Brazil’s Pre-salt has Significant Potential

Stratas Advisors

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Brazil’s Pre-salt Background

Since the pre-salt discovery of the Lula oil field in the Santos Basin in 2006, and the first oil from the pre-salt layer, in the Jubarte field, in the Campos Basin in 2008, a large amount of proven oil reserves were consecutively discovered in the pre-salt layer and entered into projects developments. According to Petrobras, the pre-salt formation contains about 16.4 billion barrels of crude oil reserves in the ultra-deep water area offshore Brazil.

Geologically, the pre-salt layer occurs at a depth of 5-7 km and under a layer of salt up to 2 km thick. It is a sequence of sedimentary rock formed by the separation of the current American and African continents about 150 million years ago. At that time, a large amount of organic matter deposited and accumulated as rivers on the continents separated and flowed to lower levels, then were covered by saline water for millions of years. Under thermochemical processes, the organic layer turned into hydrocarbons and formed the pre-salt layer.

The development of pre-salt fields faces main challenges, including harsh oceanographic conditions in the Santos and Campos basins; an ultra-deep water environment without pre-installed production infrastructure, which is 300 km off the coast with water depth reaching deeper than 2 km and an oil reservoir nestled 5 km below the seabed with a 2 km thick salt layer above; developing new technology to withstand the high pressure in the reservoirs and the contaminants in the fluids along with producing. However, new technologies have been developed during the last 10 years to resolve the challenges. For instance, the development of different raisers that are pipeline systems take oil and gas from seabed to the platform, new well construction solutions, and the design of CO2 separation and re-injection systems enables oil production in the inhospitable pre-salt reservoirs.

Key Pre-salt Fields Developments

- Whale Park Complex includes: Baleia Azul, Baleia Franca pre-salt fields started production in 2010, and Jubarte pre-salt field came on stream in 2008.

- Sapinhoa Norte and Sapinhoa South pre-salt fields both have been producing oil since 2014 and 2013, respectively. Total oil reserves are estimated between 1.2 to 2 billion barrels.

- Lula is the largest pre-salt producing field in the Santos Basin in Brazil. The Lula Northeast started production in 2013; Lula Alto and Lula Central came on stream in 2016; Lula Sul began in 2017; and Lula Extreme Sul and Lula Norte are due on stream later this year.
• Iracema North pre-salt field in Campos Basin came on stream in 2015.

• Lapa (Carioca) pre-salt field came on stream in 2016 in Santos Basin.

• In April, 2018, Petrobras started the first production from Buzios 1 in the Brazil’s pre-salt province; as with other Buzios series, Buzios 2 and Buzios 3 are also due to start production in 2018; Buzios 4 is set to begin in 2019 and Buzios in 2020.

• Iara pre-salt field is expected to start in 2018 through P-68 FPSO with 150,000 b/d capacity after its 22.5% working interest was transferred from Petrobras to Total completed in January 2018.

• According to Petrobras’ latest news, the first oil on Berbigao pre-salt field will come online in early 2019.

• The Atapu Sul pre-salt field will start production in 2019; Atapu Norte/Piloto Sururu will come on stream after 2020.

• The Mero (former called Libra) pre-salt development series will begin after 2020. The Pioneiro de Libra FPSO is carrying out extended well tests. Oil flows started in 2017 at a rate of 50,000b/d. The Guanabara FPSO, which will be the first full-scale production unit at Mero, is due to start operation in late 2021.

• The Sepia pre-salt project is currently in EPC contract tendering/bidding stage, and the first production is projected to be in 2020.

• Jupiter pre-salt development series are planned to start production in 2025. Petrobras is looking to start the Jupiter pilot in early 2023.

Figure 1 Brazil’s Pre-salt Fields Developments Location Map
**Pre-salt Oil Production Growing**

Stratas Advisors has projected the total oil production of Brazil and from pre-salt fields through 2025. We risked total oil and pre-salt production with a probability factor regarding future development of project execution capability on timing and scale for the base scenario. The high-case scenario is un-risked, which is not applied to the probability factor on the production forecast. This also assumes projects could develop successfully on schedule and reach full production capacity.

In 2011, pre-salt total oil production only accounted 7% of total oil production in Brazil; in 2017, pre-salt oil production climbed to 1.4 million b/d, provided more than 50% of total oil production in Brazil; this growing trend will continue through 2025. Total pre-salt production will dominate more than 75% of total Brazil crude oil production both on base and high-case scenarios (See Figure 2).

**Figure 2 – Brazil’s Total Oil and from Pre-salt Fields Production Forecasting through 2025**
Upcoming Pre-salt Play

On Oct. 27, 2017, the ANP held the second and third pre-salt rounds for PSCs, and six pre-salt blocks were offered: Entorno de Sapinhoa, Norte de Carcara, sul de Gato do Mato, Peroba (5.3 Bbbl), Alto de Cabo Frio Central and Alto de Cabo Frio Oeste.

On June 7, 2018, the fourth pre-salt round will offer four pre-salt PSCs blocks: the Uirapuru, Dois Irmaos, Tres Marias and Itaimbezinho areas. The previously included Saturno block will be offered in the fifth pre-salt round. Total estimated unrisked oil in place is 17 billion barrels.

The Brazilian National Council for Energy Policy is going to approve the fifth pre-salt round, which is scheduled to take place on Sept. 28, 2018. This round will include the giant Saturno prospect in Santo Basin, Tita in the contiguous areas of S-M-534 and S-M-645, Southwest of Tartaruga Verde and Pau Brasil (4.1 Bbbl) prospect.

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