Brazil aims for a brighter horizon

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Overview

BRAZIL KEEN FOR STABILITY AFTER WHITE KNUCKLE RIDE

Oil and gas sector has paid a heavy price for past political agendas but hopes are there that lessons have been learned and future prospects are brighter

GARETH CHETWYND
Rio de Janeiro

A little more than four years the Brazilian oil sector has careersed from unstrained euphoria to severe downturn.

Three years ago, 71 of the world’s floating rigs were working in Brazil, but the number has dipped to less than 10.

Petrobras has signalled that 25 ultra-deepwater rigs will be enough for its own needs for the foreseeable future.

The number of workers employed directly or indirectly by Brazil’s oil sector has crashed by more than 500,000 — more than half — according to industry bodies.

Big new shipyards are standing idle, and some are cluttered with half-built drillships, monuments to failed industrial policies.

The Brazil boom was driven by the Santos basin pre-salt discovery, with an estimated 36 billion to 46 billion barrels of recoverable oil equivalent.

The ramp-up past 1 million barrels per day from just 58 wells earned Petrobras a deserved recognition at the 2015 Offshore Technology Conference in Houston.

As Petrobras now grapples with its current financial and existential crises, it is worth remembering that this impressive surge was achieved with 40% foreign investment equity, due to the presence of partners, BG Group (now Shell), Repsol Sinopec and Galp Energia.

The company’s current woes go much further than oil price blues.

Drunk with the pre-salt punch, Petrobras was investing around $47 billion per year in 2012, when its most ambitious five-year plan was launched. However, the company’s top managers completely failed to spot the severity of the decline on Campos basin assets, let alone prevent it.

As a result, Petrobras has relatively little to show for all these investments in terms of net production growth, yet became the world’s most indebted oil company, owing the equivalent of about $255 billion.

Collapse

Then Operation Car Wash, the infamous corruption probe uncovered a network of kick-backs and money laundering involving former Petrobras executives, contractors and politicians.

The credibility collapse has bumped up the company’s financing costs even more.

In the most recent update, in January this year, the company’s annual investments were averaging less than $20 billion, and may fall further.

Promises of bumper demand, stiffened by Brazil’s local content requirements, attracted a wave of investments in new Brazilian capacity, but these orders have all but dried up leaving even the most competitive sector, subsea engineering and fabrication, running at less than half of installed capacity.

The oil giant, a formidable negotiator even in the best of times, has been using all legal means to drive down its unit costs.

Suppliers have been doubly punished by the parctiy of licensing activity over the last seven years.

This included a five-year hiatus as Brazil debated the contractual regime for the pre-salt resulting, eventually, in the shift to production sharing contracts in 2010, but only one area, Libra, has been licensed since then.

The gap coincided with the oil price highs and excitement about the pre-salt, so Brazil probably missed out on a bumper crop of signature bonuses, as well as suffering a severe downturn in exploration activity.

Policy-makers were warned about the dangers of giving Petrobras sole operator status on the pre-salt contracts, and mandating a minimum 30% stake, but these warnings were ignored.

Data collated by Abepetro, the industry association for supply chain companies, shows that the split in activity between Petrobras and other oil companies, which peaked at 55:45 in 2012, has slipped back to 90:10, and now the state company is helpless to carry the sector forward.

The country also woke up to the advantages of scale, there is a growing recognition that there needs to be a new focus on competitiveness.

“Brazil has paid a heavy price for the political agenda of resource nationalism and neo-monopolistic policies that greeted the pre-salt finds,” says Adriano Pires, director of the Brazilian Centre for Infrastructure Studies.

But all is not gloom and doom.

President Dilma Rousseff was already shifting to a more pragmatic set of oil sector policies when she was suspended from office, and the interim government of President Michel Temer is preparing a new agenda, which is pursuing an aggressively pro-business agenda.

There is a tangible new sense of urgency about knocking the oil sector into the kind of shape that fits Petrobras’ true investment capacity and attracts foreign and private sector investments.

There is broad consensus across the Brazilian oil industry — despite lingering union opposition — around a minimum agenda of reforms that will get the industry moving again.

Tax breaks

These include overdue clarification of the rules on unitisation and the procedures for obtaining a waiver for local content penalties, as well as an extension of tax breaks and a commitment to perennial licensing rounds, starting with a flagship “unitisation” licensing round scheduled for 2017.

In the gloom hanging over Brazil lately, it is sometimes easy to forget the quality of the pre-salt riches, where individual well flows average around 25,000 barrels per day.

Brazil’s offshore industry enjoys the advantages of scale, there is also a growing recognition that there needs to be a new focus on competitiveness.

The technical barriers to exploiting Brazil’s pre-salt riches — gas-rich, carbon dioxide-contaminated carbonate reservoirs located beneath a two-kilometre salt canopy in ultra-deep waters — can spell opportunities that go hand-in-hand with this quest to cut costs.

If Brazil’s government gets the regulatory mix right, global suppliers of innovative and advanced deep-water solutions could rediscover that sense of El Dorado that Brazil’s pre-salt once gave them.
Brazil has paid a heavy price for the political agenda of resource nationalism and neo-monopolistic policies that greeted the pre-salt finds. Adriano Pires, director of the Brazilian Centre for Infrastructure Studies
**Politics**

**Temer takes the driving seat**

**Interim President Michel Temer** pledges progress on oil and gas reform but **fightback by suspended Dilma Rousseff** and slush fund allegations among potential challenges

GARETH CHTWYND
Rio de Janeiro

**Brazil** is currently in the unusual situation of having two presidents. President Dilma Rousseff was suspended from office in May as the result of a congressional impeachment process, and her former vice president Michel Temer is now holding office on an interim basis.

The matter should be resolved in late August, when the Senate is scheduled to decide Rousseff’s fate in a final vote by two-thirds qualified majority.

The impeachment proceedings were launched against Rousseff on the grounds that she had broken fiscal rules during her first term of office, which ended in December 2014.

Some critics say the impeachment was tantamount to a coup. They questioned the motives of the lawmakers who led the assault on the presidency, some of whom were directly implicated in the Car Wash scandal, unlike Rousseff herself.

Brazil’s constitution allows impeachment on criminal grounds alone, so merely arguing that Rousseff should have known about the corruption was not enough to force her removal.

“The rebellion against Rousseff was dressed in fiscal terms to satisfy constitutional requirements, but the argument that this was a coup made no headway with Brazil’s Supreme Court,” says Thiago de Araujo, a partner at Arko Advice, a political analysis firm based in Brasilia.

Willy and cautious Temer moved swiftly to appoint a pro-business cabinet once he was in office. He also appointed Pedro Parente as chief executive of Petrobras and put key oil sector reforms, particularly the return to multiple operators in the pre-salt, at the top of his legislative agenda.

The multiple operator reform, seen as a vital first step to the other promised regulatory reforms, was close to being voted into law as Upstream went to press.

“The new administration is trying to be pragmatic and represents a significant shift toward a more pro-business and pro-market government,” says Jimena Blanco, Americas team leader with risk consultancy firm Verisk Maplecroft-Wood Mackenzie.

“One of the key areas where the administration already enjoys congressional support for reform is the oil and gas sector, where Petrobras is no longer able to explore or invest in assets adequately. This is part of a much broader initiative aimed at restoring confidence and bringing foreign investment into Brazil,” Temer, a wily and cautious politician, has been treading warily before the final impeachment vote.

He backtracked on plans to throw open the aviation sector to foreign capital and has avoided showing his hand on plans to hold a pre-salt licensing round in 2017.

Temer has also been working hard to offer enough rewards and incentives to build up a broad coalition base in Brazil’s fractious Congress.

Uncertainties remain, starting with the slim chance that Rousseff might avert final defeat in the Senate and return to office.

“This scenario would spell a very weak or lame-duck government and would possibly lead to early elections, and constitutional uncertainty about the legality of that, but we rate the chances of Rousseff returning as very slim, just 5% to 10%,” says Blanco.

Even after vaulting this hurdle, Temer faces a fresh risk that he will be prevented from seeing out his own term until scheduled elections in 2018.

Brazil’s electoral authority is analysing allegations that the Rousseff-Temer ticket was tainted by Car Wash slush funds. This matter is likely to reach a deliberative decision only in 2017, and could feasibly result in the annulment of the entire Rousseff-Temer ticket, and the declaration of new elections.

**Pro-investment agenda** Temer has also taken some fire from the Car Wash scandal. He quickly lost three of his new cabinet members due to the emergence of recorded conversations suggesting the use of political influence to steer clear of the Car Wash probe.

At least one plea-bargain statement, by a former executive with Brazilian contractor Engievix, suggested that Temer had handled slush funds for the Democratic Movement Party (PMDB), but no corroborating evidence has emerged.

“We see the chances of Temer staying in office until 2018 as slightly reduced, at 50% to 60%. This is because of the potential termination of the entire Rousseff mandate by the electoral courts,” Blanco says. Yet, with some of the dust from Car Wash beginning to settle, attention is switching to the economic measures that can be expected from the new administration.

Temer’s private investment advisor, Wellington Moreira Franco, has been listening closely to the oil sector. Another pointer came last month with the naming of experienced oil sector insider Marcio Felix as secretary of oil and gas in the Energy Ministry.

Some time has been lost with the impeachment, and some issues have been thrown back open to negotiation, but the urgency of this pro-investment agenda is growing. Key regulations have been promised within the next 40 days.

The decision to honour the previous administration’s social welfare and public sector wage commitments bolster support before the impeachment vote and October local elections, but they also force the budget deficit higher and increase pressure for the pro-investment measures.

Oil industry insiders are confident that these long-awaited measures will emerge over the coming weeks.
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Operating rights hold the key to reforms

Role of Petrobras in production sharing contracts in the spotlight

GARETH CHETWYND
Rio de Janeiro

EXPERIENCED players on all sides of the oil industry believe that a relatively modest set of regulatory reforms could have a dramatic effect on Brazil's oil sector.

The starting point, everybody agrees, is ending the rule that allows only state-controlled operating rights on the production sharing contracts that were introduced for the pre-salt in 2010.

The law also requires Petrobras to take a minimum 30% in all production sharing contracts. These laws were strongly backed by Dilma Rousseff when she was still serving as chief of staff to president Luiz Inacio Lula da Silva. By late 2014, when Rousseff was starting her own second term as president, the parlous state of Petrobras' finances had persuaded even her that the single operator rule would have to be relaxed.

With Rousseff currently suspended from office, Petrobras chief executive Pedro Parente made his own position clear, stating that restricting freedom of choice on whether to invest or not, was "in the interests of neither company nor country".

Vowing to tackle Petrobras' debt, Parente has criticised the "euphoria and triumphalism" of recent years. One of the bills proposing to repeal this law has already made its way through Brazil's upper house.

Sponsored by Jose Serra - then opposition senator, and now Interim President Michel Temer's Foreign Minister - the bill has been watered down to retain some preferential rights for Petrobras.

Oil industry lobby groups decided to throw their weight behind the bill, despite the presence of this clause, though sources there were hopeful that it would be repealed at a later stage.

"It is not ideal, because preferential rights distort the market, but we think it is better to proceed. Attempting an amendment now would mean the bill going back to the Senate, setting the whole process back by at least six months. There would be little chance of holding a licensing round next year," says an executive with one European company.

Resolution expected within weeks from policy panel

BRAZILIAN officials have signalled that there will be a unitisation resolution within the next 40 days, probably through an extraordinary meeting of the Energy Ministry's policy panel, writes Gareth Chetwynd.

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UNITISATION DEALS UNDER ANALYSIS

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<th>Field</th>
<th>Basin</th>
<th>Operator</th>
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<tr>
<td>Casareu</td>
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<td>Piranbu</td>
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<td>Sapinhoa South</td>
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<td>Baleia Azul</td>
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<td>Gato do Mato</td>
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<td>Carcara</td>
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EVALUATION

Areas under initial evaluation for unitisation:
- Atapu/Sururu/Berbigao
- Buzios
- Sepia-Jupiter-BM-S-24
- BM-C-34
- BN-C-32 (Itaipu, Juparte surround)

UNITISED AND APPOINTED UNITISATION DEALS

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<thead>
<tr>
<th>Field</th>
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<tr>
<td>Tartaruga Mestica</td>
<td>Campos</td>
<td>Petrobras</td>
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<tr>
<td>(Tartaruga Verde field)</td>
<td>Santos</td>
<td>Petrobras</td>
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<tr>
<td>Lula - Lula South</td>
<td>Santos</td>
<td>Petrobras</td>
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<tr>
<td>Sapinhoa</td>
<td>Santos</td>
<td>Petrobras</td>
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<tr>
<td>Nautilus (Argonauta field)</td>
<td>Campos</td>
<td>Shell</td>
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Defining volumes

These cases, concession holders face the prospect of carrying the PPSA through appraisal and reservoir development until another owner is selected, and must do so without having the necessary rules in place for issues such as cost recovery or definition of volumes in these cases.

The deterrent effect of regulatory uncertainty on unitisation has been all too evident. The Gato do Mato development has been put on hold — with the consent of hydrocarbons regulator ANP — because, in the absence of clear rules, operator Shell was reluctant about going ahead with investments that could ultimately be to the benefit of a future unitisation partner.

Interpretations of the law that were prevailing with the regulators, could also have resulted in a mandated transfer of the operation to Petrobras, even if — as the evidence suggests — a much larger part of the Gato do Mato reservoir lies on the BM-S-54 concession area.

The uncertainty surrounding unitisation has also had a powerful deterrent effect in respect of Petrobras’ efforts to farm out or sell off valuable interests in projects such as Carcara and Tararua Verde, with very significant extensions onto open acreage.

There are additional areas of uncertainty on the application of different royalty systems, two different regimes and whether the PPSA’s powers of veto apply to the concession through unitisation.

BRAZIL’S future oil and gas secretaries, Marcio Felix, confirmed last week that the administration of interim President Michel Temer is planning to go ahead with a licensing round of four unitisation areas next year, writes Gareth Choryavnd.

The four “pre-approved” areas are near the established discoveries of Sapinhoa, Carcara, Gato do Mato and Tararua Verde. These are all areas where the evidence points to extensions from concession discoveries with significant volumes on the open acreage side. Although industry leaders are adamant that missing pieces of the regulatory puzzle must be put in place, the low-risk aspect of the unitisation round offers Brazil a chance to harness new production relatively quickly. “Done properly, this unitisation round can bring results much more quickly than in a frontier basin, like the equatorial margin where you can wait four years for the first well results,” says José Firmo, head of the service companies association Aepetro.

Adriano Pires, director of the Brazilian Centre for Infrastructure, says: “It still takes at least five years or so to get production moving in these unitisation areas, but the uncertainty has virtually no carbon dioxide or hydrogen sulphide and has very high reservoir pressure.

Petrobras opened a data room for its stake in BM-S-8 earlier this year, but interest has been muted because of uncertainty over unitisation.

“Mapping out the licence process and other unitisation rules would make Carcara an attractive investment,” says an oil and gas lawyer.

“The Temer administration passed up an opportunity to formally move the licensing round at a recent meeting of the Energy Ministry’s policy panel.

“We think there are certain key elements to be put in place to make this round truly attractive,” says Antonio Guimaraes, E&P executive secretary of the IBP.

“This starts with the repeal of the single operator rule and includes the unitisation resolution and extension of Repetro (tax relief).”
RESEARCH & DEVELOPMENT

R&D tax — ‘a good idea, applied badly’

Oil companies and suppliers say levy has become disconnected from business end of industry

GARETH CHETWYND
Rio de Janeiro

Brazil’s research and development tax — a 1% share of the higher royalty rate — was welcomed as one of the more enlightened aspects of Brazil’s local content policies, but it has become a source of frustration.

Problems stem from the fact that the levy is tied to universities and dedicated research entities, and not by approval of the National Petroleum Agency (ANP) on a case-by-case basis. Oil companies believe the R&D levy has become disconnected from the business end of the sector, with not enough funding being transferred to practical and timely application.

“The creation of the levy was a very positive decision. It really looked like Brazil was on the way to becoming a global hub for R&D and innovation, but this was not carried forward properly and we have been seeing a heavy retreat in investments,” says Jose Firmo, president of Abespetro, representing supply chain and service companies.

Laboratories The first wave of investment under the R&D levy was typically in upgrading and expanding infrastructure, such as laboratories.

“The investments were supposed to migrate from the theoretical to the practical, developing into new technologies and attracting researchers to more pragmatic applications, but we have not found the right drivers for this,” Firmo says.

Brazil’s failure seems to be in this crucial interface between research and private industry. There are some complaints of overregulation.

“The ANP has to approve each project, and this has been applied restrictively. The regulator should facilitate the decision-making process, not restrict it,” says a manager with one of Petrobras’ pre-salt partners.

One such case involved an unsuccessful attempt to set up a Brazilian branch of Sintef, Norway’s independent research foundation.

The 25-strong team included 18 Brazilians, and the initiative soon drew strong support from Petrobras, Statoil and Repsol.

“The aim was to support Brazil with technical experience from Norway and boost our own par- participation in the technologically exciting pre-salt play. The ANP was supportive on a technical level but they just couldn’t get the regulations to work in a way that gave Sintef enough support to continue. Put simply, we could not cover our costs,” says Kjetil Solbraekke, former head of the disbanded Brazilian unit of Sintef.

In Sintef’s case, the problem stemmed from the need to fit a non-profit entity’s administrative structure within the terms available to public universities, including salary payments, calculated as hourly time spent strictly on approved projects.

Remunerative structures could not be stretched for the levy to cover basic administrative costs, such as rents, and salary payments that went beyond project time.

“Fundamentally, we want to de- develop projects for implementation, not to be left on the shelf.”

Shell Brazil technology manager Fabiano Lobato.

Plea to take away uncertainty surrounding Repetro

Brazil’s new administration is being urged to clarify some pending tax matters so as to tap true investment potential from a planned licensing round, writes Gareth Chetwynd.

Brazil’s onerous tax system would stop oil sector development in its tracks were it not for a special exemption scheme, known as Repetro, that exploits a legal loophole by classifying offshore equipment as export.

The Repetro system is due to expire at the end of the decade, but the simple matter of extending this has been held back amid Brazil’s political upheaval.

“Today, you don’t know when you invest in a field if Repetro will end in 2019. This is no way to proceed,” says Jose Firmo, head of Abespetro, the oil industry body representing service companies.

Before the impeachment process against President Dilma Rousseff, the energy ministry’s policy panel (CNPE) signalled that this tax break would be extended by 20 years, but Rousseff’s impeachment may have delayed publication of the relevant decree.

“If everyone agrees on the merits of Repetro there is no reason to suppose it will not be approved,” Firmo says.

With attention focused on the extension, Firmo noted that it is easy to forget that there are also aspects of Repetro that could be improved. Under current rules, for example, coverage does not extend to either warm or cold-stacking, meaning that most of the 40 rigs that fell idle in Brazil quickly left the country. “This was an unnecessarily dramatic exodus that spells even more lost jobs and higher mobilisation fees in the future,” a manager with one of the big drilling companies says.

Paralleling Repetro, the Brazilian Association of Exploration & Production Companies has also led a campaign against two new taxes that the Rio de Janeiro state government intends to levy on production. Rio state has seen oil sector royalties fall steeply in line with oil prices and is suffering a partial collapse in some public services.

The state government has responded with a new 18% goods and services tax on each barrel of crude produced in the state and a monitoring tax of 2.71 Brazilian reais ($0.34) per barrel.

The ABEP claims the taxes will raise costs by 40%, undermining viability of new projects and shortening the life of older fields. It has has filed lawsuits challenging the legality of both taxes.

Consultancy Wood Mackenzie has suggested that introducing the taxes in a low price environment would result in at least 300 million fewer barrels being produced in the Campos basin.
learn to do (joint industry projects) that bring results, and integrate the universities into this process. "Universities can help iron out the uncertainties, and it is desirable that they get involved with even more practical applications, like the development of prototypes," he says.

However, Mariano also calls for a "rethink" of the whole scientific development model in Brazil.

"Today, universities provide the main mechanism for transforming research into commercial application, but the mechanism tends to be through incubators or technology parks, which does not always work. "It is not easy to find the right location for doing prototypes, for example, and it can be a challenge to find the right researchers," he says. Almost 10% of Shell's upstream investments in Brazil go toward R&D.

Supply chain What many in the industry would like to see is a widening of the R&D levy's scope to cover activities that are much closer to the business end of the oil sector, extending to R&D work by the supply chain companies.

"Allowing the R&D incentive to be applied to the sector's own technology investments could be a potential solution in a time of scarce orders, and these investments could be aligned squarely with the new focus on reducing costs," says Jose Mauro Ferreira, head of Abepetro's chapter for the subsea sector.

Luciana Maria Souza de Mesquita, the ANP's deputy superintendent for R&D, says recent new regulations would bring improvement in the practical applicability of the levy, opening new funding channels for training, qualification of personnel and prototypes.

She said the recent creation of a new scientific committee at the agency could also bring improvements.

"The industry knows best what the technology issues are and how to solve them, and works best when the rules are kept simple," says Solbraecke, who is now senior vice president with consultancy firm Rystad Energy.

BRAZILIAN dreams of developing the pre-salt fields predominantly using domestic industry too often fell victim to political posturing or worse, writes Gareth Chewig.

Petrobras, with its huge demand projections, was used as a battering ram for such policies, resulting in bottlenecks, inefficiencies, high costs and delays.

With hindsight, it is hard to fathom how partners such as BG Group and Portugal's Galp Energia were persuaded to back the "replicant" floating production, storage and offloading vessel projects, surviving up huge risks laden contracts to local suppliers, some of which were lacking in experience.

For older upstream concessions, local content requirements were under 35%, so requirements on projects such as Lula and Sapinhoa could probably have been fulfilled by subsea hardware alone.

Putting these older projects back on track is largely a question of mitigating measures, with Chinese yards typically supplying the solutions.

Local content became an important bidding criterion from the 2006 licensing round onward, leading to chronic difficulties on more recent concessions.

Compliance with these commitments is monitored by the ANP, and fines are piling up into hundreds of millions of dollars.

Local content is also a major headache for fields such as Buzios and Sepia, located in the Petrobras rights transfer area, and also on Libra, where Petrobras heads an international consortium.

Both these projects, put together when oil prices were soaring, received highly-detailed and very demanding local content requirements.

On the current tender for floating production units for Libra and Sepia, there are over 60 local content categories per unit, each with its own tightly-regulated percentage.

The collapse of Sete Brasil, the rig building entity now in Chapter 11-type bankruptcy proceedings, has its own effect.

Even if some rump version of the 28-rig charter survives, this project will not contribute anywhere near the local content percentages once promised to Brazil by pre-salt projects such as Libra and Buzios.

Some suggestions for restructuring Brazil's rules on local content are already in the pipeline when President Dilma Rousseff was suspended.

However, administering onerous local content liabilities from past licensing rounds is the real problem.

The existing law offers scope for seeking a waiver when it proves impossible or impracticable to comply with local content commitments.

Operators have been exasperated by the long wait for full regulations and clarification about how waivers will work, and how fines will be reduced and cancelled.

The National Petroleum Agen-

cy has been slow to provide its own clarification on how waivers will be applied.

The agency held a public hear-

ing recently to evaluate claims that there were no seismic vessels mobilised in Brazil during the 2008 to 2015 period.

Some operators were wary of this move, fearing an attempt to refute the argument that there were no reasonably priced options.

In the event, no seismic vessel owners came forward with such arguments, and industry associations merely backed the view that availability was zero.

With a new Energy Ministry team now in place, there are renewed hopes for a looser interpretation, or even intervention, on the topic of waivers.

There are some concerns that failure to grant significant waivers on projects such as Libra and Sepia could seriously threaten the profitability of the entire project.

It remains to be seen whether the failure of Sete Brasil will be admitted as a ground for waivers, for example.

Industry leaders hope for the emergence of a workable system with some built-in recognition of the extent to which local content policies ran beyond the reasonable or the practicable between 2008 and 2013.

Regulators have taken a cautious stance, up to now, wary of provoking lawsuits by companies that lost out in past licensing rounds to companies now unable to fulfill their commitments.

The Brazilian Institute for Oil & Gas (IBP) has played down this concern, claiming that only 7 of the 979 blocks awarded under Brazilian licensing rounds up to 2014 were challenged in their outcome, by the local content criterion.

It seems clear that Brazil should move away from local content from the perspective of license round bidding criteria.

"But it is still hard to see how the problem will be solved on long-term projects," says Kjetil Solbraeke, senior vice president (South America) with Rystad Energy.

"A ‘MAJOR HEADACHE’

Waivers could be key to moving projects on

FOCUS BRAZIL

Time to address the local content issue
Complications surround PPSA

Powerful state entity Pre-Sal Petroleo remains untouched so far by calls for reform and is fighting its corner in the pre-salt equation

GARETH CHETWYND
Rio de Janeiro

Pre-sal Petroleo (PPSA), the federal entity that represents Brazil’s national interest in the production sharing contracts process, has so far been spared the attention of those demanding reform of the Brazilian oil sector.

Created at the height of the pre-salt euphoria, PPSA at first spooked some of the oil companies considering investment in the new production sharing contracts because it was given sweeping powers — including an overall veto on the operating committees — seemingly out of proportion to its non-contributory role in the investments.

In practice, the way the PPSA has gone about building up a track record has been much more reassuring. The PPSA has been staffed by some of the most experienced heads in the Brazilian oil industry, and the small team has been working hard to bring some value to the pre-salt equation.

“We recognise that we have considerable power in the operating committee so we set out to put together a strong technical team that can genuinely contribute to the task of optimising results and finding solutions,” says Edson Nakagawa, PPSA technical director.

“Controlling costs is part of our role, and there is a healthy tension around this, but we try to take a collaborative position. Nothing we have done has caused any delays and we have been able to make some positive contributions, on tendering processes for example.”

Nakagawa is upbeat about the impacts of the Sierra bill that is set to end exclusive operating rights.

“Publishing unitisation regulations and clarifying local content waivers will also help avoid stagnation,” he says.

Pressing concerns The PPSA has a more pressing concern of its own that has attracted less attention than other problems.

The National Energy Policy Council (CNPE) is yet to issue a resolution for the marketing of pre-salt crude, including the selection of official trading agents.

Without this framework in place, the PPSA is powerless to start turning the pre-salt riches into revenue, even though some oil is already flowing from the concession side of the reservoir on fields such as Lula and Sapinhoa.

A marketing framework needs to be in place before April 2017, when production from the Libra extended well test is due to begin, to the tune of 30,000 barrels per day of oil.

“We need to have a lifting agreement signed six months before this and the trading agent are contracted, for which we need the commercialisation regulations in place,” says Nakagawa.

Moreover, there are several fields where reservoirs located on concessions are in production despite extending onto open acreage in the pre-salt polygon.

Two of the unitisation areas, Lula and Sapinhoa, are big pre-salt fields already under production by Petrobras-led consortia.

The protrusion into open acreage is thought to be a relatively small percentage of the fields, but these are big reservoirs. PPSA president Oswaldo Pedrosa has stated that the volumes are “not insignificant.”

The PPSA is also building up credit with the concession consortia operating on the other side of a discovery called Nautilus. Shell started producing from the main part of this reservoir, where reservoirs located on concessions are in production despite extending onto open acreage in the pre-salt polygon.

The PSC has been created and it has its merits. The government planned for a take of 65% on Libra, and just turning to concessions won’t divert it from such aims.

“The Brazilian PSC actually compares very favourably with other countries on government take.”

Petrobras rights to pre-salt acreage is a reform target

The crisis that has hit the Brazilian oil sector may have unified most of the industry around a basic agenda of pragmatic reforms, but industry leaders are eyeing a more ambitious plan to follow the planned 2017 licensing round, writes Gareth Chetwynd.

Eliminating Petrobras’ “preferential right” to pre-salt acreage is a likely target.

“This preferential right can hold things back, bringing an element of unpredictability because its impact will depend on the government of the day,” says Horacio Cuencas, Latin America upstream director with consultancy Wood Mackenzie.

“A government with an ideology similar to what has predominated in recent years might choose to hold back on rounds whenever Petrobras lacks capacity. Another, with a different set of ideas, might prefer to let things move along without Petrobras.”

Simplification of the unitisation process involving two different contracting systems is another aim.

The argument for simply stretching the concession to cover reservoir extension is compelling in cases where only a minor portion protrudes into open acreage, observes Kjetil Solbraekke, senior vice president (South America) with Rystad Energy.

“I am not a lawyer but it seems the natural thing to do, in such circumstances, to turn that part of the open acreage into a concession. This recognises that the discovery was made on the concession first,” he says.

Another suggestion is to abolish the concept of the pre-salt polygon which, under current law, is given blanket treatment as “strategic” and so requiring production sharing contracts.

Under an outlined proposal, the government of the day would be free to decide on a case-by-case basis whether areas were strategic or not. The latter kind would be licensed as concessions.

“Under the current system, a heavy post-salt oilfield located in the pre-salt polygon is more or less stranded. It makes sense to build this flexibility into the licensing system,” says an executive with one of the pre-salt partners. There is resistance to the idea of moving too abruptly away from the PSC format.

Pre-sal Petroleo director Edson Nakagawa says: “I agree that there needs to be more regulatory clarity on the rules for unitisation, but you have to be careful not to fall into the trap of changing whole systems too frequently.”

“The PSC has been created and it has its merits. The government planned for a take of 65% on Libra, and just turning to concessions won’t divert it from such aims.”

“The Brazilian PSC actually compares very favourably with other countries on government take.”
Rights Transfer areas could be opened up to tender

ANOTHER reform idea in Brazil concerns the Rights Transfer areas, where Petrobras has exclusive rights to produce up to 5 billion barrels of oil but is barred from farming out any interest, writes Gareth Chetwynd.

The first phase of this project, involving four floating production, storage and offloading vessels, ran into delays due to the technical and financial problems faced by the Odebrecht-led Enseada consortium. In 2014, shortly before the extent of Petrobras’ problems became clear, the Rousseff administration approved a resolution extending the company’s exclusive rights to produce billions of barrels more crude from the same area as the Transfer of Rights.

Magda Chambriard, the director general of the Brazilian hydrocarbons regulator, said the four areas — Buzios, Iara Surround, Florim, and Tupi Northeast — could hold between 9.8 billion and 15.2 billion barrels of oil equivalent. At the time, she supported the measure to simply grant the areas to Petrobras, with government shares ranging from 46.53% for Florim to 48.53% for Iara Surround, arguing that this was the fastest route to put the areas into production.

Petrobras’ current financial predicament paints a very different picture. A reform-minded government could reverse the latter measure by decree, opening up the bountiful "surplus" reserves to competitive tender.

“A better solution would be to amend the law to allow Petrobras to farm out interests in the Rights Transfer area. This way a more conventional joint venture partnership could take shape,” says Adriano Pires, director of the Brazilian Centre for Infrastructure.

Now called Massa, a few months ago as part of the BC-10 development.

The PPSA also has an interest in the Tartaruga Mestica area, which is contiguous with Tartaruga Verde, where Petrobras is currently running an extended well test.

So the PPSA is already accruing production credits, but is powerless to actually handle the oil.

At some point in the future, the PPSA and the concession holders will have to work out who owes what in relation to oil produced on one side, and upstream expenditure on the other.

Failure to settle this matter quickly will mean credits building up on the federal side to a point that neither side will find comfortable.

The problem is particularly worrying in relation to Libra.

“If there is not some alignment soon, the government will probably have to resort to a temporary system for commercialising. We cannot stop the Libra project because of this,” Nakagawa says.

To some observers, this uncertainty underlines some deeper problems, of which the PPSA may ultimately be part.

“The intentions are good but the rules surrounding PPSA are too complicated and too rigid,” says Kjetil Solbraekke, senior vice president (South America) with Rystad Energy.
Brazilian battle on to slash costs across the board

Country trying to tackle position as second-hungriest when it comes to the need for oil and gas development cash

GARETH CHETWYND
Rio de Janeiro

The Brazilian oil industry is focusing on costs with an intensity not seen before. Lavish Petrobras investments have started to ramp up on the pre-salt, but a steep decline in output from the Campos basin has spoiled the party. The impact of the Car Wash scandal on the credibility of Petrobras, shipyards and contractors has intensified the squeeze on capital expenditure costs. Effective local content policies ushered in some of the classic problems associated with protectionism, including high prices, low productivity and inefficiency. One study by Rystad Energy shows Brazil with the second highest development costs, behind only the UK. Recent estimates by consultancy Wood Mackenzie suggest that break-even costs on pre-salt development governed by concession rules were averaging around $40 and $55 (Brent), depending on the pre-salt. The PSC terms reflected the fact that Petrobras had already been spearheading a battle to reduce operating costs. Suppliers say they would like to work more closely with the oil company to move away from the break-even development costs. Petrobras has already been focusing its formidable technical prowess on the costs issue, with strong advances in the field of pre-salt drilling. There are calls for this approach to be stepped up. “It is not really in the DNA of the offshore sector to put cost-cutting first,” says Edmar de Almeida, head of the Energy Economics Group (GEE) at Rio de Janeiro’s federal university. “Brazil has a proud history of searching for engineering solutions, but now it needs a new model for business, requiring even more standardisation and simplification of the paperwork to reduce costs,” he adds. The scale of demand in Brazil offers scope for building a competitive advantage. Libra, for example, has an estimated 8 billion barrels of oil equivalent reserves, according to Brazil’s regulators. Most players agree that local content policies have a place in such a market, but there is now a new focus on building upon what Brazil can do competitively. “Even at the lowest point in this downturn cycle you still see 25 to 30 advanced ultra-deepwater rigs working in Brazil. This is a level of activity that clearly justifies a significant supply chain development,” says Abespetro president Jose Firmo. “The subsas sector shows what can be done, producing 100% of what is used in Brazil. This is a sector that can penetrate export markets provided there are some more advances in productivity,” says Firmo. Petrobras’ industrial base can also be relatively competitive and the market for surface side construction is big enough to foster healthy competition between domestic yards. This opportunity was arguably spurned by contractors involved in the Car Wash cartel, but yards such as BraSFels, Brasa and QGI have performed well in the assembly and integration of FPSO topsides modules, industry insiders say. However, the Brazilian yards are now financially battered and in need of orders. Supporters of more interventionist local content policies say help is needed and argue it is not enough for Brazil to settle for topsides fabrication and integration and repair work. Shipyard lobbyists argue that modern new facilities, such as the Enseada yard in Bahia, Estaleiro Jurong Aracruz and even Estaleiro Atlantico Sul, could take Brazilian productivity to a new level if they are given a chance to build up experience. “There is not a shipbuilding sector in the world that was built without strong government support in the form of orders, subsidies or incentives,” says Sergio Bacci, president of Brazilian shipbuilders’ association Abenav. “It is not a sector that can just go into the world and become competitive. Let’s have a rational debate about how to do this properly.” Bacci admits that local content needs to be rethought and improved, but he believes that the world’s biggest offshore market must not drop aspirations to build rigs or floating production, storage and offloading vessel hulls for the pre-salt. “All the repair work in the world would not be enough to maintain these big facilities,” Bacci says. Free marketers say competitive licensing round activity is the best way to avert downturns. They argue that Brazil should drop the highly detailed listing of local content items and allow the suppliers to look for what is most competitive in terms of price and delivery to build up local content. “The preference for local suppliers comes naturally, when goods and services are supplied competitively,” says one oil company source.
New administration expected to revisit local content revision

President Dilma Rousseff’s administration in Brazil was already looking at ways to refocus local content policy — proposing transferrable local credits for inward investment or exports — but the “Pedefor” initiative was interrupted by her suspension from office, writes Gareth Chetwynd.

“Pedefor was an important initiative because it signalled a move from penalties to incentives and bonuses,” says Kjetil Solbøe, senior vice president (South America) with Rystad Energy.

Critics said the Pedefor proposal appeared to be too bound in red tape, requiring the involvement of too many ministries and committees. The new administration is expected to return to the same theme, throwing open the debate again, before acting.

Another prime opportunity for boosting Brazil’s competitiveness is in the field of government take and also in cutting red tape. IHS data shows oil sector investment down 26% between 2014 and 2015, but declining by a much more severe 42% in Brazil, from $43 billion to $25 billion.

Brazil’s share of world investment has fallen from 5.85% to 4.5%, when its geology suggests the potential for 7% to 10%. “It is perhaps time for Brazil to consider adjusting government take to something that is more compatible to a break-even of $45 in the pre-salt,” says Edmar de Almeida, head of the Energy Economics Group (GEE) at Rio de Janeiro’s federal university. Holding perennial licensing rounds is also seen as fundamental. Those hoping for a fundamental change in the Brazilian oil sector are banking, more than anything, on what new Petrobras chief executive Pedro Parente has called the acid test of competition.

“An open and competitive oil sector brings down costs across all the segments. Oil companies compete for acreage and the suppliers compete for the custom of diverse clients, helping to bring down costs and improve quality and efficiency,” says Adriano Pires, director of the Brazilian Centre for Infrastructure.

The Brazilian Petroleum Institute has also lobbied for delays with environmental permitting to be tackled urgently. “We need to have more certainty that the licensing processes will be technically adequate and expedited efficiently. The process is still slower than we would want, and improvements have so far fallen short of what was expected,” one source says.

Recovery of Brazil’s offshore industry requires, at the very least, a more tangible demand horizon to allow for planning of investments, training and recruitment, and this means licensing rounds.

The halt in the licensing process between 2008 and 2012 was tantamount to a reversal of the 1998 opening of the oil sector, critics say, resulting in the chronic reduction of exploration activity seen today.

Data collated by supply chain association Abespetro shows Petrobras activity halving and private sector activity shrinking to 10% of the total.

A Global Player in the Brazilian Pre-Salt

Galp is a global integrated energy operator and one of the first companies to believe in Brazil’s oil potential, back in 1998.

Today, Galp holds stakes in 27 E&P projects in Brazil, including the Lula field, in the Santos basin pre-salt, helping to unlock some of the world’s largest oil reserves.

galp.com
Turning a problem into an advantage

Libra field partners looking at ways of changing 45% contaminant content from a hindrance to a benefit

Reservoir logs tee up 4D seismic as an invaluable tool

THE Libra pre-salt oil area is one of the biggest Brazilian discoveries to date, but it also presents a more complex set of challenges than other pre-salt giants such as Lula, Sapinhoa and Carcara due to higher levels of carbon dioxide.

The light pre-salt crude shows a gas-oil ratio of 440 to 460 m3/m3, with CO2 content of about 4% in the produced gas. This compares to a CO2 content of about 15% on a field such as Lula.

Libra, a flagship project in more ways than one, is the first oil discovery to be developed using the production sharing contract model that Brazil introduced in the wake of the pre-salt discoveries.

Although Petrobras-operated, the joint venture sees the Brazilian company involved in a more integrated partnership than anything that has gone before, working alongside Shell and Total each on 20%, China National Petroleum Corporation and CNOOC Ltd each on 10%, and Pre-sal Petrobras as the contract managing entity.

The consortium is working on a series of technical solutions while emphasising that their actual implementation at Libra will depend on how knowledge of the reservoir evolves.

The partnership aspect is particularly strong in the technical sphere, where there is a big emphasis on cost control.

If Libra is to serve as a litmus test for the economics of the pre-salt, then finding effective solutions to technical challenges will be critical.

A rich crossover of competences, expertise and experience is in evidence among the partner representatives at Libra project headquarters in Rio de Janeiro.

Confidence is high in a team that believe they can not only overcome the technical challenges but, in the case of CO2, turn some of them into real and significant advantages.

The presence of this corrosive "contaminant" can push up costs and squeeze revenues, for example requiring exotic alloys in the subsea environment, or increasing the amount of topside plant required for processing and compressing gas.

On early pilot floating production, storage and offloading vessels in the pre-salt, CO2 is stripped out and re-injected using membrane technologies, but CO2 levels are lower on projects such as Lula, and gas plant still tends to occupy about 60% of the total space.

On Libra’s pilot FPSO, currently under tender, gas will be reinjected, with the CO2, but this is just a first step.

For full-scale development, the Libra partners want to amplify options for reservoir management by stripping out the CO2.

Solving the problems has led to some talk of supersized FPSOs in the Brazilian pre-salt, but this misses the more nuanced direction that the Libra consortium has been taking.

“The high level of CO2 poses one of the key challenges on Libra, and will probably provide the focus for some of the most interesting applications of technology,” says Keith Lewis, applied technologies manager with the Libra project team.

“These challenges are quite well known, and Petrobras has already done quite a lot in terms of extracting and dealing with CO2 in the pre-salt.”

“The difference in Libra is the very high level of CO2. This doesn’t change the nature of the challenge, but it does provide opportunities, and we have been focusing our technologies on this.”

“We have tried to look at the behaviour of CO2, and see what you can use to actually benefit from having such high levels.”

CO2 processing has emerged as an invaluable tool for reservoir management, and could allow optimised placement of injection and production wells, avoidance of “bypassing” oil in the reservoir reduction of overall drilling requirements.

“Imaging has its difficulties in the pre-salt, but we see important benefits of 4D in these complex carbonate reservoirs,” says Keith Lewis, applied technology manager on the project.

The Libra partners are still working on the format, but they plan to start the 4D survey in the north-west section of Libra, where the pilot floating production, storage and offloading vessel will be located, possibly expanding across the whole area.

“Sure, 4D seismic is expensive, but if you look at the cost of just one well in the wrong place, it will pay for a lot of 4D expenditure,” Lewis says.

With 4D seismic monitoring, the Libra team also aspires to greater control over the injection process, making the most of intelligent completions on injection and production wells, and allowing a more pinpoint assessment of how sophisticated these completions need to be in each case.

“This, combined with other monitoring tools, could allow us to act before gas gets to the producer, for example, help us tackle the issue of dealing with a lot of gas into topsides.”

“Optimising gas and water injection in this way links into the objective of improving processing configurations, and hopefully increasing the proportion of liquids to gas in the system,” Lewis adds.

The challenges of working with 4D monitoring in the pre-salt include the demand for high levels of seismic repeatability.

Permanent monitoring with seabed cables offers a reception solution, but with higher costs. Faster turnarounds on multiple surveys mean this offers an alternative.

Another area of research for 4D seismic covers the problem of improving the repeatability of source signals from the sub-salt. The Libra team plans to consider the alternative of using marine vibrators, rather than air guns.

Libra does not cover as large an area as some of the other pre-salt fields, but resource density is high with very thick reserves.

Project managers, like Lewis, promise that the field will have some of the best deep-water wells in the world. The latest well, announced in June, had 410 metres of net pay.

“I have worked on many fields around the world, and this one is exceptional. You don’t see this kind of resource density elsewhere. In one square kilometre of Libra, there is a lot of oil.”

“It makes Libra very competitive in a deep-water context. So asking how to get maximum production from wells is very valid,” says Lewis.

The Libra area covers about 550 square kilometres and, with seven wells drilled so far, the project managers already know that they are working with a reservoir with an unusually high hydrocarbon density, writes Gareth Chetwynd.

Designing and contracting of a new 3D seismic base for the north-west section of Libra has taken into consideration the option for future 4D seismic data for reservoir monitoring.

Ocean bottom node work has been the chosen technology, and the base survey is scheduled to be acquired in mid to late 2017.

The use of 4D seismic in carbonate reservoirs is extremely challenging, yet it may prove to be an invaluable tool for reservoir monitoring once it is put in place.

Interest in increasing the recovery factor on such a huge reservoir has made Libra the likely location for what is likely to become one of the biggest applications of 4D seismic technology ever seen in a deep-water environment. This application of 4D technology can allow optimised placement of injection and production wells, avoidance of “bypassing” oil in the reservoir reduction of overall drilling requirements.

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Ultra-deep prompts a rethink on risers

Libra's demands mean need for new approach

COMPOSITE flexible risers have provided a lively topic for research in recent years, though developers have been frustrated by the fall in oil prices, writes Gareth Chetwynd.

Conditions in Brazil's ultra-deepwater pre-salt, and the traditional Brazilian preference for using flexible riser configurations, presented a promising launch pad for these new technologies.

Libra’s special demands point squarely in the direction of a step-change in riser materials and designs, to enable free-hanging catenary riser configuration.

The main driver for carrying forward the research on composite flexible risers for the longer-term development of Libra is clearly set out in the strategic plan for dealing with greater depths or pressures. It is about reducing the demand for buoyancy aids and thereby reducing the cost of installation and the size of gas plant and occupation of the pre-salt deck space.

“Put simply, as it is now, in the Libra pilot floating production, storage and offloading project, under tender, this quickly led to a conceptual shift to a single line for WAG injection.”

The idea, appealing in its simplicity, is attributed to the Petrobras subsea engineering team, and involves connecting wells via a seabed loop to enable hydrate-free changeover between liquid and gas injection systems.

“The development of Hi-Sep for a subsea configuration will take longer, but that tends to coincide with a later stage in the life of the field when the gas ratio is increasing.”

Hi-Sep also increases the subsea simplicity, is attributed to the Libra’s applied technology leader Keith Lewis.

The assessment of what is required for a free-hanging catenary configuration on Libra has started with subsea layout optimisation, aiming at fewer lines to be installed.

On the Libra pilot floating production, storage and offloading project, under tender, this quickly led to a conceptual shift to a single line for WAG injection.

The idea, appealing in its simplicity, is attributed to the Petrobras subsea engineering team, and involves connecting wells via a seabed loop to enable hydrate-free changeover between liquid and gas injection systems.

The Libra team has also worked with all the major suppliers on this. We believe that there are significant opportunities to reduce the weight by 30% to 50%, bringing advances in accelerated ramp-up and cost reduction,” Lewis says.

The underlying aim remains that of reducing weights and dispensing with buoyancy modules.

Keith Lewis, Libra project applied technologies manager

Quest to understand behaviour of CO₂

Ultra-deepwater systems, with their capacity to enhance recovery through CO₂ injection at high pressures, is a test case for some of the best Risers providers on this. We believe that there are significant opportunities to reduce the weight by 30% to 50%, bringing advances in accelerated ramp-up and cost reduction,” Lewis says.

The underlying aim remains that of reducing weights and dispensing with buoyancy modules.

Keith Lewis, Libra project applied technologies manager

The search for potential and interlinking opportunities from having high levels of carbon dioxide is going further at Libra.

“Injecting CO₂ also helps us with hydrate inhibition. This may change the limits on dehydration in reinjection, and opens a window to other technologies that can increase oil throughput through the system and reduce costs,” says Keith Lewis, Libra project applied technologies manager.

Understanding the phased behaviour of CO₂ is part of a bigger picture for mapping, evaluating and applying technologies on Libra, within the framework of those three main drivers. At an earlier stage of the project, experts from all Libra partners worked out a list of 12 candidate technologies, leading to the selection of 10 for implementation, in a first phase.

Well results and a growing body of data on reservoir analysis led to a recent review of the original list to open the door to technologies whose value may have been missed. The new workshop led to the admission of another 50 ideas for evaluation and subsequent shortlisting.

At least two of these supercritical and high-efficiency glycol dehydration techniques came into the frame as a result of work done on the new parameters for dehydration limits.

Underlying aim of removing buoyancy costs and delivering the free-hanging catenary design. The third part of the puzzle for a free-hanging catenary riser on a technically demanding project such as Libra is the possible use of new materials to move away from buoyancy aids required for the lazy-wave configuration.

Engineering studies have scanned solutions that might allow for a free-hanging catenary design using conventional steel risers and pressure armours, but the sheer quality of the Libra reservoir seems to be pointing to something different.

“Libra has exceptional highly productive wells, so we are looking at the need for less flowlines or production lines. We are working on qualifying six-inch WAG lines and eight-inch production lines, but this becomes more challenging to deliver free-hanging catenary design using conventional materials,” Lewis says.

“This encourages us to look at alternative material selection and study composites, where there is a greater potential for hanging even the largest lines in Libra in a
Petrobras faces long haul to rebuild credibility

Brazilian giant has fallen to become the world’s most indebted oil company but the fightback has begun

GARETH CHETWYND
Rio de Janeiro

STATE-run Petrobras, once seen as heir apparent to ExxonMobil’s crown, has been devastated by the Car Wash corruption scandal and the drop in oil prices. Instead of becoming the world’s leading oil company, Petrobras is now the largest debtor, owing close to $130 billion, and has little to show for this in terms of net asset value.

New chief executive Pedro Parente has made it clear that tackling debt and rebuilding credibility will be his priorities, promising a disciplined effort to cut costs, raise cash from the sale of non-core assets and continue to strengthen anti-corruption compliance procedures.

Petrobras is not yet free of the consequences of the Car Wash corruption scandal, and may be heading for the heaviest punishment ever meted out by the US Securities & Exchange commission, plus billions of dollars worth of compensation payments for aggrieved international shareholders.

In terms of management and operations, Petrobras will soon unveil a new version of its business plan, probably with some more investment cuts and reduced production targets, but investors will hope to avoid another crop of write-offs.

Progress is being made in cutting costs, with some debt refinancing as well as the investment cuts, and reduced operating costs. “Brazil tends to have high unit costs and low productivity, yet Petrobras has been extremely cost efficient in the pre-salt, with operating expenses of about $8 per barrel,” says Horacio Cuenca, head of research for the Americas with consultancy Wood Mackenzie.

Like its peers, Petrobras has been seeking opportunities to reduce its offshore fleets, typically brokered roll-off deals in return for chartering periods and reduced rates for chosen units.

Suppliers have often gone along with this, taking a pragmatic view of available opportunities in such a difficult market.

Concerns However, the wounded giant has been going further than ever before to avoid or delay payments, and there are also some concerns.

“We have seen Petrobras taking many more risks on potential liabilities. One example is by using the Car Wash corruption evidence to force rip-offs owned by companies such as Enoco and Vantage,” says an oil and gas law firm.

“I think certain risks are acceptable, but others are not. These are risks.”

The sale of regasification terminals and LNG carriers, which had fallen to become the largest debtor, owing $130 billion by the end of the decade. Weakened trade unions have so far shown little stomach for a fight, but this could change.

There are rising expectations about a Petrobras asset disposal programme that was supposed to raise $15 billion in 2015-16, but has only peaked at that target so far.

Petrobras is starting to move more decisively in selling mid-stream assets in the gas and electricity sector, including a $5 billion sale of the TAG pipeline system to Canada’s Brookfield group.

The sale of regasification terminals, with integrated power generation assets, has attracted interest from oil majors such as ExxonMobil, Total, PetroChina and Shell.

A plan to raise billions from prime upstream assets was launched in the first quarter of 2015, but made little progress due, observers say, to a failure to push the process aggressively, and buyers’ concerns about the lack of clear regulations to deal with unitisation scenarios.

These hindrances appear set to change. Petrobras is making a more decisive stance on its desire to sell, with announcements on offerings involving onshore and shallow-water assets.

The new administration is also promising to issue comprehensive regulations on unitisation measures next month, potentially unlocking huge Petrobras sales such as Carcará (BM-S-8), Jupiter (BM-S-24) and Pao de Acucar (BM-C-33).

However, some investors say they have lost some confidence in the company’s whole risk analysis capacity. One applied this sceptical view

Research and development sticks to its cost cutting task

The work by Petrobras to reduce costs has been unglamorous at the best of times, but it has been overshadowed by the glaring publicity over corruption and financial problems, writes Gareth Chetwynd.

However, the company’s research and development division has been making quiet progress with several projects, the most visible of which is the reduction in costs of drilling through the salt canopy and into the pre-salt carbonates.

In 2008, pre-salt wells were requiring 152 days for drilling and 158 for completion. By 2016, this had fallen to 51 and 53 days, respectively.

A technology programme that ran from 2013 to 2015 focused on drilling management and also product partnerships with suppliers, such as Baker Hughes’ Kymera drill bit and Schlumberger’s Stinger.

Another of the 23 projects tested reduced use for Super duplex steel resulting in more than $200 million in capital expenditure savings during tests on 115 pre-salt wells on the Lula and Buzios fields, despite the presence of carbon dioxide, seawater and high acidity.

“Applying the latest knowledge on rock-fluid interaction in pre-salt provided an insight into a higher than expected pit and opened a window for less expensive metallurgy,” according to Jose Roberto Fagundes, Petrobras general manager for geo-engineering and well-engineering R&D.

This single breakthrough allowed lower cost materials on columns and casings, eased delivery schedules and allowed higher local content, Fagundes told an IBP forum on costs and competitiveness.

Fagundes outlined 21 R&D projects with a costs profile – comprising 10 with an operational expenses profile and 13 capex projects – consuming just $26 million Brazilian reais ($83.4 million) in the 2016 budget.

Petrobras’ focus areas for cost reduction were listed as well construction, maintenance and abandonment, subsea material, installation and intervention, surface processes and efficiencies for gas and liquids separation, processing and compression, plus reliable measuring in the presence of contaminants, and flow assurance and optimisation.

“Oly see the changing focus in the R&D programmes. In the 1990s, it was all about bringing technology to Brazil for the shallow-water expansion. In the 1990s, the challenge was adapting technologies for deeper and deeper waters, but also working with heavier oil on projects such as Papa Terra and Membro Sirf,” Fagundes said.

“Then the 2006 to 2010 period, as the pre-salt took centre stage, had a technical programme set to 2018. This was a time when wells were easily costing $600,000 to $1 million a day. Now for the 2015-2020 period, we see a new shift from pre-salt investments to the reduction of costs,” he added.
Concession sale can offer hope to sector

**ONSHORE INITIATIVE**

**Topaz Project may provide revitalisation**

The proposed sale by Petrobras of more than 100 onshore concessions spread across five states provides a ray of light for a sector that has been long-neglected in Brazil, write Fabio Palmigiani and Gareth Chetwynd.

The initiative, called the Topaz Project, offers 98 producing fields and six exploration blocks in the mature Reconcavo, Potiguar, Espirito Santo and Sergipe basins that are currently producing about 35,000 barrels per day of oil.

The amount represents approximately 20% of the company’s entire onshore production, but less than 2% of its total domestic output.

To put this into perspective, a single high-productive well from the Sapinhoa pre-salt field can produce 35,000 bpd, and even more is expected from fields such as Libra and Carioca.

Petrobras estimates the onshore areas on offer hold 207 million barrels of oil equivalent in proven, probable and possible reserves.

Proposals were received in June, sources say.

While the fields may not represent much in terms of Petrobras production, they are a lifeline for small producers.

The Brazilian Association for Independent Oil & Gas Producers (Abip), which represents 25 companies that have a combined production of about 3000 bpd from 50 onshore fields, believes the sale may just be the tip of the iceberg.

“Petrobras has been suggesting this can be a pilot project, with many more onshore fields to be offered at a later date,” says Abip executive secretary Analbal Santos Junior. “This is important because it can propel new investments at fields that were almost abandoned by Petrobras.

“This can lead to more hiring, giving smaller producers new investment opportunities while keeping the wheel spinning.”

Although onshore production represents just a tiny fraction of Brazil’s hydrocarbons production, there are currently over 8100 onshore wells on stream, compared to just 770 offshore basins.

Onshore production in Brazil has been declining in the past few years due to lack of investments.

It dropped 26% in the last decade to 187,900 bpd.

Small producers are also eyeing the so-called fourth mini-round, which may see the offering of up to 13 onshore fields with marginal accumulations. The event is scheduled for launch at the end of 2016.

In a similar event last year, the hydrocarbons regulator ANP awarded nine out of 10 fields, raising 4.25 million reais ($1.3 million) in signature bonuses.

Such events are sorely needed. “Onshore activity has all but ceased. The main region, the north-east, has one drilling rig that,” says Jose Firmo, head of the supply chain association Abespetro.

Petrobras followed up the onshore sale with a new offer last month, consisting of nine mature fields in shallow waters.

The company launched a competitive sale process for the disposal of the Caibota, Camorim, Deurado, Guaricema, Tatui, Curim, Espada, Atum and Xareu fields.

The nine areas produced on average 12,000 barrels of oil equivalent per day in 2015, representing just 0.5% of Petrobras’ total output.

The fields have been grouped into production complexes with integrated facilities in order to provide potential new owners with full operating conditions.
Five years after production started at the Peregrino heavy oil field, Statoil is preparing to drill its first well as an operator in the ultra-deep waters of the Espirito Santo basin.

“Our exploration efforts are now concentrated in the Espirito Santo basin, where we plan to drill the first wells in the end of 2017. It will probably be one of Statoil's most active drilling operations outside Norway,” says Statoil Brazil president Paal Eitrheim.

The Norwegian company is presently analysing seismic data and discussing with partners Petrobras, Total and Queiroz Galvao Exploration & Production which prospects to prioritise and how to optimise resources.

Upstream understands that Statoil will soon be tendering for a rig to carry out a four-well wildcatting programme in Espirito Santo.

The proposed campaign will feature the drilling of two wells in Block ES-M-743 and one well each in blocks ES-M-598 and ES-M-671 from late 2017 to August 2018.

Over the past few years, Statoil has participated in the drilling of a number of wells in Espirito Santo at Petrobras-operated blocks, making important light oil discoveries, including Indra and Sao Bernardo.

"Espirito Santo is an emerging oil basin in Brazil with proven post-salt and pre-salt plays, with higher risks not proven yet. We have learned a lot with the recent activities conducted by our partner, and we are ready to operate in this basin," adds Eitrheim.

Great opportunity Statoil is also soon expected to take over operatorship of Block BM-C-33 in the Campos basin, home of large pre-salt discoveries such as Pao de Acucar, Gavea and Seat.

A deal for the change of command was signed with Repsol Sinopec late last year and is pending approval from market regulator ANP.

Eitrheim says: “This is a great opportunity to deploy Statoil’s experience as offshore operator and gas supplier. "BM-C-33 is a complex carbonate reservoir, so we are now analysing the data collected through the drilling and production tests, which had a very positive result.”

BM-C-33 is estimated to hold more than 700 million barrels of oil and 3 trillion cubic feet of natural gas in resources in water depths close to 3000 metres.

"Right now, our focus is to map the subsurface. The consortium is working to mature our reservoir understanding to establish the most effective drainage strategy. Given the water depth, this is most likely going to be a subsea development," explains Eitrheim.

"Gas treatment is also a key issue. The plan is to use existing technologies, extended, as required, for the specific water depth and reservoir conditions." Brazil occupies a top spot in Statoil’s investment profile and, with long-term growth in mind, the company is moving forward with a second phase development at the Peregrino development in the Campos basin.

Wood Group was recently awarded a multi-million dollar contract to provide detailed engineering and design for a third wellhead platform to serve this shallow-water project.

The platform, WHP-C, will be installed in 120 metres of water and will provide additional capacity for between 40,000 and 45,000 barrels per day of oil from Peregrino South-East, adding 250 million barrels of recoverable reserves, with first oil scheduled for 2020. "The expectation is to expand production, increasing the number of wells from a new area.

"In all, 22 wells — 15 oil producers and seven water injectors — should be drilled in phase two,” says Eitrheim.

Since phase one started production in April 2011, Statoil has been adopting solutions to standardise operations in Peregrino to reduce costs, while delivering significant improvements in drilling efficiency.

Eitrheim says: “These factors have largely contributed to the reduction of investment costs by around 10%, improving the break-even from almost $70 per barrel in 2014 to below $45 per barrel in 2016.”

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THE acquisition of BG Group gave Anglo-Dutch supermajor Shell a major addition to its portfolio in Brazil, cementing its position as the largest international oil company with upstream activities in the country.

Shell completed the $68.2 billion merger with BG five months ago, gaining access to numerous exploration opportunities in the northern equatorial margin and, more importantly, a significant slice of pre-salt riches in the Santos basin.

Before the deal, Shell was producing about 30,000 barrels per day of oil in Brazil from its Parque das Conchas and Bijupira-Salema fields.

"Thanks to the merger, we are now producing 215,000 bpd, and by 2020, Brazil will represent more than half of Shell’s deep-water production and about 25% of the company’s total hydrocarbons output," said Shell Brazil president Andre Araujo, addressing a recent industry forum.

Working interests

Shell acquired working interests ranging from 25% to 30% at key pre-salt developments operated by Petrobras, including Lula and Sapinhoa, already on stream via eight floating production, storage and offloading vessels—with three more units soon to be deployed—and Lapa, Berbigao and Sururu due to enter production later this decade.

Araujo said: "The acquisition is transformational for Shell in Brazil, given the presence that BG has built in the country over the past few years. "Shell has been in Brazil for 103 years, and we continue to reinvent ourselves while looking for new opportunities." Shell recently unveiled a new medium-term plan that calls for capital expenditure of between $25 billion and $30 billion per year to 2020, while announcing its intention to raise $30 billion from divestments in the next two years.

"Today, Shell has no plans to sell assets in Brazil... any portfolio revision is business as usual," Araujo added.

Since the acquisition, Shell has been investing to simplify its operations in Brazil to make it more efficient, despite the higher complexity of its new assets.

"We are making some adjustments in the company. The low oil price environment is forcing us to act," Araujo said.

"The whole industry made a mistake, which was to get used to high oil prices, but Shell is making a great effort to avoid any kind of euphoria when prices recover.

"The company is now focused and well-structured to work with low oil prices for a prolonged period of time."

Araujo said Shell will continue to bet in Brazil, and remains bullish when it comes to its pre-salt and post-salt perspectives.

In the Santos basin, the company is working alongside Petrobras, Total, China National Petroleum Corporation and China National Offshore Oil Corporation in the development of the giant Libra pre-salt field.

First oil is scheduled for early 2017 via a series of extended well tests via the Pioneiro de Libra FPSO.

Commercial output is due for 2020, with a larger floater to be contracted. Shell holds a 20% interest at Libra.

Shell has been facing a series of hurdles to develop another promising pre-salt find, Gato do Mato, discovered on Block BM-S-54 back in 2010, but the company has been locked in unitisation talks with the federal government since early 2014.

Araujo said: "Work at Gato do Mato is halted because we don’t have a clear legislation regarding unitisation agreements in the pre-salt.

"We are used to carrying out unitisation at other countries, but the different types of contracts in Brazil cause a certain complication.

"It is important to solve this matter quickly, but in the right way, with clear rules that help the industry, so we don’t shoot ourselves in the foot."

Araujo criticised the new law that establishes further taxation for exploration and production activities in Rio de Janeiro state.

"Surprises like this new tax have a direct impact in a company’s decision to move forward with a project.

"The risk of more taxes generates insecurity in the oil sector. You don’t kill the goose that laid the golden egg."
Independent producers working hard to survive in tough times

Players such as Ouro Preto, QGEP and Barra Energia focused on capital discipline as low oil prices continue to take a toll in Brazil

**DOMESTIC COMPANIES**

The prolonged low oil price scenario in the international market has made it more difficult for Brazilian independent producers to withstand the current downturn.

However, the new generation of domestic players has learned from the mistakes of its predecessors, carving up a new image for the sector that may help Brazil attract new investments.

**QUEIROZ GALVÃO**

The company recently decided to bet on the hydrocarbons potential of the Sergipe-Alagoas basin where it last year won deep-water blocks SEAL-M-351 and SEAL-M-428 in a licensing round.

The permits are located near some of the biggest light oil discoveries made by Petrobras in the area in recent years, including Moita Bonita, Muriu, Barra, Cumbe, Farfan and Poco Verde, which are estimated to hold more than 1 billion barrels of recoverable reserves. "We see Sergipe-Alagoas as the main driver for our exploration efforts over the next few years," says QGEP chief executive Lincoln Guardado.

"I would say that, excluding the Santos basin pre-salt province, Sergipe-Alagoas is probably one of the most attractive plays in Brazil," Guardado adds that QGEP is looking to farm down its 100% stakes at the two blocks, but keep operatorship.

"We see enormous upside potential for Sergipe-Alagoas. We liked all the 10 blocks offered in the 13th licensing round, but we choose to invest in the two that may help Brazil attract new investments.

After companies such as OGX and HRT made big promises that were followed by poor results and large losses, banks and financing agents have become cautious about the risks of investing in Brazil.

The recent drop in crude prices, the Operation Car Wash corruption scandal and political uncertainties have only worsened the situation. But while it has become challenging to tap capital markets to fund projects, Brazilian independents are working hard to preserve cash and survive the present cycle.

"It has become harder to be an independent oil company in Brazil because our image has been tainted by some recent failures. I think we need to prove ourselves twice to show we have a solid business. This is a burden we will have to carry for a little longer," says Ouro Preto founder and chief executive Rodolfo Landim.

Companies such as Ouro Preto, Queiroz Galvão Exploration & Production (QGEP) and Barra Energia have responded by seeking to adopt strict internal controls and transparent governance policies and are aiming to apply rigorous standards to carry out investments without the need to raise much debt.

"Capital discipline is very important... There has to be a constant quest for efficiency, cost reduction, results optimisation and caution to allocate cash at projects where returns are expected. But while it has become challenging to tap capital markets to fund projects, Brazilian independents are working hard to preserve cash and survive the present cycle.

**DOMESTIC COMPANIES**

Queiroz Galvão Exploration & Production (QGEP) has been diversifying its offshore portfolio in Brazil, increasing its exposure to new frontier plays while preparing to begin output from the Atlanta heavy oil field in 2017, writes Fabio Palmigiani.

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"We see enormous upside potential for Sergipe-Alagoas. We liked all the 10 blocks offered in the 13th licensing round, but we choose to invest in the two we considered the best," says Guardado. QGEP has until 2020 to shoot new seismic in Sergipe-Alagoas.

On the more immediate horizon, QGEP has until 2020 to shoot new seismic in Sergipe-Alagoas.

"We are seeking to optimise operational costs at Atlanta, and we hope to achieve costs that are compatible with the final sale price of our oil," Guardado says.

QGEP signed an agreement to sell production from Atlanta to Anglo-Dutch supermajor Shell, which is still marketing the viscous 14 degrees API crude though Guardado believes the oil will be sold for a discount of between $18 and $20 to Brent prices.

Production at Atlanta is expected to reach 20,000 barrels per day of oil from two wells linked to the Petrojarl I. QGEP is still considering the possibility to spud a third well at Atlanta, which would increase output to 30,000 bpd throughout the three-year period of the early production system. "A third well would not increase our operational costs by a wide margin, but it would boost our estimated revenue by a third. We expect to make a final investment decision on drilling a third well next year," explains Guardado.
with higher return on investment,” says Barra Energia chief executive Renato Bertani.

According to Landim, not only has the market become more risk-averse, but the costs of securing new funding have increased.

“There will always be money available to fund good projects, but depending on market conditions, this money can be either cheap or expensive. The problem I see is the expectation that banks have toward oil prices in the spot market, which is raising financing costs for projects being developed right now that have a lifecycle of 20 years or more,” says Landim.

Guarantees (Ouro Preto) chief executive Lincoln Guardado says even companies not looking to access capital markets are being affected by the negative outlook.

“We are feeling the effects on our warranty costs. We have to renew a series of guarantees every year, such as the minimum exploitation programme, and this has become more expensive,” says Guardado.

QGEP has about 1.3 billion reais ($403.7 million) in cash reserves, enough to fund its operations for the next two or three years, and is due to start production at the Atlanta oilfield in early 2017. However, the company has not discarded tapping capital markets in the future to fund other projects or even ATLANTICA.

“The way in which we will do it has not been decided yet. We have already discussed with some banks the possibility of offering our reserves as guarantee, as this would carry smaller costs,” says Guardado.

Meanwhile, Landim highlights the importance of funding exploration projects with full equity, saying Ouro Preto will not leverage itself or raise debt to pay for seismic surveys and drilling.

“We have hundreds of millions of reais in cash, and we are obviously preserving it. I see no problem in raising some debt to finance development projects, but not exploration,” says Landim.

“We need to raise money to pay for our operational costs, but this can be accomplished in several ways, including the partial sale of some of our assets... but this has to take place at the right time, when market conditions improve.”

Barra is also benefiting from a cautious investment strategy. The company, through its minority stake in the QGEP-operated Atlanta field, will begin to generate cash next year and is looking to expand beyond the Santos basin, where it also holds a 10% interest in Block BM-S-9-8 – home of the Carcara pre-salt discovery.

Portfolio The company won the backing of private equity outfits First Reserve and Riverstone, which injected $500 million each, and another $200 million came from institutional investors. According to Bertani, Barra Energia has used $700 million so far, and retains about $500 million in its coffers.

“As a deep-water player, we are looking at opportunities, particularly in the pre-salt in the Campos and Espirito Santo basins... However, we are only investing in new areas if it makes sense to our portfolio. We are not putting at risk our investment capacity,” says Bertani.

Ouro Preto may be a tiny company compared to the likes of state-controlled Petrobras, but the independent has big ambitions to expand and a surprising appetite to invest in Brazil’s most productive play — the Santos basin pre-salt province, writes Fabio Palmisani.

Founded in 2010 by Rodolfo Landim, an executive with long experience in the oil and gas sector, Ouro Preto emerged at a time when the Brazilian industry was going through turmoil as the government revamped the country’s regulatory framework after large discoveries in the pre-salt.

“It was a complicated period because we created a team and were ready to participate in new licensing rounds, but we were not expecting it would take so long for the government to sort the new legislation, so we waited for three more years until everything was finally done,” says Landim, who is also chief executive of Ouro Preto. With the resumption of oil rounds in 2013, Ouro Preto attracted investors and was able to secure acreage in new frontier plays such as the offshore Barreirinhas basin and the onshore Parnaiba basin.

In 2014, Ouro Preto took another step to expand by acquiring the Brazilian upstream assets of US independent El Paso for an undisclosed sum.

“That was a very important deal for us because we acquired some producing assets like Camarupim and Pescada-Abaraiana, began generating cash flow and got upside on a couple of production development projects,” says Landim.

Ouro Preto is now targeting a giant leap forward, with plans to operate in the Santos basin pre-salt province.

“The company is counting on the Brazilian Congress to approve a bill ending Petrobras’ obligation to operate all future pre-salt fields with a minimum 30% stake.

“My strategy for the pre-salt is to set up a vehicle to attract resources from potential investors that want to invest solely in the pre-salt with people who know the Brazilian market. I’m going to try to come up with investments directed to a specific opportunity, and I think this can be very attractive,” explains Landim.
**SUBSEA**

**Engineering sector looks to build for the future**

**The scale of the Brazilian market and the preference for subsea completion and flexible risers** has led to boundaries being expanded, but now the downturn is **focusing minds** on lower-cost solutions.

**GARETH CHTETYND**
Rio de Janeiro

**THIRTY years of developing equipment for the ultra-deepwater sector, in-** cluding ways to standardise technologies and developing solutions, and also in terms of capacity. The pre-salt, with its added element of corrosive fluids, spurred a new wave of invest- ments from companies such as GE, Technip, Aker Solutions and FMC Technologies.

The scale of the Brazilian mar- ket, and Petrobras’ preference for subsea completion and flexible risers, has given the sector an important differential.

**Important foundation** Taking the ultra-deepwater sector, in- dustry associations estimate that between 25% and 30% of all global subsea equipment was being pro- duced for Brazil before the 2014 downturn, a scale seen as an im- portant foundation for building up an internationally competi- tive industry.

When the oil price was at $100 per barrel, our challenge was all about installing enough capacity to prevent overheating, as well as qualifying equipment for the pre-salt conditions. This has changed with the downturn,” says Jose Mauro Ferreira, subsea director with Abejpetro, the Brazilian industry body representing supply chain companies.

In 2014, the subsea sector was expecting orders worth $30 bil- lion in the 2015 to 2020 period, but investment has slumped since then and output has dropped to less than half what it was in 2014.

The situation is not as critical as in the surface side industries, which have seen a severe collapse in engineering and shipyard activity, but even the more com- petitive subsea sector is facing serious concerns about the de- bilitating long-term effects of the downturn.

“Most engineering talent has been saved from the cuts so far, but this is changing. The in- dustry has come a long way in building up engineering skills and productive facilities, so it is important to think carefully about what we can do to preserve what has been built up,” says Fer- reira.

“The focus has shifted to the development of a new generation of lower-cost solutions for the supply and installation of subsea equipment.”

There have been suggestions on how Petrobras might try a more collaborative approach to studying assets, especially in research and development stage. This led to calls for Brazilian policymakers to reset the coun- try’s R&D levy with this aim in mind, helping an important in- dustry through the current crisis in the process.

“Allowing the R&D incentive to be applied to the sector’s technol- ogy investments could be a po- tential solution in a time of scarce orders, and these invest- ments could be aligned squarely with this focus on reducing costs,” Ferreira says.

**Warning** However, while the current open debate on oil sector policies indicates a growing ap- preciation of the challenges, pol- icy makers are being warned that there is a need for urgency in tak- ing action.

“Next year will be critical. If nothing improves the suppliers will have no option but to cut back on the flesh of their engi- neering capacity,” Ferreira says.

**Most engineering talent** has been saved from the cuts so far, but this is changing... It is important to think carefully about what we can do to preserve what has been built up.

Mauro Ferreira, subsea director, Abejpetro

**AKER SOLUTIONS** was one of the many companies surfing the wave of Petrobras subsea sector orders in recent years, writes Fabio Palmigiani.

The company opened its new subsea plant in Paraena state in April and the facility will specialise in manufacturing subsea trees for the pre-salt sector.

The plant, Aker’s biggest, employs between 1200 and 1500 workers and doubles the company’s Brazilian capacity.

Aker signed a frame agreement with Petrobras in March 2013 covering 60 well-sets of vertical subsea trees, subsea control systems, tools and spares for delivery by 2018.

“We have a respectable backlog of subsea trees from our frame agreement that gives us some breathing room, but we continue to look for more opportunities,” says Ricardo Serafim, Aker Brazil’s vice president for strategy and marketing.

Aker also has a contract worth more than $100 million with Petrobras to supply eight manifolds that alternately inject water and gas to increase oil recovery, and an agreement to provide maintenance and other services for subsea equipment.

However, Serafim admits the future is uncertain. “If truth be told, the subsea industry here in Brazil was cushioned. We

had a client that embraced us all and an oil price above $100 per barrel that justified any investment. The important thing was to have the equipment available,” he says.

Describing the market downturn as a strong lesson for the sector, Serafim says Aker has responded by investing in subsea solutions in operational efficiency.

“We have a cost-cut programme in place and our goal is to achieve a global reduction of 5%,” he says.

The development of new technologies is one of the pillars at Aker, according to Serafim, and the company is investing in the next generation of subsea control systems.

The company is also looking at opportunities outside the subsea sector to expand its footprint in Brazil.

“We are looking at asset integrity management with great interest, especially because key companies in Brazil that used to carry out this sort of work have been banned from signing new contracts with Petrobras in the wake of the Operation Car Wash investigation,” Serafim says.

“We are considering entering this niche market in Brazil... We have the tools to operate. We only need to get a full understanding of the operator’s requirements,” he adds.

**Overview:** Nelson Romano, president of the Brazilian Association of Industrial Engineering

**Photo:** DORIS
BRAZIL’s Petrobras relies on its advanced fleet of flexible pipelaying support vessels (PLSV) to ensure the ramp-up of pre-salt production, but even this once vibrant sector is feeling the effects of the downturn, writes Fabio Palmigiani.

A few years ago, it appeared crystal clear that Petrobras would require two dozen PLSVs to tackle the enormous amount of work in the pre-salt — with as many as 26 new production units planned to enter operations in Brazil from 2016 to 2020 — but now the state-controlled company may no longer need half of its ordered vessels.

Since it started to re-assess the size of its massive PLSV fleet a little more than a year ago, Petrobras has made some progress in cutting costs and reducing its fleet to a number more compatible to its existing needs. The company currently has 16 PLSVs in operation, with seven newbuild units due for delivery by the fourth quarter of 2017.

Industry sources estimate Petrobras’ demand for PLSVs over the next couple of years will be in the range of 10 to 12 vessels, indicating that the oil giant needs to make deeper cuts to deal with the projected oversupply.

With that in mind, Petrobras is in a fresh round of contract renegotiations with its main suppliers to streamline its fleet and secure lower dayrates, as some of the larger vessels hired from Sapura Navegacao, Subsea 7 and the Technip-DOF Subsea consortium were chartered at dayrates close to $300,000.

Even though they represent just 4% of Petrobras’ offshore support vessel fleet, the PLSVs are highly specialised units with a considerable order backlog, as most vessels currently on hire and expected to enter operations are chartered for periods of five and eight years.

The downturn is also affecting the offshore rig market.

Petrobras, which at one point had close to 70 rigs in operation, has since reduced its offshore fleet to half that number.

“We will have a drilling fleet that will be completely adjusted to our current demand by the end of the year,” Petrobras exploration and production director Solange Guedes said recently.

DEMAND for offshore support vessels in Brazil has been falling since Petrobras hit the brakes on contracting more units two years ago, as it looked to reorganise its finances and operations, writes Fabio Palmigiani.

For 15 consecutive years, from the opening of the country’s oil and gas industry to foreign operators in 1999 until 2014, the Brazilian OSV fleet had more than tripled to a record 500 units.

According to the Brazilian Association of Offshore Support Companies, the contracting spree finally ended in 2015, when Petrobras started to react to the low oil price environment.

The number of OSVs in Brazil fell to 445 vessels in 2015 and is now about 416 units.

However, offshore brokers predict more than 70 other contracts in Brazil will be cut by December.

“While some of these contracts may be renewed for the optional period, we expect that most of these vessels will indeed be released,” says a source.

Petrobras currently has ongoing tenders for platform supply vessels (PSV), oil spill response vessels (OSRV), remotely operated vehicle support vessels and shallow diving support vessels, but sources believe these new charters will not be enough to compensate the number of units to be dismissed this year.

When it comes to new demand from other operators in Brazil, there is not much on the immediate horizon.

France’s Total is tendering for three PSVs and one OSRV to operate in the For do Amazonas basin, but only for 2017, when the company will begin drilling in the area.

Meanwhile, Karoon Gas recently delayed an appraisal programme at its Echidna discovery to the first quarter of 2017, for which it is thought likely to seek six OSVs.
Petrobras rallies to try to stem Campos slump

FABIO PALMIGIANI
Rio de Janeiro

The revitalisation of mature fields off Brazil has proven to be as important as the development of new pre-salt reserves, as Petrobras needs to make urgent progress to slow down the fall in production from the prolific Campos basin.

In May 2010, when Petrobras was just starting operations from the Lula pre-salt field via an extended well test, the company was producing 1.686 million barrels per day of oil from the Campos basin, which represented more than 80% of the company’s total domestic output.

Fast forward to May 2016, and oil production in the Campos basin has dropped to 1.416 million barrels per day of oil production in the Campos basin and now accounts for slightly more than 80% of the company’s total domestic output.

Petrobras committed a strategic mistake. It practically abandoned less than two thirds of the company’s output in Brazil.

“Petrobras committed a strategic mistake. It practically abandoned the Campos basin and did not carry out the necessary investments in maintenance, focusing instead on the development of the pre-salt province, where production costs are higher,” says Adriano Pires, director of the Brazilian Centre for Infrastructure Studies, a Rio de Janeiro energy think-tank.

“That happened at a time when the government was saying the pre-salt would be the salvation of Brazil. Political motivations got in the way of technical decisions, and now production in Campos is dropping at a rate that will be very difficult to revert.”

Improvements

In an effort to salvage production in the Campos basin and improve performance in mature fields, Petrobras launched the Proef operational efficiency programme in 2012.

The company has been working hard ever since to improve operational efficiency at most of its older production systems in the Campos basin, successfully lowering operating costs, but the decline has not been stemmed.

Market regulator ANP has become more proactive in recent years in forcing Petrobras to act to maximise the recovery of hydrocarbons in the Campos basin.

Five large fields — Marlim, Marlim Sul, Marlim Leste, Roncador and Albaçora — where production has been dropping at alarming rates in recent years, have been targeted by the ANP as the centre for Petrobras’ investments for enhancing production.

Marlim is expected to anchor most of the investments in the medium term. The field, which is currently producing 182,000 bpd from seven ageing platforms, will receive two new floating production, storage and offloading vessels in the next decade.

The FPSOs will probably be chartered units, and will use flexible riser systems due to environmental concerns about coral reefs that did not exist in the heyday of the Campos basin expansion.

“The current Petrobras business plan had a first unit eyed for 2019, but the situation at Petrobras deteriorated since that plan was announced, so I don’t think anyone still expects that to happen so soon,” says a source with a floater company.

In late May, the ANP agreed to extend the lifespans of Marlim for an additional 27 years, meaning the concession contract will now expire in 2052 instead of 2025, giving Petrobras the possibility to produce an extra 900 million barrels of oil equivalent from the area.

The ANP has also asked Petrobras to install one new production unit each at Roncador and Marlim Sul, but details on when this might happen are not very clear.

“Petrobras has been reducing its investments over the past couple of years, and I suspect the current management will reduce it further in 2016,” says Pires.

“So this means even less money for the Campos basin.”

One option for Petrobras is to include more of these areas in its divestment plan.

Financial difficulties

Some industry sources believe that Petrobras’ financial difficulties, coupled with the current low oil price scenario, may dissuade the ANP from enforcing the contracting of these two units for Roncador and Marlim Sul any time soon.

Other investments to revitalise production at mature fields in the Campos basin should include the drilling of more wells to test untapped reservoirs, shooting new seismic, optimisation of subsea equipment and actions to expand water injection and boost water treatment capacity at top sides.

Petrobras is yet to come to the market with tenders for such work.
Optimism stays afloat for Brazilian offshore

Despite all the uncertainty, there is still optimism about the future of Brazil’s offshore sector, writes Gareth Chetwynd and Fabio Palmigiani.

“Brazil has not been fulfilling its potential due to regulatory questions that create barriers, but it is important to appreciate the size of the prize. Brazil has geology that is very favourable,” says Antonio Guimaraes, E&P executive secretary of the Brazilian Petroleum Institute (IBP).

There has been excessive hype about the wonders of the pre-salt — the Lula field has suffered pressure loss in some areas and has started to yield to the oil-water contact — but experienced heads still wax lyrical about this extraordinary play.

“The pre-salt assets are just magnificent. The wells may be expensive, but there are few areas around the globe that are so productive,” says Horacio Cuencar, head of Americas upstream research with Wood Mackenzie.

The main problem with this play and some others is sometimes the sheer abundance of hydrocarbons. On Carcará, for example, sources say that the reservoir drive is so powerful that there is little scope for re-injecting the rightful gas, with talk of the first two floating production, storage and offloading vessels requiring compression capacity for 20 million cubic metres per day.

“Re-injecting, as on Lula, improves recovery and reduces the size of the tasks when you have to find a market onshore, so on Carcará you potentially have a big problem monetising that gas, but this is the kind of problem that oil companies like solving,” says Cuencar. In the days when Jose Sergio Gabrielli was Petrobras chief executive, the company was investing to chase a 2020 production target of 4.2 million barrels.

The current plan has cut this target to 2.7 million bpd, but analysts expect this to come down further when the updated business plan is unveiled. “I think it will be pulled back to 2.2 million bpd,” says Adriano Pires, director of the Brazilian Centre for Infrastructure Studies.

Petrobras will continue to play the leading part in developing the pre-salt fields, but there is a virtual consensus now that Brazil is poised to enter a new period of private sector investment.

Edson Nakagawa, a director of Pre-Sal Petroleo, says: “Some might argue that it is better to wait for oil prices and Petrobras to recover before pressing ahead, but we have seen how this can lead to missed opportunities.”

Pires says: “It will take time to turn things around. If you imagine it takes a minimum of five years from licensing to new production, the impacts of a unification pre-salt round in 2017 would only be felt in 2023, at best.”

Others were more bullish about the role that the oil giant will continue to play. “Building an open sector with the participation of many more players is crucial, but there can be no more immediate impact than getting Petrobras back on its feet and with ambitions to invest,” says Jose Firmo, head of the supply chain association Cospespetro.

The oil industry is in agreement about the formula for bringing the Brazilian oil sector back to life, starting with a unitisation licensing round followed by regulatory improvements but extending to a concerted effort to reduce costs and increase competitiveness in Brazil.

“The real challenge is whether the federal government that governs in the interests of the oil sector and not in the interests of Petrobras,” says Pires.

**U PRE-SALT PRODUCTION FORECAST**

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| SOURCE: FPSA

**BIG POTENTIAL STILL EXISTS**

But ‘it will take time to turn things around’

“There should be enough new production on the way to keep overall Brazilian output rising modestly into the next decade, despite the accelerating decline on the Campos basin, writes Gareth Chetwynd and Fabio Palmigiani.

The last in a crop of big chartered units will be delivered over the next 12 months, comprising two units by Moeck International, on the pre-salt Lapa and the post-salt Tartaruga Verde fields.

Floating production, storage and offloading vessels ordered from local shipyards have been travelling a more tortuous road.

The P-66 FPSO, the first of a scheduled eight “replicants” was supposed to start production on Lula South in 2015, but first oil was put back to 2017.

Integration at the BrasFels shipyard has been held up by the wait for gas compression units, following a re-bid by Petrobras.

Five other replica floats are progressing, helped by the transfer of much of the hull construction integration work to China, and all six should enter production before the end of the decade.

The other two hulls for the P-75 and P-77 were converted in China and integration will take place at QGI’s Honorio Bicalho yard in Brazil.

Petrobras is also tendering for two large FPSOs for the Libra and Sepia pre-salt fields, with commercial production earmarked for 2020.

Bids were re-submitted recently, but one source suggested that the whole exercise, carried out with excruciatingly detailed local content requirements, might ultimately turn out to be an argument in favour of local content waivers.

There has been some talk of a fifth floater for Buzios and a new unit to revitalise output in the Marlim field, but there is little optimism about a new wave of Petrobras orders.

Libra will get a dynamically positioned FPSO for extended well tests in the second quarter of 2017, and is expected to start its huge ramp up with the pilot project in 2020, but even this project may struggle to stay on track without a sustained recovery in oil prices.

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**Sector set to see overall output increase as latest units ramp up**

There is still optimism about the future of Brazil’s offshore sector, according to a report by Gareth Chetwynd and Fabio Palmigiani.

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**Optimism stays afloat for Brazilian offshore**

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**INFRASTRUCTURE**

**Acu superport proves to be a smart manoeuvre**

Facility conceived by Eike Batista’s EBX group in good position to serve Brazil’s most important offshore region

GARETH CHETWYND

Rio de Janeiro

The collapse of Eike Batista’s EBX empire showed what can go wrong when an integrated group of companies pursues leveraged growth during a commodities boom.

Some lofty promises — such as OXG’s million barrel per day of oil production target and ONS’s assembly line of floating production units — turned to dust in the downturn. However, the Batista-led EBX group were built on a strong business logic, and one or two were marching along impressively under new investors.

The Acu industrial port, located about 240 kilometres north of Rio de Janeiro, is the most successful of these.

The “superport” was conceived by Batista as a hub for exporting iron ore from Minas Gerais but expanded to host oil and gas industries serving Brazil’s most important offshore region.

The original business plan included a giant shipyard, a steel mill and even Batista’s answer to Tesla, the world’s leading manufacturer of electric cars.

Batista sold part of his mining business to Anglo American and opened up a new iron ore export route through Ferroport, Acu’s first port terminal, retaining a 50% stake.

As dredging of the three kilometre-long T2 port canal advanced, industrialists saw the port as a cleverly planned response to Brazil’s infrastructure bottleneck, promising to bring new levels of efficiency to offshore logistics.

Multinational companies began setting up manufacturing and operations bases along the canal, including new flexible pipe plants for Technip and NOV for the challenging pre-salt conditions.

With the demise of EBX, US investment giant EIG Energy Partners acquired a controlling interest in LLX, paying $624 million to Batista, who owned a 50% stake in the port, a large part of which was in 2013.

The result, Prumo Logistica, is now 60% owned by EIG. Dubai’s Mubadala Development Company and Brazil’s Itau bank are also key stakeholders, converting debt to equity for stakes of 6.7% and 6.2%, respectively.

This second phase of investment reached a milestone with the inauguration of three private-run terminals in June.

**Expansion**

The T-Oil terminal, fruit of a partnership between Prumo and Germany’s Oiltanking, allows the transfer of up to 1.2 million barrels per day of oil from shuttle tankers to long-haul vessels.

Oiltanking acquired its 20% stake in 2015 for $200 million, becoming the T-Oil operator.

A contract, for handling up to 200,000 bpd of crude was signed with BG, inherited by Shell.

This output comes from stakes in Petrobras-operated pre-salt fields such as Lula and Sapinhoa.

Andre Araujo, head of Shell’s Brazilian unit, has said the company is considering an expansion of its operations at Acu, where storage depots and blending facilities form part of the plan.

Transshipment operations are expected to start from T-Oil in August. Its jetties can handle six shipments simultaneously, with sheltered conditions for manoeuvring offering an attractive alternative to a Uruguayan port facility used by BG Group so far.

“The fact that our terminal is sheltered will greatly reduce delays for our customers. There is also far greater control of the operation of the facility and the chances of any spillage,” says Prumo’s chief executive Jose Magela.

Shell also sold operations at Acu’s new maritime fuels terminal, operated under a joint venture with BP, which started some bulk shipments from its own multi-cargo terminal.

Chouest won a contract to serve Petrobras from six berths, two of which are in operation so far, but is banking on much greater demand in Brazil, building more than double that capacity.

Chovan is reportedly poised to follow Petrobras by signing up for use of more of the new Chouest berths.

Other companies setting up their operational bases at Acu include power and propulsion provider Wartsila and mooring specialist Intermoor.

There is space for many more.

Acu’s port and inner channel boasts more than 25 kilometres of docks, piers and breakwaters, including 13 kilometres of quays on Terminal 2. Its 300-metre-wide inner channel, has 6.5 kilometres of quays with a draft ranging from 10 metres in the upper section to 14.5 metres in the lower section.

These investments support Prumo’s view that Acu will become the main offshore service hub for the Campos and Santos basins.

The Roncador field is about 120 kilometres away from Acu, while Tala, in the Santos basin is further, about 450 kilometres distance from the base.

“Bottlenecking has been an ever-present problem for Brazil. Logistics has so far been very restricted to Macei, with just three inefficient Petrobras berths,” says Magela. “By offering excellent logistics and significant de-bottlenecking, you can greatly increase the number of vessels per day, compensating for the moderate increase in distance compared with Macei.”

A total of 1.1 billion Brazilian reals ($812 billion) has been invested in ACP port so far, including 6.4 billion reals by Prumo, 3.7 billion for Ferroport and 1 billion reals on planning applications have also been submitted for a new offshore base for helicopters. The site would be 100% private, but would look to Petrobras as its biggest potential customer.

The scale of the ongoing

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**Prumo Logistica committed to delivering on promises and plans for a drydock and shipyard may have been dropped but the site of OXG’s proposed integration yard could still provide an option for one of the contenders hoping to supply Petrobras with its next fasteners on projects such as Libra and Sepia.**

The port at Acu will open its own 500-metre quay for offshore vessels in 2017, while Prumo is also working on plans for another dry dock for vessel repairs.

Planning applications have also been submitted for a new offshore base for helicopters. The base would be 100% private, but would look to Petrobras as its biggest potential customer.
The potential of the Parnaiba basin has attracted new players in the region and is looking to develop the pre-salt associated gas, says Prumo Logistica executive secretary Antonio Guimaraes. "It will be much more complex without Petrobras as the main player," Odonne says.

Last year, Petrobras announced the sale of a 49% stake in its natural gas distribution subsidiary Gaspetro to Japanese group Mitsui for 1.93 billion reais ($598.7 million). "We are also selling our pipeline network, two LNG terminals, associated gas-fired power projects and its liquefied petroleum gas distribution company Lijq," Odonne says.

Livia Amorim, researcher at think tank Getulio Vargas Foundation, highlights that the Bolivian gas re-export from the gas market is not the only factor, because diplomatic relations between two nations may also be taken into consideration.

Northon Torres Vargas, consultant at Bolivia’s national hydrocarbons agency, says the two countries need to conduct a new (IBP) round of negotiations this month to talk about the details of a potential new gas contract.

The company hit a target, set 18 months ago, to export 54 MMcmd from pre-salt to Parnaiba, using four land rigs, despite declining 25% in the second straight year of sharp economic recession. "Over the past 12 months, natural gas consumption in Brazil declined 25%, resulting in an over-supply of gas," says Queiroz Galvao Exploration & Production chief executive Lincoln Guardado.

"The problem is that gas is treated as if it were oil, and this hurts the economics. Getting access to the infrastructure has also been a persistent problem. This is changing now, and it is a good time to rethink the whole transport model, hopefully creating a transport system geared to providing access. A dedicated pipeline operator, as exists in the electricity sector, might be one option," Decio Oddone, Prumo Logistica oil and gas projects director, says: "Nobody knows if Brazil will still require the Bolivian gas in the next decade. The market conditions are definitely not the same as when this agreement was first signed."

He argues the situation at Petrobras may be a key factor when the time comes to renew the contract. "Petrobras has also been signaling an intention to exit the gas market. If that happens, Brazil will have to negotiate volumes directly with Brazilian companies. It will be much more complex without Petrobras as the main player," Odonne says.

PGN remains confident that the 20-year contract for shipments through the 3150-kilometre Parnaiba-Bolivia gas pipeline is due to expire in 2019, and given the uncertainties faced by Petrobras there is growing speculation about whether the deal will be renewed or not. The current take-or-pay agreement between Petrobras and YPF covers shipments of up to 10 MMcmd.

"The natural gas market lacks its own effectively regulated system to encourage technology growth," says Antonio Guimaraes, executive secretary for the Brazilian Petroleum Institute. "In turn, this affects the economics. Getting access to the infrastructure has also been a persistent problem. This is changing now, and it is a good time to rethink the whole transport model, hopefully creating a transport system geared to providing access. A dedicated pipeline operator, as exists in the electricity sector, might be one option."

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The sweep of Brazil’s most intense corruption probe has moved deeper into the political sphere and further revelations are likely, but shell-shocked oil and gas sector now trying to find a way forward

RAZIL’S Car Wash probe has not formally concluded, but the focus has switched away from Petrobras and into the political arena, where the dramatic developments may be yet to come. In the corporate field, Petrobras has been busy installing the most rigorous compliance system possible.

Some say that this process, overshadowed by Department of Justice and Securities & Exchange Commission suits in the US, has been pursued so rigorously that it has left little space for contracting activity to continue and has distracted from the urgent need to conclude divestment transactions.

Brazilian engineering and construction companies embroiled in the corruption investigations are trying to adapt to the new post-Car Wash world, and some are struggling for their very survival.

A long list of traditional companies and industrial groups that were suspended from the Petrobras vendor list have apparently suffered delays exceeding the Car Wash scandal, but the focus has not formally concluded divestment transactions.

Brazilian engineering and construction companies embroiled in the corruption investigations are trying to adapt to the new post-Car Wash world, and some are struggling for their very survival.

The list includes traditional Brazilian groups such as OAS, Schahin, Mendes Junior, Galvao Engenharia, GDO, Aluisa Engenharia, Fidens, Iesa, Tome Engenharia, TTK Engenharia and Jaragua Equipamentos. Other suspended companies, such as Odebrecht, Queiroz Galvao, UTC and Engevix, have so far managed to avoid a judicially supervised process, but relations with creditors has been fraught with difficulties.

Seeking an escape route from industry-wide paralysis, some companies have sought settlements or “leniency agreements” to cap their liabilities, following the tenets of a law enacted in 2013.

Bureaucratic: For a company to be fully cleared of wrongdoing, it needs to sign leniency agreements with federal prosecutors, the country’s anti-trust agency Cade and the Ministry of Transparency & Compliance, formerly known as Brazil’s comptroller general’s office (CGU). There are some additional uncertainties involving the federal tax agency and the federal audit tribunal.

“Unlike the US, where the Department of Justice handles the cases, in Brazil the process is extremely complicated, long and bureaucratic, discouraging some companies from taking this path,” says Bernardo Weaver, a partner in the Rio de Janeiro office of law firm Tauli & Chequer Advogados. So far, five companies have signed leniency deals jointly with federal prosecutors and Cade.

Andrade Gutierrez, Camargo Correa and Toyo Setal agreed to co-operate with investigators and pay fines worth 1 billion reais ($203 million), 400 million reais and 15 million reais, respectively. At least two other leniency deals are being kept under wraps because prosecutors opted not to disclose their terms.

Upstream understands that one of these involves Brazilian engineering group Carioca Engenharia, the company that renovated part of the Inhauma shipyard, which is expected to pay 100 million reais in fines. There is some co-ordination with agreements brokered by the company chief in jail for over a year, prosecutors were said to have been brokering a kind of contest between the two men and their respective companies, offering leniency to the party able to supply most information.

Depositions such as these two have the power to unseat the highest-ranking officials, but there is growing concern about the financial stress being faced by the big construction groups.

“Car Wash was important for Brazil, but you can’t just destroy the companies that provide the infrastructure for this country.”

Sergio Bacci, president of Abenav, Brazil’s building association.

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Sergio Bacci, president of Abenav

GE’s Brazilian unit, speaking at a test between the two men and their respective companies, offering leniency to the party able to supply most information.Depositions such as these two have the power to unseat the highest-ranking officials, but there is growing concern about the financial stress being faced by the big construction groups.

“Car Wash was important for Brazil, but you can’t just destroy the companies that provide the infrastructure for this country. You can’t make the blue collar workers pay the ultimate price. It is time to start thinking about re-building and not just dismantling industry,” says Sergio Bacci, president of Abenav, the national shipbuilding association.

The sweep of Brazil’s most intense corruption probe has moved deeper into the political sphere and further revelations are likely, but shell-shocked oil and gas sector now trying to find a way forward.
Leniency agreements have key role to play on the road back

The leniency agreement and a very comprehensive corporate governance and compliance programme in Brazil are seen as the route back to respectability for companies embroiled in the Car Wash corruption inquiry, or anxious to stay clear of such problems, writes Gareth Chetwynd.

This comes in spite of the frustrations and uncertainty surrounding Brazil’s overlapping institutional arrangements.

One of the earliest and most comprehensive leniency agreements was signed by Camargo Correa, in September 2015. “Our financial exposure from Car Wash became fully visible, so we have the advantage of certainty,” a source with the company tells Upstream.

“Also, only 25% of our orders are for public works, compared with 60% for Odebrecht or 85% for Queiroz Galvão, so business activity is moving along.”

Encouraged by the new corporate governance regime at Petrobras, and tough financing conditions, Brazilian contractors have been investing heavily in compliance procedures, including training and mechanisms to deter and prevent corruption.

“The first thing the banks ask you is ‘how is your compliance programme?’ It is important to go to Petrobras, to the (National Development Bank) and the CGU, or its successor, to study their programmes and see how you can fit your own compliance into the system at all levels,” said Flavio Rimoli, executive vice president for governance and compliance with Camargo Correa, speaking at a recent DMM compliance forum in São Paulo.

“You can have no new business without passing through ethics committees and the whole compliance process, verifying also that it has proper analysis of risk both when you sign a proposal and when you sign the contract,” he said.

The UTC construction group put its own compliance programme in place about eight months after the details of the Car Wash scandal emerged in November 2014.

With top executives jailed, new leaders were appointed across the group, and an experienced chief compliance officer named and given technical support from a trained and funded multi-disciplinary team. An ethics code and ethics committee were put in place and a whistle-blowing channel contracted externally.

More than 13,000 people have received training at 636 events, according to José Guimarães, compliance officer at the UTC Participações unit.

“We see monitoring and compliance culture spreading around the pillars of the programme, with the stress on visibility. We reached 100% implementation two months ago, although we aspire to continuous improvement,” he says.

The Car Wash revolution has been so powerful in Brazil that there is little room for talk of budgetary limits, even in times of crisis.

“We have never had so much difficulty getting Petrobras to sign up for business, but if there is one area where they have been willing to spend, it is on compliance,” says one Rio de Janeiro-based lawyer.

“The value of training is appreciated as never before, because there is acute awareness of reputational value... Brazil wants to learn from this,” says Guimarães. The new culture is spreading. At Petrobras, about 60,000 workers are said to have completed a basic course raising awareness of the compliance implications of dealing with customers or accepting gifts.

“Sometimes you have to work with your own partners and stimulate them to set up an ethics committee and other procedures of their own,” Rimoli said.