LNG consumption: prospects of world and Asian demand in the face of nuclear energy evolution

William Clavijo, william.vitto@pped.ie.ufrj.br
Niágara Rodriguez, niagararodrigues@gmail.com
Renato Queiroz, rpqueiroz2010@gmail.com
Edmar de Almeida, edmar@ie.ufrj.br

1. Overview

The world market for liquefied natural gas (LNG) has grown rapidly in recent years. The volume of LNG traded went from 100 MTPA (million tonnes per year) in the year 2000 to 244.8 MTPA in 2015, expanding by an average of 6.6% since the year 2000, although it decreased to 2.2% between 2010 And 2014 (IGU, 2016). This growth was mainly driven by higher oil prices and demand pressures stemming from concerns about security of supply. The main driver of the growth in the world 's demand for LNG is in the countries of the Asia - Pacific region. The demand in this region more than offset the fall in European demand over the last decade.

The Fukushima nuclear accident, which resulted in the shutdown of Japanese nuclear reactors and the abandonment or freezing of nuclear programs in other countries - like Germany, as well as optimistic predictions about the chinese economic growth - stimulated investments to increase the liquefaction capacity of natural gas in the producers countries. Thus, it is estimated that by 2020 the global liquefaction capacity will reach 437.7 MTPA, a 40% increase over 2014.

Despite the strong expansion of the LNG market between 2000 and 2012, the dynamics have changed since 2013. This change began with a drop of european demand and accelerated with the recent cooling of demand from the main asian consumers, generating uncertainty about the Possibility that demand may continue to following the supply growth in the coming years. The picture was complicated by the fall in oil prices in September 2014 and its effect on LNG cargo prices.

Thus the year 2014 inaugurated a new cycle for the international LNG market marked by excess supply and falling prices, which should remain until 2025 (IEA, 2015). However, the growth in LNG demand is conditioned by the behavior of the Asian economies and the uncertainties related to their energy policy decisions in the coming years. In this sense, three key issues must be considered: the speed of nuclear power retaking in Japan and the expansion of nuclear programs of LNG importing countries such as Korea, China and Taiwan; The greater penetration of new renewables (wind, solar and biomass) in the world energy matrix; And finally, the future behavior of the Chinese economy[1].

Considering that Asia will be the engine of the growth of the global LNG demand, it is essential to know the behavior of these countries for the next years. Therefore, the present article will estimate the global and Asian demand for LNG as a function of the growth of the nuclear energy evolution, in order to do forecast for a 2030 horizon.

2. Methodology

The methodology used to estimate global LNG demand is the time series model, called the Error Correction Vector (VEC). The estimation of the cointegration vector was performed using the method of Johansen (1988) and Johansen and Juselius (1990). The parameters of the global demand function for LNG $(Dgnl_t)$ was estimated from the following relation:

$$Dgnl_t = \beta_0 + \beta_1 Cenel_t + \beta_2 Nucl_t + \beta_3 DF + \mu_t$$

[1] The IEA (2014) demand forecasts for the year 2020 are well below what the Chinese government itself projects for the same period (BORDOFF and HOUSER, 2014). According to IEA (2014) in 2020 China's consumption will be close to 295 bcm / na, while Chinese planning consumption will reach 400 bcm / year

in which $Cenel$ is the world's electricity consumption in period t, which varies from 1994 to 2013, $Nucl$ is the world production of nuclear energy in year t, μ is the error term. The dummy variable (DF) was added to the model in order to capture a possible structural change in LNG demand due to the Fukushina nuclear accident and the Japanese decision to shut down its nuclear reactors.

Also, the participation of renewable energy sources in the world's electricity consumption will be discounted, since the participation of renewable sources in the electrical dispatch causes the displacement of the gas plants, and therefore reduces the need to import LNG For the generation of electric energy.

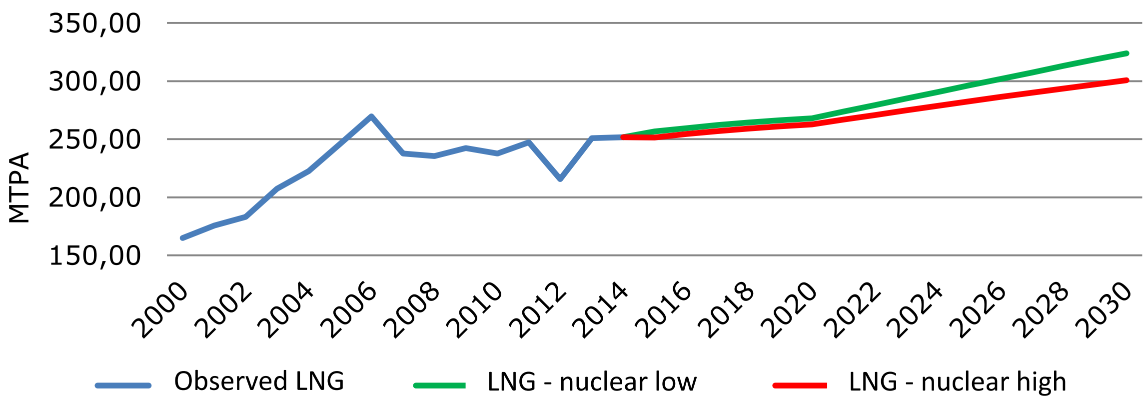
3. Results and conclusions

The demand for LNG was more sensitive to changes in energy consumption than to variations in nuclear power production, which seems quite reasonable. The long-run average elasticity-electricity, in the analyzed period, is elastic, that is, it is higher than unity (-1.64). Long-term nuclear elasticity is less sensitive (0.35).

The DF dummy is not significant and did not capture the expected signal, so the shutdown of Japanese nuclear power stations did not represent a significant impact on the variation in the world demand for LNG.

The predictions were based on two scenarios of participation of nuclear energy in the generation of electric energy, high and low nuclear. Considering the Low Nuclear Scenario, total LNG demand in 2020 could reach 268.03 MTPA and 324.05 MTPA by 2030. The projection of LNG demand in the Nuclear High Scenario may reach the amount equivalent to 262.76 MTPA In 2020 and 300.69 MTPA in 2030, as can be seen in Figure 1.

Figure 1 - Projected global LNG demand



Source: Search results.

The small inter-relationship between the nuclear and LNG markets can be observed through the low sensitivity found in the model, 0.35. Thus, in both the high nuclear and the nuclear low scenarios the variation in the expected LNG demand is small. The variation in global LNG demand between the scenarios (high and low nuclear) in 2020 is 2% and in 2030 it is 7%.

4. Bibliography

International Gas Union (IGU). World LNG Report. 2015.

JOHANSEN, S. Statistical analysis of cointegrating vectors. Journal of Economics Dynamics and Control, v. 12, p. 231-254, 1988.

JOHANSEN, S.; JUSELIUS, K. Maximum likelihood estimation and inference on cointegration with application to the demand for money. Oxford Bulletin of Economics and Statistics, v. 52, p. 169-209, 1990.