GAS DEVELOPMENT IN BRAZIL

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Agenda

- Introduction
- Key Factors for Gas Development
- Outlook and Conclusions

Introduction: Brazil´s selection

- Among several considerations to select Brazil as a case study, we can highlight the following:
  - Country size
  - Low gas participation in the energy matrix
  - Growing energy market
  - Regional integration

Introduction: Countries Background

- **BRAZIL – DEMAND MARKET**
  - Area: 8,5 MM sq.km.
  - Population: 186 MM
  - GDP/capita: u$s 8.300
  - Estimated Energy Market: 181 MM TEP
  - **Gas Participation: 8.8 %.**
  - Renewable Sources: 38 %
  - Gas Reserves: 11.9 Tcf (without recent discoveries)

- **BOLIVIA – EXPORT MARKET**
  - Area: 1 MM sq.km.
  - Population: 9 MM
  - GDP/capita: u$s 1.000
  - Total Energy Market: 6.5 MM TEP
  - Gas Participation: 25 %
  - **Gas Reserves: 52 Tcf (proven & probable)**

- **ARGENTINA – MATURE MARKET**
  - Area : 2.8 MM sq.km.
  - Population: 39 MM
  - GDP/capita: u$s 4.000
  - Total Energy Market: 58.7 MM TEP
  - **Gas Participation: 53 %**
  - Gas Reserves : 22 Tcf

SWOT Analysis

STRENGHTS	WEAKNESSES
• Brazil´s commitment to be self sufficient in crude oil production: - Milestone achieved in 2006;	• Lack of clear energy policies in all countries: - State / Federal rules in Brazil; - Electricity pricing / investments;
• Petrobras´s leading role in the energy sector: - New gas reserves at Santos Basin; - Infrastructure development;	• Significant differences among regulatory frameworks and energy prices' setting among the countries;
• Bolivia´s huge gas reserves;	• Nationalization in Bolivia;
• Argentina developed market and expertise;	• Uncertain energy policy in Argentina;

SWOT Analysis

OPPORTUNITIES	THREATS
• High oil and products prices make natural gas competitive;	• Volatility in gas demand due to large hydroelectric power base;
• Potentially sustainable availability of energy sources on a regional basis / countries synergies;	• Considerable delay in restoration of a stable regulatory framework;
• Gas-fired thermal power plants finally expected to dispatch at high load factors;	• Lack of political and contractual understanding among countries at the Southern Cone;
• Creation of a “Gas Hub” and a “Gas Ring” at the Southern Cone region;	
• Significant gas infrastructure still has to be built within Brazil and the region;	

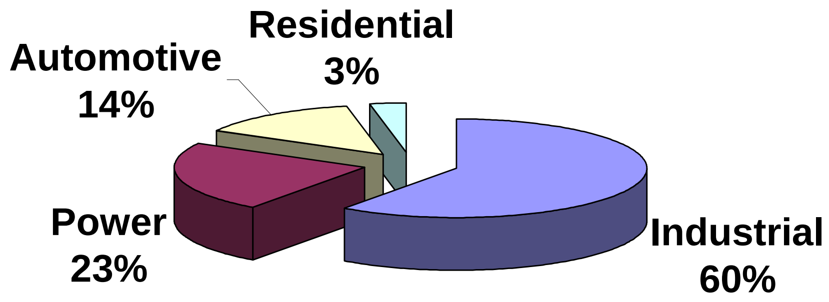
Key Factors for Gas Development

Brazil could finally develop natural gas on a massive basis due to …

- Strong Demand and even further Potential
- Adequate Regional Reserves
- Competitive and Sustainable Prices
- Government Policies

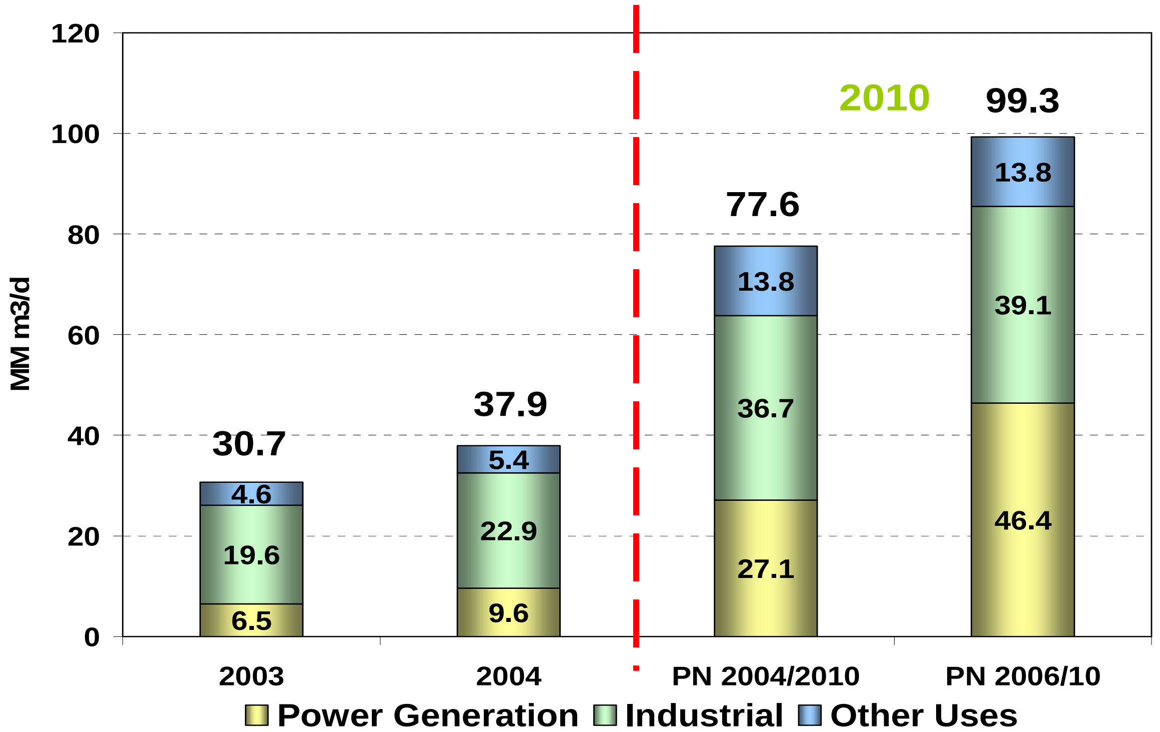
Strong Demand

- By 2004, Brazil gas demand could be grouped into four types of uses:



- Brazilian gas demand grew from less than 20 MM m3/d to 37 MM m3/d

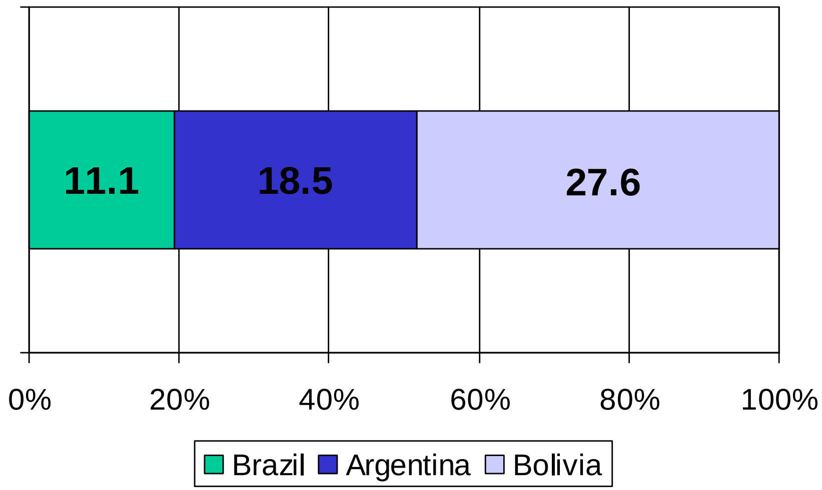
(16.6 % compounded annual growth, period 2000/2004)



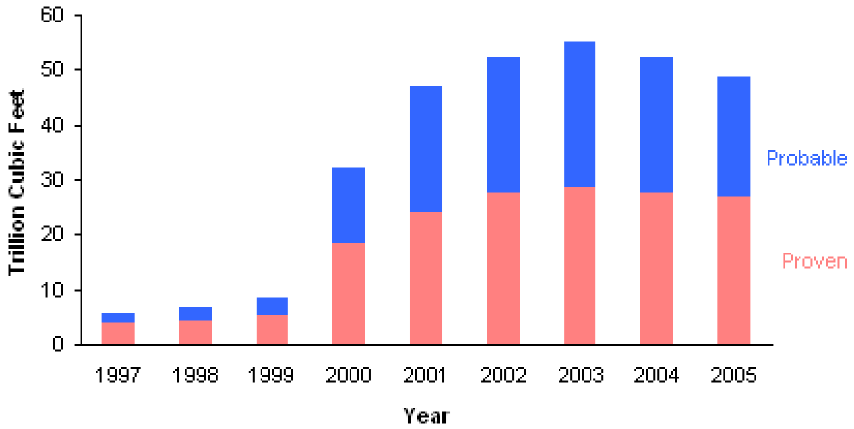
Regional Balanced Gas Reserves

- The region has enough reserves to allow Brazil to improve gas participation in its energy matrix.

REGIONAL RESERVES (TCF)



Bolivia's Natural Gas Reserves, 1997-2005



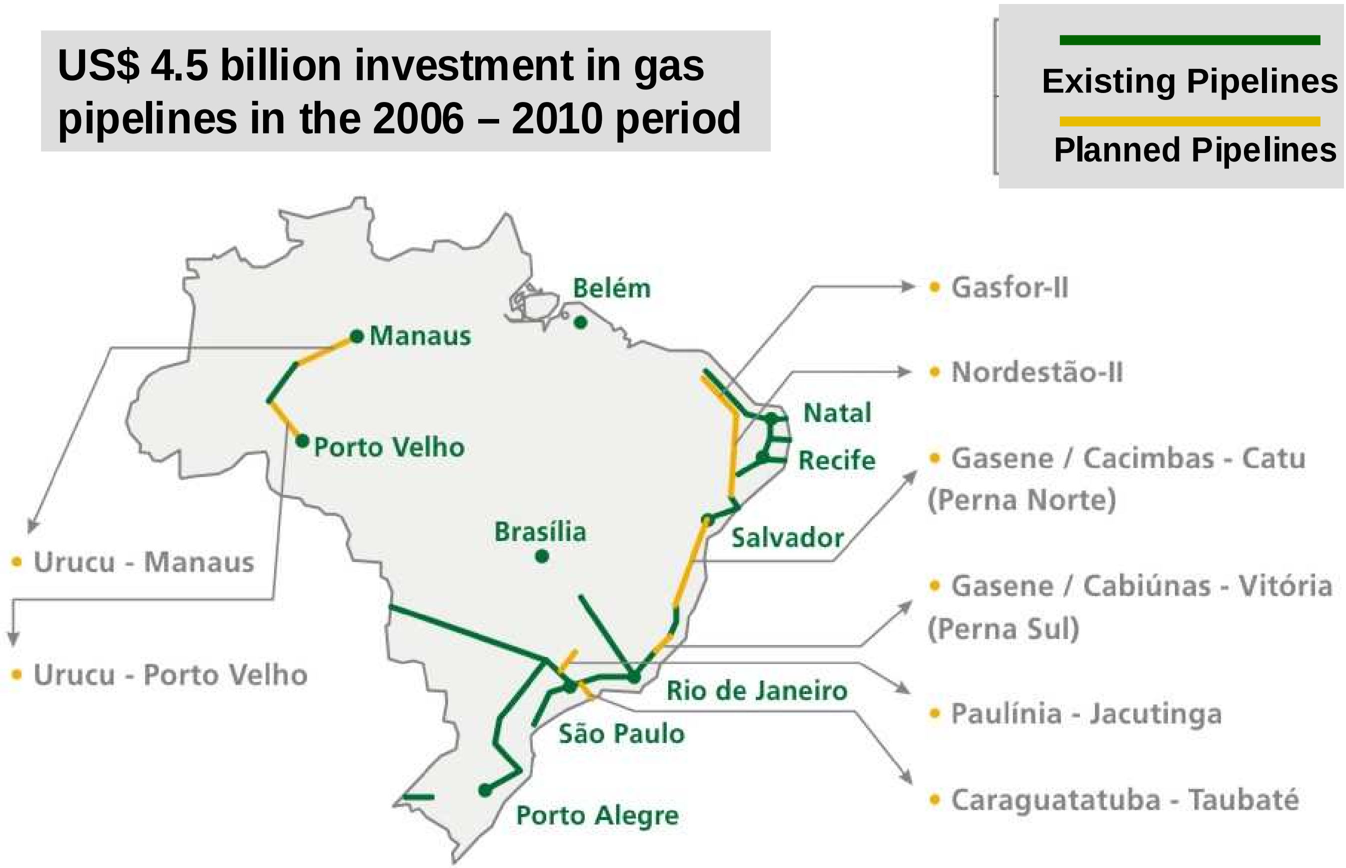
Source: YFPB

- The Southern Cone is **<u>regionally</u>** balanced between supply and demand, but cross-border agreements are required.

Required Infrastructure

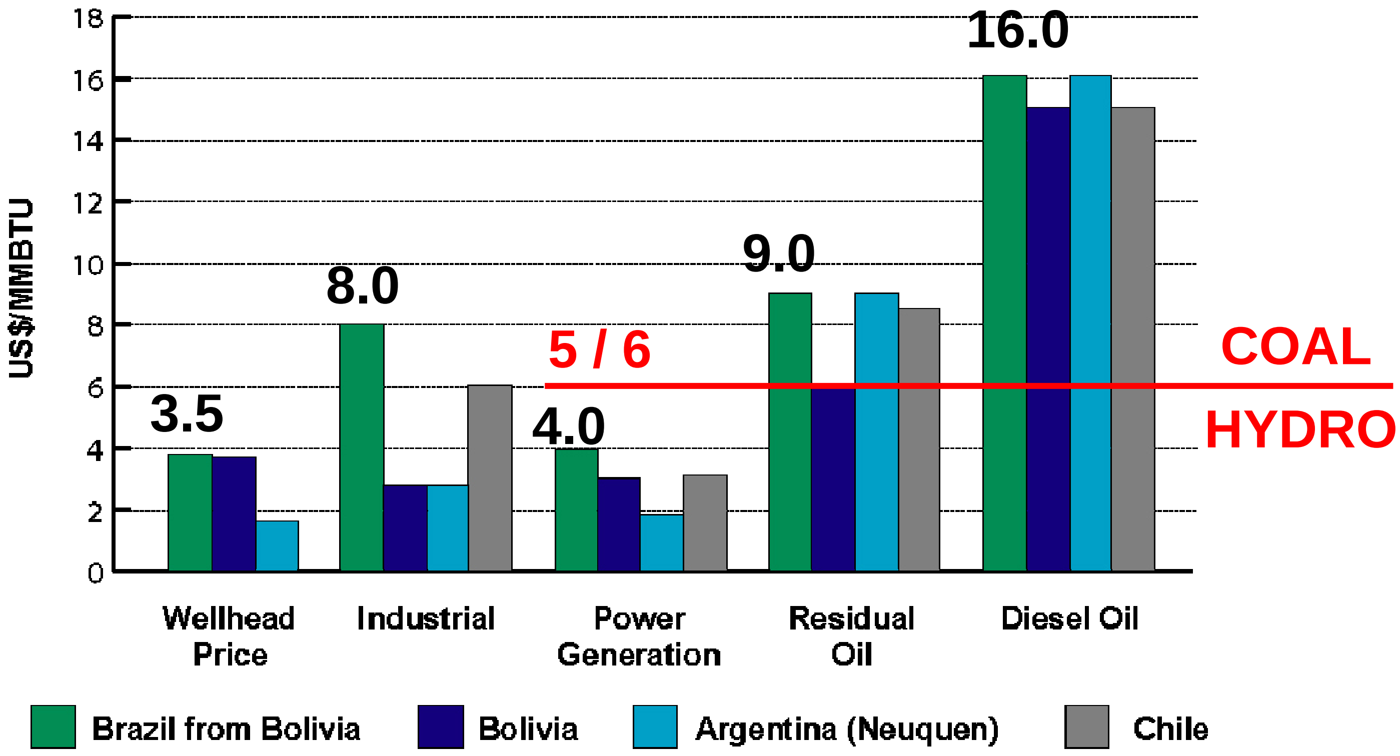
- However, natural gas reserves still need to be connected to demand centres, and some significant challenges remain open

US$ 4.5 billion investment in gas pipelines in the 2006 – 2010 period



Competitive Prices: the Gas Advantage

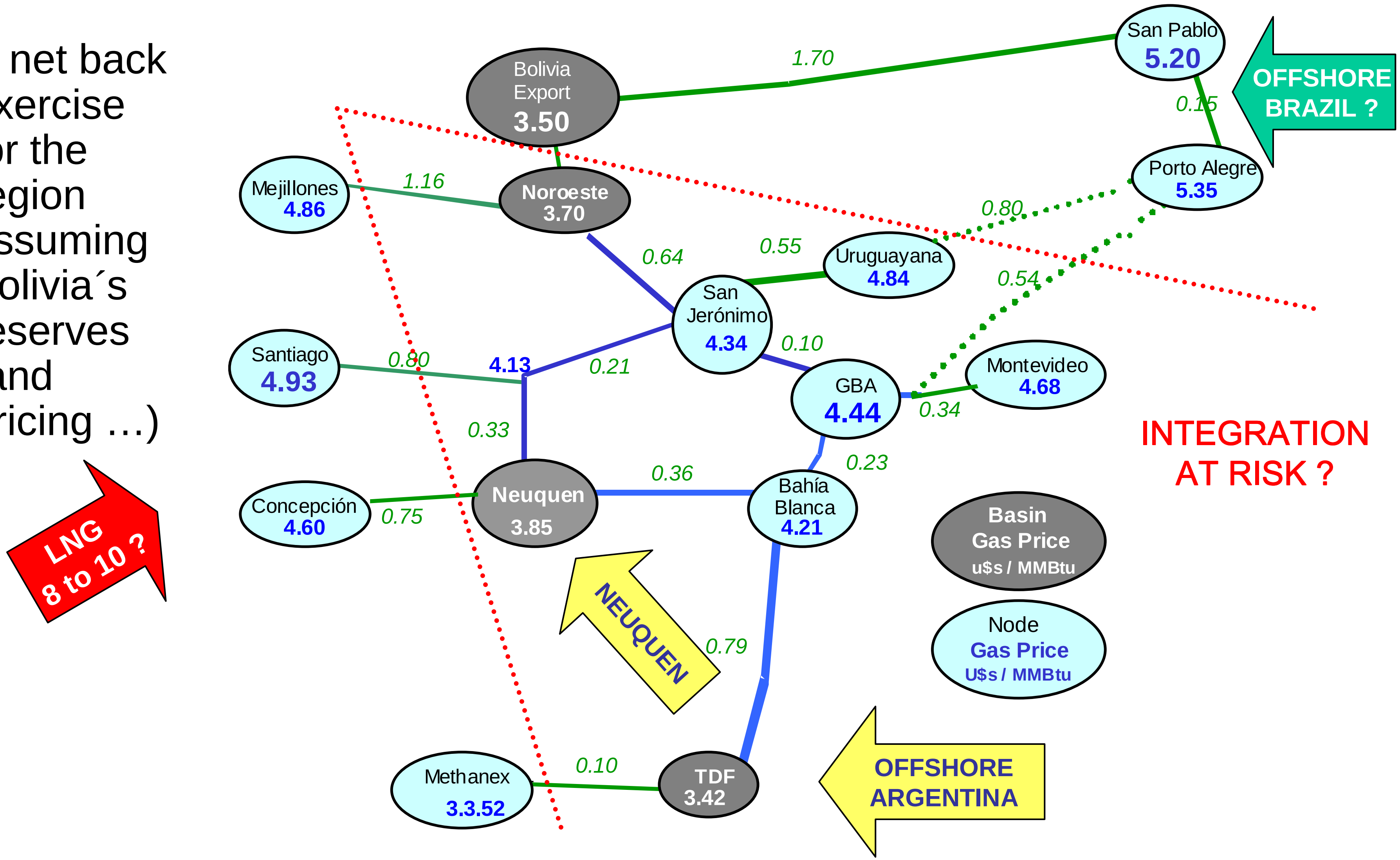
- Current prices for different fuels and segments by countries ….



- Gas for power generation has a clear advantage among some fuels, but it will depend on the price of coal or hydro electricity.
- Gas advantage for industrial consumption depends on the type of fuel to be replaced.

Sustainable Prices: an Exercise ...

A net back exercise for the region assuming Bolivia´s reserves (and pricing …)



Outlook and Conclusions

- Brazil stands as the major emerging gas market in the region;
- The Southern Cone has gas reserves and gas demand within the same region;
- However, deepening differences among countries defer integration and complete successful development of natural gas supply;

Outlook and Conclusions

- A ***Regional Policy for Sustainable Energy Supply*** is required at the Southern Cone to improve reliability of supply and guarantee long term economic development;

- Significant capital expenditures are still required to:
  - develop and produce stranded gas reserves;
  - place infrastructure to link reserves to markets;

- A compatible and comprehensive set of gas prices for different categories of consumers is needed;

- Current end-user price competitiveness of natural gas at Brazil and Argentina should be acknowledged by Bolivian Government;

All Industry Players in this region

should keep on working together,

finding creative solutions to tap existing needs,

and continue natural gas development.

Thank you !!