BRAZILIAN NATURAL GAS MARKET DEVELOPMENT
FROM PLENTY OF SUPPLY TO SHORTAGE

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Brazilian Natural Gas Market Development

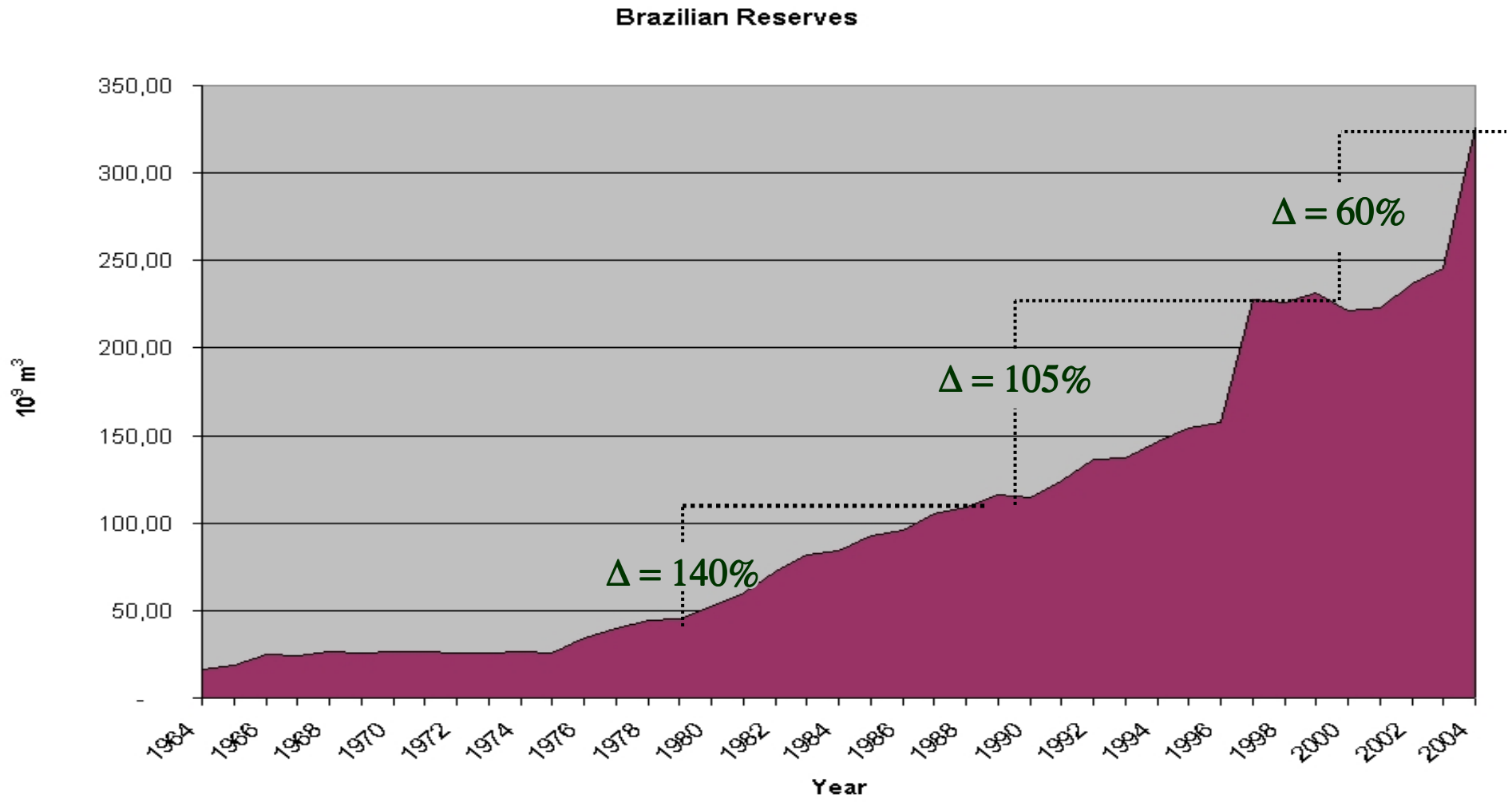
- Brief Natural Gas History (60's to 90"s)
- Bolivia-Brazil pipeline project
- Market (2000 – 2005)
- Market growth forecast
- Challenges - Southern Cone Regulations
- New Upstream and Midstream Projects
- CONCLUSIONS

Brazilian Natural Gas Market Development

Brief Natural Gas History (60's – 90's)

- Supply: Domestic reserves;
- 1960's Natural gas in Bahia State for the Petrochemical and Fertilizer industries (fuel and feedstock)
- Early 80's new gas reserves associated in Campos Basin and Northeastern:
  - Rio de Janeiro industries to replace fuel oil;
  - and Rio LDC (CEG) to replace naphta in residential segment;
  - Northeastern industries to replace fuel oil.
- New pipelines built:
  - Rio de Janeiro – 1982;
  - *Nordestão* in the Northeastern region – 1985;
  - Rio to S. Paulo – 1987;
  - Rio to Minas Gerais – 1994.

Brazilian Natural Gas Market Development



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Bolivia-Brasil Pipeline Project (GASBOL)

- Highlights:
  - 2.0 bi US$ Project;
  - 3,153 km , 32 inches pipeline;
  - Southern and Southeastern regions – the wealthiest ones;
  - Most industrial segment;
  - Startup operations: July/99 (S.Paulo) and Feb/2000 (Southern section);
  - Maximum capacity: 30 10^6 m^3/d;
  - Thermal power generation segment accelerated capacity hiring.

- The 1st. Open Season in Gasbol (2001/02) was frustrated by Federal Government Program to save electricity consumption;
  - Excess capacity in 2003 (50%):
    - 15,7 10^6 m^3/d actual flow x 30 10^6 m^3/d capacity.

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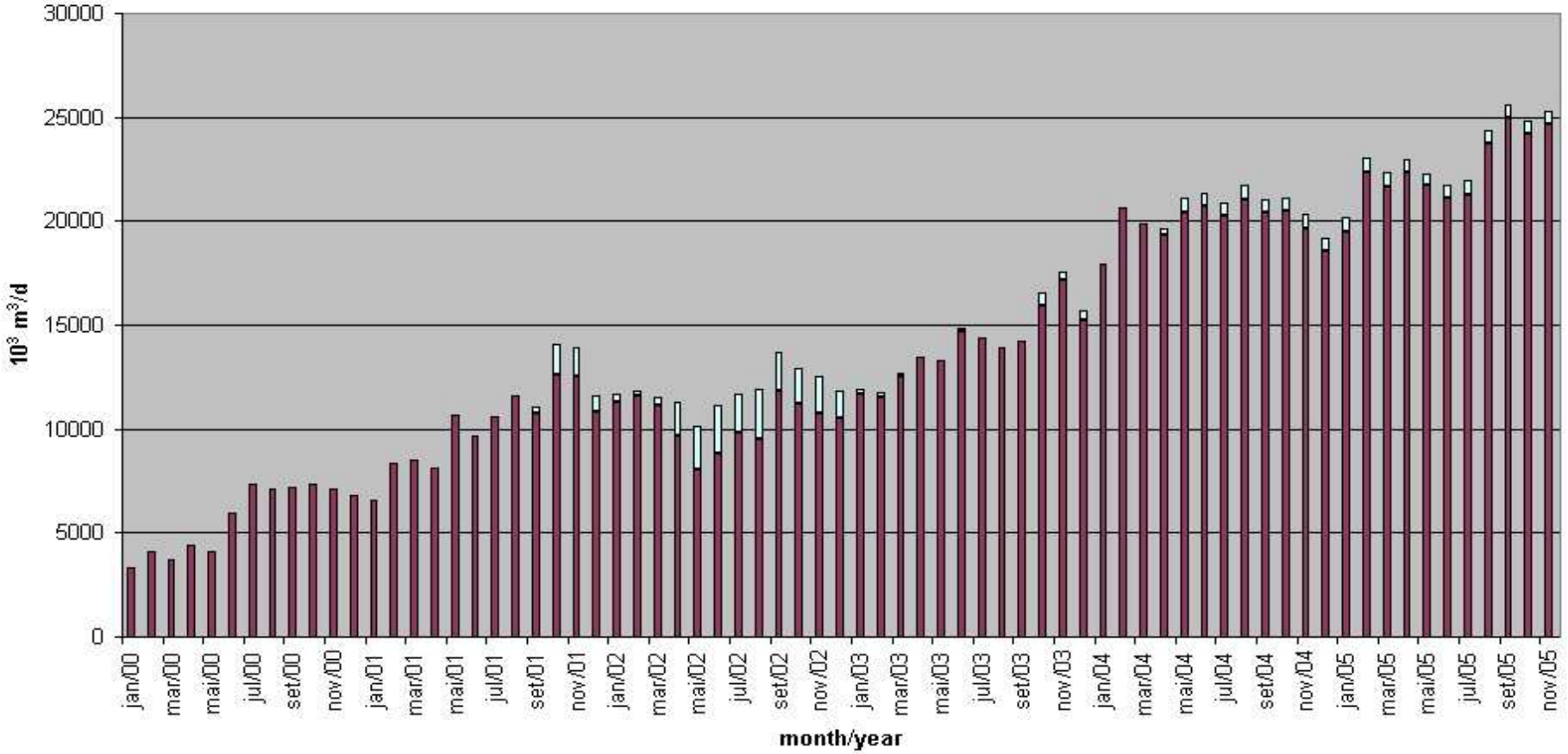
Figure 1b
GASBOL
Daily Deliveries



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Market (2000 - 2005)

- Market growth 2000 – 2005:
  - 23 % per year as average growth;
  - From 16 10^6 m^3/d to 50 10^6 m^3/d

- Market share developments:
  - Industrial: from 78% to 55% - the most relevant segment;
  - Power Generation: from 12% to30% - the second relevant segment;
  - GNV: from 6% to 12% - the biggest raise.

- Relative Gas Prices x Fuel Oil Prices;

- Gas Prices + Transportation Tariff = City-Gate Price:
  - Gas Prices = f (International basket of fuel oil prices);
  - Transportation Tariff = fixed (excalator: 0,5%a.a.);
  - City-gate Price = very competitive in high prices oil scenaries.

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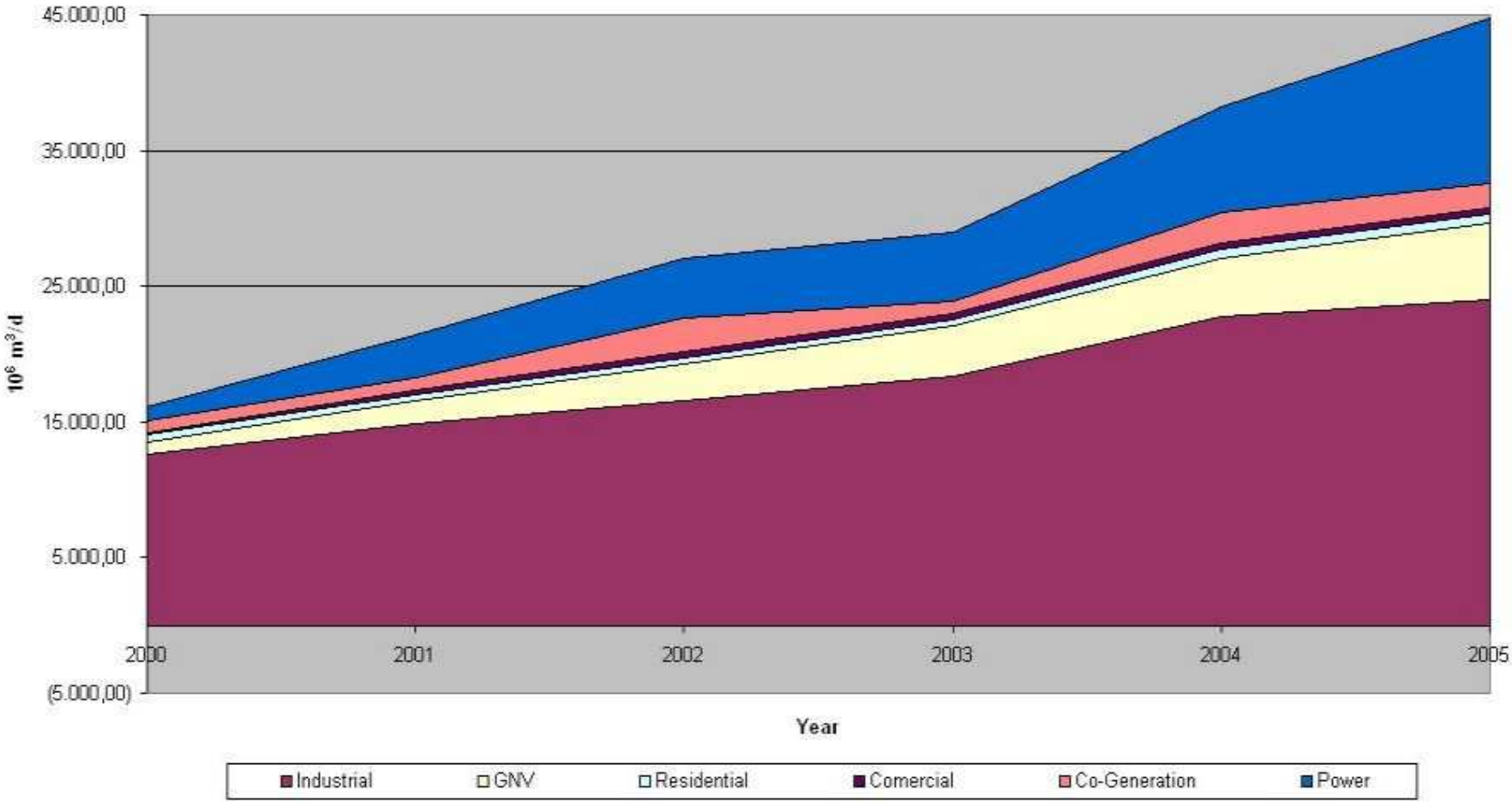
Figure 3
Market Growth 2000-2005



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Brazilian Electrical Sector

- Brazilian Electrical Sector is hydro dominant;
- Natural gas thermal power operates in a complentary basis, water inventory dependant;
- Economical optimum operation leads to low load factor for thermal power generation;
- Natural gas storages could bring flexibility to this system;
- LNG imports, storages and regasification plants would avoid spare capacity in pipelines.

Installed capacity	10^9 W	%
Hydro	70.4	75
Thermal	20.3	21
Others	9.3	4

Gas-fired	10^9 W	10^6 m^3/d
Northeastern	2.1	10.3
Southern & Southeastern	7.4	35

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Market Growth Forecast

- Petrobras Target 2010: 100 10^6 m^3/d (under review);
- From plenty of supply to shortage: medium term;
- Solutions in place:
  - New availabilities:
    - Domestic productions;
    - Bolivia (reserves not yet fully operational);
    - LNG.
  - Demand growth should be restrained by higher prices.

GNP x Natural Gas in Southern Cone

Country	GNP (10^9 USD)	Proven Reserves (10^9 m^3)	Comsumption (10^9 m^3/y)
Brazil	800	310 (2005)	18.3 (2005)
Argentina	175	534 (2005)	37.9 (2004)
Bolivia	9	890 (2004)	1.5 (2004)

CHALLENGES – Southern Cone Regulations

- Bolivia:
  - New legislation (higher taxes to the producers);
  - Political issues: nationalization of the hidrocarbon industry;
  - New investments (not probable under current circustances)

- Argentina:
  - Constraints in gas price policy – *pesificación* -
  - Cuts on exports to Chile.

- Brazil:
  - New legislation for Natural Gas (3 projects in the Congress under discussions);
  - Regulator's acts related to the Open Access, Tarifs and Assignments.

New Upstream Projects

- Northeastern:
  - Manati: Bahia – 3 - 6 10^6 m^3/d – 2005/06

- Southeastern:
  - Espirito Santo Basin:
    - 10 10^6 m^3/d – 2007/08;
    - Higher potential.
  - Santos Basin:
    - Mexilhão: 7 - 12 10^6 m^3/d – 2008/09;
    - BS-500: higher potential.

- Amazon Area:
  - Urucu production : 7.5 10^6 m^3/d;

New Midstream Projects

- Southeastern Region Malhas: end of 2006
- Northeastern Region Malhas and GASENE (linking SE to NE)
- Bolivia – Brazil pipeline expansion (?):
  - New Open Season Capacity Offer: likely to be put in hold;
  - Minimum 3 years to start-up operations.
- Amazon Area:
  - Pipeline Urucu - Manaus: under implementation;
  - Pipeline Urucu - Porto Velho: under development.
- LNG Projects: under development.

New Midstream Projects

- Gasoducto de Sur
  - Venezuela pipeline to Brazil, Argentina and Uruguai:
  - 9,700 km;
  - US$ 23 billion;
  - Complex funding;
  - Cross environmental highly sensitive areas;
  - Under **study** by a Comission among the Gorvernment Countries involved;
  - Long term solution.

CONCLUSIONS

- From plenty of supply at the begining of 2000, Brazilian market scenario is shifting to a shortage;
- Industrial, Power Thermal and Vehicular Segments were responsible for the recent fast demand growth;
- Fast demand growth 2000/2005 was related to the Bolivian gas pipeline implementation and a competitive price policy to the market expansion:
  - Bolivian gas has reached 50% market-share;
  - Brazil is highly dependent of this source.
- Bolivia is the largest gas supplier in the Southern Cone:
  - Hydrocarbon industry nationalization shall constrain new investments;
  - Brazil and Argentina are the major buyers for Bolivian gas.

CONCLUSIONS II

- In a longer term, Venezuela may compete with Bolivia for Brazilian and Argentinean markets;
- New upstream and midstream domestic projects, some under constructions, others under study, are in place;
- LNG Projects may replace supply expansion from Bolivia and could bring flexibility in gas supply, given that thermal power is expected to operate in low load factor due to predominance of hydro generation;
- Challenges are related how to manage regulations in the Southern Cone, mainly in Bolivia.
- The key words are DIVERSIFICATION and FLEXIBILITY.