

IN CONFERENCE

LSFO in the Western Hemisphere: The View from Petrobras

This issue's "In Conference" is based on a presentation by Rodrigo Berkowitz of Rio de Janeiro-based Petrobras at World Fuel Oil Summit VIII in Athens on May 21-23, 2015. Following a stint in Houston at Petrobras America where he supervised fuel oil and feedstock trading, Mr. Berkowitz moved to Rio to coordinate Brazil's fuel oil exports. World Fuel Oil Summit VIII was hosted by Public Power Corporation S.A. Hellas and organized by Axelrod Energy Projects.

This issue's "In Conference" takes a look at Petrobras' refining and fuel oil exports as well as sources of LSFO demand in the Western Hemisphere

Petrobras and Brazil

A fully integrated energy company, Petrobras is one of the largest companies in Latin America. Petrobras' trading offices outside of Rio de Janeiro are located across different continents in Beijing, Buenos Aires, London, Rotterdam, Singapore, and Houston. Petrobras maintains a large fleet of oil tankers. Shares in Petrobras are traded on the Sao Paulo, New York, Madrid, and Buenos Aires stock exchanges. The Brazilian government retains a controlling majority in Petrobras through a golden share.

Brazil's worldwide oil and gas production stood at 2.67 million boe/d in 2014. Of that amount, 2.03 million boe/d was oil (including NGL) production in Brazil. Oil (and NGL) production outside Brazil stood at 116 kboe/d. Brazil has crude oil (and

gas) reserves of 16.61 billion boe.

Brazil's oil product output stood at 2.17 million b/d in 2014. Of that amount, diesel accounted for 853 kb/d and gasoline for 494 kb/d. Fuel oil output amounted to 286 kb/d. The Brazilian fuel oil market (including inland demand and bunker fuel) ran 205 kb/d in 2014. Brazil's inland demand includes power and industrial users.

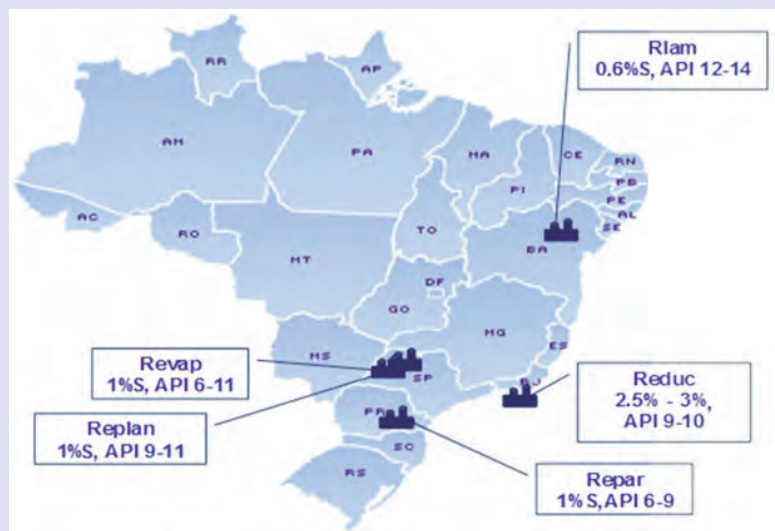
Petrobras Refining and Fuel Oil

Petrobras' 13 refineries in Brazil have aggregate refining capacity of 2.2 million bpd. The majority of Petrobras' refineries are located in southeastern Brazil, an area that is more densely populated and GDP-intensive than the rest of Brazil. In addition to domestic refineries, Petrobras has aggregate crude refining capacity of 281 kb/d at refineries outside Brazil (with plants in the United States, Argentina, and Japan).

In 2014, Petrobras exported 85 kb/d of fuel oil, with LSFO accounting for 75% percent. Petrobras is expected to export 60 kb/d of fuel oil in 2015, with LSFO accounting for 75% percent. Petrobras exports fuel oil from five refineries. Of the five, four export LSFO (Rlam, Repar, Replan, and Revap). Reduc exports HSFO. The LSFO grades are sub 1%S and the HSFO averages 3%S. (See the accompanying map.)

The Caribbean is the main destination of LSFO exports and Asia is the preferred market for HSFO exports. The cargo arbs depend on quality, price differential, and logistical costs. Brazil's exclusion from the Generalized System of Preferences in the European Union in January 2014 made Brazilian fuel oil less competitive for European users. As recently as December 2011-January 2013, Petrobras was a contract supplier of LSFO to the Electricity Authority of Cyprus.

PETROBRAS, FUEL OIL EXPORTING REFINERIES



In line with its international trading, Petrobras leases fuel oil tanks in the Caribbean and Singapore. In the Caribbean at NuStar's St. Eustatius terminal, Petrobras leases 1.4 million barrels of fuel oil storage. Petrobras leases 1.2 million bbls of storage at Helios in Singapore.

Key Sources of LSF0 Demand

Three sources of fuel oil demand in the Western Hemisphere are considered.

Brazil

Brazil's electricity generation is based largely on hydro power. In 2013, hydro accounted for 71 percent of Brazil's electricity generation. Other sources of generation were: natural gas (11 percent), biomass (8 percent), and petroleum products (4 percent).

Since 2013, Brazil has experienced a reduction in water levels at its hydro facilities because of severe drought. Indicative of drought conditions, the stored hydro energy in southeast/central region of Brazil dipped from 80% capacity in early 2012 to 30% in early 2015. In the same period, the stored hydro energy in the north/northeast region fell from around 90% to slightly over 40%.

In order to make up for the loss of hydropower, Brazil, at Signiant economic cost, has turned to oil- and gas-fired power plants. (Despite a better 2014/2015 rainy season, hydro facilities are still experiencing low water levels in 2015.) Internal fuel oil consumption for these power plants ran approximately 250 kt to 300 kt per month from August 2014-Feb 2015. By contrast, from August 2013-November 2013, fuel oil consumption ran from close to zero to 150 kt per month. The plants burn 1%S max fuel oil. Reflecting heightened internal demand for LSF0 for power generation, more of Petrobras's LSF0 barrels are going to the internal market than before the drought.

Puerto Rico

The biggest consumer of LSF0 in US territory, the Puerto Rico Electric Power Authority (Prepa) consumes roughly 1.3 million barrels/ month of 0.5%S max fuel oil. For Prepa's Aguirre plant on the south-

ern coast, fuel oil arrives at Guyanilla. From Guayanilla it moves by pipe to the Corco storage facility and from there it is barged to Aguirre. Costa Sur, also on the southern coast, is supplied by 100-230 kbbl cargoes or via pipeline from Corco. The fuel oil supply for Prepa's San Juan and Palo Seco plants, both located on the northern coast of the island, arrives at the Puma Energy Caribe Terminal at Bayamón as well as the Puerto Rico Ports Authority docks. The material is then moved via pipeline from these coastal sites to the San Juan and Palo Seco plants. The St. Eustatius terminal is in close proximity to Puerto Rico making the terminal logistically advantageous for supplying its fuel oil.

Material from various sources (including Brazil, the US, Europe, and Africa) can be used in blending to the 0.5%S Puerto Rican specification. When heavy feeds in the US Gulf are well supplied (as has been the case in recent months), some LSSRs (sourced, for example, in Cameroon, Congo, and Gabon) can be used in blending for Puerto Rican power generation.

Argentina

In past years, Argentina has imported as much as 1 million mt of 1%S max fuel oil in its winter season. However, Argentina's 2014 winter consumption of 1%S fuel oil import requirements were lower than anticipated due to an increase in local fuel oil output and a milder winter. Higher competition from the US East Coast/US Gulf Coast made this market less attractive for Petrobras. The reasonably robust differentials between 0.5%S and 1%S in 2014 made the Caribbean market more attractive than Argentina for Petrobras. The 0.5%S differential expanded from about \$5/bbl in early 2014 to over \$15/bbl by late 2014. In early 2015, the 0.5%S/1%S differential ranged from around \$12-18/bbl.

LS Bunkers

The ECA cap of 0.1%S has more or less spelled the end of demand for 1%S bunker fuel in the Caribbean (and elsewhere). As recently as 2013, the LS bunker demand ran an aggregate 500 kb per month in Panama, St. Eustatius, and Puerto Rico. With the end

of the 1%S ECAs, the Far East is rather well supplied with LSFO, with increased competition to supply regional utilities. Reflecting reduced demand, LSFO components are going into the HSFO bunker pool.

Conclusion

Given existing water levels, Brazil's ther-

mal power plants will continue to burn fuel oil, natural gas, and diesel over the short term. Over the next few years, Puerto Rico will continue to burn LSFO in large quantities over the next few years due to lack of investment in alternative generation. Market dynamics for fuel oil will be transformed when the high seas go to a 0.5%S cap on bunker fuel as early as 2020. ■