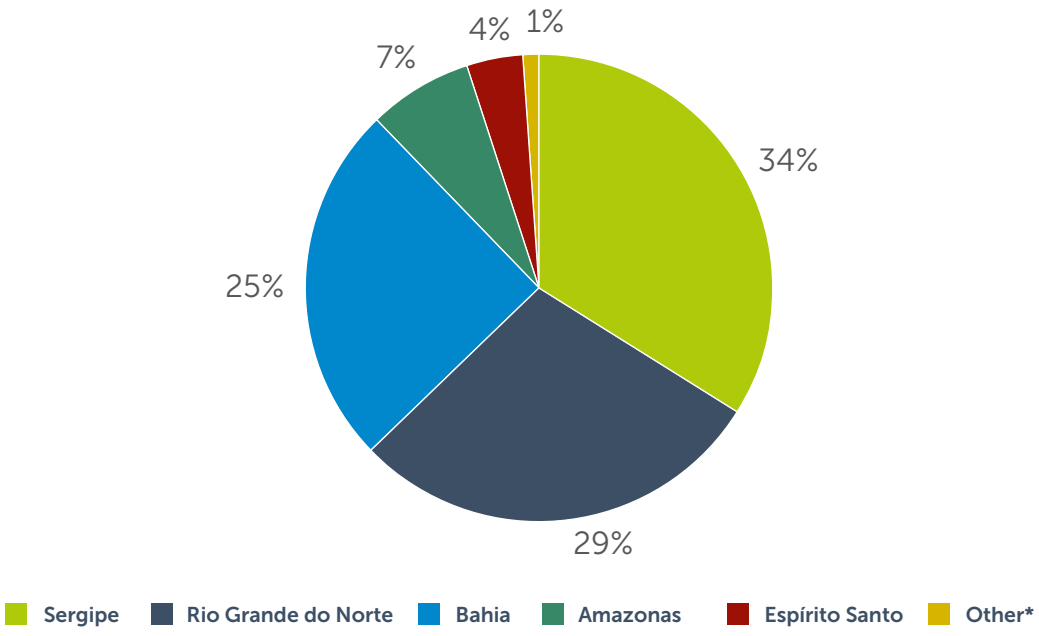
Graph 6. Percentage of natural gas onshore production in Brazil by state, in 2017.



*Other includes: Espírito Santo, Sergipe e Ceará.

Source: ANP, 2018.

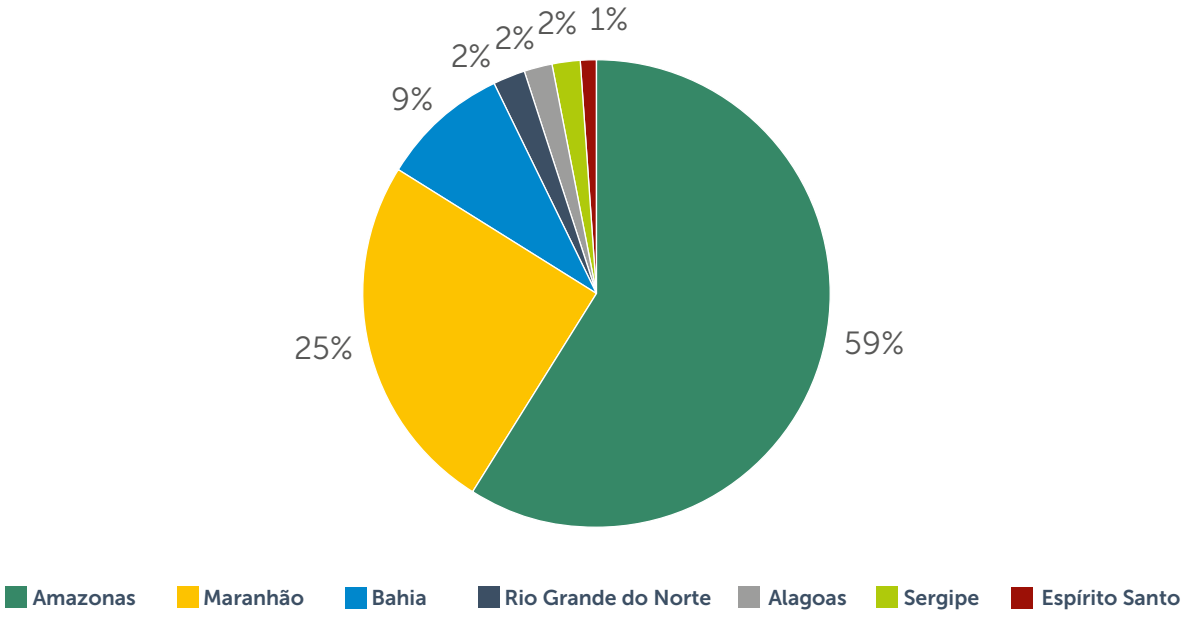
Graph 7. Percentage of onshore proven oil reserves in Brazil by state, in 2017.



**Other includes: Alagoas, Ceará and Maranhão.*

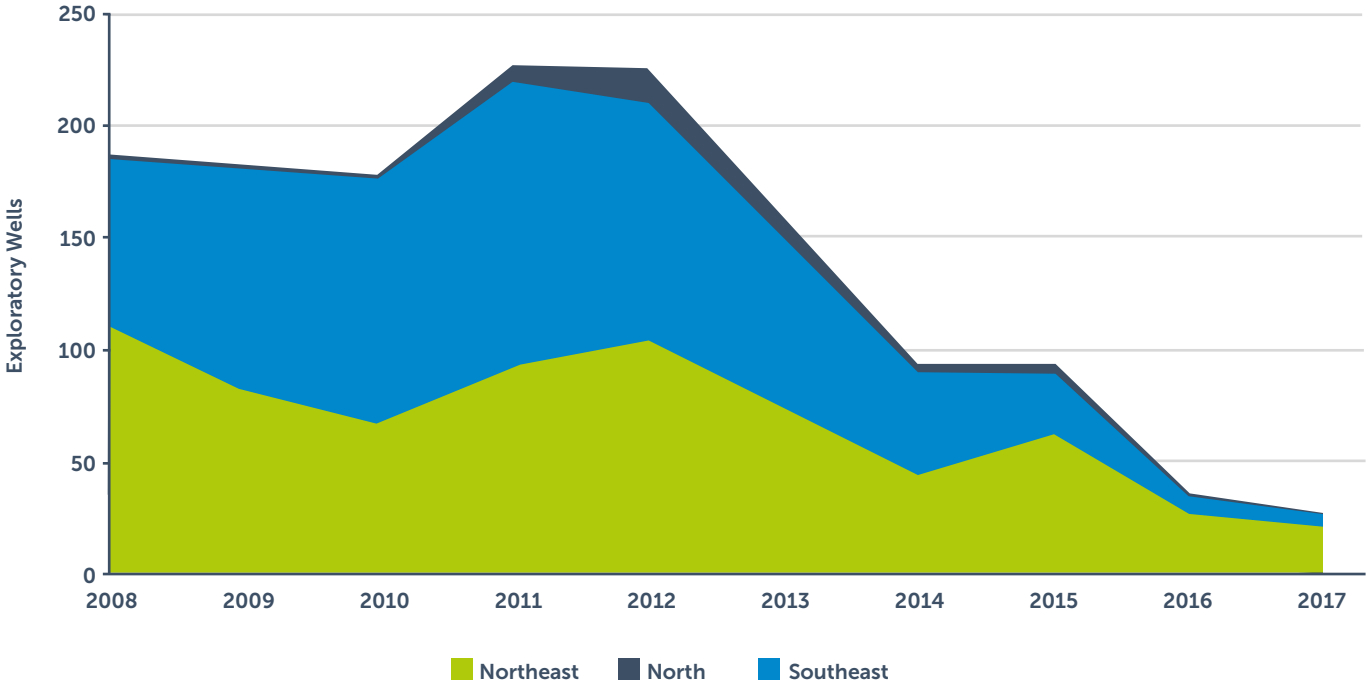
Source: ANP, 2018.

Graph 8. Percentage of onshore proven natural gas reserves in Brazil by state, in 2017.



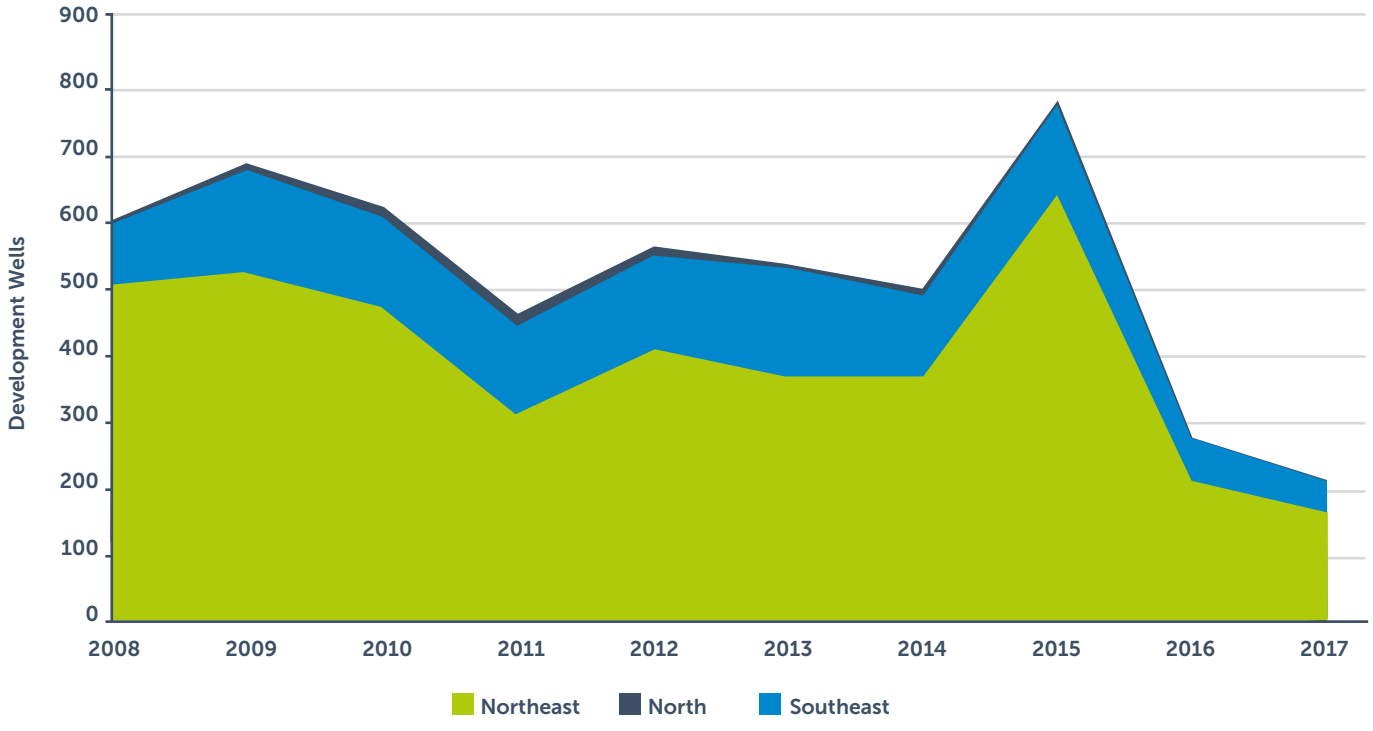
Source: ANP, 2018.

Graph 9. History of exploratory onshore drilling activity - Concluded wells by year.



Source: ANP, 2018.

Graph 10. History of onshore drilling activity for production development - Concluded wells by year.



Source: ANP, 2018.

Table 2. Evolution of onshore total reserves, in Brazil and states.

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Oil (in millions of barrels)										
Brazil	1.456,1	1.478,3	1.492,1	1.576,3	1.475,5	1.444,8	1.169,8	951,8	1.042,1	906,3
% Proven	62%	63%	61%	58%	62%	61%	71%	70%	62%	66%
% Probable and Possible	38%	37%	39%	42%	38%	39%	29%	30%	38%	34%
Amazonas	164,2	200,5	211,4	192,3	168,6	167,0	89,6	61,9	49,7	45,8
Maranhão	-	-	-	-	-	0,1	0,0	0,1	0,1	0,3
Ceará	23,1	20,6	19,7	17,6	31,0	31,2	30,4	19,6	4,1	0,7
Rio Grande do Norte	349,5	357,6	333,9	351,3	355,6	335,9	326,6	246,9	243,4	231,9
Alagoas	15,9	14,2	14,5	21,2	14,6	16,1	14,0	12,3	8,0	8,6
Sergipe	342,6	295,9	331,5	319,4	306,9	294,2	296,1	272,4	334,3	344,9
Bahia	475,6	505,6	501,3	597,2	522,6	531,4	343,2	286,8	346,8	224,1
Espírito Santo	85,1	83,7	79,8	77,3	76,3	69,0	69,9	51,9	55,7	50,0
Paraná	0,0	0,0	0,0	0,0	-	-	-	-	-	-
Natural Gas (in million m^3)										
Brazil	115.730,3	118.939,7	117.227,1	118.523,9	140.979,4	116.584,5	100.998,0	86.575,4	76.258,6	78.741,6
% Proven	57%	55%	59%	60%	51%	60%	71%	82%	81%	84%
% Probable and Possible	43%	45%	41%	40%	49%	40%	29%	18%	19%	16%
Amazonas	90.452,6	93.908,5	94.456,3	95.742,8	89.236,6	86.963,3	74.486,1	51.225,4	38.686,3	40.757,1
Maranhão	-	-	-	-	29.704,6	8.651,9	8.405,6	17.677,2	20.412,2	20.822,2
Ceará	-	-	-	-	-	-	6,6	0,0	-	-
Rio Grande do Norte	2.172,3	2.365,1	2.188,7	2.277,2	3.274,7	2.548,9	2.209,7	2.108,8	2.241,1	2.257,9
Alagoas	4.906,8	4.450,2	4.173,3	4.335,8	4.222,9	4.335,3	3.757,1	2.907,7	2.626,9	2.482,9
Sergipe	1.306,3	1.343,0	1.483,7	1.912,7	1.756,3	1.813,6	1.730,0	1.565,3	1.629,0	1.591,5
Bahia	14.849,6	15.149,2	13.379,4	12.510,6	12.055,5	11.553,3	9.452,5	10.324,1	9.833,4	10.344,3
Espírito Santo	1.265,6	953,4	731,7	919,3	728,7	718,1	950,4	766,9	829,7	485,6
Paraná	777,1	770,3	813,9	825,6	-	-	-	-	-	-

Source: ANP, 2018.

Table 3. **Onshore Areas under Open Acreage, by state.**

State	Total Blocks
Rio Grande do Norte	**186**
Bahia	**159**
Alagoas	**101**
Sergipe	**62**
Espírito Santo	**52**
Ceará	**35**
Minas Gerais	**35**
Amazonas	**22**
Mato Grosso do Sul	**20**
Maranhão	**17**
Piauí	**6**
Blocks that are divided into two states	
Ceará and Rio Grande do Norte	**12**
Maranhão and Piauí	**7**
Alagoas	**3**
Mato Grosso do Sul and Goiás	**2**
Amazonas and Pará	**1**
Bahia and Espírito Santo	**1**
Mato Grosso do Sul and São Paulo	**1**

Source: ANP, 2018.

Table 4. Operating companies and some onshore E&P partners corporations, in Brazil.

Exploratory Blocks		Fields under Development		Fields in Production	
Operator	Blocks	Operator	Fields	Operator	Fields
Alvopetro	10	Imetame	4	Alipetro	1
Cemes	3	Petrobras	11	Alvopetro	2
Cisco	1	Petrosynergy	1	Arclima	1
Cowan Petróleo e Gás	6	Vipetro	2	Central Resources	3
Galp Energia Brasil	2	Petroenergy	2	EPG Brasil	2
Geopark Brasil	8	Ubutu Engenharia	2	Guto & Cacal	1
Great Oil	1	PGN	2	Imetame	4
Imetame	20	Perícia	1	IPI	1
Nova Petróleo	9	Phoenix	1	Leros	1
Parnaíba Gás Natural	17	Guindastes Brasil	2	Maha Energy	1
Petra Energia	15	Alvopetro	3	Nord	1
Petrobras	43	Newo	2	Nova Petróleo	4
Petrosynergy	1	Engepet	1	Oceania	1
Recôncavo Energia	4	Energizzi	1	Petrobras	210
SHB	1			Petroil	1
Shell Brasil	1			Petrosynergy	11
Tek	1			Parnaíba Gás Natural	5
TOG Brasil	10			Phoenix	1
Vipetro	2			Proen	1
Bertek Ltda	2			Recôncavo E&P	5
Ouro Preto Energia	7			Santana	1
Norteoleum	3			Vipetro	3
Phoenix	2				
Great Energy	3				
Petroil	3				
Maha Energy	6				

Some partners corporations in the consortiums		
Aurizônia Petróleo	Geopark Brasil	Quantra
Barra Energia	ONGC Campos	Queiroz Galvão
BP Energy	OP Energia	Repsol Sinopec
Brasoil Manati	OP Pescada	SHB
Chevron Brasil	Orteng	Shell
CNODC Brasil	Petro Vista	Sinochem Petróleo
CNOOC Petroleum	Petrobras	Sonangol Guanambi
Dommo Energia	Petrogal Brasil	TDC
ERG	Phoenix Petróleo	Total E&P do Brasil
Frade	QPI Brasil	

Source: ANP, 2018.

REGIONAL OPPORTUNITIES OF BRAZIL'S O&G ONSHORE MARKET

OPPORTUNITIES IN BAHIA'S STATE

FIEB's article

Bahia is the cradle of oil in Brazil and can again make history with the large-scale exploration of mature wells by small and medium-sized companies, called independent producers. Much time has passed since the discovery of oil in the outskirts of Salvador, in the neighborhood of Lobato, and the subsequent discovery of the first commercial accumulation in the Recôncavo Basin in Candeias. These extraordinary events resulted in the construction of the Landulpho Alves Refinery (RLAM), then the creation of Petrobras in 1953, which remained exclusively in the state until 1965.

The peak of production in the fields of Bahia occurred in the late 1960s, when the daily monthly average reached 165,000 bpd, falling rapidly until the 1980s practically half that value. Currently the onshore production in Bahia is in crisis, reaching the lowest level in the entire history of oil exploration in the state. In 2017, a little more than 32 thousand bpd was produced, a amout smaller that the the largest pre-salt well, which has a daily average flow of 36 thousand bpd.

As in every crisis, there are always opportunities. The loss of relative importance of production in the state may lead to a transformation in Brazil's onshore sector, with the possible sale of mature fields. As stated by Petrobras, which owns the majority of the 93 onshore fields, composed of more than 1,300 wells, profitability is not as interesting as other assets of the company, but is of particular importance for small producers whose existence consists in the recovery of oil in fields already exploited. Some of these companies are already operating successfully in Bahia and others are preparing to carry out investments and research in the event of the sale of these assets.

This opportunity is real because there is still a significant number of crude oil to be recovered in the state. According to the latest data from ANP, there are total onshore reserves of 224.1 million barrels, of which 182 million barrels are tested reserves. For illustrative purposes only, if the volume of reserves were recovered and monetized in full at the current price levels of the Brent barrel, we would have an amount of around BRL 84 billion, equivalent to more than a third of Bahia's GDP. In addition, it should be considered that the cost of production in the Recôncavo is relatively low and the oil is of excellent quality.

Certainly there are great challenges for this scenario to materialize, but there are objective conditions for this, such as infrastructure, skilled labor, extensive geological knowledge, companies that already operate in mature fields in the state, etc. This can bring new chapters to the history of oil in Bahia and foster the development of a profitable activity, generating jobs, business, royalties, taxes and, above all, economic development.

ANP's Open Acreage maps of areas in Bahia can be accessed in the following links:

- *rodadas.anp.gov.br/arquivos/Oferta_Permanente/Mapas_blocos/RP_SES-T2.pdf*
- *rodadas.anp.gov.br/arquivos/Oferta_Permanente/Mapas_blocos/RP_SREC-T1.pdf*
- *rodadas.anp.gov.br/arquivos/Oferta_Permanente/Mapas_blocos/RP_SREC-T2.pdf*
- *rodadas.anp.gov.br/arquivos/Oferta_Permanente/Mapas_blocos/RP_SREC-T3.pdf*
- *rodadas.anp.gov.br/arquivos/Oferta_Permanente/Mapas_blocos/RP_SREC-T4.pdf*
- *rodadas.anp.gov.br/arquivos/Oferta_Permanente/Mapas_blocos/RP_STUC_S.pdf*

VISION OF THE STATE OF MINAS GERAIS

FIEMG's article

As known to the companies in the sector, between 2010 and 2012, the São Francisco Basin was the object of significant investments in the blocks acquired in the 7th and 9th ANP's Bidding Rounds that summed USD 300 million. Among the highlights of investments made, we can mention the acquisition of 22 thousand kilometers of 2D seismic and drilling of 30 exploratory wells. As a result of this significant initial investment, extensive unconventional natural gas resources were discovered through 32 registered discovery notifications.

The subsequent phase, which would be the evaluation for the sizing of these discoveries, was impacted by the judicialization of the exploration of unconventional gas resources in Brazil, which has prevented the continuity of these works to date.

In the first version of the document Onshore Oil and Gas Environment in Brazil, published in March 2017, it is stated that the main opportunities for gas extraction in the world, coming from new frontiers, are non-conventional reservoirs, this being the case of the São Francisco Basin.

Non-conventional exploration is intensive in well drilling, which has a very positive impact on the development of the related industry to meet the strong demand related to this activity. In addition, it opens the opportunity for the emergence and consolidation of the hydraulic fracturing activity, essential in the exploitation of unconventional gas resources, which is a specialized, high-tech industry and still non-existent in the country. The development of this segment will not only be local but has potential to be implemented in other basins – such as Parnaíba and Recôncavo, which also have unconventional resources to be made feasible.

The monetization of the gas produced, in addition to meeting the industrial and domestic demands, will necessarily require thermoelectric power generation, heating up the industry in this sector and increasing the availability of electricity in the southeastern region of Brazil. The recent Ten-Year Energy Plan 2026, published by EPE on page 150 says:

"Unconventional natural gas resources are expected to produce 3 million m^3/day, with an estimated start at the end of the decade and expectation mainly for the São Francisco Basin, which has discoveries under evaluation"

In view of the above, due to the economic importance of the aforementioned facts, we propose the following actions for the continuation of natural gas exploration in the São Francisco basin:

- Elaboration of the legal framework for unconventional reservoirs exploration;
- Execution of a pilot project, with R&D funding, to attest to the environmental and economic feasibility of E&P;
- Preparation of MME and ANP policy to encourage the E&P of non-conventional resources.

These actions may result, as mentioned above, in the creation of the non-conventional gas E&P industry, increase in the power generation park, alternative supply of positive adjustments in the grid of the energy matrix, and increase in the energy availability of the southeast region.

ANP's Open Acreage map of areas in Minas Gerais can be accessed in the following links:

- *rodadas.anp.gov.br/arquivos/Oferta_Permanente/Mapas_blocos/RP_SSF_S.pdf*

OPPORTUNITIES IN THE ONSHORE O&G MARKET IN AMAZONAS

FIEAM's article

Of the great vocations of Amazonas in relation to its natural resources, its O&G potential stands out, possessing the second largest Brazilian Natural Gas (NG) reserve in Brazil, as well as dozens of sedimentary basins. The State was a pioneer in E&P activity in the northern region, beginning its research activities in 1917 and the first drilling in 1925, in the Amazonas Basin. Given its potential, Amazonas is considered one of the "new frontiers" of O&G in Brazil.

Currently Petrobras, Rosneft and Eneva have assets in the region, but despite the great potential of this "new frontier", the relevant existence of seismic data, evidence of hydrocarbons and blocks offered, only one company produces in the region, in a single basin, that of the Solimões.

A successful experience, the Urucu oil, discovered in 1986 in the city of Coari, distant about 650 km from the capital Manaus, deserves to be highlighted by the quality (one of the lightest produced in the country), being an indication of the potential of the region. The Amazonas and Solimões basins, moreover, are conducive to the occurrence of light oils, which facilitate processing in the refineries and allow their use in the production of more noble and high added value derivatives such as petrochemical naphtha, diesel, gasoline and LPG. From Urucu, about 11 million cubic meters of natural gas and 54,000 barrels of oil and condensate are extracted daily, making Amazonas the third largest producer in the country in barrels of oil and equivalent and Coari, the largest onshore producer of natural gas. As for LPG processing, the production of about 1.3 thousand tons/day supplies the states of Amazonas, Pará, Rondônia, Acre, Tocantins, Amapá and, still, part of the Northeast.

The ANP, aiming to foster the development of the sector in the Amazonas and Solimões basins, has announced the Open Acreage of Areas for O&G exploration and production, approved by Energy Policy Committee Resolution 17/2017. In addition, it plans to launch its 16th Bidding Rounds in 2019, which includes the Solimões Basin.

The development of this so-called "new frontier" of O&G has, in addition to the extraction of light oils, numerous potential benefits, such as natural gas supplying thermoelectric power plants. Since the construction of the Tucuruí Transmission Line, Amazonas has been linked to the National Integrated System (SIN) of electricity. Thus, the reserves (discovered and potential) of the Amazonas and Solimões basins have the power to increase national energy security by the possibility of creating a power generation park using natural gas energy in the form of the Parnaíba Complex in Maranhão.

It should be noted that onshore activity promotes the internalization of production, brings development and income to regional economies, contributes to the decentralization of the supply chain, generates employment, and raises tax collection, with the payment of royalties and special shares, reasons for stimulating the activity to contribute to economic development and wealth generation for locations far from urban centers, and the diversification of productive activities in Amazonas, now very much centered in the Manaus Free Trade Zone.

In this context, the main challenge today is to find solutions to monetize large gas reserves, either by transforming them into electricity – which requires investment in transmission lines – or by liquefying it – which stumbles upon process costs (liquefaction) and logistics in the Amazon – but, above all, guarantee legal security so that it is possible to invest in long-term projects.

We, the Federation of Industries of the State of Amazonas, understand that some initiatives have already been adopted to increase the attractiveness of onshore activities, such as the Onshore Area Revitalization Program and the provision of permanent onshore areas by ANP, but we also believe that it is still possible to improve tax and integration issues between the gas and energy sectors, to enable new monetization solutions and to stimulate new projects and private investments. For this, we will work with our Mineral Resources and Environment and Responsibility Coordination, in order to promote the O&G market.

ANP's Open Acreage map of areas in Amazonas can be accessed in the following links:

- *rodadas.anp.gov.br/arquivos/Oferta_Permanente/Mapas_blocos/RP_SAM_O.pdf*

ESPÍRITO SANTO LAND OF OPPORTUNITIES

FINDES's article

Espírito Santo is small in size and great in opportunities. Located in the Southeast, it accounts for only 0.51% of Brazil's total area – a size similar to Denmark – but occupies the country's second largest O&G producer. With 13 port terminals in operation and five new announced projects – which include the Central Port, focused on offshore service, the State developed from the logistic vocation to the external market.

The evolution of the O&G production chain was essential for the transformation of our economy, the second most industrialized in the country today – 31.1% of state GDP comes from the general industry. Most of this result, however, is related to offshore production, following a national trend – ANP data show that only 5% of the national production is onshore.

This reduced participation reflects the low attractiveness of the onshore production fields when compared to the offshore fields, considering productivity, profitability and transportation costs for outflow. Espírito Santo, due to its industrial profile and logistical advantages, has been presenting itself as a viable alternative for the O&G industry, especially small and medium-sized enterprises.

Responsible for 8% of onshore production in Brazil, our state has 49 fields in production, which represent 19% of the country's onshore-based fields. Although it reached 3.9 million barrels in 2017 in the state of Espírito Santo, onshore production presents an average annual decline of -2.6% since 2010. Part of this decline may be associated with the model of production and exploration of onshore oil in Espírito Santo being uncompetitive.

Seen as a window of opportunity for greater diversification of the sector, the 14th Bidding Round, promoted by ANP, enabled companies based in Espírito Santo, including small and medium-sized ones, to acquire 8 onshore blocks, with BRL 4 million in bonuses and a forecast of other BRL 19 in investment. To encourage onshore production, Espírito Santo joined Repetro in March of this year, reducing taxes for the acquisition or importation of assets invested in the exploration and production of O&G.

By adding the strength of the Espírito Santo industry, legal certainty and the commitment of institutions to improve the business environment, we at FINDES believe that Espírito Santo is one of the best investment options in the country. Through the Espírito Santo Forum of O&G – which links FINDES, Government, Petrobras and Shell - we have created connections in favor of the growth of the production chain. We want the continuity of the bidding rounds and the construction of an increasingly competitive market, strengthening the onshore production and the Espírito Santo economy.

ANP's Open Acreage maps of areas in Espírito Santo can be accessed in the following links:

- *rodadas.anp.gov.br/arquivos/Oferta_Permanente/Mapas_blocos/RP_SES-T4.pdf*
- *rodadas.anp.gov.br/arquivos/Oferta_Permanente/Mapas_blocos/RP_SES-T6.pdf*

O&G ONSHORE OPPORTUNITIES IN MARANHÃO

FIEMA's article

Maranhão has a strong natural gas supply potential, with a proven reserves of 6.3 billion m^3, referring only to the fields in production, in addition to an risked reserves of 0.320 trillion m^3. In its territory, the Parnaíba Basin, the second largest producer on onshore, is located in Brazil, which accounts for 7% of all natural gas production in the country. In this chain, Parnaíba Gás Natural (PGN), belonging to the Eneva Group, is operating, with a concession area of more than 40 thousand square kilometers, with seven commercial fields, of which five are in production (Gavião Real, Gavião Vermelho, Gavião Branco , Gavião Caboclo and Gavião Azul) and two others in development (Gavião Preto and Gavião Branco Norte). Due to the large product offer, four power plants currently operate in the Parnaíba Complex, with an installed capacity of 1,427 MW of power. ENEVA is the largest private operator of natural gas in Brazil. In addition to the PGN, Petrobras, BP Energy and Petra also have blocks in operation in the region.

The main point of concern of the natural gas exploration in Maranhão lies in the distribution due to the absence of gas pipeline and high freight cost in a liquefied natural gas ship. Our state has several productive activities that can be developed with the use of natural gas, either as a fuel for heat supply, as raw material in steel-making, in the chemical or petrochemical industries, or in the manufacture of fertilizers (production of ammonia and urea), in the ceramics industry, in the manufacture of glass and cement and in the generation or co-generation of electricity. Without forgetting the residential and automotive use that, in the short term, could generate immediate economic impacts.

In the current productive structure of Maranhão, important companies stand out, which could represent a great market for natural gas, such as cement industry, steel unit, ceramic industries (red, white, refractory materials, thermal insulation materials, high technology ceramics aluminum and its production line (ingots, plates, billets, sheets, tubes, wires and cables), large pulp industry, paper and paper products, glass industry (flat and hollow) , companies that generate thermoelectric energy using coal, as well as agro-industrial units, beverage manufacturers (beers and sodas). And, in the future, to exploit shale gas reserves, with great occurrence in the state, but awaiting regulation for its exploitation.

The progressive realization of this potential will bring great changes in the productive and industrial structure of Maranhão, with significant investments in both the production and distribution of gas, as well as in enterprises that consume this clean energy source, in addition to the residential and automotive sectors.

Its important to find the point of convergence between supply and demand, sectors that need gas and natural gas producing and distributing units. This potentiality is exposed in our state. We just need to turn it into reality.

ANP's Open Acreage maps of areas in Maranhão can be accessed in the following links:

- *rodadas.anp.gov.br/arquivos/Oferta_Permanente/Mapas_blocos/OP_SPN_N.pdf*
- rodadas.anp.gov.br/arquivos/Oferta_Permanente/Mapas_blocos/OP_SPN_SE.pdf
- rodadas.anp.gov.br/arquivos/Oferta_Permanente/Mapas_blocos/RP_SPN_O.pdf

RIO DE JANEIRO: OFFSHORE EXPERIENCE AND ONSHORE SUPPLY POTENTIAL

FIRJAN's article

Not only from the sea comes O&G opportunities in Brazil. Nor are they restricted to the extraction of our natural resources, with the new high oil tide, translated into a new business environment, Brazil is again one of the best destinations in the world of oil.

The potential we have in offshore areas, which are very concentrated in the state of Rio de Janeiro, is undeniable, but in the sense of sustainability and sharing of experiences, the onshore areas can greatly add to the development of the country.

Even with the history of O&G having started in onshore areas, they are still little explored. Therefore, recognizing the multiplier power that our underground wealth can provide regionally, we believe that the union of efforts must transform this potential into a true and lasting legacy to Brazil.

The insertion of Rio de Janeiro in this market may even seem somewhat illogical. If we do not have onshore reserves, what should be the state's role in such projects?

However, the state of Rio de Janeiro can be a great partner in the development of the onshore O&G market in Brazil. In addition to concentrating the main decisive pole for the topics related to this market, with the presence of the main companies, regulatory and representative agencies, the state built knowledge base as well as goods and services.

The value that we can add to the joint work, is in the articulation to improve the business environment, and also through partnerships for the supply of equipment and technological development to increase our productivity, consequently, our country's competitiveness. In the same sense, we encourage to remain close to those who have already been through the O&G onshore market propulsion.

In 2017, aiming to boost our results for the benefit of the country, we conducted four projects: the O&G Onshore Workshop, the publication of the Brazil's O&G Onshore Environment first edition, the mission to the Global Petroleum Show in Canada and national missions in the state of Rio Grande do Norte and Bahia, with company visits. We must continue to make efforts to strengthen these actions.

By doing this, learning from the best global practices, we will walk a successful path. Therefore, in 2018 we work in the same areas of technical content production parallel to the establishment and strengthening of partnerships.

Rio de Janeiro and all companies located here are committed to the development of the E&P activites of O&G in Brazil. Onshore and offshore.

VISION OF THE STATE OF RIO GRANDE DO NORTE

FIERN's article

Currently, the production of oil from Rio Grande do Norte represents only 2% of the national production, according to ANP Bulletin of March/2018. Since 2017, Petrobras has announced the sale of some fields, however, the divestment operations did not went forward here in Rio Grande do Norte.

Considering the current scenario of O&G production in the state of Rio Grande do Norte, presented by ANP's, the announcement of the sale of Mature Onshore Fields in the state may mean new investments by independent producers.

As perspectives for Rio Grande do Norte it is expected:

- To implement the synergies between the main actors of the O&G Productive Chain, including producers, suppliers and financiers of this activity to increase E&P, aiming at a strong and competitive onshore E&P industry, increasing production and with a plurality of operators and suppliers of goods and services.
- To reduce legal barriers with ANP to support small producers as well. This will enable the generation of new direct and indirect jobs, income and social development, with the perspective of the local industry resumption that is, nowadays, partially mobilized to meet the needs of the sector.

The Federation of Industries of the State of Rio Grande do Norte – FIERN participated in 2017 in several seminars that discussed the revitalization of oil E&P activities in the Potiguar Basin, focusing on the resumption of investments in the sector. We can highlight as a positive action, the creation of REATE, Program for the Onshore Area Revitalization, through an initiative of the O&G Secretariat of the Ministry of Mines and Energy, whose objectives are:

- Revitalize Brazil's onshore E&P activities;
- Stimulate local and regional development; and
- Increase the competitiveness of the national onshore O&G industry.

In view of this context importance, FIERN is represented in the State Commission for the Revitalization of Oil Onshore Activities in the state. In the Commission participates, as well, the ANP, EPE, Petrobras, Trade Federation of the states of Rio Grande do Norte and Ceará, local unions of companies and workers, universities, National Service of Industrial Apprenticeship – SENAI, Brazilian Micro and Small Business Support Service – SEBRAE, Brazilian Petroleum, Gas and Biofuels Institute – IBP, and the Brazilian Association for Independent Producers of O&G – ABPIP.

As an institutional action, the FIERN System, through the Rio Grande do Norte's SENAI Regional Department, implemented with its own resources and through agreement with BNDES, the SENAI Institute of O&G Technology (IST-P&G), located in the city of Mossoró, in Rio Grande do Norte.

IST-P & G is a modern unit developed to support the growth and development of the O&G production chain in the state and region. The institute has a specialized team, state-of-the-art laboratory infrastructure and is prepared to execute several technical services with excellence. In addition to IST-P&G, the FIERN System has the Center for Gas Technologies and Renewable Energies (CTGAS-ER), which can also offer innovative services and solutions to increase the competitiveness of the O&G and Renewable Energy Industry.

ANP's Open Acreage maps of areas in Rio Grande do Norte can be accessed in the following links:

- *rodadas.anp.gov.br/arquivos/Oferta_Permanente/Mapas_blocos/RP_SPOT-T1B.pdf*
- *rodadas.anp.gov.br/arquivos/Oferta_Permanente/Mapas_blocos/RP_SPOT-T2.pdf*
- *rodadas.anp.gov.br/arquivos/Oferta_Permanente/Mapas_blocos/RP_SPOT-T4.pdf*
- *rodadas.anp.gov.br/arquivos/Oferta_Permanente/Mapas_blocos/RP_SPOT-T3.pdf*
- *rodadas.anp.gov.br/arquivos/Oferta_Permanente/Mapas_blocos/RP_SPOT-T5.pdf*

OIL AND GAS ONSHORE PRODUCTION IN SERGIPE

FIES' artcile

In January 2017, the Ministry of Mines and Energy (MME) announced the REATE Program, which aims to revitalize Brazil's E&P of oil and natural gas in onshore areas. The actions should involve the concessionaires and companies of the value chain, that is, the suppliers of goods and services, stimulating the development of the onshore oil industry, at national, regional and local level.

Onshore oil production in Brazil reached 48 million barrels of oil equivalent (BOE) in 2017. Sergipe was the fourth largest producer among the Brazilian states, responsible for 14.2% of the national onshore production, surpassing the 6.8 million bep in the year.

In Brazil, onshore oil production declined over time, in the 2000s, approximately 17% of total Brazilian oil production occurred on onshore, but this situation has reversed in recent years and in 2017 the onshore production share did not reach 5%. Regarding the production of natural gas onshore, this reduction was also representative, going from 39.4% to 19.6% between 2000 and 2017.

In Sergipe, the movement was on the other direction. Onshore production represented just over 66% of total state production in 2000, and now accounting for 77.6% of total oil production in Sergipe, with the collaboration of one of the largest oil producing basins on onshore, located in the municipality of Carmópolis. The peak of the share of onshore production occurred in 2006, when onshore production accounted for 84% of the state's oil production.

Sergipe's production of natural gas occurs mostly at sea, with production onshore less representative. In 2000, the share of natural gas production in Sergipe's onshore fields was 6.7%, falling to 6.2% in 2017.

Thus, the creation of government policies to encourage the onshore production and exploration of oil and natural gas, contributes to local development, generating gains in the productive chain of the mineral extractive sector, which could generate more jobs and greater income circulation, as well as encouraging innovation regionally and locally.

ANP's Open Acreage map of areas in Sergipe can be accessed in the following links:

- *rodadas.anp.gov.br/arquivos/Oferta_Permanente/Mapas_blocos/RP_SSEAL_T5.pdf*

OPPORTUNITIES AND SUCCESS CASES IN LATIN AMERICA

DEVELOPMENT OF THE O&G ONSHORE MARKET IN MARANHÃO

Eneva's article

Natural gas production in Brazil is still predominantly offshore and associated with oil. From a demand perspective, the largest consumer market (50%) is thermoelectric plants, a volume that should intensify in the coming years to support the growth of renewable sources in the energy matrix.

Considering the potential of Brazil's onshore basins, the benefits derived from its exploration, and the need to increase domestic natural gas supply, its proprietary to establish an agenda in order to improve the attractiveness of onshore areas and to stimulate the debate on market integration of natural gas with the electricity sector.

In addition to increasing domestic gas supply, production in onshore basins has a multiplier effect of wealth. Let's take as an example the case of Maranhão, where the Parnaíba Basin is located, discovered in the 50's, but which until the beginning of the decade did not have any producer well.

Eneva, through its subsidiary Parnaíba Gás Natural, began producing in Santo Antônio dos Lopes, 300 km from São Luís in 2012. Six years later, Maranhão is the fifth largest producer of natural gas in the country, from five producing fields, 121 drilled wells, 200 km of constructed pipelines and BRL 8 billion invested.

Table 5. Production of Natural Gas in Maranhão year by year (in thousand m^3).

Year	2012	2013	2014	2015	2016	2017
Production	381	1,419,659	1,968,438	1,565,319	1,926,290	1,617,242

Source: ANP, 2018.

As result of the activity, BRL 388.15 million were generated in government take and payments to third parties, inlcuding royalties, special shares, payments to land owners, R,D&I and retention of areas cost are included.

Table 6. Government and Third Party Shares 2012/2018.

Compensation	%	Value
Special Share	4.50%	BRL 17,545,498.65
Royalties	79.80%	BRL 309,576,772.37
Land owners	8.00%	BRL 30,957,677.24
R,D&I	3.90%	BRL 15,288,573.85
Retention of Areas	3.80%	BRL 14,785,258.80
Total	**100%**	**BRL 388,153,780.90**

Source: ANP e Eneva, 2018.

The benefits of increasing the onshore natural gas' attractiveness are:

- The production of natural gas onshore promotes the internalization of production, bringing development and income to regional economies, contributes to the decentralization of the supply chain, generates employment, and raises the collection of taxes and payment of royalties and special shares;
- Creates capacity to meet, locally, demands for natural gas;
- It contributes to the transition to a renewable matrix, supported by a thermoelectric power generation capacity.

To stimulate, therefore, the development of the Brazilian onshore basins is to contribute to the strengthening of regional economies.

MONETIZATION CHALLENGE

One of the successful ways of monetizing onshore areas is through integrated energy models, such as *gas-to-wire* construction of thermoelectric power plants near onshore-based producing wells. The gas produced is used for power generation, and the energy is transmitted through lines. Thus, it is possible to enable onshore E&P activity even in areas where there is no pipeline network.

Eneva, pioneered this model in the interior of Maranhão, in Santo Antônio dos Lopes, where four thermal plants are supplied from the natural gas produced in the nearby onshore fields. While the natural gas market does not develop and, therefore, the pipeline network does not expand sufficiently, gas-to-wire is the best option for monetizing gas assets onshore.

From integrated *gas-to-wire* models such as this, it is possible to finance E&P activities onshore from the fixed revenue from the thermoelectric power plants. This model still has the benefit of generating energy at a competitive cost, contributing to the national energy matrix safety.

In order for this model to be replicated, however, an integrated approach is required from the natural gas and electric sectors. This, because the *gas-to-wire* model requires a certain degree of predictability of generation and, consequently, revenue from the sale of the fuel, in order to support investment decisions in the expansion of proven reserves sufficient to service the thermoelectric dispatch.

The electric sector, on the other hand, demands physical availability of fuel to service the thermoelectric dispatch and to support the amount of energy sold in contracts. However, the hydroelectric predominance in the national energy matrix makes the thermoelectric demand uncertain, and may be high in periods of water scarcity and as well as quite low when the tributaries are higher and the reservoirs are full.

In the search for ways to promote greater integration between the electricity and natural gas markets, a proposal was discussed within the Subcommittee 8 of Gas Para Crescer Program (Gas to Grow), which goes through the definition from the generating agent, prior to the energy auction, of maximum and minimum dispatch limits for certain horizons (e.g.: 5 years). In this way, the thermoelectric power plant could exercise its right to have its dispatch limited to, say, 70% of its maximum availability, cumulatively calculated based on a 5-year moving average.

It is therefore a proposal addressed to the *gas-to-wire* segment that still demands reflections and definitions, such as the correct inclusion in energy sector models or constraints of dispatches outside the order of merit.

The expected benefits are:

- Compatibility of the natural gas consumption from *gas-to-wire* thermoelectric plants with the dynamics of investments in E&P, improving the viability and competitiveness of projects.
- For the same natural gas reserve, the proposal allows a greater installed capacity of thermoelectric generation, being able to contribute to the maximum demand (peak demand) of the National Integrated Eletric System.

- In this sense, the *gas-to-wire*, unlike the LNG with anticipated dispatch, could perceive payment by the peak demand generation, not only by the generation of energy.
- For consumers: the increase in the number of projects participating in energy auctions can make the projects more competitive, allowing them to achieve lower tariffs.
- For the development of onshore gas in Brazil: greater generation of geological knowledge of the sedimentary basins, greater revenue from royalties, job creation and technical training.

It is worth mentioning the government's effort throughout 2017 to initiate and motivate the debate on the natural gas market opening and its interaction with the electricity sector, with initiatives such as Gas to Grow Program, CP33, and the REATE Program. It is imperative, however, to move forward, to give investors greater security and to increase the private sector attention towards this market.

Onshore development, like what has been happening in Maranhão, leads to the generation of wealth and economic dynamism for locations far from urban centers, increases the supply of hydrocarbons, and when it comes to integrated *gas-to-wire* projects, reliability of the brazilian electrical system.

THE OIL MARKET IN COLOMBIA

ACIPET's article

During 100 years of history in Colombia, oil has grown increased in importance for our economy, particularly during the last decades. The oil industry in Colombia began in 1905, with the so-called Mares Concession and by the hand of Tropical Oil Company, a subsidiary of Standard Oil of New Jersey, in Magdalena Medio. A similar concession was granted to General Virgilio Barco Martínez, in Catatumbo. The concession period for Tropical Oil ended in 1951, giving rise to the establishment of our state-owned oil company, Ecopetrol.

During the last century, exploration and production activities were consistent and in expansion. The oil production reached a peak of 850 Mbpd towards the end of the 1990's, with a significant drop at the beginning of this century, and a new recovery starting in the year 2006. This rebound enabled Colombia to surpass – at the beginning of this decade – one million barrels per day of production, which faced a new drop due to the crisis of years 2015 and 2016.

Production peaked 850 Mbpd and, subsequently, showed a downward trend due to the fall in international oil prices, which reached levels below $10 per barrel at the end of the referred decade – 1990´s. In addition, Colombia suffered loss of competitiveness with an oil policy against the global scenario in terms of prospection, tax attractiveness, and political stability and physical safety conditions for the development of operations in the country.

The decrease in reserves and the oil production drop led Colombia to start a fundamental change in its oil policy, which allowed the country not only to reclaim its status as a favorable destination for investments in this industry, but also to improve its transparency, prospect, and political stability conditions. Colombia was on the verge of becoming an importing country.

According to Colombia's Ministry of Finance in 2018, the stabilization of crude oil production in the last two years at levels above 850 Mbpd and the oil price between $65 and $70 per barrel –higher than the $55 per barrel, with which the nation's and Ecopetrol's financial forecasts were drafted –, will lead to the increase in profit for the oil companies in the country. That will also reflect in an increase of income from taxes and royalties for the country, and more dividends from Ecopetrol next year.

For this reason, it results in unexpected profit, and the country's financial status improves consequently. With the increase during the year, two reflections instantly emerge:

1. Higher export earnings, reducing the trade deficit.

2. Effects reflected in the U.S. dollar exchange rate.

Forward tax scenarios will be made based on $65 by 2020 and, thereafter $70 per barrel.

Despite being a country with abundant natural resources, the current reality is that approximately 90 percent of the crude oil produced today comes from fields discovered more than two decades ago and, in the same period, no fields above 500 million barrels have been discovered. In a positive scenario expected for the reserves approximately by 2023, looking for new energy sources (biofuels, non-conventional energy sources) in a responsible transformation process; encouraging investments for the development of state-of-the-art refineries; encouraging improved recovery activities; offshore exploration and production activities and at non-conventional deposits are fundamental for the future development of the industry and its major effects on public finance.

Colombia has experimented with several licensing models to offer its oil blocks. In the first decade of this century, the procedures for the assignment of vacant areas were conducted by direct assignment; then, by the middle of the last decade, moving to open or closed bidding procedures and, on exceptional occasions, the direct assignment system. In 2007, the system was modified, and areas were now assigned through special bidding procedures, which began with the Mini-Round in 2007 and, thereafter, periodically every two years, by the Colombian National Hydrocarbons Agency – ANH.

The exploratory blocks used to be auctioned through Bidding Rounds, which occurred every two years when a large number of blocks were offered to the industry, whose companies were awarded upon fulfilling a minimum investment and bringing to the table resources in addition to those required – the bidder that brought more to the table was eventually declared the winner.

However, this model had to be rethought due to the growth of the country and the search for new reserves. Thus, ANH approved Agreement No. 2 of 2017, under which the new regulation for promotion and assignment of areas come into effect, consolidating all regulations previously in place on the matter thus consolidating a new method, which has several differences with respect to how the blocks had been offered to the oil companies.

The assignment is permanently proposed, which requires the ANH to update the map of the areas on an ongoing basis. This is intended to make supply and demand more open and dynamic. Once a proposal is made, ANH discloses it too the market, without mentioning the interested party, and gives approximately one month for other bidders to submit their offers. The best offer wins; however, the original bidder is entitled to improve its offer; and, in case of a tie, such bidder wins.

Under this new model, the metrics considered in the offers include the exploratory objectives, for instance, the number of wells with the technical specifications and depth levels defined in the agreement, not the money investment based on a price list.

PETROBRAS' ONSHORE ACTIVITY

Petrobras' article

Petrobras has 219 concession contracts in land, located in the sedimentary basins of the Solimões, Amazonas, Ceará, Potiguar, Sergipe/Alagoas, Recôncavo, Tucano Sul and Espírito Santo. They are mature basins, some with more than 50 years of production and well-known petroleum systems, which exploratory and complementary developments to the current ones, which will increase of the recovery factor, characteristic of the activity in these mature fields.

In these concessions, the company also stands out for the logistics infrastructure of production and outflow, already fully implemented, and by the large number of wells and facilities. The portfolio of onshore concessions is grouped into production poles, which have, in common, infrastructures and facilities for production and disposal.

Operations in oilfields are of low to medium complexity, offsetting the costs of operation, maintenance and logistics resulting from the wide geographic dispersion. Petrobras has been implementing strategic initiatives aiming at reducing the extraction costs and extending the concession contracts with ANP, enabling an increase in investments in the Development Plan of these fields.

ANP has already approved the extension of the Araçás concession contract in Bahia for another 27 years (up to 2052). In addition, requests for extension of the concessions of Canto do Amaro and Fazenda Pocinho in Rio Grande do Norte, Fazenda Alegre in Espírito Santo, Rio Urucu and Leste do Urucu in the Amazon are filed with the agency. Additionally, Carmópolis requests in Sergipe, Alto do Rodrigues in Rio Grande do Norte, Fazenda Boa Esperança, Taquipe, Fazenda Balsamo and Massapê – the four concessions in Bahia will be filed this year.

It should be mentioned that Petrobras continues to invest in technological innovations, such as the "Multiphase Pumping System", a project conducted by the Petrobras Research Center – CENPES – and tested in Carmópolis, the largest onshore field in Brazil. This technology will also be applied in offshore fields, including in deep waters.

Initiatives for innovation and cost reduction are a constant in operations in mature fields. Among these solutions, we also highlight the creation of the "Fisher Screw" Tool, which allows the rescue of the foot valve of the mechanical pump units during a fault corrective operation, without the need for intervention with an Onshore Production Rig. These initiatives are considered as references in the industry, showing how we are able to find creative solutions to reduce costs.

It should be noted that technological innovations are the result of the management of competences developed by Petrobras, prioritizing the acquisition and dissemination of critical and strategic knowledge, the development of technical skills and the expansion of the exchange of experiences, taking into account the needs of the processes in each area.

It is important to point out that, like all Petrobras operations, the activities in onshore fields are also guided by the commitment to life, present in all organizational levels of the Company. An integrated and robust management system for safety, environment and health aims to ensure that all facilities, processes and activities are conducted in a planned and safe manner, in absolute compliance with legal and regulatory requirements.

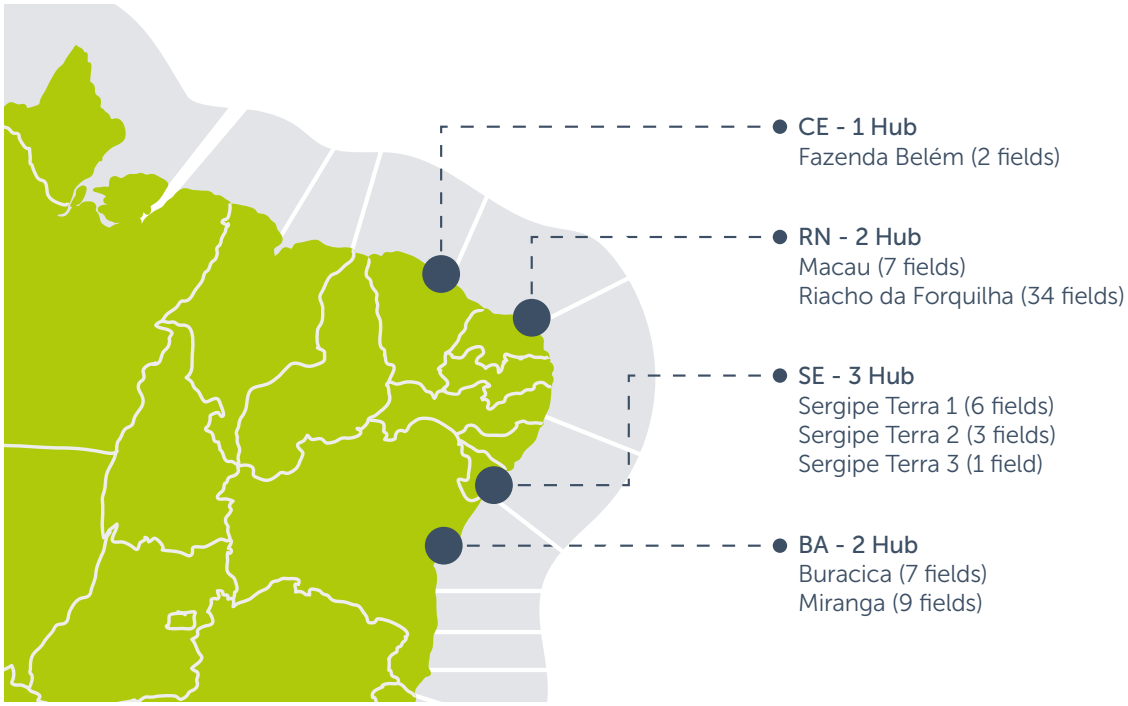
Reduction in oil production in landfills is a natural process in mature basins. The fall in oil prices, which affected the industry worldwide, and the resulting adjustment of costs and investments in this new environment, have accentuated the decline in the last five years. In addition, the recent brazilian socioeconomic situation has affected the service provider market, and in some areas, specific aspects have a significant impact on production, such as the water crisis in the Northeast, which has limited the collection of water for injection in the oil fields.

Petrobras, as a major oil company, constantly manages its portfolio, with the purpose of generating value, guarantee discipline of the use of capital and return to shareholders. In this process, it has prioritized the development of

deepwater production and has launched, as one of the levers of the Business and Management Plan for the period from 2018 to 2022, the program of partnerships and divestments, an important measure for reducing its debt and for the feasibility of future investments.

Among the concessions that Petrobras is divesting, there are 69 onshore fields, grouped in eight hubs distributed in four brazilian states, as detailed in the figure below. It should be mentioned that, in the current cycle of the active portfolio management process, other terrestrial concessions in the state of Espírito Santo are being evaluated as candidates for divestment.

Figure 5. Mature Fields under divestment process



Source: Petrobras.

The portion of the average production of oil, LPG and natural gas corresponding to the eight land hubs currently in the process of divestment, which comprise the 69 fields mentioned, is equivalent to approximately 1% of the total production of the Company.

The divestment of these concession contracts will allow the entry of new players in the O&G industry in onshore fields, diversifying the productive chain with numerous benefits for society, such as:

For the regional economy: i) creation of a development hub based on integrated exploration, production and refining enterprises, covering the entire value chain of the O&G industry; ii) Higher investments of new players, who have alternative financing sources; iii) Induction of greater dynamism and diversification in the regional economy, with the tendency of the installation of satellite industry in the vicinity of the fields.

For the O&G segment: The introduction of new players in the segment, with different experiences and capacities, will give new impetus to the discussions and decisions on the contractual, tax and regulatory conditions in general of the industry.

For Industry Workers: A more dynamic and diversified labor market with greater opportunities for entrepreneurship.

Petrobras will continue to operate and invest in onshore E&P activities for oil and natural gas, focusing on increasing the recovery factor, generating employment and income and contributing to the development of the country.

FINAL CONSIDERATIONS

ONSHORE OIL AND GAS: BRAZIL BEYOND THE OFFSHORE

ONIP's article

Over the years, E&P investments in Brazil have been heavily shifted to our offshore horizon. The large oil reservoirs on the coast, with a high attractiveness for the companies' activities, do not prevent the development of onshore areas.

The new winds, which blow towards the earth, with the undertaking of actions to make feasible the activity in the interior of the country, move the market with a new potential of demand. This reflects in a highly motivating factor towards a new virtuous cycle of diversification of this segment, by intensifying the internalization of the multiplier effects for the society.

This new chain began with the implementation of a Calendar of Bidding Rounds for Exploratory Blocks and with the Open Acreage of Areas. Well received throughout the O&G market, these actions bring the predictability expected by all agents, which makes them increasingly more propitious to choose to invest in Brazil.

In addition, while investors have had the opportunity to plan and elaborate strategies in the search for new horizons, the country has been more receptive to market demands. That is why the various programs implemented by the Government were highly opportune, among them, the greater emphasis on the O&G onshore market, we highlight the REATE Program.

From REATE, a program led by the MME, actions were initiated to improve the business environment on the onshore. In this sense, it is very important to be close to our neighboring countries in the American continent to expand the results of our actions, with learning and sharing of lessons learned.

In the oil world, some agents have proven themselves as great executors of successful programs and projects in their localities. Onshore industry success stories happen both in the United States and Canada, as well as in countries bordering Brazil. In Latin America, Colombia underwent a process of accelerated expansion of its onshore oil production, explaining its capacity for execution, not only operational, but also in the solution of political and environmental standoffs.

Therefore, among the actions required to unlock the market, we must highlight those aimed at improving the environmental licensing processes in E&P operations, aiming to make the execution of activities faster and less costly. Another important action is to stimulate the marketing and refining of oil from independent producers, which will attract production and outflow from new companies.

For the dynamism of the market, it is essential that Petrobras execute their strategic repositioning, with the completion of its divestment plan. From this, not only areas already producing and with a project profile more suitable to independent producers are being made available in the market, but also the increase of interest in new investments and access in our refining park.

Partnerships, then, are key when seeking the best practices applied in the world. In this way, we will make O&G's business environment in Brazil even more attractive to new investments.

Also, by boosting E&P activities throughout the country, whether in the onshore or offshore market, we will be driving the demand for other members of the productive chain. That is, the supply companies involved directly and indirectly, including those of small and medium size, will have new markets to offer their products. From the supplier perspective, partnerships are also essential, through technology transfer and Joint Venture, for example.

Brazil already has the advantage of having natural resources available for exploration, and also has the capabilities to make them a true legacy for the country. Thus, it is fundamental that our actions are directed at a systemic level, so that we can continue to work towards the attraction of investments for E&P and how to increase the participation our suppliers in it.

That is why ONIP is committed to promoting interaction between institutions and governments, in order to guarantee effectiveness in the implementation of an industrial policy focused on the O&G market development.

With a focus on increasing the productivity and competitiveness of the entire Brazilian industry, we have defined a permanent strategy to stimulate the insertion of the development culture aimed at global market access. An example of structuring action is the realization of the Virtuos Circuit: best practices event, meeting between plaintiff and suppliers of the market and field visits of several industrial parks.

We also identify the installed capacity to meet the demands that are to come, bringing the reality of the corporate environment closer to daily business. And so, it is ONIP's duty today to be at the forefront in the articulation among all stakeholders, contributing to the interplay between productive chains, sectoral organized spaces, representative class associations and political leaderships.

We understand that only together, with synergy, we will move forward. An environment of permanent discussion between the main players of this market is fundamental, in which the exhibition of different visions materializes as a healthy and innovative practice, but always having as understanding that at the of the day it must converge in favor of Brazil. And, we will only achieve if we continue working together.

APPENDIX

LIST OF ABBREVIATIONS

1P: PROVEN RESERVES
3P: PROVEN, PROBABEL AND POSSIBLE RESERVES
ABESPETRO: BRAZILIAN ASSOCIATION OF OIL SERVICE COMPANIES
ABPIP: BRAZILIAN ASSOCIATION FOR INDEPENDENT PRODUCERS OF OIL AND GAS
ACIPET: COLOMBIAN ASSOCIATION OF PETROLEUM ENGINEERS
ANP: NATIONAL AGENCY OF PETROLEUM, NATURAL GAS AND BIOFUELS
BOE: BARRELS OF OIL EQUIVALENT
CAT: ANP'S PMSJPRE AREA COORDINATION
CENPES: PETROBRAS RESEARCH CENTER
CTGAS-ER: CENTER FOR GAS TECNOLOGIES AND RENEWABLE ENERGIES
E&P: EXPLORATION AND PRODUCTION
EPE: ENERGY RESEARCH OFFICE
FIEAM: FEDERATION OF THE INDUSTRIES OF THE STATE OF AMAZONAS
FIEB: FEDERATION OF THE INDUSTRIES OF THE STATE OF BAHIA
FIEMA: FEDERATION OF THE INDUSTRIES OF THE STATE OF MARANHÃO
FIEMG: FEDERATION OF THE INDUSTRIES OF THE STATE OF MINAS GERAIS
FIERN: FEDERATION OF THE INDUSTRIES OF THE STATE OF RIO GRANDE DO NORTE
FIES: FEDERATION OF THE INDUSTRIES OF THE STATE OF SERGIPE
FINDES: FEDERATION OF THE INDUSTRIES OF THE STATE OF ESPÍRITO SANTO
FIRJAN: FEDERATION OF THE INDUSTRIES OF THE STATE OF RIO DE JANEIRO
IBP: BRAZILIAN PETROLEUM, GAS AND BIOFUELS INSTITUTE
IST: SENAI INSTITUTE OF TECNOLOGY
LNG: LIQUEFIED NATURAL GAS
LPG: LIQUEFIED PETROLEUM GAS
MME: BRAZILIAN MINISTRY OF MINES AND ENERGY
O&G: OIL AND GAS
ONIP: BRAZILIAN NATIONAL ORGANIZATION OF THE PETROLEUM INDUSTRY
PGN: PARNAÍBA GÁS NATURAL
R,D&I: RESEARCH, DEVELOPMENT AND INNOVATION
SEBRAE: BRAZILIAN MICRO AND SMALL BUSINESS SUPPORT SERVICE
SENAI: BRAZILIAN NATIONAL SERVICE OFINDUSTRIAL APPRENTICESHIP

IMPORTANT LINKS

ABESPETRO's website: **https://abespetro.org.br/**
ABPIP's website: **http://www.abpip.com.br/**
ACIPET's website: **https://acipet.com/**
ANH's website: **http://www.anh.gov.co/Paginas/inicio/defaultANH.aspx**
ANP's Bidding Round Web site: **http://rodadas.anp.gov.br/en/**
ANP's website: **http://www.anp.gov.br/wwwanp/**
BöingGleich's website: **http://www.bglaw.com.br/en/**
CANADA's website: **https://www.canada.ca/en.html**
Eneva's website: **http://www.eneva.com.br/en/**
EPE's website: **http://epe.gov.br/en**
FIEAM's website: **http://www.fieam.org.br/**
FIEB's website: **http://www.fieb.org.br/**
FIEMA's website: **http://www.fiema.org.br/**
FIEMG's website: **http://www7.fiemg.com.br/**
FIERN's website: **https://www.fiern.org.br/**
FIES's website: **http://www.fies.org.br/**
FINDES's website: **https://sistemafindes.org.br/**
FIRJAN's website: **http://www.firjan.com.br/english/who-we-are/default.htm**
IBP's website: **https://www.ibp.org.br/?lang=en**
MME's website: **http://www.mme.gov.br/web/guest/pagina-inicial**
Petrobras' website: **http://www.petrobras.com.br/en/**
Schlumberger's website: **https://www.slb.com/**
SEBRAE's website: **http://www.sebrae.com.br/sites/PortalSebrae/canais_adicionais/sebrae_english**
U.S Energy Information Administration website: **https://www.eia.gov/**

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