

**Brazil's experience and needs in Natural
gas storage: research and regulation**

Prof. Dr. Waldyr L. R. Gallo

**Energy Department – Mechanical Engineering College
UNICAMP**

FAPESP and University of Birmingham

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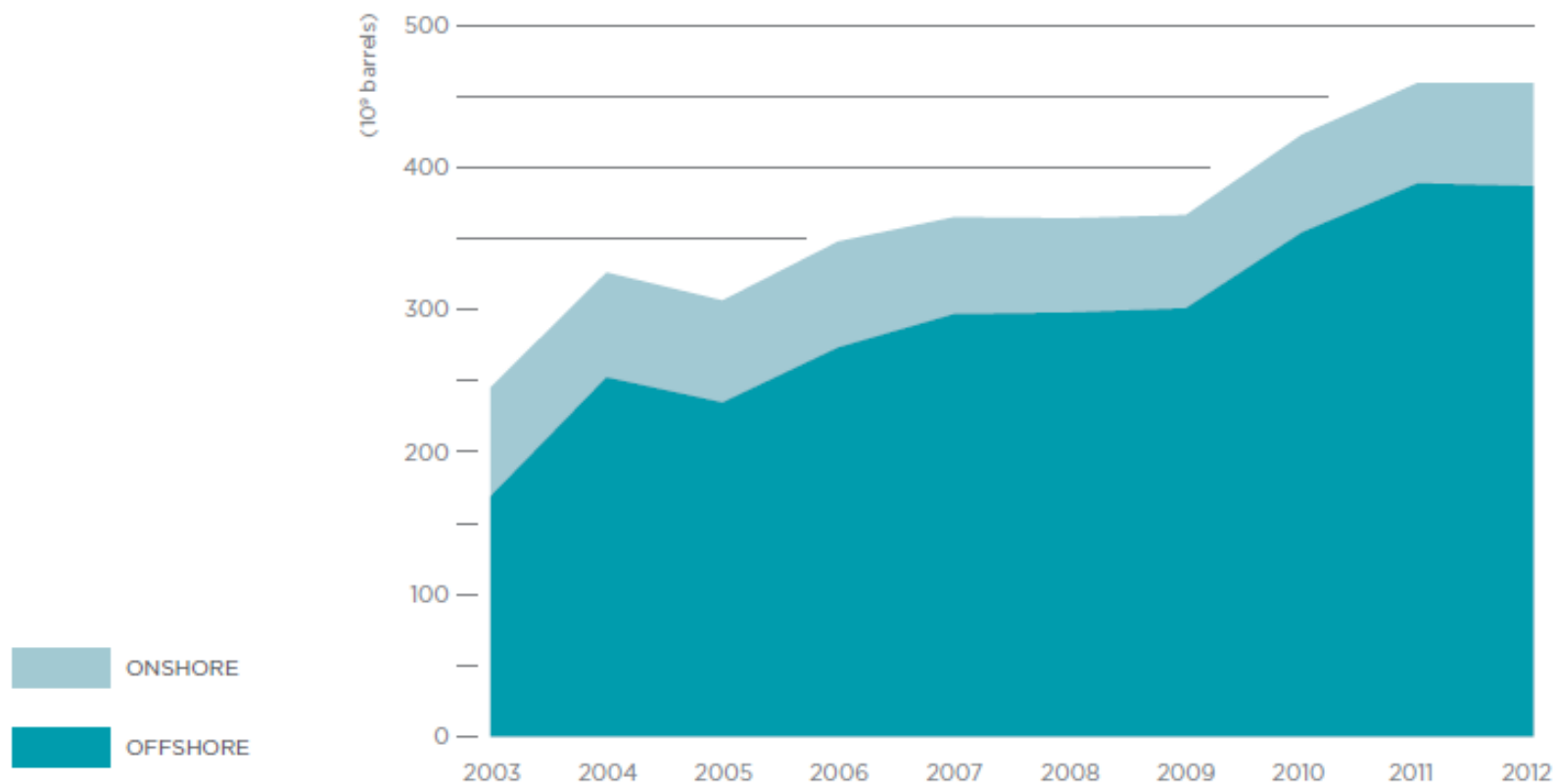
Summary

- 1. Natural gas in Brazil – overview**
- 2. Regulation for gas storage**
- 3. Research needs**

1. Natural gas in Brazil – overview

Brazilian natural gas reserves

FIGURE 1.2. PROVED NATURAL GAS RESERVES, BY LOCATION (ONSHORE AND OFFSHORE) – 2003-2012



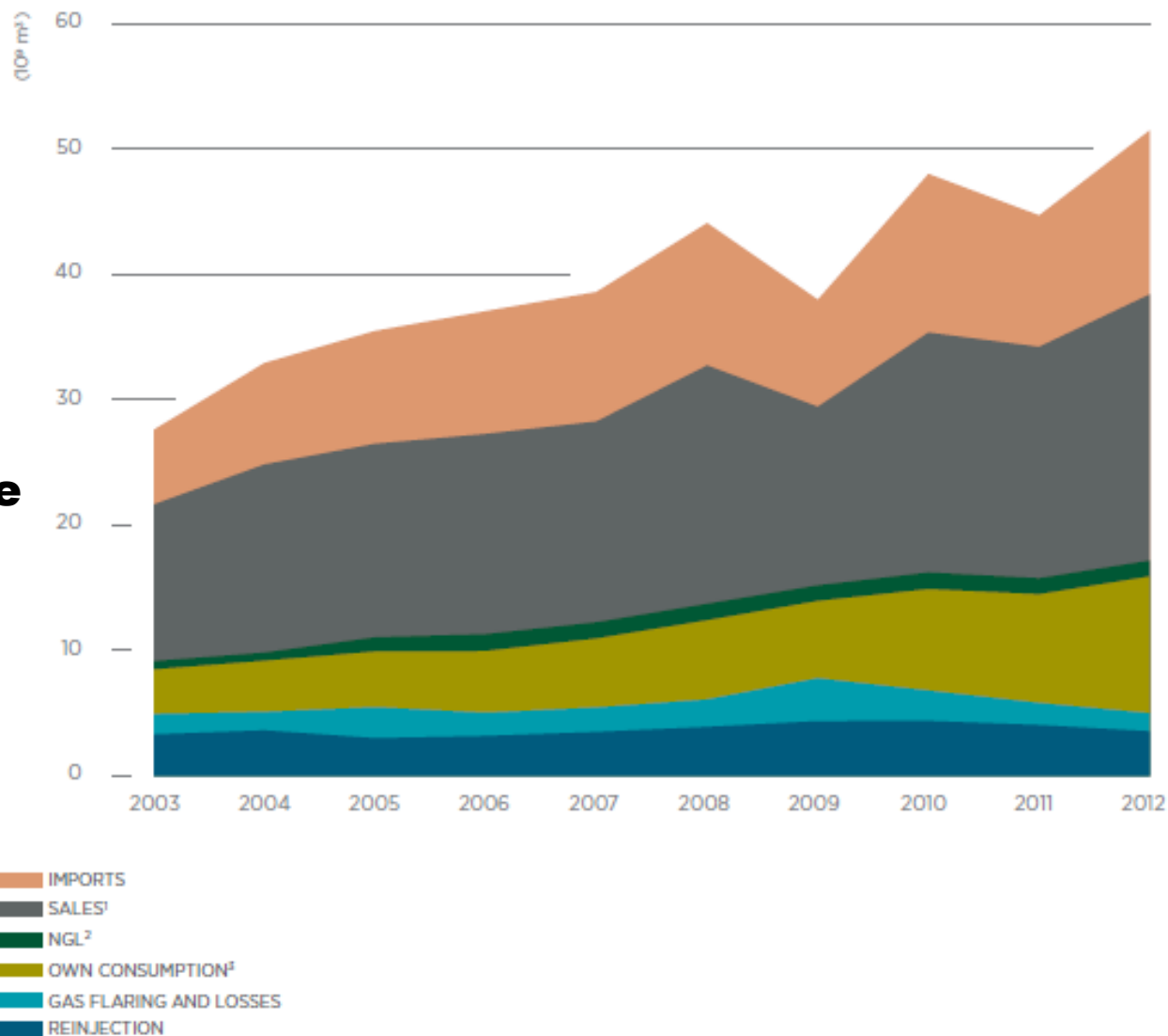
SOURCE: ANP/SDP (Table 1.2).

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1. Natural gas in Brazil – overview

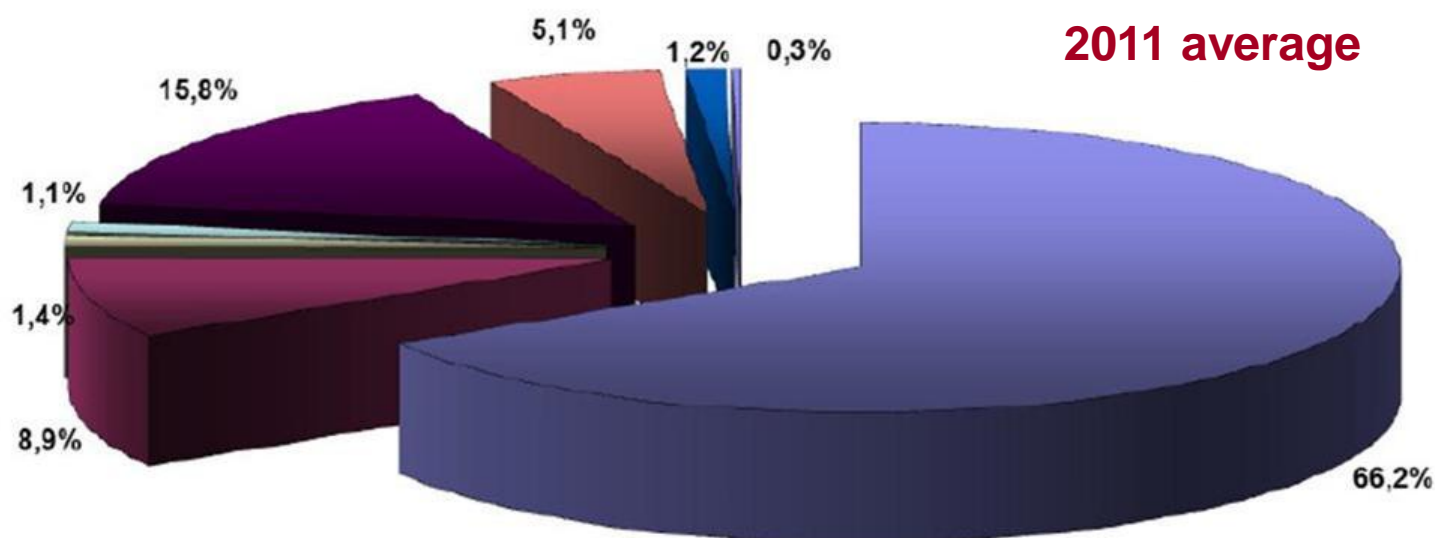
Natural gas balance

FIGURE 1.16. BRAZILIAN NATURAL GAS BALANCE - 2003-2012



1. Natural gas in Brazil – overview

Sectoral consumption



■ Industrial

■ Automotive

■ Residential

■ Commercial

■ Thermoelectricity

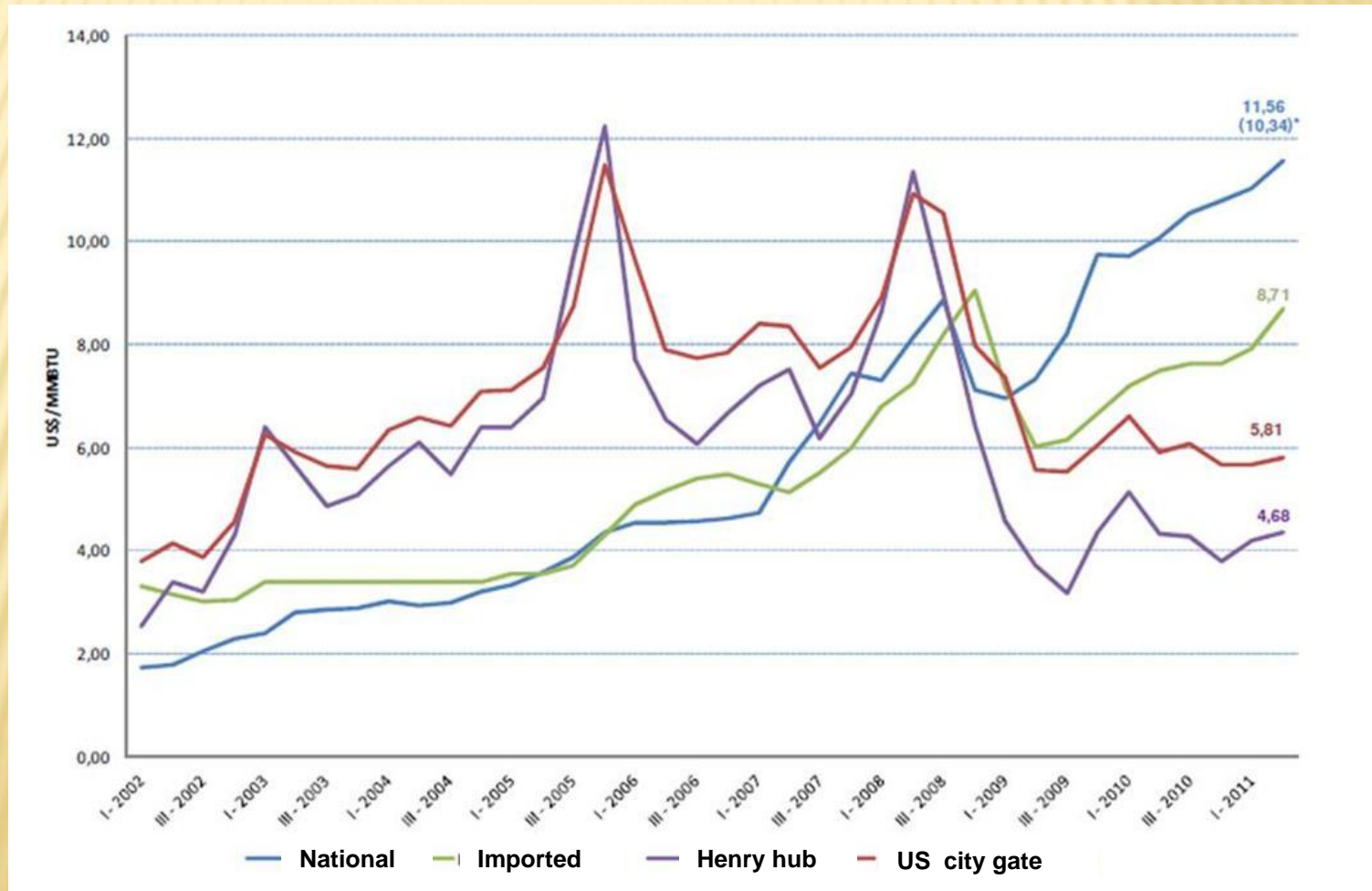
■ Cogeneration

■ Raw material

■ Others (CNG)

1. Natural gas in Brazil – overview

Gas Prices

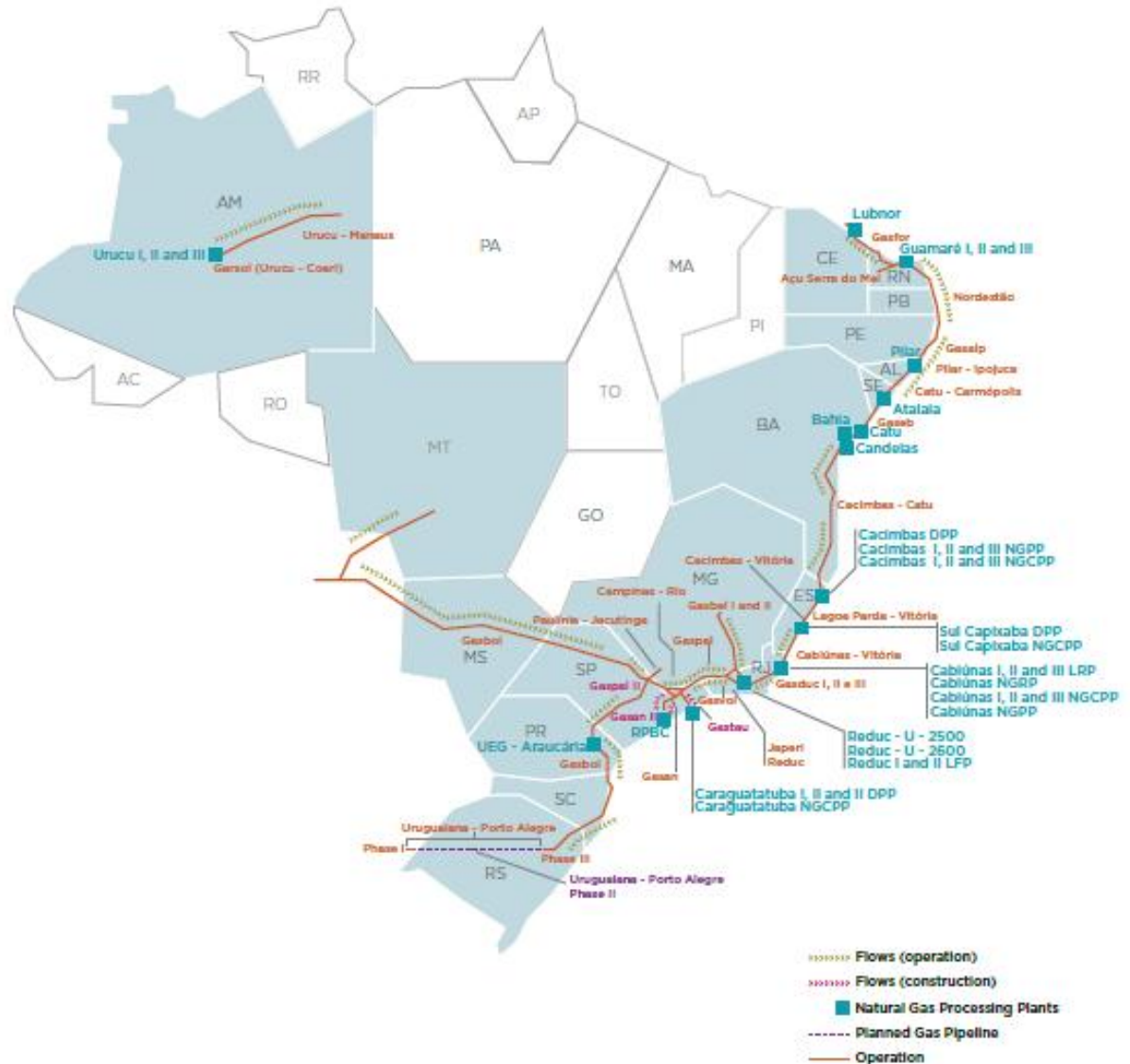


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1. Natural gas in Brazil – overview

Natural gas infrastructure

MAP 1.3. INFRASTRUCTURE FOR NATURAL GAS PRODUCTION AND TRANSPORTATION - 2012



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1. Natural gas in Brazil – overview

LNG regasification in Brazil: Guanabara bay (RJ) and Pecém (CE)

From:

Catar

Trinidad

Nigeria

Norway

Belgium



2. Regulation for gas storage

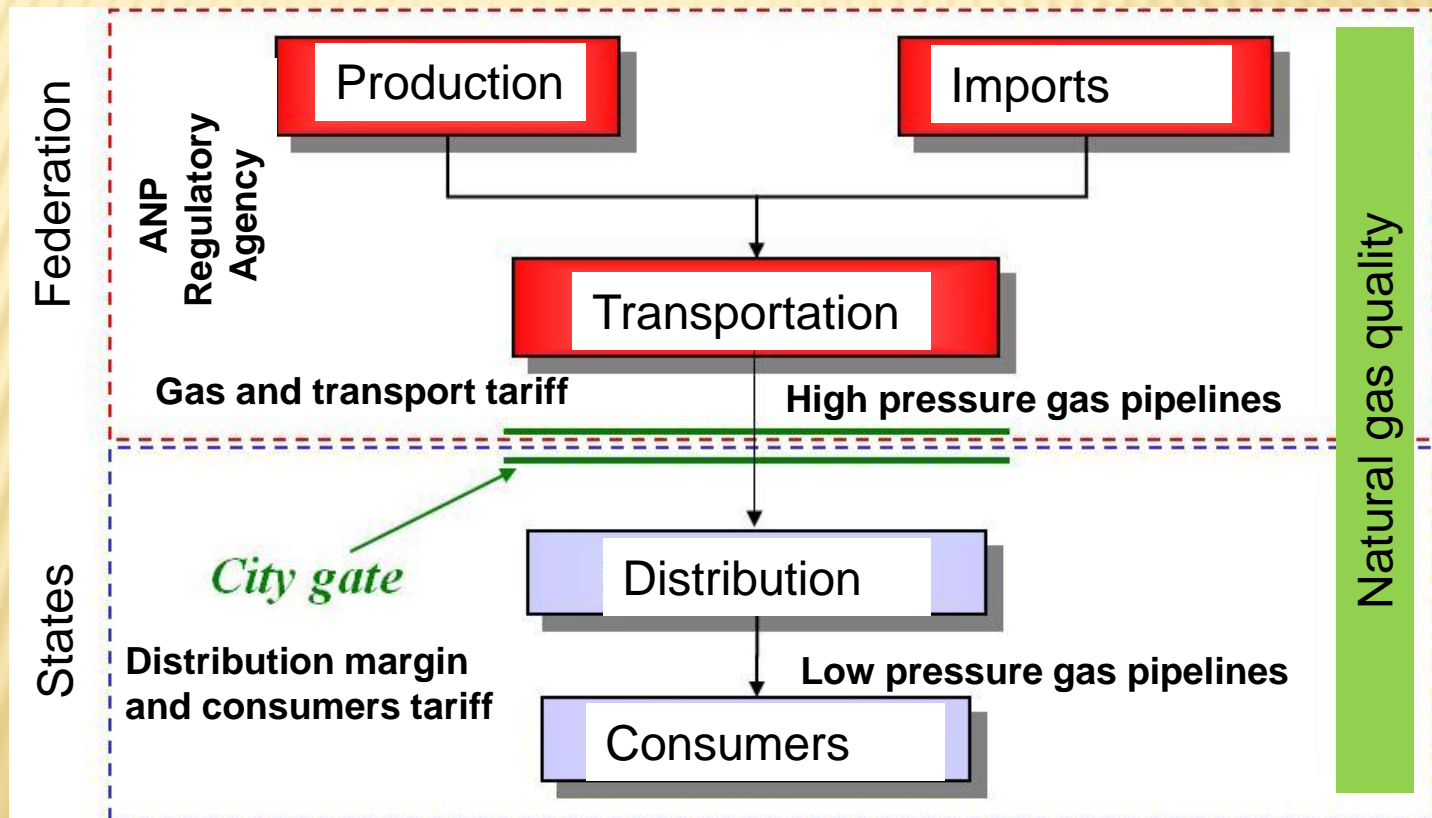
1995 – Constitutional Amendment n.5: It is a monopoly of each State of the Brazilian Federation to explore – directly or through by public concession – the distribution of gas to final consumers (low pressure network).

This monopoly extends to any gaseous fuel, including natural gas. So, from the city gate to the final consumer, the service is conduced by a Distribution Company. The service and tariff to final consumers are regulated by the Government of each State.

Regulation difficulties and even conflicts among Federal and State regulations can occur.

2. Regulation for gas storage

Regulation: Federation and States



2. Regulation for gas storage

The Law 11.909 (March 2009 – “Natural Gas Law”) – principal aspects:

Gas transport service: By granting authorization or concession with public auction.

New pipelines: exclusivity period set by the MME to the initial shippers (who enabled pipeline)

Construction of new pipelines or expanding capacity: MME, by its own initiative or provoked by third parties, preceded by public call for capacity contracting

Gas transported must meet quality requirements (except for dedicated pipelines, the result of negotiation)

Interconnection shall be permitted provided that there is no loss of quality of gas

2. Regulation for gas storage

The Law 11.909 – principal aspects (cont.):

Concessions: 30 years; discretion of the Auction: low annual income; permitted the transfer of the concession agreement (authorized by ANP)

Concession contract: fixed route, capacity, points of receipt and delivery, maximum annual forecasted revenue, the exclusivity period, implementation schedule, minimum investment, expansion possibilities, annual revenue and adjustment criteria

Permits: if it is an international pipeline, 30-year term

Existing pipelines: ratified permits of ANP (30 years); exclusivity period: 10 years of the entry into operation; preserved tariffs and review criteria in force.

2. Regulation for gas storage

The Law 11.909 – principal aspects (cont.):

Open access: after the exclusivity period is mandatory

Contracting of access: firm, interruptible and extraordinary; firm: a public call;

Trading of contracted capacity: only the firm modality;

Import and export of natural gas: permits

Storage of gas: HC reservoirs or other geological formations: bidding and concession. Exclusivity period to be defined in the bidding

Packaging for non pipeline supply (CNG, LNG bulk): ANP and other agencies (ANTT, ANTAQ) permits

Liquefaction and regasification units: ANP permit

2. Regulation for gas storage

The Law 11.909 – principal aspects (cont.):

**Free consumer: under Law, but it depends on regulation by the States.
Until now, only SP, RJ, AM, ES and MA defined the conditions for
free consumers – and in different ways.**

**Production pipeline for gas: between the producing region and
Processing Units Natural Gas. They are exempt from the free
access regulations**

Resolution ANP n.52/2011 (September 2011)

**Regulates the activity of transporting natural gas, due to new Law :
Carrier may NOT buy or sell natural gas
Establishes the conditions that must be met by contracts of
purchase and sale of natural gas**

2. Regulation for gas storage

Regulation of distribution and final price: it depends on each state. Example

In São Paulo State: Regulatory Agency for Sanitation and Energy of the State of São Paulo (ARSESP) defines the value of the distribution margin and the tariff to final consumers.

The tariff of gas is given by:

$$T = P_G + P_T + M_D$$

Where:

P_G → Price of the gas (molecule);

Gas produced in Brazil: free price;

Gas imported from Bolivia: price defined by a bilateral contract

P_T → Transportation price: negotiated

M_D → Distribution margin: defined by ARSESP

2. Regulation for gas storage

Gas market in brazil is not yet mature:

Infrastructure needs to be increased, both in the transportation (high pressure gas pipelines) and in the distribution (network of low pressure)

Difficulties in the natural gas market: the difficulty of storage; “take or pay” contracts; the need to build and increase infrastructure; the need to expand the market in a combined and coordinated way.

The first bidding process for a new pipeline is in progress now

Some dilemmas:

- **Growth of the distribution network *versus* price competition**
- **Contract minimum volumes (Distributor X consumer)**
- **Notice period to go away from a “take or pay” contract**

3. Research needs

Researches on technical themes:

- **Geological identification of adequate sites for natural gas storage**
- **Identification of the best technologies for intermittent gas compression and expansion with floating pressures**
- **Evaluation of the efficiencies for process compressors in the storage installations**
- **Evaluation of the energy recovery opportunities in the gas expansion**
- **Comparative analysis among storage of LNG and compressed natural gas**

3. Research needs

Researches on regulation themes:

- **How to implement the mechanisms of free access to pipelines without inhibiting investments in new pipelines**
- **How to coordinate the needs of new thermoelectric plants, using gas as fuel, with the planned expansion of the pipeline network**
- **How to coordinate the federal regulatory activity (pipeline transportation) with state regulatory activity (distribution networks) for the expansion of the gas market**

Researches on economics of natural gas storage:

- **Evaluation of social risks for leakage of stored natural gas**
- **Evaluation of the best configuration for location of natural gas storage: before or after the city gate.**

Tank you

Prof. Dr. Waldyr L. R. Gallo
DE – FEM – UNICAMP
gallo@fem.unicamp.br