



Gas Market Integration in South America- Scenarios to 2015

3rd LACGEC Santa Cruz - Bolivia

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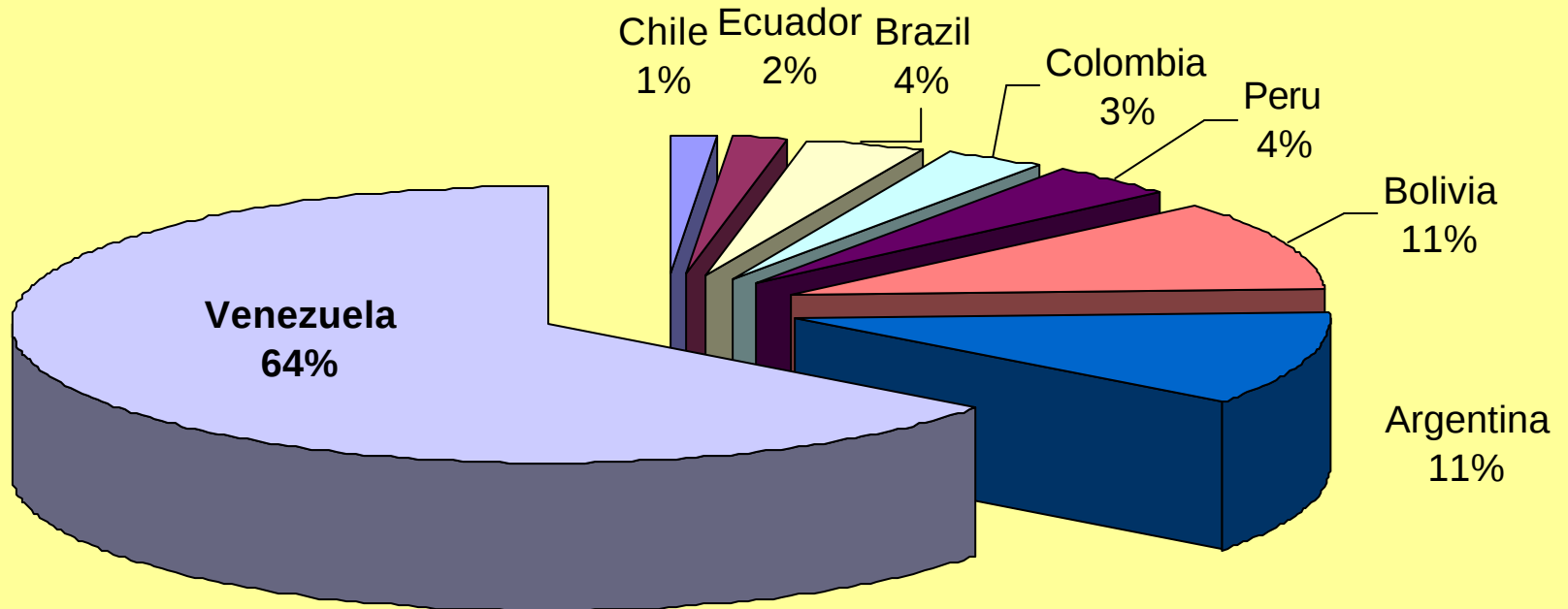


Gas Market Integration in South America- Scenarios to 2015

- Natural Gas Reserves
- Gas Integration Model
- Future Energy and Gas developments in main countries
- Gas surplus and deficits
- A reference scenario for gas interconnection
- An alternative scenario and conclusions

Gas Reserves

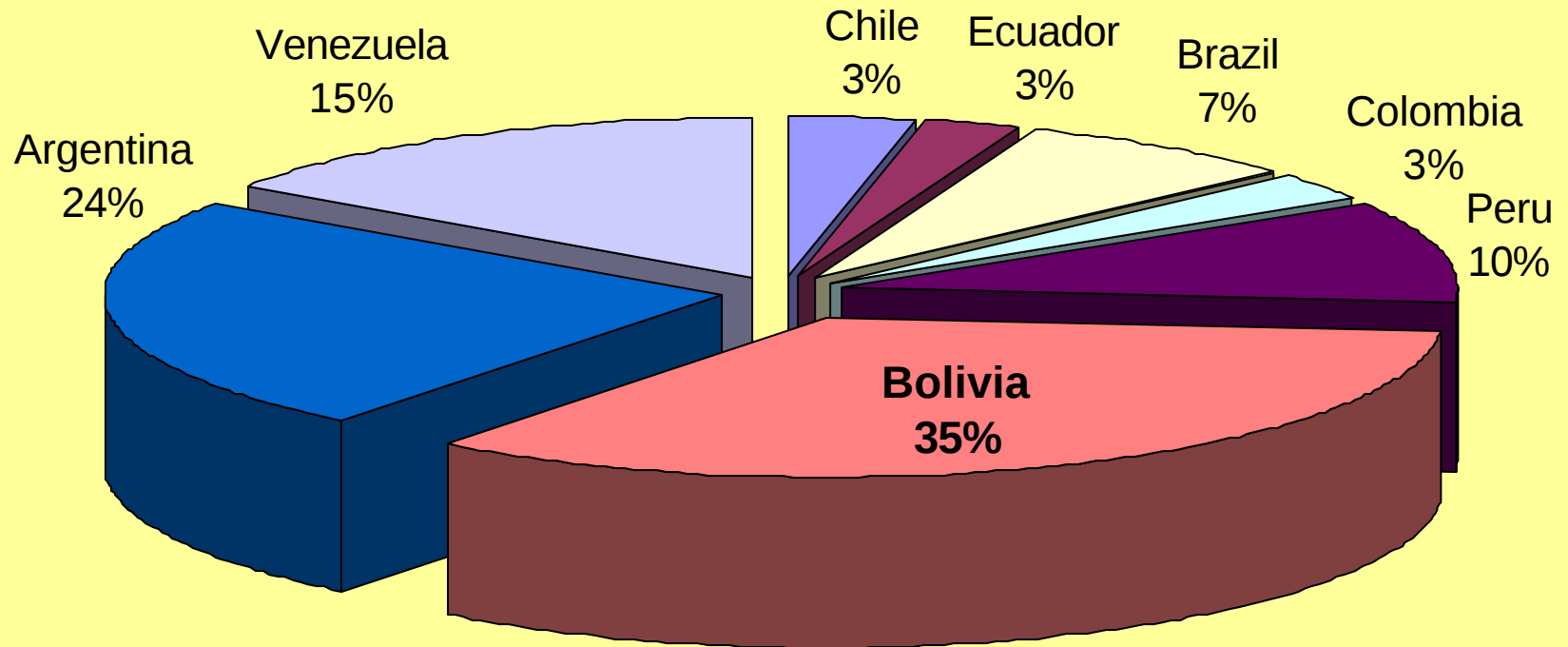
Distribution of gas proven reserves in 2000
including associated gas



Total proven reserves
1.1.2000: 227 TCF

Gas Reserves

**Gas reserves (proven + probable) in 2000
excluding associated gas**

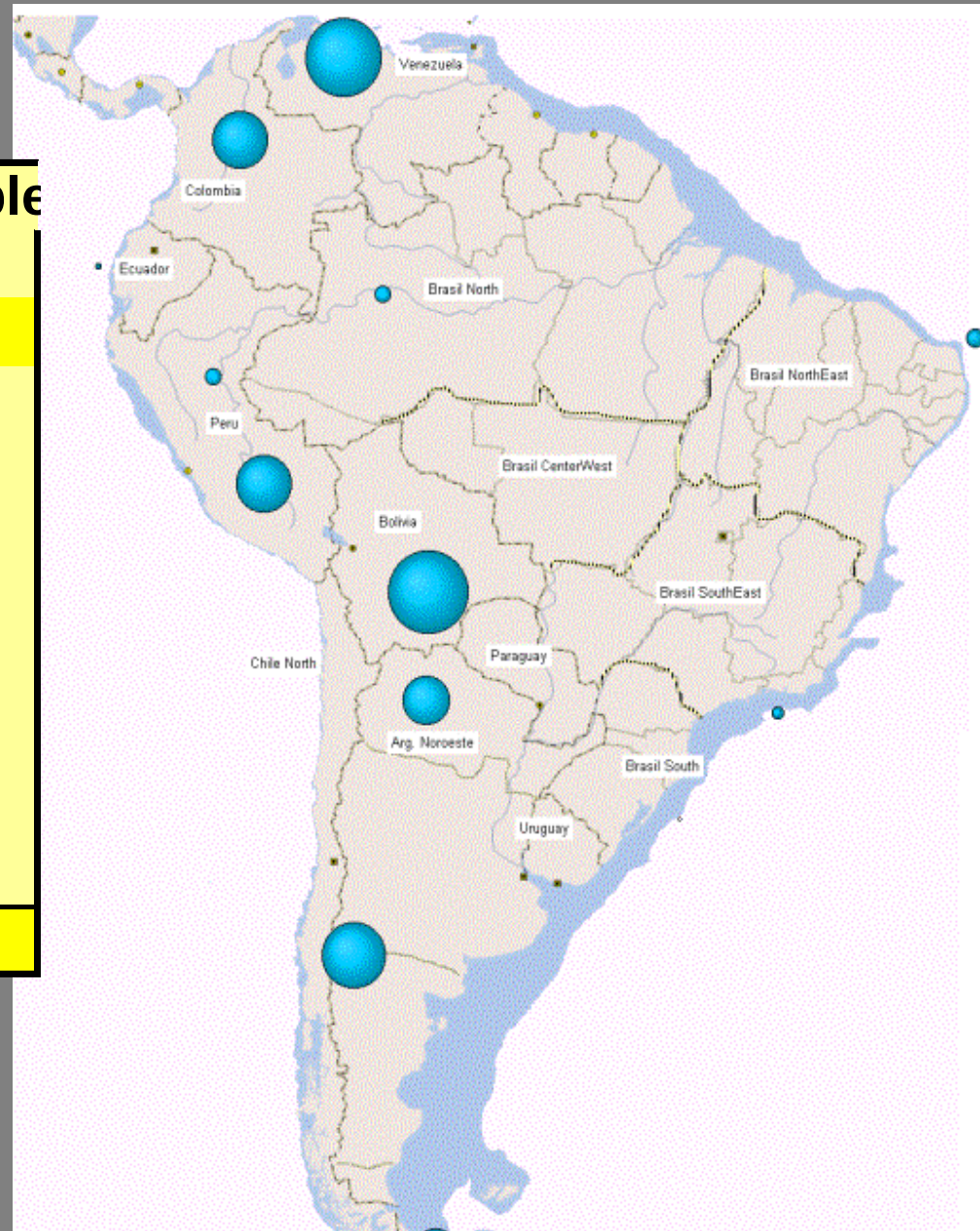


**Total: 4838 BCM or 137 TCF
Bolivia 46.7 TCF**

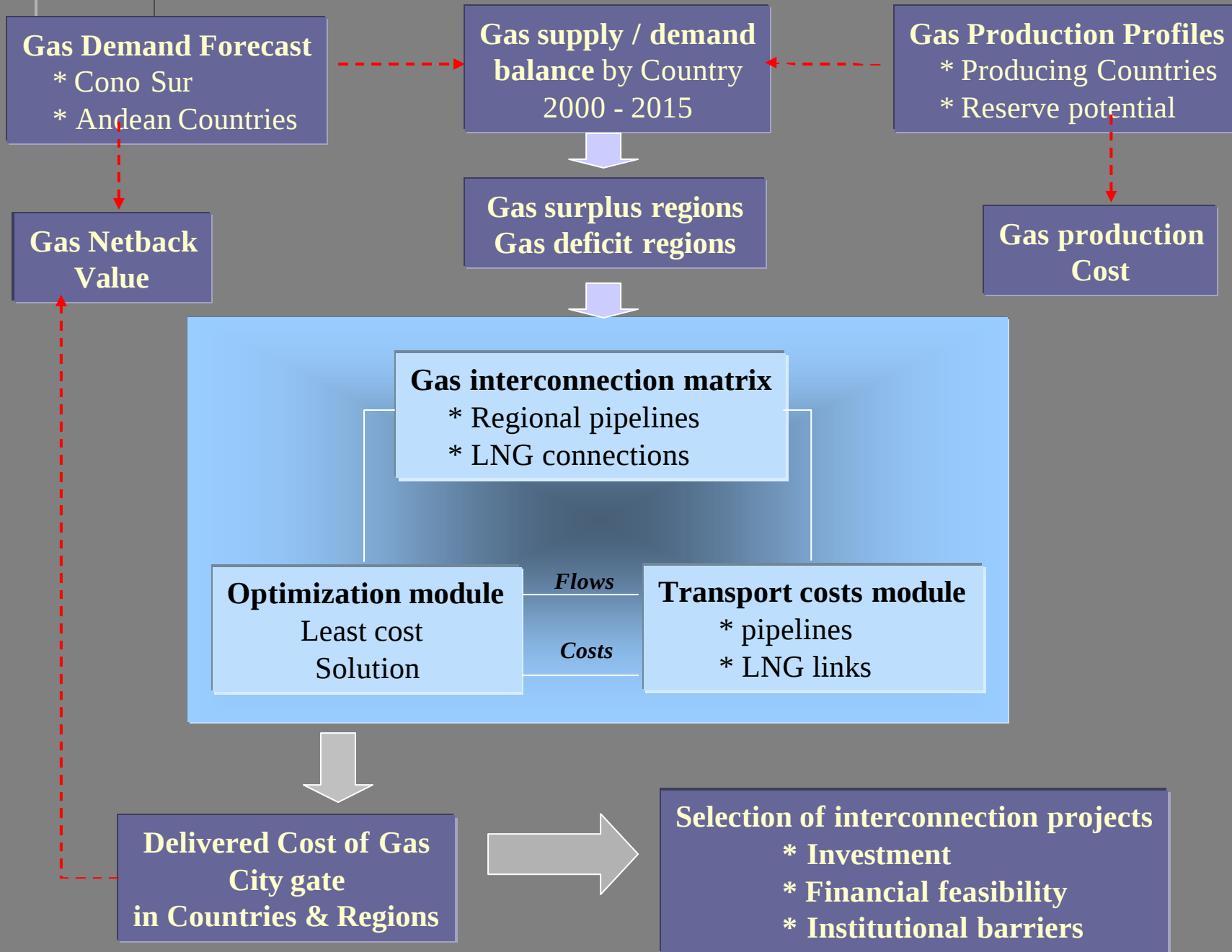
Natural Gas Reserves

Free Reserves Proven + Probable 01/01/2000

Chile	4.5
Ecuador	3.6
Brazil	10.0
Colombia	4.0
Peru	14.0
Bolivia	46.7
Argentina	33.0
Venezuela	21.1
	136.9



-Gas Interconnection Model General Methodology



Main drivers for gas interconnection scenarios

Economic Growth

HIGH

LOW

Capital markets
Financing

Project Financing favoured

Investment seen at higher risk

Energy Demand

HIGH

LOW

Market Liberalization
Regional Cooperation

Max Liberalization of
energy sector

Constraints to regional
integration

Gas to Power generation
Development of IPPs

HIGH

LOW

Natural Gas Demand

HIGH

LOW

Gas Production

Maximum
Success of exploration

Limited
Lack of investment

Need for Gas Import
Connections

HIGH

LOW

Argentina: future production & consumption

Bolivia: future production & LNG export outside southern cone

Brazil: future gas demand and gas to power in a country dominated by Hydroelectricity

■ Definition of Gas Supply /Demand Scenarios

■ BASE:

- Economic Growth: base
- Gas penetration: high except Argentina (mature)
- Gas production: base except Bolivia and Colombia high

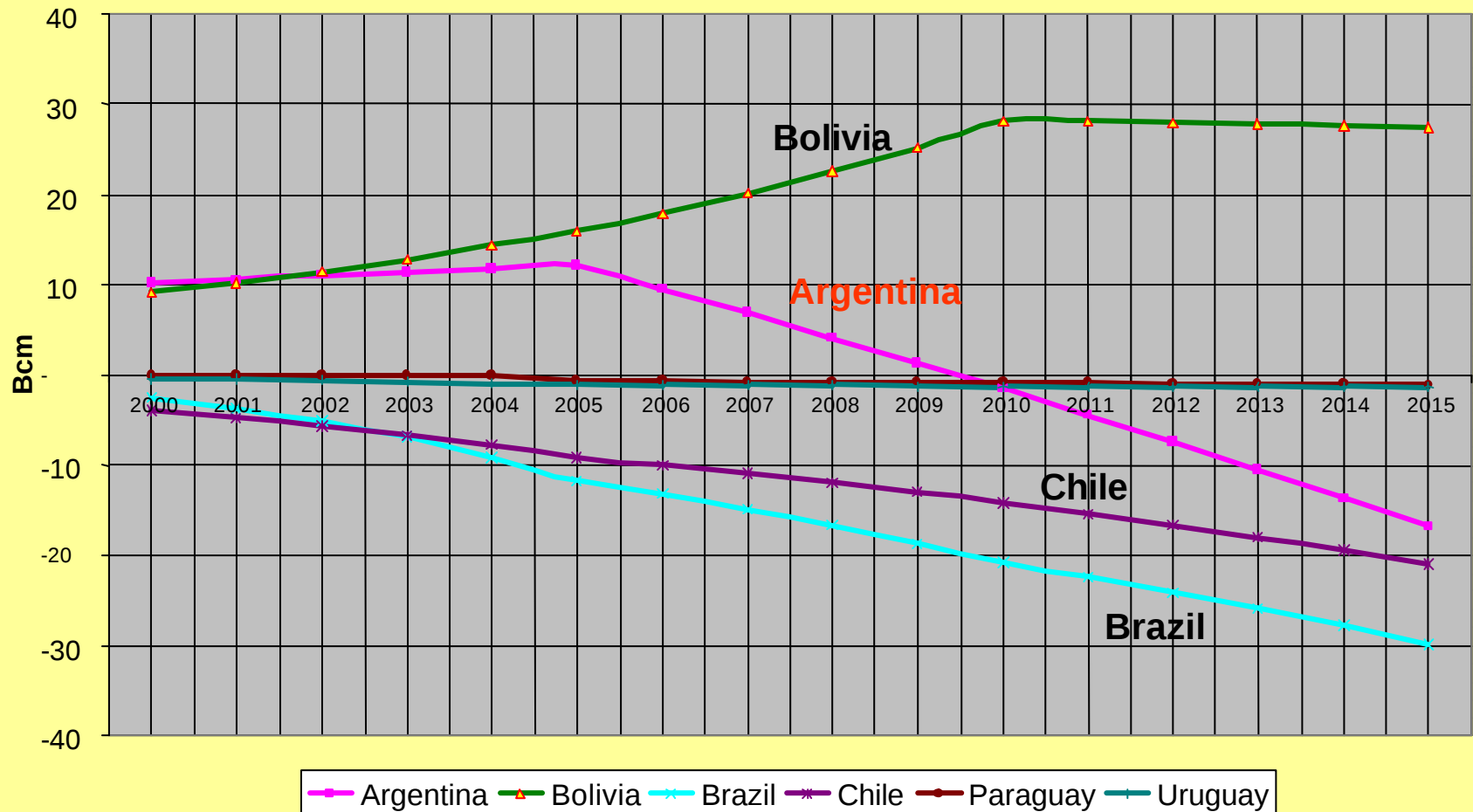
■ HIGH:

- Economic growth: high
- Gas penetration: high
- Production: high

Gas Supply Demand Balance

Base Scenario

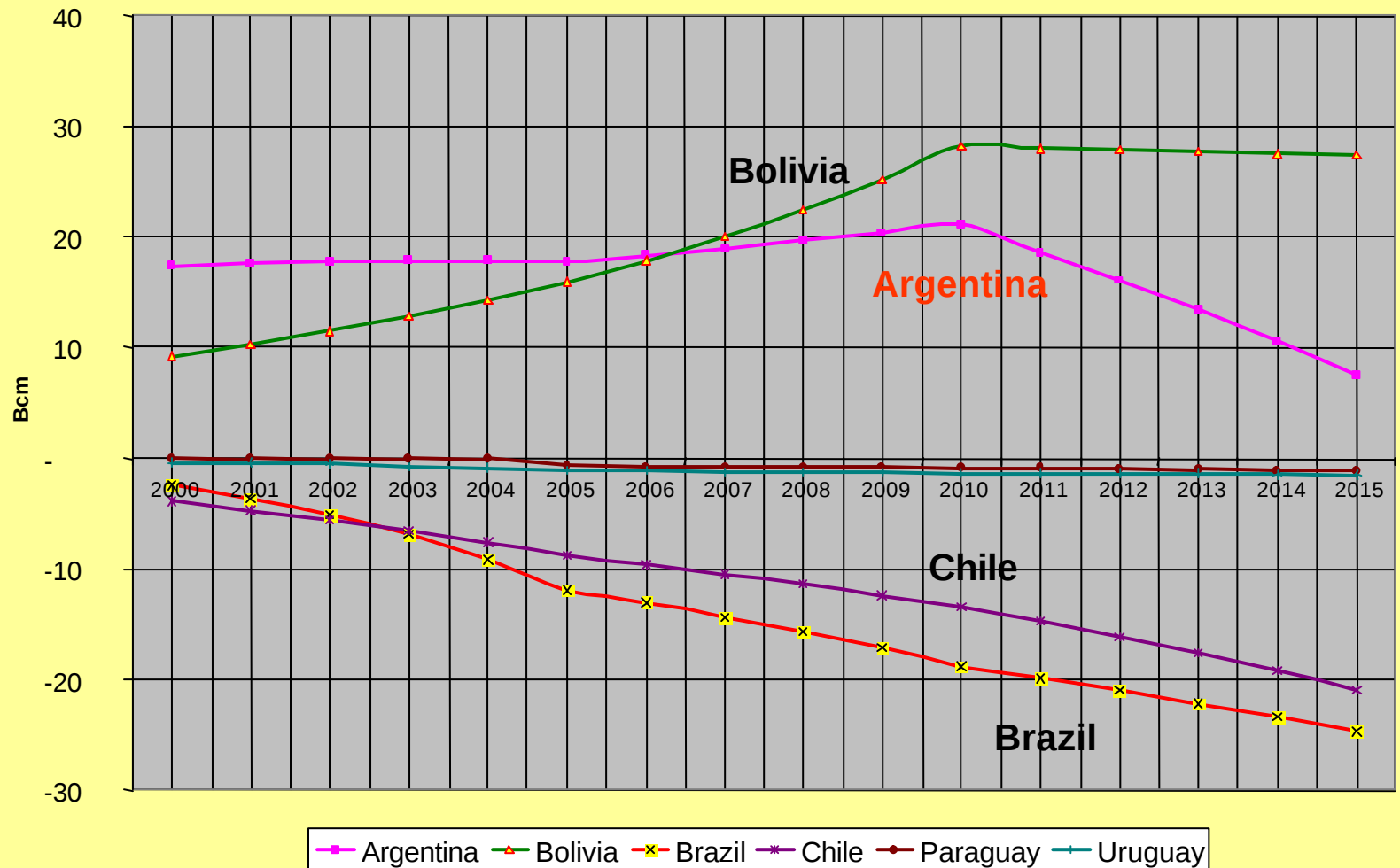
Supply - Demand Balance CONO SUR Countries



Gas Supply Demand Balance

High Scenario

Supply - Demand Balance CONO SUR Countries

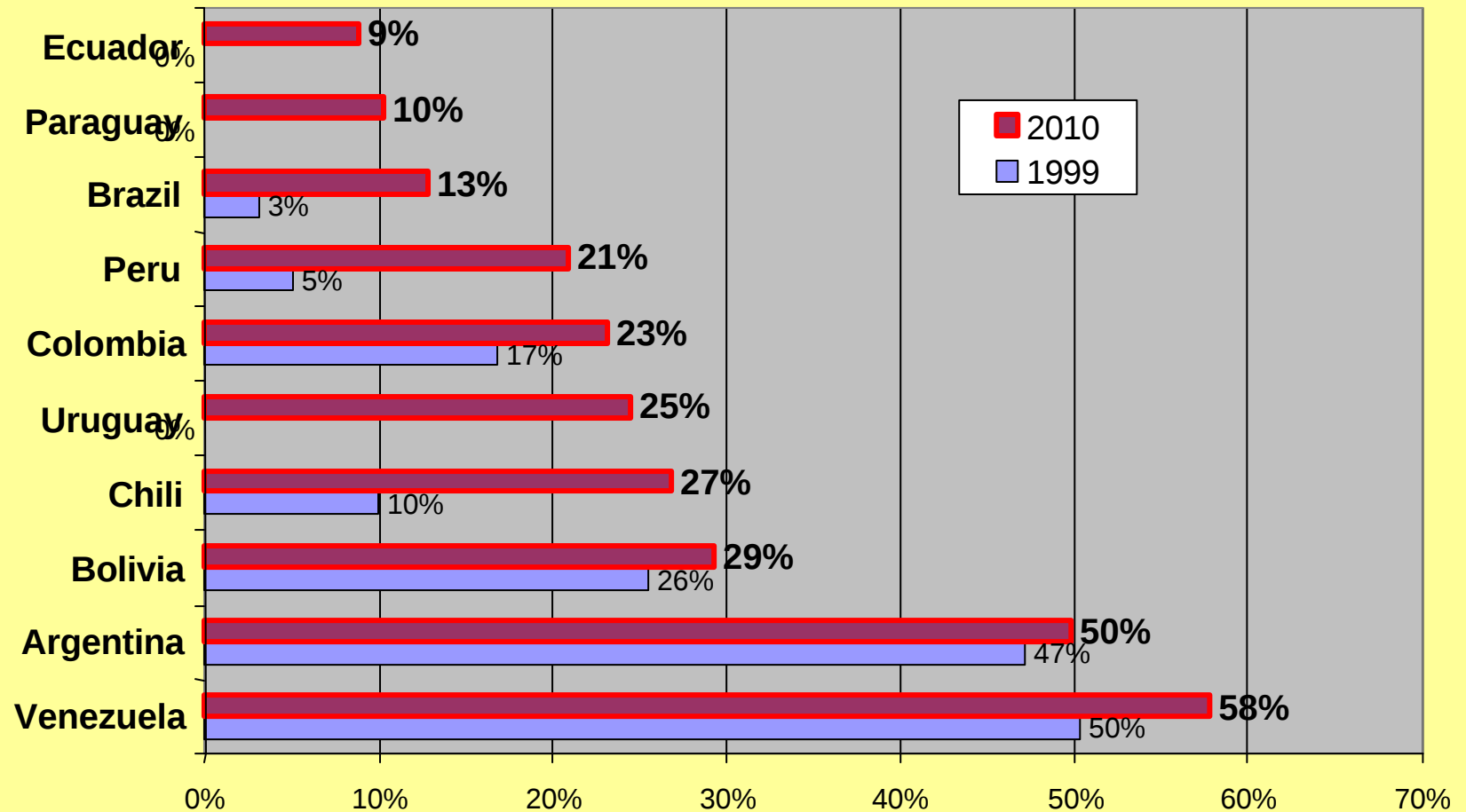


Gas Demand

-Reference Scenario

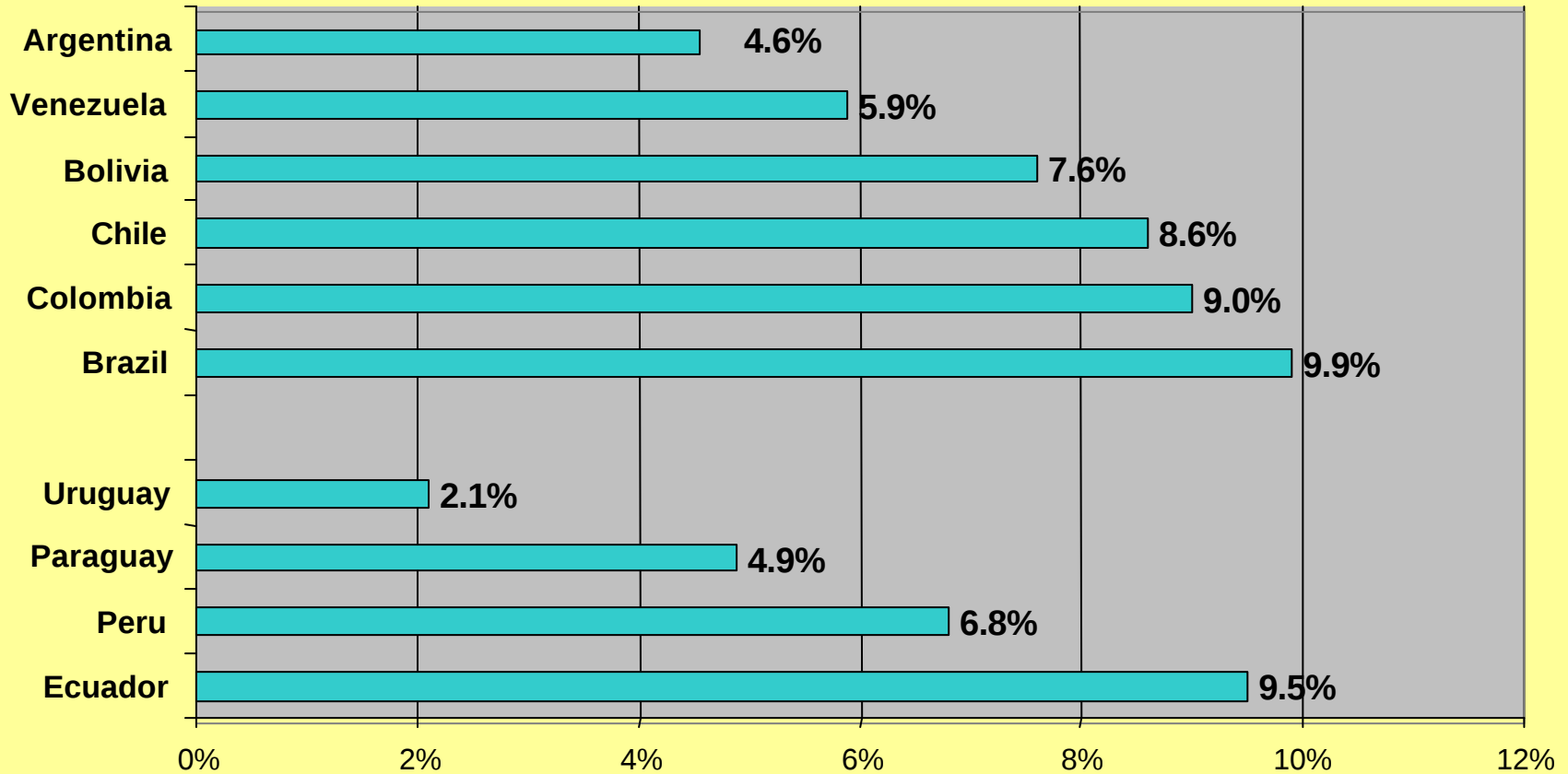
Gas share in energy: Europe 22% World 20%

Gas share in energy matrix in 1999 and 2010



Average growth rate: low 6.9% to high 8.2%

**Gas consumption growth rates 2000 to 2015
Reference Scenario**

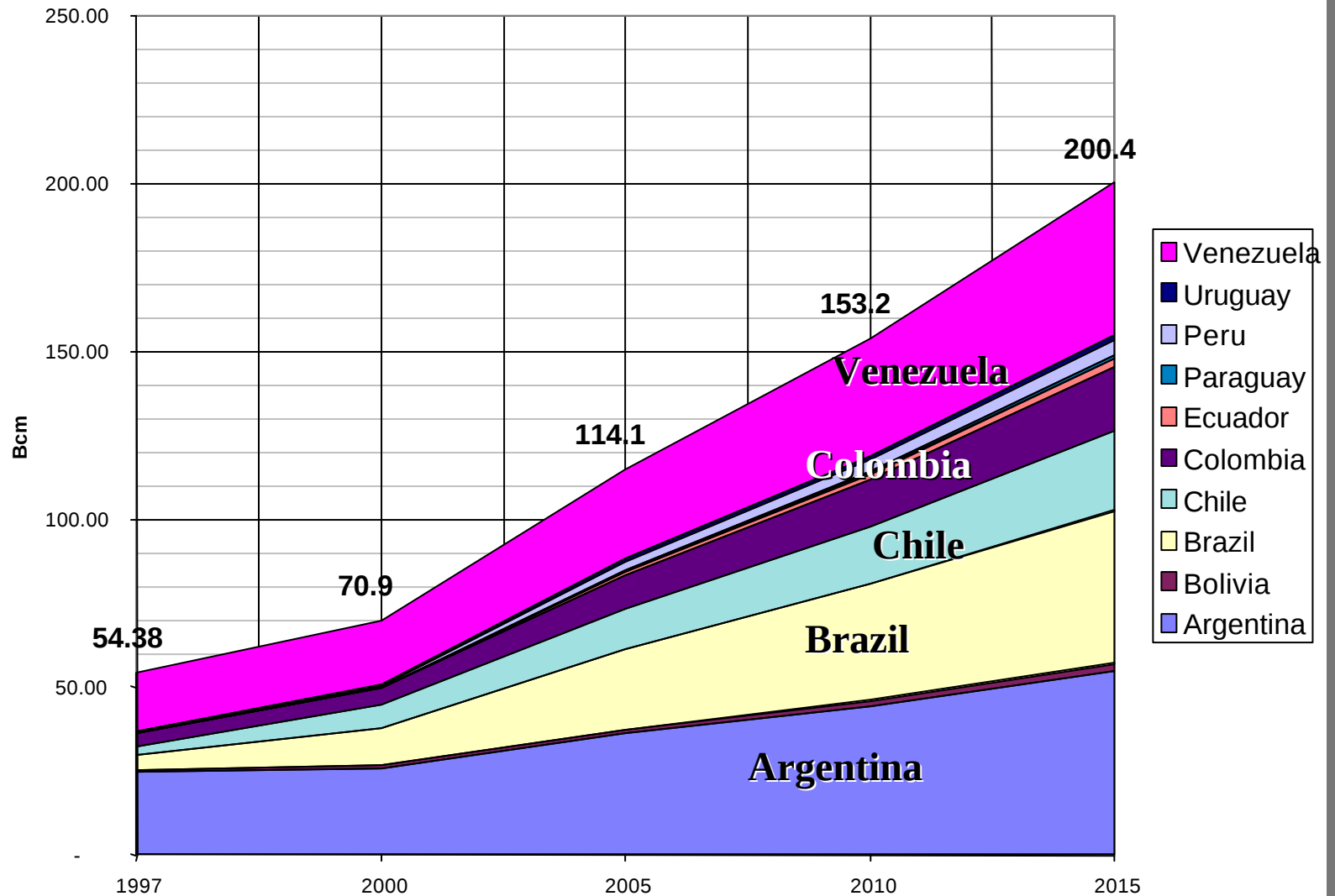


Reference Scenario

- **Consensus views** regarding
 - possible evolution of natural gas demand in each country
 - production levels of different gas basins
- **Base Scenario of Economic Growth**
 - sustained development during 2000-2010
 - regular growth thereafter
- **Gas Penetration high in all countries**
 - except Argentina set at Base level
- **Production on the safe side**
 - Bolivia set at a medium level (48 Bcm/year in 2015)
 - Argentina with sustained production (59 Bcm/year in 2015)
 - Camisea dedicated to domestic market only

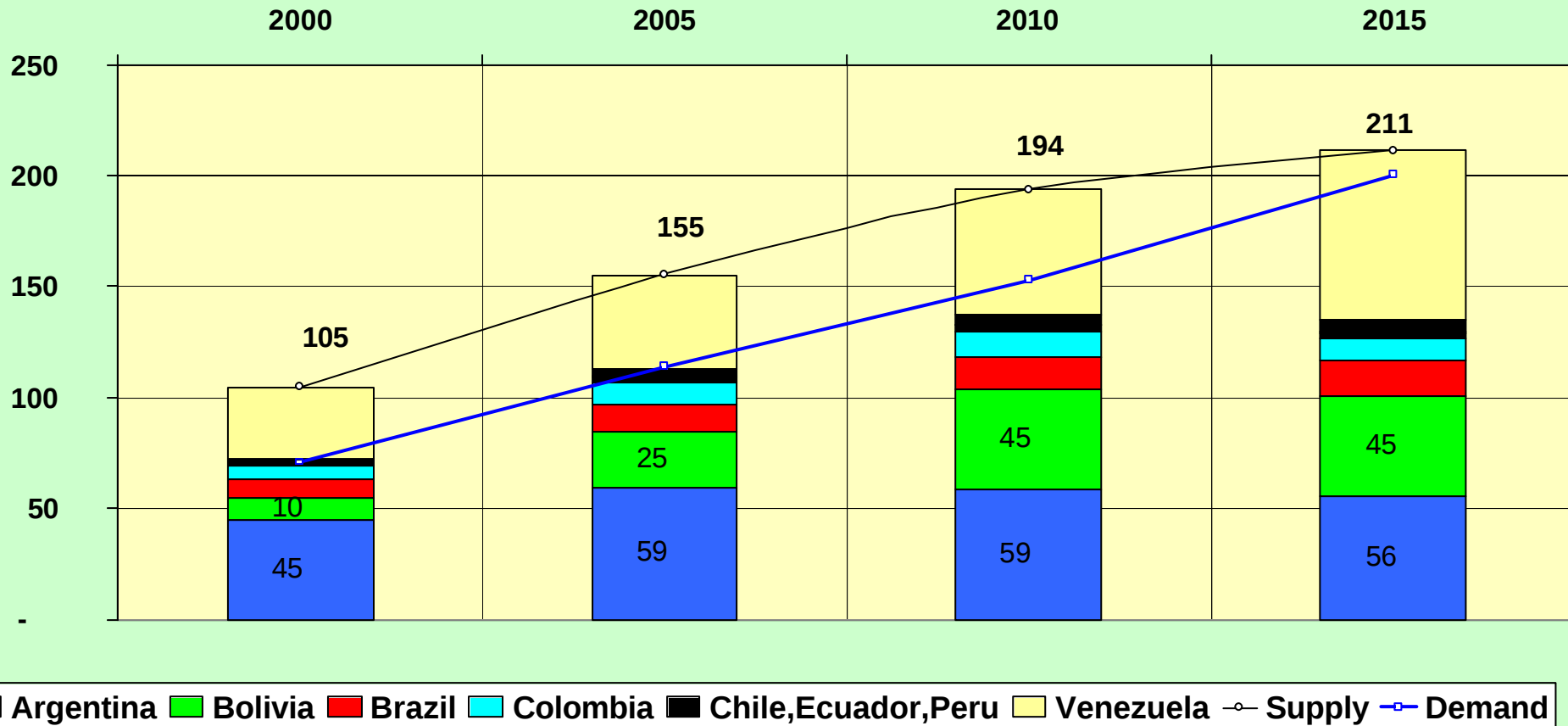
Reference Scenario

■ Natural Gas Demand: **average 7.2% over 2000 -2015**

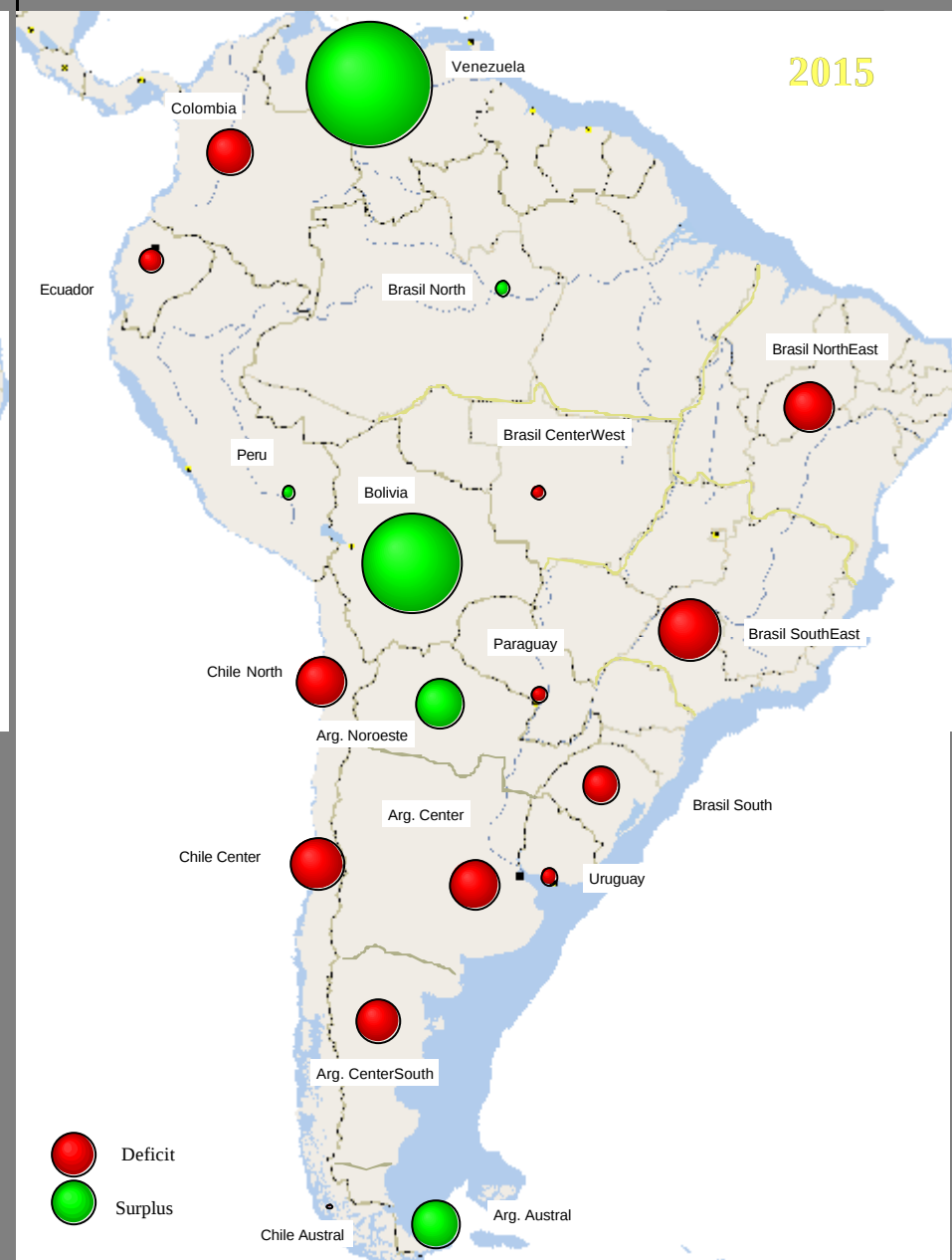
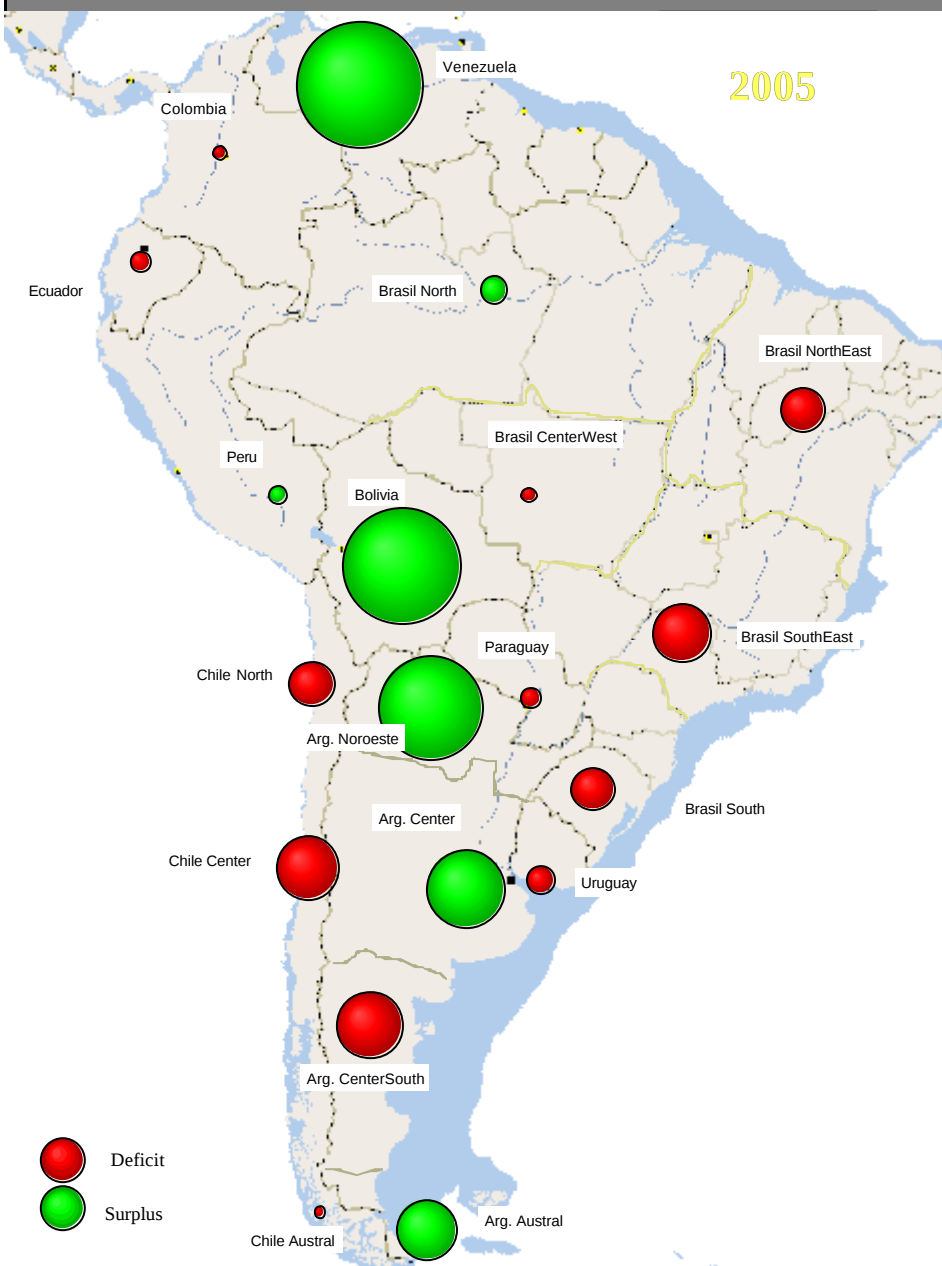


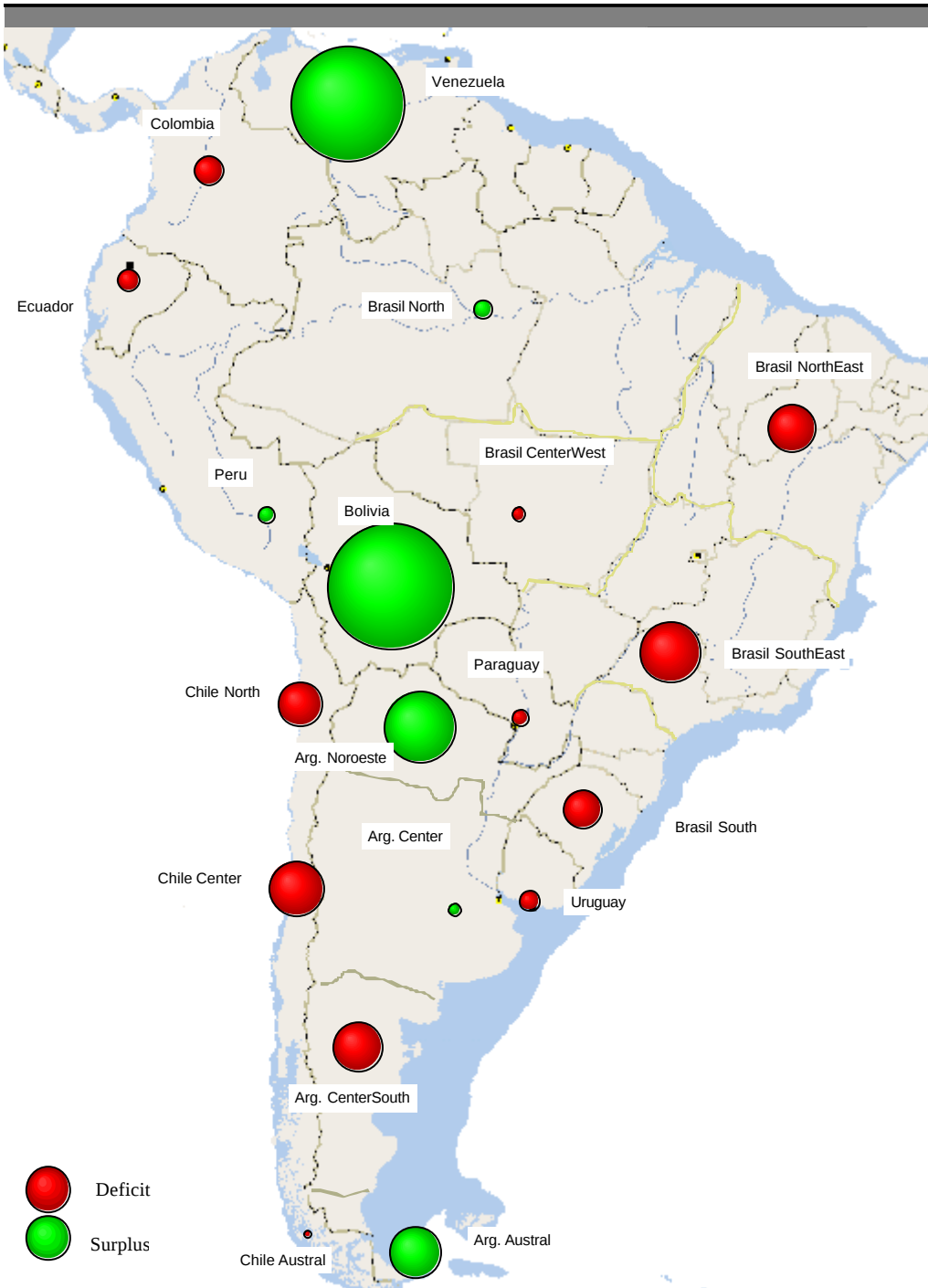
Reference Scenario

Potential Natural Gas Production by country Bcm



Reference Scenario



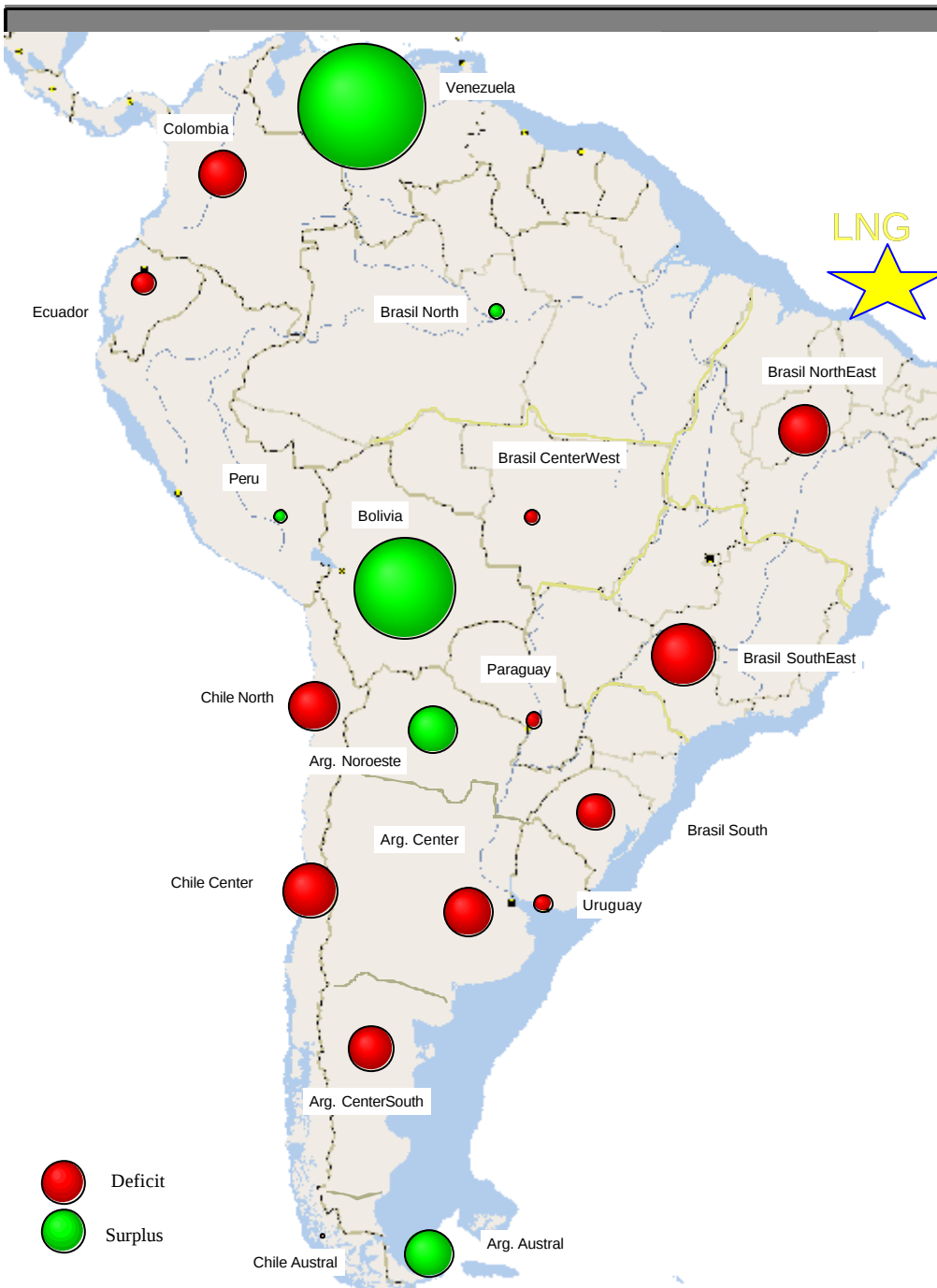


Reference Scenario

- Regional Supply / Demand Equilibrium - **Year 2010**
- Gas Surplus in Argentina is reduced
- Deficit in Chile & Brazil increases

Surplus / Deficit 2010

Argentina	+19
Bolivia	+18.6
Brazil	-20.3
Chile	-15.3
Colombia	-1.7
Ecuador	-1.4
Paraguay	-0.8
Peru	
Uruguay	-1.3
Venezuela	+3.2
TOTAL	0



Reference Scenario

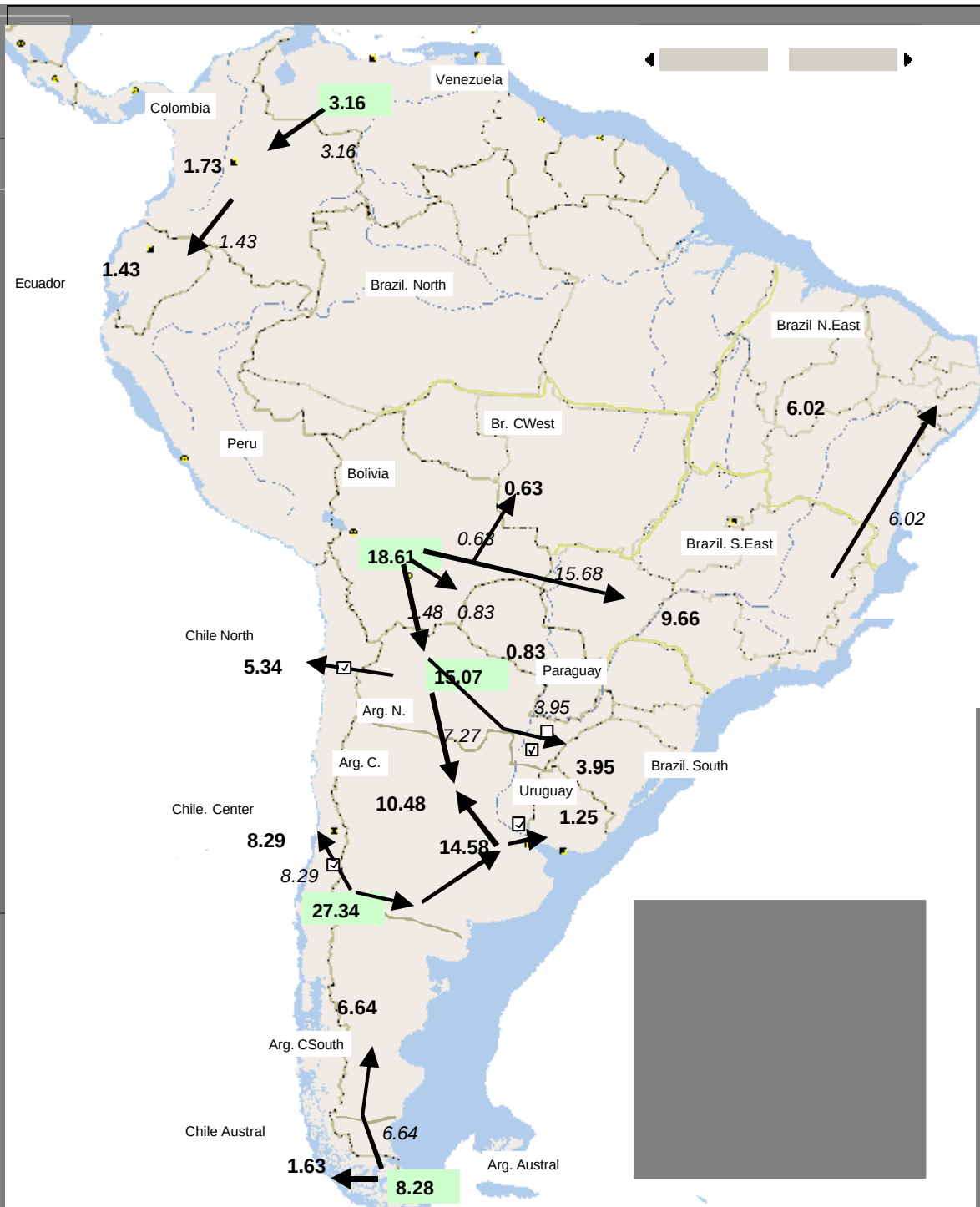
- Regional Supply / Demand Equilibrium - Year 2015
- Brazil & Chile Deficit Important
- Bolivia can't supply both Brazil and Southern countries
- LNG from Venezuela is required to supply Brazil

Surplus / Deficit 2015

Argentina	+5.2
Bolivia	+44.8
Brazil	-29.9
Chile	-23.3
Colombia	-8.0
Ecuador	-2.3
Paraguay	-1.1
Peru	
Uruguay	-1.4
Venezuela	+16.1
TOTAL	0

Reference Scenario - *Regional Flows 2010*

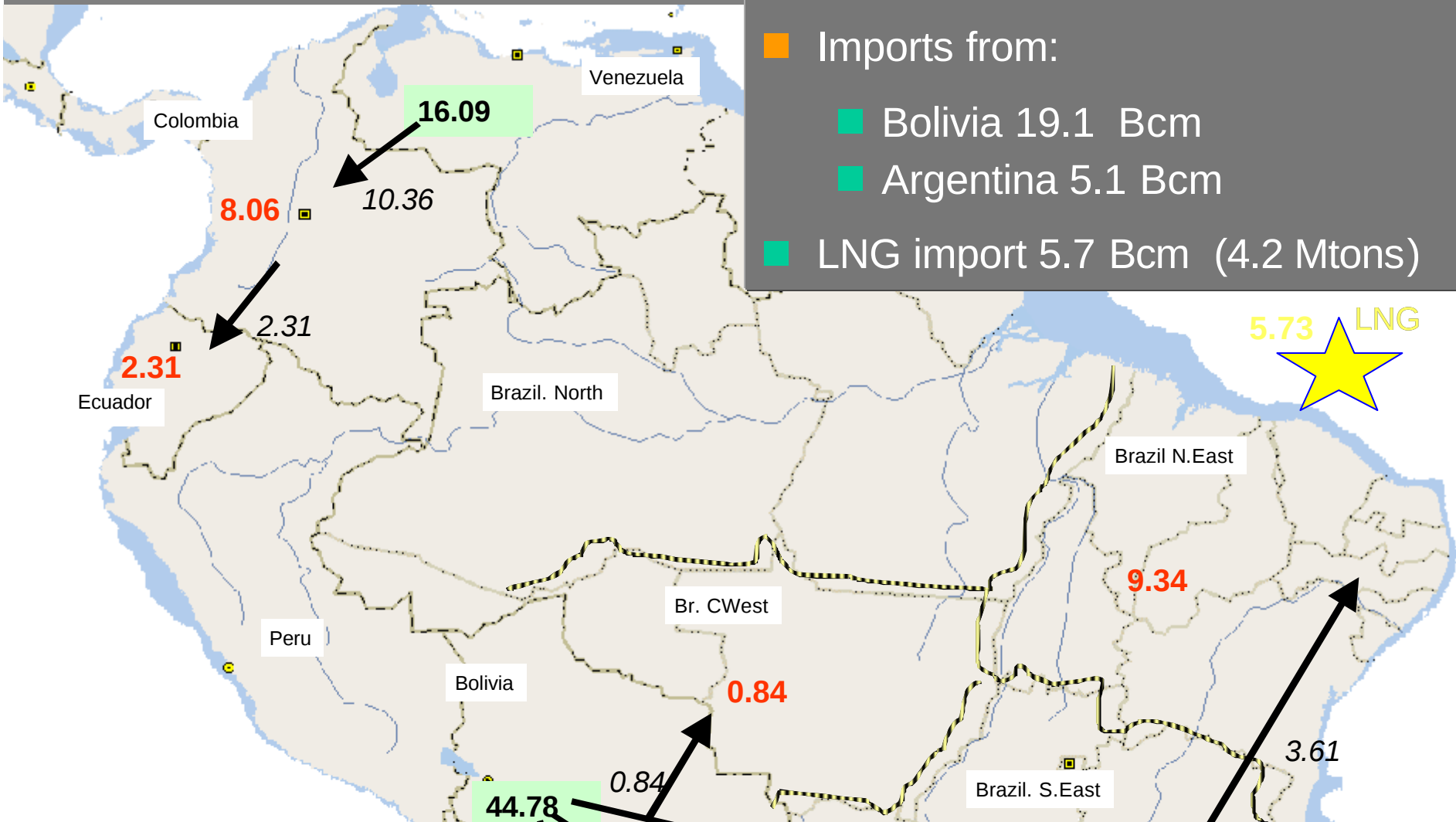
- Year 2010
- Argentina needs Bolivian Gas to supply its market and Chile market
- Brazil deficit can be supplied by Bolivia
- No LNG is needed from Venezuela
- Average distance covered: 1 133 km



- Year 2015
- Large deficit in southern cone countries will require importation of LNG from Venezuela to Brazil
- **Average distance covered: 1 344 km**

Reference Scenario - Regional Gas Flows 2015

- Brazil Demand 45.6 Bcm
- Brazil Production 15.7 Bcm
- Imports from:
 - Bolivia 19.1 Bcm
 - Argentina 5.1 Bcm
 - LNG import 5.7 Bcm (4.2 Mtons)



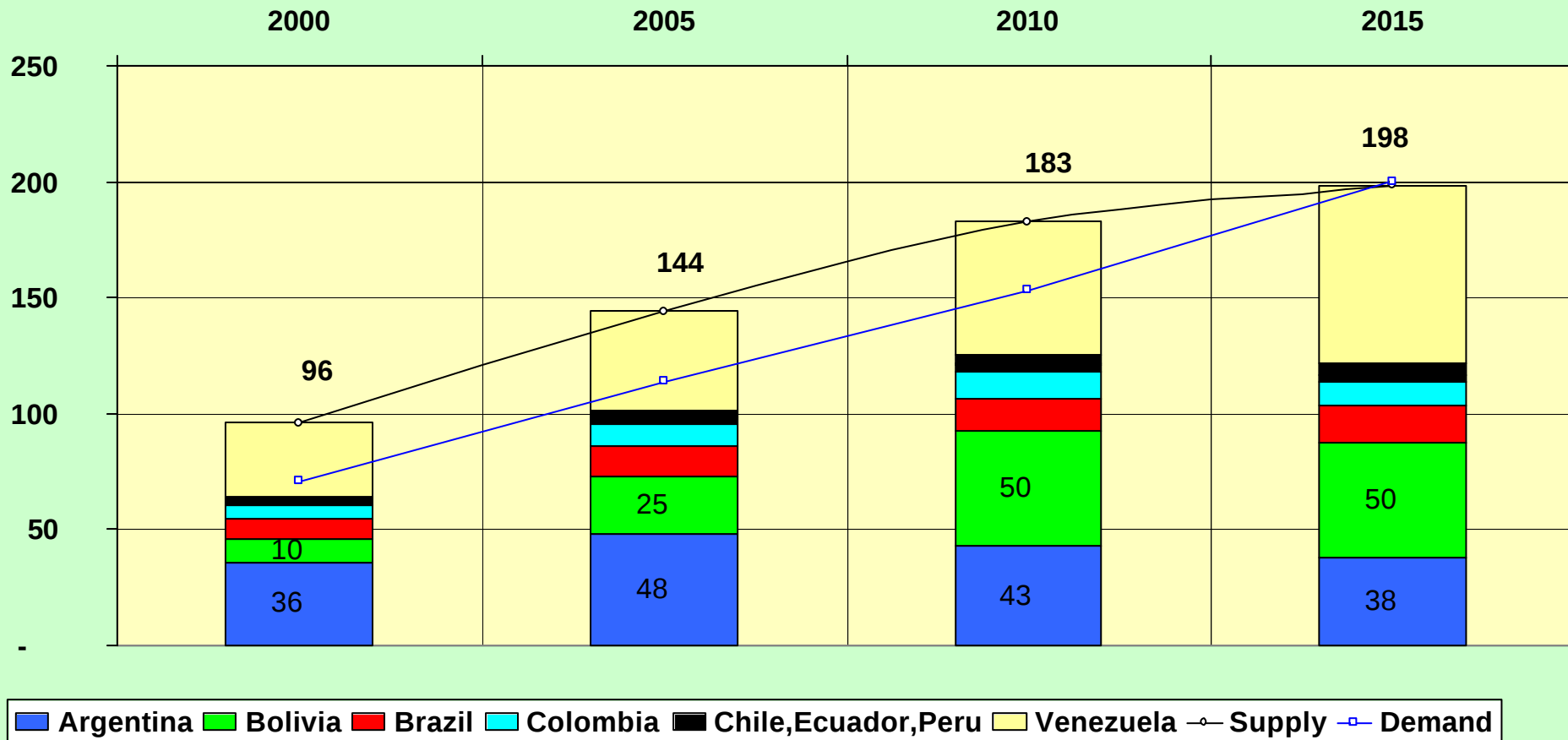
Alternative Scenario 1

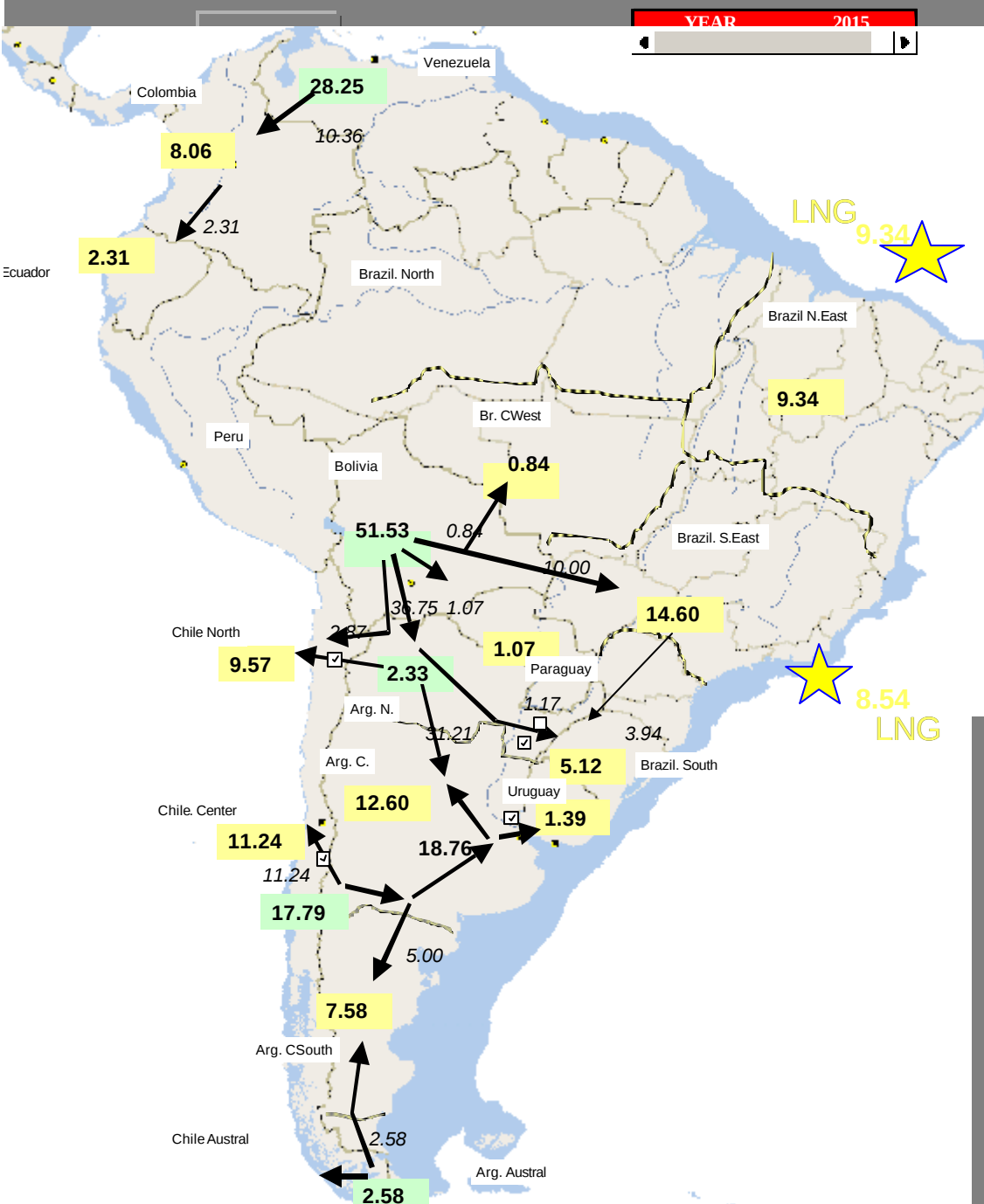
Argentina limited production

- Same assumptions as Reference Scenario regarding
 - Economic growth scenario, possible evolution of natural gas demand in each country
- Alternative assumptions for production profiles
 - Argentina production is declining after 2008 and limited to 38 Bcm in 2015
 - Bolivia production is limited to a plateau of 54 Bcm after 2010
- Consequence
 - Major LNG imports from Venezuela are required to supply Brazil (6.6 million tons in North East and 6.3 million tons in South Brazil, equivalent to 17.9 Bcm)

Alternate Scenario

■ Natural Gas Production by country Bcm





Alternative Scenario 1 Argentina limited production

- Year 2015
- Large deficit in southern cone countries will require importation of LNG to Brazil North East and South (total 17.9 Bcm or 6.6 million tons)
- Average distance covered: 1 725 km compared to 1344 km in reference scenario

- Expected gas demand in « ConoSur » at reasonable level: 7.2% average growth over 2000 –2015
- High gas penetration in power sector but electricity markets dominated by Hydroelectricity
- Necessity to organize integration of gas and electricity markets:
 - Gas suppliers: Argentina and Bolivia
 - Thermal electricity supplier: Argentina
 - Hydropower balance: Brazil and Paraguay
- Major gas integration problems appear after 2010

- Bolivia will use part of its reserves for LNG export outside « Cono Sur »
- If Argentina gas production declines after 2010, Bolivia cannot supply Brazil, Chile and Argentine markets
- Additional gas supply must come through LNG from Venezuela (and partly from Peru by pipeline)