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OPINION

by **Heloisa Borges Esteves**, Director for Oil, Gas and Biofuels studies at the Energy Research Office (EPE)

Our time is up, the time is now

Strategic Plan 2021-2025 – Petrobras

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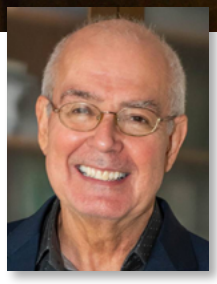
Special interview

Mauro Destri, president of Destri Consulting

'TO GO AGAINST THE PESSIMISM'



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Our time is up, the time is now

Opinion of **Heloisa Borges Esteves**, Director for Oil, Gas and Biofuels studies at the Energy Research Office (EPE)

Our time is up, the time is now

articles

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seções

THE RESILIENCE TLD

The Covid-19 pandemic (Coronavirus Disease 2019) impacted the world, which, however, does not seem to have realized that the effects of this new 'version' of SARS (Severe Acute Respiratory Syndrome) , a virus described as a coronavirus in 1960 and which caused an epidemic in 2003, will continue for quite some time. Not only because of the number of infected people, who approach 80 million, but also because of the more than 1.7 million dead and another 100 thousand in critical condition.

We were barely out of the biggest crisis in the history of the Brazilian oil and gas industry when we were literally 'swept away' by the coronavirus wave, which shows no signs of losing strength. However, as in all crises, this one also showed us the strengths of this sector, which has an important role in pre-salt Brazil. The oil and gas production chain gave an unmistakable demonstration of the maturity of its health, safety and environment policies, as it was able to quickly establish guidelines in the face of this new biological risk, especially in offshore operations or that involve some type of containment.

More than that, the industry not only created and incorporated new tools to monitor and control the health of human capital, but also assumed a crucial social role in combating Covid-29, supporting, financing and actively participating in initiatives to assist the treatment of people infected - from the installation of basic hospitals to the production of equipment, such as vents, among other measures.

Even impacted by the effects of Covid-19 on the economy, intensified by the divergences between the major world producers - Organization of Petroleum Exporting Countries and allies (OPEC +) and the United States - the Brazilian industry has shown its resilience. Mainly from its offshore projects in the pre-salt, which has been recording successive productivity records per well and today accounts for more than 70% of the national oil and gas production.

A new exploratory frontier in which oil companies have been continuously investing in new technologies, betting on the potential return on these assets. This is the case of Petrobras, which reformulated its portfolio, increasing the divestment portfolio and prioritizing projects with breakeven prices of US $ 35 a barrel of Brent, with the proposal also to pay more dividends to shareholders, as the reader will assess in the article cover.

But it is not only the pre-salt that reveals this resilience of the Brazilian industry, which still has in the revitalization of mature offshore fields as well as in the emerging decommissioning market opportunities for all, as highlighted by our interviewee Mauro Destri, who had a proposal presented in digital events materialized in the Maritime Fields Production Revitalization and Incentive Program (Promar), approved by the National Energy Policy Council (CNPE) on December 9.

The fact is that this 'long-term test' (TLD) of the pandemic left clear evidence that the quarantine was productive for this industry and left us with important lessons that we need to move forward safely in the face of adversity. Brazil and Brazilians need us all. ■

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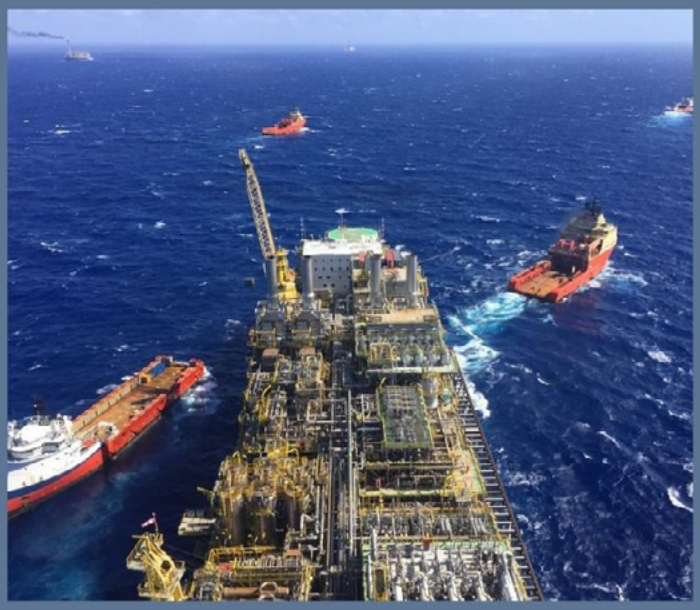


MME launches on March 11, the Maritime Fields Revitalization Program - Promar

MINISTRY OF MINES AND ENERGY (MME) launches, in an online event promoted by the Energy Research Company (EPE), on March 11, the Program to Revitalize and Encourage the Production of Maritime Fields (Promar). The program seeks to create conditions for the revitalization of mature maritime fields and to improve the economic use of accumulations of oil and natural gas considered to be of marginal economy.

Established by means of Resolution of the National Energy Policy Council (CNPE) No. 10/2020, Promar aims to make better use of national oil resources and to increase the payment of government participation. In addition, the program aims to generate jobs and expand the industry of goods and services aimed at the exploration and production of oil and natural gas in offshore areas.

The event will count on the participation of the Minister of Mines and Energy, Bento Albuquerque, and representatives of the EPE, the National Agency of Petroleum, Natural Gas and Biofuels (ANP), parliamentarians and members of the industry. In addition, a presentation will be made by the MME on Promar's dynamics and next steps.

Launch of Promar

Live broadcast: www.bit.ly/LancamentoPromar ; Date: March 11 Time: 2pm ■

Divestment Plan - Petrobras starts binding phase of Carmópolis Cluster

PETROBRAS INFORMS the beginning of the binding phase regarding the sale of all of its stakes in a set of 11 onshore production field concessions, with integrated facilities, located in the state of Sergipe, jointly called the Carmópolis Cluster.

Potential buyers qualified for this phase will receive a process letter with detailed instructions on the divestment process, including guidelines for due diligence and the submission of binding proposals.

This disclosure complies with the Petrobras' internal rules and with the provisions of the special procedure for assignment of rights to exploration, development and production of oil, natural gas and other fluid hydrocarbons, provided for in Decree 9,355/2018.

This transaction is aligned with the strategy of portfolio optimization and the improvement of the company's capital allocation, concentrating increasingly its resources on world-class assets in deep and ultra-deep waters, where Petrobras has demonstrated great competitive edge over the years.

About Carmópolis Cluster - The Carmópolis Cluster comprises 11 onshore production concessions, located in different municipalities in the state of Sergipe, and includes access to infrastructure for processing, offloading, storage and transportation of oil and natural gas.

The Atalaia Cluster, which contains, among other assets, the Aracaju Waterway Terminal (Tecarmo) and the Bonsucesso-Atalaia Oil Pipeline, which flows the oil production from the concessions to Tecarmo are also part of the Carmópolis Cluster.

In the year 2020, the average production of the Carmópolis Cluster was around 10,000 barrels of oil per day and 67,000 m3/day of gas. Petrobras is the operator in these fields, with 100% stake. ■

Electric Power - With 67,436 average MW, electricity generation had the highest increase in 2020 during the 4th quarter

CONSOLIDATED DATA by the Electric Energy Trading Chamber - CCEE point to a 2.7% growth in both energy generation and consumption in the fourth quarter of 2020, compared to the same three months of 2019. The period recorded the largest positive changes in all last year.

The production of hydroelectric plants fell 1.4% in relation to the same period of the previous year. The photovoltaic solar decreased by 1.3%. Thermal generation had a growth of 14.7% and reached the mark of 16,699 average MW. Wind farms generated 3% more in the period, reaching 7,641 MW. In total, 67,436 average MW were generated in the National Interconnected System - SIN.

In the view of consumption, the Free Contracting Environment (ACL) grew 10.5% in the months from October to December, compared to 2019. This expansion was due not only to the increase in production, notably in electro-intensive sectors, such as the extraction of metallic minerals, textiles, non-metallic minerals and metallurgy and metal products, as well as the increased migration of consumers from the Regulated Contracting Environment (ACR). In the year, there were 1,522 new consumers who joined the segment.

In the ACR, there was a negative variation of 0.7%. Total consumption in the period was 67,385 average MW.

December Results - According to the consolidated data of CCEE, in the last month of the year, both consumption and power generation increased by 4.6% in the annual comparison, totaling 67,687 average MW. The highlight was the production by wind farms, which grew 12.9%, and thermoelectric plants, which rose 30.1%.

Consumption, in turn, was driven by the 14.5% increase in the free market. In the regulated environment there was also a slight increase, of 0.6%, compared to December 2019. ■

PPSA - The Union's share in the sharing regime in 2020 was 2.9 million barrels of oil and 32.2 million m³ of natural gas

THE FEDERAL GOVERNMENT was entitled to 2.9 million barrels of oil and 32.2 million cubic meters of natural gas from the total produced in 2020 in contracts under the regime of sharing in the Pre-salt Polygon. The information is part of the Monthly Bulletin of Production Sharing Contracts prepared by Pré-Sal Petróleo (PPSA), manager of the contracts on behalf of the Union. Currently, of the 17 contracts that operate on a sharing basis, three are in production - Area of Development of Mero (Libra), Surroundings of Sapinhoá and Tartaruga Verde Sudoeste, operating four FPSOS and 18 wells. In 2020, the total production of these contracts totaled 16.3 million barrels of oil and 89.7 million cubic meters of natural gas available for sale.

In oil production, the result in 2020 highlights the Mero Development Area as the main producer in the sharing regime, accounting for 57% of the accumulated total (9.3 million barrels), followed by the Tartaruga Verde Sudoeste fields (25% , 4.1 million barrels) and the Surroundings of Sapinhoá (18%, 2.9 million barrels). In the production of natural gas available for sale, the Entorno de Sapinhoá fields were the main producers, accounting for about 65% of the total accumulated with 58.7 million cubic meters. The natural gas produced in Mero, with a high CO2 content, is being injected into the reservoir for an effective increase in oil production. So far there is no forecast for its commercialization.

In the parcels of the Union, Entorno de Sapinhoá recorded the largest surplus in accumulated oil, about 55% of the total (1.58 million barrels), and also the largest surplus in available natural gas accumulated to be marketed by the Union, around 99 , 6% of the total (32.1 million cubic meters).

Since the beginning of the production of the sharing regime, in November 2017, until December 2020, the Union has accumulated a production of 7.7 million barrels of oil and 52.4 million cubic meters of natural gas.

December 2020 results:

Oil - In December 2020, the average of the total production in sharing regime was 47 thousand barrels of oil per day (bpd) in the three contracts, being 29 thousand bpd in the Mero Development Area, 7 thousand bpd in Surroundings Sapinhoá and 10,000 bpd in Tartaruga Verde Sudoeste. The daily average of the total Union oil surplus in the three sharing contracts was 8.6 thousand bpd, of which 4.3 thousand bpd in the Mero Development Area, 4.2 thousand bpd in Entorno de Sapinhoá and 39.2 bpd in Tartaruga Verde Sudoeste.

Natural Gas - In December, the average daily production of natural gas was 238 thousand m³ in the two contracts with commercial use of natural gas, with 160 thousand m³ / day at the CPP of the Surrounding of Sapinhoá and 78 thousand m³ / day at the CPP of Southwest Green Turtle. The daily average of the Union's natural gas share was 92,000 m³. ■

Local Content: ANP holds second public hearing on TAC of local content

ANP HELD ON FRIDAY (2/12) the second public hearing on the draft resolution that will regulate the terms of conduct adjustment (TAC) of local content. The proposal is that, instead of paying fines for non-compliance with local content commitments (arising from certain contracts, not added by ANP Resolution No. 726/2018), companies make new investments in national goods and services, in order to stimulate the Brazilian industry.

When we succeed in promoting this new commitment, we return to the core of the local content policy, which is the acquisition of goods and services in the country, promoting the national industry. What we want is to generate jobs and income, which is the main objective of the policy" , said ANP director Dirceu Amorelli at the opening of the hearing.

Local content commitments are those assumed by companies, in oil and gas exploration and production contracts, to contract a minimum percentage of national goods and services. For a TAC to be signed, there must be a sanctioning process, and the sanctioning process must be related to contracts that could not be amended by ANP Resolution No. 726/2018, charging a fine for non-compliance with these commitments. The idea is to replace the fine with new investment commitments in the local industry.

Changes to the original draft - The topic had already undergone public consultation and audience in 2020, but there was a change in the draft resolution with the aim of making the TAC more attractive. Due to the change, the ANP held a new consultation and hearing, ensuring greater transparency and legal certainty.

The original resolution draft established the maintenance of the two processes, the TAC and the sanctioning process. The second would be suspended and would only be filed at the end of the TAC, if it was fulfilled. If the TAC was not met, the company would pay a fine for this non-compliance and would also have the sanctioning process resumed from where it left off, and could pay another fine at the end.

The new draft, on the other hand, proposes that the TAC replace the sanctioning process, that is, that the second be filed when the term is concluded. Thus, in case of non-compliance, the operator will pay a fine only for non-compliance with the TAC.

As the signing of the TAC is optional for operators, the change aims to encourage the participation of these companies, increasing investments in the national industry. In addition, the new rules do not discourage the process of assigning rights, as could occur with the original proposal.

The new draft resolution passed a 45-day public consultation, during which 62 contributions were received. The suggestions received at the consultation and at the hearing will be evaluated by the technical area, to change or not the original draft. The consolidated text will undergo legal analysis by the Federal Attorney's Office at the ANP and approval by the Agency's collegiate board, before its publication. ■

‘TO GO AGAINST THE PESSIMISM’

It was an extremely productive quarantine for consultant **Mauro Destri**, who has participated in several digital events in which he presented a bold proposal: that of a government program that would boost the revitalization of mature and marginal fields in the offshore environment. The tireless Destri, who has spent more than 30 years at Petrobras, mobilized so many people around the proposal, which he called REMAR, that it was 'sponsored' by the Secretary of Petroleum, Natural Gas and Biofuels of the Ministry of Mines and Energy (MME), José Mauro Ferreira. Result: to go against the pessimism and inertia caused by the Covid-19 pandemic, Destri saw his idea materialize under the name of the Program to Revitalize and Encourage the Production of Maritime Fields (Promar), by the National Council for Energy Policy (CNPE) . The formal launch was made in January in Macaé, the strategic base of the production hub in the Campos basin, in which are the major assets that Promar intends to leverage.

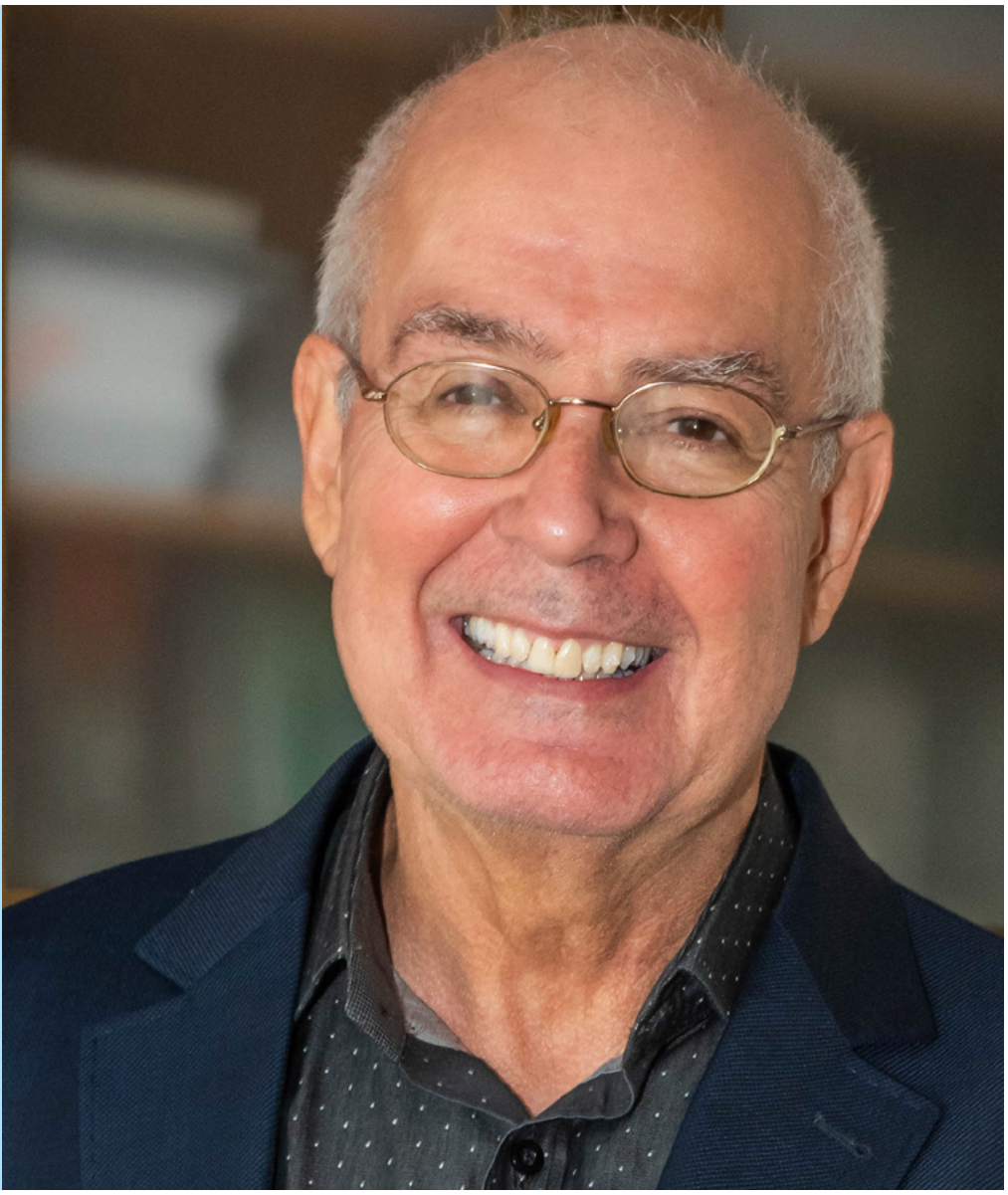
As the Roman general Pompeu said, to encourage fearful sailors, “Navigare onecere, vivere non est necesse”, which the Italian Petrarch immortalized in the expression “Navigating is necessary, living is not necessary.” After all, we are talking about an industry that has learned to navigate, even against the current: that of oil and gas!

By **Beatriz Cardoso**

T&B Petroleum - **On December 9, CNPE approved a resolution creating the Program to Revitalize and Encourage the Production of Maritime Fields (Promar). In other words, it incorporated its proposal, nicknamed Remar, of a program focused on mature and marginal fields, similar to Reate (Program to Revitalize the Exploration and Production of Oil and Natural Gas in Terrestrial Areas). The name does not matter, as we know who is responsible for this program. How do you feel about this important victory?**

Mauro Destri – Analyzing Reate, which has the same objective, which is to revitalize mature fields, but on land, and uneasy about the paths that the segment of mature and marginal fields are taking, I thought about “hitting” the program to the sea. In spite of many thinking, my original idea is not restricted to mature and marginal fields in shallow waters, but it covers all Brazilian offshore that is in this condition; so even Marlim, for example, fits in the series of modernizations and / or regulatory adjustments (I don't like the term benefit, it reminds me of assistance and operators don't need it) that such a program can provide, from problems with environmental licensing, to through challenges in the midstream and downstream to deal with suppliers of goods and services. Thankfully, I found ‘chorus’ at MME secretary José Mauro Ferreira, who in record time leveraged the program.

We now have 120 days ahead (extendable for an equal period) for proposals to be presented to the collegiate body. Which can take a year or more, as we have seen with other programs, which took time to



Reate into consideration, we saw that the mobilization of the most significant representatives of Industry, associations, class entities, regulatory bodies, lawyers, operators, suppliers of goods and services, legislative and executive powers of states and municipalities, generated a true tsunami around the program.

get off the ground. How to streamline this process, since it is important to leverage the revitalization of mature fields, postponing their abandonment and generating return for investors?

Still taking Reate into consideration, we saw that the mobilization of the most significant representatives of Industry, associations, class entities, regulatory bodies, lawyers, operators, suppliers of goods and services, legislative and executive powers of states and municipalities, generated a true tsunami around the program: the stages were accelerated, we had a series of meetings, events and also the mobilization of the CNPE itself, which in record time created RCNPE 04/2020, which guides the National Agency of Petroleum, Natural Gas and Biofuels (ANP) to create a new resolution, now in progress, for modernizations in the form of royalty collection. So, if all this was done with commendable speed for the onshore, why not expect the same for the Brazilian offshore, whose prospects for gains are much greater?

What are the main points that should be included in this program, whose objective is "the better use of national oil resources, the increase in the payment of government participation, the generation of jobs and the expansion of the goods and services industry focused on the exploration and production of oil and natural gas in maritime areas?

I consider the points below to be crucial, which can and will be studied by all subcommittees or WGs (working groups) that, I believe, should be created. When I presented my proposal in several forums, including ANP and MME, I stressed that it was necessary:

• Create a regulatory framework suitable for mature and marginal fields at sea;

• Encourage the use of resources in reservoirs with low permeability;
• Increase the competitiveness of the medium and small national offshore oil industry;
• Stimulate local and regional development;
• Employment and income generation;
• Maintenance and / or increased demand for local personnel, infrastructure and services;
• Maintenance and / or development of the local and regional supply network for goods and services;
• Adequate use of funds from oil and gas production activities;
• Improvement and technology innovation to increase RF;
• New bidding criteria to make exploratory blocks of permanent offer more attractive;
• Revitalize E&P activities in mature and marginal marine areas.
The most attentive reader will see that some of the points mentioned here have already started to happen, not exactly because of the program, but because it was evident the need for such modernization, such as, for example, permanent auctions.

When you proposed Remar, now Promar, for MME and ANP, the idea was that the O&G industry, from operators to the various suppliers of goods, services, associations, entities, municipality, among others, could take advantage of the advantages that a such a program can bring modernization to the sector. In this context, how do you see the program? What regulatory modernizations would you like to see carried out?
When I thought about the program, I saw several advantages, for example, the preservation of the national interest; maintaining and / or increasing demand for local personnel, infrastructure and services; generation of income and employment, since the offshore activity of mature and marginal fields contributes to the promotion of economic activity; maintenance and / or increase in revenue allows improvements in education, health and safety and the valorization and growth of national energy resources, among others. All of them would, in themselves, be linked to the objectives mentioned above, elements of collimation of the most diverse actors, as in the case of Reate. However, in the various forums in which I participated, I could see other values and advantages that could be incorporated over time. Returning to your question, regarding the necessary modernizations, in terms of technologies to reduce / optimize the costs of independent operators that are eager to revitalize mature fields, they need to be accompanied by a healthy and legally sustainable and credible environment for these players to invest. As for regulatory aspects, we have the issue of financial guarantees, now in the stage of assessing contributions during the public consultation, which were too valuable for the industry and which, I hope, are also valuable from the point of view of the ANP. Added to this, the need to modernize resolutions that deal with the categorization of companies as micro or small (ANP Resolution 32/2014) and the adequacy of collection and royalties, now underway, in the wake of Resolution CNPE 04/2020.

At the beginning of the year, Rystad Energy estimated that decommissioning investments could reach US $ 42 billion by 2024, mostly in the North Sea (with 23 production assets hibernated annually by 2024). With 20 plans for approved offshore installations and another six under analysis at the ANP, Brazil was identified as having the potential to become the third world decommissioning market, behind the North Sea and Gulf of Mexico. Can Promar slow down this process or are there assets (fields and UEPs) that need to be effectively decommissioned in the coming years?
Let's do it by steps. There are those assets that need to be decommissioned for various reasons, such as the nine Marlim units, as a result of the field revitalization project, in which two new FPSOs will be installed precisely in the area covered by the other UEPs. In addition, other reasons (such as security) add the 19 assets with the Decommissioning Facilities Program (PDI) approved. Now, without a doubt, Promar, like all possibilities of technological, regulatory and legal gains, and of the goods and services supply chain itself, will certainly lead to the postponement of the decommissioning of several assets.

Petrobras, in its SP 2021-2025, maintained 18 units in decommissioning projections (exchanged P-12, already decommissioning, for P-47, from Marlim), but reduced from US $ 6 billion to US $ 4.6 billion the volume of resources planned for that purpose. What can generate this reduction of more than 20% of the projected in 2019 values, if the number of units is the same and the P-47 is something more complex?
Only Petrobras could effectively respond to this, but some clues may lead us to conjecture. Petrobras is divesting assets and, consequently, negotiating with the new operators for them to decommission lines, pipelines and subsea equipment in these areas. For example, the entire submarine system covering the P-07, P-12 and P-15, was the responsibility of the new operator that starts operating in the central south area. There are hundreds of kilometers of lines, more than a dozen subsea

equipment, etc; much more complex than the P-47 decommissioning program, for example.

Decommissioning projects need to enter the routine of companies that operate or will operate in mature fields, avoid the temptation to see them as a "necessary evil", but rather seen as a vector of revenue generation, exactly as in a project of commissioning, dedicating time and skills, optimizing all resources available to the organization. In this context, do you believe that the chain of goods and services is already adequate or adapting to meet this demand?
Our supply chain of goods and services, having been in the industry for over 30 years, is one of the most prepared for challenges like this. International companies that have fleets of vessels capable of decommissioning large structures in seas outside Brazil already operate in the country. Abandoning wells is part of our daily lives, just as it is in our routines to collect lines and equipment, undo UEPs and transport them wherever we go. We are ready. What's missing then? First, start doing effectively. Second, modernization of environmental regulations and, finally, lastly, adapting our ports and shipyards, properly licensing them and modernizing regulations and laws that deal with taxation. The good news is that, with the delay in carrying out large-scale decommissioning (after all, we have talked about it since 2014), many shipyards are preparing properly.

Based on the current laws that regulate the decommissioning activity, such as Resolution nº 817/2020, which gathers the regulations in force until then, consolidating itself as a new regulatory framework in decommissioning and is endorsed by the three main authorities involved (ANP, Brazilian Institute of the Environment and Renewable Natural Resources / Ibama and Navy) is it possible to safeguard the technical, environmental, economic and quality aspects?
Absolutely sure. This resolution, in itself, was an immense gain for the country and, certainly, the environment will be preserved, more than ever. However, I remember that operators and regulators go through a learning process with regard to decommissioning. We have a more organized scenario than before. But there is still a lack of greater alignment of deadlines in the environmental aspect between Ibama and ANP. My interpretation is that it is still loose. As for being economically protected, it will be more aligned when the resolution of the financial guarantees for decommissioning comes out.

> There are those assets that need to be decommissioned for various reasons, such as the nine Marlim units, as a result of the field revitalization project, in which two new FPSOs will be installed precisely in the area covered by the other UEPs.

Plug and abandon is a key step and there are already companies that are thinking about solutions that will increase the reliability of this process. What innovations in technological solutions do you consider vital for this process to be even more secure and reliable?
The abandonment of wells, precisely because it is the most costly discipline in Decommissioning projects, has been having, by companies providing well services and its outsourced companies, a tireless and incessant demand for new technologies or even reconfigurations of technologies already consecrated and they all go through an exhausting process of approval of such new ideas. So, I understand that what is said today as safer and less expensive, tends to be outdated tomorrow. The other day a company presented me with a prototype for abandoning wells that would dispense with conventional tools (I cannot go into details due to a confidentiality agreement), but it has already started its pilgrimage by operators and regulatory bodies that, if approved, will be totally revolutionary.

Petrobras has been demanding from companies decommissioning work references, carried out in Brazil or abroad. Now, if this was not done before, how can national companies have this reference, even if they are trained and with foreign partners? How can you avoid being dismissed from this process and having your chances reduced?
They will not be. Petrobras seeks to protect itself against such requirements. After all, the responsibility is immense. An accident, depending on the dimensions of the decommissioning project (DECOM), can have catastrophic consequences for the environment and the company's ima-

ge - a very valuable asset. However, the operator understands that if we do not have experience in all phases, we can associate with foreign companies that have this expertise. In key disciplines such as the environment, wells, collection of lines and submarine equipment, undocking and transport of UEP, we are among the best in the world. So, a consortium, a partnership is the best of all worlds. I am not afraid of barriers.

Is there currently any solution to minimize the negative impacts of coral-sol, mainly because it is a problem that Petrobras faces in some of its units in the Campos basin?
We don't have a ready-made, standard solution. We have a lot of research on the subject. According to the ANP (faq-descomissionamento-01072020.pdf), the only effective measure to prevent further spread of the sun coral is the scraping of the encrusted equipment. The export of the facilities would only be viable for the region where the species originates, Southeast Asia. Even so, it would not be feasible to export all the equipment. I see some control measures that can and should be applied in the Campos basin, such as antifouling paints and the cleaning of the hulls of vessels arriving in Brazil. For support vessels, inspection and docking for cleaning. The removal in vessel hulls can be done with containment and routine cleaning of the vessels, thus preventing the development of the sun coral. But all of these suggestions, in real life, have to be projects approved by environmental agencies.]

During all the years of activity of a production unit, its production process generates several radioactive residues, many of which are stored in these production units. Do you believe that it is possible to transport these products to land, develop a way to treat them and reduce the possibility of environmental impacts during the decommissioning process?
TNORM CAT I[1] already has a solution, it disembarks with complete safety and it is possible to treat and dispose of it in landfills. But TNORM CAT II, is equivalent to radioactive waste from nuclear power plants, whose regulation is the responsibility of the National Nuclear Energy Commission (CNEN). For this the only viable solution is the packaging in its own containers and stored in areas under monitoring "Ad eternum "Of the operators" owners "of the tailings, according to CNEN NN8.01 in duly licensed locations.

After all, which one to choose: decommission or revitalize ???
Both! And this is positive for the industry, for the supply chain of goods and services, for municipalities, states, the country as a whole. A new industry is now emerging that will generate around R $ 26 billion, according to the ANP. There will be 19 decommissioned assets by 2025, which puts us in third place in the world in terms of spending on such a new industry, behind only the GOM and the North Sea, which in contrast, do not have the strength of our industry when we talk about commissioning. On the other hand, see what revitalization brings us encouragement in relation to the 'dark cloud' that they have placed on Petrobras' divestments. The independent operators that come to acquire assets (only for 2020 we have 20 teasers offered, from small onshore fields to the magnificent fields of Marlim and Albacora) arrive bringing fantastic results. It is good to remember that, as they are fields of Round Zero, they would have to be decommissioned if they were not sold and that, given the preference in the portfolio to develop the pre-salt, Petrobras would inevitably do so. Some examples below show the success of the strategy, which will ensure the payment of government stakes, as well as the maintenance and / or increase of jobs, the relationship with the entire supply chain, etc.
Perenco: in two months of operation it has already doubled the production of its fields (Pargo, Carapeba and Vermelhos) and, as informed in some webinars by its directors, it has already requested a life extension from 2025 to 2040. Imagine the need for critical resources to revitalize a active over 30 years;
Trident: production is already increasing and its useful life has been extended beyond 2040 of giant assets such as the PPM-1, PCE-1, P-08 and P-65 platforms, with the same benefits mentioned above;
Potiguar: in one year of operation, it has already achieved an unthinkable increase in production in the onshore field of Riacho da Forquilha, with the same benefits - a balm for independents entering this market.
Anyway, we have to be realistic; over time, the fields lose their strength and there is a need to decommission assets. So, live decommissioning with its countless opportunities. However, there will be those fields that can be revitalized by operators specializing in this. So thanks for the revitalization. The Brazilian is perhaps one of the most resilient beings in the world and, now, once again we will be tested and, for sure, we will pass with praise.

Editor's note - Mauro Destri gave this interview in record time, even though he was in isolation due to being infected by Covid-19. Which did not stop him from teaching a 'lesson' on the subject. Thanks for your preference, Destri!

[1] **TNORM** is the acronym for naturally occurring radioactive materials technologically concentrated ■

Photo: Petrobras Agency

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Strategic Plan 2021-2025 – Petrobras

The DDD plan

Divestments (US $ 25 to 35 billion) and distribution of dividends (in similar amounts) are the main points of Petrobras' strategic plan for the five-year period 2021-2025

By **Beatriz Cardoso**

With a cut of more than U $ 20 billion in investments scheduled in relation to the previous plan (dropped from US $ 75.4 billion to US $ 55 billion) and expansion of the divestment portfolio, Petrobras wants to ensure the remuneration of its shareholders from U $ 25 to 35 billion in this period, in line with the transformational agenda announced in 2019, supported by five pillars: maximizing the return on capital employed, reducing the cost of capital, relentless pursuit of low costs, meritocracy and respect for people and the environment and focus security of operations.

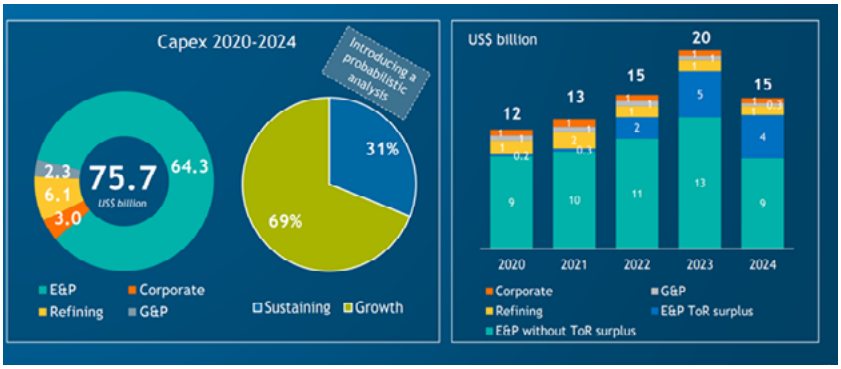
The Strategic Plan 2021-2025 announced by Petrobras on the last day of November, on the eve of the first digital Rio Oil & Gas, was impacted by the devaluation of the real, the reduction and optimization of exploratory investments, the avoided investments with the sale of assets and the review of the project portfolio. It also reflects the world pandemic year of Covid-19, which by the beginning of December had already accounted for more than 66 million cases and 1.5 million deaths (of which almost 12% in Brazil).

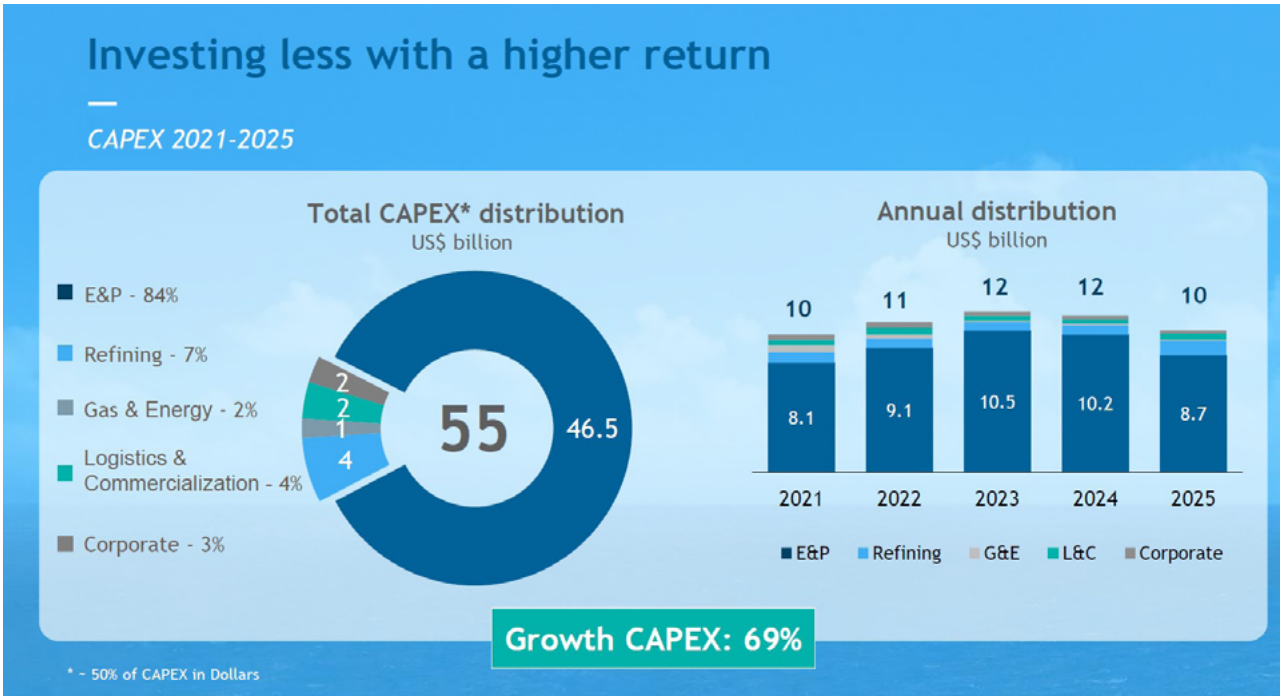
The increase in the divestment portfolio, which implies an increase of US $ 5 billion, is the result of a projection that did not materialize, since the oil company confirmed the receipt in the first three quarters of 2020 of only US $ 1 billion with the sale of assets - not something equivalent to the US $ 5 to 6 billion previously estimated (annual average of the previous plan).

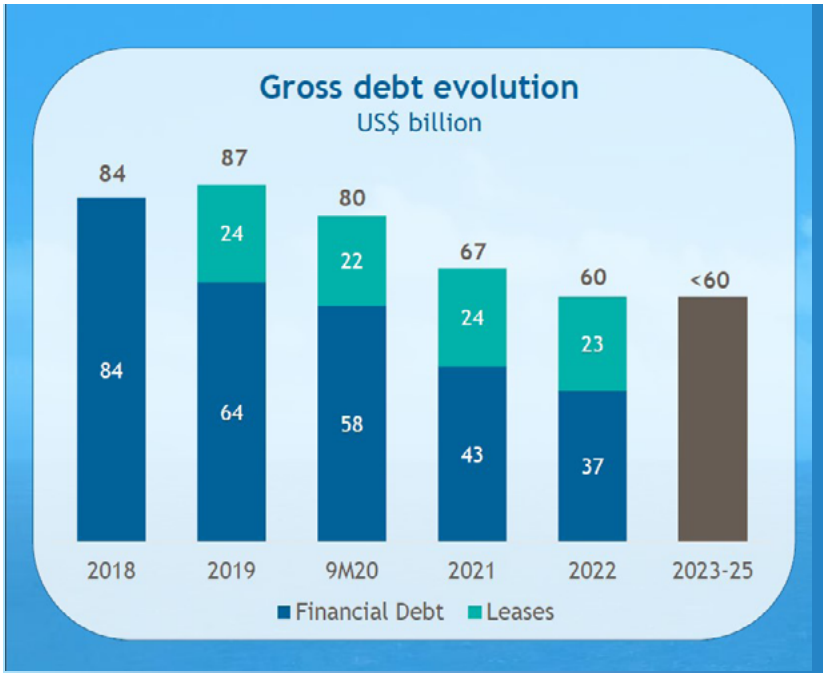
The cut in investments reflects the insertion of new assets (which, therefore, should not receive any more contribution for upgrade, only for maintenance) as well as the failure to materialize the company's goal of reaching the end of 2020 with a gross debt of US $ 74.4 billion - it was R $ 80 billion at the end of the third quarter of the year. In order to reach US $ 60 billion of gross debt (projected in PE 2020-2024 and maintained in the current one), Petrobras is betting on reducing investments and increasing the sale of assets in the portfolio strengthened with Marlim.

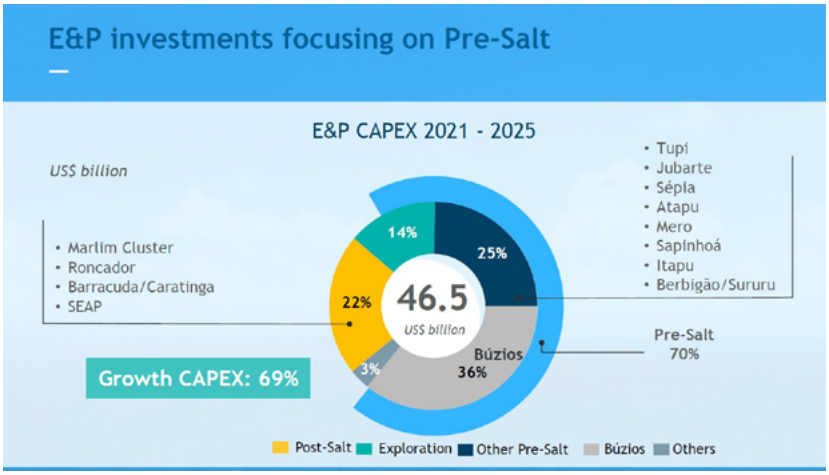
HISTORICAL REDUCTION IN E&P

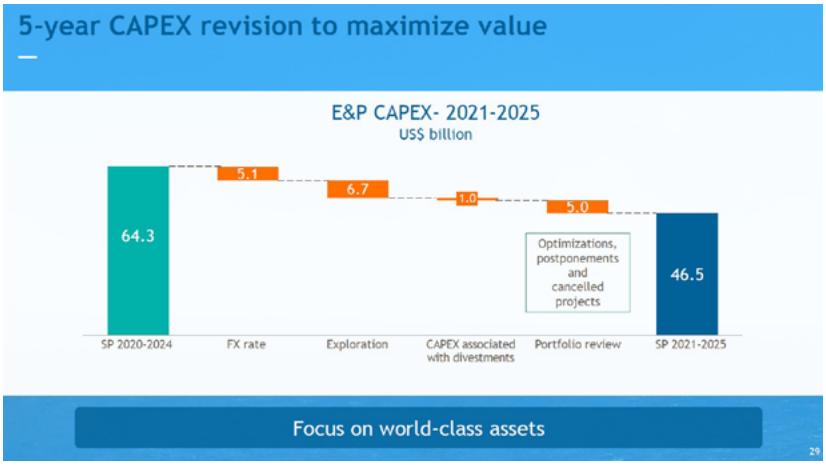
The cut of up to US $ 24 billion in investments planned for the exploration and production (E&P) area between 2021 and 2025 is one of the most significant in the last two decades. In the previous plan, Petrobras predicted that of the US $ 75.7







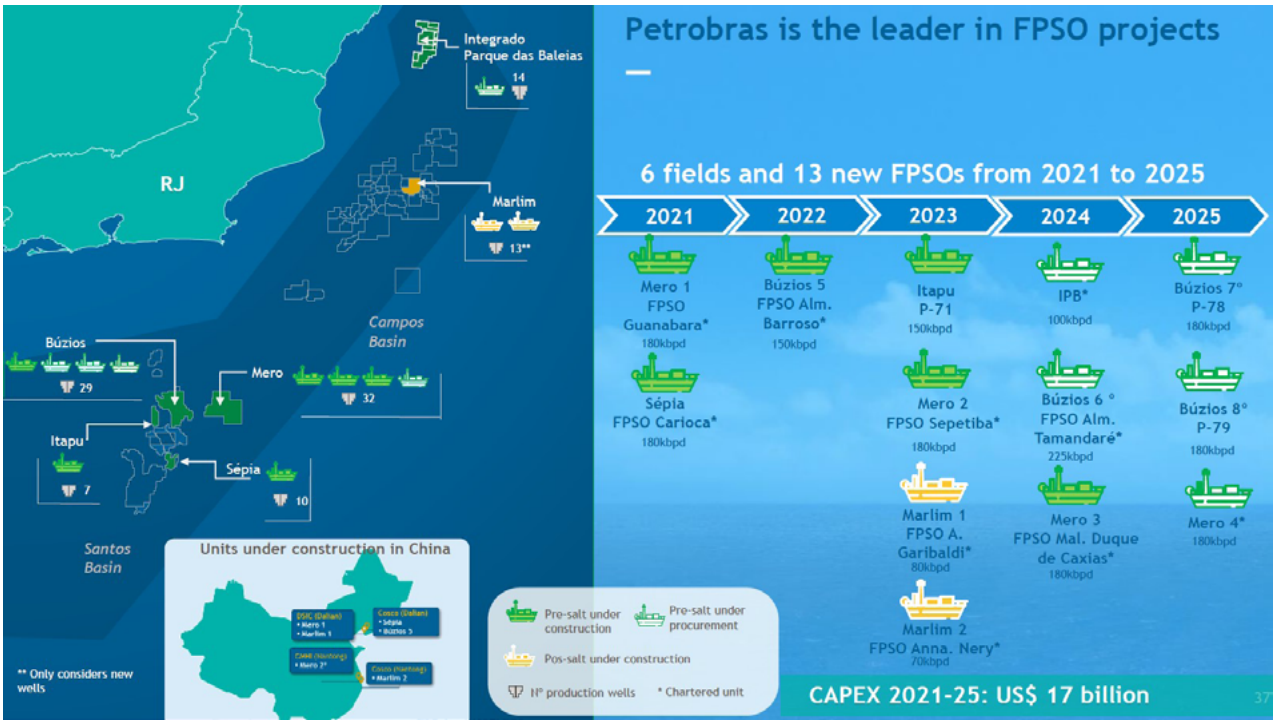




billion it would invest by 2024, about US $ 64 billion would be allocated to E&P. Of this total, 59% in the pre-salt and 29% in deep-water projects in the post-salt, mainly in the Campos basin, in assets such as the Marlim complex (Marlim, Marlim Sul and Leste), the only one for which they were planned new production units at the beginning of the SP 2020-2024.

The crisis caused by the covid-19 and the goal of better remunerating its shareholders led the company to "actively and deeply manage our portfolio", as pointed out by Petrobras Exploration and Production Director, **Carlos Alberto Pereira de Oliveira**, during a presentation of the 2021-2025 Strategic Plan to analysts, in the Brazilian version of Petrobras Day, on the morning of November 30.

The objective, according to the company's president, Roberto Castello Branco, is to maximize value, prioritizing investments in world-class assets, mainly in the pre-salt, and in divestment. Thus, investments in E&P fell to US $ 46.5 billion (almost US $ 18 billion less than previously forecast and equivalent to the total forecast for this frontier in the previous plan), leaving the pre-salt with US $ 32 billion (70 % of total E&P in the current plan). About US $ 11.7 billion cut in the current plan refers to portfolio review (project optimizations, postponements and cancellations) and US $ 6.7 billion to exploratory activities



CAMPOS BASIN

Thus, the Campos basin, in which the state-owned company planned to invest around US $ 20 billion, through PE 2020-2024, in revitalization projects and complementary actions, had almost a third of the investments cut, and should receive US $ 13 billion in resources. until the middle of this decade.

Oliveira ensures that the impact of the divestment on production will be 300 thousand barrels / day. What would not impact the company's production goals as much, since the prediction is that the pre-salt accounts for up to 80% of the national production (rate that today is 70%), with "a lower cost production and low emission greenhouse gas (GHG) ". A further US $ 2 billion is foreseen in investments in production in ultra-deep waters in the SEAL basin and another US $ 1 billion in the exploration of new fronts in the Brazilian equatorial tide, in which the state company has assets in Foz do Amazonas.

FALLS SHORT ON THE PRODUCTION GOAL

Petrobras' Production Development Director, **Rudimar Lorenzatto**, pointed out that in the next five years the company will put into operation 13 new production systems in six fields - Mero (4), Búzios (4), Sépia (1), Itapu (1), Parque das Baleias (1), all in the pre-salt, and Marlim (2), in the post-salt. What has not been clear so far is the scope of the divestment in Marlim and how it may impact the units under construction (FPSO Garibaldi and FPSO Anna Néri) in this count.

Petrobras' main bet is the Búzios field, in the pre-salt of the Santos basin, the largest in the country and which should exceed 2 million barrels of oil equivalent per day (boed) at the peak. Today producing through four Petrobras own FPSOs (P-74, P-75, P-76 and P-77), it will win another four units. Modec won the bid for the construction, operation and chartering of the FPSO Búzios 5, with a capacity of up to 150 thousand barrels / day of oil and 6 million m³ / day of gas, which should start production in 2022.

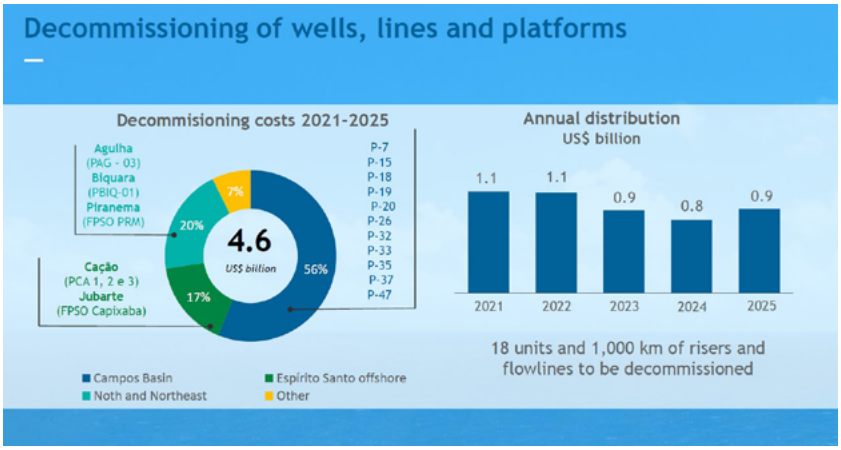
Of the 3 others planned, two will be own FPSOs P-78 and P-79, already in bidding) and a third will be chartered: the FPSO Almirante Tamandaré, with capacity to produce 225 thousand barrels of oil and 12 million m3 of gas , which should start operating in the second half of 2024, will be the largest in operation in the country.

Although the board affirms that the shutdowns scheduled for this year, suspended due to the covid-19 pandemic, will not impact production, as maintenance would be being carried out in the second half, the production curve has changed in the new strategic planning. And it was revised downwards in this strategic planning, which it estimates reached 3.3 million boe / day in 2025 (against 3.5 million boe / day in 2024, in the previous plan.

The planned investments in decommissioning also fell in this SP being US $ 1.4 billion below the previous one, even though they continue to be 18 units, of which only one platform is not included now (P-12), since it started in July of that year. The P-47 in Marlim entered the list.

DIVESTMENTS TO REDUCE DEBT AND INVEST IN WORLD-CLASS ASSETS

Refining investments total US $ 3.7 billion (against US $ 6 billion



in the previous plan). Petrobras intends to sell assets that add up to around 50% of the company's refining capacity, for this reason investments in the refining and natural gas area. The state-owned company intends to reach 2025 with five refineries - four in the state of São Paulo (Replan, Revap, Recap and RPBC) and one in Rio de Janeiro (Reduc), with a total refining capacity of 1.15 million barrels / day against the current 2.2 million barrels / day. It will dispose of eight assets: Refap (RS), Rnest (PE), Repar and Six (PR), Rlam (BA), Lubnor (CE), Reman (AM) and Regap (MG).

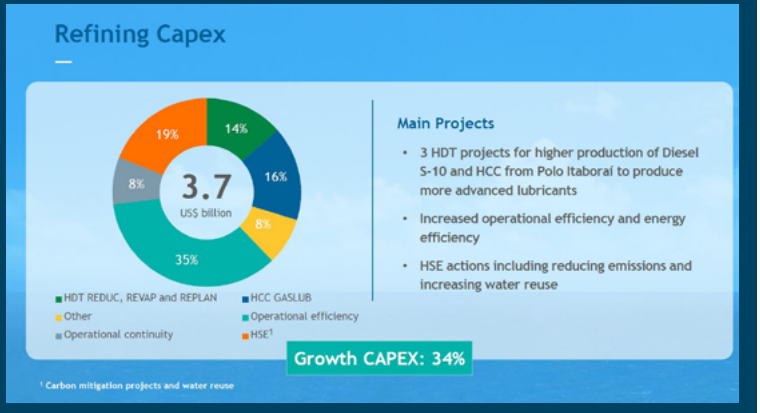
The Director of Refining and Natural Gas at Petrobras, Anelise Lara, stated that one of the strategic plans for gas and energy is to add more value in the commercialization of energy and in the optimization of the company's thermoelectric portfolio, with a focus on generating value of the gas produced.

Therefore, US $ 1.1 billion will be invested in this area, with emphasis on the completion of the construction of the Gas Treatment Unit (UTG) of the GasLub Itaboraí Complex (formerly called Comperj). UTG will receive the gas drained by route 3, another priority project for the company, expanding the integrated capacity of the pre-salt routes to 44 million cubic meters per day. "The objective is to provide greater security for oil production in the pre-salt fields," said the executive.

She pointed out that resources are being invested in improving gas turbines to increase power and operational efficiency. "We have the strategy of seeking segregation of value in the sale of gas, with the aim of reaching 2025 with the significant expansion of our capacity through the expansion of the Guanabara Bay terminal", concluded Anelise Lara. ■

Refinig for sale

The resources foreseen for the downstream area amount to 13% of the US $ 55 billion foreseen for 2021-2025, distributed as follows: refining will have 7%, gas & energy with 2% and commercialization & logistics with 4%. Among the priority projects in the natural gas area is Route 3 (almost 85% completed), including 100% of the sea pipelines and the Natural Gas Processing Unit (UPGN). In refining, investments prioritize adaptation at Reduc and Revap and a new production unit at Replan aimed at the production of dieselS-10. In logistics, the focus is on the optimization of oil and oil outflow pipelines in São Paulo (Pró-Dutos).



MONITORING HAZARDOUS MATERIAL LEVELS ON BOARD SHIPS

How did it all start and why is this important to both human beings and the environment?

From 31 December 2020, ships above 500 GT flying the flag of an EU/EEA member state, or third-party flagged vessels calling at European ports, must carry an IHM (Inventory of Hazardous Materials) certification on board.

Guidelines for inventory of hazardous materials

It started with the adoption of the Resolution A.962(23) IMO Guidelines on Ship Recycling on December 5th, 2003. The resolution aimed to give advice to all stakeholders in the recycling process, including administrations of ship building and maritime equipment supplying countries, flag states, port states and recycling states, as well as intergovernmental organizations and commercial bodies such as shipowners, ship builders, repairers and recycling yards.

The guidelines introduced the concept of "Green Passport", a document containing an inventory of all materials potentially hazardous to human health and the environment.

The ship recycling legislation is a dynamic set of rules, and the A.962(23) resolution was replaced by the "International Convention for the Safe and Environmentally Sound Recycling of Ships" – the Hong Kong Convention – in the spring of 2009. The conference that created the convention was attended by 63 countries and overseen by IMO, though it has as of 2019 not yet been ratified. For the Hong Kong Convention to become effective, 15 ratifications, representing 40% of the world merchant shipping by gross tonnage, and on average 3% of recycling tonnage for the previous 10 years, are required.

The Hong Kong Convention has been ratified by Belgium, Denmark, France, Norway, Panama, and the Republic of the Congo to date, while Italy, Netherlands, Saint Kitts and Nevis and Turkey are in the process.

The Hong Kong Convention introduced the term "Inventory of Hazardous Materials" – IHM – which replaced the "Green Passport" term.

Gry Cecilie Sydhagen founded Metizoft AS in 2006 with an ambition to make the maritime industry greener. In 2009, Sydhagen was honoured as the «Norwegian Female Entrepreneur of the Year» for her effort in developing green technology solutions. Metizoft is among the world's first and leading consulting companies providing turnkey Green Passport / IHM (Inventory of Hazardous Materials) solutions to shipyards, shipowners, suppliers, and other business segments in the maritime industry. With a broad variety of clients worldwide, Metizoft has some of the most advanced vessels within the maritime industry in their portfolio.
Metizoft operates out of Norway, Singapore and Shanghai, China, also having an extensive network of IHM inspectors, operating out of strategic ports on all continents. More than 50 employees go to work every day at our offices to provide sustainable solutions for the entire ship lifecycle.

List of substances

On December 30th, 2013, the new EU Ship Recycling Regulation (EU SRR) entered into force, a regulation that builds on the Hong Kong Convention (HKC). The EU SRR includes all the hazardous materials listed in the HKC – such as asbestos, PCBs, TBT and CFCs – as well as an additional two substances: PFOS and HBCDD. Some substances have no threshold level, such as asbestos, PCBs, Ozone depleting substances such as CFCs and anti--fouling systems containing organotin compounds as a biocide. Other substances, such as lead, mercury, PBB, PFOS and HBCDD, have a threshold level.

All border-crossing, commercial ships flying the EU flag or calling at EU ports above 500 gross tonnage (GT) are required to have an updated IHM on board.

The EMSA's Best Practice Guidance on the Inventory of Hazardous Materials published June 5th, 2018 is the most recent guideline that provides the current substance list to be monitored in the IHM. It also provides latest best practice guidance to the development and updating of IHM in accordance with the EU Ship Recycling Regulation.

Health and safety

With a continuously updated IHM, shipowners will contribute to increased safety for their crew members in addition to safe recycling of ships. A ship's IHM enables ship recyclers to plan safe removal of hazardous materials, reducing harm to both workers dismantling ships, as well as the environment.

Asbestos is the most common hazardous material on board ships, and generally exists in insulation, gaskets, brake linings, pipe lagging and other similar items. Over decades, trapped asbestos fibers can cause inflammation, scarring and eventually genetic damage. Asbestos also causes different forms of cancer as well as progressive lung disease.

Though the EU Commission has issued technical guidelines for safety and environmental requirements for ship recycling, regrettably, the fact is that most ships today are recycled in South East Asia using the so-called "beaching method". This causes many injuries and deaths to people, both adults and children, working under terrible conditions. Hazardous materials are also leaking directly into the soil, causing harm to the surrounding environment.

To be compliant

Newbuilds have been required to have an updated IHM on board since 2018. By the end of 2020, all existing ships that are affected by the EU SRR are required to have an updated IHM on board. Ships lacking IHM are required by law to have an IHM inspection by certified personnel before producing an IHM.

Once an IHM report has been compiled, the legislation requires it to be continuously updated throughout a ship's life cycle. Certified HazMat Experts maintains IHM, tracking hazardous materials entering ships and identifying products in their supply chain containing or potentially containing hazardous materials. SDoC (Suppliers Declaration of Conformity for Material Declaration Management) and MD (Material Declaration) documentation is filled out and continuously added to the IHM. HazMat Experts are certified by class companies such as DNV GL and ABS. ■

The new global O&G scenario

The new focus of oil companies implies new winners and losers

Companies of the O&G industry face a greater challenge than they have heretofore had to face – how to survive in the new global O&G scenario. That scenario involves high operational risk in countries with available oil resources, low oil prices, a lower-for-longer price scenario, an imperative to operate with much lower costs, pressure to ensure access to stable production for years to come, and the need to consolidate investments in projects without technical or environmental impediments.

Faced with the challenges of the heralded energy transition, the O&G industry must focus on that which it does best – produce fossil fuels efficiently, while demand for them exists. However, the challenge of navigating the energy transition will only become urgent for the O&G industry after it is able to ensure its survival in the current oil age, which will last for years to come, even if demand declines significantly.

The O&G industry cannot count on help from predictions of higher oil prices, as some have suggested (Amadeo, 2020), since any price increase will soon bring greater production from swing producers, such as shale producers.

Nor can the O&G industry rely on the strategy of franticly drilling more wells to sustain production of unconventional resources, as is the case in the shale patch. O&G companies will have to seek conventional plays that offer the opportunity to develop and produce resources efficiently.

The high costs and long cycles of deep-water projects, which in the past reduced the attractiveness of those projects, are today accepted as part of the nature of a robust portfolio of long-life production projects.

The search for diversification resulted in many O&G companies having projects in many countries throughout the world, which also meant that they incurred many losses, since most regions do not offer

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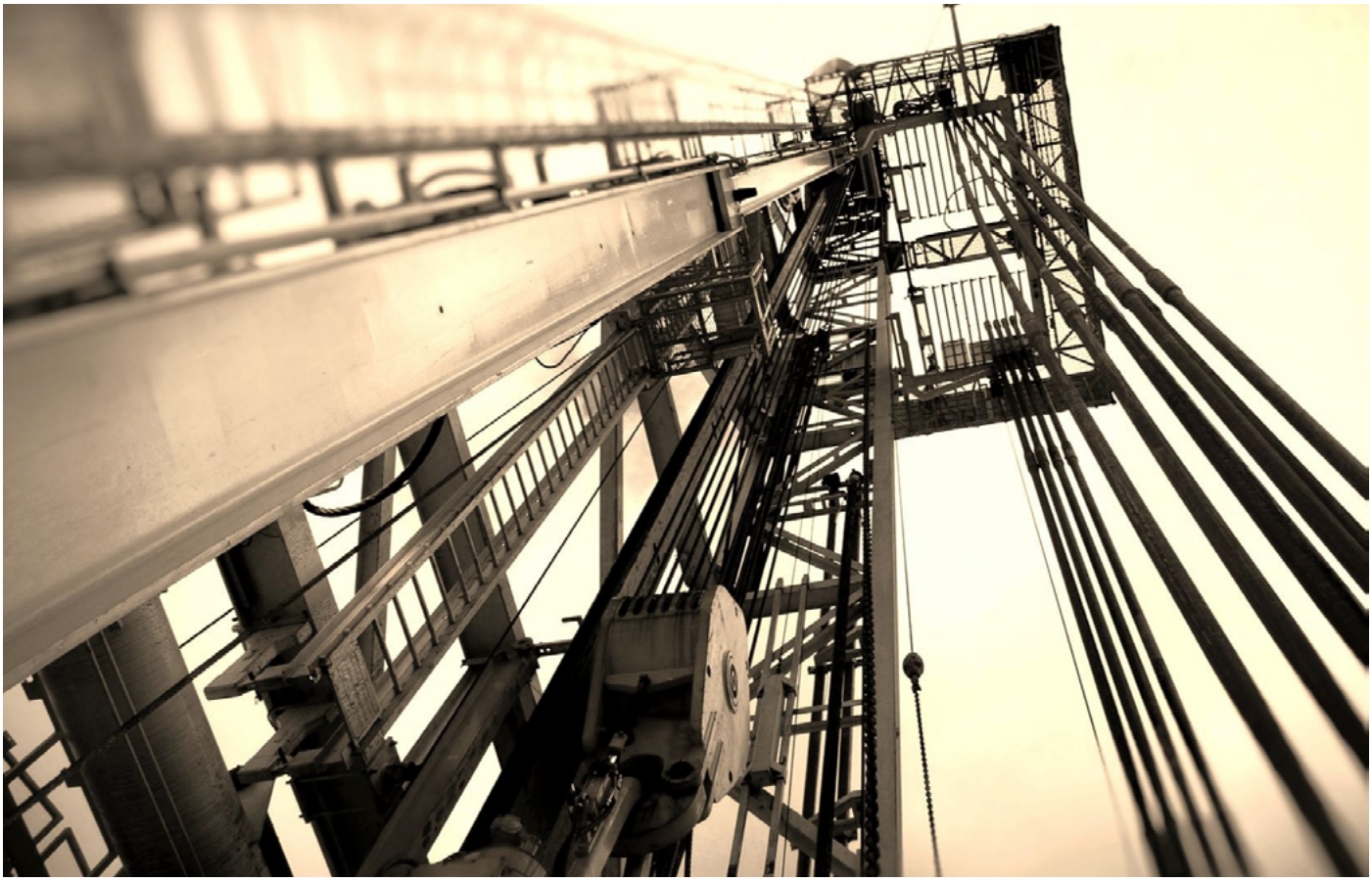
He is an international consultant in oil and energy, focusing on environmental, new technologies and geopolitical implications. He is a researcher with INOG-CNPq/Brazil, and was a post-graduate professor, course and project coordinator, and founder of several environmental and biotech companies. Prof. Jones is fluent in English, Portuguese and Spanish, and is a member of various professional entities in Brazil and elsewhere, as well as a member of Mensa Brasil, and of the Geosciences Advisory Board of NXT Energy Solutions Inc., Canada.



safe or viable operating conditions. Projects in high-risk countries, and regions with unfavorable technical or environmental conditions, such as the Arctic, can no longer be considered an acceptable destination for investments.

O&G companies will have to avoid countries such as Venezuela, Russia, Iran, and many others that exhibit political or social uncertainties, conflicts, corruption practices, or human rights violations. Those countries will have to make do on their own, or with the help of countries such as China, if they wish to develop their oil resources, but that will be no easy task.

In fact, CEOs that guided their companies to invest in countries exposed to sanctions, or in projects with insurmountable environmental or technical difficulties, could well be held responsible, since they were clearly not prudent with their shareholder´s capital, in the face of predictable risks.

Now, those leaders need to avoid such risks, and will need to concentrate their companies´ investments on safer, bigger, longer-lasting and more price-resilient plays, which do not present major environmental or technological difficulties. Today, portfolio diversification is less important as an investment driver than the optimization and resilience of those investments. Furthermore, it is more and more difficult to handle so many projects in different countries, regions, and operational environments, each one with different characteristics and control requirements.

Given the size of the industry and its major companies, relying on so many projects represents an enormous administrative and risk-control challenge. The majors of the O&G industry need a portfolio composed of large projects that can meet their production needs, but in a manageable fashion.

Such large projects are mostly located in major world sedimentary basins and are generally associated with offshore deepwater and ultra-deepwater environments. Given that the world now offers fewer exploratory opportunities with acceptable political risk, it is not enough to identify plays with geological favorability. Those plays must be associated with acceptable risks relating to technical, environmental, and political issues.

Large projects tend to offer low Opex costs, due to their scale of production, which dilutes operational costs. That is the case, for example, of the pre-salt plays in Brazil, which exhibit some of the lowest lifting and production costs in the world – Petrobras says that their lifting costs are below US$3/bbl, and their production costs, including rig costs, below US$5/bbl (Petrobras,

2020a). Those costs are probably equal to or below those of major Middle Eastern fields.

Besides a low Opex, large oil plays, such as those of the Brazilian pre-salt, can also offer a reasonable Capex, in relation to production, since many of those fields have very productive wells. Búzios, for example, recently broke productivity records in Brazil, with wells producing over 59 thousand bopd (TN Petróleo, 2020).

Large O&G companies are known for their ability to manage huge projects involving numerous suppliers, billions of dollars in investment, and complex logistics. Those megaprojects are also amenable to technological innovations that have provided significant reductions in cost, as well as improvements in performance and financial returns.

Petrobras, for example, recently unveiled its Prod1000 program, with which it expects to reach first oil in 1000 days after a discovery is made, and their Exp100 program, with which it expects to reach a 100% success rate for exploratory wells. Both are objectives that break entrenched industry paradigms that have existed for many decades, which held that exploration efforts in deep waters were subject to large exploratory risks and long delays in putting assets in production (Petrobras, 2020b).

The O&G industry has traditionally feared the technological challenges posed by deepwater projects, such as the need for huge structures, great water depths, the need to drill through thick salt layers, and the need for leading-edge technology for processing and production of fluids. However, those challenges have generally been overcome rather easily, in recent years. Today, deepwater and ultra-deepwater environments are not as challenging as they were even a few years ago, and they continue to increase their share of world production (US EIA, 2016).

The Brazilian pre-salt plays have been considered superior to the plays in the Gulf of Mexico (Jones, 2020) since there is a great disparity between exploratory successes in the Gulf of Mexico and the Brazilian pre-salt. While in the Gulf of Mexico exploratory successes result in production of several thousand barrels of oil per day, in the Brazilian pre-salt, exploratory successes lead to production of tens of thousands of barrels of oil per day, with many successful wells producing at those rates (ANP, 2020). Production from those Brazilian wells places them at the top of the ranking of all producing wells in the world, and much above the most prolific wells in the US, where in 2019, only 23 wells, among more than 435 thousand, produced more than 12.800 bopd (US EIA, 2019).

As to the potential of the Brazilian pre-salt as an exploratory play, its attractiveness is also associated with its yet-to-find-oil potential (YTF), calculated to be between 176 and 273 billion barrels of recoverable resources (Jones & Chaves, 2015).

Even so, it may be argued that the Gulf of Mexico and the Brazilian pre-salt exhibit similar attractiveness for the majors of the O&G industry, since each has important characteristics that favor investment. The Gulf of Mexico is under the influence and protection of the US, in the safest political operating environment in the world, while the Brazilian pre-salt also enjoys a stable operating environment and a YTF potential unequalled in the world. That situation implies that only Brazil rivals the Gulf of Mexico as an alternative destination for global O&G investments.

With respect to environmental and safety considerations that could restrict or make investments in some regions of the world unfeasible, the offshore plays of the Brazilian pre-salt and the Gulf of Mexico pose relatively few environmental restrictions, and offer low operational difficulties, despite hurricanes being a concern in the Gulf of Mexico.

The presence of existing infrastructure in exploratory regions has also been an important factor in making new O&G projects feasible, since that can significantly reduce Capex requirements. Without that existing infrastructure, many such projects would never read a final investment decision.

Thus, in the new global O&G scenario, for an oil province to be considered attractive, it must contain, besides plays with significant YTF potential, existing infrastructure to facilitate its development. That is the case, for example, of the Gulf of Mexico, which exhibits one of the world´s most dense infrastructure of flow and production facilities, and to a lesser extent, also the case of the Campos and Santos basins in Brazil, where years of exploration and production activities left a legacy of significant infrastructure assets.

The world offers a great number of oil provinces with exploratory potential (Figure 1), most of which the USGS assessed in 2012 (USGS, 2012a). However, based on operational and environmental risk considerations,

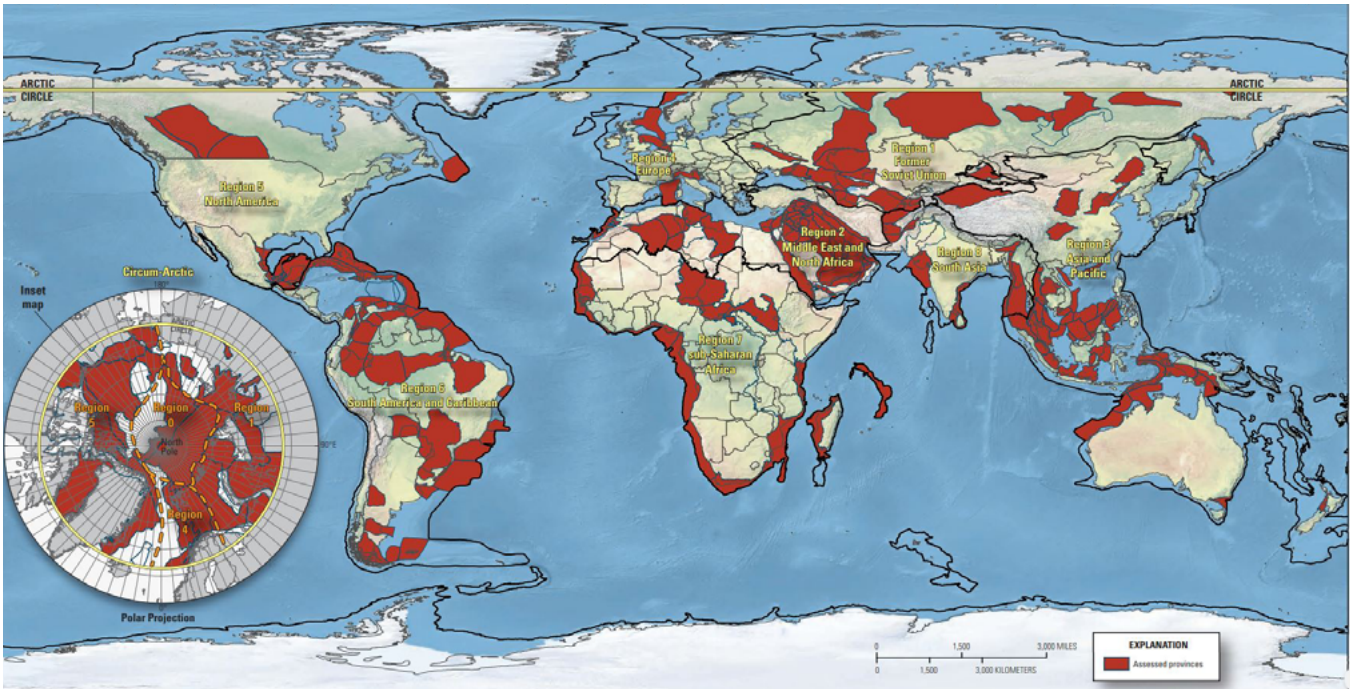


Figure 1: World oil provinces assessed by the USGS in 2012 (Source: USGS, 2012a)

despite their YTF potential, many of those provinces may be excluded outright from consideration as attractive investment destinations. Important exploratory frontiers and producing regions may cease to be attractive for new investments, as a new vision of the O&G industry takes hold, in which companies focus on fewer, more attractive provinces in the world.

Northwest Australia, for example, is among the regions that may lose attractiveness, despite having large LNG projects underway. But those projects suffered large cost overruns and technical difficulties (Boiling Cold, 2020), which reduces their attractiveness. Areas with large recent discoveries, such as the Equatorial Margin, with the exceptional Guyana and Surinam plays, may also suffer a reduction in attractiveness, if political risks become a menace to the business environment (Argus, 2019).

The southern (Mexican) part of the Gulf of Mexico, despite having a large YTF potential and showing incipient attempts at O&G reforms, also suffers due to political uncertainties, which raises the risks of operating in Mexico (Market Research, 2020). Southeast Asia also exhibits elevated political risks (Nikkei Asia, 2018), and suffers due to possible expansionist ambitions by China, which have long been seen as a serious threat, and which inhibit the attractiveness of otherwise interesting plays in the region (Rand Organization, 2000).

In Africa, there are few countries that do not pose serious political risks, besides involving image risks to companies operating there, on account of the possible contamination of business deals by corruption (Duri, 2020).

In South America, whether due to geological uncertainties, or due to scant exploratory efforts, scarce infrastructure in place, or due to the elevated political risks involved, there are few oil provinces that represent attractive targets for the O&G industry. That situation leads to the exclusion from consideration of deepwater plays that the USGS assessed as having high YTF potential, such as regions offshore Argentina, Uruguay, and even Pelotas Basin in Brazil (USGS, 2012b).

When O&G companies make decisions regarding investments in new projects, to guarantee their business survival during the remaining years of the oil age, few global destinations will be considered acceptable, however, Brazil will certainly be among them. Despite corruption scandals and politically induced policy shifts, political risks are still seen as being limited, and Brazil is considered a safe destination. The perception among foreign investors is that changes in the former environment of impunity, as well as recent regulatory changes, have improved the business climate in Brazil (Garver & Cox, 2019).

Brazilian oil production is expected to increase significantly in the next few years, rising to approximately 7.5 million bopd

in 2030, which represents over twice the current production rate, based solely on projects currently under development (Petersohn, 2019). This ensures that Brazil will be one of the top five world oil producers.

Since offshore projects in Brazil generate production increments of approximately 180 thousand bopd (the typical size of FPSOs operating in the region), and since over 50 new FPSOs may enter production by 2030 (Abelha, 2019), it is possible that even those positive production estimates may be conservative.

Other analysts have also suggested that O&G activity in Brazil will increase, as the majors of the industry focus their attention on the Brazilian offshore, where significant new discoveries are expected (Mingchi, Kuitai & Jing, 2020; Wood Mackenzie, 2019).

New O&G players may enter Brazil in several ways. Companies may invest directly in the acquisition of blocks offered by ANP (the Brazilian national oil agency), in exploration bidding rounds or through its Permanent Offer Program. Companies may also farm-in to some of the many projects that await development, many of which in the hands of Petrobras, which does not have the financial wherewithal to invest in all of them, due to capital limitations. Finally, some opportunities refer to assets offered for sale by Petrobras, and even other operators working in Brazil, whose divestment program includes many onshore and offshore assets.

Since 2016, shale oil and shale gas plays, especially in the US, have attracted an increasing share of global O&G investments. However, in the new global O&G scenario, the offshore sector will be the least affected by the recent reductions in exploration budgets (Rystad, 2020). This resilience reflects the long cycles and relative inflexibility of offshore projects, once they are underway, but also the recognition of their strategic importance to the O&G industry, in the long run. It is these plays that will furnish the industry with the stable, low cost, and long-duration production that it needs.

Among the main areas that will drive O&G activity in Brazilian plays, three stand out: the transfer of rights areas, released in 2019, the production sharing (pre-salt) areas, released in 2019 and preceding years, and the areas in the upcoming bidding rounds of 2021 (the 17th Concession bidding round is scheduled for October 7th) and subsequent years. All these areas involve plays with multiple billion-barrel recoverable potential. A preview of what we can expect is the Búzios field, which reached production of 844 thousand bopd from only four FPSOs (Reuters, 2020a).

The focus of the O&G industry in new plays will increase investment activity in some regions, but will turn oil resources in other regions into stranded assets, so that remaining resources will remain in the ground. This transformation will bring profound changes in countries where O&G production will no longer have the economic importance that it has today.

Even major producing countries, such as Russia, may lose much of their share of world oil production, due to inefficient production. Russian oil production relies on many low-production wells, which are relatively uncompetitive. Average Russian production is below 70 bopd per well, from its 180 thousand wells (Reuters, 2020b). Production from many of those wells may become untenable if cost and price pressures aggravate their economics. Furthermore, Russian production may also be threatened if majors of the O&G industry decide to distance themselves from the country, as sanctions and political pressures weigh in.

The concentration of exploratory plays in just a few regions of the world will leave many countries behind. The economic and geopolitical consequences cannot be ignored, including increased risk of recession and conflicts. As a result, the world will certainly become more turbulent and conflict-prone. The destabilization of many current O&G producers will make them more likely to aggressively try to protect their interests. Luckily for Brazil, it seems to be relatively safe from most such potential conflicts, and from regions where transformational pressures will be felt the hardest.

Even if the world becomes generally less attractive for O&G players, Brazil should continue to enjoy a healthy flow of investment, even more so in relation to regions that will suffer the strongest negative impacts of the restructuring of the focus of O&G industry.

Despite the fact that O&G players will merely follow the safest and most appropriate path for their continued survival in the new global O&G scenario, one of the fortunate consequences for Brazil is that the resulting trends will likely drive more future investments towards the country. ■

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Our time is up, the time is now

Paraphrasing HM Queen Elizabeth II, 2020 is not a year on which the oil industry (or the world in general) shall look back with undiluted pleasure. In the words of the Queen, one might consider it our annus horribilis.

Much has been said (and written) about 2020. So I will no further explore it. As an insufferable and hopeless optimist I believe our main challenge is now to turn 2021 in our "annus mirabilis" (or as close to it as possible).

The good news is that despite the health crisis, the Brazilian government remains in full swing in building reforms in the oil and gas sector. In recent years, Brazil was able to take advantage of great opportunities to attract investments. We adjusted our Local Content policy, resumed exploratory block auctions and regulated mechanisms such as the reserve based lending. Moreover, the country created an ingenious and innovative mechanism to offer auction E&P concession contracts and Petrobras' assets sale program created opportunities for new players on E&P assets, refineries, thermoelectric plants, fertilizers and gas assets

The country identified the necessary actions to eliminate regulatory restrictions and stimulate competition in the sectors of supply, distribution and resale of oil products, cooking gas and natural gas. We have made progress in introducing competition and price transparency. The New Gas Market is advancing rapidly. Important programs such as Reate2020 and the Abastece Brasil initiative were delivered and generated their first results. Reate2020 is now on a new phase and the Ministry of Mines and Energy just launched the Promar Program (is main objective is create conditions for the revitalization of mature offshore fields). RenovaBio was implemented and regulated.

That´s the good news: much has been done. The bad news is that much remains to be done. And the Covid-19 pandemic highlighted this sense of urgency, the need to move even further.

When we look at the big picture, we have a myriad of challenges ahead, most of them summarized in the National Energy Plan 2050, approved in its final version in December 2020. Although the energy systems are in transformation, oil remains an indispensable source in Brazil and in the world. Only competitive opportunities will thrive, though. Therefore, we need to unlock our exploratory new frontiers, maximize the recovery of our hydrocarbon reserves, accelerate the development of the natural gas industry and do all that while advancing towards a decarbonized future.

Worldwide, the economic impact of relief packages and the Covid-19 vaccination rates are set to increase. Therefore, in the short and medium term, there will be investment opportunities as society´s net income and government spending grow. The economic recovery, in the short term, will probably become energy intensive, increasing the demand for oil long before it finally falls. As a result, considering expectations that the global oil demand gradually will recover in 2021, Brent prices reached in January their highest values since February 2020.

And to answer the question I proposed in the beginning of this paper, how can we turn 2021 in our "annus mirabilis"? We accelerate. The oil and gas industry is a global one, used to facing challenging environments and dealing with risks. But in order to remain attractive, Brazil must invest in overcoming the many inefficiencies that we still have. So, Brazil needs to finish its industry reforms. As a dear friend recently told me: regulatory stability is important, improvement in the regulatory process is important, but the most important thing is to not miss the opportunity to do the right thing, at the right time. And our time is now. ■

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