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**A regulatory overview of the Brazilian Natural Gas
Market**

Project 21

**“Setting up of the Brazilian and Paulista Natural Gas Law
Service: USP’s Interdisciplinary Natural Gas Policy, Legal and
Regulatory Intelligence Service”**

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1. Natural Gas industry and the Brazilian regulatory perspective

According to the national Gas Law (2009), natural gas is defined by “any hydrocarbon that remains in gaseous state under normal atmospheric conditions, produced directly from petroleum or gas reservoirs, whose composition may contain wet, dry and residual gases.” Furthermore, natural gas is composed mainly by methane (CH₄), around 90%, and ethane (C₂H₆), around 10%. In addition, there are other components like hydrogen sulfide (H₂S), carbon dioxide (CO₂), nitrogen, helium and heavier fractions of hydrocarbons, which count for small fractions of the average overall composition of the natural gas.

Composition, weight and physical properties are the main differences between the natural gas and other fuel gases. For example, liquefied petroleum gas (or LPG) is usually a mix of propane (C₃H₈) and butane (C₄H₁₀) and is stored in containers and used for cooking in some regions (GPA Midstream, 2016).

According to EBA (2016), biogas differs from natural gas both in origin and in composition. Resulting from the anaerobic digestion of organic matter, biogas is composed of methane (around 60%) and carbon dioxide (around 40%) with traces of hydrogen sulfide, oxygen, hydrogen and nitrogen. When the carbon dioxide and the trace elements are cleaned from the main biogas, it becomes biomethane, which has the same usage of natural gas.

Liquefied natural gas (or LNG) is purified natural gas, cooled at very low temperatures and transported in liquid form.

The evolution of the natural gas industry regulation can be divided into four phases. The first is called emergent or nascent, where countries such as Peru and Vietnam are represented, detaching an incipient infrastructure, a not very developed gas market, presenting high political risk, and with a predominance of state companies (GOMES, 2005).

Next are the developing markets, such as China, India and Brazil, due to existing infrastructure, growing number of participants and an incipient regulation (GOMES, 2005).

At the third phase are included countries such as Spain, Korea and Argentina, which show a developed infrastructure, counting on several participants and in which competition begins to arise. These result from the existence of access to conveyance capacity, different suppliers, opening mechanisms downstream and a very consolidated regulatory agency (GOMES, 2005).

And, finally, a mature market, consonant to a fourth stage development, encompassing countries such as the United States of America and England, in which there is a high level of competition, with the separation of activities in the chain (unbundling), in which the consumer can choose the supplier, also detaching transparent prices and fees (GOMES, 2005)

Thus, the study of the natural gas chain, composed by exploration and production, importation and exportation, processing, transportation, commercialization and distribution, allows the understanding about the reason why there are structures which admit higher degree of free trade and others which lead to a more intense regulation under the natural monopoly regime (COSTA, 2006).¹

In addition, this market has characteristics that make verticalization a good option through the economic perspective, considering the possibility of transaction costs reduction and the existence of economies of range and scope, which allow the funding of a step of the chain by the other (COSTA, 2006).²

In Brazil, oil and natural industries started their flexibility with the Constitutional Amendment 9/95 and 5/95, after by Law # 9,478/97 (the Petroleum Law). However, the concepts given by this law to the natural gas sector were

¹ In order to enable a general overview in a synthetic way, importation and exportation will be discussed in the same topic as exploration and production; processing will be treated in short version and stocking won't be approached. The intention is to make the text more dynamic and directed, not to disadvantage these other activities. In order to study deeper each of these questions, it is important to check the authors quoted through this text.

² The historic factor should be added to this point.

quite preliminary, especially regarding open access to pipeline network. The late discoveries have made natural gas (NG) usage a very recent practice in Brazil. Along with the associated nature of gas reserves, which gives priority to oil production, and to the lack of infrastructure, NG is acquired as a secondary role (CECCHI, 2001, p.35).

Numerous provisions in Law # 9,478/97 aggregate common technical definitions (Chapter III - Section II, Article 6.) to exploration, development and production of oil and gas. It also incorporates general rules for exploration, development and production and the announcement of the invitation to bid (Articles 21 and following). These legal provisions were highly criticized, since the objective of the law was stating activities related to oil monopoly activities (PINTO, 2014).

Natural gas industry is more associated with E&P to Mining industry, rather than from the oil sector, since it displays mining typical risks, such as reservoir's depletion and higher-level profits than the regular industrial activity. However, after its extraction, it features peculiarities in network transport and distribution, given the fact that it needs physical structures that holds these gases high volatility (COSTA, 2006).

The technological improvement allowed greater economic scale for natural gas usage when transported by pipelines, which also brought regional aspects to the market, strong interdependence between chain links and high transaction costs (LAUREANO, 2005). However, Law # 9,478 / 97 did not define the natural gas characteristics and peculiarities. The main critic is related to the non-creation of tools that aimed to enhance competition in the natural gas industry (COSTA, 2016).

An analysis on those articles show that there was not any concern to take measures by law enforcement to prohibit vertical and horizontal integration. The Law # 9,478 / 97 did not divided activities on accounting or other more effective ways than the mere creation of a subsidiary, nor forecasted percentage of each shareholder in their respective chain segments (for example, the producer cannot own more than 20% on transport actives). It also did not provide any regulation to liquefied and compressed natural gas activities (COSTA, 2006) (PINTO, 2014).

The free access rules, provided by Article 58, were attributed to the agency's regulatory activity. Transportation is a typical example of natural monopoly, but the Law # 9,478 / 97 did not consider so and did not set as National Agency of Petroleum, Natural Gas and Biofuels (In Portuguese: Agencia Nacional de Petroleo, Gas Natural e Biocombustiveis - hereafter ANP) - ANP's competence to regulate about third party tariff to have network access. Without specific standards, Brazil faced challenges in order to effectively promoting investments and fair competition in the natural gas industry (COSTA, 2006).

Law # 11,909, 2009, was ruled in order to change this scenario. This mentioned law "deals with the activities related to the transport of natural gas, pursuant to article 177 of the Federal Constitution, as well as the treatment, processing, storage, liquefaction, regasification and commercialization of natural gas" (LAW 11,909, 2009). After that, Decree 7382, 2010, regulates Chapters I through VI and VIII of Law 11909 of March 4, 2009.

Gas Law was the start point to the whole regulation after 2009. In this regards, the following sections we describe a general analysis of the natural gas production chain and discuss the current regulatory condition of this industry in Brazil. Figure 2 shows a history line of the natural gas regulatory regime in Brazil.

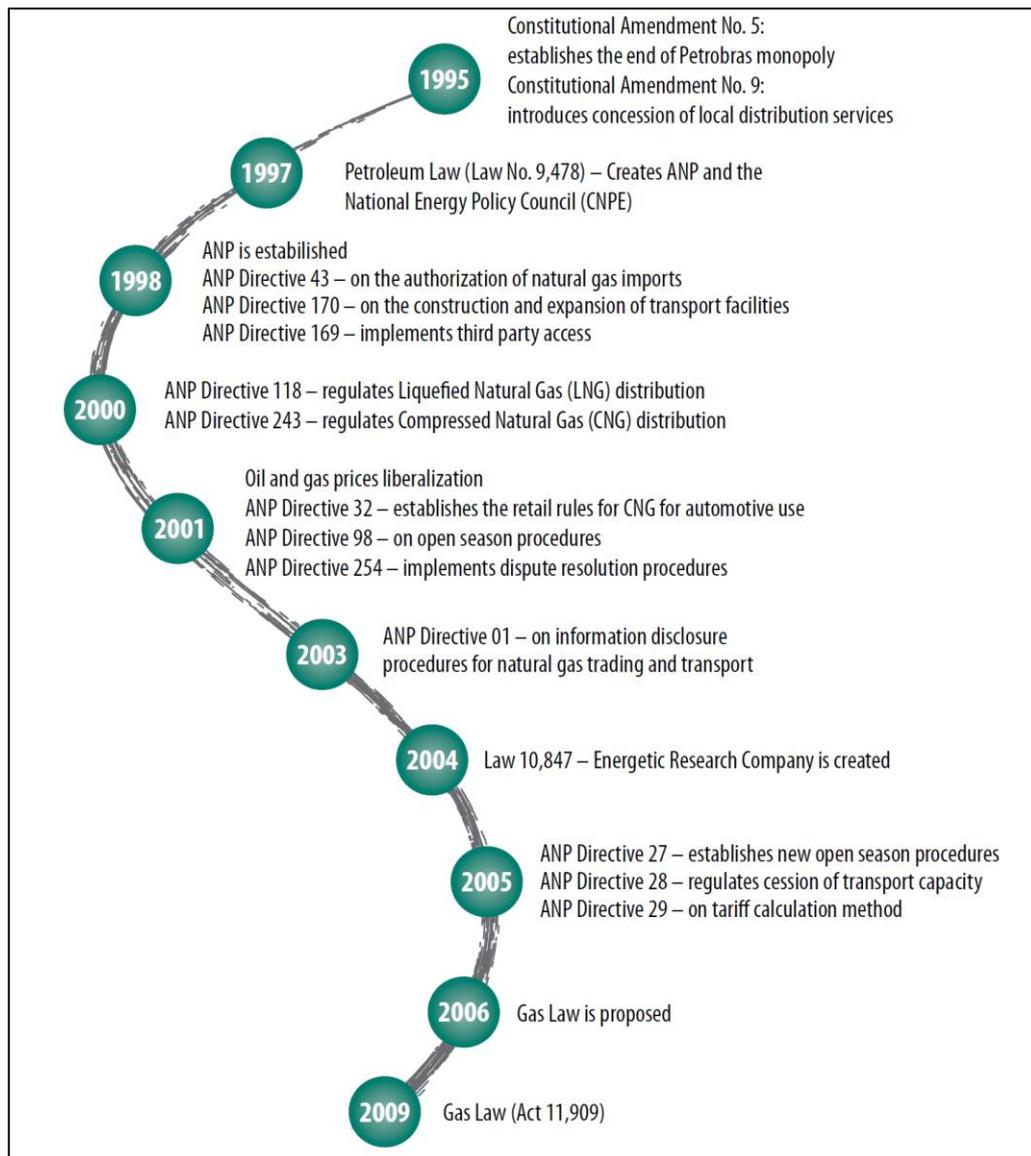


Figure 2: Evolution of the natural gas sector regulatory regime in Brazil

Source: ANP, 2009.

According to Iberglobal (2014, p.1) “natural gas is attracting much investment because of its low carbon emission and clean energy label. With recent discoveries of significant oil and natural gas reserves, the government has been offering concession bids to domestic and foreign companies to explore and operate in the region.”

Therefore, in next section, we analyze the ways companies get into the exploration and production sector in Brazil.

1.1. Exploration and production

By having sectors, which are eminently competitive, and sectors with natural monopoly characteristics, the natural gas industry allows to aggregate deregulation³ and regulation, due to the flexibility of the Union's monopoly (exploration, production, importation, exportation and transport, commercialization) and the States' monopoly (distribution). In this sense, the three power spheres action stands out, which are the federal agency, state regulatory organ and the system of antitrust, with the intention of verifying the practice and activities of the integrant companies of this industry, in order to foster the competitive environment (COSTA, 2006).

The first steps to be considered are the exploration and production of natural gas, which include the development and the declaration of marketability of the specific well. The exploration corresponds to the "recognition and study of the favorable geological structures to the oil and natural gas accumulation"⁴ (SANTOS et al., 2002, p.80).

These sectors have high risks⁵, since the proven occurrence of natural gas in a specific well can only be assured with the perforation, in addition to seismic work and the collected material analysis. If the gas is not found, neither the oil in the pioneer well, the investments made will not be recuperated (sunk costs) (COSTA, 2006) (PINTO 2014). Beyond that, after the perforation, as it reaches contact with the productive formation of natural gas, it is important to "test the formation in order to determine if the company will be able to profit from the extraction of this good" (MEDEIROS, 2000, p.19).

After the feasibility is checked, the field is developed and the required infrastructure for the natural gas production is added. Right after, the gas can be

³ According to Silva (2001, p.30), deregulation consists in the State's effort to mitigate the interference of regulations on the private sector, which means, the substitution of rigid rules for flexible norms, inside a more dynamic context suggested by globalization. On the other hand, deregulate means to leave the economy orientation or ordination by the State.

⁴ Natural gas is a fossil fuel, which can be found associated or not with oil, resulted from the decomposition of the organic material of anaerobic form (ABREU and MARTINEZ, 2003, p.13).

⁵ It is important to highlight that the risk is divided in three species: geological, concerning the uncertainties regarding the supply estimation and the production performance; contractual, regarding the uncertainties about the applicability and efficiency of the supply contracts; and commercial, related to the access to the potential markets and the success on the exploration of these markets (SCHWYTER, 2001).

used for the process of energy generation in the production unities, for the fields' reinjection and it part of it can be allocated to the Natural Gas Processing Unities (NGPU), where it will be dehydrated and fractioned, in order to serve the minimum standards to different finalities (SANTOS, et al., 2002).

As previously mentioned, in 1995, the Brazilian Congress enacted the Constitutional Amendment no. 09. One of the major changes was the allowance for foreign investment in the oil industry. With the flexibility of the Union monopoly on this industry, especially in this sector, it became possible for other companies, beyond Petrobras, to exercise these activities, which in the beginning demonstrated the goal to expand the competition, increase and attract investments.

It became important, then, the definition of the sectors inside the chain, that could be deregulated and which would still be under the regulation, because the "economic theory has far verified that some chain phases are not shaped for competition"(SCG-ANP, 2005, p. 02).

In this sense, the sector of exploration and production was articulated in a way that competition⁶ was implemented by public bid, promoted by ANP, the competent organ to the administration of right of exploration and production of natural gas belonging to the Union, as defined by the Law 9.478/97 (art. 21). This has been happening since 1999, when occurred the first round of public bids. Before that, ANP had signed 397 concession contracts with Petrobras, event called round zero.

Since 1995, these institutional changes have been very important for the Brazilian oil and gas industry development. First, because it became possible to create a transparent environment under the rule of law, including an independent agency (ANP), and the investors could feel more comfortable doing business in this sector.

According to Article 8 of the Petroleum Law one of the purpose of ANP is to promote regulatory measures, contract and monitor economic activities

⁶ Also Pfeiffer (2004, p.73) explains that this sector is capable of working inside the competition model, due to the publication of auction notices for exploration and production, however, adds that further regulation measures are important to stimulate higher competition in the sector.

inherent to the petroleum and natural gas, such as the concession agreement and the bidding announcements (ANP, 2016b). Therefore, between several attributions⁷, in this sector, ANP exercises supervision on the execution of concession contracts made with the concessionary company or the consortium, which won the bid process (ANP, 2016b).

In the matter of Petrobras' participation on this stage of the chain, it is the main winner of the bids, such as in the consortium, where it is the leader company (operator) most of the times (ANUATTI NETO et al., 2005) (INSTITUTO ACENDE BRASIL, 2016).

Regarding the property of the petroleum reservoirs, Article 3 of the Petroleum Law says: "The Federal Government owns the petroleum, natural gas 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" (PETROLEUM LAW, 2016).

At the same time, Article 26 of the Petroleum Law foresees that the concession implies that the concessionaire assumes the risk and expense, and in case of success, entitles it to the petroleum produced in a given block. On the other hand, the concessionaire is subject to the fiscal burdens and legal or contractual participations, such as royalties (called Participation Fees) (PETROLEUM LAW, 2016).

In addition, these provisions in the Petroleum Law intended to attract investments, which were essential to the Brazilian government in order to prove its capacity on planning and building a stable negotiation environment.

Secondly, although the Petrobras is powerful in the Brazilian upstream, the legal changes have encouraged the companies to share expertise and experience with Petrobras, through mechanisms such as consortium in the upstream and the downstream. The first and the second points have contributed to the increasing investments in the Brazilian upstream.

⁷ Article 8 from the Oil Law and Decree 2.455, of 14.01.1998, define ANP's functions, attributions will be commented on Chapter 7 of this essay.

Thus, after Pre-salt discoveries, Brazilian Congress enacted Law 12.351/2010, and it was creating a mixed system.

The ANP supports the Brazilian National Energy Policy Council (CNPE) in decisions on the areas there will be offered for concession or production sharing in the bidding rounds (ANP, 2016b).

For the bidding of areas, the ANP prepares the proposal protocols, promotes public sessions and prepares the drafts contracts - either for concession or for production sharing. In the case of concessions, the Agency executes the contracts on behalf of the Federal Government. The Agency also has the responsibility to measure the production in the oil and natural gas fields - an activity that substantiates the distribution of the governmental takes (ANP, 2016b).

In the next section, it will be stressed more details about the Brazilian concession agreement.

1.1.1. Concession Agreement in Brazil

The concession agreement is considered a public contract and its clauses are unilaterally defined by the Federal government, represented by ANP who is liable for monitoring the contractual management and the supervision of the concession operations. The ownership of petroleum has transferred from the Brazilian government to the company at the Production Metering Point (ANP, 2016a). It means a compensation for the company who invested and assumed the risk.

The Brazilian concession agreement (ANP, 2016a) is divided into six chapters and has thirty-five clauses. It is a complex agreement that attempts to address many possible situations in oil and natural gas operations under the best worldwide oil practices. It is categorized as a long-term contract. Despite its complex dimension, it is an incomplete contract, due to the uncertainty inherent to the oil activities. Therefore, it is necessary that the parties attempt the governance of contractual relations and avoid conflicts that could result in an anticipatory breach, it means efforts to minimize the ex post costs transactions

(WILLIAMSON, 1979) (KLEIN, 1998) (BROUSSEAU; GLACHANT, 2008) (CAMERON, 2006).

The Petroleum Law foresees that a company can enter the Brazilian oil upstream through its participation in the bidding processes, which must be performed by ANP. The company should follow the conditions required by the Brazilian laws and by ANP. The requirements involve technical, financial and legal issues. For example, Article 5 states that the enterprises must have their headquarters and administration in Brazil (PETROLEUM LAW, 2016). Afterwards, the concession agreement must be assigned between ANP, represented the Federal Government, and the petroleum company which won the bidding in a specific block.

The concession contracts must comprise two phases: exploration and production. The exploration phase includes the appraisal activities, and the production phase contains the development activities (PETROLEUM LAW, 2016).

Both phases contain a previous provision of Work and Investment Program. The concessionaire has the obligation to perform these Work and Investment Programs, however, the concessionaire, usually, has the discretion about the technical issues. ANP must approve them.

After the Minimum Exploratory Program is completed, the concessionaire must notify ANP regarding the following choices: (i) declare the first exploration term over and move on to the second exploration term, the concessionaire should present financial securities; (ii) consider if the exploration phase has ended, retaining only some areas; (iii) notify ANP that there had been no discoveries, which implies either to the exclusion of the block from the concession area, or the conclusion of the concession agreement (ANP, 2016a).

The concessionaire must notify ANP regarding any discovery within seventy-two hours. In addition, the concessionaire must make an Evaluation Plan and submit it to ANP who will have up to sixty days to respond to the concessionaire. About the Declaration of Commerciality, the concessionaire has sole discretion in the decision concerning the development of the concession area. The concessionaire could make a Declaration of Commerciality prior to the end of the Exploration Phase (ANP, 2016a).

It is required that the concessionaire delivers the Development Plan within 180 days from the Declaration of Commerciality to ANP. The Development Plan must be prepared in accordance with the Brazilian legislation and with the Best Practices in the Oil Industry. It means the Development Plan should accomplish with the efficiency of the production and the control of the reserve's decline. The concessionaire must provide financial security, such as a letter of credit (ANP, 2016a).

ANP shall have up to 180 days to approve the Development Plan. Furthermore, ANP may propose some changes aiming to improve the plan. If ANP does not respond within such period, the plan will be considered approved. Thus, the concession agreement avoids delays (ANP, 2016a).

The clause 4.2 defines the total term of the concession. It starts from the effective date until the respective Declaration of Commerciality, and if the concession continues, 27 years are added. There are provisions concerning extended periods required by the concessionaire who must provide a written justification of the technical, financial, and economic issues (ANP, 2016a).

The expiry of the concession contract may happen by agreement between the parties, or by the normal expiration of the contractual term. In addition, it may take place at the end of the exploration phase, if the concessionaire exercises the option to withdraw from and return the areas where its investments in development are not justified. Moreover, if no commercial discovery has been made, the agreement will be extinguished.

The following table provides a brief illustration of some provisions existing in the Brazilian Concession Agreement (ANP, 2016a). Moreover, it is important to mention that there is a clause about payment to the landowners, in the amount equivalent to 1% of the oil and natural gas production (ANP, 2016a).

Table 1 - Concession Agreement (ANP, 2016a).

Duration	In general, the Exploration Phase is in between 3 and 7 years and the Development Phase lasts 27 years.
Relinquish ment	If the concessionaire does not declare the commerciality, it should relinquish the area at the end of the Exploration Phase.

	When the concessionaire decides to produce a specific field, all the other areas should be relinquished. Voluntary relinquishment is permitted by writing to ANP.
Area	Blocks will be defined by ANP in each Round.
Obligations	Minimum Exploratory Program, Development Program, Annual Budget Program, Annual Production Program, Local Content Commitment, Obligations to keep the ANP informed about its activities.
State participation	There are no provisions. The Government is compensated by the concessionaire, through participations fees and Federal, State, and Municipal taxes.
Government Participations	Bonuses, royalties, special participation, payment for the occupation and withholding of areas (retention fees), investment in research and development.
Method of Award	General invitation to apply in rounds; award under the rules defined by The Tender Protocol which is published at least forty days before the Bidding Rounds.
Applicants' qualifications	Technical, financial and legal requirements established by the Brazilian legislation and by ANP, added an Expression of interest plus a participation fee.
Applicable Law	Brazilian legislation.
Official Language	Portuguese.
Method of resolution of conflicts	Conciliation, "ad hoc" arbitration, and Brazilian Courts when the cases are not related to available property rights.

Force majeure clause	It might mean suspension, termination, or amendment of the concession agreement, depending on the extension and seriousness of the effects of the act of God or force majeure events. The concessionaire assumes its own losses.
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The Petroleum Law and the concession agreement are clear about the Federal Government ownership of the reservoirs in the national territory, including the inland, territorial sea, continental shelf, and exclusive economic zone. The concessionaire assumes all risk and costs of the petroleum operations, and its petroleum ownership starts at the Production Metering Point. The concessionaire must pay the fiscal burdens and legal or contractual participations. This decreases the transaction costs, because the ownership of the petroleum is defined.

The control of the exploration and production activities belongs to the concessionaire, in its sole discretion. It observes the Brazilian legislation, the Minimum Exploratory Program, the Development Plan, and the Best Practices of the Oil Industry (ANP, 2016a). There is a trade-off between the government reservoirs ownership and the concessionaire control of the operations. ANP supervises the concessionaire operations.

It is important to note the kinds of unilateral rescission by ANP which occurs when “the concessionaire fails to comply the fixed Term by ANP for the performance of any pending contractual obligation, which may not be less than 90 days.” ANP might choose to apply sanctions, defined in the clause 29 (ANP, 2016a), instead of rescinding the agreement, depending on the concessionaire degree of fault. In this case, the concessionaire is guaranteed through law process, with full defense right, and the ANP decision can be appealed to the Brazilian Courts.

In the eventuality of the concessionaire, or any of its members, are declared bankrupt, insolvent or require legal recovery, the termination occurs. In these cases, the concessionaire is responsible for losses and damages that result from its default.

The termination, suspension or amendment of the concession agreement may also occur (ANP, 2016a), after situations that are characterized as a force majeure event.

The unilateral termination of the agreement and expropriation are examples of the highest political risk. There is no provision about expropriation of the concessionaire assets in the Brazilian concession agreement or in the Petroleum Law. After the termination of the concessionaire activities, all assets revert to the Federal Government, and will be managed by ANP (ANP, 2016a).

Clause 35.2 concerns the amendment of the concession agreement: “any modifications or amendments to this contract must comply with the applicable legislation and only have validity if carried out formally and in writing and signed by the representatives of the Parties.” This provision minimizes the political risk, because the parties must agree to the alterations and the formal proceeding according to the rule fixed by this clause (ANP, 2016a).

Petroleum and natural gas production is characterized by a capital intense industry (ANP, 2016a), being the concessionaire liable for the costs and risk of the petroleum operations, including specific assets, and information for performing its activities. According to the Brazilian concession agreement, the concessionaire must make its investment in each phase under the ANP inspection.

The concession agreement and the Petroleum Law were drafted in a specific and singular moment of the Brazilian history. The institutional changes were a significant step to increasing investments and attracting international and national oil companies. One of these changes was the transfer of the petroleum ownership from the government to the concessionaire and its control over the operations.

However, it is important to stress that in the concession agreement and the Petroleum Law there are provisions that seems to create political risk and ex post transactions costs. The non-existence of clear standards to the ANP’s decisions and the presence of vague expressions are examples.

The amendment clauses of the concession agreement makes a trade-off between higher ex post transactions costs and flexibility, which create a favorable environment for the concessionaire to perform its operations.

From the investor's point of view, the concession agreement provides a continuing relationship with ANP, the higher ex post costs of keeping ANP informed are compensated by the increase of credibility between the parties.

The ex post costs in the specific investments are increased because the concessionaire has many obligations to perform through its operations, including the minimum investment in the local content. Because of these intensive investments, it is essential to provide more guarantee that the investor's rights cannot be violated by the government or by ANP. If the Brazilian Federal Government intends to transform the country into an attractive option in the petroleum world, it is important to consider provisions that tend to minimize the political risk.

Therefore, a mixed regulatory framework has been enforced for the oil & natural gas exploration and production (E&P) since 2010. For 98% of the total Brazilian sedimentary basins area, the concession regime established by Law 9478 of 8.6.1997 is applicable (ANP, 2016b). Production Sharing Regime is focused on Pre-Salt area, as we may see in following section.

1.1.2. Production sharing regime

In Brazil, many oil fields have been discovered, such as the Lula field, which could hold up to 8 billion barrels of light crude oil (PETROBRAS, 2008). In regards to the Lula Field discovery, the former head of the ANP, Haroldo Lima (Director-General), said that there might be another nearby discovery which may hold as much as 33 billion barrels (GREENSTEIN, 2008). At the beginning of 2007, the Brazilian oil reserves were close to 12 billion barrels. With these new discoveries, Brazil could become an important exporter country in the global oil industry, mainly, due to oil self-sufficiency, reached by the country in 2006 (TIME, 2008).

Therefore, the Pre-salt production will likely have the international market as the principal course. Because of these new discoveries and the higher oil prices during the end of the last year, the political debates have been intensified. When Petrobras announced the new discoveries, for instance, Edison Lobao, the Brazilian energy minister, suggested “the government may set up a new national oil company to oversee development of the promising sub-salt acreage that has not yet been licensed to exploration companies (GREENSTEIN, 2008). He argues that the oil is a ‘sovereign asset’ that should be used for the benefit of the whole Brazilian population and not just shareholders of companies (GREENSTEIN, 2008). At the same time, Lobao's idea was not widely supported by key ministers such as Presidential Chief Of Staff Dilma Rousseff, a former energy minister herself, and Finance Minister Guido Mantega, but it appears to be gaining support, with Vice President Jose Alencar coming out in favor.

Regarding this point of view, the former president Luiz Inácio Lula da Silva said during one of his interviews with Time Magazine, that he just created an inter-ministerial group to propose some changes to the current oil model and the government would make a decision in 2009 about how to proceed with the development of the Pre-salt frontier (TIME, 2008).

The inter-ministerial group was created for working out the details of possible changes to the current Brazilian Petroleum Law related to the Pre-salt exploration and development. One of the studied proposals involves the creation of a 100% state-owned company and a new agreement model for oil exploration, such as a participation sharing agreement or a service-risk contract. It is important to stress that many of these proposals occurred during a time of higher crude oil prices. The current economic crisis and the decreasing oil prices may change some of these initial projections.

Therefore, after four years since Petrobras’ announcement, in 2010, Law 12351 of December 22 established the production-sharing regime for the areas not yet granted of the pre-salt polygon and other strategic areas. The law also established the Social Fund, which allocates portions of revenues derived from production sharing contracts for programs in the areas of education, culture, sports, public health, science and technology, and environment, as well as programs to mitigate the effects of climate changes (ANP, 2016b). Article 4 states

that Petrobras shall be the operator of all blocks contracted under the production share regime, being, for this reason, entitled to minimum interest in the consortium (30%).

The Union shall not undertake the E&P risks arising out of the production share contracts (Article 5). The costs and investments necessary for the performance of the production share contract shall be fully borne by the contractor (Article 6).

The rules for the bidding process for contracting under the production share to be issued by the ANP and with the relevant tender protocol (Article 13).

The tender protocol shall be accompanied by the respective basic draft contract and shall indicate: I – block object of the production share contract; II – bidding process judgment criterion; III – minimum percentage of surplus oil of the Union; IV – formation of consortium and the respective minimum interest of Petrobras; V – restrictions, terms, criteria and conditions for the calculation and appropriation, by the contractor, of the cost in oil and the production volume corresponding to the royalties due; VI – criteria for definition of surplus oil of the contractor; VII–minimum exploratory program and the estimated corresponding investments; VIII – minimum local content and other criteria related to the development of the national industry; IX – value of the signing bonus, as well as the portion to be allocated to the public enterprise; X – bidding process rules and phases; XI – rules applicable to the joint participation of enterprises in the bidding process; XII – list of documents required and the criteria for technical, legal, economic–financial and fiscal qualification of the bidders; XIII – the guarantee to be submitted by the bidder for its qualification; XIV – term, venue and time in which the interested parties will be given the data, studies and other elements and information necessary for bid preparation, as well as the cost of their acquisition; and XV – venue, time and form for submitting bids (Article 15).

The winning consortium will be established from criteria of highest surplus in oil for the Union (Article 18).

Article 27 states that the production share contract shall envisage twophases: I – the exploration phase, which shall include the activities of evaluation and possible discovery of oil or natural gas, in order to determine its

commerciality; and II – the production phase, that shall include the development activities.

Article 29 shows the essential clauses such as: I – definition of the block object of contract; II – contractor's obligation to assume exploration, evaluation, development and production risks; III – indication of guarantees to be offered by the contractor; IV – right of the contractor to appropriate the cost in oil, enforceable only in case of commercial discovery; V – restrictions, terms, criteria and conditions for the calculation and appropriation, by the contractor, of the cost in oil and the production volume corresponding to the royalties due; VI – criteria for calculating the value of oil or natural gas, based on market prices, specifications of the product and the location of the field. VII – rule and terms for splitting the surplus in oil, which may include criteria related to economic efficiency, profitability,

Regardless of the contract type, the ANP is solely responsible for authorizing, monitoring and controlling, in addition to measuring the production in any area of the Brazilian territory where oil & natural gas prospecting or extraction activities are being performed. In any of the regimes, the hired companies pay royalties (ANP, 2016b).

Currently, ANP starts to analyse two new Bid Rounds: 1) 14th Concession Round Bidding; and 2nd Production-share Round Bidding (ANP, 2016c). Thus, probably many agents have expectations around this opportunity.

At the same time, Petrobras plans to sell \$ 15.1 billion in assets: 30% in exploration and production, 30% in supply and 40% for gas and energy sector are attracting a lot of investors to oil and gas sector. The divestments are expected to total US \$ 42.6 billion in 2016 and 2017, including business restructuring, asset retirement (sale of an asset, which can be rented below) and additional divestments. Mitsui paid around \$ 1.9 billion for 49% of Gaspetro.

Also, Petrobras has recently concluded negotiations with a consort led by the Canadian group Brookfield for the sale of the company Nova Transportadora do Sudeste. Details and values of this operation are yet to be disclosed, but this step should mark the completion of two thirds of Petrobras's divestment plan for the 2015-2016 period (MACHADO, 2016).

Thus, Brazil intends to attract foreign capital and put an end to a partial privatization. Therefore, clear rules established are fundamental to this Institutional Changes process. In this way, ANP has opened two important Public Consultation on: (i) tariff transportation; (ii) storage.

In this perspective, a recent Public Consultation process was postponed by the ANP until the 12th of December, 2016. The text for the Consultation n° 14/2016 has rules over the acquirement of subsidies and additional informations about the application of methodologies for calculating pricing features over the transport wich should be in the natural gas purchase and sale contracts.

1.1.3. Local Content Clause

Local content clause is part of the concession and production sharing agreements. This clause is the obligation of hiring a share of national goods and services in the exploration, development and production. If the oil companies do not comply with this clause, they will incur in a fine applied by ANP.

Recently, discussion has started in Brazil about possible changes to the local content clause. In terms of private sector participation in the oil and natural gas industry, private investors have seen local content clause as barriers because of its difficult fulfillment. Even Petrobras faces difficulties in this issue: the company was fined in more than R\$ 200 million just in 2015.

A recent decree has changed part of the local content rules, and also included investments in R&D and innovation to meet the demands of E&P contracts. There are even directions for the application of research resources, but without interfering in the regulation promoted by ANP. This decree transformed fine into investments, wich is an improvement of the policy, including and considering, in certain cases, for the purpose of local content other investment results, as the export of Brazilian items and technology development, for example. Even more recently, authorities informed that the local content attendance will not be used as a metric in order to evaluate proposals in the coming bidding rounds for petroleum exploration areas (R7, 2016).

According to the decree, companies can use a committee to consider local

content crediting - which will have the name of local content units (UCL in portuguese). Those UCLs may be obtained when the company facilitates the installation of new suppliers in the country, promoting the expansion of production capacity and technological innovation process from suppliers, purchase goods and systems here to export pioneers and acquire lots of goods and systems developed in the country (OMS, 2016).

A recent Resolution by ANP was made with the goal of focusing on the inclusion of deduction of the amounts of national plots of items classified as materials, of the imported parcels values when these are incorporated into goods and systems of foreign origin manufactured in Brazil under the special customs regime for export and import of goods intended for research activities and exploitation of petroleum and natural gas (REPETRO).

These items are included in ANP Directive # 19 of June 14, 2013, which deals with Local Content Certification.

In the short term, this easing of the requirement of local content clause, brings economic benefits for oil companies, because they will only buy a product or hire a service when they have better proposal. In addition, with those changes the companies have greater contractual freedom, including by reducing transaction costs with the possibility of incorporating major economic gains in their budget.

For instance, local content new rules may benefit the relationship between Petrobras and Sete Brasil, with a reduction in the loss of state investment in the company created to enable the construction of the probes of the pre-salt - especially in shipyards dedicated exclusively to Sete, as the Paraguaçu, Bahia, whose shareholders are Odebrecht, OAS, UTC and Kawasaki. If the oil operator facilitate the installation of new shipyards or encourage the export of components for Brazil, for example, can earn credits and make a smaller acquisition of local content in other sectors.

Petrobras would have at least part of the injury compensated because it will have to rent these probes at prices above the international market. Prices of probes belonging to the Sete did not follow the decrease of general costs of the oil industry in the world, resulting from declining in the price per barrel in recent

months.

Foreign operators in Brazil may have advantages to this decree as it aims to stimulate that these multinationals will bring suppliers to Brazil, which are installed in other parts of the world and provide not only for operations in the country but also as a global platform of production.

2. Brazilian Natural Gas Law

The Gas Law (11,909/2009) covers activities related to natural gas transport, pursuant to Article 177 of the Federal Constitution, as well as its treatment, processing, storage, liquefaction, regasification and commercialization. This Law also changes provisions from the Petroleum Law (9,478/1997).

The transport of natural gas shall be performed by corporations or consortia, whose formation is governed by Brazilian Laws, with headquarters and administration in the Country, at the entrepreneur's own risk and expense. The corporation/consortia must submit to the following regimes: (a) the concession, preceded by the bidding process, shall be applied to all transport gas pipelines considered as being of general interest; or (b) the authorization shall be applied to the transport gas pipelines that involve international agreements.

The Ministry of Mines and Energy will establish the guidelines for the transport capacity hiring process and consider the Country's pipeline network studies regarding its expansion. The objectives are to propose the gas transport pipelines that shall be built or expanded and to define the concession or authorization regime.

The natural gas transport concessions shall be in force for thirty years as from the date of the agreement's signature. They may be extended for equal terms, under the conditions set forth in the concession agreement. ANP shall promote the bidding process for this concession.

Third parties access to pipelines is ensured by Gas Law's Article 33, which prescribes that "the access to the transport gas pipelines shall be through the hiring of the following transport services, among other ways provided for by the regulations: I - firm, in available capacity; II - interruptible, in idle capacity; and III - extraordinary, in available capacity" (Gas Law, 2009). The open access shall be both in available capacity and, after its full hiring, to idle capacity shall (PINTO, 2014).

Open access to interruptible transport services, in idle capacity, and extraordinary, in available capacity, shall be pursuant to the regulations, having the publicity, transparency and guarantee of access ensured to all interested parties (Article 34). Capacity assignment, understood as a transfer, is authorized in whole or in part, of the firm transport capacity hired usage rights. In order to preserve the Carrier's rights, ANP regulates the capacity assignment (Gas Law, 2009). The main different points between Petroleum Law and Gas Law are described in Table 2.

Table 2: Petroleum Law versus Gas Law (ANP, 2009).

Rules	Law # 9,478 (1997)	Law # 11,909 (2009)
	(Petroleum Law)	(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 ¹
Gas trading	No regulation	Authorized by ANP

Shortage	-----	Overseeing of transmission by ANP
	Authorized by ANP	Concession by ANP
Natural Gas transport	no contracts signed between transporter and ANP	Concession contracts signed with ANP last for 30 years
	no expiration date for authorization	Authorization by ANP in particular 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

In addition, Decree 7382 regulates Chapters I through VI and VIII of Gas Law 11909. In this regarding, says 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 natural gas transport activity (Article 6).

In this sense, for the purposes on its own initiative or driven by third parties, the Ministry of Mines and Energy shall prepare the Ten-Year Plan for Expansion of the Gas Pipeline Transport Network (PEMAT), preferably revised on an annual basis, based on studies developed by the Energy Research Company – EPE (CROSO; MOUTINHO DOS SANTOS, 2014) (CROSO, 2015).

PEMAT was published in 2014 (EPE, 2014), and only Guapimirim-Itaboraí (Rio de Janeiro) gas pipeline was an eligible project. This pipeline will be 7 miles long and will transport 17.4 cubic meters/day from Guapimirim, one of the arrival points of the gas from the pre-salt fields, to Itaboraí to supply the gas to the new gas petrochemical complex COMPERJ, which is currently under construction.

The winner of the 30-year concession will be the company that offers the lowest transportation tariff (IBERGLOBAL, 2014).

Petrobras recently announced that COMPERJ construction is under review. The calculations on the costs of the pipeline were under investigation until September, 2016, when the government canceled the auction. So, Petrobras lost its interest to this pipeline. ANP suspended this caution in 2015 and recently canceled it announcing that both the investigations on the calculations of the cost and the relevant changes to the macroeconomic scenario, as well as the possible changes to the start of the operations, made the government reevaluate the parameters that were originally established for the pipeline (RAMALHO, 2016).

2.1. Importation and export of natural gas

In regard to the regulation of natural gas imports, ANP authorizes the accomplishment of this activity inside of some technical requirements established by Portaria 43/98. The practiced prices and others aspects concerning the contracts are agreed between the parts, the autonomy of the will prevails (ANP, 2016b).

Gas Law states that any enterprise or consortium of enterprises organized under the Brazilian laws, with headquarters and administration in the Country, may receive authorization from the Ministry of Mines and Energy to perform natural gas import and export activities (Article 36). The performance of natural gas import and export shall observe the guidelines established by the CNPE (sole paragraph).

2.2. Storage and packaging of natural gas

The Gas Law establishes, in its article nº 37, that the storage of natural gas must be performed by enterprise or consortium of enterprises organized under the Brazilian laws, with headquarters and administration in the Country, at the entrepreneur's own risk and expense, through concession, preceded by bidding process, or authorization.

In the following article, it is stated that the storage of natural gas in hydrocarbon reservoirs relinquished to the Union, and in other non-producing geological formations (pointed by the Ministry of Mines and Energy or the ANP through delegation) must be object of concession for use, preceded by bidding process under the competition method and the exploration shall be at the concessionaire's own risk and expense.

The ANP must prepare the protocols and promote the bidding process for the concession of the storage activities, and should also, through delegation of the Ministry of Mines and Energy, enter into the concession agreements for the storage of natural gas. The Ministry of Mines and Energy must, after consulting with the ANP, establish the exclusivity term for the agents whose hiring storage capacity has enabled or contributed to enable the implementation of storage facility.

Other rules state that the imported or produced natural gas, pursuant to article 26 of Law 9478 of August 6, 1997, and stored in natural geological formations shall not constitute property of the Union, according to article 20 of the Federal Constitution.

The ANP must provide geological data regarding the areas with potential for the storage of natural gas to the interested parties, with due consideration, for analysis and further confirmation of its suitability. All data obtained in the exploratory activities must be transferred to the ANP, free of charge. The performance of non-exclusive exploratory activities necessary for the confirmation of suitability of the areas with potential for storage depend on authorization from the ANP.

In regards to the storage of natural gas, cases other than those provided for in article 38 hereof shall be authorized by the ANP, pursuant to the applicable law. The packaging of natural gas must be performed by enterprise or consortium of enterprises organized under the Brazilian laws, with headquarters and administration in the Country, at the entrepreneur's own risk and expense, upon authorization. This packaging is regulated by ANP from the transport and commercialization of natural gas to the end consumer through alternative means to the pipelines.

2.3. Processing

The natural gas processing unit is responsible for the detachment⁸ of heavier and richer (propane) elements composing the humid natural gas, generating dry or poor gas with lighter characteristics (methane and ethane)⁹ and a liquid current of natural gas (LNG). The LNG is composed by heavier fractions than the propan, such as the liquefied petroleum gas (LPG) and natural gasoline (ANP, 2005).

The higher occurrence of heavy elements in the natural gas gives it considerable energetic value; therefore, it is better applied in petrochemistry and gaschemistry plants. However, the increase of gas calorific power entails lose on the detonation power, being the reason why for need such as vehicular use demand higher precision in the composition of this energetic (SANTOS et al, 2002).

The primordial function of the NGPU consists in enabling natural gas to be used in its different forms. As well as allowing the cleansing of this energetic resource, for example, with hydrogen, sulfur and, possibly, carbon capture, the natural gas usage becomes more trustful for the user, assuring the reliability of the final product and avoiding the transport and distribution (pipelines) system corrosion¹⁰.

⁸ The NGPU executes the detachments by an operation sequence, which may include treatment, compression, absorption and cooling, depending on the process type to be used. "The hydrocarbons recuperated may be stabilized and separated by fractionation, in order to obtain the desired products, in the NGPU or in other specific unities, such as the Liquid Fractionation Unity (LFU) and the Condensed Natural Gas Processing Unity (CNGPU)" (ANP, 2005).

⁹ The proportion of methane is, usually, between 80% and 95% (ABREU and MARTINEZ, 2003, p.16). According to these authors, the superior calorific power of the dry natural gas is very high, between 8000 and 10000 kcal/m³ (ABREU and MARTINEZ, 2003, p.18). ANP (2005) understands that the rich gas is the one with heavier components than propane (higher quantity of carbon), constituted by fractions of LPG and natural gasoline. In this sense, "when it is said that a specific stream of humid or rich natural gas presents richness of 6%, it means that the stream is constituted by 6% of LPG and natural gasoline and 94% natural gas per se". This fraction of 94% will constitute, after treatment and processing in an NGPU, a stream of dry and poor natural gas (processed and residual natural gas). It is important to register that the main types of applicable process in an NGPU are the simple refrigeration, the refrigerated absorption, the Joule-Thompson expansion and the turbo-expansion (ANP, 2005).

¹⁰ The most common impurities found in oil and natural gas, according to Abreu and Martinez (2003, p.14), are "salt water, sulfur compounds (sulfidric gas and other sulfurated compounds), oxygen compounds (carbonic gas), nitrogen compounds and diverse metals compounds".

This aspect became relevant in the recent years, due to the higher requirement for quality by the natural gas consumers, without forgetting ANP actions, which published the Resolution nº 16, on June, 17, 2008, establishing the specifications “of natural gas, national or imported, to be commercialized on national territory”.

In this sense, the construction, expansion and operation of a NGPU, according to Resolution 49, from September, 2014, are executed under ANP authorization, with the possibility of title transfer, since the order is previously submitted to the agency.

Under the Gas Law, according to article 43, any enterprise or consortium of enterprises organized under the Brazilian laws, with headquarters and administration in the Country, may receive authorization from the ANP to construct, expand the capacity and operate natural gas processing or treatment plants. The natural gas processing or treatment activity may be authorized for enterprises that comply with the technical, economic and legal requirements set forth by regulation.

The same law states that any enterprise or consortium of enterprises organized under the Brazilian laws, with headquarters and administration in the Country, may receive authorization from the ANP to construct and operate natural gas liquefaction and regasification plants, as well as gas pipelines for the production transfer and offloading out of the concession for the exploration and production of petroleum and natural gas. The regulation must issue rules on the eligibility of the interested parties and the conditions for the authorization, envisaging the conditions for the transfer of its ownership, upon compliance with the environmental protection and safety requirements.

The following structures are exempt from granting access to third parties: gas pipelines for production offloading; natural gas treatment or processing plants; and liquefaction and regasification terminals.

Transport

In order to reach the final usage of natural gas, there must be a flow system, which requires the construction of an infrastructure net (pipelines¹¹), through high pressure barrel transport or the modification of its physical state for the transport by cryogenics ships.

In case of physical state modification, the natural gas becomes liquefied, reducing its volume in 600 times and its temperature to -160°C, in order to be transported by ships. Regasification facilities are required in order to recover the natural gas original state, after its transportation. (SANTOS et al., 2002).

Santos et al. (2002, p.85) points that the natural gas transport can be approached in a wiser way, by embracing the transport as electricity and as liquid products or synthesized solids.¹²

This transportation sector is an economic activity itself, with characteristics of a natural monopoly, constituting typical essential facilities. Therefore ANP is responsible for establishing rules that guarantee free access of third parts to the transport installations, and also for solving possible conflicts, as determined by art. 58 of Petroleum Law¹³.

Concerning the free access, ANP's Portaria 169/98 regulated the subject, but was revoked in April 2001. Since then, a discussion process between ANP and the agents of the sector (beyond citizens participation) begun, and the result reached was divided into five normative pieces: (i) resolution of free access to the

¹¹ According to Medeiros (2000, p.27) "the majority of pipelines, which are steel made, measure, in general, from 10 to 32 inches of diameter. When natural gas is transported by pipeline, it is transferred to very high pressures (15 to 100 kgf/cm²), in order to reduce the gas volume and provide sufficient power to push the gas through the tube. To maintain the pressure level required in order to move big volumes of gas through a pipeline, the gas need to be periodically compressed. This demands the installation of stationary compressors each 80 to 160km throughout the long pipeline". Abreu and Martinez (2003, p.19) say that "inside the long distance transport pipelines, the usual pressures may get from 100 to 150 kgf/cm² right after the compression station, dropping, throughout the pipe, until cerca 30 to 40 kgf/cm², when there will be another compression station".

¹² In regard of electricity, the choice will be to produce the electricity close to the natural gas field and transport it by transmission lines, or carry the gas (with pipelines or LNG) until somewhere close of the consumer market and then transform it in electricity in order to connect them to the electric energy distribution net. Furthermore, synthetic forms to transport natural gas through alteration of the gas in solid products by the gaschemistry industry are registered. Moreover, there has been rescued and developed technology of synthetic fuel production from natural gas (Gas to liquid – GTL) (SANTOS, 2002).

¹³ Article 8, VI, of this law prescribes, "It is ANP's attribution to establish the criteria to the transport fares calculus"; adding it to article 58, it is understood that the fare value in case of conflict should be decided by ANP; when in case of agreement, ANP has to verify if the value is compatible with the market.

natural gas transport installations¹⁴; (ii) decree that regulates the conflict resolution process; (iii) decree about information to be sent by the shippers and the loaders to ANP, market and other loaders; (iv) resolution about natural gas transport capacity cession¹⁵; (v) resolution on fare criteria¹⁶.

It is important to point out these measures, due to the creation of a non-discriminatory access to the entrepreneur's places on the upstream and downstream, the possibility of selling and buying natural gas directly by the producers, distributors and big consumers. This way, the goal is to assure bigger competition on the sector, reduce the market power of the shippers and increase the investment attraction on exploration and production (CECCHI, 2001).¹⁷

The Brazilian Constitution establishes that the transportation of natural gas through pipeline is a monopoly of the Federal Government; however, the states are entitled to the exploration of the piped gas distribution services in their territories.

Since its establishment and within its legal scope, the ANP works to promote the expansion of the gas pipeline network. In 2009, the Gas Law (Law 11909 / 2009) assigned the Agency with the duty to authorize the commercialization of natural gas, to promote bidding rounds and to execute concession contracts for pipelines; to establish (in case of concessions) or approve (in case of permits) natural gas transportation rates and inspect the permits and their resulting contracts. The Agency also regulates and inspects the warehousing of natural gas, oversees the transportation of the product in the network and coordinates it in contingency situations. (ANP, 2016b)

ANP issued Directives 27, 28 and 29 in 2005, in order to regulate matters involving the natural gas transport. Later, ANP Directive 15 of 2014, replaced Directive 29/2005. There was also a Directive issued in 2016 (ANP 11/2016) wich

¹⁴ Resolution 27, from 14.10.2005, in its 1st article, announces that it will regulate the use of natural gas pipelines transport installations, against adequate payment to the transporter.

¹⁵ Resolution 28, from 14.10.2005, regulates, according prescribed in its 1st article, the cession of capacity contracted in the natural gas pipeline transport.

¹⁶ Resolution 20, from 14.10.2005, establishes, according to its 1st article, criteria to the natural gas pipeline transport calculus.

¹⁷ It is important to register the Bill of Law 226/2005, that "disposes about importation, exportation, processing, transport, stocking, liquefaction, regasification, distribution and commercialization of natural gas", made by Senate Rodolpho Tourinho, that nowadays is found in the Deputy House for appreciation.

features rules for several aspects of the natural transport, among them: service providers in natural gas transport, operational swap of natural gas and the hiring process for capacities of transportation of natural gas. Next sections will discuss and compare each one of them.

2.4. Open Access Rules

Directive # 27 from October 14th of 2005 regulated the pipeline transportation facilities of natural gas with adequate remuneration to the Transporter. The Directive # 27 has forbidden the Transporter vertical integration, by preventing this agent from buying and selling natural gas, except in the case of own consumption and for keeping of an operational stock (Art. 3). Article 4 granted a non-discriminatory access to transmission pipelines and hubs, except in the case of new transport facilities.

Furthermore, Article 6 established general contract conditions and submitted transport contract models assessment to ANP's inquiry. Finally, it provided the Public Tender for Capacity Allocation (*Concurso Público de Alocação de Capacidade - CPAC*), an offer procedure and service capacity allocation for Firm Transportation. Enabling third party access to transmission capacity based on the principles of transparency, equality and publicity.

This Directive was revoked by Directive #11/2016.

2.4.1. Capacity Assessment Directive

Directive # 28, also from October 14th of 2005, regulated the contracted capacity assignment in natural gas pipeline transportation. It allows that a Carrier, holder of a Firm Transportation Service contract, may assign to a third non-transporter party, total or partial share of its contracted transport capacity, respecting the Transporter's contractual rights. If necessary, an additive will be included into the current contract.

Furthermore, the capacity assignment did not release the giving Carrier from its contractual obligations towards the Transporter unless under an express agreement. This assignment of rights must be reported to ANP, as well as the contract submission the agency's inquiry for the inspection of any offense.

This Directive was revoked by Directive #11/2016.

2.4.2. Review of ANP Directives # 27/2005 and 28/2005: Directive # 11/2016

The open access system network was originated by the doctrine of "essential facilities" used in US antitrust cases. The third-party access regulations in the Gas Law (Law # 11,909/2009) is specific to pipelines, differently from the third-party access rules for liquids (oil and its derivatives) and natural gas transport facilities previously established by the Petroleum Law. Under the Petroleum Law rules for third-party access, ANP published Directives # 27/2005 and 28/2005; thus, they are being review within the 2015's Consultation and Public Hearing.

ANP's Directive # 27 reviewd aims to update the regulation of third party access considering the new guidelines introduced by the Gas Law. It focuses on providing greater transparency regarding offer and contracting of transport services. For ANP's Directive # 28, the review is necessary due to Gas Law content and its regulatory Decree, as well as the regulatory provisions recently issued by the Agency, like ANP Directive # 51 from December 26th of 2013, which regulated natural gas carrying activities.

On February 11th, 2015, ANP published the Public Hearing Notice # 07/2015 in order to acquire resources and additional information about the Directive draft that will replace Directives # 27 and 28 of 2005.

ANP has made available on its website, the Directive Draft and the Technical Note # 016/2014-SCM, of December 12th, 2014 (ANP, 2015). The period for receiving comments from stakeholders ran from April 6th to May 15th of 2015. The Draft received about 630 comments regarding open access to pipelines and Transport Capacity Assignment.

Thus in 2016, Directive 11 was published and the most relevant aspects of the non-discriminatory third party access to gas pipelines regulation can be summarized as the following:

1. The mechanism for Transport Capacity Allocation to interested Carriers;
2. The procedures for pipeline congestion management (contractual or physical);

3. The transport services offered by the Transporter to Carriers and the regulated Tariffs.
4. The balancing rules for pipeline; and
5. The rules for capacity release.
6. The need for transparent information regarding pipeline's capacity calculation. Without proper knowledge of the capabilities subject to contracting, how they are calculated and allocated, there is no guarantee that prospective carriers are able to use them fully.

Throughout the nine years of this set of Directives regarding third party access to pipelines, no effectiveness to provide the entry of other Carriers in the Brazilian natural gas industry was observed.

In addition, the Directive # 11/2016 regulates the operational exchange of natural gas, introduced by Article 15 of Decree # 7382/2010, which set up an alternative third-party access to transport pipelines (ANP, 2015).

2.4.3. Tariff Criteria Directive

Directive # 29, also from October 14th of 2005, establishes the criteria for natural gas pipeline transport tariffs calculation. Article 3 provides that the tariffs will not lead to discriminatory or preferential treatment among users. This Directive provides that the applicable rates to each service and/or carrier will consist of an accounting system related to the provision's specific cost. These ones must reflect the efficient service provision as well as its variables, such as the distance transported, delivered volume and the hiring terms.

This resolution was revoked by ANP Resolution # 15 from March 14th of 2014, discussed ahead.

ANP Directive # 15/2014 is far more robust than its previous Directive (29/2005). It discriminates transport types while address the propositions approval procedure for NG transport tariffs sent by the industry. In its 4th Article,

Directive # 15/2014 describes the calculation principles for transport tariffs, referred as the following:

- To represent an efficient, safe and reliable pipeline operation;
- To allow enough revenue for the Transporter's costs, a fair and adequate investments return in transport services facilities, and their respective depreciation and amortization of the Regulatory Assets Base, which corresponds to its Allowed Revenue Cap; and
- To not promote a discriminatory or preferential treatment among Carriers.

Convergent with the Gas Law, Resolution 15/2014 establishes in its 7th Article the Public Call processes for transport capacity hiring. The proposed Transportation Tariff should be sent to ANP's approval and should contain at least:

- I. "The financial structuring presentation for the project with all considered funding sources description, third party financing conditions and any relevant information needed to a correct understanding of each funding instrument presented;
- II. The project's discounted cash flow;
- III. The calculation chart used for the discount rate in the project's discounted flow;
- IV. The already made investments, when applicable, and the spending projection for the pipeline's definition, procurement, construction, installation and assembly, divided, the minimum, among the following categories:
 - a) Pipeline (mainline and extensions);
 - b) Complements (receipt and delivery points, measuring and compressor stations, among others);

- c) Components and equipment ("pigs" and spheres launchers and receivers, valves, flanges, gaskets, among others);
 - d) Construction and assembly (pipeline preparation track, crossings and intersections, conditioning, commissioning etc);
 - e) Environmental licensing;
 - f) Release, use or share of the Right-of-Way;
 - g) Work Management; and
 - h) Engineering design (feasibility studies, basic design, detailed design, etc.);
- V. The operational and maintenance costs projection, in addition to general and administrative expenses;
 - VI. The uncertainty associated with sections IV and V parameters;
 - VII. The planned or measured transport capacity, as applicable;
 - VIII. The demand estimates for contracted transport capacity;
 - IX. The adjustment criteria, as well as its projection index, for the Transportation Tariff; and
 - X. The referred natural gas calorific value."

After the Transportation Tariff proposition, presented by the applicant Transporter, ANP will examine this proposal in a maximum period of 90 days from the submission date. Directive # 15/2014, in its Article 8, repeats Article 5th from the old Directive # 29/2005, concerning the Transport Tariff structure applicable to the Firm Transportation Service.

The new Directive received a specific chapter on Transport Tariff Approval Procedure for Pipelines Subjected to Authorization. In Directive 29/2005 there was no such prediction. The Transporter must submit for ANP's approval, the transport tariffs related to the Firm Transportation Service. In case of failure to comply these cost transparency requirements, the proposition will not be rectified by the Agency (Article 14). The Directive # 15/2014 also addressed the concepts

of Shared and Incremental Tariffs adopting the same wording as Directive 29/2005.

Directive # 15/2014 brought some innovations regarding Directive 29/2005 by raising the possibility to review Transport Tariffs under the authorization regime. This revision shall cover the addition of new assets and facilities into the Asset's Regulatory Base, which accounts for temporary or permanent deactivation, tax burden, whose new value must necessarily be approved by the ANP, in which the principles of publicity and transparency will apply (Articles 16, 17 and 18).

The Transport Tariffs applicable to the Firm Transportation Service approved by the ANP will be periodically reviewed every 5 years from the Commencement Date. This periodic review process aims at updating and adapting the methodology and parameters used to calculate the return on investment given the macroeconomic conditions and prevailing market in the country. ANP, within 180 days prior to the base date, will request the Carrier's proposal of revision. This review may involve the recalculation of transport rates applicable to other transport services that have been settled on by the Firm Transportation Service (Article, 19 §§ 1, 2, 3).

Reductions in Transport Tariffs related to the Firm Transportation Service, originated from the Shared Tariff application, from the resultant income transference of Interruptible Transport Service sales or from the Extraordinary Transport revenues reversal, will be conditioned to verification, by the Carrier's part, to the full payment of natural gas sales price, if it is commercialized (Article 21). In the case of lack of proofs, the Shared Tariff may be reversed to the Incremental Rate. Thus, converting the Transport Tariff discounts into ones applicable to the interruptible mode as well as reverting Extraordinary Transport Service revenues into discounts applicable to the appropriate modality.

As previously mentioned, a recent Public Consultation nº 14/2016 has rules over the acquirement of subsidies and additional information about the application of methodologies for calculating pricing features over the transport which should be in the natural gas purchase and sale contracts.

2.5. Distribution

The activity of natural gas distribution¹⁸ starts at the delivery station (Custody Transfer Station), known as city gate. The local concessionary is the competent company to distribute natural gas until the final consumer, due to the constitutional competence of the States on this subject (art. 25, § 2 CF/88). The final usage can be residential, commercial, industrial and automotive.

The distribution is the final step of the chain, in physical terms, and happens, in general, by pipelines of molten iron, steel and polyethylene, in low and medium pressure (between 4 to 20 atm) (SANTOS et al., 2002).

In this sector, gas must meet the standards specified by ANP's decree, as well as contain smell, in order to easily identify any kind of leaks. Santos et al. (2002) suggests that where the net infra structure does not exist, the delivery of natural gas may be anticipated by distribution by liquefied natural gas in bulk, or even by high-pressure cylinders, known as virtual pipeline.

Medeiros (2000) adds that these pipelines need to be monitored 24 hours per day, during the whole year¹⁹. In order to do so, transport and distribution companies keep supervisors who control the data acquisition system, which are computerized systems that allow the information acquisition and the gas stream control through the net by satellite or telephone communication systems²⁰. This allows the supply reliability, as well as system operation safety.

The costs of the distribution activity are high and the deadline to obtain invested capital return is long. That is why the entrepreneurs can see the vertical

¹⁸ According to Abreu and Martinez (2003, p.19), "in the distribution nets to the urban consume, aiming the communities safety, the pressure is reduced for 5 to 6 kgj/cm² in the main branch and, in the consume unities, for 15 to 30 cm of water column". About the pipe cost, according to these authors, it is usual to refer as the product of the tubing length (expressed in linear meters) by its diameter (expressed in inches), being a good reference, nowadays, a value from Us\$ 15 to 25 by metropol, which means, the cost by pipe meter is from US\$ 15 to 25 multiplied by the number of inches of its nominal diameter".

¹⁹ According to Medeiros (2000), the transport and the distribution of canalized natural gas is one of the more safety forms of energy transport and therefore presents data of the North American Transport Department (data of the last years of the 90's), in which the electric stream is responsible for more than 100 deaths per year, during the transmission and distribution; while in the same year only 14 fatalities from pipelines accidents were registered.

²⁰ Another method explained by the author is the intelligent PIGs, which are devices of robot inspection, used in the inspection of inner walls of the pipelines in order to measure the corrosion, defects, the inner diameter of a tube section the to remove material accumulated through its sections.

integration of the chain as a way to get stronger in the market, as well as have enough capital to expand and assure the final consume of its product.

Furthermore, when vertical integrating, the economic agent proportionate supply safety to its client and may aim cash flow compensation in activities not that profitable which are important to the final use of the gas obtained by a take-or-pay contract, for example.

Therefore Santos (2002, p.185) lectures that the natural gas industry continues constrained by its inherent hardness, especially on the transport and distribution systems, because “the gas own volatility and its lower energetic density when compared to oil and coal, make much more complex and expensive the transport and distribution of gaseous hydrocarbons”.

Through this perspective, the creation of an environment favorable to the increment of crucial infra structure, and to the growth of the rational use of gas in the Brazilian energetic matrix becomes necessary. In order to be achieved, this interaction between offer and demand needs to adopt a coherent and open governmental policy, or the usage of instigation methods for a more competitive environment.

The Gas Law, in its article nº 46, establishes that the free consumer, the self-producer or self-importer whose needs for movement of natural gas cannot be fulfilled by the state distribution company, may directly construct and implement facilities and pipelines for its own specific consumption, by means of an agreement assigning its operation and maintenance to the state distribution company, and the facilities and pipelines shall be incorporated to the State’s assets through declaration of public utility and fair and previous indemnification, in case of full use.

It is also stated that the operation and maintenance rates for the facilities shall be established by the state regulating body according to the principles of reasonableness, transparency, publicity, and the specific characteristics of each facility, and in case the facilities and pipelines are constructed and implemented by the state distribution companies, the rates established by the state regulating body according shall consider the investment, operation and maintenance costs, observing the principles of reasonableness, transparency, publicity, and the

specific characteristics of each facility. In case the distribution facilities are constructed by the free consumer, the self-producer or self-importer, the state distribution company may request that the facilities be sized in a way to allow that other users have their needs met, negotiating the necessary compensations with the free consumer, the self-producer or self-importer, under arbitration of the state regulating body (Article 46).

The article 47 of the Gas Law states that, for some cases, the commercialization of natural gas shall be upon the execution of agreements filed with the ANP, which shall inform the origin or characteristics of the reservoirs that will support the supply of the natural gas volumes hired and also may, according to specific regulation, request this data from the natural gas sales agent.

2.6. Commercialization

The natural gas commercialization does not require authorization of any public organ. It can be freely executed by interested agents, constituted by Brazilian laws (CECCHI, 2001).

In this context, the commercialization companies purchase natural gas and then sell it to the distribution companies, or to the final consumers. In this last case, they must hire the distribution service in order to deliver it (this option does not occur in Brazil nowadays). It is important to highlight that, as thought by Pfeiffer (2004), the States shall create norms to regulate this subject.

The relevance of the commercialization activity is to transform the owner of the infra structure net in a service delivery (or at least in its bigger part), engendering the competition by the possibility that the consumers may buy the product from different natural gas traders.

However, in most Brazilian states, there is not such prevision in the concession contracts, according to the study made by SCG-ANP, there are only clauses in this sense in states as São Paulo and Rio de Janeiro (SCG, 2005).

The Gas Law, in its article 48, says that the natural gas commercialization agreements shall contain a clause for the resolution of possible controversies,

which may provide for arbitration agreement, pursuant to Law 9307 of September 23, 1996.

In the Article 49, the Law states that the public enterprises and the government- controlled corporations, their subsidiaries and affiliated companies, holders of concession or authorization, are authorized to adhere to the instrument and arbitration agreement referred to in the previous article. The rights related to credits and debts deriving of hiring of natural gas dealt with in article 47 are regarded as available.

2.7. Others regulatory issues

Currently, Brazilian Government has launched a Program called “Gas to Growth” (MME, 2016).

This program was presented in September 2016. After Petrobras started its disinvestment Plan. It is opportunity to diversify the sector agents, with increased competition. In order to mitigate regulatory risks, Brazilian Government is discussing during Workshops with private and public agents what kinds of rules could be enacted (MME, 2016).

In this context, the Brazilian Government has indicated premise such as: adoption the best international practices; attracting investments; increased competition; diversity agents; dynamism and access to information industry players; participation; and respect for contracts (MME, 2016).

Brazilian Government Agenda embraces issues such as swap taxation; the creation of a full open market; the creation of a National System Operator or a Chamber for financial liquidation, like the electrical sector.

3. Conclusion

Natural gas industry has different development stages worldwide and open access rules reflects on its dynamics and needing for investments (Negreiros, 2003). The opening of the final market has the potential to increase the efficiency

of services and to reduce the gas price in order to increase competition; on the other hand, the possible reduction in the revenues of distribution companies may compromise the pace of investments in the distribution network expansion. Thus, balance goals, such as encouraging the competition and the distribution network growth, requires the opening of the final market and this to be accompanied by the adoption of other regulatory mechanisms in order to ensure investments by distributor companies (Colomer, 2013).

Therefore, it is relevant and essential to build a regulatory harmonization, including the legal and regulatory aspects, in order to develop a robust gas market in Brazil.

Nevertheless, it is necessary to acknowledge the need of lowering the entry barriers for other companies, due to the reduction of Petrobras' market power.

In this perspective, considering the new position of Petrobras in the Natural Gas Industry in Brazil, together with legal and regulatory changes that have been demanded by the industry players and studied by Brazilian authorities, will bring a new dynamic to the Brazilian market (Petrobras, 2016).

Furthermore, the Brazilian Government Program “Gas para Crescer”, Petrobras (2016) pointed out some key issues that need to be addressed in this industry institutional change, in order to establish an affordable, secure and liquid market, such as:

- A new transport system measure – considering inputs and outputs;
- A creation of business environment that provides liquidity for exchange between agents;
- The needing for an independent manager of the transportation system;
- Adjustments in the interaction with the electric sector to lower overall cost of service;
- Adjustments in the tax model.

As we can see, the regulatory agenda for the next months are robust and will have pressure from many kinds of groups.

Therefore, our intention is to pay attention on agents' discussions, as well as contribute with this debate. In this context, during the following months, we intend to produce working papers and published them as a book.

Regarding our website and data system, we already have our classification and the specialized firm we have a contract definition until November.

By last, we concluded that the second semester was very productive and we have our goals accomplished. However, we must highlight that Brazilian natural gas industry is going through a moment with a lot of changes and we have a huge regulatory agenda. Therefore, the next Report Scientific will continue to explore all those institutional changes.

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