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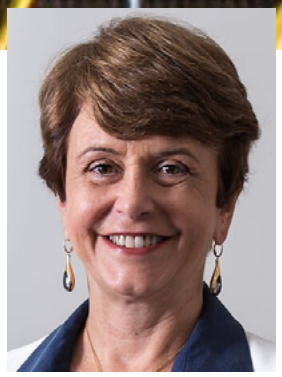
Opinion by **Ana Zambelli**, Managing Director of Brookfield Private Equity and coordinator of the IBP Diversity Committee.

Diversity is imperative in organizations: it's time to act

- Technology gains even more prominence
- Extended representativity reflect sector growth

Special
Energy women

DIVERSITY IN ACTION



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A PINK-TONE INDUSTRY

We were starting October, the month when the campaign against breast cancer wins the media. It was the pink November that gave rise to the idea. Why not make a magazine literally 'pink', with only female leaders addressing industry issues?

It seemed complicated until we presented the idea to our 'network' who mobilized to leverage this unprecedented project, since it wasn't a matter ABOUT diversity. The proposal was to make a panel of the oil and gas industry, listening only to women in command positions in companies, public agencies and sectorial entities.

With so many converging forces, it would be impossible to go wrong. The 'rose gold' spurted: we discovered a 'talent pool' of the highest quality, with executives and managers in the most diverse positions of command in this production chain.

With just 20 days to contact, interview, edit, review and diagram the magazine until November, the challenge was time. As if this represented an obstacle for women, wives, mothers and professionals, who work two or even three days a day when seeking to improve their qualifications.

More than 80% of the sources responded. Leaders of companies such as Petrobras, Shell, Total, Repsol Sinopec Brasil, Potigás, Siemens Energy, TechnipFMC, Schlumberger, from entities such as IBP, SPE Brasil, Onip, ABESPetro and Abpip, from the academy (FGV Energia), from the Kincaid | Mendes Vianna office Lawyers, in addition to the ANP. Many of these have personally endeavored to facilitate interviews with other sources. We also had the support of male leaders who made the bridge with colleagues who were on vacation or in other countries.

Thanks to this proactivity and commitment from the sources and commitment of TN Petróleo team, we are delivering a historic magazine, which portrays, unequivocally, how gender diversity has been built with professional excellence, leadership skills, entrepreneurial spirit and a lot of boldness for our 'oil women'.

This is what the reader will see in the cover story "Diversity in Action", which brings a panel of the great challenges of the sector, as well as in articles written by experts on the subject. The advancement of women is also expressed in the professional profile of Sylvia dos Anjos, one of the pioneering geologists in the world oil industry. And in the opinion section, in which Ana Zambelli, Managing Director of Brookfield Private Equity and coordinator of the IBP Diversity Committee, says that "tomorrow is today, today is now and the transformation is for now".

Good reading

Lia Medeiros
Communication, Sustainability and People Director at Benicio Biz Editores

Benício Biz editores associados Ltda

Rua Nilo Peçanha, 26/904
Centro – CEP 20020 100
Rio de Janeiro – RJ – Brasil
Tel/fax: 55 21 3786-8365
www.tnpetroleo.com.br
tnpetroleo@tnpetroleo.com.br

PUBLISHER
Benício Biz - beniciobiz@tnpetroleo.com.br

DIRETORA DE COMUNICAÇÃO
Lia Medeiros
(21) 99107-9603
liamedeiros@tnpetroleo.com.br

EDITORA
Beatriz Cardoso: (21) 99617-2360
beatrizcardoso@tnpetroleo.com.br

INTERNATIONAL AFFAIRS
Dagmar Brasilio: (21) 99361-2876
dagmar.brasilio@tnpetroleo.com.br

GRAPHIC DESIGN
Benício Biz: (21) 99124-3326
beniciobiz@tnpetroleo.com.br

GRAPHIC PRODUCTION AND WEBMASTER
Luiza Medeiros
luizamedeiros@tnpetroleo.com.br

COMMERCIAL
Rodrigo Matias: (21) 99532-7061
matias@tnpetroleo.com.br

SUBSCRIPTIONS
(21) 99269-4721
assinaturas@tnpetroleo.com.br

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The T&B Petroleum website aims to be an information and communication hub between the Brazilian and international markets.

Innovation and technology has been our mission in covering the best of the latest products and services, disseminating knowledge, focusing on people and teamwork behind the technologies and services that make a difference across the industry.

If you need information about the Brazilian oil and gas or energy sector, we are confident that the T&B Petroleum website is your best resource.

We regularly monitor the movements of organizations and dozens of companies in the private sector to offer our customers the latest developments that can make a difference when operating in Brazil's fastest growing sector.

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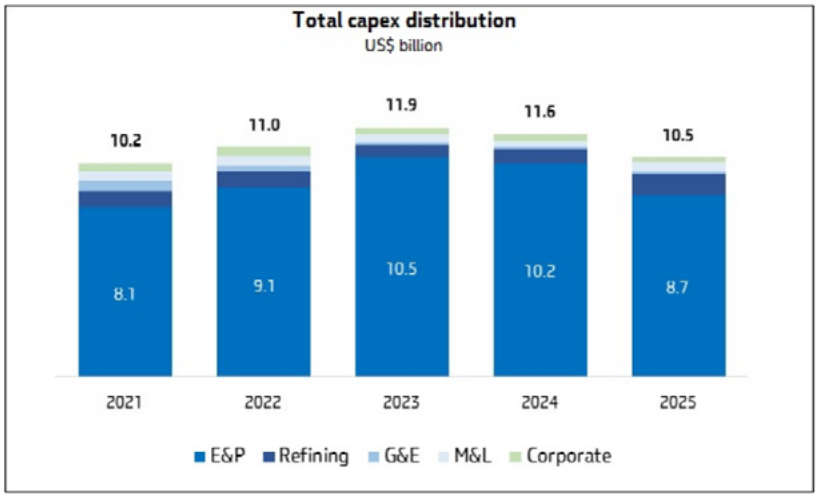
With planned investments of US$46 billion in E&P, Petrobras launches its Strategic Plan 2021-2025

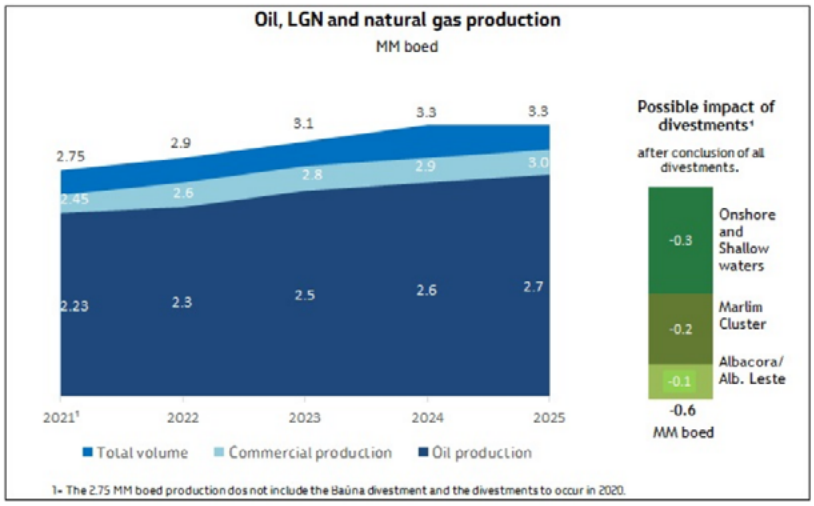
Petrobras informs that its Board of Directors approved, in a meeting held today, the Strategic Plan for the five-year period 2021-2025 (SP 2021-25). The plan maintains the 5 pillars that support the implementation of the company's set of strategies: (i) Maximization of the return on capital employed; (ii) Reduction of the cost of capital; (iii) Relentless search for low costs and efficiency; (iv) Meritocracy and (v) Safety, health, respect for people and the environment.

Petrobras reaffirms the vision of "Being the best energy company in generating shareholder value, focusing on oil and gas and with safety, respect for people and the environment", aims to eliminate the performance gap that separates us from the best global oil and gas companies (Mind the Gap concept) and presents the model of double resilience: economic, resilient to low oil price scenarios, and environmental, focusing on low carbon.

SP 2021-25 presents four top metrics that will directly impact the compensation not only of executives, but of all company employees in 2021. Two metrics are related to sustainability (ESG):

• Intensity of greenhouse gas emissions (GHG);
• Leaked volume of oil and oil products;
• Gross debt of US$ 67 billion in 2021;
• Consolidated EVA® delta of US$ 1.6 billion.





We maintain the TRI indicator (total recordable injuries per million man-hours) as the top metric for 2021, but adjust the target to below 0.7, reinforcing the company's commitment to life. We continue with our zero fatality ambition and insert in this plan the ambition of zero leakage.

Debt reduction and financial deleveraging will continue to be a priority, with the operating cash generation and divestments fundamental for these purposes. From January 2019 to September 2020, even with the impacts of COVID-19 and the oil shock in 2020, we have been able to reduce our gross debt by US$ 31 billion and maintain our target of US$ 60 billion by 2022.

Our divestment portfolio contains more than 50 assets at different stages of sale process. At the same time as debt relief, divest-

ments contribute to improving the capital allocation and consequently to create value for the shareholder.

Capex foreseen for the 2021-2025 period is US$ 55 billion, of which 84% is allocated to the Exploration and Production of oil and gas (E&P). The investment of US$ 46 billion in E&P involve approximately US$ 32 billion, 70%, in pre-salt assets. This allocation is adherent to our strategic positioning, focusing on world-class assets in deep and ultra-deep waters, which we are natural owners, with a human capital quality, technological knowledge and ability to innovate.

The capital scarcity imposes competition between projects to obtain funding, approving only those that are resilient to Brent of US$ 35/bbl.

Oil, LNG and natural gas production

The oil and gas production curve estimated for the period 2021-2025, without considering the divestments, indicates a continuous growth focused on the development of projects that generate value, increasing the participation of the assets in the pre-salt with lower lifting cost. During this period, 13 new production systems are expected to come into operation, all of them allocated to deep and ultra-deep water projects.

The oil production for 2021 reflects the impacts related to the COVID-19 and the divestments that occurred in 2020. We consider a variation of 4% up or down for the 2021 production.

Low carbon and sustainability commitments

Petrobras reinforces commitment to the environment and the use of new technologies for decarbonization of our processes and products, which involve for example the reduction of natural gas flare burning, CO2 reinjection and energy efficiency gains in the refineries. We have created an executive management focused on climate change, linked to the Institutional Relations and Sustainability Office, and we aim to keep Petrobras in the first quartile of the industry in relation to low CO2 emissions.

The 2021-25 Strategic Plan proposes a set of strategies that give visibility to issues that were relevant in 2020 for the future of Petrobras, such as (i) transparency and focus on sustainability (ESG), especially regarding the decarbonization of operations; (ii) strengthening of logistics activities, marketing and sales; (iii) search for a more efficient and sustainable Refining - Bio-Refining and (iv) strengthening of Petrobras' management model.

With the execution of this Strategic Plan, Petrobras reaffirms its commitment to become a more financially robust company, with low indebtedness and cost of capital, focused on world-class oil and gas assets and value creation, always acting in an ethical and transparent manner, with safety in its operations and respect for people and the environment. ■

RD&I: new technological partnership model is launched by Petrobras

PETROBRAS REMODELED its innovation management system and presented another module of the Petrobras Connections for Innovation program. The model is supported by three pillars of the new technological partnership portfolio management: generation of value, with close alignment of deliveries to the company's challenges; highly competent partnerships with science and technology institutions or leading companies focused on results and reducing the technology development cycle.

As a pilot for the new technological partnership environment, Petrobras announced research opportunities on three relevant topics for the oil and gas industry: "Development of a rapid method for determining renewable content in mixtures of fuels and biofuels; Quantification of processes in structural geology to reduce uncertainties in geological models, using artificial intelligence techniques; and Remote inspection of FPSO tanks. Research institutions interested in presenting project proposals on these themes should access Petrobras' technology investment management system (https://sigitec.petrobras.com.br/SIGITEC/). After the pilot, the new model should definitely start operating in January next year.

"In the past 20 years, Petrobras has invested around R $ 10 billion in Science and Technology Institutions. Of this total, R $ 2.4 billion in infrastructure projects alone, helping to build a high-potential innovation park in the country. Through technological partnerships, we will continue with our investments focused on adding value and accelerating our innovation ecosystem, through the active management of the project portfolio ", explained the company's Director of Digital Transformation and Innovation, Nicolás Simone (Photograph).

For the manager of the Petrobras Research Center (Cenpes), Juliano Dantas, project management needs to adapt to the current moment, which demands resilience and productivity. "We have been innovating for a long time, but it has gained new approaches and ways of engaging with the concept of ecosystem. Partnerships need to be more connected with a portfolio that guarantees productivity. We want to increase the probability of success in R&D, to detect which barriers we need to overcome and what new business models we must implement in order for a solution to generate value. For this reason, we have improved our relationship with technological partners by aligning incentives and having the Petrobras Connections for Innovation Program as a backdrop ", commented the executive.

In addition to technological partnerships, the Connections for Innovation program, launched in 2019, also includes the Startups module, to strengthen the relationship with the innovation ecosystem also in this modality. The Startups module is in its second edition and, this year, it had 363 enrolled startups of which 18 were selected. They will share a total amount of R $ 10 million and, depending on the projects developed, they may become suppliers to Petrobras.

Management

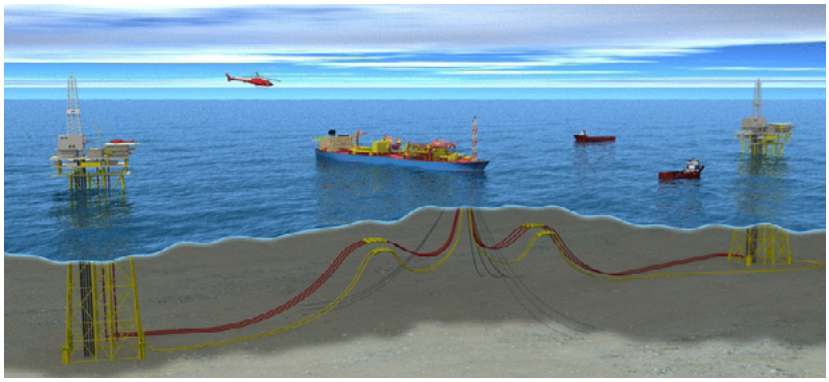
Another novelty presented in the technological partnership model is the launch of two new tools for the management of technological partnerships: Performance Evaluation, for analysis of the technical, administrative and relationship dimensions of partners and Competitiveness Environment, which will manage the entire process selection of the research project.

In the new management model, Petrobras will use advanced Analytics techniques - a tool that monitors data to support decisions - to help in the selection of universities to be invited for the development of projects, showing, for example, which institutions have differentiated competence in one particular area of knowledge.

The assessment will also consider the institution's ability to contribute to technological maturity (TRL) and increase the application potential.

Currently, Petrobras has hundreds of developments in force with external partners, with 130 universities. The targets in the short, medium and long term horizons remain, but according to Dantas, "the objective is to accelerate them". Details of the new scientific partnership model are available on the website ■

Aker Solutions wins maintenance contract for Peregrino



EQUINOR SIGNED a maintenance and modification services contract with Aker Solutions in the Peregrino field.

The contract will be for four years and includes an option for an extension of two more years.

The second phase of development, starting production next year, involves adding a third fixed wellhead platform (WHP--C) and drilling new horizontal production wells with artificial elevation, supplied by electric submersible pumps of rock bottom.

Multiphase export booster pumps will pump oil, gas and water transported through pipelines to the field's existing FPSO for processing.

The produced water will be returned after the separation process to the WHP-C for reinjection.

Equinor's objectives are to extend the productive life of the field and increase the recoverable reserves by 273 MMbbl.

Linda Litlekalsøy Aase, vice president of Aker Solutions, said: "Together we will work to extend the useful life of Equinor's assets and find low-carbon solutions wherever possible." ■

The ANP will hold a public session of the 2nd PERMANENT OFFERING CYCLE on December 4

DUE TO THE COVID-19 pandemic, the event will be hybrid: the public bidding session will be in person, with a reduced number of people, and there will be a live broadcast so that the public can follow the entire process over the internet.

Public session of the 2nd Cycle

The face-to-face part of the auction will be held at the Sheraton hotel in Rio de Janeiro, and will be attended only by the people necessary for its realization and representatives registered by participating companies to submit offers. The event will include all safety precautions, such as social distance and mandatory use of masks.

Will be on offer 14 sectors of exploratory blocks from nine basins (Santos, Espírito Santo, Campos, Paraná, Amazonas, Recôncavo, Sergipe-Alagoas, Potiguar and Tucano), as well as two sectors of areas with marginal accumulations in the Solimões and Recôncavo basins. The 63 companies registered in the Permanent Offer may make offers.

See the sectors on offer: **http://rodadas.anp.gov.br/pt/oferta-permanente/2-ciclo-da-oferta-permanente/setores-em-oferta-no-2-ciclo-da-oferta-permanente**

See all registered companies: **http://rodadas.anp.gov.br/pt/oferta-permanente/inscricao-de-licitantes**

See the schedule for the 2nd Cycle: **http://rodadas.anp.gov.br/pt/oferta-permanente/2-ciclo-da-oferta-permanente/cronograma-2-ciclo-op**

What is the Permanent Offer

The Permanent Offer is a form of concession of blocks and areas with marginal accumulations for exploration or rehabilitation and production of oil and natural gas. In this modality, there is a continuous offer of fields returned or in the process of being returned, of exploratory blocks offered in previous bids and not auctioned or returned to the Agency, and also of new exploratory blocks under study at the ANP (with the exception of areas in the pre-salt layer) , strategic or located on the Continental Shelf beyond 200 nautical miles).

Thus, companies do not need to wait for a round of bids to have the opportunity to finish a block or area with marginal accumulation, which is on offer. In addition, companies have as much time as they deem necessary to study the technical data of these areas, without the limited time limit for a round.

Once the application has been approved in the process, the company can declare interest in one or more of the blocks and areas offered in the Public Notice. This declaration of interest must be sent to the ANP, accompanied by an offer guarantee, and must identify all sectors in which the company aims to present offers at the public session to be held.

After approval by CEL of one or more declarations of interest, a cycle of the Permanent Offer begins, as from the disclosure of its schedule by the Commission. The cycles correspond to the holding of public bidding sessions for one or more sectors that have had a declaration of interest.

On the day of the public session, registered companies can make offers for blocks and areas with marginal accumulations in the sectors under bidding in that cycle.

In the case of exploratory blocks, the offers consist of signature bonuses (equal to or greater than the minimum bonus determined in the notice) and Minimum Exploratory Program (PEM), containing the activities that companies undertake to carry out during the exploratory phase (such as drilling wells and seismic surveys, for example). If there is more than one offer for the same block, the company or consortium that reaches the highest score wins, with the signature bonus weighing 80% and the PEM 20%.

For areas with marginal accumulations, the only criterion for determining the winners is the subscription bonus offered, which must also be equal to or greater than the minimum determined in the notice. ■

Startups: New announcement for rapid deployment solutions is released by Petrobras

PETROBRAS LAUNCHES this Tuesday (11/24), a public call for solutions from startups or other companies, capable of meeting the company's demands in the areas of Health, Operational Safety, Optimization and Process Automation. It is Petrobras' first public notice in this model that aims to internally test innovative solutions for the company, but validated or in the market validation phase.

"This pilot is part of the company's open innovation strategy, in which we seek to implement creative ideas with a high potential for impact on productivity or safety in the oil, gas and energy sector, accelerating the development of our innovation ecosystem," he says. Petrobras' Director of Digital Transformation and Innovation, **Nicolás Simone.**

Registrations continue until December 7th and can be made through the link:https://petrobr.as/editalsolucoes . The forecast is that the list of selected candidates will be released before the end of the year. ■

Growth of 3.3% in the first half of November, energy consumption in the free market

ENERGY CONSUMPTION In the free market maintained its growth trajectory in the first half of November, with an increase of 3.3% in relation to the same period in 2019. The information - still preliminary - makes up the InfoMercado Quinzenal bulletin, released by the Electric Energy Trading - CCEE. When purging the effect of migrations from the Regulated Contracting Environment - ACR, the segment registered a drop of 1.4%.

Detailing the analysis, Free Consumers, which have a load greater than 2 megawatts (MW), presented an increase of 5.9%. For special consumers, who are on the threshold of 0.5 MW to 2 MW and can only hire incentive energy, there was a decrease of 2.1%. Both results disregard the purge of migrations between environments.

Fields of activity - The scenario remains evolving in almost all branches of activity that buy energy on the free market, with growth in 11 of the 15 segments analyzed by CCEE. The sanitation sector remains the highlight (30.3%) followed by Commerce (10%).

For the energy-intensive industries, the highlight was the growth in non-metallic minerals (7.2%), chemicals (5.2%) and various manufactured products (5.5%). There was a decrease: transport (9.7%), services (2.2%), vehicles (1.1%) and metallurgy (0.5%). The figures disregard the purging of cargo migration. ■

BECOMING A STRONG COMPETITOR

Amid the redesign of the downstream, accelerated by the divestments of Petrobras, and the expansion of the gas market, the Brazilian oil company is preparing to operate in a market with new players. "We have to prepare ourselves to be the best in generating value for our shareholders, whose main representative is Brazilian society," says Anelise Lara, director of Refining and Natural Gas at Petrobras.

By **Beatriz Cardoso**

T&B Petroleum - **The oil and gas industry in Brazil, as well as the world, is going through an atypical moment, although it has always been a very volatile sector. Amid this scenario, what is your perception of trends for the coming years considering that natural gas is considered as one of the fuels of the energy transition?**

Anelise Lara – Over the past 100 years, the oil industry has gone through several crises and the prices of the commodity have always varied according to them. Currently, the average oil price, updated by American inflation, is in the range of 40 US $ / bbl. That is why we have to remain resilient in this oil price range and not consider peaks and valleys that may eventually appear along the way as the base scenario.

Oil has been part of the world energy matrix since it was discovered, as it is a source of high energy density, easy to move, and that, even if it is found/produced underground in areas where there is no human presence (such as in deep waters, in the Arctic or desert regions), can be moved and consumed anywhere on the planet.

Natural gas, on the other hand, has other peculiarities...

Although it can be produced in those same regions, it was not an energy source widely used in the past. Why? Precisely because of the need to develop an important pipeline infrastructure for its transportation. With the development of LNG technology and maritime transport for this product, gas has also become a commodity with global movement and pricing defined in regional hubs. It started to represent an increasingly relevant source in the energy matrix, also boosting the generation of electric energy through gas-fired thermal plants.

What makes it an important component in this transition equation...

In my view, in the coming years, we will still see important volatility in oil prices, whether due to the reduction of new investments in exploration and production (drop in supply and tendency to increase prices) or because of the impact energy transition (drop in demand and trend towards price reduction). But, no discussion of energy transition can do without the oil and gas industry. This industry is mainly responsible for the generation of energy that moves the world and will continue to be an

important player in the world matrix for decades to come. We still have a significant portion of the population living in conditions of poverty on the planet and the increase in the well-being of this population will be achieved in large part by the incorporation of goods and customs that will demand more energy. The industry has to reinvent itself and look for ways to reduce greenhouse gas emissions, either in its operations or taking into account the entire value chain, including greater use of gas and the production of liquid derivatives. increasingly sustainable. That is what we are proposing to do at Petrobras with the production of renewable diesel and bio-QAV within our refineries.

> But, no discussion of energy transition can do without the oil and gas industry. This industry is mainly responsible for the generation of energy that moves the world and will continue to be an important player in the world matrix for decades to come.

What is missing for the great natural gas take-off, since we have large proven reserves and other potential ones, we have already passed the regulatory framework consolidation phase and the ANP even launched a 45-day prior consultation on the "Conceptual Model of the Gas Market in the Union's Competence Sphere "?

The approval of the new Gas Law Bill (PL 6.407), which is in progress in the Federal Senate, is lacking, as well as greater clarity in the regulation of the transportation and distribution segments by competent bodies. The bases for this opening to occur are laid. The TCC (Term of Cessation of Conduct) that we signed with CADE, in July 2019, has been a fundamental part of this opening process.

But we've come a long way. The input-output model is expected in the Federal Decree 9,616 / 2018, allowing the participation of multiple shippers once has the legal infrastructure measures defined by the ANP. We have the SAZIEF tax model approved by CONFAZ already in use, allowing the application of this new input-output model. It is a gas transport sector that already has the participation of independent agents. We also have several regasification terminals planned or already being built in the country. And an integrated flow infrastructure in the pre-salt layer, which will be completed with the completion of Route 3, allowing the entry of large volumes not only from Petrobras but also from other producers. And there is also the opening of gas imports from Bolivia to other agents.

Attractive factors for new investors ...
This is a sector that has great potential to attract large investments to the country. However, for this to happen it will be necessary to have clear rules and a guarantee of respect for signed contracts. We don't need to reinvent the wheel. We have successful examples of opening up the gas market in several developed countries. The gas bill, which is in the final approval phase, considered precisely these best practices and benchmarks in the international market in its preparation. For this reason, we defend that the text of the PL is approved in the Senate without changes.

What is the expectation of expanding the participation of natural gas as a source in the Brazilian energy matrix?
Brazil currently benefits from three different sources of natural gas supply: the gas produced in the country, mainly in the Brazilian pre-salt fields; the one imported from Bolivia; and LNG, which tends to have entry points along the entire coastline. A fourth source, gas imported from Argentina, could be included in this portfolio, through the construction of gas pipelines from the unconventional gas reserves of the province of Neuquén to the Rio Grande do Sul. The integration of these systems will make the South Atlantic region to become a relevant global gas hub in the future.
In my opinion, the expansion of the share of natural gas as a source of the energy matrix will occur through thermal plants generating electricity for the Brazilian integrated system. We also have the potential to increase the share of gas in the industry in general, mainly chemicals, fertilizers, ceramics, and steel, but this will depend on the reduction in the price of gas that is obtained with the opening of the market.

“The refining profile in Brazil is expected to change substantially with the divestments of Petrobras and the entry of new players. Today, Petrobras bears the responsibility of supplying the national derivatives market, although this is the legal responsibility of the ANP.”

I do not believe in the universalization of gas throughout the country. Unlike countries with cold climates, Brazil does not need domestic heating and, therefore, the level of residential consumption hardly makes a distribution network in small and medium cities feasible. Gas containers (LPG) will continue to play a relevant role in the cooking taking place in Brazilian homes.

Regarding the refining area, for more than three years we have been discussing the redesign of the downstream, of refining. What should the refining profile be like in Brazil, with the divestments of Petrobras: expansion of the park, new players?
Although Petrobras' monopoly was extinguished more than 20 years ago, only now, with the divestments made by the company, we will have the opening of the refining sector in Brazil. And why hasn't it been done before? One explanation is precisely the very relevant role of Petrobras in this segment (responsible for 98% of the refining park), which ended up alienating potential investors.
The refining profile in Brazil is expected to change substantially with the divestments of Petrobras and the entry of new players. Today, Petrobras bears the responsibility of supplying the national derivatives market, although this is the legal responsibility of the ANP. With the entry of new agents in this market, the role of the ANP will be fundamental, being responsible not only for ensuring national supply but also for formulating policies and guidelines for the entire sector. Therefore, we defend that, in this transition phase, the ANP can prepare itself with sufficient human and material resources to face this challenge.

Challenges for all agents...
Petrobras manages the entire refining park in an integrated manner and

refineries do not make independent decisions about FUT (utilization factor), volumes, and prices. Today this planning process is done centrally, at the company's headquarters taking into account the demands of the internal and external market, the existing logistics, and the economic return for the company. With the opening of the market, the new players will start to manage their refineries independently, seeking to maximize value on the capital employed. This can also lead to new investments not only in refining but also in the logistics chain, aiming at increasing efficiency and generating new products.

I do not doubt that there will be a lot of competition in this process. Refiners will not only be focused on their closest market, they will also tend to seek new markets outside their area of influence. In my view, the consumer will gain from this, as there will be a drop in market share among refiners and importers and price will be an important variable in this equation.

Speaking of challenges, which is the biggest one today on your board?

My biggest challenge is to prepare our team for the opening of the refining and gas markets. We will start competing in an open market, with several private players. For this reason, we have to prepare ourselves to be the best in generating value for our shareholders, whose main representative is Brazilian society. For that, we will have to gain agility and flexibility, maintaining the necessary governance to guarantee the integrity and compliant processes.

Petrobras has become a worldwide benchmark in the area of operational safety, with excellent performance indicators even compared to the majors. To give you an idea, our TAR (rate of recordable accidents per million man-hours) in the areas of refining, gas, and energy is 0.27, on average for the year. The TAR of the best global oil companies is in the range of 0.9. In other words, we are well below the global benchmarking. Why? Because safety is an intrinsic value for all oilers workers and is in the DNA of our people. When in doubt, stop! This is our motto. Nothing is more important than the safety of our people and our facilities.

This same commitment to safety has to be in the DNA of our people when we talk about the incessant search for lower costs, the excellence of operational performance, the maximization of energy efficiency, the massive application of digital transformation, and the decarbonization of our operations. With this set of values and guidelines, we will certainly be strong competitors in this new refining market in Brazil. ■

Fotos: Agência Petrobras

Foto: AkerSolutions

DIVERSITY IN ACTION

Data increasingly become some of the main assets of the oil and gas industry: the more insufficient or imprecise, the greater the risks and uncertainties, the lower the potential for success, and the lower the efficiency of the projects. As the 'new oil' of an industry undergoing accelerated transformation, the processing, interpretation, and analysis of an ever-increasing volume of data still involves an increasing multiplicity.

To this already complex multiplicity, some variables have been added that did not use to be part of this equation a short while ago. Like gender, a recurring theme in organizations, but which does not materialize on the board and executive management of oil and gas companies, in which women are still a minority. However, a new 'energy matrix' is emerging in the industry, with growing female leadership. It shows the simple exercise of bringing together experts to talk about the current challenges and future perspectives of the industry - from exploration and production to gas and refining, to technological innovation and digital transformation, and to regulatory framework and energy transition.

The fact is that competence and professional qualification, in addition to the vocation for leadership, are adding shades of pink to'this 'organizational chart' of the sector. This is demonstrated by the more than 20 female executives and leaders who speak with exclusivity to TN Petróleo about an industry that many of them know from the 'factory floor' (or field work) to the highest management positions.

More than a panel about the sector, this female 'intelligentsia' in the oil industry signals that which still hinders the change of mindset when the issue of diversity is on the agenda.

By **Beatriz Cardoso**

The digital transformation will set the 'tone' in the new normal of the oil and gas industry, in which technology and innovation are the faithful of the scale and cost and risk reduction, the basic assumption for business sustainability. These factors are forcing companies to rethink their priorities, looking for ways to make it possible to minimize uncertainties and, increase reliability to improve efficiency aiming at increasing productivity, with more safety.

This task becomes even more complex in one of the most challenging contexts of this industry in recent decades: facing the COVID-19 pandemic coupled with historical factors that 'graduate' the volatility of this market. An almost perfect storm, in which the impacts extend from public health and societal behavior to the direction of the economy and the energy sector.

"The worldwide drop in consumption has impacted prices and led to new market balances. Given this situation, it is normal to have a reanalysis of investments and divestments of companies. Even in this context, Brazil has proven itself to be resilient and competitive", highlights Heloísa Borges Esteves, director of Oil, Gas and Biofuels Studies at the Energy Research Company (EPE).

Emphasizing that all actions aimed at the development of this sector have been guided by the National Council for Energy Policy (CNPE), within the scope of national energy planning, Borges Esteves evaluates the sector's result in 2020 as positive.

PRE-SALT RESILIENCE

"The oil industry in Brazil, which started the year with expectations of resuming investments in exploration and production (E&P) in Brazil and had to revise its projections, managed to maintain a high level of production, with the pre-salt contributing significantly to economic activity ", Borges Esteves observes.

The figures of the Dynamic Panel for the Production of Oil and Natural Gas, released in September by the National Agency for Petroleum, Natural Gas and Biofuels (ANP), confirm the following: on October 21 the daily production of equivalent oil was approximately 3.6 million boe (of which 2.8 million barrels of oil), 70% of which comes from the pre-salt.

This volume is similar to the September average (3.7 million boe / day), just over 300 thousand barrels below the absolute record registered in January, when Brazil surpassed, for the first time in history, the milestone of 4 million boe / day . In the first six months, production fluctuated between 3.5 and 3.9 million boe / day.

According to Petrobras, the main operator on the new frontier, pre-salt production increased 32% in the first nine months of the year compared to the same period in 2019. That is why the initial target for that year, of 2.7 million boe / day, was increased to 2.84 million boe / day (a variation of almost 1.5%). The expressive operational performance, according to the oil company, was due to "the increase in the production capacity of Búzios and the high operational efficiency in the pre-salt, as well as the postponement of part of the major scheduled production stops".

In addition, extraction costs fell from $ 7.9 / boe in the third quarter of 2019 to $ 4.5 / boe in the third quarter of 2020. "Approximately 60% of the decline was due to cost savings, efficiency gains, increased production, and active portfolio management, while the rest was caused by the depreciation of the real against the dollar. In the pre-salt, the extraction cost was US $ 2.3 / boe in the third quarter ", informed Petrobras when announcing the results for the third quarter.

These figures reflect the maturity of the Brazilian oil and gas industry, as well as the pre-salt's resilience to market volatility - with a break-even among the most competitive oil and gas industries in the world.

INVESTMENT ATTRACTION

"This is the time to make an effort to maintain the country as a pole of attraction for investments, since, in the view of EPE, the oil and gas sector is and will remain very important in the coming years", affirms Heloisa Borges Esteves, stressing that the pre-salt will have a dominant participation throughout this decade.

"In the long-term, the fact that we will have reserves and the conditions to transform them into a profitable productive activity is also positive, both as a means of cooperating with the country's energy security and as a possibility of contributing to sustainable development - which will naturally depend on the balance among the economic, environmental and social spheres ", adds the director of EPE.

Supported by more than 30 years of experience in the sector, in Brazil and abroad, and today acting as an independent consultant and member of the international board of directors of energy, infrastructure and certification companies, Ieda Gomes Yell agrees that the oil and gas industry goes through a time

Photo: Petrobras Agency

of extraordinary challenges. And it is necessary to be aware of the evolution of the energy sector.

"In the short term, we have the drop in demand, caused by the isolation measures with the outbreak of COVID-19 and the excess supply, particularly of shale oil in the United States and low-cost oil from Russia and Saudi Arabia. In the medium and long term, the goals of countries and companies to reduce greenhouse gas emissions point to a progressive decarbonization of energy consumption ", Gomes Yell points out.

Gomes Yell indicates that although there are several scenarios of oil and gas consumption beyond 2030, oil consumption is expected to fall, and companies listed on the stock exchange are being pressured by investors and NGOs to reduce their production. "Oil and gas consumption should not reach zero, even in the most daring scenarios. Companies that produce at competitive costs will be able to maintain their share in the world market ", says Gomes Yell.

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>
> HELOÍSA BORGES ESTEVES, DIRECTOR OF OIL, GAS AND BIOFUELS STUDIES AT THE ENERGY RESEARCH COMPANY (EPE)

According to Gomes Yell, although the pre-salt fields are highly productive, the investments required for development are enormous and the tax burden in Brazil is high and complex. "If Brazil wants to maintain its participation in this smaller oil market, it will be necessary to offer an attractive tax regime, healthy competitive conditions and an educational system that prepares competent professionals", Gomes Yell concludes.

THE NEW MOMENT OF NATURAL GAS

The Brazilian natural gas market is in a moment of transition towards the adoption of good international practices and greater competitiveness, including diversity of agents and greater liquidity. "In this scenario, different sources of supply will be important for the sector, contributing to the Brazilian economic development with its different contractual characteristics", evaluates Heloísa Borges Esteves, director of Studies of Oil, Gas and Biofuels at EPE.

The forecast of EPE (2019), is that the total gas production will double in ten years in the country. However, net production, which will actually reach the consumer market, will be lower, due to technical issues and the existing bottlenecks along the chain.

In the PDE2030 studies, recently published on the EPE website, the production and supply forecasts for oil and natural gas were revised. "It is interesting to note that the forecast for oil production for the decade in PDE 2030 is about 8% lower than that presented in the previous plan", points out Heloisa Esteves.

However, concerning the gross production of natural gas planned for the decade, an increase of about 3% is estimated in relation to the previous projection. " This is because, despite the lower energy demand caused by the Covid-19 pandemic, forecasts of natural gas supply in Brazil remained optimistic, given the prospects brought by the New Gas Market for the sector and the possible change in legislation for this market ".

Building more gas pipelines for transporting from sea to land, expanding the treatment capacity of the additional gas portion (expansion or new UPGNs) and increasing the capillarity of gas distribution in the States are some of the ways to reduce bottlenecks. Investments that must be assumed by the private sector, which questions its attractiveness without the guarantee of the country's reindustrialization.

"The energy sector in Brazil has a great advantage over other countries, which is the diversity of energy sources that can be used to promote national development. In this sense, industrial enterprises tend to analyze different possibilities of energy inputs at the time of their implementation", ponders the director of EPE.

According to her, associated or non-associated natural gas, in onshore and offshore environments (post-salt and pre-salt) may contribute with different characteristics of flexibility and contractual term, depending on the needs of different types of consumers.

NET MARKET

She acknowledges that, until then, natural gas has not been competitive for some sectors, compared to other inputs (such as fuel oil), mainly in areas far from the existing integrated network, which makes the viability of new transport pipelines difficult.

"With a greater number of agents, a greater range of possibilities for offers and demands, opportunities for third party access to the existing infrastructure and new contract models, which have been emerging throughout the process of evolution of the legal and regulatory framework, a better equating risk ", emphasizes Heloisa Esteves.

"The agents will be able to make different types of contracts available throughout the life of a flow, processing or transportation project, even if there is a change in market conditions", she adds.

Ieda Gomes Yell considers that natural gas in Brazil has not yet reached the stage of a fungible commodity, such as oil. "The market in Brazil is not yet liquid, despite the progress in the construction of distribution networks and new LNG (liquefied natural gas) terminals", she highlights, comparing Brazil with other markets. While the country has only 46,000 km of distribution networks and transport pipelines, Pakistan has about 190,000 km and neighboring Argentina, 160,000 km in Argentina.

"Algumas distribuidoras de gás têm investido fortemente na conexão de novos consumidores e na expansão das redes em suas áreas de concessão, mas o

Photo: Urucu (AM), Petrobras Agengy

principal desafio para atrair mais investimentos privados é a expansão de mercados âncoras de grande porte, como indústrias e usinas termelétricas consumindo maiores volumes na base", afirma a consultora.

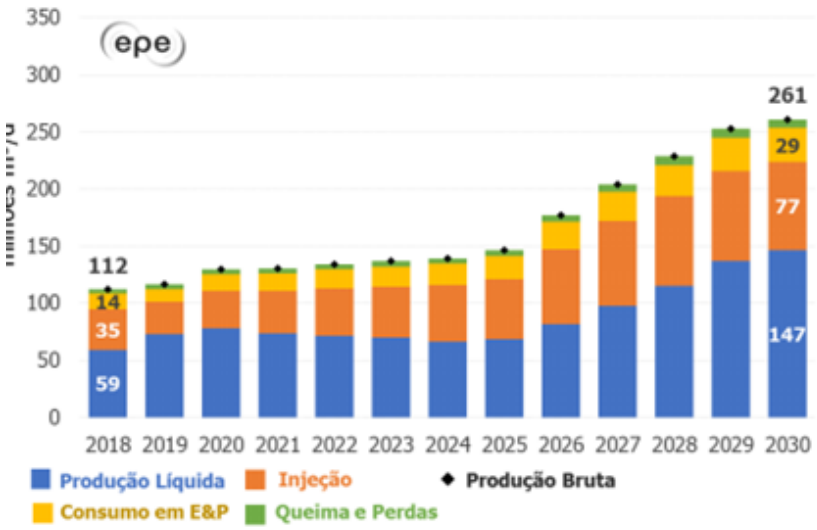
However, she notes that despite the difficulty in expanding consumption in these two base segments, there has been a positive movement of private investments in LNG terminals, guaranteed by PPAs (Power Purchase Agreement, long-term energy purchase and sale agreement)) and fixed revenues, and the privatization of transport pipelines, guaranteed by capacity payments by Petrobras. "Private investment in infrastructure in the mid and upstream depends on guarantees of consumption and revenues to enable commensurable returns for shareholders", concludes Ieda Yell.

CONCEPTUAL MODEL

With a focus on expanding this market, on October 5, the National Petroleum, Natural Gas and Biofuels Agency (ANP) launched a prior consultation, for 45 days, of the document entitled 'Conceptual Model of the Gas Market in the Union's Competence Sphere'.

"The oil and natural gas industry in Brazil is undergoing a major transformation process. In the specific case of natural gas, Brazil is moving towards a new Market design, with the participation of a multiplicity of agents and new ways of contracting transportation. This design has been discussed with industry agents since the Gas to Grow initiative and within the scope of the New Gas Market", notes the Regulation Specialist and advisor to the ANP Board, Melissa Cristina Pinto Pires Mathias.

According to her, the document in prior consultation consolidates this design, placing once again for debate with society, the organization and the functioning of the different markets that make up the natural gas industry within the Union's sphere of com-



petence. It also recalls that a new legislation (PL already cited, under discussion in Congress) will give rise to the need for revision in a series of ANP regulations.

"The Brazilian natural gas industry is moving towards a more liquid market and with greater transparency in the price formation process. This will change the dynamics of the market's operation and will require the regulator to pay close attention to the determination of the necessary requirements for the performance of agents in the different segments of this energy chain ", stresses Melissa Mathias, who holds a PhD in Energy Planning.

The expert notes that the model under discussion is based on equal treatment among agents with regard to access to transport capacity, which will be contracted on the entry and exit regime, and on shorter-term contracts. This will allow competition in the competitive segments of the chain, contributing to the attraction of agents to operate in these segments.

Another point that she considers being of vital importance in this debate is the price formation process, which must be as transparent as possible, reflecting market conditions. "Thus, consumers will have knowledge and predictability of the costs of using the product and it will be possible to send correct signals to market agents who intend to invest in the necessary expansion of infrastructure in the natural gas industry", points out Melissa Mathias

It reiterates that social participation is fundamental for the improvement of the regulatory framework. "In this sense, the Prior Consultation to analyze the conceptual model for the natural gas industry, within the sphere of competence of the Union, represents an important advance towards a market whose rules of operation and the relationship between agents are well defined. What will contribute to an environment with clear rules and, therefore, more conducive to investments ",.

Melissa Martins is endorsed by the director of EPE, Heloisa Esteves, who applauds the various initiatives of the ANP to consolidate and present the international experience in several links in the natural gas chain. "This will allow market agents to have a more practical perception of how the processes that used to occur in an intra-company way will work, involving few companies (such as, for example, the daily movement schedule, hiring capacity, etc.)", Heloisa Esteves assesses.

Heloisa Esteves also observes that, in the new legal and regulatory model, producers will be able to directly access the market and large consumers will be able to directly contract transport capacity. "Which will require a greater level of knowledge about procedures and guidelines", he points out. And recalls the ANP also made available a manual of good practices for the distribution of natural gas, based on national and international experience, "which can be considered voluntarily by the distributors to optimize and make their operation more efficient." ■

ENERGY TRANSITION

The role of natural gas in the energy transition is carefully analyzed by industry experts. **Ieda Yell** notes that the scenarios of the International Energy Agency and BP, for example, point to an increase in the consumption of natural gas in the next 10-15 years, as an ideal substitute for coal and complementary to intermittent renewable energies.

Still according to Yell, from 2030-2035 the projections point to a drop in gas consumption of 15% to 40%, depending on the acceleration scenario. "These scenarios assume that more efficient ways of storing electrical energy (batteries, coupling with hydraulic energy, etc.) will be found and that CO2 capture projects will be implemented globally", evaluates Ieda Yell.

Yell considers that such scenarios also foresee greater participation of biogas and hydrogen. "All of these alternatives are challenging, in terms of costs and logistical issues, but 20-30 years from now everything is possible. Take the case of cheaper wind and solar sources, "comments Ieda.

The consultant and member of the boards of directors of several companies in the energy area, adds that the production of associated gas has grown a lot in Brazil, but most of the energy is reinjected, although there is a growth in thermoelectric projects based on LNG, with surplus gas in the FSRUs (Floating Storage Regasification Unit) that can be sold in importing regions. "The greater participation of natural gas in the Brazilian matrix may occur if regulatory, fiscal and legal bottlenecks are addressed and if independent producers expand their offer to the market," Yell concludes.

For the director of EPE, Heloisa Esteves, the pace of the energy transition may vary between countries and that changes in the participation of natural gas in the different energy matrixes depend on the pace of technological advances and competitiveness. That is why regional and national characteristics should be considered in the analyzes, and no transition path applies to all national contexts. "As a consequence, there will be different roles and relevance for natural gas in relation to different countries," she says.

In the view of EPE, presented in the National Energy Plan 2050, the energy transition will be based on electrification (mainly renewable), biofuels, energy efficiency (catalyzed by digitalization) and natural gas. "In particular, natural gas will have the role of integrating the technological paradigms of fossil fuels and renewables by enabling a greater introduction of non-dispatchable renewable sources in the electricity sector. In addition, hydrocarbons may play an important role in replacing fuels with a higher carbon footprint in the industrial sector, "she explains.

However, this participation of natural gas as a transition fuel in Brazil will be influenced by competitiveness issues vis-à-vis other fuels, in addition to competition between natural gas from different sources. "Natural gas will tend to have a greater penetration in areas already served by gas pipelines, and can also be taken to other areas not yet served via compressed natural gas, liquefied natural gas or new gas pipelines", she adds.

Heloisa Esteves believes that one of the main contributions of natural gas with regard to the energy transition is the fact that it is a fuel with low emission in burning, compared to others, and at the same time that it has potential for storage, whether in the reservoirs where is found or in future underground natural gas storage projects.

It also recalls that natural gas has already promoted seasonal energy security in the country, operating at times when the hydroelectric plants are less affluent. "In the future, based on new contractual models, it will also be able to promote intraday energy security, supporting a greater penetration of wind and solar energy, until new forms of large-scale energy storage that meet its intermittency are made possible", predicts Heloisa. For her, concerning the energy transition, it is necessary to move forward in promoting the efficient development of the natural gas market and infrastructure, identifying future synergies with emerging solutions. ■

THE DISTRIBUTOR'S EXPECTATION

"WHAT IS EXPECTED for the next few years is that the bottlenecks are resolved and we have a great surge in natural gas, as soon as the states assume the role of assisting in the formation of this gas market", says the CEO of Companhia Potiguar de Gás (Potigás), **Larissa Dantas.** "This role, leadership and articulation of the public authorities will be essential for the growth of the natural gas industry and for the end consumer to have access to gas at more competitive prices", postulates the executive, who is one of the main mobilization agents in the sector.

Optimistic, she says that the expectation of expanding the participation of natural gas as a source of the Brazilian energy matrix is for growth. "The moment, even worldwide, is for an energy matrix to be increasingly made up of renewables and natural gas is an energy of fossil origin, with less potential for pollution," says Larissa Dantas, recalling that renewable energies such as wind and need to work with a backup, as they are intermittent. "Then comes the expansion of the use of natural gas to act as a backup for these renewable energies that are growing in Brazil, especially in Rio Grande do Norte, which has a high potential for wind energy," she points out.

Recalling that the oil and gas sector has been volatile because prices are pegged to the dollar, which makes this volatility very unpredictable. "The idea is that there will be a stability of this volatility for the gas market shortly, as is the case with shale gas prices in the United States. The world must repeat this successful example, which reduces the volatility of natural gas by disconnecting it from the price of oil", emphasizes the executive.

After all, what is missing for the great surge in natural gas, since we

have large reserves and other potential ones?"The initial focus should be on creating demand," says Larissa Dantas, noting that the gas sector, like the oil sector, is thus subdivided into upstream, midstream and downstream.

In the downstream, are the natural gas distribution companies, which are specialized in capturing demand. However, it is necessary to know the details of the natural gas distribution industry channeled to the New Gas Market scenario. "These nuances that are within the 27 natural gas distributors in Brazil are peculiar even for each state, but, the general state regulatory framework has a structural basis common to all. This regulatory framework needs to be harmonized with federal legislation so that the gas market and industry have a functioning from upstream to downstream that contemplates the increase in demand in the coming years ", evaluates the executive of Potigás.

With regard to the upstream of natural gas, she points out that the agenda for the day is to increase the supply of pre-salt gas. "There are technicians in the area who point out that there is not enough flow infrastructure for this natural gas to reach the final consumer. There are controversies regarding this issue ", she observes. For this

reason, she prefers to highlight onshore natural gas. "It is cheap and local gas, extracted conventionally and whose exploitation will allow more competitive prices for the coming years", says Larissa Dantas.

Perspective reinforced with the creation of REATE - Revitalization Program for the Exploration and Production of Oil and Natural Gas in Terrestrial Areas, of the Ministry of Mines and Energy (MME) and which leveraged the New Gas Market program, launched in 2019, which seeks to stimulate and attract new investors. For the president of Potigás, the investments expected to be assumed by the private sector are attractive because they will ensure greater capillarity in the distribution of natural gas.

"Once the demand created by the local distribution companies is guaranteed, it would be met with new investments. These are situations that should happen in parallel, "she concludes:" The country's reindustrialization will happen when there is a more competitive natural gas molecule. Several work fronts need to be appreciated and prioritized. " ■

TECHNOLOGY GAINS EVEN MORE PROMINENCE

The intensive use of technology is one of the characteristics of the oil and gas industry, mainly in offshore exploration and production (E&P) activities, which have always demanded incremental and disruptive innovation, to overcome the continuous challenges that arise in this scenario.

With the discovery of the giant pre-salt reservoirs, the production chain as a whole started to invest more continuously in research, development and innovation (RD&I), to generate solutions, from the well to the topside, that would make the production of this new frontier feasible.

A 'technological race' that made it possible to start pre-salt production two years after the discovery and just one year after confirmation of large reservoirs, with recoverable volumes of 5 to 8 billion barrels of oil and natural gas, in Tupi (block BM-S-11).

The role of technology in this rapid evolution of the pre-salt, which reached one million barrels/day of oil in 2016, to reach 1.5 million barrels/day two years later, is unquestionable. A process also reinforced by the incentive policy materialized in the RDI clause in the contracts for exploration, development and production of oil and natural gas, which generated more than R$ 18 billion in investments in the last two decades. Although the volume of resources generated by this clause this year is one-third of the previous year due to the critical context generated by the Covid-19 pandemic, technology and innovation remain mandatory.

ELECTRIFICATION OF OFFSHORE PROJECTS

In a scenario of lower oil prices, economic slowdown and drop in consumption, companies in this production chain, individually and in strategic partnerships, seek to generate "fit for purpose" technologies for the oil industry.

Solutions from the well to the topside that consider as premises the reduction of the time between the discovery and the first oil, the increase of the efficiency and operational safety and the higher productivity of its assets. In other words: there are multiple challenges.

There are countless existing and under development technologies that aim to ensure that these premises are met in offshore projects. And for all of them, more energy is needed for subsea systems, to guarantee greater reliability and efficiency in the extraction, elevation and monitoring of production among the priorities of the oil companies.

Total's R&D director, **Isabel Waclawek,** confirms

this concern of oil companies, especially those that operate in more complex scenarios such as the pre-salt. Waclawek confirms that the company's priorities in Brazil are technologies that make it possible to increase production, minimize risks, reduce CO2 emissions and decrease costs. Among them, the electrification of subsea fields (both from the point of view of completing wells and subsea arrangements) as well as the improvement of subsea processing systems (to optimize surface plants and increase production and/or operational performance). "The goal is to ensure that all subsea equipment is powered electrically, without the need to use hydraulic infrastructure," Isabel observes.

Total, together with its consortium partners, has been investing in the development of 100% electric subsea solutions, such as electrical systems for the intelligent completion of wells to improve operational efficiency and safety. Especially in the pre-salt projects, whose fields are located in deep and ultra-deep waters and more distant from the continent, demanding more complex underwater arrangements and, consequently, which demand more energy.

"We are working with our partners to develop energy generation and distribution solutions in remote fields or wells. Wind energy can be, for example, a solution for offshore generation in more remote regions. Other solutions that combine different sources of energy to meet the challenge of this scenario can also be considered. And there are efforts to develop a high voltage motor to meet the demand for electricity at the bottom of the sea ", says the executive of the French company.

ENERGY TO INCREASE PRODUCTION

Aware of this challenge, TechnipFMC has sought to develop solutions with this focus. "Our vision for subsea includes a fully electric system, powered by renewable energy, which will simplify the subsea infrastructure and reduce - or even eliminate - emissions of environmental pollutants", reveals Luana Duffé, Vice President of Subsea Projects & Country Manager at TechnipFMC in Brazil.

"The electrification of the field has great potential for transformation. With it, we will minimize the CO2 footprint, reducing emissions from the field, leading to simplification, adding more reliable solutions and, basically, saving on OPEX and CAPEX with the removal of the entire hydraulic infrastructure, both subsea and topside. And that is significant ", Luana Duffé highlights.

She stresses that an important aspect of subsea operation powered entirely by electricity is that it will greatly improve the capacity of long systems and tiebacks (connections between two lines). "When you think about it, there is no better way to contribute to a more sustainable approach to developing oil and gas resources than to eliminate floating facilities and simply be able to go beyond the existing infrastructure," she points out.

SMART COMPLETION

One of Total's partners in the development of new technologies, Schlumberger has one of its priorities in the well area. "As the industry prepares for electric submarine architecture, the need for a fully electric flow control system capable of handling high production rates and pressures became evident, especially in offshore operations in extreme environments such as pre- salt ", highlights Anna Paula Lougon, Director of Technology at Schlumberger in Brazil.

According to Anna Paula, there are very few electrical flow control

systems available in the industry, and the existing systems are aimed at low and medium production rate applications. That is why Total and Petrobras are implementing, in partnership with Schlumberger, an R&D program in Brazil focused on the development of an intelligent electric cable completion (defined as CI_CLE). "It will pave the way for a fully electric completion and, eventually, a fully electric subsea infrastructure," Lougon says.

The executive notes that the elimination of subsea infrastructure hydraulic systems has numerous economic and environmental benefits and is an objective of the oil and gas industry. "All-electric production will reduce costs, improve the reliability of the operation, reduce the environmental impact and allow digital management of the field and, consequently, the increase in oil production", she affirms.

Anna Paula stresses that it is very important to manage the production uncertainty of the heterogeneity of the reservoirs to maintain productivity and mitigate the risks of premature production of water or gas in pre-salt exploration fields. And that remotely operated flow control valves are crucial to enable such management. "The fully electric intelligent completion system will allow: the reduction of the number of Christmas trees and the complexity of the umbilicals, an increase in the efficiency of the installation and minimization of risks during the productive life of the field", she concludes.

SUBMARINE SEPARATION

At the same time as it seeks to improve well engineering technologies, operators and suppliers are increasing subsea systems, which are gaining more and more complexity and functions. Isabel Waclawek, from Total, highlights the importance of the evolution of subsea separation technology (gas, oil and water) to reduce costs, optimize production and simplify process plants on offshore platforms. "With this, the separation and injection processes in the reservoir would be carried out on the seabed, eventually eliminating the use of risers for injection of water or gas from the platform, minimizing operating costs", Waclawek points out.

Speaking of risers, this is another critical piece of equipment that has been receiving increasing attention from the entire production chain. The French oil company is evaluating different types of riser configurations (flexible, rigid or hybrid technology), looking for a solution that has the lowest cost with the lowest possible risk. "This assessment considers the most severe scenarios, especially those in the pre-salt region, where we have operational production conditions with higher concentrations of CO2 and with higher pressures and temperatures, which can cause the failure of risers by SCC (stress corrosion cracking)", stresses Total's R&D director.

A risk that impacts all the majors currently operating in the pre-salt. Hence the set of efforts in the search for solutions to mini-

mize potential failures by SCC in the pre-salt risers, as well as in the development of technologies that guarantee the flow of hydrocarbon production in ultra-deepwater depths.

TechnipFMC is working on two fronts: separation and umbilicals. "In the context of high volumes of gas and CO2 production, the pre-salt FPSOs will have to dedicate more than 50% of the topsides to process gas. In a scenario in which the GOR (gas-oil ratio) will only increase over time, the best strategy to avoid the bottleneck of oil production is to eliminate gas and CO2 on the seabed, through separation and injection ", says Luana Duffé, from TechnipFMC.

Duffé points out that the subsea processing solution would allow the extension of the production plateau, since the topside would not have bottlenecks due to the increased production of gas and CO2. "We are working in collaboration with partners to enable this subsea processing system (Subsea Processing System) and make it available as a sustainable tool to manage gas processing demands and reduce CO2 production on the surface," says the vice president of Subsea Projects & Country Manager.

HYBRID RISERS

At the same time, TechnipFMC is developing a new generation of flexible tubes to operate in highly corrosive environments like this. "This offer will be a combination of Hybrid Flexible Tube (HFP) for dynamic risers and innovative solutions for flexible lines. In both cases the concentration of CO2 in the annular tube will be drastically reduced. HFP is taking advantage of the latest composite material technology, enabling a flexible riser solution with superior mechanical performance, as well as addressing CO2 corrosion problems and, at the same time, reducing the weight of the tube structure by up to 50% . In addition, it will make it possible to have the riser in a free catenary configuration, which is the simplest and most economical ", says the executive.

According to her, the use of composite replacing steel layers also contributes to the reduction of carbon emissions during the manufacture of HFP. "We estimate that HFP will reduce the carbon footprint of manufacturing by 70% compared to a conventional flexible one", complements TechnipFMC's Country Manager, which is implementing a rigid pipe manufacturing process in Brazil, by building a modern spoolbase in Porto do Açu, in São João da Barra, in northern Rio de Janeiro, and also the qualification of suppliers for steel tubes coated with a corrosion-resistant alloy. To meet the demands of offshore projects, the unit is being installed in an area close to the company's flexible lines factory, which already operates in the industrial and port complex.

"In a context with low oil prices, integrated business models become more relevant, such as iEPCI™ - TechnipFMC's exclusive approach to undersea developments that integrate SPS (Subsea Production System) and SURF (Subsea Umbilical) offerings, Riser and Flowlines), which create and expand the pool of deepwater opportunities. These models reduce the time to reach the equilibrium point of the project, with an economic approach to its development, and accelerate the first oil and gas production", emphasizes Luana Duffé.

ROBOTIC AUTOMATION

Another technology that has demonstrated its diversity of applications is robotics - from exploration to production, from inspection to decommissioning. On land, at sea, inside wells, ducts, risers and other critical equipment or environments, robotic systems show that the tool can go far beyond what was imagined when the first robots appeared. Even because other technologies have been added to robotics, which today has an enormous multiplicity of resources to operate on different fronts.

A new generation ROV GeminiTM, a fully integrated system that leverages advanced precision robotics and which TechnipFMC points out as an important milestone for automation in terms of reducing probe days and the potential to reduce the carbon footprint. "It incorporates the next generation of force-compatible manipulator technology, combined with more than 30 interchangeable underwater tools and machine vision technologies to automate complex tasks," highlights the Vice President of Subsea Project. ROVs (Remotely Operated Vehicles) are robots operated by remote control used in different activities and fields of science, especially in environments where human beings can't act directly.

Luana Duffé reveals that two of these ROVs are currently operating for Shell Offshore Inc. on rigs contracted in deep waters in the Gulf of Mexico. The company launched a set of new ROV services for drilling rigs along with Gemini ™ to ensure even more efficiency for this tool, with a view to more autonomous operations.

Autonomy that began to be consolidated with autonomous underwater vehicles (AUVs, from the English Autonomous Underwater Vehicle), a robotic/mechatronic system that navigates in the water without the need for a human pilot

or connection cables, eliminating the use of support boats for the control, minimizing the associated cost. For Isabel Waclavek, from Total, it is a tool of vital importance in risk management and asset integrity, whose development and/or improvements have been optimizing the preventive analysis of events, with a focus on monitoring of pipelines and subsea equipment.

The robots will also play an important role on autonomous (unmanned) offshore platforms, which are in the plans of the French oil company and other majors. "We are going to limit the risk of exposure to operational teams, reduce the footprint of the facilities and simplify the associated logistics. The activities will be carried out by robots specifically developed to perform operational tasks and larger maintenance can only be scheduled once a year ", explains the R&D director at Total.

In the optimization of production, we are working on technologies to guarantee production in deep waters and over long distances, avoiding the formation of paraffin or hydrates through heated ducts or with optimized insulation and through more efficient software for the simulation of flow in the lines of production.

PRODUCTION & DECOMMISSIONING

Beyond the operational tasks, robotics has the vocation to become an important ally in both production and decommissioning, a scenario that we are beginning to experience in the country. This is one of the bets of Repsol Sinopec, which has been working in partnership with the Brazilian company Ouro Negro Tecnologia and PUC-Rio in the development of robotic systems, with resources from the ANP RD&I clause.

> Today, there is no more room for error, nor more room for petrophysical interpretations or characterizations of a rock that are dubious.
>
> ANNA PAULA LOUGON, DIRECTOR OF TECHNOLOGY FROM SCHLUMBERGER.

"The project is already generating very promising results for the development of a robotic solution that aims to reduce costs and risks in the decommissioning operations of the fields. We will present a joint paper at Rio Oil & Gas 2020, entitled "Robotic Platform For Rigless Intervention In P&A Wells", with an interesting approach

on the topic ", highlights the Research and Development Manager at Repsol Sinopec Brasil, **Tamara Garcia**, who works for 18 years in the management of R&D projects for new technologies and strategic alliances, focusing on research for the energy sector at the oil company.

Another disruptive project under development by this tripartite partnership is Wellrobot®, an autonomous modular robotic system for inspection and operation in oil wells. Developed to be resident in the well, operated remotely and with the ability to move around without cabling or connections, it can perform various types of inspection and operations in wells, such as wireline, coiled tubing and tractor, among others. With intelligent, autonomous navigation, locomotion and performance systems that will enable it to position itself and perform tasks automatically, the technology will allow reducing the time and cost of intervention in wells, an activity that often requires the stoppage of production, as well as a relevant amount of technicians and infrastructure.

DIGITAL INTELLIGENCE

But no word defines the technological direction of the oil and gas industry as much as the digital transformation, which goes far beyond the integration of new technologies. It means a profound change in structure and mindset, led by technologies such as virtual reality (VR, Virtual Reality),

Internet of Things (IoT), robotics, 3D manufacturing, among others, being Artificial Intelligence (AI - Artificial Intelligence) the major driver of this transformation.

In the oil industry, these technologies are used at all stages. Especially in those that are the core business of the majors: the exploration and production of hydrocarbons. Just to get an idea of how AI conducts the digital transformation process, just use digitalization as a reference in two basic activities of this industry: the characterization of the reservoir and the drilling of the well. "There are several projects, mainly in the pre-salt layer, using artificial intelligence to improve the characterization of the reservoir", informs Anna Paula Lougon, from Schlumberger.

According to Lougon, the use of AI in the pre-salt characterization routines accelerated the learning curve. "Today, there is no more room for error, nor more room for petrophysical interpretations or characterizations of a rock that are dubious. We need to be more assertive, predictive and repetitive, having more accuracy in what we can estimate in terms of quantity of reserves and extraction capacity. Thus, in characterization, the use of data learning and artificial intelligence is essential, using all previously acquired data ", points out the Director of Technology.

It is also an intelligent digital platform that seeks to reduce human errors in drilling, according to Anna Paula Lougon, noting that this activity has many repetitive tasks. "Drilling teams can complete these tasks quickly and are highly adaptable to changes, but they are not consistent with variability, due to factors such as experience and environmental conditions. Achieving consistency is an ideal task for automation, which would reduce

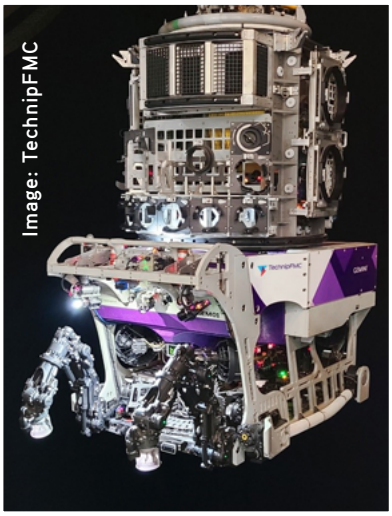


Image: TechnipFMC

the spread of distribution ", she adds.

Considering these factors Schlumberger created the 'probe of the future': it has provided a drilling automation mechanism that acts as a brain from the design to the execution phase. The brain, in this case, is the digital platform in the cloud, called DELFI. "It is a secure digital platform designed to integrate new digital workflows. The cloud-based environment made applications and workflows accessible to all users and allowed team members to build common workspaces, "explains the executive.

The digital drilling plan encompasses all the tasks required to drill the well and is loaded onto the rig's edge platform by the manager. "Once activated, tasks are routed to the appropriate person, using computerized notifications to orchestrate their activities. Tasks include standard work instructions and checklists, which are subsequently completed by the team. The tasks that are carried out through automation, such as going to the bottom, include details such as all drilling parameters ", adds Anna Paula.

She notes that due to the uncertainties inherent in drilling, the workflow structure combines prescriptive standard operating processes and work instructions with a versatile exception management system, using an AI-based dynamic planning mechanism. "The step size and parameter envelopes are specified in the digital drilling plan and the automated event detection and response is transferred back to the planning software for use in future planning. The digital platform ensures that the apprenticeships of a well are quickly used in platforms, fields and basins ", she guarantees.

The rig's mechanization allowed for dynamic automation and implementation of the digital drilling plan. One of the most essential elements of the system is its organization, with a single crew and a remote operations center performing most well construction activities on-site (rig operations, coating execution, cementation, mud mixing, directional drilling, mud registration, etc.) "This holistic approach to the delivery of wells offers the opportunity to accelerate the adoption of technologies and mitigate many of the challenges associated with accepting drilling automation," concludes Schlumberger's Chief Technology Officer.

RD&I IS THE BASE OF EVERYTHING

What is clear in the current scenario, is that despite the critical perspective in which we live and what we see in the new normal, there is, in reality, a great opportunity for technology and R&D. "There is an opportunity for innovations and technical knowledge acquired and under development to be more quickly implemented in the industry," says Anna Paula Lougon. She points out that within Schlumberger Brasil, represented by the BTiC - Brazil Technological Integration Center. there is a group dedicated to research that

does not work in isolation, but in an integrated way with operations. "Which allows a global view of the day-to-day challenges and possible solutions, methodologies and innovations (knowledge) of migration to the company's R&D portfolio. Within this research group, efforts are focused on partnerships and investments in strategic and relevant projects for the Brazilian industry. The important thing is to develop technologies for the challenges of the Brazilian fields, focused on an 'appropriate' approach to the purpose ", she concludes.

This has also been the focus of Repsol Sinopec Brasil, which in the past four years has invested more than R $ 150 million in research and development. "We have a portfolio that serves all areas of interest in the industry's value chain, which includes technologies to reduce geological risk and more efficiently identify new reservoirs, those for improving the recovery factor, improving productivity fields, to those that will contribute to the field decommissioning operation, more efficiently and safely", affirms Támara Garcia.

Garcia also lists some points that she considers important in this scenario of opportunities. "An increasingly integrated robotization, with performance and data acquisition systems and decision-making dashboards, are an important focus in the adoption of more efficient solutions and risk mitigation. There is also plenty of space to incorporate mathematical and computational tools that allow better use of information. And a multitude of examples that address related challenges, such as the predictive maintenance of equipment subject to corrosion and mechanical stress, the control of leaks, the optimization of drilling operations and the decommissioning processes ", highlights the executive at Repsol Sinopec, stressing that the commitments to climate change remain a priority focus of action for Repsol Sinopec. "We were the first in the industry to declare the goal of becoming zero emissions by 2050", she concludes.

Total R&D director Isabel Waclavek agrees with Támara Garcia. "Undoubtedly, another very important point that demands great RD&I efforts is the energy transition and the commitment to promote sustainable and low-carbon developments. Today, the O&G industry, as well as Total, has been playing a strong role in the development of new technologies to reduce CO2 emissions and to increase energy generation, which is fundamental for future developments and for the electrification of subsea fields ", Waclavek states.

The executive stresses that Total's ambition is to be one of the largest global players in clean and affordable energy, seeking sustainable development. "We intend to contribute more and more to the development of renewable energies and to the energy transition, to enable better conditions for today's society and future generations", she concludes. ■

Shell Brasil: largest generator of resources for RD&I

INNOVATION IS IN OUR DNA

Second largest oil and gas producer in the country and main partner of Petrobras in pre-salt areas, Shell Brasil is the largest generator of resources for research, development, and innovation (RD&I), after the Brazilian state-owned company: in the first half of this year, there were almost R$ 110 million, almost a third of last year's figures (R$ 291 million). Resources that, added to the countless projects implemented in the last 15 years (Shell was the first foreign major to produce oil in Brazil after the monopoly broke), attest to the Anglo-Dutch oil company's focus on generating innovation in the country.

"Innovation is in our DNA. We have been using the IOT (Internet of Things) concept since the 70s, with sensors in offshore equipment and remote monitoring. Robots? As old as the need to dive thousands of meters deep in the deepwater business!", Says Shell Brasil's IT manager, Adriana Moreira, stressing that E&P companies are among the most innovative in the world.

It goes further by assessing that the volume of data collected in the operation as a whole is likely to be among the largest among the various industries. "And every day, these data are treated more and more as real assets, due to the immense value they can generate. There is a great awareness that data only generate value when they become insights and these lead to actions. That is why digitization is an important item in the companies' strategy", Adriana adds.

For this reason, continuous investments in RD&I, to generate solutions that face the challenges faced by the sector, mainly in offshore projects. "Anything that reduces the time between discovering the well and the first oil increases safety, and the volume produced, reduces costs, and increases collaboration and productivity are always welcome. In this sense, do not leave out any of the technologies of the so-called Industry 4.0, artificial intelligence, digital twins, robotics, mobility solutions and, permeating all this, cybersecurity", lists Adriana Moreira.

She points out that the sector has already recorded many successful cases in drilling wells in record time with the use of Artificial Intelligence for the analysis of seismic data, revealing trends, much more quickly than traditional analyzes. "Digital twins will make oil platforms work with greater availability, that is, with fewer stops, while ensuring fewer people on board and more security. Robotics, including drones, will speed up and increase safety in high-risk activities, such as ship hull paintings and submerged inspections. Not to mention mobile solutions, which have allowed access to relevant information for decision-making in real-time, 'one click away'. And this is just the beginning, the possibilities are endless ...", says the IT manager at Shell Brasil

CYBERSECURITY: THE DATA WAR

What are the advances and challenges in the IT area in an industry that has a strategic information data lake? For Adriana, the advances are extremely significant, reinforced by investments in the majors' Research & Development areas, working collaboratively with universities, other companies, and startups. "The main objective is a significant reduction in the processing time of geophysical data and the application of state-of-the-art complex algorithms", Moreira stresses.

The first challenge that comes to mind is cybersecurity. "The threat is constant, a real war. And not just war, as opponents are increasingly having access to technology, social engineering/psychology, and, most importantly, a collaboration between the parties. Therefore, it remains for us to do the same, to create an army at home ", evaluates Adriana Moreira. Hence the concept in vogue in the market, of "Red Team" and "Blue Team" coexisting in the company. "The first to think about possible attacks. The second to elaborate defenses. It is necessary to use a lot of technology and psychology, but also to promote more collaboration between companies, without sharing internal information or the technologies in use, but rather the tracks left by criminals ", Moreira defends.

And there are also challenges related to the speed with which technologies have been made available, demanding more agil-

ity and more risk, in addition to creativity to see problems and opportunities that did not seem to exist and that will only be revealed through data analysis and externalization. "Change management is certainly also of great importance, as it has been responsible for the failure of many projects. If change is not handled with care and commitment, who will want to change the way they work? ", Points out Shell's IT manager.

How to make the organization as a whole understand the requirements of cybersecurity when people are so used to turning on the machine, connecting automatically, and starting to browse? Adriana Moreira is incisive: it is necessary to bombard people with information until they feel in constant discomfort about the threat. "It is time to use psychology, as I mentioned earlier, trying to answer the question that is on everyone's mind: What's in it for me? Moreira asks.

"In this sense, according to Adriana, the reward package plays an important role once again." There has to be a policy of recognition and also of consequence. It's more or less like in Covid-19: wear a mask, wash your hands, use alcohol gel, or you get the virus. For cybersecurity, it goes like this: be suspicious, do not click, do not visit any website, do not leave your data exposed or you may have serious personal and/or professional problems", she emphasizes. Moreira says that with many reminders, training, simulations, among other actions, people come to realize that they are all players of a great team, with an important role in the defense against cybercrimes.

Adriana also questions the traditional form of reward. "In the industry, you are typically recognized for successes, when the digital age demands that you also recognize attempts, the boldness to try and fail, as long as you fail quickly and cheaply and that the lesson is learned and shared", evaluates Adriana Moreira.

CHANGE IN MINDSET

For Adriana Moreira, a change of mindset is also important to seek greater and more 'fit for purpose' democratization of information in the industry, since companies still have a lot of resistance in sharing information. It recognizes that this is more than correct and is supported legally in the case of strategic or competitive information. But he considers that it is necessary to facilitate access to operational, non-strategic, and non-competitive information, to develop the industry, partnerships, and, mainly, personal, procedural, and environmental security.

For her, the industry is brilliant at using technology in the best possible way when the benefit is clear, such as drilling a new well even deeper than the previous ones, with a substantial gain in resources ($)."This leads me to point out the first challenge in response to your question: the desire to transform is less to transform when things are going relatively well and the benefit is not so defined, and, the so-called Net Present Value is not known. This is very common in digital initiatives and it certainly removes an industry that likes numbers from its comfort zone ", concludes the executive, stressing that the IT partnership with the Business, the valorization of skills such as Project and Change Management, and a strong area of R&D (Research & Development), like the one that exists today in Brazil, are excellent tools to overcome these and other challenges. ■

Interview wich **Elgonda LaGranje**, from Siemens Energy

AUTONOMY WILL MAKE A DIFFERENCE

This statement is from Siemens Energy's Director of Digital Solutions, Elgonda LaGrange, speaking exclusively to TN Petróleo about the technologies that are crucial for the oil and gas industry, recognizing that some solutions are below expectations and the big challenge is the autonomy issue. "We are not yet at the point where full autonomy is possible, but unmanned operations, as a steppingstone towards autonomy, are already becoming a reality in the North Sea", evaluates LaGrange.

Which technologies Siemens Energy considers vital in the E&P areas, from the well to the topside, to reduce costs, ensure safer operations, ensure a higher degree of reliability and increase productivity, especially in scenarios such as the pre-salt and ultra-deep waters: well engineering, fully electrical intelligent completion systems, electrification solutions for subsea systems, digital twin?

Elgonda LaGrange - All of these technologies will play a role in driving increased efficiency for offshore E&P. It is not a matter of which technology to deploy, but rather how to deploy a combination of these to deliver the most value to a specific asset. In this regard, let me highlight 3 topics. First, we certainly see electrification, both subsea and topsides, as a major trend. Here the primary challenge is to reduce cost and emissions, like wind and solar some years ago. I am confident that the price point for offshore electrification will also improve significantly in the medium term. A second topic is the digital twin. Although there has been an enormous amount of talk on this topic, the delivery has mostly fallen short. The main challenge is that vendor data does integrate seamlessly into a single digital twin for the asset. The industry must converge on an interoperable data structure to make the digital twin a reality. The CFIHOS standard certainly seems like a promising development. Lastly, the third topic that will make a real difference is autonomy. We are not yet at the point where full autonomy is possible, but unmanned operations, as a steppingstone towards autonomy, are already becoming a reality in the North Sea. It is even increasingly possible to reduce manning on brownfields installations. In my mind, autonomy is the next big theme in O&G.

In Siemens Energy's view, what are the solutions and factors that can accelerate the digital

transformation process, until we reach the digital oil field?
Technology-wise, I think I covered most of it in my previous answer. I would probably add visual and audio analytics and robotics to carry those. I think a more significant challenge than technology is cultural change. We work with customers who tell us that they are delaying digital deployments because their offshore teams, who have been operating assets for many years, will not accept new ways of working. We have had technicians insisting on the option of using a printout on a clipboard rather than a tablet for their inspection rounds. Management may reiterate that they are committed to digitalization, but that does not mean their people are ready to accept it. For the full value of digital to be realized, the industry must invest in change management and reskilling to the same extent that they invest in technology.

Siemens Energy has adopted the model of partnerships with companies and universities in Brazil. Do you believe that partnership, collaborative action, in the open innovation model, is the best way for the industry to overcome technological challenges?
Siemens is well known for its innovative DNA and Siemens Energy will not be different. One very strong principle within innovation is co-creation and it has been key during our 150+ years journey in Brazil. Siemens promotes collaboration from ideas inception to very large investment projects. One example is known as Hacka-Siemens, an event that we promote between one or two large partners and students, start-ups, programmers, or whoever is interested. During the typically 2 days event, each partner presents one problem they are challenged with and the participants have 2 days to build an application utilizing Siemen's Mindsphere platform. The winners are awarded, recognized, and well exposed as we typically have such events in fairs or similar. The ideas, solutions and innovation that are promoted in such events is great, besides the atmosphere.

Then in the large business partnerships, Siemens is frequently partnered with companies on infra-structure projects like GNA - Gas Natural Açu (joint venture formed by Prumo Logística, BP and Siemens) in Porto do Açu, for instance, where the largest thermo power plant in Brazil is being built. Siemens also invests significantly in R&D especially in new technologies along with universities and other companies, and results show that such partnerships benefit the involved parties, but ultimately the community and the industry. Our latest R&D project is focused on hydrogen, one of the Siemens Energy's areas of focus. So, yes, we strongly believe in partnerships and we'll continue to invest on it with great focus on the energy ransition and sustainability. we'll continue to invest on it with great focus on the energy transition and sustainability. ■

In collaboration with **Dagmar Brasilio**, international communications manager of TN Petróleo

1 CFIHOS (Capital Facilities Information Handover Specification) it is an important USPI-NL standard that specifies the information required by the owner operator to operate, maintain and modify industrial process facilities, including oil and gas. The specification applies to the entire value chain and includes information necessary to meet the requirements of regulatory authorities. It provides a good platform for standardizing information requirements across the industry to reduce uncertainty and delivery costs, simplify the license for the operating process and also a basis to support interoperability and greater efficiency of work processes during operations and the maintenance phase of the installation life cycle.

ANP STRENGTHENS OPERATIONAL AND TECHNOLOGICAL SAFETY

The National Agency of Petroleum, Natural Gas and Biofuels (ANP) is becoming an increasingly active player in the oil and gas sector, beyond its role as regulator. Proof of this is the volume of investments it manages, resulting from the RD&I clause in exploration and production contracts and which has been driving innovation in the sector: since the creation, these resources have already totaled more than R$ 18 billion until mid-2020.

Its performance gains even more complexity with regard to operational safety since biological (or health) risk should definitely enter the industry's HSE guidelines after Covid-19. The pandemic turned out to be a test of the Agency's ability to respond quickly, which has done very well in this critical scenario that has been in place since March 2020.

ANP established a regulatory framework for operational safety based on a management system, in which the regulated must obtain the perception of the risks involved in the activity carried out, defining its own procedures following the best practices recognized by the industry", points out the Superintendent of Safety Operational and Environment, **Mariana Rodrigues França**.

In this way, it is prepared to fulfill its function of regulating and inspecting the safe continuity of the operations of the oil and gas industry in Brazil, ensuring that "the regulators adequately analyze the risks, including biological and sanitary ones, and implement measures so that no major occurrences occur. accidents, safeguarding human life and the environment ".

The prompt response came in the form of the publication of ANP Resolution No. 816, of April 2020, which defined the procedures to be adopted by regulated agents while the temporary measures to deal with the public health emergency persist and demanded improvements in the management systems of operators, not only to address the COVID-19 pandemic but to treat outbreaks and multiple cases of infection onboard marine production and drilling units, regardless of their origin.

"In ANP inspections that continued to be carried out remotely, it was required to define clear and objective criteria for the operational continuity of the facilities, previously establishing the conditions for stopping activities, total stoppage of production, the disembarkation of teams, eventual lockdown and abandonment of unit, "explains the superintendent.

She notes that regulators, in turn, revisited the existing risk studies of assets (eg, HAZOP, APR, bowtie), identifying whether the human safeguards defined for the various scenarios (topside, subsea and wells) could be impacted by the reduction of professionals on board and, therefore,

if they could continue to be performed in the facilities.

The Superintendent of Operational Safety and Environment adds that the Agency, in its role of providing Brazilian society with a safer and more sustainable oil and gas industry, will continue to work towards regulatory simplification, optimization of resources for inspection, digitization for continuous improvement communication and information sharing with society and with national and international partners, as well as innovation to maximize efficiency and reduce risks to people and the environment.

"From the regulated market, ANP will continue to demand a leading role in operational security, based on a robust management system, with the improvement of contingency procedures, risk analysis and emergency response capabilities, even in a scenario of logistical restriction and reduced number of professionals, since outbreaks and 'random disturbances' can occur ", Rodrigues França concludes.

CYBERSECURITY

Beyond biological risk, another aspect has been taking on a new dimension in the pandemic: cyber attacks. That is why the Agency has also been investing in data processing and storage technology from the Exploration and Production Database (BDEP), created 20 years ago and which gathers a collection of immeasurable value.

Mariana França recognizes that the constant evolution of Industry 4.0 involves many challenges related to security, the volume of data and its flows. "The premises of the Agency's role are the increase in data storage capacity, transfer speed, and, above all, safeguards for technical data and regulated activities", she stresses.

That is why the security of technical data has always been a priority in all technological solutions used in BDEP, which even has a specific coordination to deal with security and data storage. In 2019, the Hermes Robot began operating, which, in addition to minimizing operating costs, offers greater protection against cyber threats.

With no similar in Brazil in terms of stored petabytes, Hermes is a model similar to a 'private cloud', in which several storage pools, such as storage, act as if they were a single

large storage solution, presenting a high performance of access to data.

Besides, due to the complexity of the procedures required because of this technological improvement, an internal Technical Data Security Committee was created in March this year. "This Committee aims to support the managers' decision regarding activities that impact the security of technical data and discusses, among other issues of encryption, backup and data integrity", points out Mariana França.

According to the superintendent, all of these investments allow faster delivery of exploration and production data to companies that use BDEP, guaranteeing their safety throughout the data cycle at the Agency, which also involves their receipt and conformity assessment.

Highlighting that other technological solutions are being tendered, she notes that planning is essential to ensure that the structure is monitored by market innovations, especially in the public sector. "As the dependence of the oil and gas industry on digitalization is increasing, cybersecurity is at the center of the review of the regulatory framework for operational safety", França ponders.

With this premise, the ANP signed on October 9 a Memorandum of Cooperation with the Petroleum Safety Authority of the Kingdom of Norway (PSA-Norway), Norway's regulatory body, to intensify the exchange of experiences. "Cybersecurity is part of the work plan of this agreement, to study the risks and vulnerability of the security of oil and gas exploration and production activities in a holistic way, considering the integration of people, technology and organizations", explains the superintendent.

REGULATED CHAIN IN EXPANSION

Beyond the operational safety aspects, the ANP also has the challenge of accompanying the growth of this expanding industry in the country, which should gain new players. "We are experiencing the greatest transformation in the oil and gas sector in Brazil", says the superintendent of Exploration, Marina Abelha Ferreira.

She emphasizes that the chain regulated by the ANP, which was already very extensive and with a great plurality of actors, tends to expand even further in the current scenario of Petrobras' divestment. "It will be more and more necessary for the Agency to expand its capillarity and agility, seeking regulatory simplification without losing its effectiveness", Abelha Ferreira points out, remembering that the ANP's performance will be fundamental to guarantee the supply of fuels with quality and safety for consumers.

Marina Abelha Ferreira also notes that the coronavirus pandemic coupled with the sharp drop in oil prices brought additional complexity to the sector's promotion in global terms. But she points out that Brazil's geological potential for discoveries, combined with transparent and effective regulation, can create the right environment for investments.

"It is important not to lose timing. The whole world is already preparing for the transition from the energy matrix to low carbon sources. We need to work to accelerate the exploration of oil and gas in Brazil so that society can effectively benefit from these resources ", says the superintendent of Exploration.

To face these challenges, according to Marina, the ANP has the advantage of having extremely qualified technical staff. "We must guarantee quality training for our team, preparing for regulation for the future, in a transparent and effective manner, promoting public interest and attracting investments for the development of Brazil", she concludes. ■

EXTENDED REPRESENTATIVITY REFLECT SECTOR GROWTH

The creation of Petrobras in 1953 was the starting point for the development of the oil and gas sector. Therefore, nothing more natural than four years later, the Brazilian Institute of Oil and Gas (IBP), the first sectoral entity in this production chain, would appear. Its objective was 'to disseminate technical knowledge about the nascent national oil industry'. That is how we started to consolidate one of the most important collections of knowledge in this area.

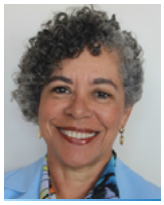
Always following the evolution of the industry, entities started to appear whenever a segment felt the need to have greater representation in this market. Thus, in 1985, Brazilian engineers working in the exploration and production area founded SPE Brasil, with the same objective of sharing the knowledge that the industry had been expanding, after the discovery of the turbidites of the first large deepwater reservoirs in the Campos Basin.

The breaking of the monopoly opened an opportunity for new players in this productive chain and the sector would expand this representativeness with the creation, in 1999, of the National Organization of the Petroleum Industry (ONIP), with the mission of 'contributing to the increase of competitiveness and sustainability of national industry, the maximization of local content and the generation of jobs and income in the oil and gas sector '.

In 2004, the Brazilian Association of Petroleum Service Companies (ABESPetro) is created and, three years later, with the entry of small and medium companies in the dispute for blocks in ANP auctions or in Petrobras farm outs, is founded the Brazilian Association of Independent Producers (Abpip).

GENDER THAT REPRESENTS THE INDUSTRY

Once again, the entities also began to reflect changes in the industry, including in the area of gender diversity. Especially in recent years. In reality, they went a little further. The evidence is that the sector that is far behind, in terms of the inclusion of women in command posts, today has as its main spokespersons, in defense of its interests, a female majority.



This is the case of the oldest organization in the sector, IBP, which for a year has been chaired by economist Clarissa Lins, and has in its executive secretary the 'oilwoman' **Cristina Pinho,** one of the first women to manage offshore assets at Petrobras - the P-7, in the Bicudo field, and the P-20, in the Marlim mega-field, both in the Campos basin.

Today, Onip has as general director Karine Fragoso, manager of Oil, Gas and Naval at Firjan, and independent producers bet on a woman to lead Abpip: the Country Manager of GeoPark, Lívia Valverde Almeida Santos Carvalho. In September, Nadia Stanzig assumed the General Secretariat of ABESPetro, which currently has **Anna Carvalho**, on the board.

IBP IN TRANSFORMATION

IBP President Clarissa Lins, who at the end of last year took charge with the task of leading the transition to professionalization of the entity, advances in the process of strategic repositioning of the institution in a new energy scenario, both in Brazil and globally. However, it went further by ensuring that the IBP and the industry took a leading role in a major mobilization to face the Covid-19 pandemic.

"Everyone had to adapt quickly to the new scenario, acting with a focus on preserving the health of everyone involved

in the value chain, ensuring the safety of those who were in charge of the operation, as it is an industry that provides essential services" she observes.

In this context, IBP's main role was to serve as a platform for sharing industry best practices and the experiences and challenges experienced in the early stages of the pandemic, as well as thinking about solutions to be forwarded to public authorities, regulatory bodies, among others. "I believe that this was the first major transformation of IBP, in addition to having mobilized its resources from the first hour to support members and guarantee their operational continuity", Clarissa guarantees.

She also highlights, in a second phase, the mobilization of the industry in humanitarian actions, focusing on the populations most affected by the coronavirus. This performance was reflected in the support given by IBP and associated companies for the implementation of the Lagoa-Barra Campaign Hospital. "We managed to mobilize members, on every front we thought relevant, that beyond its own initiatives, unite efforts acting through the IBP to ensure the greatest impact of these actions," she adds.

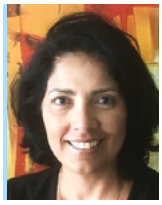
Amid all this process, IBP underwent other changes due to a new strategic planning (one of the tasks received by Clarissa Lins at the end of 2019, upon assuming the presidency), which is reflected in the statute approved in August. The institution also changed its name (the word biofuels was removed), since the scope of its activities will be centered on the main activities of this industry: upstream (exploration, drilling and production), midstream (refining, logistics) and downstream (distribution and marketing).

"We have to evolve according to changes in the context of the energy industry, while maintaining the solidity of our values and principles", says Clarissa Lins. It is also reflected in the entities that have emerged in recent years and that dispute spaces that sometimes overlap. It demands a more collaborative performance by everyone.

"This already occurs in our commissions and it has representatives from other entities, to deal with topics that are of interest to everyone", points out the president of IBP, noting that ABESPetro originates from them (the Commission of Offshore Service Companies). ‘‘The important thing is that everyone recognizes the credibility and reputation of IBP, built on 63 years of activities. And that they also recognize the value of relating to those who are by our side ’’, Clarissa Lins concludes.

ONIP'S ADULTHOOD

The organization that consolidated the first register of suppliers in the sector's production chain, CadFor in 2007, not only reached the chronological age but also its mission. ‘‘ONIP remains with the purpose of serving as an articulation forum, now no longer restricted to oil, but also to the guidelines of



natural gas and energy as a whole. ONIP's main focus has always been to build market opportunities for industries installed in Brazil. Today, our view has expanded the boundaries of offshore exploration and production, to reach other market environments’’, highlights the director general of ONIP, **Karine Fragoso**.

A natural evolution of the entity, since the current scenario is very different from the one existing at the time of its creation. "ONIP was fundamental in this construction, as it has always positioned itself and defended, in the different forums that promoted, led or participated, the diversity of agents in the market to increase competitiveness and management efficiency", he points out. Now, ONIP continues to work for the construction of a sustainable environment, and, therefore, for the multiplicity of opportunities for its associates and partners.

"The world has changed and so has ONIP. Today, access to information and agents is much easier. The available tools, so used in this COVID period, also transformed the relationship between regulatory agents and their regulated ones, as well as between the buyers and their suppliers ", observes Karine Fragoso.

Fragoso points out that with the expansion of the market, anchored not only in the growth of production, but also in the diversity of environments and, fundamentally, in the number of agents, the opportunities for access multiply and Brazil is increasingly consolidated through its reserves, capacities and skills, to go further. "Institutional representation would be no different. We accompany the creation of Abespetro and Abpip, which, like ONIP, has oil in its name. And we can say that they are the result of ONIP's work. What makes us proud and makes us work always looking for partnership and themes that are common and dear to us. And they are many ", Karine adds.

The ONIP leader stresses that ONIP's main focus is market opening and the insertion of national industry, a factor common to all entities. "ONIP has broadened its vision and put in its work plan the goal of being a truly national organization, which works for all basins. The onshore needed us, and we answered the call. This does not exclude our work in the offshore, we go wherever it is necessary to defend our positions and build proposals for solutions, as a result of an active listening to the market, in its different segments ", concludes Karine Fragoso.

GROW WITH QUALITY

This is the great goal of ABESPetro and one of the tasks of the new executive secretary, **Nadia Stanzig**, who accumulated strong experience and connections in the sector when she was the executive manager of AmCham-Rio (American Chamber).

"ABESPetro has been expanding its membership. We intend to continue to grow, while maintaining our representativeness. In other words, grow with quality ", he says, revealing that the entity is promoting changes in the statute for this purpose. "One of the objectives is to make this growth happen in order to attract companies that bring more innovation and technology in their portfolio, so that we can lead the digital transformation, fundamental for the O&G sector to remain competitive", she adds.

Nadia Stanzig observes that the country and the world are experiencing a time of great volatility and uncertainty. "However, Brazil is at an advantage when compared to other centers of O&G activity. The deep and ultra-deep water projects in the country have shown to be more resilient due to the high productivity of the wells and, consequently, a lower break even", she highlights.

For this reason, ABESPetro sees investments in large pre-salt projects with optimism, even though some projects may be slightly delayed due to the Capex reduction restrictions that operators are facing. "Projects in the pre-salt should move forward. The big challenge is in the marginal fields, which have a higher cost and a greater need to reduce operating costs", Stanzig says.

She says that a more collaborative action with the other entities that exist in the sector today is the great legacy of the pandemic. "The common and aligned objectives to guarantee the integrity of people and operations have been the guidelines for both operators and goods and services companies. The challenge going forward is to extend this collaborative spirit to be more competitive, "says Nadia Stanzig.

She also notes that today we have an environment in which there are not only 'direct competitors', as today companies compete with other offshore E&P centers of excellence such as the North Sea, Gulf of Mexico and the African sub-Sahara. "The new alternative energies are also arriving in an increasingly competitive way and with the support of a global carbon reduction agenda. ABESPetro has a very important mission of maintaining a purposeful agenda that helps to foster our attractiveness and competitiveness within

this world scenario ", Stanzig concludes.

RESTRUCTURED ABPIP

Created in 2007, bringing together independent operators and companies that supply goods and services in the oil and natural gas E&P chain, Abpip has seen the sector gain more strength in 13 years, but still not enough to attract new players. But the new president, lawyer Livia Valverde, is optimistic.

"The expectation is the best possible for the coming years! We consider that the industry is very aligned in seeking the consolidation of the entire productive chain of the sector through the construction of spaces for constant dialogues between its main protagonists: the Ministry of Mines and Energy (MME), the ANP, the operators, including Petrobras , the Industry Federations and also entities like Abpip", says the leader.

She highlights the importance of government initiatives, such as the program of mature maritime fields, under evaluation by MME, and the successful REATE (Revitalization of the Exploration and Production of Oil and Natural Gas in Terrestrial Areas), to stimulate the local and regional development and increase the competitiveness of the national onshore oil industry, through joint actions by all actors.

"In this second stage, the need for direct and transparent dialogue is being reinforced, which should occur at REATE Tables, in which local barriers will be discussed with the direct participation of the main agents. In this context of dialogue, partnership and transparency,

the construction, expansion and strengthening of this industry is noticeable ", affirms **Livia Valverde**.

With the new market that is being built from the divestments of Petrobras, bringing greater attractiveness to the mature onshore and offshore fields, the manager is betting on the entry of new players into the country, with some joining Abpip. "I see many opportunities starting from the consolidation of a more modern regulatory framework, to attract new investments, appropriate to this new moment", says the leader. ■

MENTORING WILL FORM NEW LEADERSHIP

GENDER DIVERSITY DEFINITELY entered the IBP agenda with the creation, in 2018, of the Mentoring Program for Women Professionals in the Oil & Gas Industry, in partnership with Global consultancy Lee Hecht Harrison (LHH). The initiative aims to leverage women in the oil and gas sector to senior management positions based on the development of leadership skills.

The program, which entered the second edition, has had a positive balance, as shown by the numbers. In 2020 there are 44 mentors, divided into two groups - executive level (Senior mentors) and managerial level, more than double the group in 2019, when there were 17 mentors, all in management positions (80% in managerial positions).

Although it is too early to say that the initiative is already impacting the industry, the fact is that there are changes in the air, according to the deputy coordinator of the IBP Diversity Committee, Cristina Pinho. "Diversity has become an important point to ensure the sustainability of the business. Companies are starting to see this: there has been an increase in the number of women on the boards of the boards of directors", she says.

She warns that anyone who is not yet satisfied with the rate of inclusion of this gender diversity in organizations, must wait. "This is gonna change. There is already an acceleration of the inclusion of women in command posts, increasing the gender representation in companies ", affirms the first female executive secretary of the IBP.

She says the culture of inclusion and diversity in companies is already at the center of the debate in the oil industry. "The mentoring program has expanded and reinforced this discussion," says Cristina Pinho, who at the launch of the launch of the second edition of the initiative, at the end of 2019, spoke of the expectations of those who are helping to form new leaders. "Many of the executives did not have mentors to help them on the path of professional development and, therefore, they had a genuine desire to accelerate the rise of young managers so that diverse thinking would contribute to the perpetuity of the oil and gas industry."

Regarding the low rate of women working in equal pay conditions as men, Cristina Pinho recognizes that this is an achievement that is still a little far from happening. "For this to become a reality, we also need to have greater representativeness in politics - which means that we have this imbalance in all sectors of the economy", she concludes.

Interview **Priscila Moczydlower**, Director of Sustainability at SPE Brasil

RESILIENCE IS IN KNOWLEDGE

Created in 1985, when Petrobras advanced into deep waters and discovered the first large and mega reservoirs in the Campos basin, SPE Brasil has positioned itself as one of the most active sections of the Society of Petroleum Engineers, the largest entity in the world of professionals and students in the Oil and Gas area, founded in 1957 (the same year as the IBP). Furthermore, SPE Brasil has played an important role in building the resilience of this industry, as a disseminator of technical knowledge. "SPE stands as a support for the entire industry, promoting debates on the most and the exchange of experiences and best practices between companies, government agencies, senior and junior professionals. Only through this intense collaboration can we move forward, as an industry ", points out Priscila Moczydlower, director of Sustainability at SPE Brasil.

T&B Petroleum - **The oil and gas industry in Brazil, as well as the world, is going through an atypical moment, although it has always been a very volatile sector, as history and the market show. In the midst of this scenario, what is your perception of how we will move forward in the coming years?**
Priscila Moczydlower – The 2008 and 2015 crises, in particular, left us more resilient and stronger. We learned to cut costs and optimize processes, and we greatly improved our efficiency and productivity. In 2020, the crisis had a totally different nature from everything we experienced before. In the pandemic scenario, with many employees working from home, a new dynamic of work was established, both in the office and in the operational areas. The companies sought innovations and optimizations and managed to remain in the market.

Is this the new normal scenario?
In the coming years, I believe that this is exactly what we will see: an increase in the intensity and frequency of the incorporation of innovations, through the development of technologies and strong collaboration between different parties, to optimize costs and share knowledge. The world tends to change faster and faster and companies with more access to knowledge and more adaptable will survive more easily. In this context, SPE stands as a support for the entire industry, promoting debates on the most relevant topics and the exchange of experiences and best practices between companies, government agencies, senior and junior professionals. Only through this intense collaboration can we advance as an industry.

Exploration and production, mainly offshore, are activities that make intensive use of technology and always demand innovation. In the new scenario, what should be the main technological demands, from the well to the topside, which will be crucial to meet in order to reduce costs, ensure greater reliability and safety of operations and increase productivity, sine qua non conditions for the sustainability of companies in the sector?
I would say that the essential technological basket for O&G starts before the well, still in the oil reservoir. We will need to understand better and better how the flows in the reservoirs occur, so that we can increase the recovery factor, optimizing the use of a resource that is not renewable. In this context, I highlight the 4D seismic and the alternating water and gas injection method, the WAG (Water Alternating Gas).
Other technologies that lead to cost reduction, increased safety or optimization of well completion, such as True One Trip - 3 Phases (TOT-3P) are also very interesting. Subsea separators, such as HISEP technology (Petrobras patent for a system for separating carbon dioxide (CO2) present in large quantities in pre-salt fields) and others are also very promising to minimize bottlenecks on platforms.
In addition, I would mention the technologies that will allow a reduction in the carbon footprint of operations, a trend in the world market. Process optimization to reduce gas flaring, technologies with greater energy

efficiency, use of equipment with lower fugitive methane emissions and coupling renewable energy sources to E&P operations may also make a difference in the not too distant future.

The oil and gas industry has always had a more negative image due to the geopolitics of oil, which has been generating conflicts for decades, as well as the socio-environmental impacts of its activities. Even today, she struggles with this negative image. How to show society how much this industry contributes positively to the improvement of the quality of life (hydrocarbon is present in almost everything that modern society offers to consumers) and that, through the intensive use of technology, enhances innovation that generates benefits that go beyond it?

Certainly, the oil industry has a positive side little appreciated by the general public. The most common image that comes to mind when it comes to oil production is that of a platform or refinery giving off smoke. However, we can say that the oil industry is the mainstay of modern society. Since the first Ford cars began to run at the beginning of the last century, the production of oil and oil products has shaped life on Earth. Several industries grew and developed from it: automobile, aviation, petrochemical, and the entire production chain. As mentioned in the question, several innovations in the oil industry have also promoted innovations in other areas of knowledge and contributed to technological development in general. And yes, today, everything we do and use has some oil derivative.

How to change the negative image?

I think that in order to change that, it is necessary to place the oil industry as something in transformation, which grows with society. Issues of environmental impact and climate change are at the heart of many international discussions today. Especially the new generation demands a different attitude from the industry, which is responding to this. Companies such as BP, Total, Shell and Equinor have already declared their goal of having zero or near zero emissions by 2050. Petrobras has the goal of zero growth in absolute emissions and a 32% reduction in carbon intensity in the E&P segment by 2025. All large companies have goals for reducing waste and preserving biodiversity. We have to show the world that it is possible to produce oil and generate wealth while respecting the environment, that the oil and gas industry can also be green. With this objective in mind, the SPE Brasil Section Sustainability Director was recently created to bring this issue to the fore and, together, define the best way forward. ■

THE WORD OF DIVERSITY

Industry must have the colors of diversity

Although it makes intensive use of technologies, accelerating innovation and positioning itself as a pioneer on several fronts, the Brazilian oil and gas industry does not reflect this modernity concerning diversity. Especially with regard to the participation of women in the corporate pyramid. This is confirmed by research on gender inequality.

The oil and gas segment had the worst indicator among four sectors in the survey conducted recently by Wyser, a consultancy specialized in recruiting and selecting executives for the middle and upper management of the multinational HR group, Gi Group. Of 60 women in positions of supervisors, coordinators and managers of technical areas, aged 20 to 50 years, from large companies, only 39% reported that it is common to have women in command positions in the companies for which they work.

The highest index is in the consumer goods sector (55%) and the last is the oil and gas sector, with 20%, below automotive (30%) and mining (33%). Regarding the existence of a diversity and inclusion program in the company, the oil and gas industry indicator is even worse: it received only 7% of positive responses, against 22% in the mining sector, which is also in the area of extraction.

In reality, the representation of women in service, industry and commerce companies is still low, as found in the survey conducted by TRIWI, a digital marketing consultancy, in August. Only 27.4% of the companies interviewed have more than 51% of the staff represented by women and 53.2% have up to 30% of women in their staff.

The index is even more frightening concerning black women, who represent only 10% of the employees of 46.8% of the companies interviewed - and 24.2% of the companies answered that they did not have black women in the workforce. The study also found that 69.4% of the organizations interviewed do not have women with any physical disability in their staff.

The percentage of women in leadership positions is up to 10% in 32.3% of the companies interviewed, of which 27.4% simply do not have women in charge. The survey also confirmed that women earn less than men in 48.4% of the companies interviewed, while in 19.4% there is equality between the two genders.

However, the American business consultancy McKinsey & Company found that the likelihood of better financial results is higher for companies that have a minimum of 30% gender or ethnic diversity among their executives, as shown by Ana Zambelli, Managing Director at Brookfield Private Equity and coordinator of the IBP Diversity Committee, who signs the section in the Opinion section of this edition of **TN Petróleo magazine**.

She is part of the group of almost 30 women in command positions in companies, public agencies and entities in the oil and gas sector, who made a panel of this industry in Brazil, each talking about her area of expertise. Now it is time to give the floor to these female leaders who are at the forefront of a movement that seeks transformation in this sector, to speak of diversity, a theme that although it is present in discussions within companies, it is not yet reflected in numbers in the corporate organization chart.

Why don't we have the same gender and race proportionality yet? How to 'process' prejudice, 'refining' inequality of opportunity, to have diversity as a 'fuel' of the oil and gas industry in the new normal?
ELGONDA LAGRANGE - Director Digital Solutions at Siemens Energy - This is a difficult question, because the industry is a mirror of community, and this year has shown just how fragmented and biased communi-

ties still are, across the world. I don't think, as an industry, we can resolve this. We can at best recognize this and manage it. In my opinion, the best way to counterbalance prejudice and inequality is education. I lived through the democratic transition in South Africa in 1994 and saw first hand how the younger generation started to lose their prejudices simply by being in the same class in school, playing sports on the same team, in an environment where diversity was the norm. I am a firm believer that our industry must support diversity in education and, most importantly, in our in-house skills development programs. That will nurture the talent that will rise to the top of our organizations.

I have never felt held back or disadvantaged because of my gender. When I studied engineering, I was one of 10 females in the first-year class of 400 students. We were all just engineering students trying to survive a new environment and a massive work load. Gender was a non-issue, and that remained my experience throughout my career in O&G. When I performed, I was acknowledged and promoted and trusted to make decisions, and when I did not, I was grilled, as simple as that.

ADRIANA MOREIRA, IT manager at Shell Brasil - We are a diverse world and the companies that will be successful will be those that participate in this diversity, as they will be prepared for all types of consumers, partners, employees, spectators etc. However, it is not enough to attract resources according to diversity. It is necessary to create an environment in which individuals feel included exactly as they are, without having to change to be 'equal' to the majority. I met a female executive who felt compelled to behave similarly to male colleagues. What is the value of diversity in this case?

Although we have not yet reached proportionality, I see that we have advanced and matured a lot within our industry. At Shell, we have implemented several internal and public actions over the years to encourage Diversity and Inclusion. Internally, we work with affinity networks to offer mentoring circles, training, events and talks with experts. This daily awareness exercise takes us out of the comfort zone, challenges the stereotypes created since childhood and makes us think about how to do things differently, often even "being pushy" with quotas, why not? The change only happens this way, with discipline, investment, indicators and action.
It was at Shell that I heard a phrase that changed the way I think about Diversity and Inclusion: "Whoever does not include it on purpose, is excluding it, even if they don't want to."

ISABEL WACLAWEK, director of R&D at Total - The oil & gas industry has made great progress over the past 30 years in increasing gender diversity, but it is still far from ideal. There are still many obstacles for women, who face prejudice and wage disparity, lack of opportunities and little access to networking and mentoring. They find it more difficult to reach senior management positions, impacting on the lack of female leadership, as examples to be followed.

Companies that value the diversity of generation, culture, gender, ethnicity, among others, are more likely to have incomes above the average of their sector. Having an environment where all professionals are heard and respected is essential for more assertive decision making and to ensure a better performance of the company. To have diversity as a 'fuel' in the oil and gas industry, companies need to consider proportionality in the recruitment and selection process, in addition to analyzing whether the work environment is favorable for women who are divided between work and family life. The first step is to work on this new culture in the company and reinforce the code of conduct for respect for others. The presence of influential leaders is essential to guarantee the professional's equal treatment with other employees.

A person is born with a talent in their DNA regardless of gender. The academic formation of each one will certainly help your professional evolution and your success in prominent positions, either within the corporate (managerial) or academic (scientific) line. The important thing is to know how to listen (to know your nature) to better explore your potential and walk the path of a successful career.

TAMARA GARCIA, Research and Development Manager at Repsol Sinopec Brasil - The main challenges are in guaranteeing an equal education and in the family and social environment, which still have many cultural barriers which limit the entry and valorization of women in the professional market, especially in the STEM areas (term in English to group the disciplines) science, technology, engineering and mathematics). Repsol Sinopec Brasil has 28% of women in leadership positions. In senior leadership, female representation is already 55%. At the global level, diversity and equal opportunities are part of our sustainability plan, which has as one of its objectives to reach 50% women in new hires and 31% participation of women in leadership positions in 2020, in addition to training such as "Unconscious Biases", which raise awareness of the topic and is mandatory for all employees.

Under-representation of women in STEM careers has deep roots. All of this generates less participation in the technology sector than we would like to have. That is why it is important to have a global action plan, which understands the challenges of the reality of the operation in each region where we are present. The company is attentive and working to raise the awareness of all employees, to promote gender equity and a more inclusive and diverse environment. We have goals in the recruitment and selection processes and internal promotions that should improve female representation in our organization.

LUANA DUFFÉ – vice president Subsea Projects & Country Manager at TechnipFMC in Brazil - I believe that diversity brings more innovation, better results and solutions for customers and the company, as it allows to extract the best

from the teams. We are improving the path towards a more inclusive culture, considering that everyone has equal opportunities, regardless of any characteristic. When racial issues intersect with gender, the challenge is even greater. According to the "Social, Racial and Gender Profile of the 500 Largest Companies in Brazil and their Affirmative Actions", a study published by the Ethos Institute in 2016, black women occupy only 1.6% and 0.4% of management positions and executives, respectively, in the 500 largest national companies.

We are seeing a huge push for gender equality today and I think it is very important to overcome the inertia. However, it will take some time to achieve a fair balance. TechnipFMC's numbers in Brazil are improving thanks to the numerous initiatives to guarantee the diversity of professionals since the hiring, as well as in the succession plans so that there is a balance between genders. Today, we have about 23% women in leadership positions.

In the technology area, there is no resistance in delivering decisions of this size to women at TechnipFMC. We have a global objective of promoting projects to increase the attractiveness of girls and young people to STEM areas and to the oil and gas industry. We have women in technical and technological positions, from the shop floor, going offshore, to management and global positions. I am an example, in the position of Country Manager - the highest at TechnipFMC in Brazil.

We have to get up and give our opinion, always. We have to position ourselves. We cannot expect the world to change. We need to be resilient, go beyond the halfway point and make sure that the ultimate goal is equality.

ANNA PAULA LOUGON, Technology Director at Schlumberger Brasil – Much is said and some studies have proven the benefits that diversity can bring to organizations: 33% higher probability of superior financial performance compared to those that do not have an ethnic and diverse representation in their compositions. And 27% more likely to outperform competing companies in creating long-term value when considering gender diversity in their policy. Greater ability to attract talent, increase customer experience, and employee satisfaction. Even with all these studies, the reality of the female workforce has 79.5% of its income (between 24 and 49 years) lower than those received by men, 13.6% of executive positions are held by women... Inverse of the pyramid of entry into organizations.

How is the portrait of the boards, councils, associations, presidency of the companies we work for? This lack of identification in leadership position photographs is a major barrier to a career within the oil and gas industry. We do not see ourselves inserted in the key positions of command and position of our companies. When faced with exceptions, they are considered 'data points that fall outside of the curve' and asked what they did differently to reach that position. We have to be able to see the accession of women in a natural way and companies have to create concrete policies that enable this diversity of gender, biotype and race.

We women of technological training are many and great! When I graduated in engineering, the ratio was 10% women graduates x 90% men. We have already changed this reality! Today we are 50% or more of that population. Within technical training, we have the same opportunities but when it comes to moving up to leadership positions, we encounter other barriers, other than training: it is when the subjective element (unconscious bias, culture, stereotype, etc.). It is precisely at this point that companies need to act to break this paradigm, with effective and clear policies.

Even with all the inequality in numbers, albeit in a timid way, the role of women in the Brazilian oil and gas market has changed. I even think that Brazil is ahead of most Latin American countries. I am privileged to have contact with inspiring women in the energy industry. And I like to see our country increasingly opening up to the female experience in managing this market.

MARINA ABELHA FERREIRA, ANP Exploration superintendent - The oil and gas industry is extremely homogeneous throughout the world, being mostly male, culminating in the lack of diversity in executive positions at its various levels. But inequality goes far beyond gender: it is necessary to include different ethnicities, cultures, sexual orientations.

The origins of this culture of inequality within companies and institutions are diverse and its existence must be recognized, discussed and combated by companies that wish to obtain the maximum value from their organization. Several studies indicate that decisions are more correct and the results are better when they are carried out in a plural environment, as it has different visions and experiences that a homogeneous group cannot provide.

To change the picture of imbalance in diversity in the industry, institutions and companies must take action at all levels, from encouraging the presence of women and ethnic plurality in courses in the technical area to choosing leaders who represent minorities in leadership positions. in senior management. Different working groups are more likely to think of creative and innovative solutions to complex problems in different contexts, expanding the capacity for adaptation, a tool so necessary in the current scenario of changes that we are experiencing.

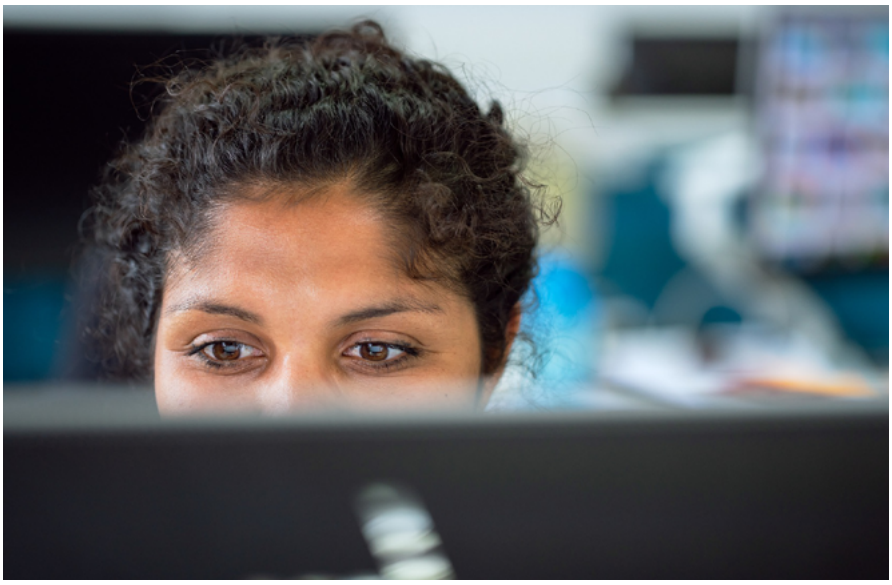
PRISCILA MOCZYDLOWER, director of Sustainability at SPE Brasil - The history of the oil and gas industry is male and white, since its inception in the USA more than a century ago. In Brazil, the belief that a woman's place is at home, taking care of children is in our cultural roots. Our oil and gas industry also grew and flourished in this culture where women were still seen as fragile and family-oriented. There hasn't been enough time to absorb the new concepts of gender equity. The number of women in STEM areas is still low, compared to

the percentage in the population. Many companies promote gender and race equity awareness campaigns and seek to hire and promote more women to executive positions, exposing them to historically male environments, such as operational areas. But it is still difficult to overcome the unconscious biases that have been imputed to us throughout life.

To combat this inequality, it is necessary to first recognize that it exists, talk about it, promote debate. In this context, the Women in Energy (WIN) SPE Brazil committee has worked on several fronts, such as the "Solta a voz" program, in which women in the industry are invited to share their experiences on social networks. WIN also promotes actions encouraging girls to choose careers in the STEM area and organizes training, lectures, debates and mentoring to promote women and diversity in our industry. There needs to be this discussion, breaking paradigms and stimulating diversity. Only with the heterogeneity of people, with different experiences and points of view, is it possible to guarantee a wide range of opinions within companies and industry and, with that, better decisions and results.

KARINE FRAGOSO, director-general of the National Organization of the Petroleum Industry (Onip) - Our diversity agenda cannot be restricted. Advancing under new frontiers, working in basins to integrate energy, open space for the use of available technologies, without prejudice, does open space for diversity of gender, ethnicity, size, and opportunities. Work diversity with a truly comprehensive look. How to work diversity just talking about ultra-deep offshore? Or, just with one genre? We all know that the diversity of views, thoughts and skills is what promotes synergy, where one plus one is never just two.

Here, we are no different from many nations. Of course, there are more developed, evolved and conscious regions and others well behind. Yes, there is still a lot of chauvinism, a lot of dumb prejudice, but as the data shows, there is also evidence that intelligence is



not measured by the size of the head, or the hair, commitment is not measured by the size of the nail, and the result is not achieved by heel size!

NADIA STANZIG, executive secretary of the Brazilian Association of Oil Service Companies (ABESPetro) - Despite the diversity theme, in the last few years, it has entered the agenda of many discussion forums, there is still a big gap for real progress within companies. I went through different segments, such as steel, generation, automotive and managerial and executive positions were almost always occupied by men, mostly white. There are market sectors where women have been gaining space and executive positions, but if we look at the theme of diversity in its breadth and taking into account the Brazilian territory, with different socio-cultural specificities, we will conclude that there is still a lot to do.

The question is complex and has no easy answer, as the solution requires not only structural changes but also mindset changes, which is more difficult in a paternalistic society. In this sense, I see the oil and gas industry taking positive steps, understanding that diversity brings benefits, including financial ones. ABESPetro follows this change. My hiring as the first woman in the position of Executive Secretary is an example. A movement that began with the election of the board of directors for the Biennium 2020 - 2021, and which includes Anna Carvalho. Our thematic committees are also aligned with this movement. Prejudice needs to be transformed into trust in the other who is different. That way we will be able to move forward with the Diversity agenda.

LIVIA VALVERDE, president of the Brazilian Association of Independent Oil and Gas Producers (Abpip) and Country Manager of GeoPark Brasil - It is gratifying to see the benefits of diversity reflected in numbers for companies! From what I have been following, I realize that the oil and gas industry has already noticed the advantages of diversification, adopting a very different posture in the most different profiles and sizes of companies, with the increase of women in leadership positions being frequent.

An example very close to my reality, is GeoPark, a company that I represent here in Brazil and that currently has 38% of its senior executive staff comprised of women from the most diverse areas such as Investor Relations, Environment, Human Resources and Culture. Not to mention the ABPIP itself, in which I currently hold the presidency and I count on the collaboration of a director and counselor who happen to be women. In other words, opportunities for women exist and, with capacity and competence, are consolidating over the years, always based on respect. ■

The geologist who made (and makes) things happen

“First, don't believe it. Always ask and seek to know the data, then draw your conclusions”. The advice of Roberto Porto, her boss at the Leopoldo Américo Miguez de Mello Research and Development Center (Cenpes), at the beginning of her career at Petrobras, has been the guiding thread of the amazing trajectory of geologist **Sylvia Maria Couto dos Anjos**.

First woman to embark on an offshore platform and to do a master's and doctorate abroad by Petrobras, she entered the annals of the world oil industry. She is one of the characters portrayed in the survey Anomalies: Pioneering Woman in Petroleum Geology, by geologist Robbie Rice Gries about pioneer women in the geosciences of oil from 1917 to 2017. And the first Brazilian professional to receive the AAPG Distinguished Service Award for 2017, most important award of the area granted by the American Association of Petroleum Geologists (American Association of Petroleum Geologists).

About to celebrate 42 years at Petrobras, she says that the secret is, to this day, “extremely motivated to make... and make it happen”.

By Beatriz Cardoso

Fotos: Arquivo pessoal

WHEN SHE JOINED PETROBRAS IN 1979, the carioca Sylvia dos Anjos did not imagine that her trajectory would pass through some of the achievements and emblematic events of Petrobras and the world oil industry itself.

Nor that she would be a pioneer and one of the agents in breaking paradigms, when transitioning from fieldwork to research laboratories, with an interval of five years in which she did her master's and doctorate in the United States, returning to Cenpes where she stayed until the beginning of 2000s and assumed strategic management functions in the company, already in the 2000s.

Sylvia's only certainty when she joined Petrobras was that she was in the right place, as geology had been part of her life since she was 14 years old, the age when she discovered her vocation in a Geography class, when the teacher talked about the movements of plaques tectonics that formed the Andes.

"It opened my eyes. I realized how fascinating geology is, because it is the only science that gives us a notion in four dimensions - after all, we

need to understand what happened to understand today," said Sylvia on several occasions.

I also felt that I would follow the field of technology, because I always liked mathematics. "Geology brought together this part of mathematics (basic cycle, identical to that of engineering: 4 calculations and 4 physics) and a little of the geography and history of the continents. I initially thought of engineering, but geology seemed more complete", she observes.

Unprejudiced

First person in the family to have a college degree - the father was a bank employee and the mother, a housewife - she emphasizes that she had unrestricted support when choosing geology. "My father became an enthusiast," she says, laughing. In fact, 'earth science' already attracted the attention of women in the 1970s. Of the 40 students in her class at the Federal University of Rio de Janeiro (UFRJ), 10 were women.

Although the majority of students and teachers were men, she guarantees that she has never experienced any discrimination in this environment. "I always knew that respect would come from being a good student. Two closest friends and I studied hard and were recognized by the class and the teachers",says Sylvia, with the wide smile that has become her trademark.

Aware that it was a difficult and competitive market, in addition to dedicating herself to studies, she sought internships - in addition to Petrobras, she interned at Nuclebrás - Empresas Nucleares Brasileiras S / A (today Nuclep) and then Vale do Rio Doce (Vale).

At the end of the course, she competed for one of the 80 vacancies for geologists and geophysicists, winning one of the two vacancies for women at the Leopoldo Américo Miguez de Mello Research and Development Center (Cenpes). "Cenpes has always been considered, in my college days, the mecca of geological knowledge", recalls Sylvia.

Place and date of birth - Rio de Janeiro / RJ - July 19, 1957

Do you have children? Debora, Mariana and Fernanda.

What books are you reading? I am currently reading *Non-Violent Communication*, by Marshall B. Rosenberg, *The Discrete Charm of the Intestine*, by Giulia Enders, and *The Ministry of the Holy Spirit*, by Edir Macedo.

Which bedside book or do you reread from time to time? Every day, the Bible

What do you like to do in your free time? Reading newspapers, magazines, sports, I like to play Beach Tennis on the beach, travel, dance, chat with friends, Bible series, have breakfast with my mother, sisters and daughters.

What is your hobby? Currently (before the pandemic) playing Beach Tennis on the beach. In the pandemic I stayed at home and discovered several skills I did painting, furniture remodeling, organizing cabinets etc. (rs)

Favorite music? Various Brazilian MPB songs and gospel music

A special trip? The African rifts of Kenya, the cradle of civilization (as the Great Rift Valley is called) and the recent model, analogous to the formation of the rifts in the Brazil-Africa separation and the pre-salt environment.

A dream not yet realized? Many dreams to be realized, we are always starting over and looking to God for direction, support and protection.

Break of paradigm

As Petrobras sent new geologists to do an 'immersion' in the field, it would take her first steps in sedimentary basins in Bahia, the cradle of this industry. She would soon break the first paradigm, by insisting to embark on an offshore unit, together with the other geologist who had been awarded a contract (who would later pursue a career at the university).

Even though she spent the day on the offshore platform, returning to shore to spend the night, as there was no structure to house women, the initiative opened the door for future classes. "The biggest gain was the paradigm break", says Sylvia.

"As a professional, we cannot accept limitations that are not technical. Prejudice has no place in knowledge or technological development. The trip to the platform showed us clearly that there was nothing to stop our work there. When working in the onshore field, we occupied trailers without bathrooms, with men and women sharing the same space. What would prevent us from working offshore? ", Asks Sylvia.

In the mecca of knowledge

She ended up staying a little over a year in Bahia, but with a commitment to return to Cenpes. "I was invited to stay in Bahia, but I decided to stay with the one who gave me the chance to enter, Cenpes", she recalls. For her, returning to the research center

after the operational experience was a goal achieved, in the same year that she would marry Luis, the boyfriend of her adolescence.

"I confess that in the first weeks at Cenpes I missed the activities in the field", she reveals. In charge of presenting relevant articles on the potential of sedimentary basins during the technical afternoons held at Cenpes, she was disappointed to see that the international literature stated that the potential for large reservoirs in sedimentary basins such as Campos, Santos, among others, was extremely low.

"My boss (Roberto Porto), seeing my disappointment, said something that guided me all these years: Sylvia, first, don't believe it. Always ask and seek to know the data to draw your conclusions", she recalls. "This is what we did. We studied and proved that they were wrong", Sylvia stresses.

In the following years, Petrobras, 'with a team of Brazilian public contests', discovered two great exploratory plays. "The turbidite, which gave us the giants of the Campos basin - a major took more than 10 years to find this play on the African side, she stresses - and then, the supergiants of the microbial carbonates in the pre-salt", celebrates the geologist. "This is knowledge and the desire to make a difference in this country."

Proficiency in daring

The thirst for knowledge would lead her to break yet another paradigm, becoming the first female professional to do postgraduate studies abroad - with less than four years of Petrobras. "It was a case of being ready at the right time," says Sylvia. She had a trip planned to do a two-month internship with Professor John Hower, from the University of Illinois (USA), while several colleagues were trying to pass a master's degree at the University of Texas, facing a common problem: passing on the English proficiency test, the TOEFL exam, required for all international students.

Sylvia decided to take the exam on her own, to assess her command of the language. "When the result of my test came out, with grades higher than the minimum required by the universities, my boss proposed that I take the master's degree and not just two months of training", she reveals. In August 1982 she went to Illinois, where she would have the company of her husband, who also went to master's at the same university.

It was a period of great emotions, as Sylvia would lose her advisor (Hower committed suicide in September 1983) when she was in the middle of her master's degree, which she concludes at the end of her pregnancy - Débora was born a week after she defended her thesis.

Another professor, invited her to do her doctorate, since in the qualification test she had been ranked at the PhD level. The other daughter, Mariana would be born a month before the defense of her doctorate, in 1986. "I thank God and the my ex-husband Luis, for all the support", she says, noting that he also did a master's and doctorate.

A new world

Back in Brazil, Sylvia returned to Cenpes, where she became involved with new projects that made her hesitate to accept other functions. "I always liked what I do. As I was coordinating studies, projects and laboratories, I did not want to accept other functions because there was still a lot to be developed", says the geologist, laughing.

However, the third time she was appointed to management, she decided to accept it. She was manager of geology for exploration, rock technology, sedimentology and bio-

INTERNATIONAL RECOGNIZED PIONEERING

THE BRAZILIAN SYLVIA DOS ANJOS was one of the highlights in the celebrations of the 100 years of the American Association of Petroleum Geologists (AAPG), founded in 1917. She was the first Brazilian professional in the area to receive the AAPG Distinguished Service Award, one of the most important awards in this area in the world.

What's more, she is one of the characters in a survey by geologist Robbie Rice Gries, AAPG's first female president, on pioneer women in the oil geosciences from 1917 to 2017. The document, ironically titled Anomalies: Pioneering Woman in Petroleum Geology gathers stories of pioneers in the oil industry, which until the 1980s were predominantly male.

In Brazil, through ABGP, of which she is currently director, she helped to implement the project Geologists of Tomorrow (partnership with UFRJ), which for five years has promoted workshops for public school teachers, to disseminate geology in classrooms. It also helped to create the Casa de Pedra Project, opened in 2016, which offers accommodation for students and teachers to carry out fossil field studies in the Araripe Basin, on the border between Pernambuco and Ceará.

"Geology is still very little absorbed by society and by the country's ruling class and in many countries in the world. Many geological facts are still seen by many as something imaginary, mystical and mysterious. It is essential that geologists

stratigraphy, at Cenpes, where she would leave after 16 years, in 2005, to work in the operational area of Exploration, at the company's headquarters, managing the modeling of sedimentary basins.

She arrived in time to witness the 'saga of fellow explorers', responsible for the location of the Parati well and, later, Tupi. "The risk of the lease was extremely high, we followed the drilling day by day, which presented numerous problems, many doubts, until, after more than 300 days, the existence of the oil system was proven, in the Tupi well, discoverer of the supergiant field of Lula ".

As General Manager of Geology, she actively participated in a transformational process for Petrobras, which started a successful trajectory and consolidated knowledge in turbidites to advance in the challenging scenario of carbonates in the pre-salt.

"The pre-salt was like a baby at home. Everything was renewed: so much to learn. We started a true cultural transformation: we went from a company that knew and produced siliciclastic reservoirs, at depths of 3,500m, to a company producing microbial carbonates in the pre-salt layer, more than 6000m deep ", points out Sylvia dos Anjos. "We had to do a lot of training, conduct numerous field trips, which served to accelerate our ability to absorb and, more quickly, apply the new knowledge".

Digital transformation

Sylvia dos Anjos would take on a new challenge by becoming General Manager of Applied Technologies (AT) of Libra, an emblematic project. After the signing of the first sharing contract, at the end of 2013, the price of oil plummeted, making it crucial to develop and apply technology, reducing costs and increasing FR (recovery factor) in what is considered one of the largest oil and gas reserves in the country.

"Libra was a great learning experience. For the first time, the company had a large project shared with partners who lived in the same space. In AT management we had a multiplicity of companies and nationalities cooperating in the development and implementation of new technologies in the project. A multicultural soup with Chinese, English, French, Belgian, Polish participants from Shell, Total, CNPC and CNOOC (Petrobras partners in the Libra consortium).

In 2017, she would coordinate yet another transformation process, with the innovative Libr@Digital program, "which has moved and will still revolutionize the way we develop and produce oil as well as our relations with corporate areas and other corporate areas of the company", affirms Sylvia from Angels.

In 2020, she assumed the position of Business Advisor of the Refining and Natural Gas Board of Directors, with the task of implementing Digital Transformation (DT) in the businesses in this area. "I coordinate G&E projects aiming to implement technologies that promote not only digital transformation, but also Business Transformation, with the opening of the gas

market", says the geologist, who in January 2021 will complete 42 years of Petrobras.

Longevity, according to her, was always involved with new challenges. "Activities have never been monotonous. Challenges recharge our energies. I am still only at the company because I am, to this day, extremely motivated to make it... and make it happen ", she assures.

Bottlenecks in diversity

The geologist who has won awards and international recognition and helped the industry to break paradigms is also involved in another cultural transformation: Diversity. As a member and co-founder of the Diversity Committee of the Brazilian Institute of Oil, Gas and Biofuels (IBP), since 2018, she has been working to change this scenario of inequality in the industry. Especially concerning gender.

The facts show that there have been advances and setbacks. Petrobras, which in 2012 had the first female president and two directors, today has women occupying two of the eight boards - Refining and Natural Gas (Anelise Lara) and Finance and Investor Relations (Andrea Marques de Almeida). After having three female members, the Board of Directors has only the representative elected by employees as the only female representative.

Sylvia says that there are funnels in the pipeline, mainly in some STEM careers (Science, Technology, Engineering and Mathematics). "Geology is one of them. The diversity committee has been addressing these issues and measures and guidelines will help companies a lot", she says.

She recognizes that "differentiated treatment today is a little subliminal, but it exists. The woman to have the same recognition that the man needs to do much more ". But she believes that the topic has been discussed more openly in organizations. "Unconscious biases exist, but the more we discuss and talk about them, the more we can react and make more conscious decisions. We have a lot to evolve, but we are on our way! ", she guarantees.

There is still the so-called 'glass ceiling', which makes it difficult for women to advance in top careers. "There are situations of a relative increase in the positions occupied by women, but with choices of professionals who are more like a secretary, who accepts the decision of the boss, and not necessarily of someone who positions herself at the level that the position requires. In Brazil and in the world, cases are reported in which executives do not select the most qualified for the position so as not to feel threatened and have greater dominance and supremacy ", points out Sylvia dos Anjos, who has an MBA from FGV in Administration, Business and Marketing and administrative/managerial specialization by Fundação Dom Cabral, INSEAD (France) and Kellogg School (United States).

Attentive to this issue, the Brazilian Association of Petroleum Geologists (ABGP), which she helped to found in 1997 and was president twice, this year will also pay tribute to some men who stood out throughout their careers for supporting the women. "They are those described at UN Women as HE for SHE. We need to unite not only women but good guys who do not feel threatened and have recognized and taken concrete actions in choosing women ", concludes Sylvia dos Anjos.

It is a world in slow transformation. ■

"Geology gives us the real dimension of the facts today, not only in the historical context, but in the context of the evolution of the continents and the earth. Demystifying and giving the context of reality. Being able to see today, having the notion of evolution over geological time, gives us this 4 D view, the time dimension. It also gives us the dimension that as human beings, we are just a final minute on our planet's time scale. Thinking on the other hand on a smaller scale, the digital transformation with artificial intelligence algorithms allows us, in a way, looking at the historical data of the past, to make future predictions.

The domain and meaning of the evolution of time and with time."

Syvia dos Anjos

Photo: Petrobras Agency

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COMING TO AMERICA

Despite the raucous political environment, despite the social unrest, and the coronavirus, the American economy continues to grow at an historic pace with no end in sight. The wealth potential of this market is unprecedented with no signs of slowing down. Increasingly foreign investment is finding its way into this economy and reaping hugh rewards, lower taxes, upscale potential and more business freedom. There is room to grow for everyone. As tempting as the situation appears there is nothing more daunting than launching into a new economy for the first time with no experience or resources to help with this foreboding transition, i.e. passports, business licenses, hiring new employees, dealing with new laws, and business and employee regulations. Unless you are a larger multi-national with embedded resources in the US you will have to seek out and establish a resource base within the US to assist with this complicated and difficult undertaking. There is an extensive array of challenges:

- Immigration: this is an area where there are many approaches which can help ease entry into the US. A knowledgeable resource can help expedite this process.
- Incorporation: Establishing a legal presence within the US in an important first step.
- Staffing: filling key positions with competent local nationals will be one of the most important steps ever taken. Knowledge of the local laws and customs is essential to this process.
- Site location: Because of local laws, regulations and regional characteristics, potential sites must be carefully researched and analyzed prior to committing to a specific locale
- Financial services: From the very beginning you must be able to understand the tax and financial implications of your business and have access to expert council.

Frank Wilhelm is the founder and CEO of World Profit Partners, and International Supply Chain Solutions (ISCS) and is responsible for the creation and management of ISCS's unique Supply Chain capability. Frank brings to this position over twenty-five years of extensive "hands on" U.S. and international management experience in virtually all facets of integrated supply chain and materials management.
Frank has held senior level management and partner positions with major consultancies such as BDO Siedman and Cambridge Technology Partners. Additionally, Frank was President of the Process Management Group, a West Coast consulting firm that implemented and integrated supply chain process applications with business processes.

•Logistics: The US is a large geography with much regional diversity which affects inbound/outbound freight and the available modality. Careful analysis must be performed prior to any location decisions.

•Business planning: Perhaps the most important element of any move to the US. A heavily detailed plan addressing: Nesting, sustainability, conversion, and an aggressive business plan. KPI's, metrics and key events must be established and monitored.

•Funding: Funding requirements must be considered early in the process. Best to have a well thought out plan which addresses contingency needs as one of the very 1st steps in the process.

•Regulatory and permitting: Regardless of the nature of the business, there will undoubtedly be a body of rules and permit requirements which apply. Failing to comply can be disastrous. Up front knowledge is imperative.

•Market research and analysis is an important 1st step which will define the direction and scope of the entire effort.

Do's and Don'ts

Do's:

•Engage an experienced US based resources to partner with and shepherd you through this difficult process

•Create a thorough and detailed plan addressing all aspects and potential problem areas

•Begin intense sector networking within the US at once with prominent individuals and organizations

•Engage a resource to conduct a comprehensive market analysis

•Be flexible ready to change and adapt from your original ideas

•listen to your adviser

•Be patient, positive

•Make sure your supply chain and trading partners are aware of your plans

•Ensure your cash position is strong

•Assess the business, social and environmental climates in the areas before making the site selection

Don'ts:

•Do not try to go it alone

•Do not co-mingle personal and business funds

•Do not make public/press announcements prematurely

•Do not enter into business relationships with entities without thorough vetting

•Do not change or alter your strategic direction without informing your relocation partner

Participating in this red-hot US market may be a once in a lifetime opportunity, not to be missed. However, moving into this foreign geography, or any foreign geography for that matter is an intricate undertaking requiring careful planning and flawless execution. As the old saying goes "the devil is in the details". The effort may be daunting and intense but if done properly the rewards will be great. The pavement is littered with failed attempts at this but with the right assistance, guidance and expertise, success can be assured. ■

EMPOWERMENT NETWORK

Writing for a **TN Petróleo** edition along with solely female authors is a sign of evolution in women's participation in the energy sector.

Along 20 years working in the area, I have observed the empowerment of women by seeing them achieving top management positions, attending more events and meetings, and being more present in the execution of activities of the oil, gas and energy industry in all hierarchical levels and in a general way – in companies, government entities, industry etc.

As women have gained importance in the segment, natural gas has also earned great empowerment in the last years.

In the past, discovering natural gas was a big problem. It seems unbelievable, but the news about a dry well was better than of the discovery of a gas reservoir.

Well then, whatever it was a problem in the past, today it is not anymore. On the contrary, gas has it all!

In the same way as Brazil has been increasing the number of women in the three powers, the increase of the participation of natural gas in the energy matrix is on the agenda of the day.

In times of energy transition, gas has gained great importance because it is known as a bridge between fossil energy and low carbon gas emission energy.

The usage of natural gas as fuel in Brazil began with the public lighting in Rio de Janeiro in the 19th century, and today it is particularly important in the energy matrix, including for electric power generation.

Along 20 years in this segment, I have had the privilege to follow closely the empowerment of natural gas in Brazil and in the world.

I joined the Agência Nacional do Petróleo, Gás Natural e Biocombustíveis – ANP (national agency for oil, natural gas and biofuels) in 2004, the year when the Agency started the process to add "natural gas" to its name;

The importation of natural gas via GASBOL allowed the growth of offer and demand of natural gas in Brazil, increasing fivefold its share in the energetic matrix participation along these 20 years.

And gas has kept expanding! On the other hand, the transport network of natural gas not so much.

Claudia Rabelo,
Under-Secretary of Oil, Gas and Energy of Rio de Janeiro.

In 2009, the Gas Law (n. 11.909) passed, which, among other legal provisions, changed the model of authorization for granting natural gas transport services, being up to the ANP to promote auctions for the construction and operation of pipelines, but, after 11 years, there hasn't been a network expansion.

Besides the gas coming from Bolivia, the offer of domestic gas has significantly increased in the country. You might remember the announcement made by Eike Batista about the discovery of "half Bolivia" of gas in Maranhão in 2010.

Although the "half Bolivia" of gas wasn't confirmed, the significant discovery opened a new exploratory frontier in onshore basins and led to an unprecedented solution in Brazil of gas to wire, which allowed the activity and opened new possibilities of monetization for the energy sector.

For a country that has approximately only nine thousand kilometers of pipelines, the gas to wire alternative represents another option of monetization and favors investments for the exploration and production of natural gas in Brazil.

In 2013, Brazil held an auction of E&P on onshore basins focused on natural gas.

In the same year, it also took place the First Auction of Production Sharing Agreement in the pre-salt area, currently accounting for the largest volume of natural gas produced in Brazil, approximately 90 mi m^3/day.

And the state of Rio de Janeiro, which comprehends most part of the pre-salt area, accounts for approximately 70% of the production of gas in all the country.

To boost the enormous production forecast for the pre-salt, investments will be necessary the implementation of new pipelines as well as the construction of new units of natural gas processing (UPGNs), necessary infrastructure for monetization of the gas.

The pipeline Rota 3, almost ready, will bring the gas from pre-salt to the UPGN of Gaslub, in Itaboraí, predicted to be commercially operating in the first months of 2022.

Other offshore pipelines from the pre-salt are forecast for Rio de Janeiro, a privilege destination considering its geography and attractive market.

The oil companies and the Petróleo Pré-sal S.A. – (PPSA) are studying options for the use of the pre-salt gas, according to features of each field and the economic feasibility of the projects.

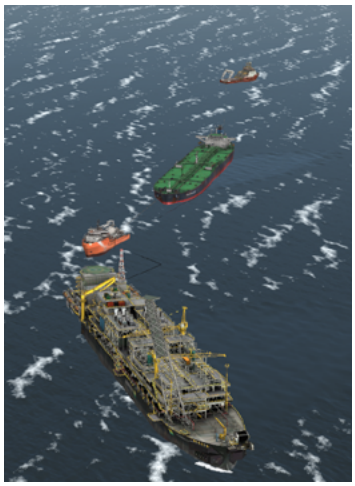
The State Government has been working in a structured way to receive this natural gas by eliminating bottlenecks for its monetization, increasing demand and fostering competitiveness even more in the State.

Our state has an enormous potential demand for the use of gas, whether for thermoelectric generation, industrial use and for the expansion of the freight of vehicles powered by GNV (vehicular natural gas).

The natural gas is quite relevant for the industry development, the economic recovery of Rio de Janeiro, and furthermore, it plays an important role in the energy transition in Brazil.

In this matter, the Rio de Janeiro Government was ahead in improving the state regulatory framework. New rules for the gas market are already in effect, giving larger legal security and dynamism to the sector. ■

Cargo transfer vessels allow offshore loading for all



A new dynamically positioned cargo transfer vessel (CTV) is opening the way for conventional tankers to load bulk liquid cargoes directly from FPSOs in Brazil. David Patterson, Loss Prevention Executive North P&I Club, provides an introduction.

Offshore loading operations from floating production, storage and offloading vessels (FPSOs) in Brazil are usually carried out by dedicated dynamically positioned (DP) shuttle tankers. The shuttle tanker's bow loading system connects to the FPSO's offload hose, and its dynamic-positioning system is used to position the shuttle tanker during the loading operation.

It has not been possible for conventional tankers to load directly from the FPSOs in Brazilian waters, which is in contrast with West Africa where such operations are common. This is because:

- Brazilian waters typically feature strong and shifting currents
- the offload hoses are not long enough to reach a midship manifold
- the offload hoses have a specialised hose-end valve which is not compatible with a standard manifold.

But thanks to the development of the cargo transfer vessel (CTV), conventional tankers in Brazilian waters can now load directly from the FPSO.

Introducing the CTV

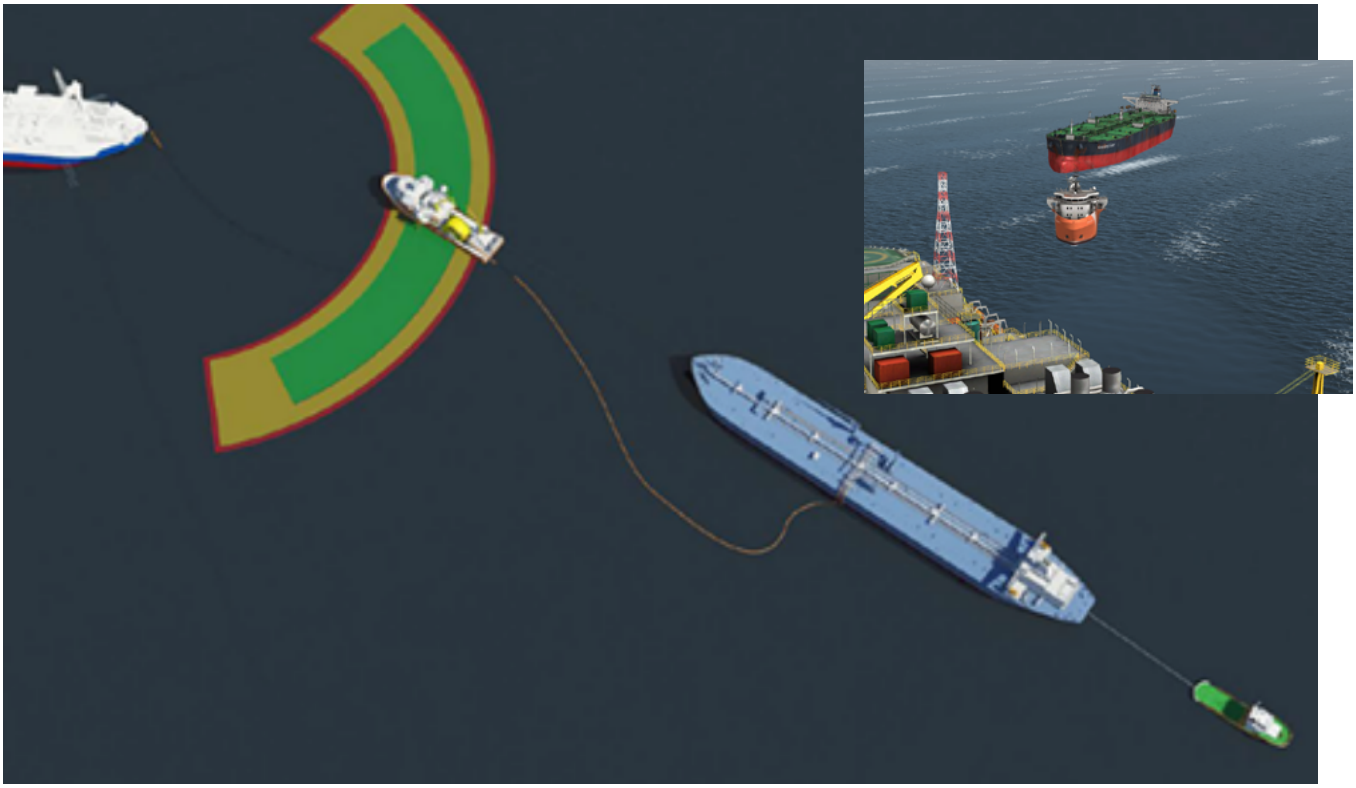
The CTV is a dynamically positioned vessel that has the ability to deploy a mooring hawser and an offload hose to connect to a conventional tanker and then to the FPSO's offload hose.

The initial connection process is very similar to a tanker connecting to a single buoy mooring and is co-ordinated by a mooring master on board the CTV. The CTV deploys a hawser for the tanker to moor, and a hold-back tug is used to keep the tanker in position. The hose is then deployed from the CTV and connected on the tanker's midship manifold. With the hawser and hose connected, the CTV tows the tanker and tug towards the FPSO and takes up a position in the offloading sector of the FPSO.

At this point, the CTV performs the same role as a shuttle tanker and maintains position within the FPSO's offloading sector. The offloading hose is passed from the FPSO to the CTV, where it is connected.

The cargo is then pumped to the tanker via the CTV, which uses booster pumps to supplement the flow rate. The specialised DP software

David Patterson works in the Loss Prevention department at the North of England P&I Association Ltd. Previously he has worked in the shipping and oil & gas industries on FPSOs, DP shuttle tankers and conventional oil tankers for various companies . He has strong background in oil tanker & FPSO operations, offshore loading and dynamic positioning.



on the CTV tracks and follows the movements of the tanker while keeping the CTV in the offloading sector of the FPSO.

This new approach allows the operator to export larger parcels directly to tankers rather than having a shuttle tanker perform the offshore loading operation and the cargo transferred via an STS.

The risks

Introducing a CTV into loading operations poses different risks compared to having a vessel load directly from an FPSO.

While the CTV is able to perform an emergency disconnection from the FPSO in the same way a dedicated shuttle tanker can, any disconnection between the CTV and tanker has to be performed manually. As a safety feature, the offload hose between the CTV and tanker is fitted with a dry break coupling, which activates in the event of any excessive strain to the offloading hose.

Since the tanker is moored to a dynamically positioned vessel, it relies on the station-keeping ability of the CTV rather than a secure mooring directly to the FPSO. Any excessive loads from the hold-back tug or environmental forces could result in the CTV moving out of position and being forced to perform an emergency disconnection from the FPSO.

The introduction of additional vessels into the operation increases the risk of miscommunication amongst the vessels. This could lead to inaccurate or misunderstood instructions or delays in stopping cargo operations.

Safe operations

To ensure the operation is carried out safely, the detailed field-specific offload procedures should be followed strictly by all parties.

This includes testing communications, applying weather limitations for the connection and loading operation and making contingency plans. Masters on tankers undertaking this operation should be familiar with these procedures. Address any concerns with the mooring master prior to commencing the connection process.

Lars Einar Rosenhaug Bjørset of Kongsberg Maritime, the designers and providers of the CTV's dynamic-positioning software and systems, explains: "The personnel performing this operation should be well trained. The operation is a new way of thinking, not like any other operations before. There are new DP software functions to be learned together with the external forces from the VLCC and the tug."

Training in simulators will help crew to prepare for this new scenario, he adds. "As the operation is so new to everyone involved, the CTV crew should practise whole scenarios in full-scale bridge simulators, taking all the vessels into account. This will provide personnel with a situational awareness of the operation, real-time communication protocols and an opportunity to follow procedures during normal operation and emergency situations." ■

THE ROLE OF INDEPENDENT OIL COMPANIES IN BRAZIL

In a context of low oil prices and Petrobras divestments, Brazilian society has to ask itself about the contribution of newcomers to the petroleum sector, as well as realize the need to adjust its regulation to this sector's evolution. Current Brazilian independent oil companies have changed from the last 20 years ago.

ANP promoted its first marginal field bidding round in 2005, in a context of rising oil prices (**Figure 1**) and scarce production assets.

To create small independents, ANP reduced royalties to lower levels as allowed by law, and defined low minimum net asset requirements for companies interested in becoming oil producers.

Figure 1 – Brent oil price

Source: Trading Economics

As a result, several indigenous and foreign companies made applications to acquire small inactive oil fields, counting on having room to grow. In the following years, lack of asset availability became a real constraint. This is no longer the scenario anymore.

Magda Chambriard is a Civil Engineer, with master degree in Chemical Engineer from Federal University of Rio de Janeiro. She is postgraduated in E&P by Petrobras' trainning department, later transformed in Petrobras University. She worked for Petrobras in E&P Department and for Brazilian Petroleum Agency where she reached the General Director position. Currently she is consultant in the energy sector and research coordinator at FGV Energia.

Since then, the Brazilian oil sector has changed drastically. From 2006 to 2008, Petrobras made several pre-salt discoveries, casting light on new opportunities. A new regulatory framework was built, allowing Petrobras to grow and face the pre-salt development challenge. However, other assets were set aside.

The outcome of decision can be seen in numbers. Currently, pre-salt represents more than 70% of Brazilian production, while the post salt production drop was sharp (**Figure 2**). Divestments became a solution to avoid lack of investments and job losses.

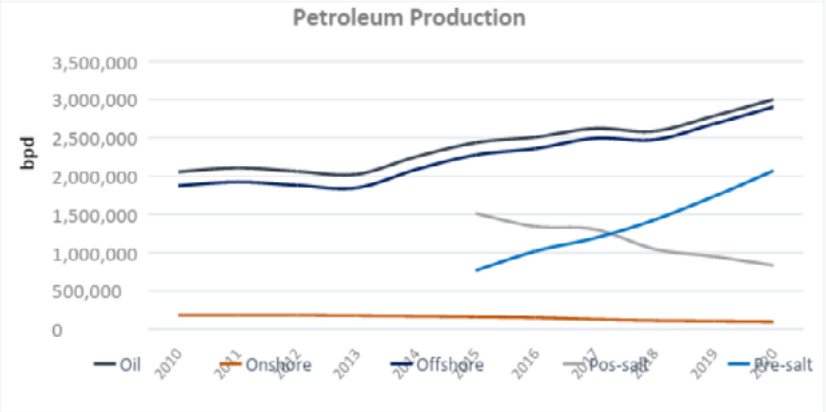


Figure 2 – Petroleum Production

Source: FGV Energia, based on ANP data

According to the 2018 20-F Petrobras report, in 2017, company employee per daily barrels of oil production were 18.4, being 89.7 in the Northeast (where production is largely onshore) and 16.7 in the Southeast (where production is largely in deep offshore waters).

These numbers provide good understanding of the independents' contribution to society. Acquiring mature assets divested by Petrobras, they support job maintenance.

Realizing this contribution, the government promptly acted to support the onshore and shallow offshore industry, providing direction through the National Energy Policy Council resolutions (CNPE - acronym in Portuguese) . Nevertheless, bureaucracy takes too long.

For example, following CNPE's decision of reducing incremental production royalties, ANP took two years to approve the first request. Process complexity has prevented a second request so far, even when low oil prices turned reasonable fields into anti-economic assets in line to be shut down. Decommissioning, instead of mature field rejuvenation, became the subject of several webinars.

Currently, there are more than 30 small and medium size Brazilian operators working hard to keep their assets and grow. But they do not have open access to essential facilities such as fluid collection and treatment stations, natural gas processing units and oil and natural gas pipelines, nor tariffs monitored by the regulator.

Without these mechanisms, they need to pay Petrobras´ costs for services, which is countersensical: Petrobras divests realizing its high costs to operate small and medium size assets. Regulation leads the state company to supply high cost services to small and medium size companies which should work to reduce them.

Apart from these bureaucratic issues, there is a crucial one: are independents small or large?

According to ANP regulation, small and medium size oil companies can produce up to 10,000 equivalent barrels per day, which means that the more independents invest to acquire new assets, the less they become eligible for royalty incentives.

In a Lower for Longer pandemic scenario, it is crucial to quicky renew regulatory stock to speed up independents' growth and job maintenance. The more they can invest, the more society can see tax revenues and workforce increase. Otherwise, the outcome will be decommissioning and unemployment. ■

AUTOMATION AND VESSEL EFFICIENCY

Many ships are sailing with sup-optimal and outdated automation systems. However, an automation retrofit can bring in several efficiency benefits, and should be part of an optimisation strategy. Here we will highlight where these benefits are most acutely felt.

Data access

When random system faults occur, they cause a significant amount of disruption. In sub-optimal automation systems, there is limited input/output command data from the system logs. Many systems are still paper-based or have poor storage capacity. However, if technicians have seamless and reliable data access, it is a major support in helping them fix the fault and prevent re-occurring.

Integrating automation

Many vessels have dislocated systems often from different makers. This means a control room will have stand-alone systems such as the PMS, tank-sounding, bilge, HVAC, refrigeration compressor control, engine safety and valve control. Also, there are dozens of stand-alone Programmable Logic Computer units hidden onboard, all from different makers, with their individual backup software, engineering software and tool-cables, with engineering software running on obsolete versions of windows – some as old as Windows 95! This makes operations and maintenance a significant challenge for crews and engineers, especially when things go wrong as technicians have to navigate this complex maze of systems.

Combining these systems into an Integrated Automation System (IAS) consolidates these systems and simplifies day-day-management and long-term maintenance, needing only one set of spare-parts, and service engineer with support available remotely.

Hans Høglund is Høglund's Senior Project Manager for Retrofit Projects, with more than 30 years of experience in delivering modern integrated automation systems to aging vessels of any type, increasing vessel efficiency.

Energy management

Effective automation and system integration can unlock significant efficiency gains for a vessel. All systems found on modern vessels need to communicate, utilizing the capacity in all rotating

machines onboard and keeps running-hours to a minimum. Integrated Power Management Systems (PMS) plays an important role in controlling all heavy energy consumers onboard and communicating between bridge and propulsion system and optimising power used onboard.

As well as propulsion units, automation systems help manage energy consumption in other essential hardware groups such as the engine cooling units. Daily, these units often run on low loads with relatively high spare capacity. Effective automation improves the efficiency of these units.

This is relevant for ships operating in colder climates, with reduced demand for chiller units when utilizing cold seawater. The system must be able to automatically close off and "fine-tune" the cooler to prevent excessive use when it is unnecessary.

Automatic control of chiller units based on temperature and power availability also increases potential great saving of fuel each year.

Propulsion efficiency

Propulsion is the biggest power consumer on board and a priority area for data interfacing. We have seen that increased focus on the fuel consumption from the bridge has a great potential. Access to consumption figures to compare against previous voyages is essential. We have witnessed some ferries generate up to 20% in fuel savings, just through proper consumption data visualisation.

Visualisation of torque and thrust sensor data from the propellor shaft gives an accurate display of cavitation. Consequently, the crew can make immediate adjustments to engine output to reduce excess fuel burn.

Data from an IAS is especially useful in allowing owners to monitor deviations, identify excess consumptions and support targeted interventions.

Together, this is why automation is one of the highest-impact technological alterations that owners can make.

THE BRAZILIAN CAPACITY TO RESIST AND INNOVATE

The innovation, diversity and abundance of natural resources are characteristics of our country and differentials that attract investors from all over the world. The oil and gas industry currently moves around 13% of Brazilian GDP and has a long chain, which goes from the wells to gas stations, with constant opportunities for a wide variety of international companies seeking to operate in the country, through partnerships.

In the oil and gas sector, Brazil is the largest producer in Latin America and one of the top 10 in the world. This milestone is the result of Brazilian entrepreneurship and the work of excellence of companies in the sector. In the field of ultra-deep-water exploration and production Petrobras has led the development of a set of technologies for pre-salt exploration. This shows the capacity of the Brazilian supplier industry to innovate. In this example the oil company acted in partnership with the industry to create engineering solutions directly applicable to the exploration and production area.

In 2020, with the covid-19 pandemic, the industry suffered a significant impact, pushed by decreasing demand and lower international oil prices. However, the oil sector showed its ability to resist crises and leverage the recovery of the economy.

In a scenario where the energy transition is presented as a global challenge, Brazil continues to stand out as a global player. The diversification and balance of the Brazilian energy matrix has opened a new frontier of opportunities for the country. Due to the pressure over producing countries to redirect investments to renewable sources, the search for alternatives has led several oil companies to direct their investments to the oil and gas sector in Brazil, opening a new frontier of investments.

This move has also been stimulated by Petrobras' bold divestment plan for assets located in onshore and conventional offshore, and the sale of refineries and other assets. The offer of a broad portfolio of fields and blocks by the Brazilian National Agency of Petroleum, Natural Gas and Biofuels (ANP) – whether on permanent offer and on the next bidding rounds, scheduled for early 2021 – make the Brazilian market even more attractive to international investors.

Despite the current volume of Brazilian oil production, our capacity can still be expanded and the way to increase exploration and production is by strengthening the sector. New Brazilian and foreign companies, served by Apex-Brasil, have come up with solutions based on innovative technologies and new businesses in the area of services

Roberto Escoto is a Major General in the Brazilian Army (retired). He graduated from the Academia Militar das Agulhas Negras (AMAN) in 1982. He holds a master's degree in International Relations from the University of Brasília (UnB) and a PhD in Military Sciences from the Army Command and Staff College (ECEME). He is fluent in English and Spanish and has advanced proficiency in French. Along 37 years in the military, he served in several advisory, leadership and command positions in Brazil and abroad. Abroad, in 2011 he was a senior military liaison officer at the UN Department of Peacekeeping Operations (DPKO) in New York, where he advised on the management of peacekeeping missions in Haiti, Cyprus and Kosovo. Between 2008 and 2010, he was the Army Attaché's deputy at the Brazilian Embassy in the United States and Canada. During this period, he headed the Brazilian Army Commission in Washington (CEBW), a body responsible for international purchases of defense material.

and supply chain, showing the sector's capacity to renew itself and add even more value to the industry.

To support companies and institutions in the sector in facing the challenges, the Brazilian Trade and Investment Promotion Agency (Apex-Brasil) has developed a series of initiatives aimed to attract investments. We have developed a portfolio of services oriented to strengthen the foundations of the sector, disseminate innovation, support the generation of new businesses, position Brazil as an important player in the global value chain and attract investments for the growth of the economy.

One of our main programs is the Brazilian Petroleum Partnerships (BPP), an ongoing program that aims to form partnerships between Brazilian and foreign companies to strengthen the supply chain and develop investment opportunities in Brazil. The partnerships developed under the program have also helped foreign companies meet local content requirements in compliance with ANP regulations. Currently, BPP manages a portfolio of about 50 technology-based innovative Brazilian companies and 15 foreign companies that are being supported to find their ideal business partners and make a soft-landing in our country.

In addition to the service through BPP, Apex-Brasil supports Brazilian companies in accessing the international market, including the promotion of their businesses at international fairs. That is the case of the Offshore Technology Conference (OTC), held annually in Houston, USA, and considered the largest trade show in the oil and gas sector in the world. The Agency is responsible for organizing the Brazilian

Pavilion and the participation of Brazilian companies in the event. In the 2019 edition, 50 companies from the industry participated in the trade show and an internationalization business mission was held with seminars, technical visits, and consultancy on how to establish operations in the U.S., and more specifically in Houston.

Another outstanding initiative of Apex-Brasil is the Digital Oil & Gas Mission. This action was carried out in two phases in 2020 and aimed to explore opportunities for the sector in the three core activities of Apex-Brasil (Export promotion, Internationalization of companies, and Investment Attraction). The first phase led 15 select companies to present their innovative solutions to four of the main operators present in Brazil (Petrobras, Shell, Equinor and Eneva). This action mobilized about 150 companies, among which 15 were selected, receiving training for the development of pitch sessions and guidelines for negotiating with potential foreign investors.

The second phase of the Mission aimed to train companies in the methodology of internationalization and promote export opportunities with a focus on the USA. A total of 25 companies participated in this stage, which sought to develop contacts and networking with service providers and potential customers located in this country.

For 2021, Apex-Brasil plans a mix of activities, considering the still uncertain scenario of the pandemic. Registration for the OTC Brazilian Pavilion in 2021 is already open. The participation of interested companies can be confirmed until February 2021. The BPP program is also available to support Brazilian and foreign companies that intend to seek international partnerships to explore opportunities to invest in Brazil. And finally, given the success of the Digital Oil and Gas Mission this year, we will hold a new edition on the first half of 2021, to be released from March next year. ■

Opinion by **Ana Zambelli,** Managing Director of Brookfield Private Equity and coordinator of the IBP Diversity Committee, was president of Schlumberger Brasil and an advisor to Petrobras and Braskem.

Diversity is imperative in organizations: it's time to act

For the past decade, gender diversity & inclusion has been a recurring theme in the business world and a prominent topic in CEO speeches, in presentations bcorporations to their investors, and as a cover page of the most influential magazines such as Forbes and The Economist. In addition, diversity has been studied by major business consultancies, such as Mckinsey, Boston Consulting Group, Deloitte; and the main theme of talent recruitment experts like Korn Ferry, Heidrick & Struggles, Egon Zehnder and LHH.

Despite all the talks on the subject, the progress achieved in the last ten years is at least disappointing. In a June 2019 BCG study titled "The Business Imperative of Diversity", global listed companies with a minimum of $ 10 billion in sales or $ 20 billion of market cap demonstrated minimal growth in the number of women leaders, with just one percentage point in ten years, rising from 26% in 2009 to 27% in 2018. McKisney latest study also came to a very similar conclusion despite its optimistic title "Diveristy wins: How inclusion matters". The survey reveled the high probability of better financial results for companies that have a minimum of 30% gender or ethnic diversity among their executives. In 2019, companies with this gender diversity in the management team showed 25% higher financial performance, while in organizations with ethnic diversity among their executives, the economic results achieved were even better: 36% above other companies. Given this fact, the report confirmed that there is still a huge gap to be filled with the presence of women and blacks in the executive teams of most organizations. Only 30% of the companies included in the study achieved progress in diversity, while 50% of them remained stagnant or worse, felt back. In the case of ethnicity, the growth was greater, but the gap to be filled is even more significant.

In face of all these facts, I cannot stop wondering why large corporations are unable to achieve gender and race equity in their administrative staff today. In dialogue with these organizations, the two responses are the most common:

- The "pipeline" is limited. Companies say they are developing talent, but they still need more time so the women, blacks, indigenous people in their organizations are ready to take on executive roles.

- Unfortunately, women do not have the same ambition as men. A common view of companies is that women do not want to give up time with their families, especially their children, so they are less available to the sacrifices required in executive life, in particular travel and long working hours.

I go back in time, about 25 years ago, to when I realized that men and women, blacks and whites were not seen in the same way, and did not have the same opportunities in our society. I had just joined UFRJ to study mechanical engineering, in a class of 64 students, only four were women, and two were blacks. Going even deeper in this analysis, less than 25% of the class lived in the North Zone of Rio de Janeiro and came from lower working class. After that, when I entered the O&G market, and the situation was not much different; out of ten field engineers only three were women, and just one black. I spent many years, as well as other women and blacks in the industry, looking

for my place and believing that "only" hard work, dedication and study would be enough. Slowly, I realized that a lot more would be required to get the recognition and the spot that I was looking for in my career. It seems obvious now, but at the time it was not: the opportunities were not equivalent for men and women, black and white. The patterns of behavior were shaped by the performance of white men, and everything that resembled them. In this way, out of the three women at would start on the "pipeline", with luck, one would reach the top ranks, and of course the one that most resembled the man behavior. It became indisputable to me that the limitations for gender and ethnicity did not come from a limited "pipeline", but from the difficulty of companies in seeing the diverse talents within the "pipeline" and offering them opportunities equivalent to those offered to the white men.

In relation to the lack of female ambition in their careers, a myth was created. Do all women have the same goals, and want to be mothers, wives and have less focus on their careers, or was it society that imposed this standard on them? For men, be a professional and have a carrier, are not as relevant in their lives as being a husband and a father? Why can a married man with children travel and work late, and we believe that a married woman with children cannot? What is the difference? Can men have a personal and professional life, while women must choose between the two?

I had the opportunity to interact with many corporations as I was invited by them to discuss about diversity and inclusion. I always started by asking their executives if they talked to their female employees about what they want for their careers or if they simply assumed that every women wanted the same thing. Then, I would share with them one of the most important step in my career, when I accepted the challenge to move to Paris with my 4-month-old son after returning from maternity leave. I remember well that this opportunity was only offered to me because my previous boss was a woman. She asked the human resources department, which had offered me a much less challenging job in Brazil, what was my preference or whether they simply assumed that I would preferred to stay in Brazil. This would make them rethink some myths about women and carriers.

In fact, are women less ambitious and focused on their careers, or do we just conclude this under the influence of our society? What we now know as unconscious biases is actually the prejudice of 20 years ago. Organizations failed to recognize and identify their diverse talents as they evaluate them with preconceived ideas or unconscious biases from their managers. When an executive selected a talent that will replace him, he used to look for someone similar to him in characteristics, attitudes and thoughts. It was rarely to consider those who brought different ideas and somehow challenge the "status quo".

Today, large corporations still seek diversity without understanding its real meaning. Diversity brings, in its essence, heterogeneity of thoughts and plurality in ideas. It is through difference of opinions, harmonious argument of distinctive points of view that creative solutions and new strategies for solving problems rise in the top organizations.

After more than twenty years of experience, working in multinational and national companies, as an executive and as a board member, it became irrefutable to me that we do not change the current scenario with the same attitudes and thoughts. As Albert Einstein once said wisely on the 40's, insanity is to expect different results with the same attitudes.

If we envision a truly diverse and inclusive O&G industry, we need to change from the inside out, from the top to the bottom, break paradigms and ambitions in order to achieve major transformations. Darwin showed us that the species that survive were not the strongest, nor the most intelligent, but those that adapted to the changes. We continue to explain why we do not have 50% / 50% men and women in our organizations, at all levels, when that is the proportion in our society. Likewise, we do not know how to justify why we do not have black, white and indigenous people in organizations in the same proportion as we do in our society. There are no more room for "baby-steps", for mediocre goals, for quotas that aim 30% diversity by 2025. We can not continue to try to explain what is inexplicable. Tomorrow is too late, today urges for immediately action and the transformation. ■

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