

IMI: The Brazilian Shipbuilding Industry Booms with Brazil's Pre-Salt Oil & Gas Projects

August 23, 2013

The information in this report is partially based on a Petrobras PowerPoint presentation for a webinar held in May of 2013. Additional data in this report is a compilation of information from other Petrobras presentations and CS Rio research.

Overview and Figures

In 2012, Brazil's proven oil reserves were 15.3 billion barrels. After the discovery of pre-salt oil in 2006 and 2007, probable reserves are estimated between 60 to 80 billion barrels, with an additional 20 to 30 billion barrels of possible reserves.¹ In terms of production, Brazil ranks 11th in world oil production with 2.14 million barrels of oil per day (bpd) and was a major trader, exporting 578,673 bpd and importing 309,371 bpd.

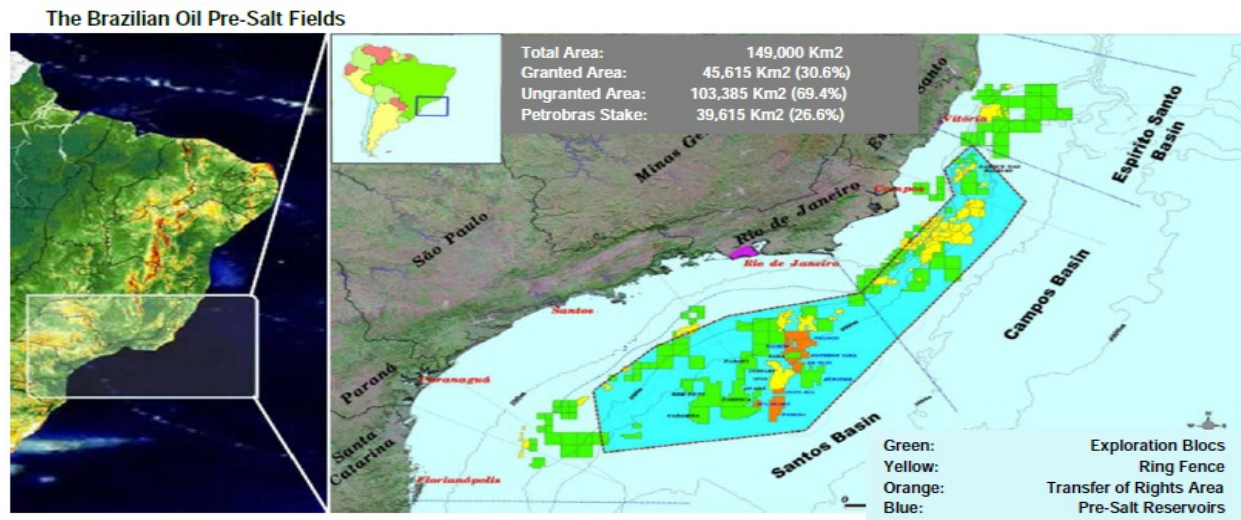
In 2012, Brazil's imports of gasoline grew by 73% in comparison with 2011. In fact, Brazil's imports of gasoline have been growing since 2010, and expenses related to these imports have reportedly jumped from USD 70.6 million dollars in 2009 to USD 285 million in 2010 and USD 1.6 billion in 2011. Since 2005, Brazil had not imported gasoline on a continuous basis and in large volumes as it did in 2012. Large domestic gasoline demand and limited domestic refining capacity were reportedly the causes for this growth of gasoline imports.

Geographically, the State of Rio de Janeiro is the center of Brazil's oil and gas activities. Rio State accounts for 82% of Brazil's offshore oil/gas production, followed by Espírito Santo at 16%. Approximately 92% of Brazil's oil/gas production originates from offshore fields.

The discovery of pre-salt oil has prompted massive investment into discovery and exploration over the last few years. Going forward, focus will shift to increasing pre-salt production, presenting significant opportunities to companies in the shipbuilding /

¹ Probable reserves have been variously designated as 'indicated' or P50 reserves, the latter referring to reserves which are estimated to have a better than 50% chance of being technically and economically producible. Possible reserves have been designated as 'inferred' reserves, sometimes referred to as P10 or P20 reserves – ie including reserves which, at present, cannot be regarded as 'probable', but which are estimated to have a significant, but less than 50 per cent chance of being technically and economically producible.

shipyard industry and their supply chain. (Please refer to the table below for the pre-salt region.)



A number of challenges accompany this exciting prospect including technological feasibility, location and infrastructure disadvantages, and installed capacity bottlenecks. First, the commercial recovery of hydrocarbons at ultra-deep levels (up to 5,000-plus meters) over a vast expanse should prove a daunting challenge for producers and will also be very costly. Depth levels coupled with distance from shore may result in logistics bottlenecks down the road. Severe shortage of existing manpower, the lack of experience of building FPSO's and a still-underdeveloped supply chain able to comply with high local content (LC) requirements may also lead to production and delivery delays.

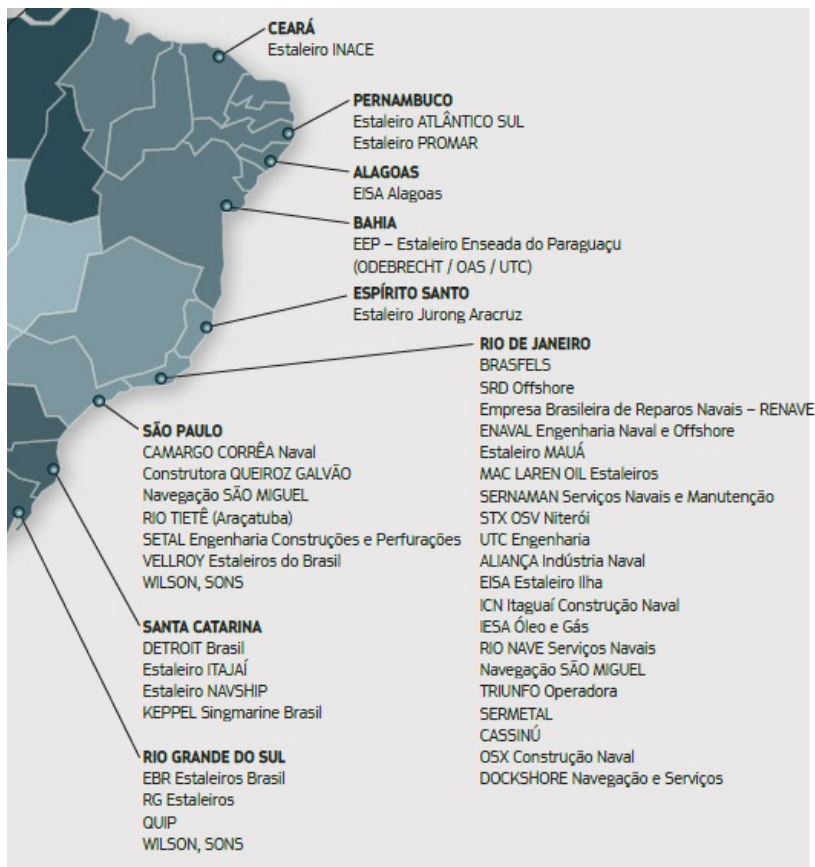
For shipbuilders, an unavoidable force and likely partner is Petrobras, the massive state sponsored Oil Company that accounts for about 92.5% of Brazil's total oil production. A table published by the Brasil Energia magazine <http://brasilenergia.editorabrasilenergia.com/> shows the top 10 companies by oil production in 2012: (Petrobras, 692 million barrels of oil per day-bpd; Statoil, 13.5m bpd; Shell, 13m bpd; Sinochem, 9m bpd; BG, 8m bpd; OGX, 3.2m bpd; Petrogal, 3m bpd; BP, 3m bpd; ONGC, 2m bpd; and Chevron, 2m bpd). The same publication ranked the top 10 companies by oil exploration area in Brazil, in 2012: Petrobras, Petra, HRT, TNK-BP, OGX, Shell, Vale, BP, Imetame, and Petrogal.

Petrobras has 980 projects in its portfolio with a total value of USD\$ 236.5B over the next five years (2013-2017). These figures dwarf other oil operators' planned investment of USD\$53B over the same time period. About 833 of Petrobras' projects (USD\$208.7 billion) have already been approved and are being implemented while the remaining 147 projects (USD\$28 billion) are being reviewed by Petrobras to confirm

their viability. Of the projects already approved, 231 are in the area of exploration and production (E&P) in Brazil. These projects represent 52% of the \$131.6 billion investment in this segment. From 2012 to 2015, 12 new oil production units already under construction will enter into operation, and increase capacity by 1.2 million barrels per day. From 2016 to 2018, seven new systems per year will increase capacity by another 2.3 million bpd.

The company is taking a three-part approach to increase efficiency. First, to optimize operational costs, Petrobras is identifying production activities (e.g. platforms, refineries, and thermoelectric plants) and supply lines (inventory, logistics, and management) where costs can be reduced. Second, it will seek to raise operational efficiency and reliability in the Campos Basin, and third to take maximum advantage within the local content (LC) policy.

Industry contacts believe that LC requirements will not impact Petrobras' production goals, but they may increase the net values of Petrobras' projects. In any case, the perception is that LC rules will not change in the short-term as five new shipyards are under construction in Brazil and when on line they will enhance Brazil's LC capabilities. The map below shows the current shipyards in operation in Brazil:



Source: <http://www.sinaval.org.br/>

Recently, the National Oil Regulatory Agency (ANP) announced the rules for the October 21st **Libra field pre-salt oil licensing round**. They can be seen (in Portuguese) at the ANP website: http://www.brasil-rounds.gov.br/round_p1/portuques_p1/edital.asp. The production sharing contract model is also available at: http://www.brasil-rounds.gov.br/arquivos/Edital_p1/Contrato_autorizado_030913.pdf. ANP specified the following LC requirements for this pre-salt oil tender:

- Exploratory phase: 37%
- Development phase up to 2021: 55%
- Development phase after 2021: 59%

Subsector Best Prospects

The technological challenges in exploiting the pre-salt oil are varied. U.S. companies with experience and expertise in the following areas and procedures are encouraged to further investigate possible business opportunities:

Drilling and completion

- Construction of high angle wells, deviated into the salt zone
- Well integrity
- Penetration rate in the microbial carbonate reservoir
- New alloys to reduce costs of well materials

Reservoir

- Reservoir characterization
- Rock fluid interaction
- Enhanced Oil Recovery

Subsea

- Flexible risers for water depths of 2,200m (7,218 ft)
- Flow assurance
- Scaling control

Floating Production Units

- Mooring in 2,200m water depths
- Interaction with the riser's system
- CO2 processing

Critical Resources	As of	Delivery Plans (to be contracted) (accumulated amounts)		
	Dec 2010	By 2013	By 2015	By 2020
Drilling Rigs Water Depth Above 2,000 m	15	39	37 ¹	65 ²
Supply and Special Vessels	287	423	479	568
Production Platforms SS & FPSO	44	54	61	94
Others (Jacket and TLWP)	78	80	81	83
SOURCE- Petrobras 2020 Strategic Plan	1. The contracts for 2 rigs reallocated from international operations expire in 2015 2. L-T demand to be adjusted as of new assessments			

Additional Market Opportunities

Moving forward, the following demand figures can be expected:

<u>Demand for Merchant and PSV Vessels</u>		
(2011-2020) Source: ABIMAQ		
Item	Optimistic Scenario	Conservative Scenario

Large Ships (oil, gas, and chemical tankers, container carriers, load carriers, bunkers, etc.)	141	111
Platform supply vessels	568	300
Port support vessels	244	191
<u>Demand for New Equipment</u>		
(2013-2017) Source: Petrobras		
Item	Un.	TOTAL
Wet Christmas Trees	un	423
Subsea Wellheads	un	263
Flexible Flow lines	km	3.667
Manifolds	un	58
Tubing and Casings	t	638.870
Umbilicals	km	2.557
Dry Christmas Trees	un	148
Onshore Wellheads	un	206
Reactors	un	159
Oil/Water Separators	un	1.225
Storage Tanks	un	440
Towers	un	127
Pumps	un	3.692
Compressors	un	328
Winches	un	298
Cranes	un	178
Combustion Engines	un	80
Turbines	un	411
Generators	un	128
Filters	un	884

The following shipyards have been awarded contracts with Petrobras and other oil companies in 2012. These EPC shipbuilders are potential buyers of oil and gas goods and services:

BrasFELS:

Awarded six Semi-submersible platforms

Technological partner: Keppel FELS from Singapore

EAS – Estaleiro Atlântico Sul:

Awarded seven drill ships

Technological partner: IHI Marine – Japan

RG – Estaleiro Rio Grande:

Awarded three drill ships

OSX: Will build two drill ships

EEP – Estaleiro Enseada do Paraguaçu (under construction – partners: Odebrecht, OAS, UTC, and Kawasaki): Will build six drill ships – Project design: Gusto (Holland)

EJA – Estaleiro Jurong Aracruz (under construction):

Will build five drill ships with its technological partner Jurong from Singapore

Estaleiro Rio Grande do Sul (ERG) – Construction of 80 production modules for 8 FPSOs – with a consortium made of Tomé Engenharia/Ferrostaal; DM Engenharia/TKK–IESA; Dresser Rand; and Rolls-Royce

Source: SINAVAL

Market Entry

Commercial Service Rio invites U.S. companies with an interest in supplying oil and gas product or services to Petrobras, engineering procurement contractors or to other oil companies to contact our office. Due to the LC policy which requires a minimum percentage of domestic content for a variety of equipment and materials to promote domestic Brazilian industry, and federal import taxes which can range as high 25-35% depending on the material or good, U.S. firms are best positioned to access the

Brazilian market through partnering with a local agent or distributor. Additionally, to participate in governmental tenders, U.S. companies are required to partner with a Brazilian firm or have a legal representative in Brazil. Consequently, we recommend that U.S. firms hire a local representative, agent or distributor for their products and services or – if there are enough market opportunities – consider, in the future, opening a local branch/subsidiary in Brazil or partner with an existing Brazilian firm. The Commercial Service has a vast network at our fingertips, supported by more than 1500 international industry and trade specialists whose job is to provide the best source of customized solutions for U.S. companies and their Brazilian partners to do business in the global marketplace.

Using the U.S. Commercial Service's Gold Key Service (GKS), we can arrange one-on-one meetings with potential partners.

Another option for market entry and networking is to register for the Offshore Technology Conference (OTC) certified tradeshow to be held in Rio de Janeiro from October 29-31, 2013. Interested parties may apply for a GKS and/or a joint-venture program by September 20th. Please contact regina.cunha@trade.gov for additional information on the GKS and/or JV program.

Useful Links:

http://export.gov/brazil/industryhighlights/energy/eg_br_051813.asp (Commercial Service Rio Oil and Gas energy webpage)

<http://www.sinaval.org.br/associados.php> (shipbuilders)

<http://sindarma.org.br/site/associados/index.html> (shipping companies)

<http://abenav.org.br/v1/index2.php?abenav=associados> (naval and offshore trade association)

<http://www.onip.org.br/areas-of-activity/?lang=en> (oil and gas industry association)

<http://www.anp.gov.br/> (oil regulatory agency)

Oil bidding rounds:

http://www.brasilrounds.gov.br/round_12/ingles_R12/areas_oferecidas.asp

