

All-in for the Brazilian oil and gas industry

Part 2: In this second and final installment, the authors examine a potential rebuilding of onshore production, the likely need for some offshore decommissioning, and the status of the country's alternative fuels.

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Last month, this article discussed Brazil's offshore sector, as well as the regulatory environment, the government's plans to support Petrobras, pre-salt development, and the role of technology in enabling the E&P sector. This month, we look at Brazil's onshore oil and gas (O&G) picture, mature oil fields revitalization, and decommissioning.

ONSHORE/OFFSHORE CHALLENGES

Onshore O&G picture. Although Brazilian crude oil production was started by developing onshore fields, it is correct to say that onshore sedimentary basins in the country are highly unexplored. There is a context for that: in the early years of Petrobras, geoscientist Robert Link was hired to set up the company's upstream department. After a decade of studies, his famous "Link Report" concluded that Brazilian potential for crude production was located only offshore, and probably in very old basins from a geological perspective—there are only two of these in Brazil, one of them being right below the Amazon forest.

This belief led Petrobras to invest much more in R&D—to be able to go offshore—than in exploratory and production Capex for the onshore basins. As a matter of fact, onshore peak production happened 50 years after Petrobras was founded, and represented—at that time—15% of total crude production in Brazil, **Fig. 1**.

Being unexplored does not mean that oil will be found, if one explores it. There are a half-dozen sedimentary basins that have been explored, under the Petrobras G&G mindset. There are other basins, e.g. São Francisco basin and Parecis basin, that are really underexplored. Also, revisiting known areas with a different approach than Petrobras' (e.g. mapping potential in deeper horizons) can make sense.

Mature oil fields. Following this rationale, and in line with the divestment program to sell all onshore assets, there is a governmental program to create a competitive environment in Brazil's onshore O&G—revitalization of mature fields divest-

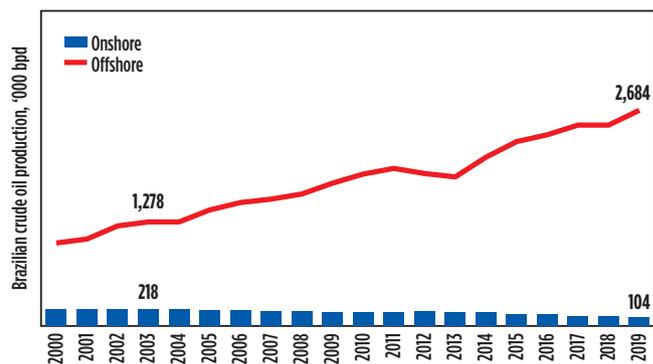
ed by Petrobras, and flooding the market with new exploratory acreage. It's called REATE. Also, an important regulation was finally approved, which is connected to exploratory activities in potential tight/shale geological plays. There are positive expectations in this area. Some discoveries—in tight gas reservoirs, in wells of 6,000 m, TD—have occurred already.

Regardless of the results that the government expects from this process, there are some important challenges: a limited number of fields are attractive for a potential revitalization program, which limits the potential for inorganic growth. It puts a limit on the number of new players, who will first have to focus on cash flow generation before eventually thinking about exploration. The fact that Petrobras "gave up" on the onshore fields some 10 years ago caused a dismantling of the supply chain. This slows and impacts the revitalization efforts and dampens further exploratory effort.

The big question mark is "will there be newcomers to play the long game—acquire acreage and start from scratch—or will exploration only gain traction after the five to 10 companies focusing on revitalization today start thinking about organic growth?" There are over 700 new onshore exploration blocks ready to be licensed, and some activity that was on hold in potential areas for tight/shale geological plays will probably be put in motion. But will someone show up for the bids, particularly for the new onshore blocks? Are the correct incentives in place—operational, financial and regulatory? It is a bit like the "chicken and egg" story, in that it is unlikely many newcomers will appear, if there is not even a small part of the supply chain that is healthy enough. For example, Brazilian onshore G&G service companies don't exist anymore, **Fig. 2**.

Unless something really big happens unexpectedly, the onshore O&G picture in Brazil will not be reinvented, but it may

Fig. 1. In 2003, onshore oil production represented 15% of Brazil's total output. With Petrobras concentrating on offshore development over the last 15 years, onshore production has fallen 50%. The Petrobras onshore divestment program may redevelop these fields and prompt fresh exploration activity.



be a slow and constant process. That is, if life outside Petrobras can be properly incentivized and, therefore, money can be made. Probably the prize for onshore activities is not very attractive, but apart from a half-dozen people inside Petrobras, who could think of something as mesmerizing as the pre-salt 15 years ago? The O&G industry has uncovered many game-changers over the time; who knows what can come out of a disciplined approach to onshore exploration in Brazil?

Decommissioning. Finally, when we talk about mature oil fields, the word, “decommissioning,” pops up instantly. The efforts to revitalize mature oil fields, especially those fields divested by Petrobras, will postpone decommissioning activities. However, the fact is that over 200 fields, onshore and offshore, will be subjected to decommissioning in the next five to 10 years in Brazil. And in a sense, it resembles the current coronavirus pandemic—it has never happened before, so it’s not clear what has to be done.

Decommissioning is a truly relevant topic in the O&G industry, and Brazil is in the very early stage of mastering this process. The “original sin” is related to the age of the monopoly, where Petrobras could produce an oil field forever, there was

Fig. 2. Petrobras has included the Urucu production cluster in its onshore divestment program. This is Brazil’s largest onshore oil field, in the heart of the Amazon basin. It produces 16,000 bopd and 530 MMcfd. There is still good exploratory potential for natural gas and condensate. Image: Petrobras.

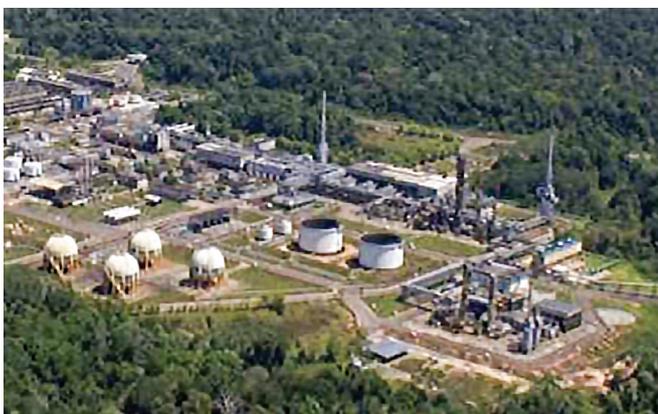


Fig. 3. The Petroleum Law of 1997 established the concession period for a producing field at 27 years. After that, requisition of concession, an extension, or decommissioning of all production facilities would be mandatory. Indeed, there will be cases where decommissioning takes place before the end of the concession period, due to economic reasons. Image: Petrobras.



no regulatory agency to oversee the process, and also, when the Petroleum Law of 1997 was conceived, the production licenses were originally granted for 27 years. This is such a long time that the entire O&G ecosystem did not take seriously the fact that the future would eventually become present, and lack of effective planning is now leading to suboptimal (and painful) execution in decom activities.

The good news is that regulation is undergoing a positive revision, and Petrobras is starting to decommission some of its facilities. But once again, the starting point is almost zero in terms of local capabilities to handle the tasks, with more questions than answers: What’s the best process? Which methodologies should be considered? How should risks be assessed and managed?

It is likely that the old mantra, “demand will create supply” will not work once again. But the lessons from the past are available for the market to learn from: the need for strong coordination on how the work will be deployed; stable contractual terms; and robust risk management policies from both sides, regulator and operators; and the creation of proper incentives for decom capabilities to be created locally. All of these are precedent conditions for this decom process to be successful, **Fig. 3**.

Although complex, the process should be straightforward, embed little bureaucracy, and be as simple as possible. And given lack of proper timely planning, the industry has to accept that the learning curve will not be smooth, learning by doing will be a reality, and regulatory agents will have to be the guardians of the continuous evolution of the process. If Brazil aims for top percentile efficiency from day 1, it will be hard to achieve even 3rd quartile, and the process will be more painful than necessary.

And lastly, Brazil has to learn from other regions and adapt these lessons into local best practices. It will take time, but it can become a successful initiative. But now the clock is ticking. The first-ever decom service bid made by Petrobras is paying the high price of being the pioneer. There is a huge amount of value to be unlocked in this market. The industry just has to find, or craft, the keys to unlock it.

BIOFUELS

Brazil has a long track record in the biofuels arena, having initially developed a very cost-competitive ethanol industry in the 1980s, and also being a pioneer in biodiesel production from the mid-2000s onwards.

The ethanol industry was leveraged by a governmental program that was striving for the replacement of gasoline imports in the midst of the second crude oil price crisis. It has been a successful program in (almost) all dimensions: Brazil’s sugar cane productivity placed ethanol in an important position in the light fuels demand landscape.

Brazil became the global leader in the ethanol market, with plenty of technological evolution in the automobile industry, focusing on either 100%-ethanol engines or “flex fuel” engines. The country today is in a slow transition to a second-generation ethanol production (from pulp) that is twice as productive as sugar cane-based ethanol.

However, every history has its “buts.” The incentives given to build the ethanol industry have created some collateral effects that are still felt today, 30 years later. Brazilian gasoline

was relabeled to “Gasoline C,” which means gasoline from refineries with mandatory addition of ethanol, today at 26% in volume. This is a “captive and eternal” market for ethanol, since there are no car engines built in Brazil today that work with 100% gasoline. And given specificities of the sugar cane plantation and gains of scale of specific regions in Brazil, the market structure moved toward an oligopoly, actually one of the most powerful oligopolies in Brazil, together with LPG distribution and a few others outside the O&G sector.

The possibility of switching between ethanol and sugar has given good flexibility to the ethanol industry, and on several occasions, there was a shortage of ethanol in Brazil because of high international sugar prices. In other words, the oligopoly had all the leverage—captive market, cost-competitiveness, and “lack of commitment” to supply security above captive market. This led to several periods of increased gasoline imports and adverse impact on fuel prices. There were years of 2% GDP growth and +15% gasoline import growth, given high sugar prices in the international market! For some time, this burden was mostly transferred to Petrobras—supply the market and hold inflationary pressures, at any cost.

In normal market conditions, and on an energetic-efficiency basis, ethanol is more cost-competitive than gasoline. For several decades, when internal gasoline prices were not exactly in line with international price parity, ethanol quickly became very important, and the industry experienced huge growth. In its peak of competitiveness, two-thirds of light fuel demand were met by ethanol.

Today, the market structure is more complex, because Brazil became a net importer of low-sulfur gasoline (maximization of low-sulfur diesel production is the modus operandis for Petrobras’ refineries). A lower crude oil price scenario, and a market clearly moving into import parity pricing, are putting pressure on ethanol, given lower gasoline prices. The overall ethanol industry did not evolve sufficiently technologically, and facilities obsolescence has decreased ethanol productivity.

Lastly, the historical tax waivers for ethanol have been under revision. The industry is lobbying for subsidies, but the long game here is moving toward second-generation ethanol production technologies. The industry will have to follow these innovations that aim at a higher-productive operational mode to maintain its competitiveness, but the market structure does not exactly facilitate this task. As said before, oligopolies like the ethanol industry tend to lag a fast pace of innovation.

Biodiesel is more recent in Brazilian’s middle distillates fuel market. Conceptually, it seems to be a “no brainer” to a country in which diesel represents 50% of oil product demand. But the biodiesel industry was actually created with secondary and perhaps more important goals, like job creation. A captive market also was created for biodiesel, but gains-of-scale were not created, such as in ethanol, and product quality has proven to become an issue when blending refinery diesel and biodiesel.

There is also the discussion of the trade-offs between agricultural production for food or for fuels, since the feedstock for the process might be the same—indeed, technologies using residues to produce biodiesel is in the midst of the discussion of product quality. On the topic of the trade-offs between agricultural production for food or for fuels, Petrobras recently tested in one refinery the use of oil from soybeans directly as feedstock for hydrotreaters. It was a big success, and the term,

Fig. 4. Following its strategy to include renewable sources of primary energy in its global portfolio, Equinor has recently applied for preliminary environmental licenses for the Aracatu project in southeastern Brazil. Image: Equinor.



Table 1. Biodiesel is being used in Brazil in a mixture with mineral diesel of 10% to 12% in volume. Source: Greenea.com.

Properties	Mineral Diesel	Biodiesel	Green Diesel
Sulfur, ppm	10-500	-	-
Cloud point, °F	23	23 to 32	-32 to 23
HHV, MJ/kg	43	38	44
Cetane Number	50	50 to 65	70 to 90

“green diesel,” was created. If this technological approach is confirmed as viable on a larger scale, biodiesel as we know it, tends to become less competitive, and the “food or fuel” trade-off will have to be analyzed in more depth, **Table 1**.

Having said that, and recognizing the mistakes from the past and the lessons that can be learned, Brazil has the potential to be a leader in biofuels in a world moving toward non-fossil fuels. Some market distortions have to be corrected in the direction of creating a healthy, competitive market, based on high-edge technologies and focused on cost-competitiveness, weighting properly the positive externalities to avoid value destructive “distractions.”

RENEWABLE ENERGY

Energy resources have always proven to be very friendly to Brazil—vast potential in hydropower generation, almost no coal and nuclear plants in the energy matrix; natural gas kicking in strongly since the 2000s; and an impressive potential for what has been the new trend in non-fossil fuel energy generation technologies—solar and wind powerplants, **Fig. 4**.

Being a continental country with diverse climate conditions, the existing Brazilian potential is not at all surprising. Especially in northeastern Brazil, the potential for energy generation from wind farms is very high and can boost the local energy market’s competitiveness. While not a game-changer for the entire country, it can be very effective for the poorest regions in northeastern and northern Brazil. Photovoltaic powerplants seem to be even more of a local solution than wind powerplants. Regulation favors small plants and even domestic utilization of solar panels.

But to include this topic in the agenda of the oil companies seems to be a distraction, even though it may sound like a positive agenda in the context of a less carbon-intensive energy ma-

trix. There are much more effective efforts that oil companies can deploy in this direction: CO₂ capture, even biofuels.

In Brazil, Petrobras seems to be moving in the right direction and divesting its “renewables power gen” assets. Surely there are a lot of economically and environmentally attractive opportunities in wind farms and solar panels, which can prove to bring efficiency and competitiveness to Brazil’s energy matrix. But the country (and possibly the world) should incentivize a new industry to arise, not come up with “distractions” for oil companies that are currently facing relevant challenges in their core businesses.

CONCLUSION

In the movies, people tend to like the original movie rather than the sequel. In the case of Brazil’s O&G industry, one should wish that the sequel is much better than the original movie.

It’s not like the last decade was a box office total failure. The pre-salt was the most exciting achievement in offshore oil of the decade, and technological breakthroughs in this area have paved the road to the future. There are still some challenges that have not been fully solved (e.g. contaminants in the natural gas, mainly CO₂), but solutions must be on the way.

Additional offshore work. The perspectives for this decade are quite promising, with the potential of 15 or more FPSOs coming onstream, and relevant exploration efforts in the areas subjected to PSAs, in which Petrobras has a smaller average working interest than in pure concession-based “pioneer” pre-salt areas. Global crude oil prices and production development challenges (e.g. monetization of natural gas and weak local supply chain) are the main topics that will determine the pace of this development. As said before, it’s likely that pre-salt production will be two times higher by 2030, when compared to 2019.

Looking at the fundamentals of the global O&G market, Brazilian economy, infrastructure, domestic supply chain and regulatory challenges, and also the financial turmoil given the coronavirus pandemic, one may conclude that the next decade will be even more challenging than the previous one. The pandemic will probably lead to new strategies for the industry, and probably to lower cash flow generation and lack of liquidity in the debt-market, given the industry’s risk aversion.

The Brazilian economy is weaker than 10 years ago, and it will probably suffer for at least a couple of years, struggling to get back to its pre-crisis level. And in this context, where there are limitations for the government to come up with innovative industry policies directed to the O&G sector, one can correctly assume that the quite ambitious “30 years in 10” plan does not fly by itself.

There is a mismatch between expectations and capabilities that will probably lead to results beyond the actual potential of the Brazilian O&G landscape: large base of high-quality upstream assets and a domestic market for oil products that can grow, if the right conditions are in place—price competition linked to international parity, infrastructure expansion, and some economic growth.

Operators’ role. The operators must take a stand and lead the efforts to further develop upstream O&G. The government will be involved in some different dimensions to recover from a probable post-coronavirus pandemic recession. One cannot

assume that they understand the needs of the industry, so they have to be educated. Petrobras today is probably the “softest” NOC in the world, when it comes to an overall governmental agenda, and although still relevant, all the O&G majors have stakes in Brazil, and yes, they do have a voice now. The government has to be educated, in order to negotiate more favorable conditions for O&G market development by playing the long game without over committing to short-term incentives. From this interaction, innovative solutions will probably appear.

The revitalization of mature oil fields divested by Petrobras will bring some dynamic to the market. It will create value for small and mid-sized companies, but it won’t be a game-changer. The same can be said for onshore activities, with the difference that the long game of exploration can deliver unforeseen results and become a game-changer. The biggest challenge here is to rebuild the supply chain and make it cost-effective.

The immature decom market presents opportunities for value creation, especially now that the regulatory agency, ANP, took ownership of the process. Risky opportunities exist, especially in “pilot projects,” but there is a lot of value to be unlocked.

Additional initiatives. Biofuels are relevant, especially ethanol, but some structural changes must happen for Brazil to recover its cost-competitiveness and global leadership in the sector. There is a governmental program named “RenovaBio” to support initiatives in this direction. And while relevant and potentially a good play for specific geographies and specific companies (not oil companies!), solar and wind power generation seem to present good opportunities.

The “30 years in 10” initiative is likely to move into “30 years in 15,” in a realistic scenario. Some level of coordination of this whole plan, maybe an “assembly of notables” from government and oil market players, to develop ideas to move the O&G industry closer to “pareto efficiency,” is an idea that might work. The Brazilian Petroleum Institute is a non-profit organization devoted to the O&G market, where all companies have a voice. It could trigger discussion of the value levers that have to be pulled to put things in motion. Some other associations and think tanks in Brazil can make this effort even more robust.

Finally, cooperation seems to be a key word for Brazil’s O&G industry. For investors, either newcomers or “oil lovers,” there are opportunities worth investigating. The menu is quite comprehensive for all levels of risk aversion. Who knows whether Brazil will finally fulfill the ever-existing prophecy of becoming the country of the future, which (ironically) is what the society has been expecting since 1500. **WO**

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