# *ASSESSMENT OF NATURAL GAS MARKET IN THE UNITED STATES AND POTENTIAL EXPORTATIONS OF LIQUEFIED NATURAL GAS TO BRAZILIAN MARKET*

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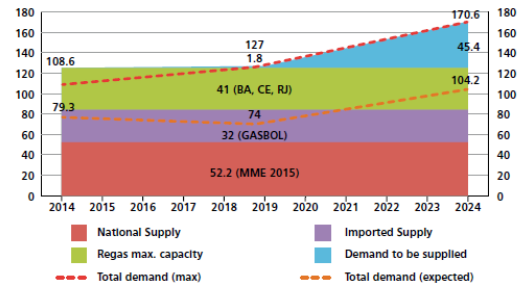
## Overview

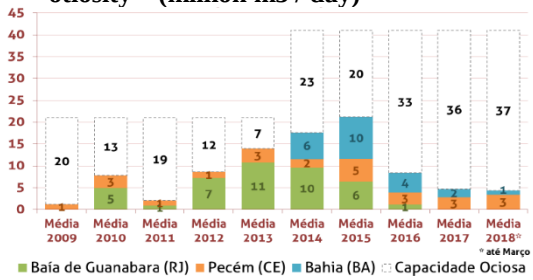
The aim of the present work is to assess the Natural Gas market in United States (US) and how its recent increase on liquefaction capacity could lead the US to be one of the world's main exporter of Liquefied Natural Gas (LNG). It will be also assessed the feasibility of exports of LNG from US to Brazilian regasification terminals. In the last years, the natural gas markets in the US faced strong development in the application of technologies used for hydraulic fracturing, that enabled a significant increase in the US oil and Natural Gas (NG) production. This growth in production and export capacity was about 5 times in the last 2 years (IEA, 2018). With the completion of new structural projects in the GN and LNG chain such as the Sabine Pass project, located on the US Gulf Coast, near the Louisiana-Texas border and along with other projects, the US country will have a total LNG liquefaction capacity of 9.6 $Bm^3$/day by the end of 2019. The overall use of existing LNG liquefaction plants in the year 2017 averaged 80% and this year in the order of 79% (EIA, 2018). Several factors may affect utilization rates, including weather-related disruptions, demand fluctuations, seasonality in import markets, schedules for production of new LNG facilities, and maintenance of existing facilities. The year 2017 was impacted by lower spring demand in the Asian and European markets and the disruption caused by Hurricane Harvey in August 2017. After this event, production resumed with the capacity rate reaching 96% in November of the same year, remaining well above 90% in the American winter of 2017-2018. Resulting in expected winter demand and high LNG prices in Asia and Europe. In front of this abundance of natural gas, the pricing of global commodities Argus agency, reported that the EIA (2018) revised downward its average price forecast for 2018 Henry Hub (HH: warehouse used as a price reference for marketing GN in the United States, located in the state of Louisiana) to US$2.99/MBtu (Millions of British Thermal Unit) of its previous expectation of US$3.01/MBtu on the increase in rates of production. The EIA expects the average price to increase to US$3.08/MBtu in 2019. Howard (2018) demonstrates that the over-supply of US LNG was triggered by recent projects under construction, with commissioning expected soon, and which may cause a prices decrease. However, the IEA (2018) points out that even with this over- supply, global demand for NG and global LNG trade should increase substantially in the medium to long term due to low energy costs in a number of global markets. The imported LNG price is competitive to the Brazilian market when it is lower than the domestic and imported supply option or if there is a short of supply from existing sources. The former is observed as 4 to 7 US$/MBtu (Secretary of Energy of the State of São Paulo, February 2018). LNG low prices are currently available on the international market as showed by ARGUS (January 2018) as US$5,25/MBtu, which can be concluded that represent a commercial viability to brazilian market. The latter is dependent on the demand for NG in Brazil, which has grown 3,4% per year from 2006 to 2018, facing two downturns in the time series, the first in 2009 and the second between 2016 and 2018, mainly triggered by lower economic activities. The current supply sources of NG comprise the domestic production, the import pipeline from Bolivia and three LNG import terminals. terminals. These terminals have their capacities and idleness highlighted in the chart 2, and which is ranging from 33 to 37 M $m^3$/day (Millions of cubic meter per day) in the past three years.

**Chart 1: Supply and Demand Curve**




**Source**: Da Silva et al (2017).

**Chart 2: Brazilian LNG Import capacities and otiosity (million m3 / day)**




**Source**: Secretary of Energy of the State of São Paulo (2018).

The multiple sources o supply is encouraged by several authors for several years, as sad by Brazilian Industrial Confederation – CNI with the Brazilian Great Industrial Energy Consumers Association– ABRACE (2018), due to

the increase the level of security and flexibility of supply. Santos (2004) points out the need to flexible natural gas supply according to the particularities of Brazilian gas consumption. The flexibility demand by the NG mix in Brazil can be be observed in Chart 1, which shows that 45,4 $mm^3$/day of not firm demand[1] still not having a supply source.

## Methods

The development of this work is based on review of primary and secondary data from exportations and markets demands from the US and Brazil. Data from Brazilian Ministry of Mines and Energy, the State of São Paulo Energy Secretary and international institutions such as the American Energy Agency, International Energy Agency - IEA and private consultants and pricing platforms like Argus, Reuters and IHS Markit. This data is also draw from sources of books and internationally published articles and historic analysis from decades ago involving up to the last years in order to compile a database of global information on LNG. To show the feasibility of this US LNG supply to Brazil will be showed by net back metodology, that, as a simplified explanation, determine the price by removing the costs of production and downstream costs from the average price.

## Results

The trending is that LNG low prices get currently available on the international market including Brazil. This competitive oportunity depends on some conditions like long term contracts os other that will be soon demonstrated. In this way, the authors expect to show that US LNG exportation could supply demands on brazilian energy market.

## Conclusions

Brazil is gradually working with LNG imports, which until today is in the hands of Petrobrás, but soon by other agents such as Prumos Energia in Rio de Janeiro and others. With the American boom and toppling Heny Hub prices used as a pricing benchmark in many of the current contracts, it will provide more attractive financial conditions for importing into South American countries such as Brazil. Some national companies demonstrate that they are visualizing this feasibility with projects of implantation of the structure of terminals of regaseificación tied to a unit of thermal generation of electric energy.

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[1]The diference between Total demand (max) and Total demand (expected) is dependant on the power plant dispatch level.