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BRAZILIAN GAS MARKET AND ITS REGULATORY OVERVIEW

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Abstract

This article offers a brief analysis for better understanding the current Brazilian regulatory framework regarding the distribution of natural gas (NG), especially considering the innovations introduced by the Gas Law (11.909/2009) and the current debate concerning the New Market Program. The methodology consisted of a literature review and survey of various data to analyze the Brazilian gas sector from the perspective of political risk and the New Institutional Economics (NIE) analysis. By using this methodology, it is clear that the current regulatory framework creates a disparity of scenarios throughout the Brazilian territory. In essence, that legal uncertainty prevents greater investment in the gas sector.

Keywords: natural gas industry; regulatory framework; Brazilian Congress; Law Gas.

1. Introduction

NG contributed a small share to the Brazilian energy matrix in 1990. However, this scenario changed a bit in the late 1990s through increasing imports of gas through the Bolivia Brazil Gas Pipeline (GASBOL) Project—an intergovernmental initiative. This pipeline may be considered a milestone in the Brazilian NG infrastructure because it provided firmer and

conditions for gas supply and enabled the consequent expansion of the gas market (Moutinho dos Santos *et al*., 2002).

A second investment wave in Brazilian NG trade history started with the Natural Gas Massification Plan, launched in late 2003. This plan, along with the freezing of NG prices, enabled NG to better compete with substitutes and resulted in increased consumption of gas. Since then, NG has been more frequent in the Brazilian energy sector (Sonja, 2014). It increased Brazil's energy security, ensured the diversification of the Brazilian energy matrix, reduced pollution, and reduced GHG emissions compared to the burning of oil and coal (Moutinho dos Santos et al., 2002; Brito et al., 2017).

Moreover, Brazil is expecting an increased supply of NG in the coming decade. In addition, the country is expected to see a 77% increase after 2025, due to associated gas production from giant reservoirs in the Pre-Salt oil province (Fiorenze et al., 2013; EPE, 2020). Clearly, NG has enormous potential. However, Brazil has been facing challenges that hinder the full development of this resource. The greatest issue is a lack of infrastructure and regulatory harmonization in approaches by the federal Union and the Brazilian States, which leads to legal insecurity and political risk. This paper focuses on those regulatory challenges. Section 2 discusses Brazilian NG rules. Section 3 presents our theory approach based on New Institutional Economics (NIE) analysis, and how institutional changes work. Section 4 offers our analysis of the New Gas Market Policy and how its institutional change is trying to improve the Brazilian regulatory framework. Finally, we present some conclusions related to the potential that those changes may increase the efficiency and to reduce the price of NG in Brazil.

2. Brazilian Natural Gas legal scene

The Oil Law (Law No. 9.478/1997) and Gas Law (11.909/2009) are the main federal laws currently addressing NG in Brazil. The Oil Law addresses the upstream issues and regulates NG production activities by the oil industry. Before the Gas Law, the Oil Law provided interested parties access to transport pipelines and terminals. In addition, the regulatory agency, the National Agency of Petroleum, Natural Gas and Biofuels (ANP), was responsible for authorizing both deployment and operation of NG transport facilities (Araújo et al., 2018).

Although the Oil Law covers several points regarding the NG chain, it has proved to be insufficient to effectively regulate the entire NG industry

(Costa, Tome and Silva, 2019). The Oil Law failed to promote the entry of new and private companies in the transport sector (Costa et al., 2018). Reduction in NG private investments and conflicts among Brazilian State-Owned Enterprise (SOE), Petrobras, and private investors over access to the Bolivia-Brazil gas-pipeline exemplified the lack of effective regulatory mechanisms (Costa, Araújo and Mascarenhas, 2019). This situation increased risk and discouraged new investments in the transport sector (Colomer Ferraro and Hallack, 2012).

The Gas Law introduced the concepts of self-producers (NG producer and explorer agents who use all or part of their own production as raw material or fuel in their industrial facilities), self-importers (agents authorized to import NG for use of all or part of the imported gas as raw material or fuel in their industrial facilities), and free consumers (agents who have the option to purchase NG from any production, import, or trade agent) (Negreiros, 2013). In addition, the 2009 Gas Law empowered ANP to authorize and facilitate NG trading activity in the federal sphere by registering NG supply contracts, NG self-producers, and self-importers (Araújo et al., 2018).

Nevertheless, the cross-participation of Petrobras in all sectors prevented the entrance of other potential investors in the transport sector. Thus, factors such as market design provided a barrier to competition (Colomer Ferraro; Hallack, 2012). The new reforms are intended to end the Petrobras monopoly. These reforms followed the structure adopted in the USA to deregulate the gas sector through Order 636, issued in 1992 by the U.S. Federal Energy and Regulatory Commission (FERC) (Costa and Araújo, 2018). This order required interstate pipeline companies to unbundle their gas purchases and sales from the transport service, and to open access to the gas transport and storage infrastructure. It helped encourage the development of market centers at the various interconnections of the interstate pipeline system (Sant Ana et al., 2009).

2.1. Before the institutional change in 1995: historical review

During the colonial period (1500-1822), the Brazilian subsoil ownership belonged to the Portuguese crown (Regalian system). After Brazilian gained its independence in 1822, the Brazilian Empire became the owner of the underground mineral resources (Domanial system). In 1889, with the Republic Proclamation, mineral ownership belonged to Republic of the United States of Brazil[1]. From 1891 to 1934, under the influence of the

1. In 1967 the name of the country was changed to *Federative Republic of Brazil*.

America legal system and liberal political ideas, minerals could be owned privately (Accession system)[2].

In the early 1930s, petroleum started to be seen as a strategic asset, which coincided with the growth of Brazilian nationalism. Consequently, the Brazilian Federal Constitution of 1934 guaranteed mineral ownership in the Brazilian Federal Union. However, a private party could secure a right to explore for and extract petroleum by obtaining a private license.

At the beginning of the Getulio Vargas' dictatorship, the Brazilian Federal Constitution of 1937 closed the oil market to foreign capital. In 1938, the Petroleum National Council regulated the petroleum sector, and allowed for geophysical exploration and to engage in oil exploitation. In the mid-1940's, the Vargas government carried out a populist and nationalist campaign that included the slogan, "the petroleum is ours".

In 1953, Law 2004 was enacted, creating the SOE Petróleo Brasileiro S.A.—Petrobras, Brazil's national oil company. This Law established a federal monopoly over all aspects of the petroleum industry (except for the export, import, and distribution of fuels)[3]. The CNP retained an inspection role (Petrobras, 2019).

During that period, Petrobras had many different functions. Before the first oil shock, its basic role was to be a gasoline supplier (wholesale distribution and retail via service stations) (Petrobras, 2019) because there were no large oil discoveries in Brazil. In 1961, Walter K. Link, an American geologist, was contracted by Petrobras to perform geophysical (seismic) exploration. He determined that, given the available technology, no commercial oil or NG deposits were present in Brazil's NG Paleozoic lands basins.[4] (Petrobras, 2019).

During the 1970s oil shocks, importer countries realized the dangers of dependence on oil from exporter countries. In this context, many countries faced new challenges in applying energy conservation programs and sought alternative sources of oil, including new frontiers for petroleum exploration in the North Sea, Alaska, deep offshore, and in developing countries. Common denominators of these new frontiers were higher exploration, development, and production costs (Petrobras, 2019).

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2. Article 72, § 17: "The mines belong to the owners of the land, subject to the limitations that are established in the law and the holding of this branch of industry."

3. In 1963 the monopoly was extended, covering also activities import and export oil and derivatives.

4. Marajó, Acre, Baixo Amazonas, Médio Amazonas, Paraná, and Parnaíba Sedimentary Basins.

In 1984, Petrobras made its first discovery of oil reserves (more than one billion barrels) in the Albacora oilfield in the Campos basin, Rio de Janeiro (Petrobras, 2019). Since then, additional discoveries of major reserves have been made in Brazilian waters (Petrobras, 2019).

By the end of the 1970's, Brazil adopted a "risk-service" form of host-government contract to improve performance in the petroleum exploration and production sectors (Silva and Costa, 2019). The form of contract was intended to attract foreign and private investments for Greenfield areas, which aimed to find more oil reserves in order to help the country to reduce oil import dependence and its negative effects on the Brazilian macro-economy.

However, no relevant oil field was discovered in areas under the risk-service contract regime and many investors did not find the risk-service contract form to be attractive. In 1988, the Federal Constitution banned risk-service contracts and the original text of Article 177 prohibited any assignment or grant in the exploration, production, refining, importation, exportation, or transportation of crude oil and NG. The that Federal Government declared itself the sole owner of all oil and NG deposits existing in the Brazilian national territory, including the inland, the territorial sea, the continental shelf, and the exclusive economic zone (Article 20, item IX of The Federal Constitution).

2.2. The institutional change in 1995

Like many Latin American countries, Brazil has a shifting history of greater or lesser oil nationalization. Law 2.004/1953 represented a victory for nationalist politicians by establishing a federal oil monopoly through Petrobas, under the guidance of a National Oil Council. After two decades, President Ernesto Geisel announced a small opening for the private oil sector, with risk-service contracts, which, in part, sought to reduce the federal budget that financially supported Petrobras (Belchior, 1988).

During the 1980s, often called the "lost decade" from an economic perspective, a strong nationalist movement within the Brazilian Congress resulted in a cautionary approach by private investors, including those that held petroleum risk-service contracts. The Brazilian Congress enacted the current Federal Constitution in 1988, which reestablished the federal oil monopoly and forbade new risk-service contracts. However, the Constitution created a mechanism to assure legal certainty for existing agreements between Petrobras and the private sector. Once again, the nationalists prevailed over liberals.

In 1995, the Brazilian Congress enacted the Constitutional Amendment no. 09, which preserved the federal petroleum monopoly but ended the Petrobras monopoly by allowing private investment in the petroleum sector[5]. Two years later the Brazilian Congress passed the Petroleum Law no. 9478 that "deals with the national energy policy, activities related to the oil and gas monopoly, creates the National Council for the Energy Policy (CNPE) and the National Petroleum Agency (ANP) and makes other provisions" (Law 97/9478).

With regard to petroleum reservoirs, Article 3 of the Petroleum Law provides that the Federal Government owns the petroleum, NG, and other fluid hydrocarbon accumulations existing in the national territory, which includes the onshore area, the territorial waters, the continental shelf, and the exclusive economic zone. Moreover, Article 26 of the Petroleum Law provides for petroleum concessions whereby the private concessionaire assumes all risk and expense of exploration, development, and production. In essence, if exploration methods are successful, then the concessionaire is entitled to the petroleum it produces from the concession area (block), subject to production royalties, income taxes, and for large discoveries a special participation levy—a form of special petroleum tax.

Since 1995, these institutional changes have been important to the development of the Brazilian oil industry. First, Brazil showed that it could create a transparent environment under the rule of law, including an independent regulatory agency (ANP), so that investors could feel comfortable doing business in the petroleum sector. According to Article 8 of the Petroleum Law, the purposes of ANP are to promote regulatory measures and investment contracts and to monitor economic activities inherent to petroleum and NG, including the concession agreements and the holding of bid rounds[6]. The Petroleum Law provisions were intended to attract investments, which the Brazilian government needed to prove its capacity for planning and building a stable investment environment.

5. According to this Law - Article 5 - authorizes regulation of and contracting with private companies organized and headquartered in Brazil.

6. Since the new oil industry framework, in 1997, until 2017, oil proved reserves increase from 7,1 to 12,8 billions of barrels, while natural gas proved reserves decrease from 410 to 365 billion of m^3.

Second, although Petrobras continues being dominant in the Brazilian upstream, legal changes have encouraged companies to share expertise and experience with Petrobras, through contractual joint-venture mechanisms. Both institutional changes have contributed to increasing investments in the Brazilian oil industry.

The Brazilian Congress has endeavored to reform the NG distribution sector. Before 1988, NG distribution was not foreseen in the Brazil Constitution. The Brazilian Congress incorporated NG service under State power, but with a nationalism footprint, whereby each State was allowed to engage in economic activities for NG distribution through public utilities. In 1995, President Fernando Henrique Cardoso submited Constitution Amendment no. 05 for congressional discussion, which prohibited the use of legislative instruments by the State Executive Power to regulate NG services.

Ore-2009, the law still established a complex NG regulatory scheme. All NG activities were regulated by the Union, except NG distribution, which was regulated by each State. This structure resulted in a lack of regulatory harmony for the NG industry.

2.3 Law 11.909/09 – The Gas Law

The 2009 Gas Law addressed deficiencies under the prior law concerning NG transport as well as NG treatment, processing, storage, liquefaction, regasification, and commercialization. It addressed all of these issues within the federalism limitations of Article 177 of the Federal Constitution. This Law also amended certain provisions of the Petroleum Law. The key differences between the Petroleum Law and the Gas Law are described in Table 1 below.

Under the Gas Law, the transport, import, or storage of NG may be performed by corporations or consortia at their own risk. Their formation is governed by Brazilian business laws, and their headquarters and administration must be in Brazil. The corporation/consortia must submit to the following transport regimes:

a) a concession, preceded by a bidding process, shall be applied to all transport gas pipelines considered as being of general interest; or

b) authorization shall be applied to the transport gas pipelines that involve international agreements.

The Ministry of Mines and Energy establishes guidelines for the use of pipeline capacity and studies its expansion. Under the guidelines, the Ministry may propose how gas is transported through pipelines, be built, or expanded. In addition, they define the concession or authorization terms of contracts. NG transport concessions have a term of thirty years from the date of the agreement's signature but may be extended for an equal term under conditions set forth in the concession agreement. ANP administers the bidding process for concessions. Third-party access to pipelines is ensured by Article 33 of the Gas Law, which prescribes access through three types of transport services: interruptible, firm, and extraordinary. In addition, it applies to available capacity and, after its full hiring, to idle capacity for interruptible services (Pinto, 2014).

The NG transport sector is considered a natural monopoly as well as an essential facility. Therefore, ANP is responsible for establishing the rules that guarantee third parties open access to transport installations, and for solving possible conflicts, as determined by art. 58 of Petroleum Law. Under the 2009 Gas Law, ANP has a duty to authorize the commercialization of NG, to promote bidding rounds, and to establish and execute concession contracts for pipelines; to regulate and approve NG transportation rates, and to inspect NG pipelines, and to monitor pipeline transport contracting practices. The Agency also regulates and inspects the warehousing of NG, oversees the transportation of the product in the network, and coordinates transport in certain contingency situations. (Gas Law, 2009).

A Directive issued in 2016 (ANP 11/2016) establishes rules for several aspects of natural-gas transport among them: service providers in NG transport, operational swap of NG, and the hiring process for capacities of transportation NG. A party having a firm transport right may assign (transfer) all or a portion of its capacity. To preserve the Carrier's rights, ANP regulates the capacity assignment (Gas Law, 2009). Further, ANP works to promote expansion of the gas pipeline network.

Table 1: Petroleum Law versus Gas Law.

Rules	Law 9.478 (1997) **(Petroleum Law)**	Law 11.909 (2009) **(Gas Law)**
Third party access	Negotiated between the parties	Open season procedures for firm transport service
Transportation	Negotiated between the parties	Set (concession) or approved (authorization) by ANP
Tariffs	---	---
Storage	---	Concession or authorization by ANP
Import	Authorized by ANP	Authorized by MME
Gas trading	No regulation	Authorized by ANP
Shortage	---	Overseeing of transmission by ANP
NG transport	Authorized by ANP No contracts signed between transporter and ANP No expiration date for authorization	Concession by ANP Concession contracts signed with ANP last for 30 years Authorization by ANP cases
Gas quality	Standards set by ANP	Standards set by ANP
Transport contracts	Sent to ANP after signed	Previous approval by ANP
New pipelines	Proposed by players	Proposed by MME

Decree 7.382/2010 regulates Chapters I through VI and VIII of Gas Law 11.909/09. It provides that the Ministry of Mines and Energy shall:

I. propose, on its own initiative or driven by third parties, the transport gas pipelines that shall be built or expanded;

II. establish the guidelines for the transport capacity hiring process;

III. define the authorization regime applicable to each case to the NG transport activity (Article 6).

For objectives driven by third parties, or based on its own initiatives, the Ministry of Mines and Energy must prepare a Ten-Year Plan for Expansion of the Gas Pipeline Transport Network (PEMAT), preferably revised on an annual basis based on studies by the Energy Research Company – EPE (Croso, Santos, 2014; Croso, 2015). When PEMAT was published in 2014 (EPE, 2014), the only new eligible gas pipeline project was the Guapimirim-Itaboraí (Rio de Janeiro) project. This pipeline will be 7 miles long and will transport 17.4 cubic meters/day from Guapimirim, one of the arrival points of gas from the pre-salt fields, to Itaboraí to supply gas to a new gas petrochemical complex COMPERJ. (Iberglobal, 2014). However, Petrobras recently announced that COMPERJ construction is under review and that the pipeline bid round was suspended indefinitely.

3. New Institutional Economics: methodologic pathway

This paper analyses the Brazilian NG Law and its main framework in light of parameters from Transaction Cost Economic (TCE) literature, which "tries to explain what institutions are, how they arise, what purposes they serve, how they change and how they may be reformed." (Klein, 1998). TCE is one branch of the New Institutional Economics Theory (NIE) and involves theoretical explanations about the governance of contractual and legal relationships, incomplete contracting, opportunism, and bounded rationality.

The NIE seeks contributions from different disciplines—economics, law, scientific administration, sociology, and anthropology—to explain the nature and evolution of a wide variety of institutions. NIE is an important tool for better understanding the various interfaces between the economic system and the legal institutions that condition economic activities. For NIE, "firms, markets, and relational contracting are important economic institutions" (Williamson, 1979). Also, Williamson (1979) says that "the economic institutions of capitalism have the main purpose and effect of economizing on transaction costs."

TCE focuses on the transaction as a basic unit of its analysis theory and explains the previous costs existing before the agreement's conclusion, called ex-ante costs. These costs involve drafting, negotiating, and safeguarding an agreement under a legal framework, which are considered in a broad context.

Contractual and legal problems might arise after an agreement's conclusion due to the parties' limited rationality and the impossibility to foresee all future troubles. These costs are called ex post costs[7]. Thus, it is necessary that the parties attempt to negotiate a process to govern their relations in order to avoid conflicts that could result in an anticipatory breach. One of the parties could be oportunist due to the contract being incomplete. Hence it is important to create contractual safeguards (Brousseau and Glachant, 2008) by creating mechanisms for coordinating and accomplishing the governance of the contract.

According to Douglass North (1992), the needs of human beings constrain human interaction in order to structure the exchange in society due to incomplete information and limited mental capacity by which to process the information. Incomplete information and limited mental capacity determine the transaction costs which underlie the formation of institutions. Business firms, long term contracts, public bureaucracies, and other kinds of arrangements are called institutional arrangements (Klein, 1998). The role of these arrangements are to reduce the costs and the uncertainty of human exchange. These costs and uncertain scenarios are significant because they influence human choice.

The rules and contracts, functioning as institutional arrangements, aim to reduce the uncertainties inherent in human relationships and the costs resulting from incomplete information and limited mental capacity. This economic explanation is used and interpreted by law science to determine the relevance of, and need for, creating clear contractual clauses that define contractual safeguards, bounding rights and obligations, restricting contractual terms, demarcating the objective of the contract and its definitions, foreseeing the paths of breach, and governing rescission and termination.

For instance, following a brief exposition about the contractual evolution, Williamson (1979) clarified that contractual drafting will be

7. For Oliver E. Williamson (1979), "Ex post cost of contracting take several forms. These include (1) maladaptation costs incurred when transactions drift out of alignment (2) haggling costs incurred if bilateral efforts are made to correct ex post misalignments; (3) setup and running costs associated with the governance structures (often not courts) to which disputes are referred, and (4) the bonding costs of effecting secure commitments."

driven, generally, by two paths: "a complex document is drafted in which numerous contingencies are recognized, and appropriate adaptations by the parties are stipulated and agreed to in advance. Or the document can be very incomplete, the gaps to be filled in by the parties as the contingencies arise". The choice would depend on the parties' goals, and it results in either flexible or rigid clauses. In general, one way to minimize the ex ante costs may be to use a form contract.

The institutional environment based on rules is the primary factor for agents' contractual choices. These choices are based on trade-offs between the costs and benefits of relying on alternative coordination mechanisms, either designed by agents (contracts) or provided by society (institutions) (Brousseau and Glachant, 2008).

According to Williamson (1979), there are three critical dimensions which characterize transactions: (i) uncertainty; (ii) the frequency with which the transactions happens, and (iii) the degree to which durable transaction-specific investments are incurred. Williamson classified uncertainty as a critical attribute; "and that frequency matters is at least plausible". These three dimensions apply to transactions of all kinds, including contracts, rules as well as laws. Based on this analysis, Ferraro and Hallack (2012) added that these three critical dimensions provide space for opportunistic behavior, raising investment risks. The authors also presented the application of co-ordination mechanisms and institutional stability to manage this situation, Figure 1 shows the investment risks diagram.

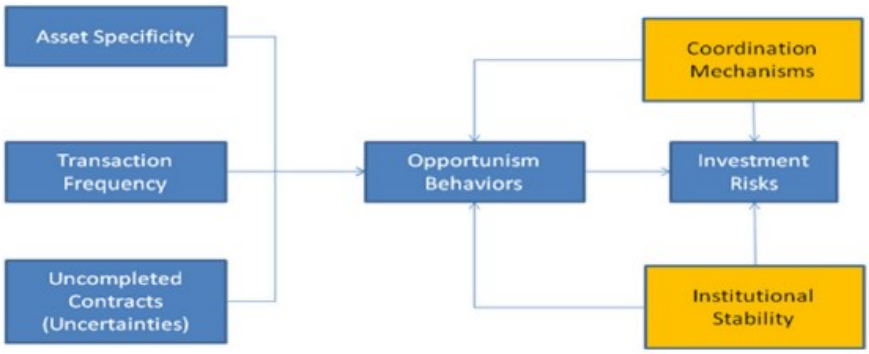

Figure 1. Investment risks. Source: Ferraro and Hallack (2012).

According to the authors, co-ordination mechanisms are structures that foster co-operation and enhance mutual trust between agents. These mechanisms are essential to stimulating investment in industries with high transaction costs, e.g., the NG industry. At the same time, the objective of the State as a regulator is to induce cooperation when the coordination structure of the market is unable to do so, but without institutional stability, the government provides a new source of uncertainties (Ferraro and Hallack, 2012).

Transaction-specific investments are investments where the value of this capital in other uses is, by definition, much smaller than the specialized use for which it has been intended. The supplier is effectively 'locked into' the transaction to a significant degree. This is symmetrical, however, in that, the buyer cannot turn to alternative sources of supply to obtain the item on favorable terms, since the cost of supply from unspecialized capital is presumably greater. Thus, the buyer is committed to the transaction as well.

Frequency involves transactional periodicity and can be characterized as one-time, occasional, and recurrent. Recurrent transactions create credibility between the parties and reduce transaction costs as more and more contracts are successfully performed.

Uncertainty relates to unforeseeable scenarios. Scholars have noted that "increasing the degree of uncertainty makes it more imperative that the parties devise a machinery to 'work things out' since contractual gaps will be larger and the occasions for sequential adaptations will increase in number and importance as the degree of uncertainty increases" (Williamson (1979).

In the New Institutional Economics context, long-term contracts can promote a robust framework, safeguarding both downstream and upstream parties in the NG industry. The experience of take-or-pay contracts in the Brazil-Bolivia gas case has shown three different phases in the parties' relations. During the final phase—the mature period of the contract—conflicts between the parties may arise due to changes in risk-sharing and in the stronger bilateral self-enforcement mechanisms present during the initial and middle phases. Thus, an independent third party may become important to ensure compliance with the contract, thereby reducing risks and conflict. (Glachant; Hallack, 2009).

It is not the goal of this paper to write about the difference between uncertainty and risk. Considering that risk is a form of uncertainty, some scholars attempt to measure the costs through market risk, legal risk, or political risk. In the petroleum industry, besides these types of risks,

Anderson (2014) cited commercial risk, completion risk, and operating risk. It is assumed that parties desire to minimize all of these risks.

Political risk is a special concern regarding NG. Political risk includes the risk of arbitrary actions of any government having jurisdiction over the parties or the contract, and the resulting lack of confidence to maintain contractual and legal rules. As already stated, the institutional environment is the primary factor for agents' contractual choices. Political risk is one of the most important factors that agents try to minimize when they decide to make a long-term, foreign investment. Thus, it is relevant to ponder whether the Brazilian NG legal framework minimizes political risk, especially in the LNG sector, which provides an important opportunity to expand Brazilian NG supply, demand, and use.

4. Results and Discussions: A New Market Program

On June 24, 2019, the Brazilian National Energy Policy Council (CNPE) released Resolution 16, which aims to establish guidelines and improvements to energy policies focused on promoting free competition in the NG market (New Gas Market Policy). Several guidelines were targeted in polemics—mainly those referring to the role of the dominant agent in the Brazilian gas market, Petrobras.

CNPE's resolution states that the agent occupying the dominant position in the NG sector should behave in a manner that will promote the total sale of the shares held by Petrobras, directly or indirectly, in companies engaged in NG transportation and distribution (CNPE, 2019). Petrobras, as a state-owned enterprise, held 100% of the NG transport capacity in the system. CNPE recommended a transparent disclosure of Petrobras's real and actual use of capacity, allowing other agents to access remaining capacity (RCGILex, 2019).

The political process, which resulted in normative changes, was followed by complementary actions. Before CNPE's decision, Petrobras sold the Associated Gas Transporter S.A. (TAG) to the Engie Group and a Canadian fund (CPQD)[8]. The deal was closed in April 2019 but not finalized until June 2019, due to claims that Petrobras had not observed the need for the endorsement of the Brazilian Congress. The sale of the controlling interest of subsidiaries of public companies and mixed capital companies without the need for legislative approval or a bidding process was analyzed by

8. In April 2017 the company had already sold it's 90% share of interests of NTS (New Southeastern Carrier), for the price of approximately US$ 5.2 billion.

Brazilian Supreme Court, which decided by majority to allows the sale on June 6.

Resolution 16 presents challenges that may need to be remedied by additional standards. For example, questions of how to harmonize the principle of respect for existing contracts and governance of state companies with the privatization recommendation and how to evaluate the opportunity and desirability of defining new concession contracts under federal entities competence need to be answered (Costa, 2019). In essence, there is a need for further dialogue between federated entities and the Union and for transitional rules (RCGILex, 2019).

In addition, the federal government launched the Fiscal Balance Promotion Plan (PEF), which aims to establish a program of fiscal tracking and transparency for states. Two of eight measures listed by the federal government for states to adhere to in the new PEF, are the privatization of state-owned NG enterprises and the implementation of reforms and measures for the provision of piped gas services that reflect good regulatory practices (including open access to consumers) in accordance with ANP guidelines.

Of course, those measures intend to create a harmonious environment between federal entities and the Union, as well as to decrease political risk. However, the agent distribution guidelines approved by the CNPE broaden the perception of risk for investing in the NG distribution sector, raising concerns about the lack of legal certainty. Yet, full compliance with current contracts limits the investment capacity of distributors (E&P Brasil, 2019).

Moreover, PEF's goal is to reduce the price of NG to the final consumer. The federal government believes that the divestment by Petrobras of its downstream NG assets will result in new competitive players that will improve the Brazilian gas market. Historically, Petrobras has sustained high gas prices; this is the main argument for the divestment of the NG assets that Petrobras controls. A parallel argument is made regarding the high prices maintained by state-owned NG enterprises.

Nevertheless, the recent privatization of the NG transportation sector will not realistically lead to a reduction in the price of energy until Brazil encourages more investment throughout the NG stream from exploration and production through transportation and processing (RCGILex, 2019). Indeed, according to Santos (2018), the risks that investors face in Brazil will discourage investment by international players. He argues that Brazil should focus on bringing Petrobras back into the NG business due to the lack of interested in the private sector to implement new NG investments.

This implies a countervailing national strategy to induce Petrobras to return to the NG business[9].

Although associated NG is plentiful in the Pre-Salt, domestically produced NG provides only 69% of total NG supply in Brazil (MME, 2019). One reason for this statistic is that Brazilian Pre-Salt NG is expensive to bring onshore. Pre-salt associated NG reserves are a challenge to the Brazilian government and to players in the Brazilian NG market due to high concentration of CO2. The technological process involves separating the CO2 from the methane and then storing it or perhaps transforming it into an industrial input.

Bolivia is the main source of imported NG to Brazil; however, its role is shrinking. Bolivian gas accounted for almost 32% of market share in 2015, but has declined to 22% of the country's total NG supply (MME, 2020). Gasbol currently serves distributors in five states (Mato Grosso do Sul, São Paulo, Paraná, Santa Catarina, and Rio Grande do Sul). The two countries have engaged in a take or pay agreement since February 1999. The Gasbol pipeline uses 24 of the total 30 MMm³/day capacity. Brazil's obligation to take the total contracted quantity ended in December 2019. Accordingly, in January 2019, ANP released an updated schedule for a Public Call to contract for excess capacity in the Bolivia-Brazil Gas Pipeline. At that time, the Agency asked the transport company, TBG, to prepare a draft Public Call Notice that was subject to public consultation between March and April 2019. The corresponding public hearing took place on April 10 (RCGILex, 2019). After the hearing, the Public Call was postponed to June, and then, in October, the Agency announced its temporary suspension. The Public Call was reestablished in December 2019. In March 2020, ANP published the authorization to hold the Public Call for capacity allocation, based on the transportation capacity waiver of Petrobras. In the new Public Call, the offer is the equivalent to 10,08 MM m3/day at the entrance spot, in Mutum, in the State of Mato Grosso (ANP, 2020)[10].

In addition, some of the winners of the last Brazilian energy auctions were thermo-power plants (TEPs) that are sourcing NG from LNG terminals, e.g., Porto do Sergipe I (Sergipe) and GNA I and II (Rio de

9. Energy Environment and Regulation Bulletin, n°1, 2018. The publication has been released and is currently being requested by the International Standard Serial Number (ISSN).

10. In parallel, an Incremental Public Call was launched, aimed at expanding the transport capacity of Gasbol. In an article of January 2020, E&P Brasil News Agency published that, according to ANP, TBG had 15 companies demanding entrance and exit capacities (38,7 MMm³/day and 29,5 MMm³/day, respectively) in this Public Call.

Janeiro). In Sergipe, the power plant will be supplied by Ocean LNG, a joint venture operated by Qatar Petroleum (70%) and N. Am. ExxonMobil (30%).

Due to Brazil's immense size and heterogeneous geography, supplying NG to isolated locations is especially challenging. Although Brazil has expanded its electricity services, costs of supplying electricity to isolated locations faces high delivery costs. Temporary emergency contracts have been a short term solution to supply fossil fuel at subsidized prices. Recently, the federal government promoted an auction to temporarily supply Roraima (an Amazonian State) until its transmission infrastructure is built. Eneva won a major share of this contract, which expects to convert its own NG production from the Azulão gas field into LNG for shipment. Thereafter, the LNG will be restructured to produce electricity. In some isolated locations, shipping LNG along the Amazon River system may be an alternative to transporting gas by pipeline, provided transaction costs can be lowered through a more efficient legal framework and a better institutional arrangement.

In sum, PEF, Resolution 16, and Bill 6.407/2013 point to the same linear strategy: Petrobras' divestment in the NG sector, the attraction of private investors, and third-party access to the NG infrastructure. This is the government's attempt to leverage the domestic NG market, and therefore, reduce average costs of production in energy intensive sectors where NG is a main source of industrial input. However, an eventual failure of current open-access regulations may lead to a new monopolistic player—the gas processor. Resolution 16 does not prohibit the owner of NG molecules from dually owning a NG processing unit (RCGILex, 2019). Thus far, no open-access rules apply to gas processing.

5. Conclusion and policy implications

Brazil's goal is to commercialize NG in a manner that will transform the owner (operator) of Brazil's pipeline system from a NG merchant model to a transport-only model, endangering competition that allows consumers to buy NG from different NG traders.

Article 48, a federal law, provides that NG commercialization agreements must contain a clause for the resolution of possible controversies, which may be arbitration, pursuant to Law No. 9307. Article 49 states that the public enterprises, government- controlled corporations, their subsidiary corporations, affiliated companies, and holders of

concessions or authorizations are required to adhere to the instrument and arbitration agreement referred to in the previous article.

Negreiros (2013) points out that the NG industry is at different developmental stages worldwide, and that the legal framework detail for the sector reflects the dynamics that characterize it. For example, if a country lacks effective legislation on the transport and trade of NG, then the NG cooperation to its energy matrix is not significant. This occurs when the degree of reliability by users and investors depends on the extent that the government's policy and regulations support NG commercialization.

While the opening of the NG market has the potential to increase the efficiency of services and to reduce the price of NG by increasing competition, the possible reduction in distribution company revenues may compromise the pace of investments in expanding distribution networks. Thus, reconciling goals, such as encouraging competition and distribution network expansion, requires the opening of the NG market, accompanied by the adoption of other regulatory mechanisms to ensure continuing and growing investment in and by distributor companies (Colomer, 2013). For instance, São Paulo is one of the most advanced states on regulation and organization of an open NG market, and it is also the most important one related to industry concentration, although, as shown in this paper, there are still important gaps to fill.

Therefore, regulatory harmonization is necessary, including laws and regulations that will encourage the development of a robust NG market in Brazil. Barriers to entry into the NG market must be lowered to further reduce Petrobras' market power.

The creation, editing, issuing, and application of standards at the State level must be consistent with national policy to promote NG use. State regulation must include incentives to expand the NG network—making pipeline NG services as universal as possible. LNG rail and truck transport should be incentivized where this cannot be accomplished.

The regulatory agenda for NG in Brazil is currently under discussion through Gas to Growth and New Market Initiatives, which intend to build a new framework. This is attractive for investment, and the state of São Paulo will play a significant role in these discussions.

In Brazil, there's a perception that these opportunities may be missed unless we clearly define the process for constructing new gas pipelines and processing units. The country is initiating this process, and decision-makers should learn from past errors. There is an urgent need to create a frame that favors negotiations with stakeholders about the most optimal way forward.

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