

## Brazil: A New Petroleum Power?

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Petrobras recently announced it has discovered between five and eight billion barrels of light oil offshore in the sub-salt layers at a depth of some 5,000 to 8,000 metres (16,000 to 26,000 ft). Petrobras stated it was the first company, "to have drilled, tested and evaluated pre-salt rocks." I believe the company was referring to the South Atlantic since this has been done in other parts of the world. For instance, there has been sub-salt production in the Gulf of Mexico since the mid nineties. However, it is certainly a feather in Petrobras's cap and they must be congratulated on their new find.

The problem with producing oil at these depths is one of cost but, with \$100 per barrel oil, the operation is profitable, and will become more profitable as the technology improves. I am a great believer in the maxim "Necessity is the mother of invention" and am confident our scientists and engineers will come up with greatly improved drilling and production methods.

The salt beds were deposited in large lakes similar to, but on a much larger scale, than the Dead Sea and are chemical sediments. As such, the salt beds, called evaporites, are natural deposits which were left after the evaporation of bodies of water whose connection to the ocean had been cut off. My colleagues tell me they are probably from the Jurassic period, and were formed when the South Atlantic Ocean was opening. It is extraordinary that in some parts they are over a mile thick.

I shall comment on the effect this significant find may have at a) world level, b) on Petrobras, and c) on PDVSA.

World level. The find is a slap in the face for those geologists who said there were no more large oil provinces to be found, especially as it comes soon after the large discovery in the Bay of Bohai off the Chinese coast. I never studied geology and it was only in the 1950s, when I saw sand and shell deposits high up the Venezuelan Andes, that I realised how, ages ago, the earth was covered by so much more sea than it is now.

My point is that there is a lot of sea which has not been explored and where large provinces may still be found. Chevron's large find in the deep waters of the Gulf of Mexico is a recent example. The Atlantic coast of South America, north and south of Brazil, is a possibility, and then there is the long coastline of the Eastern Seaboard of the USA where another Hibernia-sized field could be located. From the Beaufort Sea in the Arctic to the Weddell Sea in the Antarctic, there is a lot of coastline to be explored. Any more large finds and those who say peak oil is imminent will, once again, have to eat their words.

Obviously, it will take some years to fully develop these recent Chinese and Brazilian discoveries but, with the price of oil where it is, the incentive is there. Furthermore, China

and Brazil (together with India) are fast developing nations which will need more oil to fuel their own economies.

Petrobras. It is estimated production from Petrobras's new discovery will not start before 2010. Part of the problem is the difficulty of drilling through salt because it behaves plastically and has a tendency to flow during drilling. This means the drilling bit can be easily trapped or broken—it is a major achievement that Petrobras has been successful in drilling through 2,000 metres of salt. The company has shown the world it can compete on an equal footing with the oil majors.

The Brazilian government has decided to withdraw 41 blocks, which are close to the new find, from the next bidding round. This is understandable since it probably believes Petrobras can develop these blocks on its own and there is no need to invite partners. However, denying the opportunity to new entrants may not be such a good idea since the private oil companies can provide both the capital and some technology which Petrobras may lack. A viable alternative would be to copy PDVSA and let Petrobras take a majority stake in all the blocks, say, 60 percent, and invite the private companies to bid for the rest. Petrobras already has different partners in various parts of the globe and opening the Brazilian discovery to other oil companies would reciprocate and, at the same time, allow it to tap their capital resources and specialist technology.

The Brazilian President has quietened any fears existing partners may have had by declaring the government will not change or cancel any of the contracts it has made with them. This is a sign of good faith which will please the international oil companies, and is in stark contrast with the way Venezuela has lately dealt with the private companies.

In 2006, Petrobras's average domestic oil production was 1,778,000 b/d and that figure has currently increased to some 2,000,000 b/d. Product sales at present are running at around 1,800,000 b/d which means Brazil is now self-sufficient in oil. Gas production in 2006 was the equivalent of 277,000 b/d, but the country still needs to import substantial quantities of gas.

Any additional oil production, after meeting increased domestic demand, will be available for export. This amount will jump when production from the new discovery comes on stream. It has been suggested that, once that occurs, Brazil will show solidarity with Venezuela and Ecuador and become a member of OPEC. However, that is open to question since Petrobras is a hybrid—both a state controlled company and one that is publicly quoted. Its shareholders will hardly look kindly on any production cuts imposed by OPEC that would affect the company's profits.

Production from the new discovery will be light oil, so Petrobras may need to rethink the specifications for its new refinery in Pernambuco which was designed to take Venezuela's heavy crude. The alternatives would be to build another refinery or export the crude as such. Once Brazil has surplus oil to export, it may well compete with Venezuela as a supplier to the USA.

The production of associated gas will displace the need for Venezuelan gas and Brazil will probably negotiate with Bolivia for any shortfall it needs. It is possible Petrobras may also no longer require some of the LNG regasification plants it intended to construct.

PDVSA. The Gran Mariscal de Ayacucho liquefaction plant (previously called Cristobal Colon

before the latter fell out of favour) has been on the drawing board for over 15 years. Exxon and Shell, originally to be partners with PDVSA, were subsequently excluded and Petrobras became the preferred partner. The latter has just announced it will not participate in the project. This may be because it got fed up waiting for PDVSA to decide how much gas would be available for export or, more probably, because the new discovery will provide sufficient indigenous gas.

Brazil's new discovery will put paid to the gas pipeline from Venezuela via Brazil to Argentina, though a Trans-Andean gas pipeline connecting Venezuela, Colombia and Ecuador is still on the cards. It only needs Argentina to find more gas and PDVSA'S expectations of selling gas to countries further south in South American will be frustrated. The Gran Mariscal project will leave PDVSA as simply another Atlantic Basin supplier of liquefied gas in competition with Trinidad and Tobago, Nigeria, Angola and other African countries.

However, even that will not occur for some time since PDVSA has not yet started commercial offshore gas production and the production, when it commences, will be first needed for local consumption and as feedstock for the petrochemical plants. Procrastination has left Venezuela behind in the LNG export market. On the Pacific coast, both Bolivia and Peru will start exporting LNG before PDVSA can do so from Venezuela.

PDVSA and Petrobras are 60/40 percent partners in a block of the Orinoco Oil Belt and the intention is these companies should participate inversely 40/60 percent in the Pernambuco refinery, now being built in Brazil, which is designed to refine Venezuela's heavy crudes. This deal can still go ahead, but the question is does it make commercial sense to ship crude to Brazil only for the refined products to be exported? The crude oil could just as well be upgraded and refined in Venezuela and exported from there.

The additional crude produced by Brazil may be placed in the USA, but will this adversely affect PDVSA? It is most unlikely since PDVSA wants to diversify its client base anyway and sell more crude to China. Venezuela has such huge oil reserves that it will maintain its world-wide influence. However, if Petrobras becomes a substantial exporter, some of the geo-political clout may shift from Venezuela to Brazil, particularly as the latter has friendlier relations with the USA and the West.

The new discovery is most fortunate for Brazil with its large population of 190 millions, and there is little doubt it has major geo-political implications. In brief, it will not affect Venezuela as regards its oil production and exports, but could have an adverse effect on the latter's plans to sell gas as such or as LNG to South American countries.

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