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Infrastructure Integration and Incomplete Contracts: Natural Gas in the southern Cone

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Infrastructure Integration and Incomplete Contracts: Natural Gas in the Southern Cone

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Infrastructure integration, public goods and contractual issues

- Regional infrastructure is seen as a platform to support exchange in an expanded economic area.
- The regional public goods perspective looks at coordination failures related to multidimensional externalities (Ruffin, 2004).
- Recent experience suggest active private sector participation under the umbrella of good legal and regulatory frameworks.
- Absence of or insufficient supply of infrastructure projects has not been a problem in southern cone natural gas integration.
- But exchange supported by infrastructure come in long term contracting format required to recover sunk investments, in bilateral idiosincratic exchanges.
- Evidence show failures in exchanges of energy.

Contract theory issues in natural gas trade

- Early literature on contract design stressed sunkness of decisions, related to pipelines and gas fields, within the framework of transaction costs economics and complete contracts.
- Contract provisions in the form of minimum bill or take or pay (or deliver or pay) formats justified to cope with opportunistic ex-post behavior (Marsten, 1988).
- Studies in natural gas observing changes in contract provision in face of changes in competition and regulatory environment. (Crocker and Marsten 1985,1988).
- Recent econometric evidence on natural gas imports finds contract duration related to competition regime, asset (project) specificity and volumes (Neumann and Hirschhausen, 2006).
- Choice of contractual length may be explained by structural elements such as perceived price elasticity of demand (Neuhoff and Hirschhausen, 2005).
- Absence of case studies on contractual performance

Natural gas integration in the southern cone: from success to crisis

- Important discoveries of natural gas in Argentina along with changes in regulatory regime and business climate prompted several exports projects to Chile, Brazil and Uruguay.
- Several protocols under the ALADI framework were signed and authorizations were granted.
- Pipelines were built with capacity to deliver up to 42 MMm3day, with initial investments of about 2 billion USD.
- Exports to Chile increased substantially in the second half of the 90s as projects were completed.
- In 2002 Argentina had a severe contractual problem at a macro level (Heymann, 2006) and in infrastructure regulation.
- From 2004 natural gas shortages were followed by important cuts in exports.

Facts Sheet on Infrastructure Integration

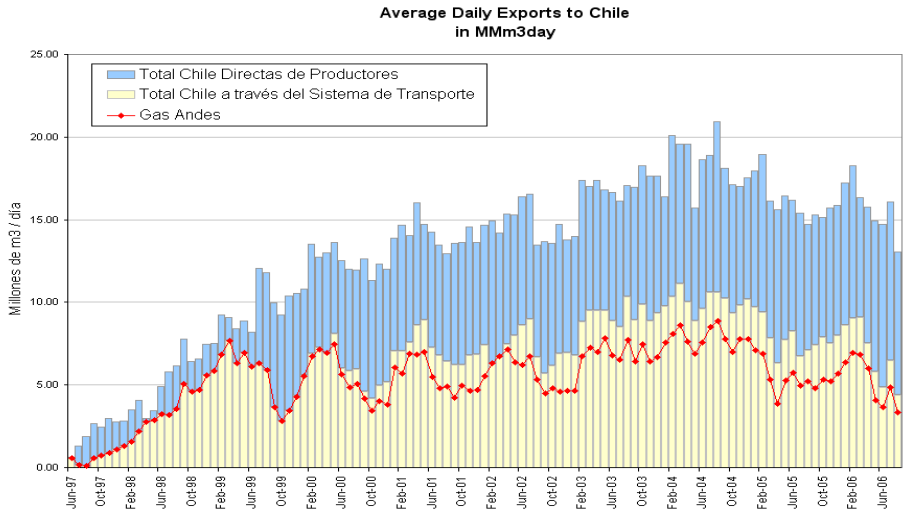
Natural Gas Pipelines in the Southern Cone						
Pipeline	**Year**	**Capacity** MM m3 day	**Distance** Km	**Current use** (Jan-Aug 2006) MM m3 day	**Initial Investment** in millions USD	**Initial Shareholders of Project**
Chile						
Norandino	1999	5	380	1.7	400	Tractebel and Southern Electric
GasAndes	1997	10	313	5.3	350	AES Gener (13%), Metrogas (13%), CGC (17,5%), Total Gasandes (10%), Total Gas and electricidad
Gasoducto del Pacífico	1999	3.5	530	0.6	342	TransCanada, 30%; YPF, 10%; Gasco, 20%; El Paso Energy, 21,8%; and Enap; 18,2%
Atacama	1999	8.5	531	1.5	380	CMS Energy and Endesa (50-50)
Metanex YPF	1999	2.0	8	2.0	6.5	na
Metanex SIP	1999	1.2	12	1.1	na	na
Metanex PAE	1997	2	48,5	1.7	na	na
Bolivia						
Tarija-Campo Durán	1972	7.7	5	5.5	na	na
Brazil						
TGM	2000	2.8	450	0.9	250	Techint, CGC, TransCanada International, Petronas Argentina SA, CMS Gas Argentina, Repsol-YPF,
Uruguay						
Cruz del Sur	2002	6	200	0.2	170	ANCAP (20%), British Gas (40%), Pan American Energy (30%), Wintershall Energía S.A. (10%)
Del Litoral	1998	0.7	15	0.1	na	na
Source: From several private and public sources and internet sites						

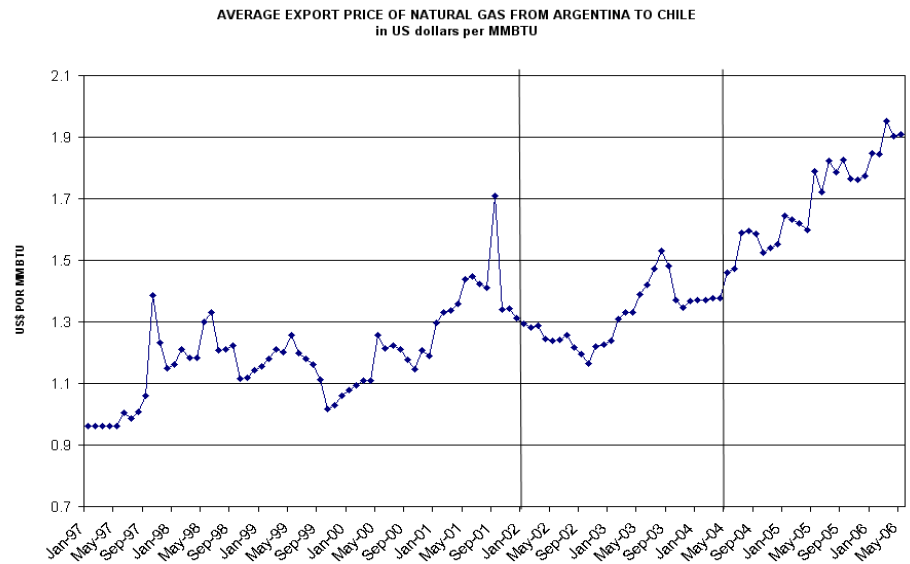
Framework for NG exports: pre-crisis

- Gas Law (1992) formally allows exports
- Bilateral Protocol (1995) sets norms that regulate supply and interconnection between Argentina and Chile.
- Secretary of Energy (SE) resolution (1998) set exports permits mechanism, requiring proven reserves and ability/commitment to maintain supply to domestic market
- Authorizations proceed on an individual and discretionary basis
- Mercosur' Memorandum of Understanding (1999) on gas exchanges.
- Competition Commission studies mergers and indirectly oversees state of exports supply
- SE resolution (2001) makes authorizations automatic after a period without observations
- After 2002 macro crises, domestic contracts frozen in pesos and export contracts not intervened (stay in US dollars). Again, requirements for domestic supply are stressed.
- Bilateral Protocol (2002) on information about "market conditions" and on "decisions" related to exchanges

Integration results: Evidence of (quasi) “strong form”

- Exports to Chile increased from nil to 15 MMm3d (15% of domestic demand)
- Contracted capacity expanded.
- Export prices reflected “strong” integration: similar (co-integrated) to domestic prices.
- Export contracts design made indexed prices constrained by evolution of domestic prices.
- Unlike Bolivian exports to Brazil and Argentina.
- Still, regulatory problems concerning access and pricing of transport





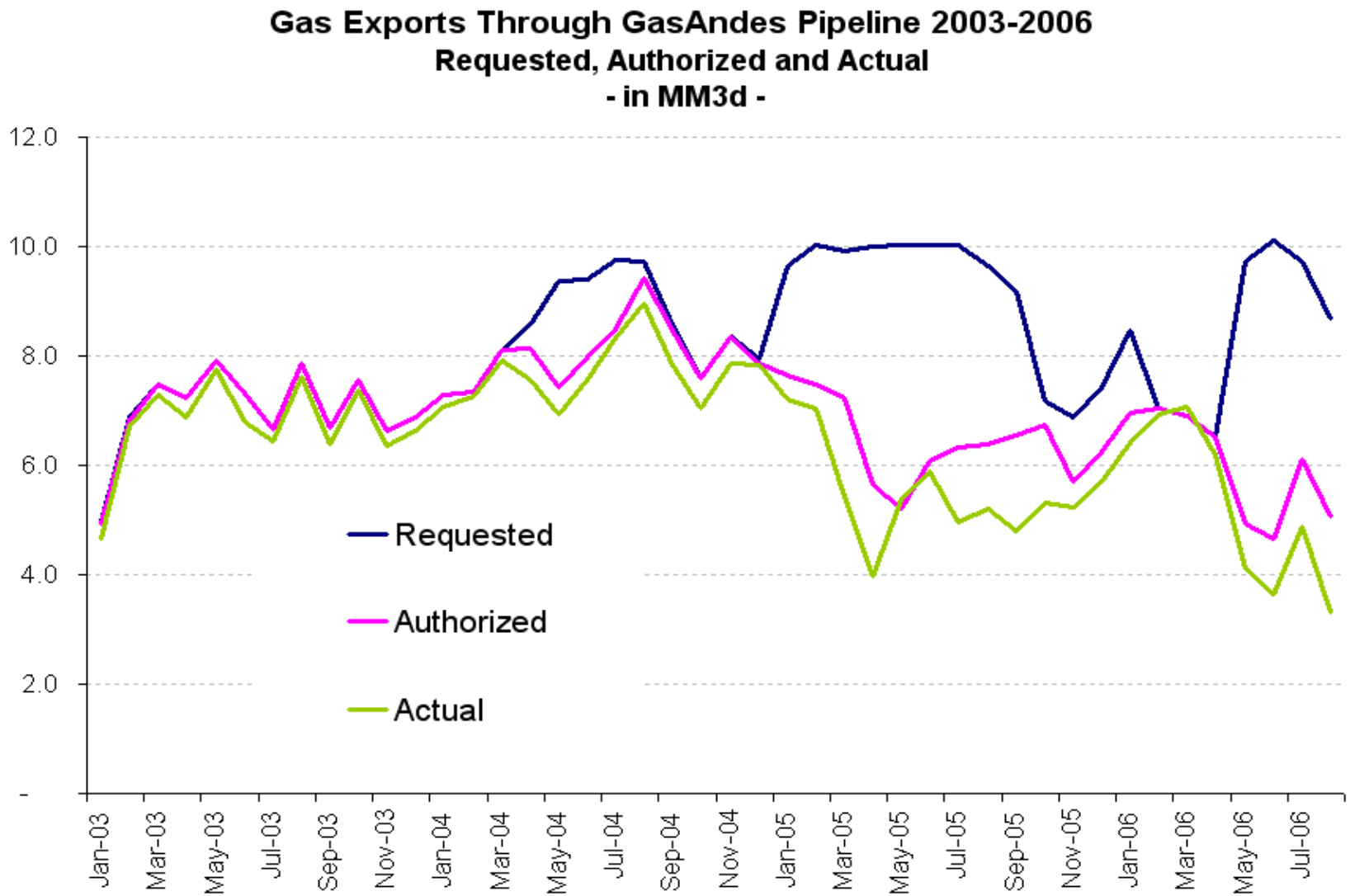
Framework for NG exports: post-crisis

- Secretary of Energy (SE) resolution (2004) suspends automatic authorizations.
- Invocation of rule of priority of domestic supply.
- Initial and temporary suspension of exports (April 2004) to redirect gas to domestic markets.
- Perfection of mechanism by SE resolution (2004) now requiring additional injections to domestic markets.
- Instructions for additional injections determined by SE on an individual basis
- Exports are not “per se” prohibited if required additional injections can be met with an equivalent fuel (several times more expensive) at same controlled domestic price.

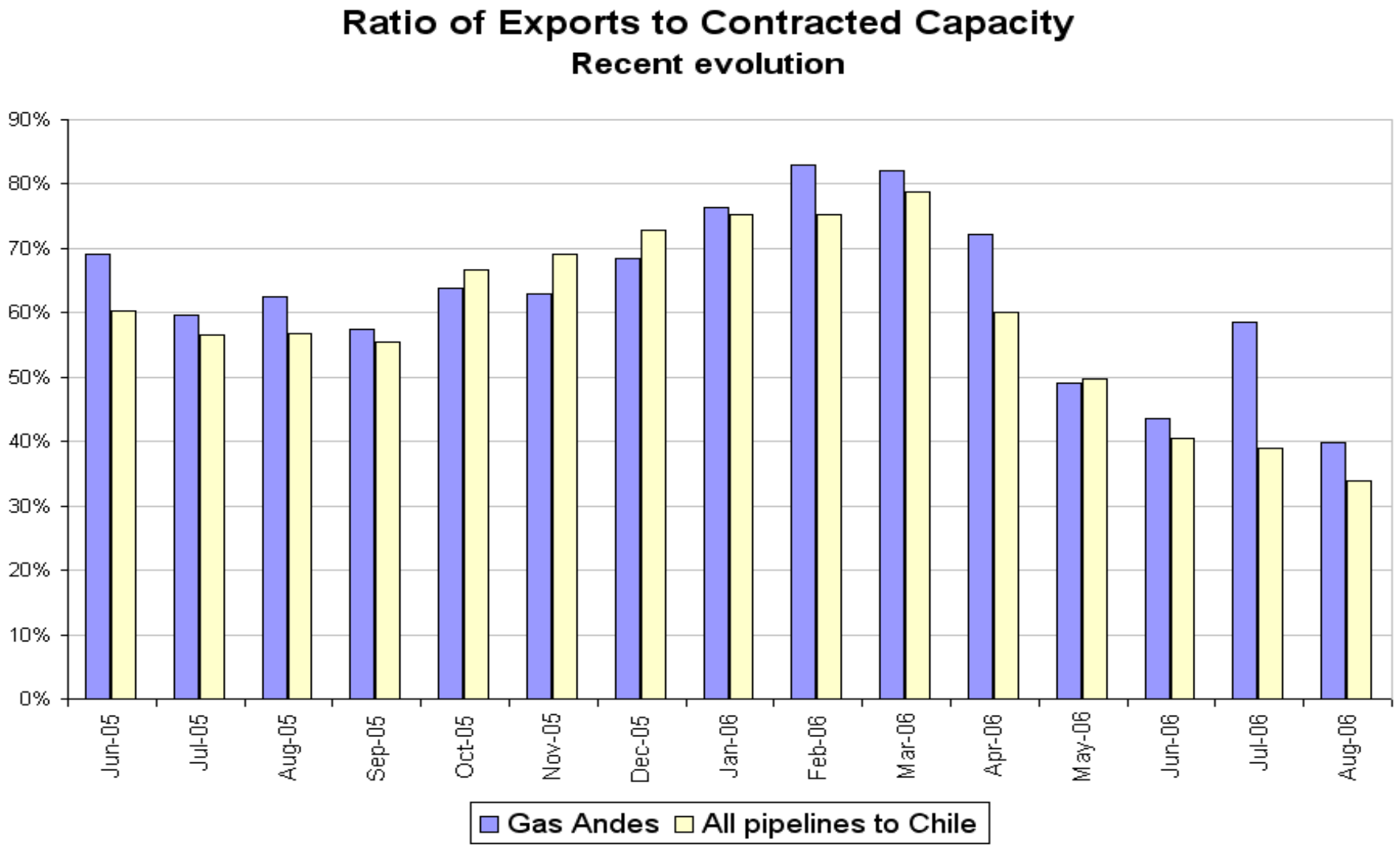
Constraints from Mandatory Supply to Domestic Market

Exports before the crisis and Required Additions to supply domestic markets in 2005 at the Different Basins					
Basin	Daily average exports in Jan 2004 MMm3d	Share in Exports	Required Additions to Domestic Market daily average 2005 MMm3d	Share in required additions to Domestic Market	Additions in 2005 / Exports in Jan 2004
Neuqina	9.84	51.4%	5.32	74.6%	54%
Austral	4.57	23.9%	1.21	16.9%	26%
NorthWest	4.73	24.7%	0.61	8.5%	13%
All Basins	19.14		7.14		37%
Source: Aggregate estimates obtained from private sector sources. Official source is the Secretary of Energy					
Memo item: Total Production in all basins= 141.3 in MMm3d for 2005; Neuquina had a 59% share.					

Exports through the GasAndes Pipeline



Exports to Contracted Capacity Ratio: see one, see them all



Competing Views of Broken Exchanges

- Hypothesis 1: Structural “fatigue” in supply not properly anticipated by suppliers and government.
- May render contracts become incomplete if unforeseen, or lead to arguments of negligence of participants concerning investment provisions given that it could have been foreseen.
- Hypothesis 2: Imbalance in domestic markets due to policy interventions, particularly on prices, and its effects on domestic demand.
- May suggest unforeseen contingency to private sector participants. Exports constraints need not be direct, but bite anyway through induced imbalances and mandatory supply to domestic markets

Structural fatigue argument:

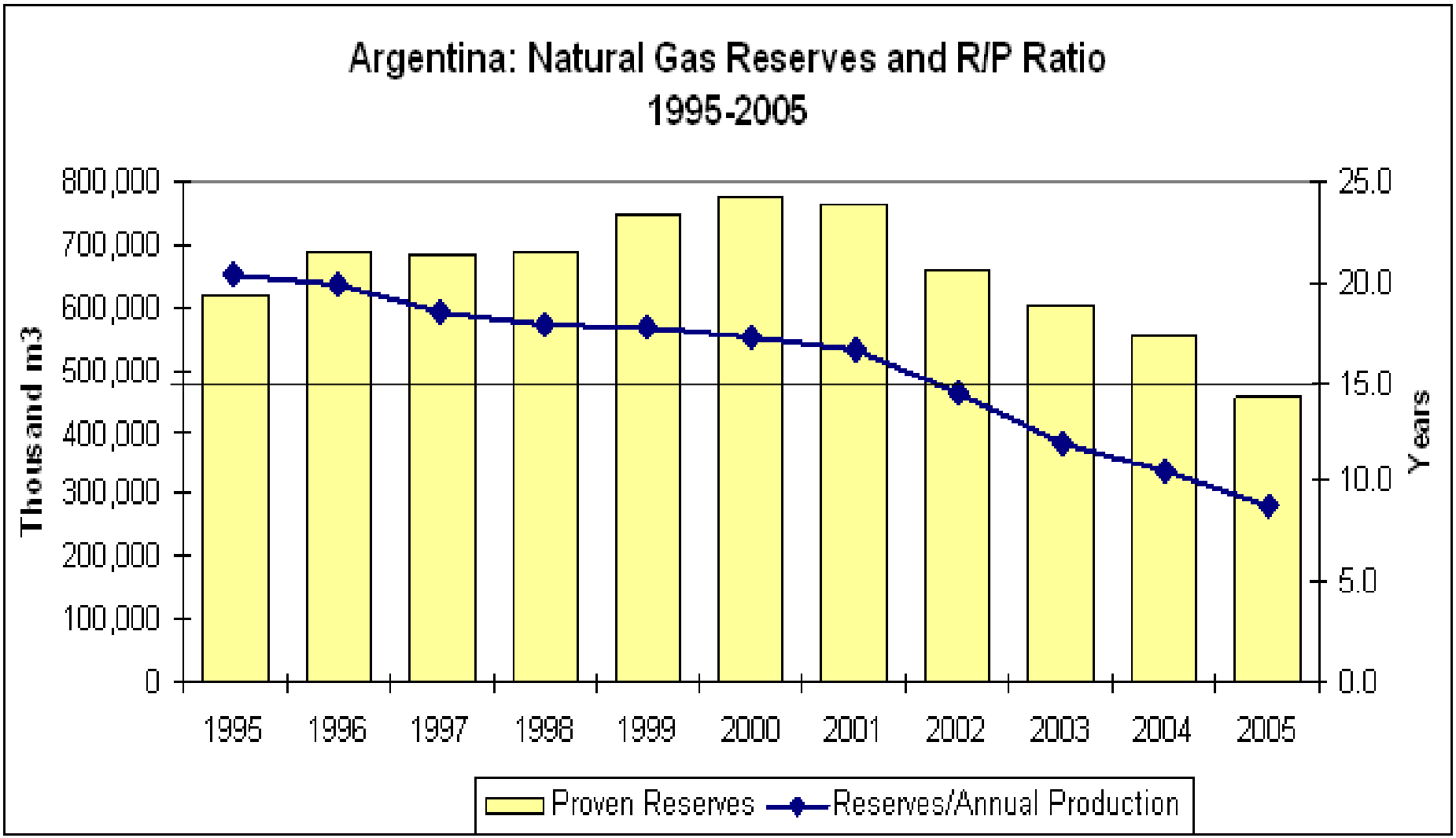
Two quotes from the past

"*The urgent need for an accelerated exploration and development program is clearly shown by the trend in the [Reserves/Production] R/P ratio. In 1987, the…R/P ratio in Argentina was 20 years, comfortably above the critical level of 15 years……Even if a substantial exploration program is undertaken immediately, and all of the probable and possible reserves are actually discovered,* ***the critical R/P ratio… [for Demand Management]… will be reached by the year 2002****."*

"*In the case of all three projects exports now being considered…the buyer who must make a significant investment in pipelines (e.g. Chile) will insist on a long term supply contract and probably require that adequate reserves be explicitly dedicated to their project. None of the proposed export projects would impose a limit on near-term gas availability… but they would reduce availability over the long term…Discussions should be continued with potential buyers of Argentine gas; however,* ***the national long term supply base should be assured before long-term export commitments are made****.*

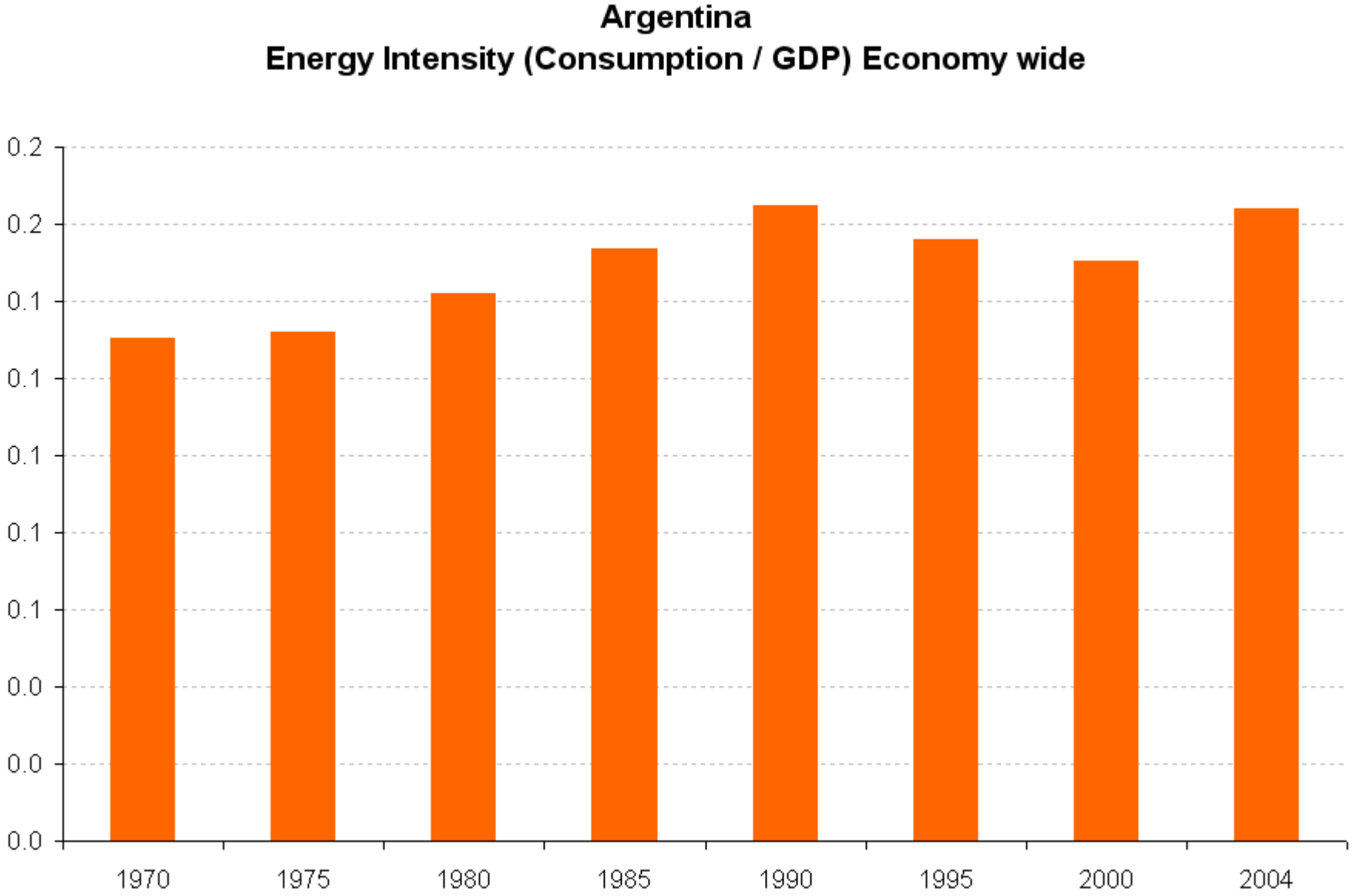
World Bank (1990), "Argentina Energy Sector Study", February 26.

"Critical ratio will be reached by 2002"…Bingo !!

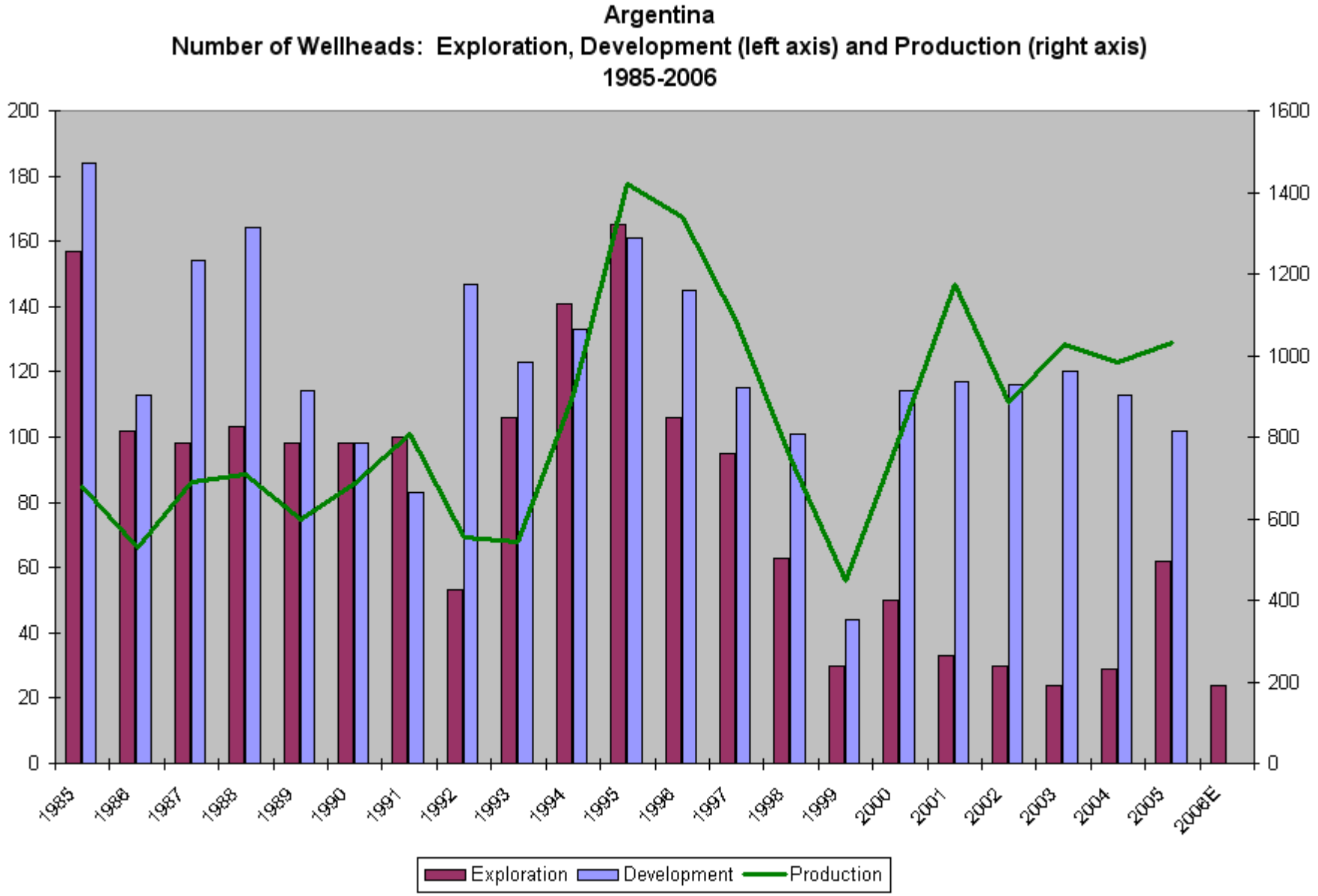


Very intensive pattern of NG use

Argentina: Energy Indicators in Long-Term Pesrpective 1970-2004								
	1970	1975	1980	1985	1990	1995	2000	2004
units: thousand of TOE								
1. Production (net of Transformation)	28232	35029	35525	39826	40950	59581	71440	73582
2. Net Exports	-2550	-5361	-3523	1882	2149	13477	21709	19784
3. Domestic Supply	25280	36936	33686	33297	34303	41015	45899	51280
4. Transformation (inc.losses)	34705	31731	47842	49896	55784	61707	76218	83579
5. Consumption	22027	25095	29385	28803	30438	37893	41485	45745
Self-sufficiency (1+(Net exports)/(Production))	0.91	0.85	0.90	1.05	1.05	1.23	1.30	1.27
Intensity (Consumption/GDP)								
Economy-Wide	0.130	0.132	0.142	0.154	0.165	0.156	0.150	0.164
Industry								
Intensity (Consumption per cápita)	0.943	0.992	1.051	0.954	0.943	1.106	1.153	1.222
Natural Gas Penetration								
in Primary Energy	0.23	0.27	0.29	0.36	0.38	0.35	0.43	0.49
in Electrcity Generation	0.18	0.26	0.27	0.36	0.45	0.50	0.64	0.59
in Final Consumption								
Economy-Wide	0.13	0.17	0.18	0.27	0.31	0.33	0.37	0.41
Industry	0.22	0.32	0.34	0.43	0.49	0.54	0.47	0.43
Transport	0.00	0.00	0.00	0.00	0.02	0.07	0.11	0.20
Reserves Horizon (P.Reserves/Annual Production)								
Oil					8.9	9.1	10.5	9.7
Natural Gas					25.2	20.3	17.3	10.6
Source: Secretary of Energy, Argentina (2006); and Argentine Institute for Oil and Gas, for reserves								


Argentina
Energy Intensity (Consumption / GDP) Economy wide
0.2
0.2
0.1
0.1
0.1
0.1
0.1
0.0
0.0
0.0
1970
1975
1980
1985
1990
1995
2000
2004

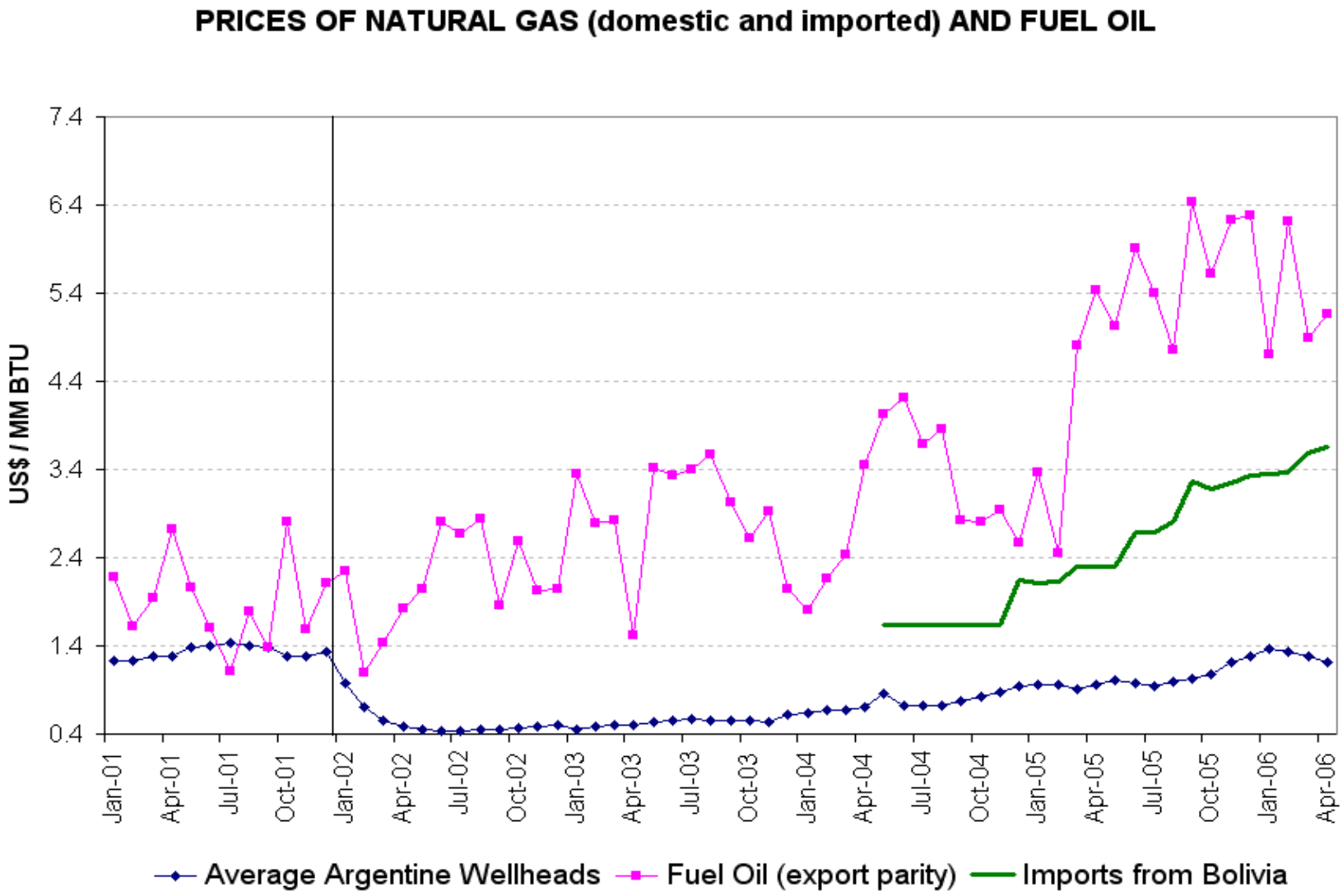
Sluggish Production or Exploration Efforts?



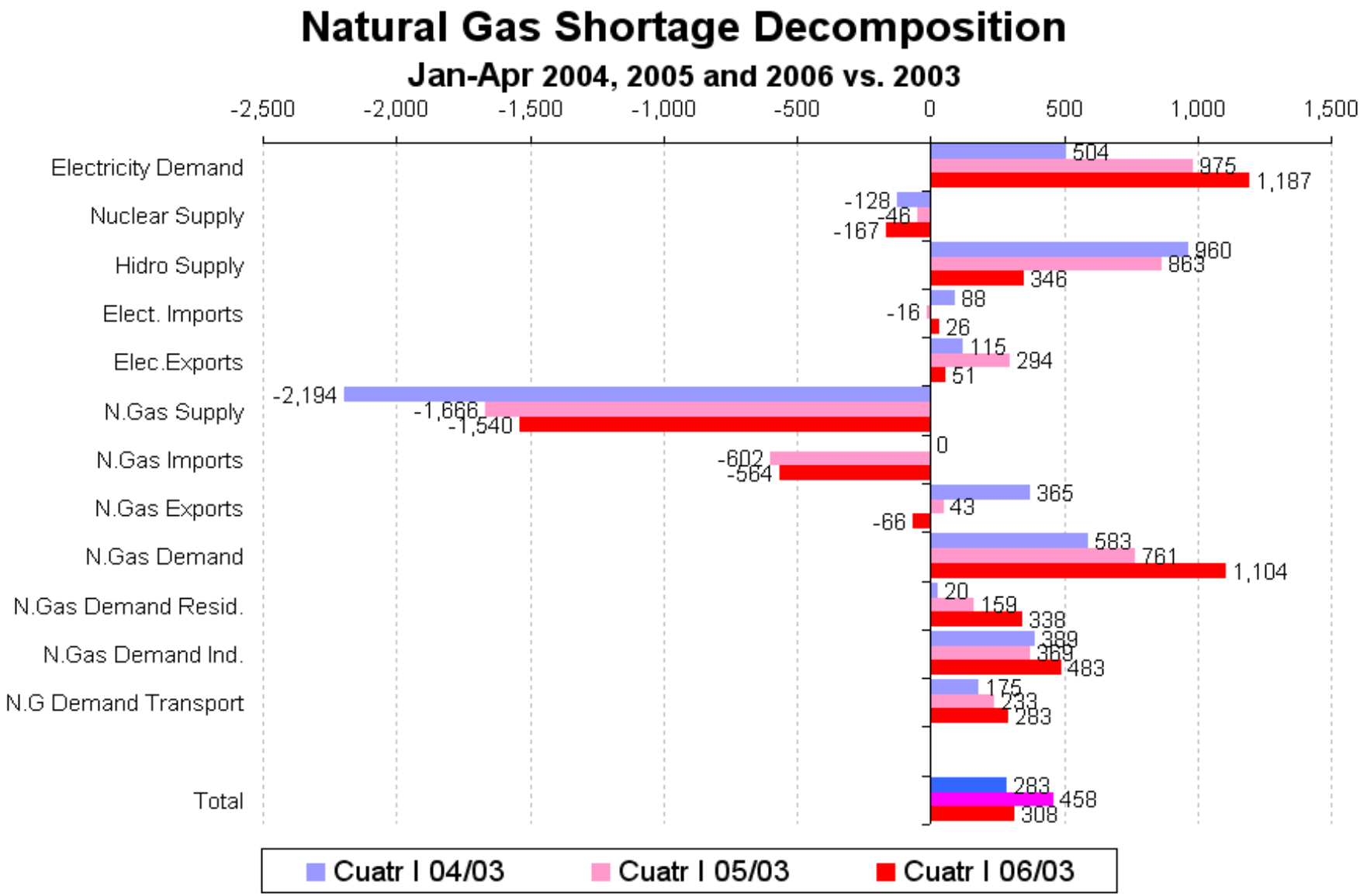
Policy-Induced Imbalance in Domestic Markets Argument

- Prices frozen for some segments and divorced from benchmark substitute fuels
- Supply-induce shortage does not fit with increased production
- NG Shortage decomposition (Cont and Navajas, 2004): evidence that demand plays leading role.
- High demand cannot be fully explained by growth or sectorial re-allocation (output-mix effect).

Price Divortium of Domestic NG



NG Shortage: ¿Supply or Demand?



High Demand: ¿Growth, Output-mix or Prices?

Cuadro 3

Assesing Energy Demand Growth In Argentina
2005 vs. 1998
Facts Sheet

GDP Growth	4.9%
Industry Growth	6.5%
Econmy-Wide Energy Demand Growth	
Electricity	28.4%
Natural Gas (w or wo elect.gen.)	27.1%
Manuf. Industry Energy Demand Growth	
Electricity	28.3%
Natural Gas	14.1%

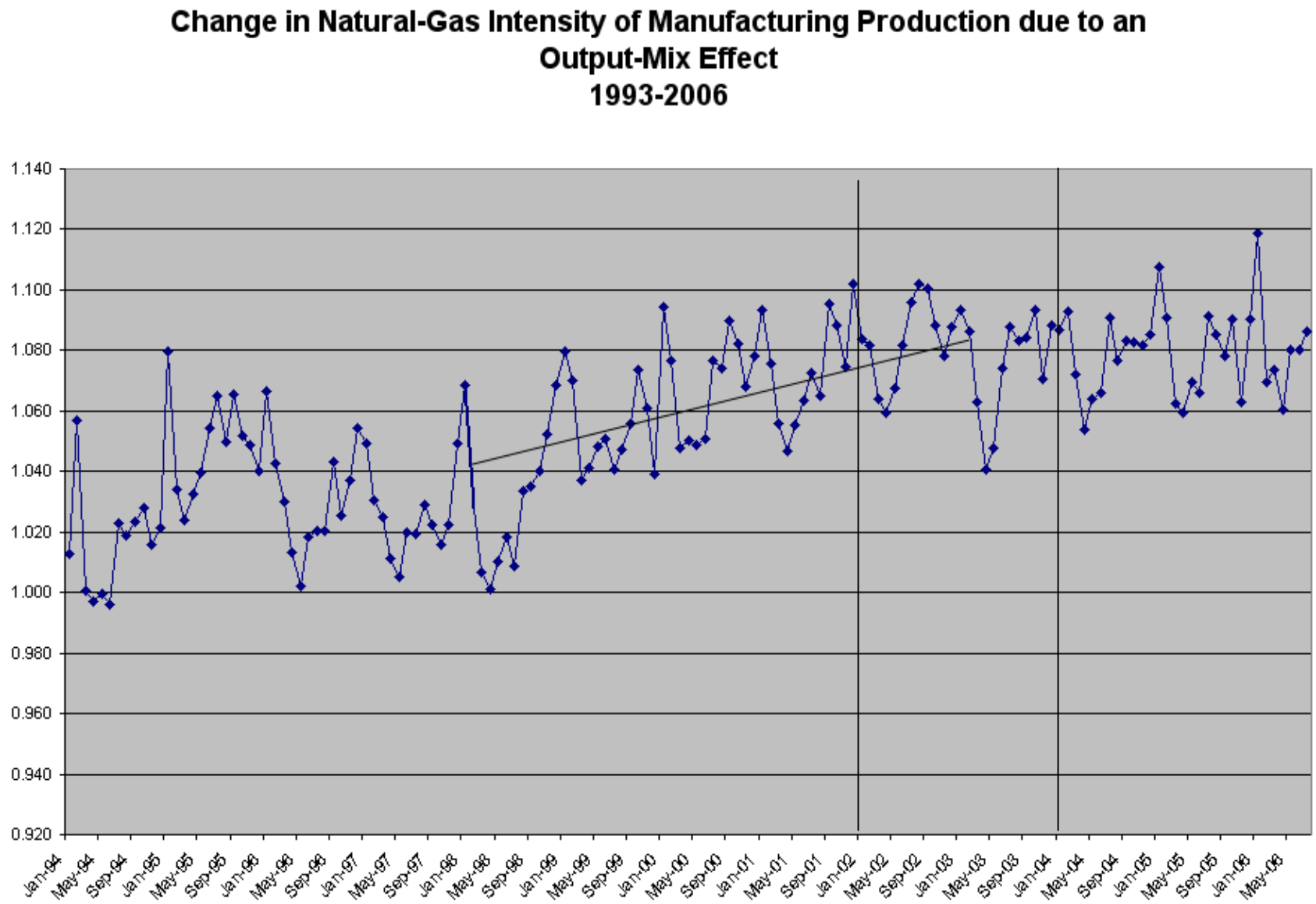
Energy Intensity 1998=100

Economy Wide	
Electricity	122
Natural Gas	121
Manuf. Industry	
Electricity	120
Natural Gas	107

Simulating an "Output Mix" Effect 2005 vs. 1998

	Intensity Growth	
	Nat. Gas	Electricity
Economy Wide	-0.1%	-0.6%
Industry	4.2%	5.0%

Output-mix effect of NG intensity in Manufacturing



“Adaptation” after Broken Exchanges

- Negotiations started at private and official levels, with obvious claims from the Chilean side.
- At the official level the argument of the Argentine government was that
  - there was an umbrella (protocols) but not an official commitment to exports,
  - exports permits were wrongly decided by previous administration,
  - legislation (and protocols) were clear concerning priority of domestic markets,
  - Decisions to supply exports were private decisions
  - Gas shortages in general are explained by insufficient investment in upstream.
  - Exports are not constrained if suppliers can deliver substitute fuels to domestic end-users
- (Unwritten) commitment by Argentine government to maintain supplies whenever possible and avoid cuts that would affect residential users.
- Negotiations and contractual conflict at the private level started after exports constraints in 2004
- Arbitration process between buyers and suppliers triggered by contracts signed in the Gas Andes pipeline.

Contractual Conflict at GasAndes Pipeline

- Relevant because is on a major transaction (about 2.5 MMm3d) on the larger pipeline (10 MMm3d capacity), i.e. close to 15% of exports to Chile.
- Original contract signed in 1996 by “Buyers” (two generators and a Distco) and “Sellers” (about 5 gas producers at the Neuquina basin).
- Qualitative Contract Features
  - Long Term (about 17 years)
  - Fixed quantities (with enlargement provisions) from a gas field committed exclusively to export activities
  - Prices indexed by Fuels but Constrained to Domestic Pricing at the Basin.
  - Take or Pay (with flexible clauses that may reflect demand uncertainty and contemplate outside opportunities to “Sellers” of selling untaken gas by “Buyers”).
  - Delivery or Pay (without flexibility, reflecting very low uncertainty of supply).
  - Major Force provisions including direct government intervention
  - Arbitrage mechanism
- Seemingly reasonable design of contractual base given nature of exchange, investments on both sides and stage of development in (gas to gas) market competition.
- Problems: Weak management of unforeseen contingencies (overall Gas availability) and ex-post resolution of impeded exchanges, including interpretation by courts.

Contractual Conflict at GasAndes Pipeline (2)

- Arbitration Demand by “Buyers” on undelivered gas.
- Major force argument by “Sellers”.
- However, difficult to sustain
  - Exports are not explicitly prohibited and could be allowed if an alternative substitute fuel is delivered to domestic market.
  - Signals of “supply fatigue” or “dynamic demand” could have been anticipated
- “Buyers” argue contractual negligence rather than major force or unforeseen contingency.
  - Lack of investment, or provisions to keep supply given domestic market evolution. Resembles official (Argentine) explanation of crisis.
- However, difficult to match with evidence on
  - Generalized, not individual, interruptions of supplies
  - Role of policy interventions post 2002 crisis
  - Role of supply and demand on domestic market disequilibrium
- Hard job for Court to “complete” the contract

Issues and Lessons for Regional Cooperation

- Beyond regional coordination on regulation-cum-competition design for infrastructure (Beato and Benavidez, 2004). Conditions to support exchanges needed.
- Energy planning as policy coordination.
  - Weak form: exchange of information. Introduced too late (2002) in the Argentine-Chilean exchange.
  - Hard forms difficult to implement due to sovereign decisions and ex-post repudiation.
- Contract design
  - Study and include provisions related to energy imbalances on both sides, but particularly on suppliers
  - Ex ante clauses to govern contingencies.
- Lesson for current Bolivia-Argentina pipeline.
  - Contract exposed to same problems.
  - Poor treatment of “non-deliverability” contingency.

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