REGULATORY REFORM IN ARGENTINA'S NATURAL GAS SECTOR

INTERNATIONAL ENERGY AGENCY

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FOREWORD

Argentina was one of the first countries outside North America to launch reform of the organisation, ownership and regulation of its natural gas industry. That process — part of an overall programme of major economic restructuring — was aimed at improving market efficiency and increasing investment through greater reliance on market forces and the involvement of private capital. This report presents the results of an IEA review of the impact of gas sector reforms. It demonstrates how successful these reforms have been in terms of increased drilling, increased investment in downstream infrastructure, enhanced supply security and lower unit costs. It also highlights remaining challenges that Government and the regulatory and competition authorities need to address, notably promoting competition in gas supply. The report complements a number of other recent IEA publications, including *Natural Gas Pricing in Competitive Markets* (1998), *Natural Gas Distribution* (1998) and *Regulatory Reform in Mexico's Natural Gas Sector* (1996).

This review was carried out by two members of the Asia-Pacific, Latin America Division of the IEA Secretariat: Trevor Morgan, a gas sector specialist, and Bruce McMullen, a Latin American specialist. The Secretariat would like to place on record its gratitude for the invaluable information and comments it received from the Argentine Secretariat of Energy, Enargas, companies and other organisations in Argentina, and IEA Member countries.

This report is published under my authority as Executive Director and does not necessarily reflect the views or policies of the IEA Member countries.

Robert Priddle
Executive Director

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EXECUTIVE SUMMARY

The gas sector in Argentina has recently undergone profound change as a result of regulatory and structural reforms launched at the end of the 1980s. Those reforms, which formed part of an overall programme of economic restructuring, were aimed at improving economic efficiency and increasing investment through greater reliance on market forces and the involvement of private capital. The design of the reform process and the regulatory framework which has been put in place have drawn heavily on the experiences and lessons learnt in other countries, notably Canada, the United States and the United Kingdom.

At the heart of the reforms were the privatisation of the downstream gas company, Gas del Estado (GdE), and the upstream oil and gas company, Yacimientos Petroliferos Fiscales (YPF); the break-up of GdE into two transmission companies and eight distribution companies (a ninth was created in 1998); the removal of wellhead and wholesale price controls; the establishment of an open-access regime; and the creation of an independent regulatory authority, Enargas. In addition, the distribution companies' retail monopoly was limited to customers using less than 10 000 cubic metres/day. Enargas's objectives include promoting competition in gas supply, setting tariffs (rates) for transmission services and distribution company gas sales — considered as natural monopolies — and encouraging long-term investment in the network.

Gas sector reforms in Argentina, mostly implemented from 1992 to 1994, have been highly successful. Gas drilling has picked up, investment in the downstream industry has increased and transmission and distribution costs have been reduced. Short-term security, in terms of system reliability and deliverability, has been significantly enhanced as a result of major investment in new capacity and system-control technology. Long-term security has also been enhanced through increased drilling and the prospect of continuing expansion of international gas trade in the Southern Cone region. Although wellhead prices have risen from the artificially low levels that prevailed before deregulation, end-user prices have risen more modestly as a result of improved transmission and distribution system efficiency and capacity utilisation. Natural gas remains extremely competitive in all end-use sectors and is priced well below the levels prevailing in North America and Europe.

Critical success factors include:

- A stable and attractive trading, investment and fiscal environment.
- The removal of gas price controls.

- Diversification of players in the upstream sector through the removal of exclusive rights and the sale to competitors of some of YPF's assets and exploration and production rights.

- The effective separation (unbundling) of the gas transmission business from gas supply and trading, which ensures non-discriminatory third-party access to the transmission system and efficient regulation of tariffs.

- Transparency in the non-price terms and conditions of access to pipelines. This has also been a key factor in preventing discrimination between shippers and ensuring efficient operation of the industry.

- Explicit rate-of-return or tariff regulation with incentives to reduce costs through an RPI-X formula[1].

- Clear definition of regulatory responsibilities with an independent and well-resourced authority.

In spite of the impressive progress that has been made in transforming the performance of the natural gas sector, there remain a number of challenges for the Government and the regulator. Foremost among these are:

- Stimulating competition in gas supply.

- Improving the effectiveness and consistency of downstream regulation.

- Stimulating exploration and production to meet growing domestic and export demand.

- Promoting regional market integration.

These issues are interrelated. One way of increasing competition in the Argentine market will be the growth of exports, assuming competitors to YPF account for the bulk of these incremental supplies. New export projects will, in turn, depend partly on the attractiveness of the legal and fiscal regime in the upstream sector and on the success of drilling in the face of competing supplies from Bolivia and weak oil prices. Although the regional market, notably southern Brazil, Chile and Uruguay, appears large and receptive to increased natural gas trade, this potential can only be fully realised if compatible investment and regulatory regimes are put in place in all countries in the Southern Cone. The Energy Secretariat in the Ministry of Economy, Enargas and competition authorities in Argentina will play a pivotal role in promoting the long-term development of the domestic and export market.

Encouraging competition in gas supply — one of the chief aims of the 1992 Natural Gas Act — is the most pressing concern. Despite divestment of assets and the removal of exclusive rights prior to privatisation, YPF remains the dominant producer and supplier of gas to the Argentine

1. Retail price index less an efficiency factor set at the start of the review period.

market, accounting for 58% of total domestic supply. It thus continues to play the role of price leader. The Government and the industry recognise the need to reduce YPF's gas (and oil) market share. However, achieving this aim within the existing legal and institutional framework may be difficult since YPF is now in private hands. Any rapid resolution to the lack of competition may have to involve an overhaul of competition legislation, including the introduction of tougher anti-trust laws, that would have the effect of obliging YPF to dispose of many of its existing production concessions and exploration permits.

The ultimate aim — once effective competition in bulk gas supply is established — should be to extend competition in gas supply to all end-users. Currently, competition is limited to those customers consuming more than 10 000 cubic metres/day. Such a move would require at a minimum full separation of the accounting and management of distribution companies' pipeline and gas supply activities (retail unbundling) to prevent discrimination against third parties and encourage access to distribution networks.

I. INTRODUCTION

This report sets out the findings of an IEA review of the regulatory framework for natural gas in Argentina. The purpose of the study was twofold: first, to provide the Argentine authorities with an objective assessment of recent reforms in the gas sector and possible areas for improvement, drawing on experience in other parts of the world; and second, to help other countries considering or embarking on gas-sector reforms to learn from the Argentine experience. This report complements a number of other recent IEA publications, including studies of competitive gas pricing, distribution and natural gas sector regulatory reform in Mexico[2].

Section II of this report describes the background to energy sector reforms within the context of broader economic and institutional reforms in Argentina and the Southern Cone. Section III provides an overview of the Argentine natural gas sector, including prospects for market growth. Section IV describes the specific elements of gas sector reforms launched in the late 1980s and subsequent policy and regulatory developments, notably the first transmission and distribution tariff review implemented at the beginning of 1998. Section V analyses the impact of these reforms on the gas market and industry structure and performance. Section VI sets out broad developments in the integration of energy networks in the Southern Cone region. Section VII provides some conclusions on progress in implementing regulatory reforms, together with an assessment of remaining challenges for policy makers and the regulator, Enargas.

The authors of this report held discussions with representatives of the following organisations in Argentina:

- Secretariat of Energy, Ministry of Economy, Public Works and Services
- Enargas
- IPAG (Argentine Oil and Gas Institute)
- Transportadora de Gas del Sur (TGS)
- Transportadora de Gas del Norte (TGN)
- Adigas (Association of Gas Distributors)
- Metrogas
- Gas Natural BAN
- Gasnor
- Yacimientos Petroliferos Fiscales (YPF)
- Pioneer Resources (Argentina)

2. IEA/OECD, *Natural Gas Pricing in Competitive Markets* (1998); IEA/OECD, *Natural Gas Distribution* (1998); IEA/OECD, *Regulatory Reform in Mexico's Natural Gas Sector* (1996).

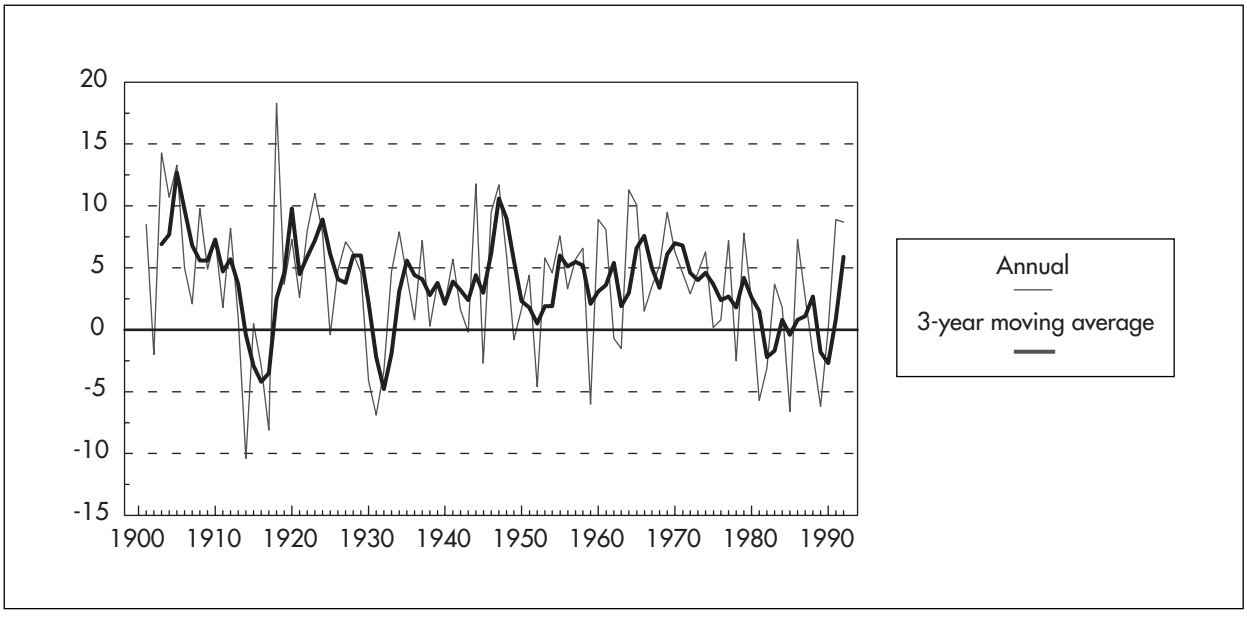
Figure 1 Map of Argentina and the Southern Cone Region

II. ECONOMIC AND INSTITUTIONAL REFORM IN ARGENTINA

ECONOMIC AND POLITICAL CONTEXT

Argentina experienced rapid, largely agricultural based, economic growth from the early 1880s into the early part of the 20th century. By the mid-1920s, Argentina was one of the world's wealthier countries with a level of economic development and income comparable to the most prosperous European countries, Canada and the United States. From the end of the 1920s until the early 1990s the performance of the Argentine economy deteriorated significantly. During the period 1976 to 1989 Argentina had virtually no GDP growth, and its per capita income actually contracted by an average of 1.1% annually (see Figure 2). In 1990, Argentina had a per capita income substantially below the industrial West. It had even been overtaken by a number of Asian nations which experienced rapid economic growth since World War II.

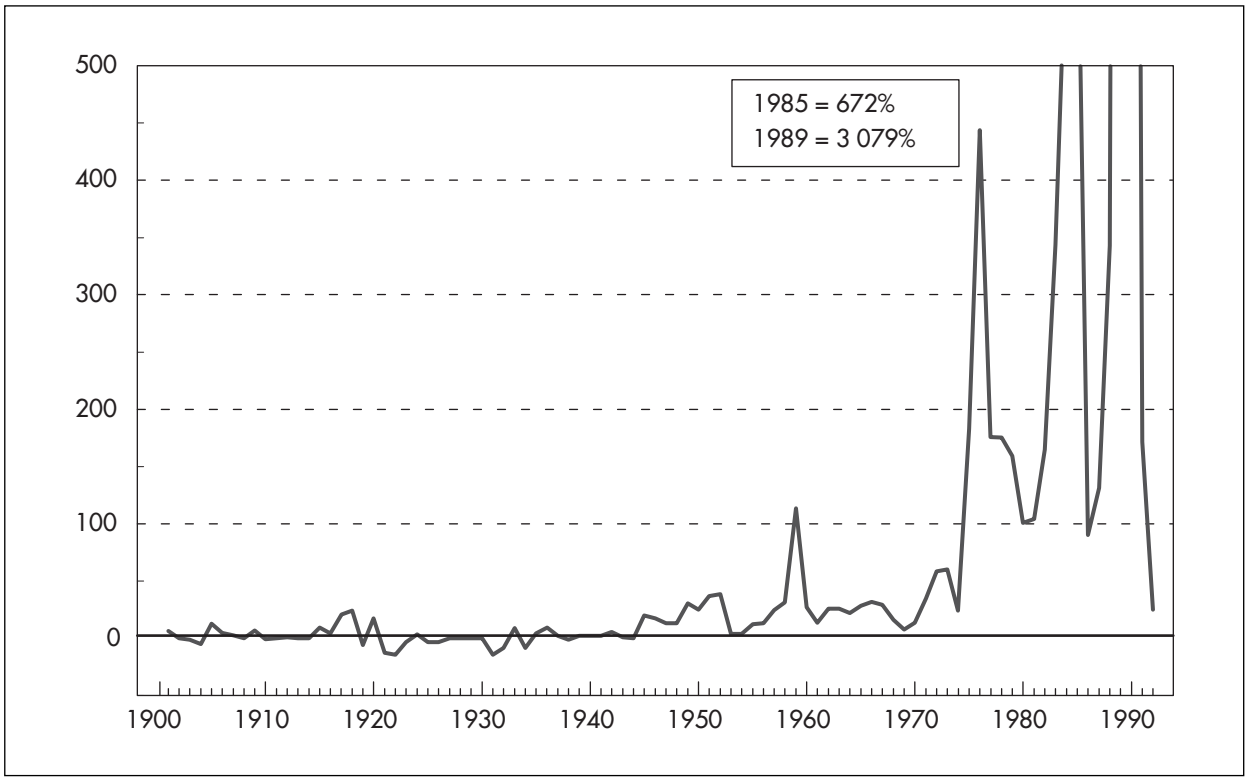
Figure 2 Growth of GDP in Argentina, 1901 to 1992
(%, year-on-year and 3-year moving average)



Source: M-A. Veganzones & C. Winograd, *Argentina in the 20th Century: An Account of Long-Awaited Growth* (OECD, 1997).

Over the 60-year period to the early 1990s, the Argentine economy experienced increasingly unsustainable, very high cyclical growth rates (see Table 1). The economy suffered from uncontrolled public deficits, low productivity and low private sector investment, agricultural stagnation, ineffective import-substitution policies, a large and inefficient state-owned sector, high unemployment and chronic high inflation. Argentina was one of the countries most affected by the world debt crisis in the early 1980s and subsequently endured two episodes of hyper-inflation, the most recent in 1990 (see Figure 3).

Figure 3 Inflation Rate in Argentina, 1901 to 1992 (annual percentage change in retail prices)



Source: M-A. Veganzones & C. Winograd (1997).

While some of these economic difficulties were linked to external events, such as the Great Depression of the 1930s and the debt crisis of the 1980s, unsuccessful and sometimes counter-productive economic policies were the root causes, exacerbated by substantial social and political turmoil. From 1955 to the election of the current Administration in 1989, Argentina had no fewer than 18 civilian and military governments. Beginning in the late 1970s, sporadic attempts were made to liberalise and strengthen the economy but these were either misplaced or not sufficiently broad or forceful to generate sustainable growth. Finally, a return to civilian rule and a political consensus for radical economic reform provided the basis for ambitious economic stabilisation and reform policies in the early 1990s.

In 1991, the Government began an aggressive and rapid programme of privatisation of almost all public enterprises, including the national telephone company, the national airline, television and radio stations, railways, federally owned highways, power plants and public utilities. Shares in the state owned oil and gas company, Yacimientos Petroliferos Fiscales (YPF), and the national gas transmission and distribution company, Gas del Estado (GdE), were also sold off. Other reforms included trade liberalisation and the establishing of the convertibility of the Argentine Peso by linking it with the US dollar.

These efforts have restored Argentina's credibility in the international financial community, virtually eliminated inflation, attracted foreign and domestic private investment and generated substantially higher rates of economic growth (see Table 1).

Table 1 Annual Average Rate of Economic and Population Growth in Argentina (%)

Period	GDP	Population	GDP per capita
1900-92	**3.5**	**2.0**	**1.5**
1900-13	6.6	3.8	2.8
1914-17	–3.5	1.8	–5.3
1918-29	5.7	3.0	2.7
1930-32	–5.3	1.9	–7.2
1933-43	3.2	1.5	1.7
1944-48	6.6	1.8	4.8
1949-52	0.8	2.3	–1.5
1953-75	4.6	1.6	3.0
1976-89	0.3	1.4	–1.1
1990-95	4.5	1.2	3.3

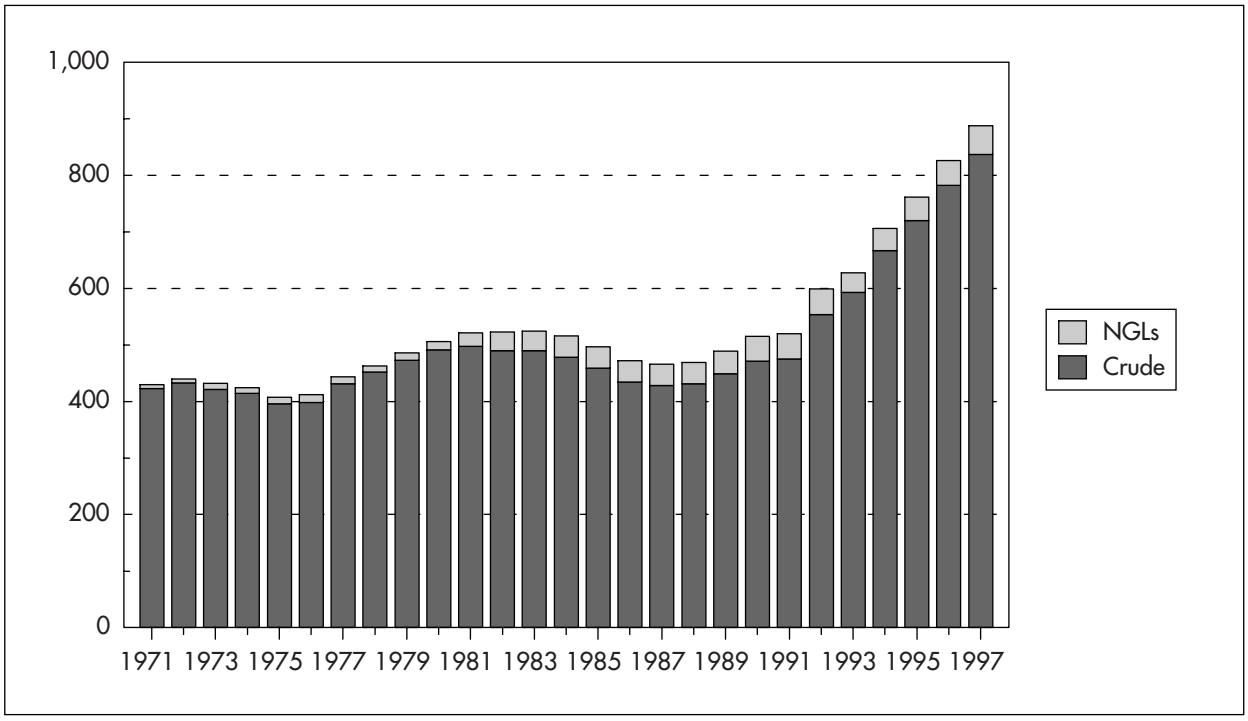
Source: M-A. Veganzones & C. Winograd (1997).

REFORMS AND RESTRUCTURING IN THE ENERGY SECTOR

Oil and Gas

Reform of the Argentine oil industry began in 1989. By early 1991, the sector had been largely deregulated, with most portions already open to private and foreign participation — either through direct investment or joint ventures with YPF. Oil companies are now free to market their crude oil and oil products either in Argentina or abroad. These reforms have generated substantial new investment, and Argentine production including natural gas liquids (NGLs) increased from 480 000 barrels/day (b/d) in 1988 to nearly 900 000 b/d in 1997 (see Figure 4).

Figure 4 Oil Production, 1971 to 1997 (Thousand barrels per day)



Source: IEA database.

A key element of the privatisation effort in the early 1990s was the sale of YPF. First established in the late 1920s, YPF is one of the world's oldest oil companies. Until 1992 it was the only company permitted to sell natural gas at the wellhead in Argentina. For many years YPF's hydrocarbons production stagnated and the company gained a reputation of inefficiency. Technologically, it lagged behind other large state owned oil companies in the region. It came to be used as a "cash cow" by governments encountering budgetary problems. It often suffered large financial losses, totalling around $6 billion in the period 1981-89.

Preparation for privatisation began in 1990 with the downsizing of the company, rationalisation of its operations, and improvement in its general management. From 1990 to 1995, YPF's work force fell from 51 000 to 5 800, while one third of the company's oil and gas reserves was sold off. Some 45% of its shares were floated in the largest Latin American share offering to date. By 1994, it was making a considerable net profit. In recent years YPF has become an aggressive international player. In 1995 it purchased Maxus Energy, a US-based upstream firm with holdings in South America and Indonesia.

Before privatisation, Argentina's monopoly arrangements in energy supply led to an acute lack of capital investment, both in the upstream and downstream. Upstream reform has encouraged private investment in exploration and development. The earlier trend towards shrinking hydrocarbon reserves has been reversed. Production of oil and natural gas has increased, and a number of foreign and domestic firms are producing hydrocarbons (see section V for details).

Gas del Estado (GdE), the state owned natural gas transport and distribution company, had a monopoly in Argentina. Its long standing dominance resulted in transmission and distribution bottlenecks that impeded supply to residential users during peak periods. Supply to industrial customers was also regularly interrupted at such times to meet residential demand. System control was precarious. Privatisation of the gas sector began in 1990 and was essentially completed by late 1992. Its objectives were to encourage long term private sector investment and provide improved service and efficiencies. Two private transmission companies and eight private distribution companies were carved out of the former monopoly. A regulatory framework based on open access to the network was developed with a price cap on transmission and distribution tariffs. Unlike YPF, GdE did not undergo a significant internal restructuring before it was broken up. These regulatory reforms and structural changes have brought significant improvements in terms of removal of bottlenecks, more efficient management and enhanced system safety and reliability (see section V).

Reform of the oil and gas sector has provided a more stable basis for long term planning and investment and has given impetus to energy linkage projects with Argentina's neighbours (see section VI). The fast-paced development of Mercosur — the Southern Cone Common Market — has encouraged this trend.

Electricity

The electricity sector has been restructured and privatised broadly in parallel with reforms in the gas sector. The 1992 Electricity Act (24.065), modelled on the approach to regulation in the United Kingdom and on earlier structural reforms in Chile, was designed to lead to competition between the privatised electricity companies. Under the Act, a regulatory authority, Enre (Ente Nacional Regulador de Electricidad), was set up to regulate all aspects of the electricity industry, especially transmission and distribution. Enre mediates in disputes between electricity companies and enforces federal laws, regulations and terms of concessions. Enre also establishes service standards for distribution companies and sets the maximum price that transmission and distribution companies may charge for their services. Enre oversees the operator of the wholesale electricity market, Cammesa (Compania Administradora del Mercado Mayorista Electrico S.A.), and the generation companies, which are not subject to price-cap regulation.

Key aspects of power-sector restructuring include the following:

- *Power generation:* Most conventional electricity facilities (thermal and hydroelectric) were sold separately, essentially making each privatised generation facility an independent power producer. Thermal plants were sold outright, while concessions averaging 30 years were awarded for most of the hydroelectric plants. There are currently around 40 generating companies operating in Argentina. Most large plants were purchased by foreign companies. Ten power generators, including the nuclear plants and most large hydroelectric facilities in addition to those under construction or in the planning stage, are still owned by the federal or provincial governments, either because efforts to privatise them have not begun or because such efforts have been unsuccessful. Generation companies are legally restricted to a maximum market share of 10% of national electricity sales. They are also prohibited from owning majority shares in electricity transmission facilities. Generators have open and equal access to the national grid.

- *Wholesale market and central dispatch:* Wholesale prices are unregulated and are set in the wholesale market (the power pool). The market has both a supply side, composed of domestic and foreign generators, and a demand side, composed of distribution companies, large users, and foreign consumers for purchasing exported electricity. The market sets three types of prices: contractual prices, seasonal prices, and spot prices. The system is administered by Cammesa, a nonprofit, independent operating agency jointly-owned by the Government and the power generation companies. Cammesa has three primary tasks: dispatching power; determining the fixed charges and other fixed fees added to spot, seasonal, and contractual prices to cover the full costs of transmission; and ensuring that the system maintains adequate reserve capacity. Cammesa determines the cost of generation for each producer and then dispatches electricity to the transmission grid in least-cost (merit) order. The price that is paid to each generator is determined largely by the highest cost of all the power that is dispatched (marginal cost). Generators whose production costs are too high to be dispatched by Cammesa receive a payment for providing the system with reserve power.

- *Transmission:* Electricity transmission is regulated by Enre. Firms may enter the industry only after successfully bidding for a fixed-duration concession for a particular area; they may charge no more than regulated prices for their services. Concessionaires must allow third parties access to their transmission networks. Transmission companies are not allowed to buy or sell electricity. Their revenues come exclusively from the regulated prices they receive, which are capped by an RPI-X formula[3] over periods of five years. The price is based on the availability of their network assets (providing a fixed source of income) and on the use of those assets (providing a variable source of income). Most of the six transmission companies have been at least partially privatised. The creation of a seventh private regional company was approved by Enre in 1996.

- *Distribution:* As with transmission companies, distribution companies have regulated maximum rates that they may charge for their services. Distribution assets formerly owned by federal electric utilities were privatised or transferred to the provinces, which have begun to privatise them. Several distribution companies were created in this restructuring. The two largest, which serve greater Buenos Aires, were the first to be privatised. Distribution companies must allow open access to their networks to end-users consuming more than 2 GWh/year. Such large users who choose to be supplied directly by a generation company pay a contracted price determined by bilateral negotiation with a generation company; they pay additional use-of-transmission and distribution system charges. Large users are also allowed to buy power directly from the wholesale electricity market, paying the spot price. The number of large users active in the wholesale electricity market has increased from 5 in 1993 to more than 200 at present.

REGIONAL ECONOMIC AND ENERGY MARKET INTEGRATION

A variety of economic, political and social reforms are occurring in Latin America. Perhaps the most impressive and dynamic are those towards regional economic integration, particularly in the Southern Cone. This development has important implications for energy and specifically for natural gas.

3. Retail price index less an efficiency factor set at the start of the review period.

Mercosur came into effect in 1991 as a free trade agreement composed of Argentina, Brazil, Paraguay and Uruguay. The initial reaction to its establishment was muted, since it seemed to be just one more in a series of regional Latin American trade pacts, most of which had enjoyed only limited success. However, trade flows between the four members grew almost four-fold within only a few years ($4 billion in 1990 compared to almost $15 billion in 1996). Mercosur quickly became and has remained the most dynamic economic integration movement in Latin America. The potential of the Mercosur market is enormous, with its population of over 200 million and a GDP of over $1 trillion.

Mercosur became a customs union with a common external tariff in 1995. Bolivia and Chile have signed free trade agreements with Mercosur and have become associate members. Mercosur is also reaching out to establish links with other countries and trade groupings in the Southern Hemisphere. In large part due to Mercosur, Argentina has become the second largest exporter to Brazil (after the United States). Mercosur has also promoted the development of active petroleum trade between the two Latin American countries.

The movement away from nationalistic economic development towards more liberal international and market-oriented approaches has encouraged regional energy linkages in the Southern Cone. Correspondingly, energy sector reform, privatisation and the encouragement of foreign investment in the sector, particularly in Argentina, have spurred economic integration. Previously, lack of infrastructure and slow growth in energy demand hindered the development of regional energy trade.

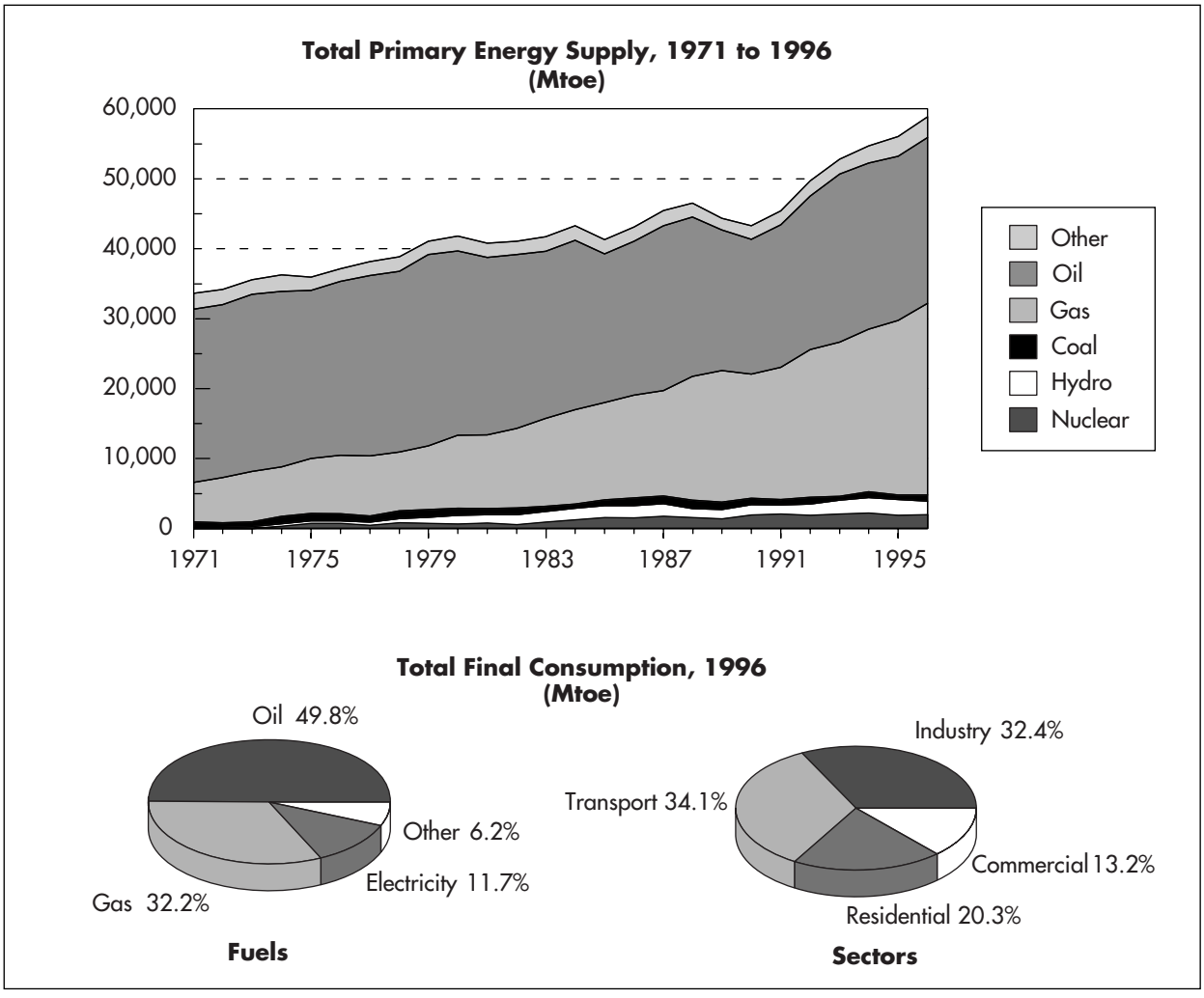
Natural gas trade will be a driving force towards regional economic integration in the Southern Cone, with Brazil being the major importer, followed by Chile and Uruguay. Bolivia, Argentina and, perhaps eventually Peru, will be the main supplying countries to these markets. Natural gas is a particularly attractive energy source, given its environmental advantages, its ability to substitute for petroleum, substantial reserves and, in the case of Argentina, an opportunity to expand export sales given the relative maturity of its domestic gas market.

III. OVERVIEW OF THE MARKET FOR NATURAL GAS

THE ROLE OF NATURAL GAS IN THE ARGENTINE ENERGY MARKET

Argentina has a very gas-intensive economy. In 1996, natural gas accounted for 44% of total primary energy supply (TPES) and a third of final consumption. Oil is the other main source of energy, accounting for 42% of TPES; combustible waste, hydropower and nuclear power account for most of the remainder (see Figure 5 and Annex A for detailed figures). The share of gas in TPES has increased sharply since the 1970s, mostly displacing oil, especially heavy fuel oil.

Figure 5 Energy Demand and Supply



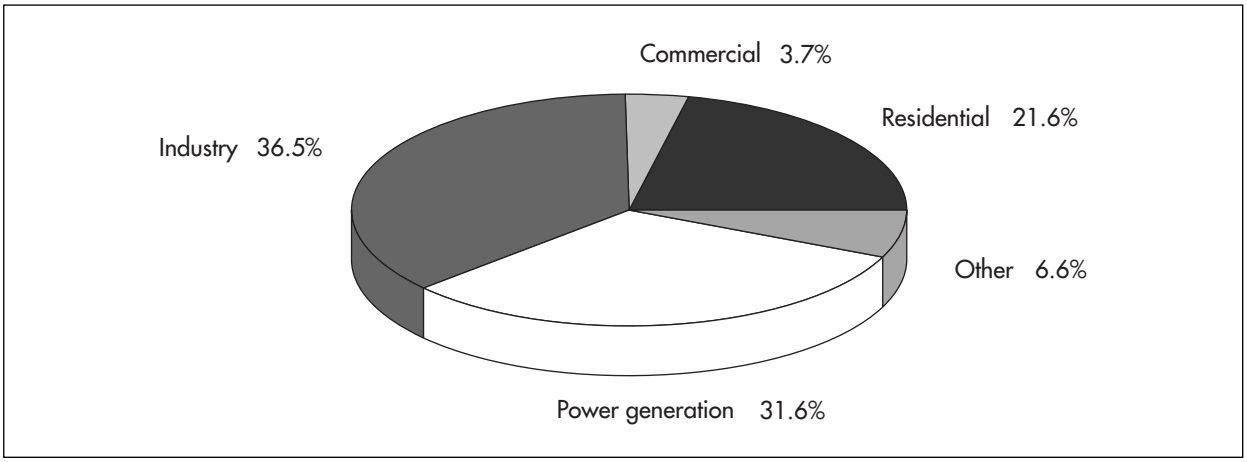
Source: IEA, *Energy Statistics and Balances of Non-OECD Countries* (Paris: OECD).

Argentina is well endowed with energy resources and is self sufficient in energy on a net basis. The country imports small amounts of coal and natural gas and exports significant volumes of crude oil and petroleum products. Imports of gas from Bolivia currently exceed exports to Chile, which began in 1997, but Argentina is expected to become a net gas exporter soon. Energy intensity, measured as TPES per unit of GDP adjusted for purchasing power parity, is just over 20% less than the average for OECD countries; intensity has been broadly flat over the last ten years, after rising steadily through the 1970s and early 1980s. The sectoral breakdown of final energy demand is close to the average for OECD countries, though transport accounts for a slightly higher-than-average proportion of demand (see Figure 5).

DEMAND FOR NATURAL GAS

Use of gas has more than doubled since 1980, reaching 26.9 bcm in 1997. Industry is the largest consuming sector, accounting for 36% of total gas consumption in 1997 (see Figure 6). Compressed natural gas (CNG) used as a transport fuel accounts for almost 5% of consumption. Close to 40% of the gas consumed in Argentina is centred on the capital, Buenos Aires[4].

Figure 6 Gas Consumption by Sector, 1997

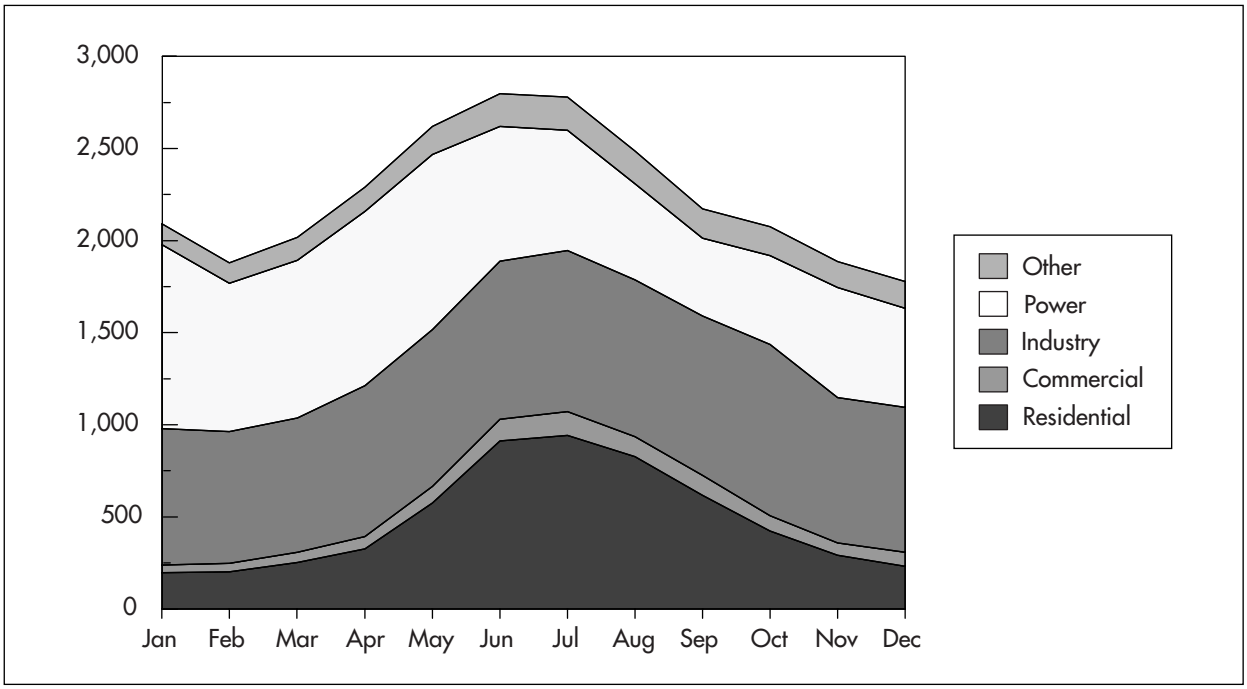


Source: Enargas, *Datos Operativos de las Licenciatarias de Gas (Monthly Bulletins)*.

Demand for gas in the residential sector is highly seasonal because it is used for space and water heating (see Figure 7). In 1997 residential demand was 4.7 times higher in July than in January. Demand in the commercial sector, and to a much lesser extent in industry, is also sensitive to temperature. Power-sector gas use is counter-seasonal, peaking in the Southern Hemisphere summer (December to February). In the winter, generators switch away from interruptible gas to oil and coal, to conserve gas supplies for households and businesses (see section V for a more detailed analysis of interruptibility). Hydropower availability is also higher in the winter, alleviating the demand for thermal generation.

4. The supply regions of Metrogas and Gas Natural BAN.

Figure 7 Seasonality of Gas Consumption by Sector, 1997
(Million cubic metres)



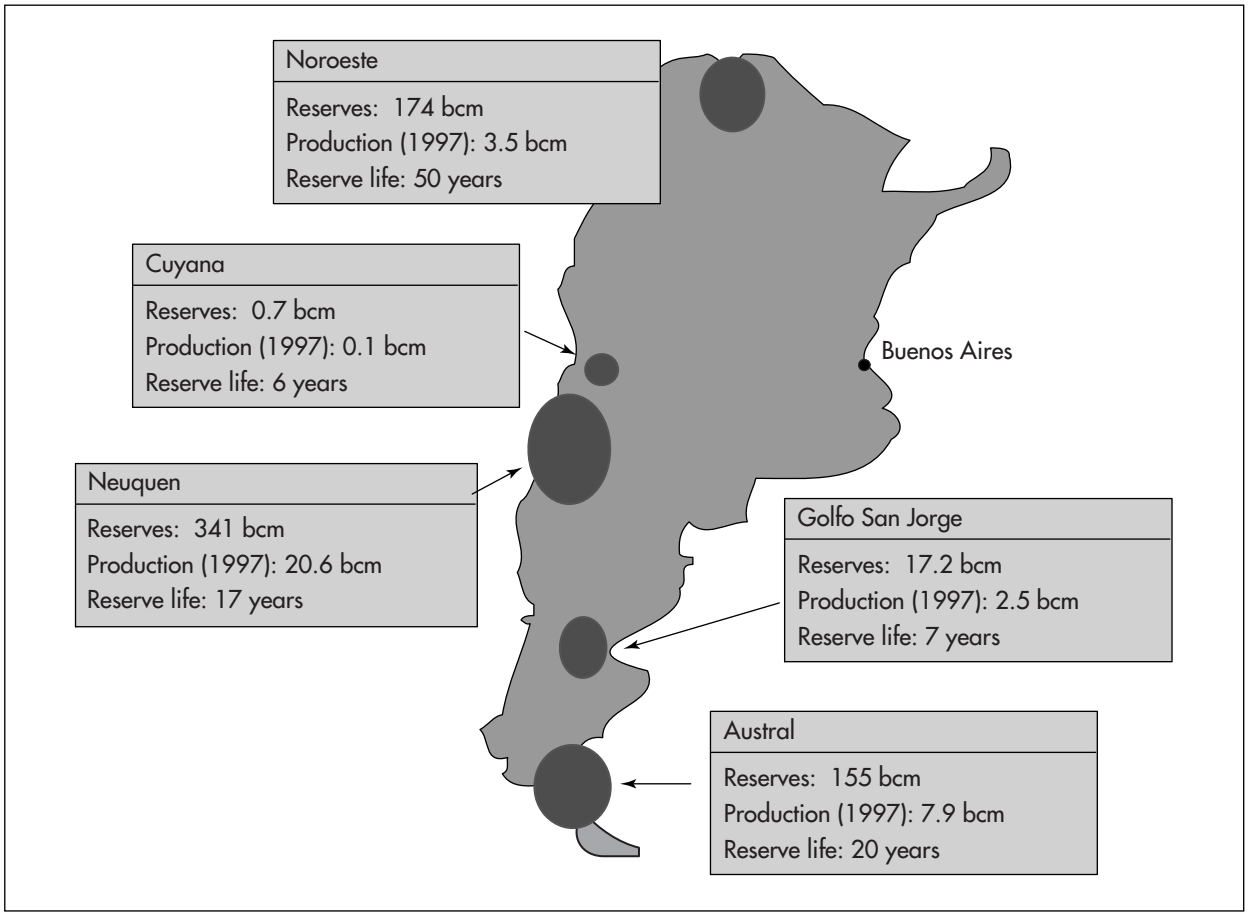
Source: Enargas, *Datos Operativos de las Licenciatarias de Gas (Monthly Bulletins)*.

SUPPLY OF NATURAL GAS

Most of Argentina's gas reserves have been discovered as a result of oil exploration. There are 19 known sedimentary basins in the country, ten of which are located entirely onshore, three entirely offshore and six straddling the Atlantic coastline. Production is currently limited to five basins and three regions: Noroeste in Northern Argentina; Neuquen and Cuyo in Central Argentina; and Golfo San Jorge and Austral in Southern Argentina. These basins account for around a third of the total acreage of known sedimentary basins. Figure 8 shows the location of these basins and data concerning proved reserves, 1997 production levels and the remaining reserve life. The Neuquen Basin accounts for almost 60% of current gas production and 50% of proved reserves. In total, remaining reserves amount to 688 billion cubic metres (bcm), equivalent to 20 years at current production levels. There is considerable potential for additional gas (and oil) reserves given that there are 14 sedimentary basins that have not yet been explored.

The national transmission network comprises five high-pressure pipeline systems, three of which bring gas from the Neuquen/Cuyana Basins in the West while the other two connect the Austral Basin in the South and the Noroeste Basin in the North. All five systems link into the Greater Buenos Aires market. At the end of 1997, the Argentine network included 11 720 km of high pressure lines and 42 compressor stations. In addition, export pipelines have been developed or are being developed to serve new markets in Chile, Brazil and Uruguay:

Figure 8 Natural Gas Producing Basins in Argentina



Source: Secretariat of Energy.

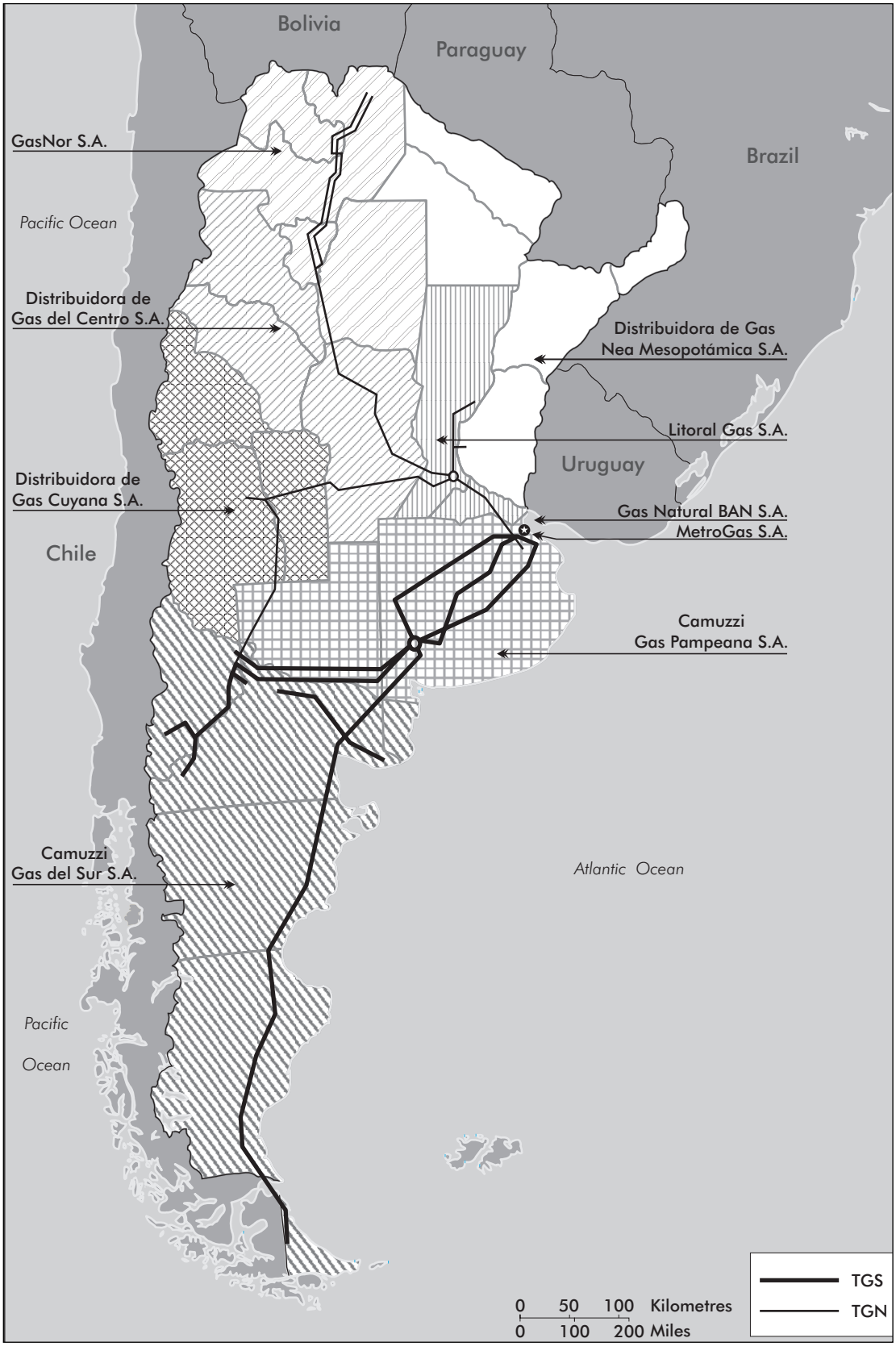
- *Chile:* Two lines to Chile were commissioned in 1997: the 7 bcm/year 460 km GasAndes line from the Neuquen Basin to Santiago, and the 1 bcm/year 50 km Methanex line from Tierra Del Fuego to Cabo which supplies a methanol plant. A 3 bcm/year 940 km line in Northern Argentina, Gasoducto Atacama, is under construction and is due to enter into service in 1999.

- *Uruguay:* A 4.5 bcm/year link from Buenos Aires to Montevideo is under construction. There are plans to extend the line to Porto Alegre in Brazil to supplement gas supplied through the Bolivia-Brazil line currently being built.

Figure 9 details the routes of the national and export transmission systems, and export lines under construction. Section 6 outlines planned export projects and other regional pipeline projects in operation, under construction or planned.

There are no underground storage facilities in Argentina, though a number of projects to develop aquifers and depleted gas fields for storage use are being studied. BAN, the distribution company in Northern Buenos Aires, operates the country's only LNG peak-shaving plant located at Gral Rodriquez near the capital. A second plant close to Buenos Aires is planned.

Figure 9 Map of Argentine Gas Transmission Infrastructure



MARKET PROSPECTS

The Secretariat of Energy forecasts that gas demand will continue to grow in the medium term. Rates of growth are expected to be highest in power generation and for CNG. Aggregate demand is forecast to increase at an average annual rate of 3.7% to 2010 (see Table 2). The per capita annual consumption of gas is expected to increase from 754 cubic metres now to 1 083 cubic metres in 2010.

Table 2 Demand Projections for Natural Gas by Sector (Billion cubic metres)

	1996	2000	2002	2005	2010	1996/2010 annual increase (%)
Residential	5.941	6.849	7.311	8.062	9.265	3.2
Commercial and Public	1.323	1.532	1.616	1.750	2.015	3.0
Industry	9.447	11.629	12.397	13.646	15.771	3.7
Power Plants	8.572	11.124	11.828	13.375	15.062	4.1
Transport	1.092	1.333	1.460	1.673	2.043	4.6
Total	**26.375**	**32.467**	**34.611**	**38.506**	**44.156**	**3.7**

Source: Argentine Secretariat of Energy, *Prospectiva 1997* (November 1997).

IV. NATURAL GAS SECTOR POLICY AND REGULATION

NATURAL GAS SECTOR RESTRUCTURING AND REGULATORY REFORM

The 1992 Natural Gas Act introduced sweeping changes to downstream gas sector policy and regulation in Argentina. Previously, the gas industry was completely monopolised, owned by the state and regulated directly by the Energy Secretariat in the Ministry of Economy, Public Works and Services. The Act, in conjunction with several decrees — notably 11.739/92 — and asset-transfer agreements, provided for the restructuring and privatisation of the industry and the establishment of a new system of regulation (summarised in Table 3). Key elements included the following:

- The integrated monopoly gas transmission and distribution company, Gas del Estado (GdE) was reorganised on a broadly geographical basis and privatised. The company was split into two high pressure transmission companies, Transportadora de Gas del Sur (TGS) and Transportadora de Gas del Norte (TGN), and eight medium/low-pressure distribution companies. A ninth distributor covering northeast Argentina has since been established and licenced. The break-up of GdE was designed to promote a degree of competition between the two transmission companies by giving both of them access to different sources of gas and to the main market centres, particularly Buenos Aires. A majority of the shares in TGN, which transports gas through two pipeline systems in the north, TGS, which operates three pipeline systems in the south, together with most of the distributors was sold to private investors in December 1992. Residual government holdings in these companies are being sold off gradually.

- An independent regulatory authority for gas, Ente Nacional Regulador del Gas (Enargas), was created and made responsible for enforcing the provisions of the Natural Gas Act, applicable regulations and the licences of the privatised companies. A primary function of Enargas is to regulate the tariffs (rates) of the transmission and distribution companies, which are regarded as natural monopolies.

- An open-access regime for the entire transmission and distribution network (except upstream gas gathering lines owned by producers) was established. Existing transmission capacity was initially assigned to the distribution companies under ten-year contracts giving them the right to gradually reduce their capacity reservations by up to 60%. Transmission companies are not allowed to trade in gas and must offer transmission services to customers (distributors, end-users and traders) on a non-discriminatory basis. In addition, gas producers, storage companies, traders and consumers who contract for purchases of gas directly with producers may not own a controlling stake in a transmission or distribution company. Distributors are not allowed to

hold a controlling stake in a transmission company, and vice versa. These ownership restrictions were put in place to prevent discrimination and market dominance.

- The distribution companies' retail monopoly was restricted to customers using less than 10 000 cubic metres/day. Larger consumers (for the most part industrial end-users and power generators) connected to the local distribution network can now choose between the previous bundled service provided by the distributor or arranging its own supply. The latter option involves purchasing gas directly from producers and contracting for transmission services from TGS or TGN. In this case, the customer can choose either to build a line to connect with the high-pressure transmission pipeline physically "bypassing" the distribution network, or to negotiate access to the local distribution network. In the case of physical bypass, the end-user must inform the local distributor and Enargas of its intention to build a direct connection six months in advance and must respect the technical requirements laid down by Enargas.

- Prices at the wellhead in wholesale transactions between producers and distributors or traders and to end-users above 10 000 cubic metres/day were completely decontrolled from 1 January 1994[5].

- Exclusive rights to specified geographic areas were granted to the distribution companies but not to the transmission companies. Thus, a new market entrant may build a competing high-pressure line anywhere in the country but may not build medium- or low-pressure distribution networks in areas covered by a licensed distributor.

- A system of licensing administered by Enargas was set up for public gas transmission and distribution, and trading/brokering. The ultimate authority for issuing licences rests with the Federal Government. Licences to operate existing systems were issued to the transmission and distribution companies for a term of 35 years, though the Act allows the Government to renew them for an additional term of 10 years based on an evaluation of their performance and a recommendation by Enargas. The Act requires that, at the end of the 35- or 45-year term, a competitive tender be held for the licence; the incumbent will have the option of matching the best bid made by a third party. The licences specify certain rights and obligations, including general terms and conditions of service and operating and safety standards. The licences provide for a system of penalties, including fines up of to $500 000 assessed by Enargas.

  Another key step in the process of restructuring the Argentine gas industry was the removal in 1989 of the exclusive rights in exploration and production held by the then monopoly oil and gas producing company, YPF, and its subsequent privatisation. To further stimulate competition in the upstream, YPF was also required to sell off around a third of its oil and gas reserves (under decree 1055/89). The initial public offering — the fifth largest ever — on the Buenos Aires, New York and other stock markets raised just over $3 billion. By the end of 1993, the Argentine Government retained a shareholding of just over 20%, while provincial authorities held close to 5%. At the end of 1998, the Federal Government announced plans to sell off three-quarters of its 20% residual share holding.

5. In the interim two-year period to 31 December 1993, the wellhead price was set at 97 cents/Mbtu, which had been the regulated price since 1991.

Table 3 Restructuring of the Argentine Gas Industry

	Before 1992 restructuring	Today
Production	YPF	Several producers: around 35 operating companies, including YPF, at end-1997
Transmission	Gas del Estado	2 companies: TGN (2 pipelines in the north) and TGS (3 lines in the south)
Distribution		9 companies (8 immediately after restructuring; the ninth was created in 1997)
Regulatory responsibility	Secretariat of Energy	Secretariat of Energy & Enargas

Role, Responsibilities and Functioning of Enargas

Enargas, established under the 1992 Natural Gas Act, is an autonomous entity responsible for regulating the gas industry under the Act, associated decrees and licenses. Enargas is governed by a board of five full-time directors appointed by the Federal Government. It operates within the framework of the Ministry of Economy, Public Works and Services and has broad authority to regulate the operations of the transmission and distribution companies, including setting rates.

Enargas has its own budget, which is included in the Argentine National Budget. Funding is derived largely from control and inspection fees levied on the regulated companies and allocated proportionately to each company based on their gross revenues from regulated activities. Enargas also collects any fines imposed for violations of the Natural Gas Act and company licences.

Enargas's objectives, set out in the 1992 Act, include:

- Protecting consumer interests.
- Promoting competition in gas supply.
- Encouraging long-term investment in the network.
- Setting just and reasonable tariffs for transmission and distribution.
- Ensuring there is no discrimination in the provision of transmission and distribution services.

EXPLORATION AND PRODUCTION

Legal and Fiscal Framework

The legal and fiscal framework for upstream activities in Argentina is the 1967 Hydrocarbons Law (17.319) and subsequent associated decrees. Several decrees since 1989 have sought to minimise regulation of upstream activities to encourage exploration and production. These decrees have removed restrictions on imports and exports of oil and gas, eliminated wellhead price controls, obliged YPF to surrender production interests and removed the company's exclusive rights over exploration and production. The Government has also taken steps to encourage foreign investment in the upstream and downstream oil and gas sectors and to reduce taxation and royalties.

Plan Argentina

A 1991 decree (2178) established new arrangements for bidding for and licensing exploration acreage, known as Plan Argentina. The plan covers 150 offshore and onshore areas in 14 sedimentary basins and provides for bids to be submitted for permits covering outstanding acreage on the last working day of every other month. Each bid must contain documentation concerning the experience and credit-worthiness of the bidding company. On this basis, the Secretariat of Energy decides on qualification and approves a programme of work, including an initial surveying phase lasting no more than three years for onshore areas and four years for offshore areas. The second and third phases involve drilling at least one exploratory well in each phase. Failure to comply with these terms results in the cancellation of the permit and the reversion of exploration rights back to the state. In the event of two or more qualifying companies bidding for the same area, the Secretariat applies a formula to determine the best bid based on the amount of work proposed and the speed with which it is to be carried out.

The previous exploration licensing regime, known as Plan Houston, stimulated limited interest. Most of the Houston licences have either reverted back to the Federal Government or are in the process of reversion.

New Hydrocarbons Bill

In 1995, the Government drafted a new Hydrocarbons Bill aimed at establishing a more stable legal and fiscal framework for exploration and production in Argentina and limiting the market dominance of YPF. This Bill was approved by the Upper House of Parliament, but more pressing issues prevented its consideration in the Lower House. The bill subsequently lapsed, but it has recently been resubmitted to Parliament. Its main features, which are supported broadly by both domestic and foreign oil and gas companies, are as follows:

- Devolution of federal government administration of the upstream oil and gas industry to the provinces, who would be given increased powers to set and collect taxes and royalties (up to a ceiling of 12%) and to manage licensing of exploration acreage that has not already been licensed by the Federal Government.

- The creation of a regulatory agency, to be known as Ente Federal de Hidrocarburos (EFH), to regulate the industry at the federal level.

- Incentives for exploration in frontier areas outside the five basins currently in production. Incentives include increasing the length of exploration periods, reducing relinquishment obligations and reviewing royalties.

- Improved rents for landowners at oil and gasfield sites.

- Environmental and consumer-protection regulations.

- The creation of a strategic oil reserve.

- Limitations of oil companies' share of the domestic oil products market. YPF currently supplies over half of the market.

DOWNSTREAM SECTOR

Transmission and Distribution Tariff Setting

General Principles

The Natural Gas Act, together with the licencing of the transmission and distribution companies, sets out the basis for determining the level and structure of tariffs (rates). Tariffs for each company must be determined by Enargas on the basis of the cost of providing service plus a reasonable rate of return on assets relative to the rate of return of businesses facing comparable risk. Also taken into account are the degree of efficiency achieved and the performance of the company in providing the service. Cross-subsidies among customer categories are not permitted. The Act further specifies the application of a price cap methodology with adjustments every six months for inflation, and efficiency and investment factors:

- *Inflation:* Transmission and distribution companies are permitted to adjust their tariffs every six months to reflect inflation as measured by changes in the US producer price index of industrial commodities (PPI).

- *Efficiency (x) factor:* This factor, reviewed every five years, provides for a reduction in tariffs as costs are reduced through improved efficiency, allowing both the company and customers to share in the gains. The company is given an incentive to lower costs because the factor, and the tariffs based on it, are established five years in advance. The factor is derived from estimated cost savings potential and is not adjusted during the five year period according to actual cost savings.

- *Investment (k) factor:* Also set in advance for a five year period (in parallel with the efficiency factor), the k factor is intended to permit an increase in tariffs to compensate companies for certain investments made during the relevant five year period. These investments include steps taken to improve the efficiency, safety or reliability of the system and to expand the system where profitable (though the Natural Gas Act does not define this last condition precisely). Enargas may propose the investments at its own initiative or they may be proposed by the companies for inclusion in the k factor subject to approval by Enargas. The companies are not required to undertake these investments, but the k factor tariff increases are dependent on their doing so. The companies may apply to Enargas for a tariff increase during the five-year period to cover proposed investments to expand capacity when the associated costs (over-and-above those already accounted for in the investment factor) cannot be recovered by the existing tariffs.

In addition to these periodic tariff adjustments, Enargas may on occasion approve other adjustments to reflect certain cost variations, such as those resulting from changes in taxes (other than income tax). All tariffs are determined in US dollars and converted into pesos at the time the customer is billed at the exchange rate laid down in the Convertibility Law (currently $1=1 peso).

Transmission Tariffs

The transmission companies, TGN and TGS, are required to publish tariffs for firm and for interruptible services:

- The tariff for firm service must consist of a monthly capacity reservation charge per cubic metre per day of reserved capacity. The transmission company may, if it so wishes, offer discounts but may not at any time charge a higher tariff than that set by Enargas under the price-cap formula. The transmission company bills the customer for the maximum daily amount of reserved capacity regardless of actual usage.

- The tariff for interruptible service must be expressed as a fixed non-discountable charge per 1 000 cubic metres/day of gas actually transported. It must be equivalent to the unit rate of the reservation charge for the firm service, assuming a load factor of 100%[6]. Interruptible service is only available for deliveries in excess of 3 million cubic metres (mcm)/year.

For both firm and interruptible service, the customer must provide to the transmission company on delivery a natural gas in-kind allowance, expressed as a percentage of the gas to be transported, equivalent to the gas consumed or lost in providing the service (demand charge). In other words, the shipper must deliver to the transmission company more gas to cover fuel and losses. All charges vary according to the zone in which gas is injected into the system and the zone at which it is withdrawn (see Table 4).

Table 4 Transmission Tariffs for Delivery to Greater Buenos Aires[1], effective 1st half 1998

Receipt point	Firm[2] ($/m³/day)	Interruptible[3] ($/1000 m³/day)	Compression fuel and losses[4] (%)
TGS system:			
Tierra del Fuego	0.950	31.664	11.27
Santa Cruz Sur	0.869	28.969	10.78
Chubut	0.626	20.885	8.38
Neuquen	0.566	18.897	4.86
TGN system:			
Salta	0.707	23.563	5.20
Neuquen	0.574	19.157	4.86

Notes: 1. See Appendix B for transmission tariffs for delivery to other delivery points.
2. Monthly charge for every cubic metre per day of reserved capacity.
3. Charge for actual volumes transported.
4. Maximum percentage of volume of gas transported that customers are required to replace in-kind to make up for gas used by the transporter for compressor fuel and losses incurred in providing the service.

Source: Enargas Resolutions 555/98 and 556/98.

6. For example, given a monthly capacity reservation charge of $1/cubic metre/day, the total annual cost or reserving 1 cubic metre/day is $12. For a load factor of 100% (i.e. constant full use of reserved capacity with no daily or seasonal load variation), the cost for gas actually transported is $12/365 = 3.29 cents/cubic metre. Thus, the interruptible charge in this example would be $32.9/1 000 cubic metres.

Distribution Tariffs

Distributors are also required to publish standard tariffs for specific customer categories and types of service. The tariff structure, shown in Table 5, with illustrative current tariffs for Metrogas which distributes gas in central Buenos Aires, is the same for all distributors, although actual tariffs vary slightly among distributors. Residential customers and CNG providers pay a fixed monthly charge and a charge for volumes actually consumed. All other customers pay a fixed monthly charge, a capacity-reservation charge and a demand charge

Table 5 Distribution Company Tariff Structure and Metrogas Tariffs, effective 1st half 1998

Customer category	Fixed monthly charge($)	Monthly capacity charge ($/m^3/day)	Demand charge ($/m^3)	Minimum bill ($/month)
Residential: R	**77.930**	**N/A**	**0.143**	**13.388**
General business:				
P (<1 000 m^3/day)				
0 – 1 000 m^3/month	11.328	N/A	0.133	13.388
1 001 – 9 000 m^3/month	11.328	N/A	0.124	13.388
> 9 000 m^3/month	11.328	N/A	0.115	13.388
G (>1 000 m^3/day)				
0 – 5 000 m^3/month	11.328	1.066	0.081	N/A
> 5 000 m^3/month	11.328	1.066	0.074	N/A
Large users:				
Customers connected to distribution grid:				
Firm - FD (> 10 000 m^3/day)	11.881	0.654	0.076	N/A
Interruptible - ID (> 3 mcm/year)	11.881	N/A	0.076	N/A
Customers connected to high-pressure lines:				
Firm - FT (> 10 000 m^3/day)	11.881	0.600	0.069	N/A
Interruptible - IT (> 3 mcm/year)	11.881	N/A	0.069	N/A
Other users:				
Imbedded local distributors - SDB	11.323	N/A	0.087	N/A
CNG - GNC	11.323	N/A	0.090	N/A

Source: Enargas Resolution 557/98.
N/A = not applicable.

for gas consumed. There are four different sets of tariffs for commercial, industrial and power-sector customers according to consumption level: P, G, FT/IT and FD/ID. The FT/IT tariffs for large users apply to customers supplied directly off the transmission system. Large consumers with annual consumption of more than 3 million cubic metres (mcm)/year can opt for firm (FT or FD) or interruptible (IT or ID) supply; in the latter case, they do not pay the capacity reservation charge. There is a separate tariff for small embedded local distributors.

Under the Natural Gas Act, distributors are permitted to pass gas-purchase costs and TGS/TGN transmission charges on to end users. The terms of all gas supply contracts, including price escalation but not the base price, are subject to approval by Enargas. The distribution companies submit information to Enargas concerning their gas purchase costs every six months, covering the winter and summer seasons. Enargas calculates the weighted average price which, in principle, the distribution companies recover directly in their final sales tariffs. The costs of local distribution and a reasonable return on capital are recovered in a gross margin, which is regulated by Enargas on a cost-of-service basis taking account of business risk, as for transmission tariffs. In practice, Enargas conducts public hearings at which consumer groups are represented and express their views. Enargas must approve tariff adjustments to take account of changes in gas costs on a six-monthly basis.

Disputes have arisen between Enargas and the distributors over passing gas costs on to consumers. In 1994 and 1995, Enargas rejected requests by the distributors to pass on the full increase in gas costs at the wellhead, on the grounds that the distributors did not attempt to minimise their purchase costs. Enargas eventually approved the tariff increases in the Winter 1996 review. This dispute prompted the Government to issue a decree (1020/95) setting up a pass-through mechanism to encourage distributors to minimise their gas acquisition costs through spot wholesale purchases. The mechanism, which distributors can opt to use or not, allows distributors to share half of any savings in short-term gas purchases compared to a reference price established by Enargas on the basis of observed transactions for each six-month period. This reference price is different from the weighted average gas price paid for all gas supplies under both long- and short-term contracts. Conversely, distributors who opt to use this mechanism can pass on to customers only half of any higher short-term gas purchase costs relative to the reference price. Both reference and average basin prices are made public between the seasonal adjustment hearings. Until recently, most distributors have chosen not to participate in the mechanism, for fear that they would be penalised if their costs exceed the reference price. Short-term gas trading only started on a significant scale in 1997.

Another dispute emerged over the weighting of gas bought from different supply basins in calculating average purchase costs. At first, the permissible pass-through of average gas costs for each distributor was based on the weighting of costs of supplies from different basins fixed for the full five-year review period (1993 to 1997). In 1995, Enargas initially rejected the passing on of the part of the increased costs proposed by two distributors, Pampeana and Sur (both majority owned and operated by Camuzzi). The increases were caused by a shift in supplies towards the more expensive Neuquen Basin. Enargas subsequently decided

to allow the average weighted cost of transport and cost of gas to vary over time with changes in the breakdown of firm gas supplies from different basins. This approach, known as "variable weights", does not reduce incentives for the distributors to seek out the cheapest supplies, but it does give the companies a cost advantage in selling gas to the unregulated sector when wellhead prices are rising. This is because the higher cost of incremental supplies is spread across both regulated and unregulated customers[7]. The variable-weights approach has nonetheless been deemed more equitable because the fixed-weights approach exposes the regulated distributors to significant financial risk.

1997 Five-year Tariff Review

The new regulatory framework came into effect on 28 December 1992. The initial tariffs for transmission and distribution were established on the basis of standard industry operating and maintenance costs derived from international benchmarks, and mandatory investment programmes drawn up for 1993-1997. Stone and Webster, a US firm of engineering consultants, advised the Government on costs and investment needs. All companies were required to invest the amounts specified in the mandatory programmes. Any underspending would have been paid over to Enargas as a fine, though no company was in practice penalised. The efficiency and investment factors were set at zero for the whole of the initial five-year review period.

The first tariff review, involving an adjustment of the efficiency (x) and investment (k) factors, was launched in 1996 and the new factors took effect at the beginning of 1998[8]. Enargas set the real weighted average cost of capital at 11.3% per annum for the transmission companies and 13.1% for the distribution companies as the basis for calculating the x and k factors. In determining the x factors, Enargas adopted an approach with two elements:

- The average reduction in costs that each company would achieve if it introduced specific efficiency programmes. Enargas assessed this potential on the basis of proposals by the companies.

- An estimate of the overall potential for efficiency gains in the gas industry as a whole. Enargas commissioned the consulting firm NERA to undertake an historical study of unit production cost reductions in the gas industry and in Argentine industry generally and to derive the

7. There is a great deal of literature on the incentive effects of pass-through regulation. For discussion of the issue in the Argentine context, see Navajas, *Effects of Passthrough Pricing Rules on Gas Purchase Decisions from Different Basins* (Economics Department Paper 9, Universidad Nacional de La Plata, Argentina, August 1998) and Artana, Navajas and Urbiztondo, *Regulation and Contractual Adaptation in Public Utilities : The Case of Argentina* (Inter-American Development Bank, Washington, July 1998).

8. The 1992 Natural Gas Act lays down a schedule for the proposal and discussion of the x and k factors, and public hearings are required before Enargas makes a final decision.

efficiency improvement that would be needed for the gas industry to catch up with other sectors. NERA estimated the difference between 1970 and 1995 at about 2% per year. The difference was higher for the transportation sector and lower for distribution. This estimated potential, which included actual efficiency gains already achieved over the previous review period, was halved so as to allow the companies to share the benefits of lower costs with consumers.

The k factors were set on the basis of specific investment proposals by the companies and an evaluation by Enargas of their necessity and profitability. Enargas approved about 70% of the programmes proposed by the companies.

The final x factors set by Enargas for the full five-year period are shown in Table 6. They were all applied in a one-off fashion at the start of the period, by calculating the net present value of applying them in a gradual way over the five years. The k factors, to be applied on a six-monthly basis from the second half of 1998 in line with actual investments, vary according to service category, period and delivery zone (see Table 7).

Table 6 Efficiency (x) Factors for Transmission and Distribution Companies, 1998 to 2002 (%)

Company	x factor[1]
Transmission:	
TGS	6.5
TGN	5.2
Distribution:	
Cuyana	4.8
BAN	4.8
Metrogas	4.7
Litoral	4.7
Centro	4.7
Sur	4.6
Pampeana	4.5
Gasnor	4.4

Notes: 1. Applied 100% at beginning of review period for all companies.
Source: Enargas.

Some of the companies were unhappy with the tariff review and specifically with the x factors set by Enargas, because of the basic methodology used to calculate the potential for efficiency gains, the magnitude of the resulting x factors and the fact that they were applied entirely at the start of the review period rather than evenly every six months. TGS filed a petition with Enargas in August 1997 challenging the regulator on a number of issues. The company later withdrew the petition while maintaining its position.

Table 7 Investment (k) Factors for Transmission and Distribution Companies, 1998 to 2002 (%)

Company and Service			1998		1999		2000		2001		2002	
			1st Half	2nd Half	1st Half	2nd Half	1st Half	2nd Half	1st Half	2nd Half	1st Half	2nd Half
Transmission												
TGS:	S. Cruz South		–	0.03	0.01	0.82	–	–	–	–	–	–
	Chubut South		–	0.07	1.79	0.82	–	–	–	–	–	–
	B.A. South		–	0.08	1.87	0.82	–	–	–	–	–	–
	B. Blanca		–	0.08	1.87	0.82	–	–	–	–	–	–
TGN:	Salta		–	0.84	0.52	0.74	0.46	–	–	–	–	–
	Tucuman		–	1.74	0.61	0.82	0.55	–	–	–	–	–
	Central		–	1.85	0.65	0.87	0.58	–	–	–	–	–
	Litoral		–	1.83	0.64	0.86	0.57	–	–	–	–	–
Distribution												
Cuyana:		– R	–	0.02	1.63	0.01	0.11	0.03	0.07	–	0.72	–
		– P	–	0.02	1.56	0.01	0.11	0.03	0.07	–	0.69	–
BAN:		– R	–	0.34	0.28	0.14	0.06	0.07	0.03	0.03	0.01	–
		– P	–	0.27	0.23	0.11	0.05	0.06	0.02	0.03	0.01	–
Metro[1]:		– R	–	0.57	0.54	0.51	0.48	0.45	0.42	0.40	0.357	0.35
		– P	–	0.41	0.39	0.37	0.35	0.33	0.31	0.29	0.27	0.26
Litoral:		– R	–	0.48	2.89	2.85	0.45	0.35	0.33	0.24	0.23	0.21
		– P	–	0.31	1.91	1.90	0.30	0.24	0.23	0.16	0.15	0.14
Centro[1]:		– R	–	0.18	0.41	0.41	0.27	0.11	0.07	0.11	0.11	–
		– P	–	0.16	0.34	0.33	0.22	–	0.06	–	–	–
Sur1:	BAS.	– R	–	3.89	3.89	–	–	–	–	–	–	–
		– P	–	5.14	5.08	–	–	–	–	–	–	–
	S.Cruz	– R	–	1.17	–	–	–	–	–	–	–	–
		– P	–	1.32	–	–	–	–	–	–	–	–
	T. del F	– R	–	3.20	–	–	–	–	–	–	–	–
		– P	–	3.22	–	–	–	–	–	–	–	–
Pamp.:	North	– R	–	9.87	9.87	–	–	–	–	–	–	–
		– P	–	8.80	8.89	–	–	–	–	–	–	–
		– CNG	–	11.49	11.33	–	–	–	–	–	–	–
	BA & B.Blanca		–	–	–	–	–	–	–	–	–	–
Gasnor:	Salta	– R	–	1.99	1.99	–	–	–	–	–	–	–
		– P	–	1.89	1.90	–	–	–	–	–	–	–
		– CNG	–	2.37	2.36	–	–	–	–	–	–	–
	Tucum.	– R	–	2.63	2.63	–	–	–	–	–	–	–
		– P	–	2.31	2.32	–	–	–	–	–	–	–
		– G	–	2.53	2.43	–	–	–	–	–	–	–
		– CNG	–	2.99	2.98	–	–	–	–	–	–	–

1. Provisional
Note: R = residential; P = small business.

Source: Enargas

Transmission Capacity Trading

In 1997, Enargas issued a resolution (419/97) aimed at creating a secondary market in transmission capacity. The transmission companies are required to establish and maintain an electronic bulletin board system along the lines of the capacity-release markets in the United States, to enable holders of firm capacity with TGS and TGN to release any unwanted capacity for a specified period. Prices are to be determined by market forces, capped by the maximum tariffs for primary capacity regulated by Enargas. This cap is designed to discourage the distributors from deliberately over-booking capacity to sell on the secondary market at a profit. However, Enargas may approve a "grey-market" transaction involving a bundled service (capacity plus gas supply) which implicitly prices capacity at above the regulated tariff. In view of the lack of initial activity in this market, Enargas is considering whether to remove the price cap[9] and whether to take further action to stimulate trade.

GAS EXPORTS

The extension of the Argentine pipeline system to export markets has raised the issue of pricing of pipeline services. Enargas is inclined to adopt the principle of rolled-in pricing, whereby the additional cost of extending a pipeline over the border is included in the overall cost base for calculating minimum revenue needs and rates for all customers (including existing Argentine customers). In this way, existing pipeline customers share the cost of providing capacity for new customers. This is in line with the approach adopted in the United States and Canada. It matches the approach to pricing of transmission and distribution services in the domestic market, where charges to all customers may be increased by the k factor to remunerate the pipeline companies for system expansion to meet demand growth.

In July 1998 the Secretariat of Energy issued a resolution laying down the administrative procedures and conditions for issuing natural gas export licences. The objective of the resolution is to balance concerns about ensuring adequate domestic supplies with the benefits of international free trade. Long-term and short-term export authorisations are permitted. The former cover exports for longer than two years and with volumes in excess of an initially-determined level of 100 000 cubic metres/day. Short-term authorisations cover export transactions of less than two years or longer than two years but with volumes which do not exceed 100 000 cubic metres/day.

Licence applications must be accompanied by specific information concerning the contractual terms of exports and technical characteristics concerning supply and transport, including:

- Origin and destination of the gas.
- Estimates of natural gas reserves in each well, area and basin from which the gas is supplied.
- Maximum and programmed quantities on a daily, monthly and annual basis.

9. Similarly in the United States, the Federal regulator, FERC, is considering removing the price cap on released capacity sales.

- Conditions of delivery, such as take-or-pay or deliver-or-pay.
- The contractual time period, price and formula for price adjustment.
- Details of the gas transport arrangements, including export point(s) from Argentina.

The Secretariat, and in particular the Under Secretariat for Fuels, is responsible for considering requests and issuing export licences. Opportunity is provided in the approval procedure for qualified "Interested Third Parties" to comment on export proposals and under certain circumstances to initiate a formal complaint procedure, which the Secretariat is required to act on quickly. Enargas is authorised to play an advisory role in formal complaint procedures and can opt to participate with the Secretariat of Energy in analysing specific cases.

Among the key general conditions for the authorisation of exports, contractual terms must be transparent and can not be more favourable than for buyers in the Argentine market. Other factors which Argentine authorities are specifically authorised to take into account include:

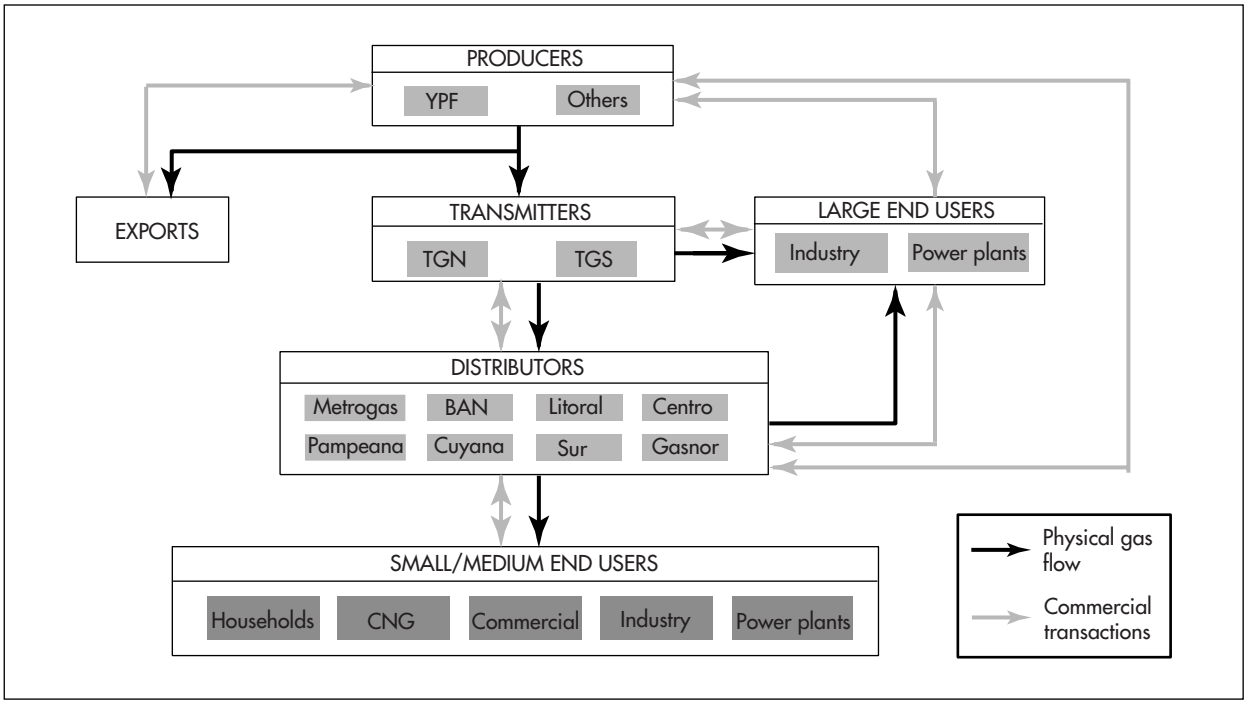
- Local supply and demand.
- The effects of the export transaction on production and transport capacities from the relevant basin in relation to domestic demands on that basin.
- The cost of transporting gas to the export market and its likely impact on netbacks and wellhead prices.
- The impact of exports on the internal market in the medium and long term.
- Information related to any similar contracts signed during the previous year.

V. IMPACT OF NATURAL GAS SECTOR REFORMS

INDUSTRY STRUCTURE

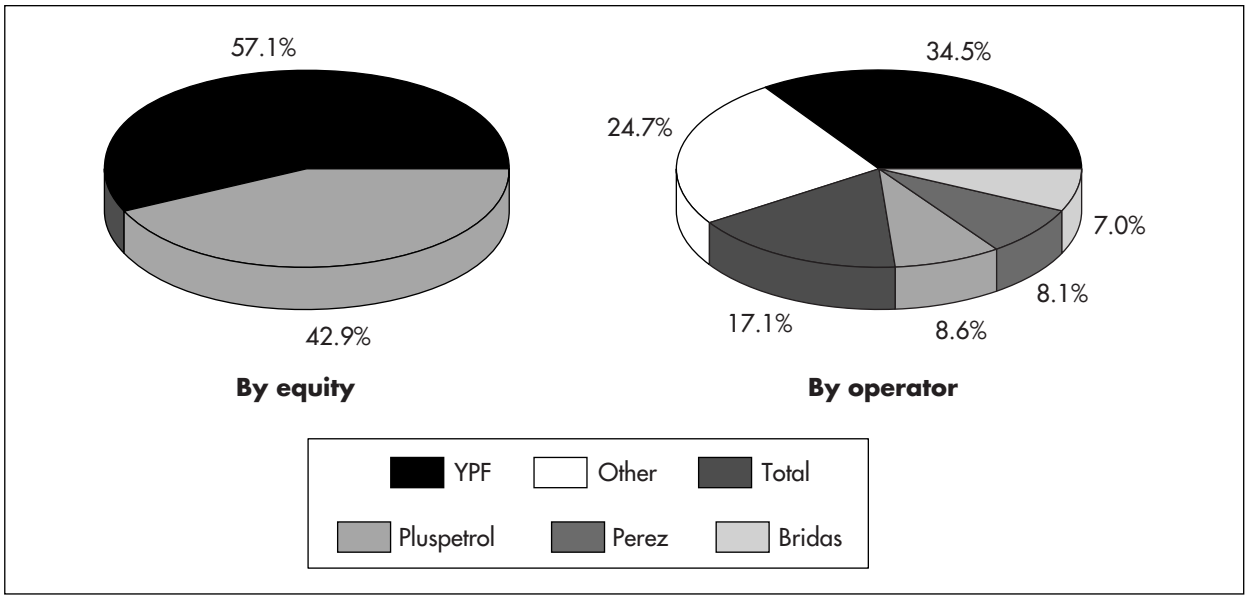
The unbundling and privatisation of the gas industry and subsequent mergers and acquisitions have led to considerable diversification in the structure of gas company ownership. Figure 10 summarises the current industry structure, commercial relationships and physical gas flows.

Figure 10 Gas Industry Structure



There are around 70 to 80 companies currently operating in the upstream petroleum industry in Argentina. YPF remains by far the largest gas producer, providing 58% of supply to the domestic market including imports from Bolivia (YPF is responsible for around two-thirds of imports). YPF's share of domestic gas output has declined slightly in recent years, from 62% in 1994 to 57% in 1997. As operator, YPF accounts for only 34% of output (see Figure 11), since a number of independent drilling companies that were formerly part of YPF operate fields on YPF's behalf. France's Total is the second largest producer in Argentina, with 17% of output as operator.

Figure 11 Natural Gas Production in Argentina by Company, 1997



Source: Secretariat of Energy.

The transmission and distribution companies have diversified ownership, with several North American and European gas companies holding important stakes and performing the task of technical operator. The status of company ownership at the end of 1996 is shown in Tables 8 and 9. In addition to the eight distribution companies created out of GdE in 1992, a ninth distributor, NEA Mesopotamica, was set up and licenced in 1997 to build and operate a distribution network in Northeast Argentina.

Table 8 Ownership Structure of Transmission Companies, end-1997

Licensee	**Private investors**		**State holding**	**Province holdings**	**Shared ownership program**
	Company	**%**	**(%)**	**(%)**	**(%)**
TGN	Gas Invest S.A.	70.00	–	–	5.00
	Tranco Gas Inv.	*22.28*			
	Inversora Catalinas	*22.28*			
	*Nova Gas Int.**	*20.60*			
	Petronas Argentina.	*18.29*			
	Others	*16.55*			
	CMS Gas Argentina Co.	25.00			
TGS	CIESA	70.00	–	–	3.00
	Perez Companc	*25.00*			
	Maipu Inversora	*25.00*			
	EPCA CIESA Inv.	*8.33*			
	*Enron Pi Co Arg**	*25.00*			
	Enron Arg CIESA Hold	*16.67*			
	Others	27.00			

* Technical operator.

Source: Enargas Annual Report 1997 (1998).

Table 9 Ownership Structure of Distribution Companies, end-1997

Licensee	Private investors		State holding	Province holdings	Shared ownership program
	Company	%	(%)	(%)	(%)
Metrogas	Gas Argentino S.A., owned by:	70.00	–	–	10.00
	*British Gas**	*41.00*			
	Naviera	*25.00*			
	Astra Capsa	*34.00*			
	Others	27.00			
Gas Natural BAN	Invergas S.A., owned by:	70.00	20.00	–	10.00
	*Gas Natural SDG**	*51.00*			
	Cia Gral de Combust.	*3.00*			
	Manra	*21.00*			
	Discogas Invest.	*25.00*			
Litoral Gas	Tibsa Inversora, owned by	90.00	–	–	10.00
	*Tractabel**	*53.00*			
	B.I.S.A.	*10.20*			
	Iberdrola	*17.00*			
	Argentina Invest Co.	*9.80*			
	Enagas Argentina	*10.00*			
NEA Mesopotamica	Bridas SAPIC	15.00	–	–	–
	Emprigas	15.00			
	Gas del Sur	55.00			
	Gaseba*	15.00			
Gasnor	Gascart, owned by:	90.00	–	–	10.00
	Jose Cartellone	*50.00*			
	*Gas de Santiago**	*50.00*			
Centro	Inversora de Gas del Centro, owned by:	51.00	–	–	10.00
	Louisiana Gas & Energy	*75.00*			
	*Italgas**	*25.00*			
	Louisiana Gas & Energy	*7.65*			
	Sideco Americana	21.60			
	Italgas	9.75			
Cuyana	Inersora de Gas Cuyana, owned by:	51.00	–	30.00	10.00
	Louisiana Gas & Energy	*24.00*			
	Sideco Amer. SACIIF	*51.00*			
	*Italgas**	*25.00*			
	Louisiana Gas & Energy	2.16			
	Sideco Americana	4.59			
	Italgas	2.25			
Camuzzi Gas Pampeana	Sodigas Pampeana, owned by:	70.00	20.00	–	10.00
	*Camuzzi Argentina**	*51.00*			
	Loma Negra	*18.09*			
	CNG International Corp.	*12.50*			
	Pacific Enterprises	*12.50*			
	Others	*5.91*			
Camuzzi Gas del Sur	Sodigas Pampeana, owned by:	90.00	–	–	10.00
	*Camuzzi Argentina**	*51.00*			
	Loma Negra	*18.09*			
	CNG International Corp.	*12.50*			
	Pacific Enterprises	*12.50*			
	Others	*5.91*			

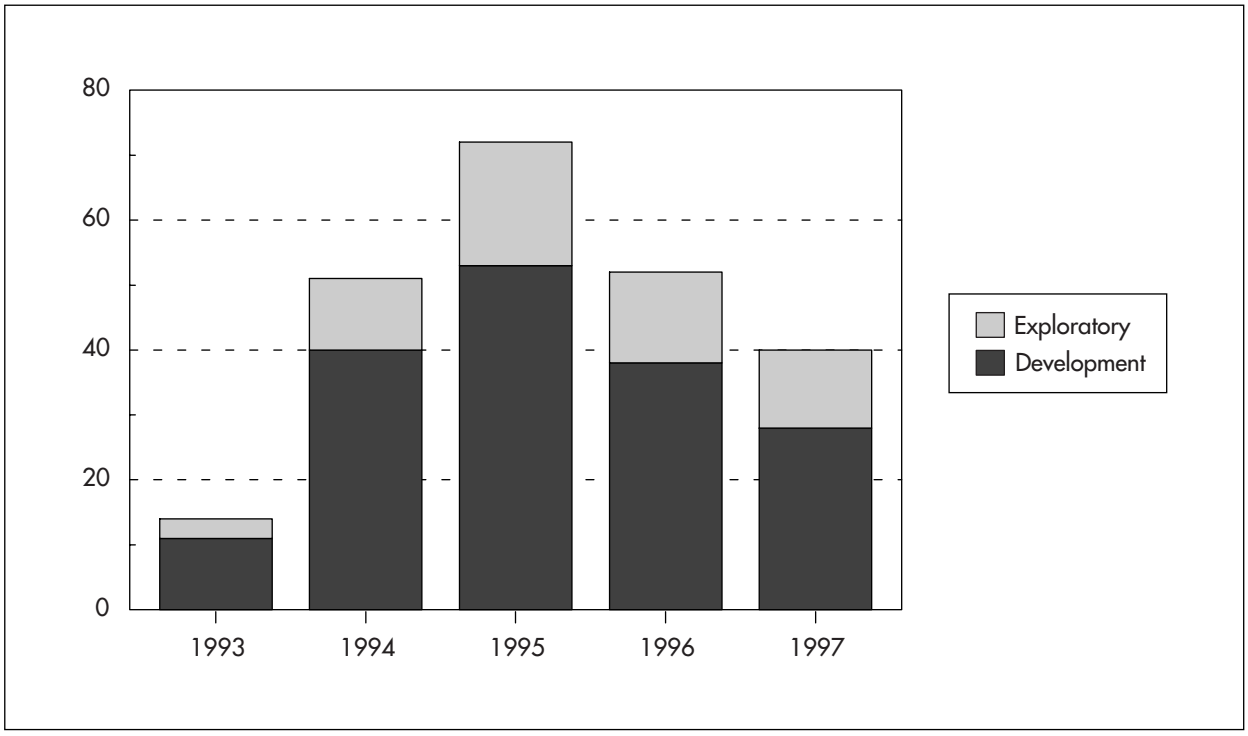
* Technical operator.

Source: Enargas Annual Report 1997 (1998).

UPSTREAM ACTIVITY

The restructuring of the upstream oil and gas sector had a positive initial impact on gas drilling activity and production. Drilling of development and, to a lesser extent, exploratory wells, surged in the early to mid-1990s from a total of 14 in 1993 to 72 in 1995, but these numbers fell in 1996 and 1997 (see Figure 12). Uncertainty over the legislative and fiscal regime (discussed in section IV), in addition to a levelling-off of wellhead gas prices, may explain the recent downturn in drilling rates.

Figure 12 Gas Wells Drilled, 1993 to 1997
(Number of wells)

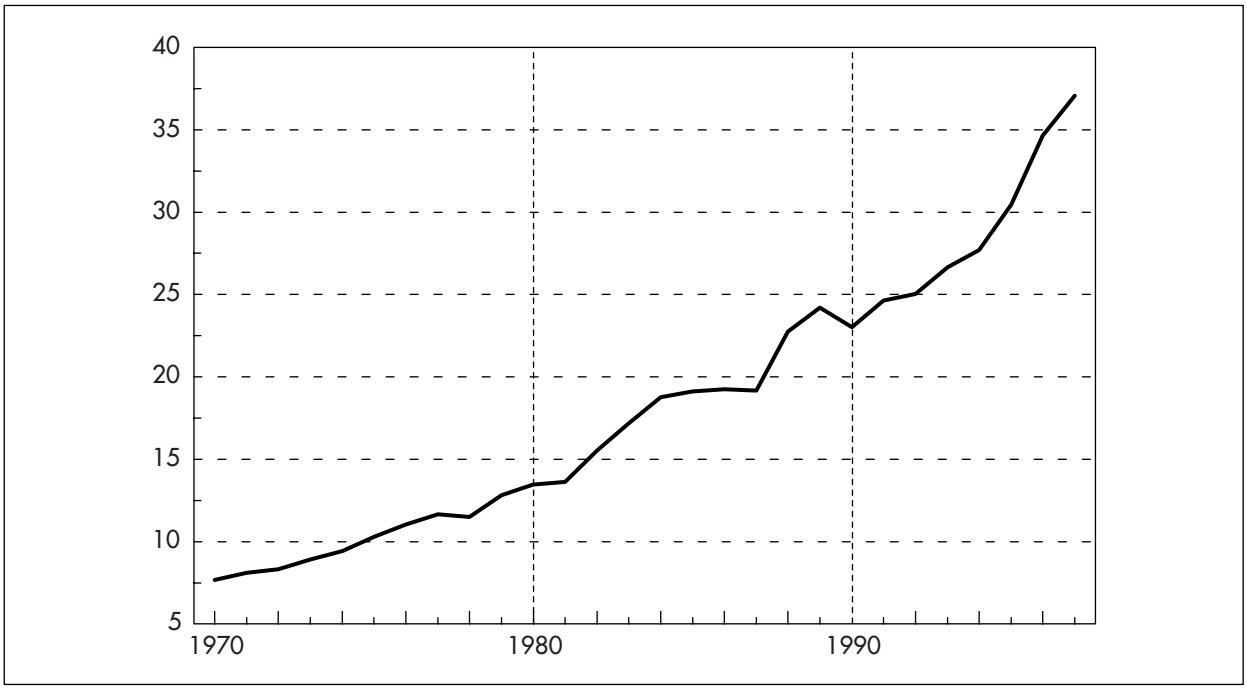


Source: Secretariat of Energy.

The impact of the increase in drilling over the last four to five years is reflected in the higher rate of growth of gas production since the early 1990s (see Figure 13). Production, which had levelled off at the end of the 1980s, increased by more than 60% over the period 1990 to 1997 to just over 37 bcm. The share of associated gas in total gas production has fallen steadily in recent years, to less than a third at present.

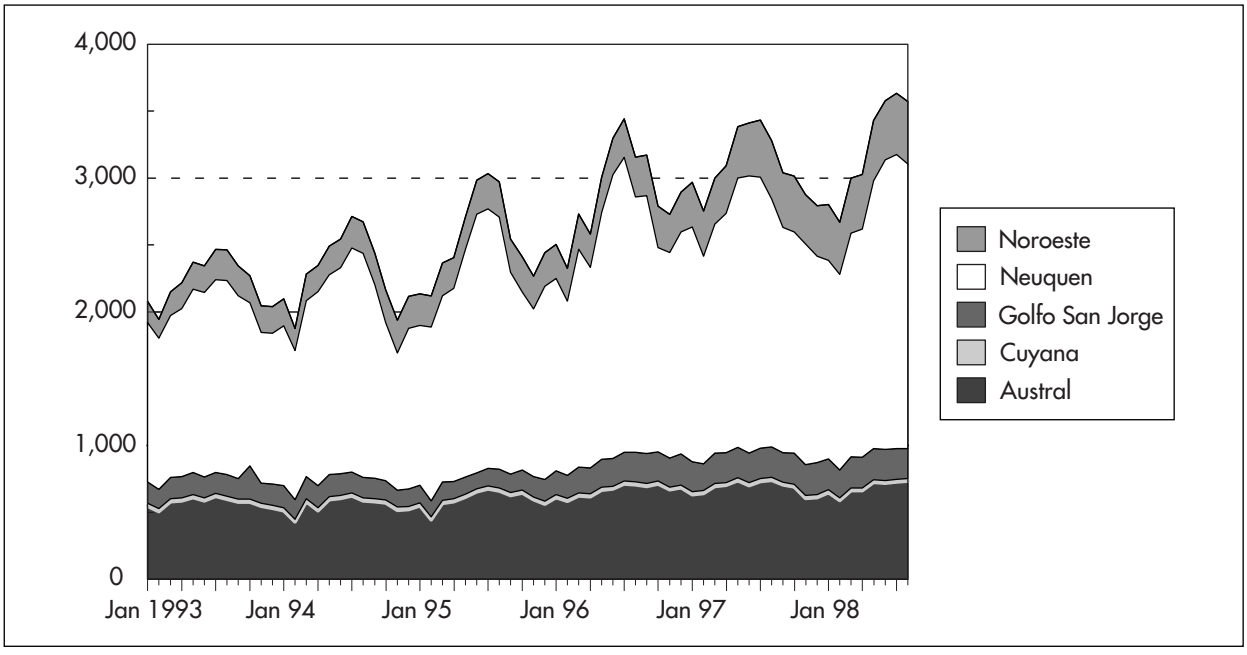
Because there is no underground storage capacity in Argentina, production is highly demand-driven, with a marked seasonality (see Figure 14). Production from Neuquen, the largest producing basin, is the most seasonal of all, acting as the swing supplier to the residential market in the centre of the country.

Figure 13 Natural Gas Production, 1970 to 1997 (Bcm)



Source: Secretariat of Energy.

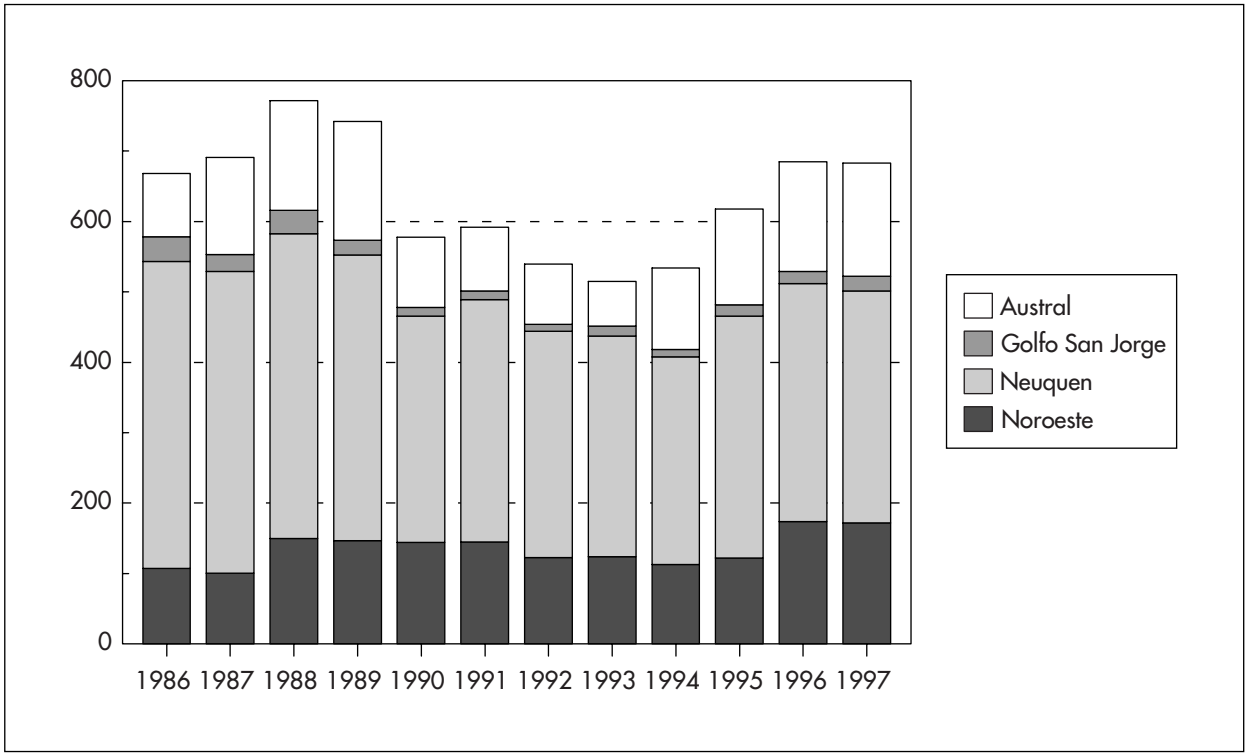
Figure 14 Natural Gas Production by Basin, January 1993 to August 1998 (Mcm/month)



Source: Secretariat of Energy website (http://www.mecon.ar/energia/).

Proven reserves of natural gas have also increased in recent years, following a steady decline from 1988 to 1993 (though the large drop in 1990 was mainly caused by a change in methodology). The biggest increase in reserves since 1993 has been in the Austral and Noroeste basins, though Neuquen still accounts for almost half of total reserves (see Figure 15).

Figure 15 Proven Natural Gas Reserves, 1986 to 1996
(Bcm, at end-year)



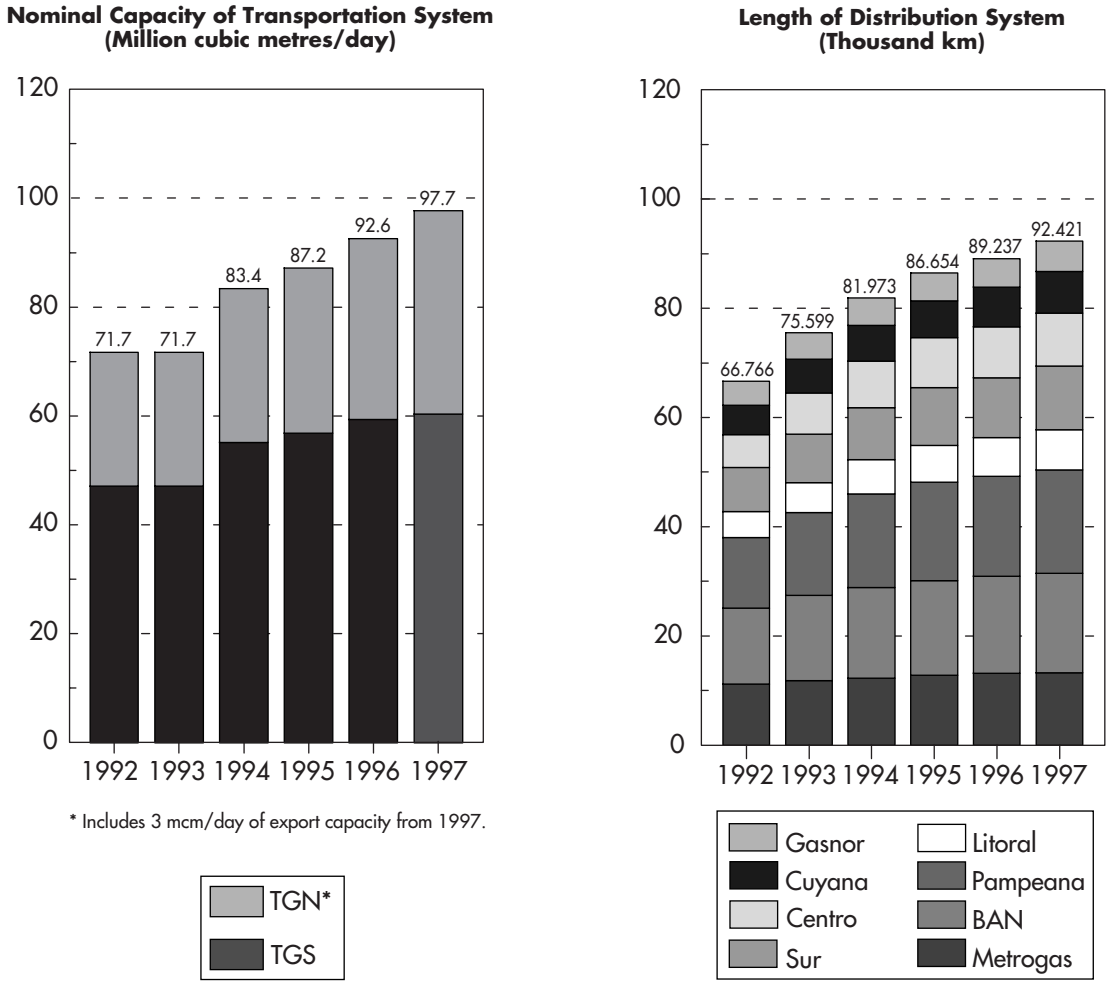
Note: The sharp fall in reserves in 1990 was due to a change in methodology.
Source: Secretariat of Energy.

DOWNSTREAM INDUSTRY DEVELOPMENTS

Network Expansion and System Reliability

The gas transmission and distribution systems have expanded significantly since restructuring in response to rising demand, initial bottlenecks and regulatory incentives to invest in capacity extensions (the k factor). Figure 16 shows the growth in transmission capacity and the size of the distribution networks since 1992.

Figure 16 Expansion of Transmission and Distribution Network, 1992 to 1997



Note: Data are end-year.
Source: Enargas *Informe Anual 1997* (1998); TGN and TGS.

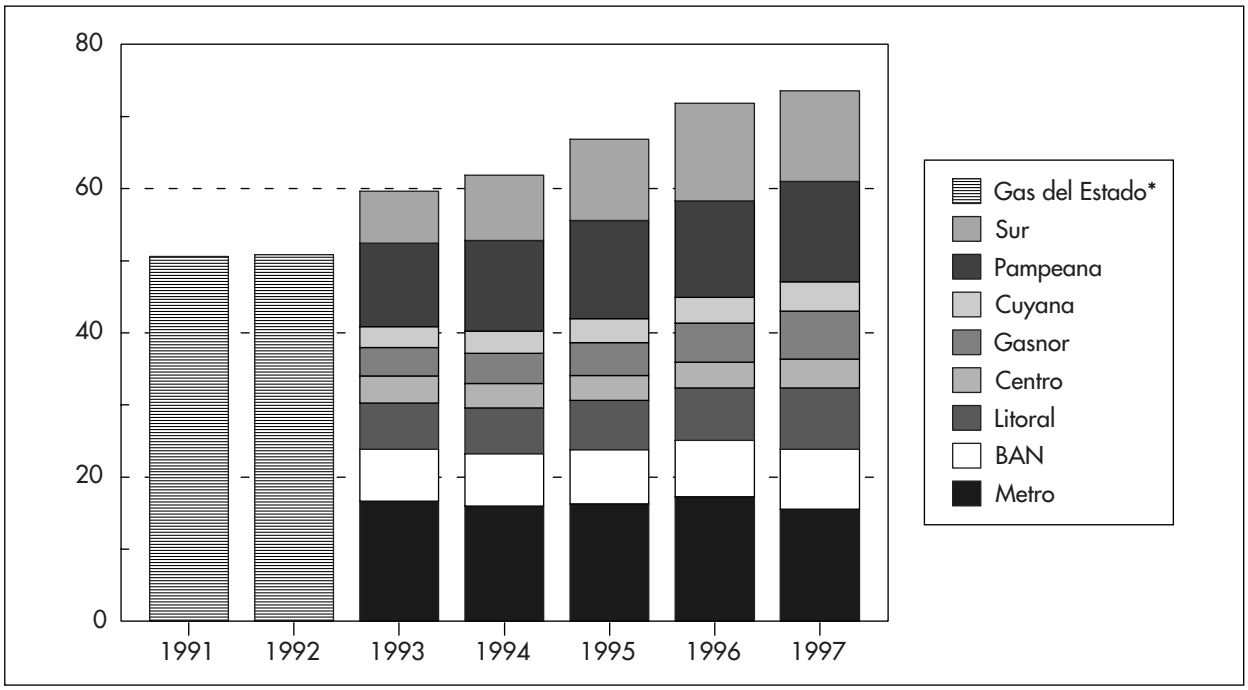
There has also been a significant improvement in system control and reliability. Before restructuring, reports on pipeline operations were transmitted by telephone while up-to-date information and near-term forecasts of daily loads were limited. Since restructuring, the transmission and distribution companies have greatly improved their monitoring and control systems through the use of information technology. Enargas requires transmission companies to telemonitor at least 85% of their deliveries.

The expansion of the network and improved reliability were made possible by a sharp increase in investment by the regulated companies: annual investment in transmission increased from $50 million in 1993 to an average $200 million over the period 1994-1996. Of these investments, around $45 million per year were mandatory for the period 1993-1997. Investment in the distribution networks also increased from $93 million in 1993 to an average of just over $200 million in the next three years.

Market Trends and Patterns

Despite the already high level of gas penetration in Argentina, consumption of gas has increased significantly since restructuring. As shown in Figure 17, sales have risen particularly rapidly in the South (in Camuzzi Gas del Sur's licensed distribution area) and North (Gasnor's area). Metrogas is still the largest single distribution company, with just over 21% of total distribution area sales.

Figure 17 Gas Sales by Distributors to End-Users, 1991 to 1997 (Mcm/day)

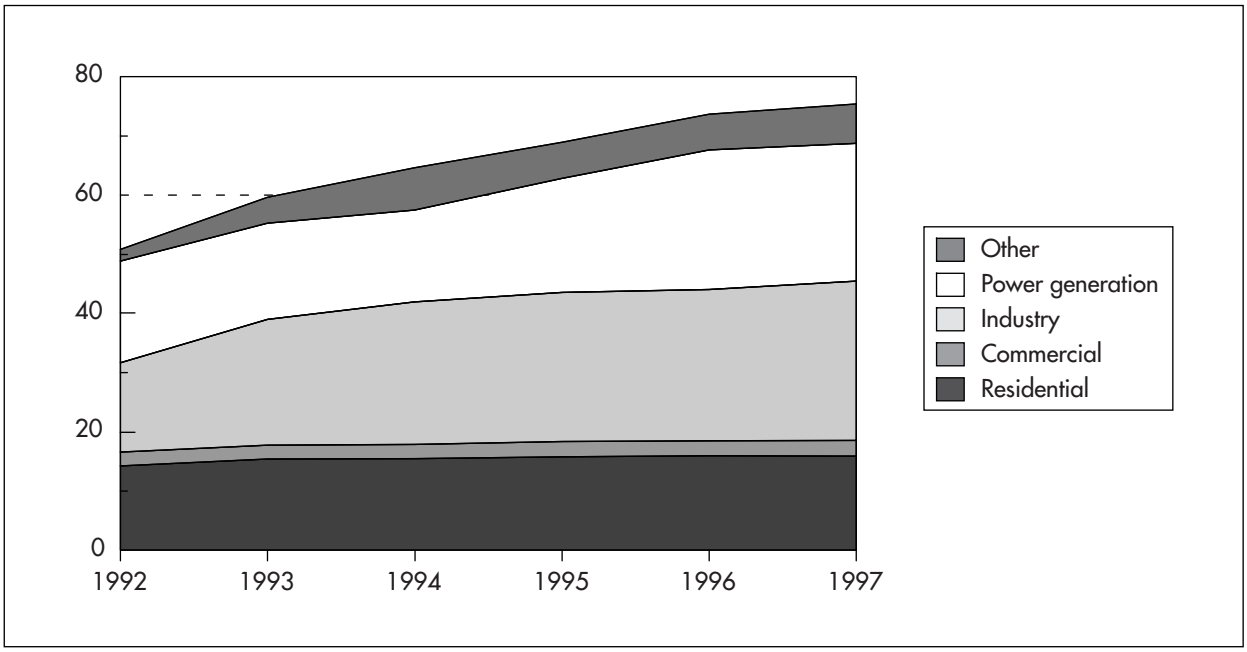


* National monopoly transmission and distribution company until end-1992.
Note: Include direct (bypass) sales to end-users.
Source: Enargas, *Informe Anual 1997* (1998) and *Datos Operativos de las Licenciatarias de Gas* (Monthly Bulletins).

Demand has risen in all sectors, but power generation and industry have seen the fastest rates of growth (see Figure 18). Since 1993, power sector demand has risen 43% and industrial demand 27%. Residential demand appears to have stabilised over the past two to three years at around 16 bcm/year. Demand in power generation has been stimulated by restructuring and regulatory reform in that sector (see Section II). Large falls in electricity prices have stimulated demand, which has led to increased investment in generating plants, most of which are gas-fired.

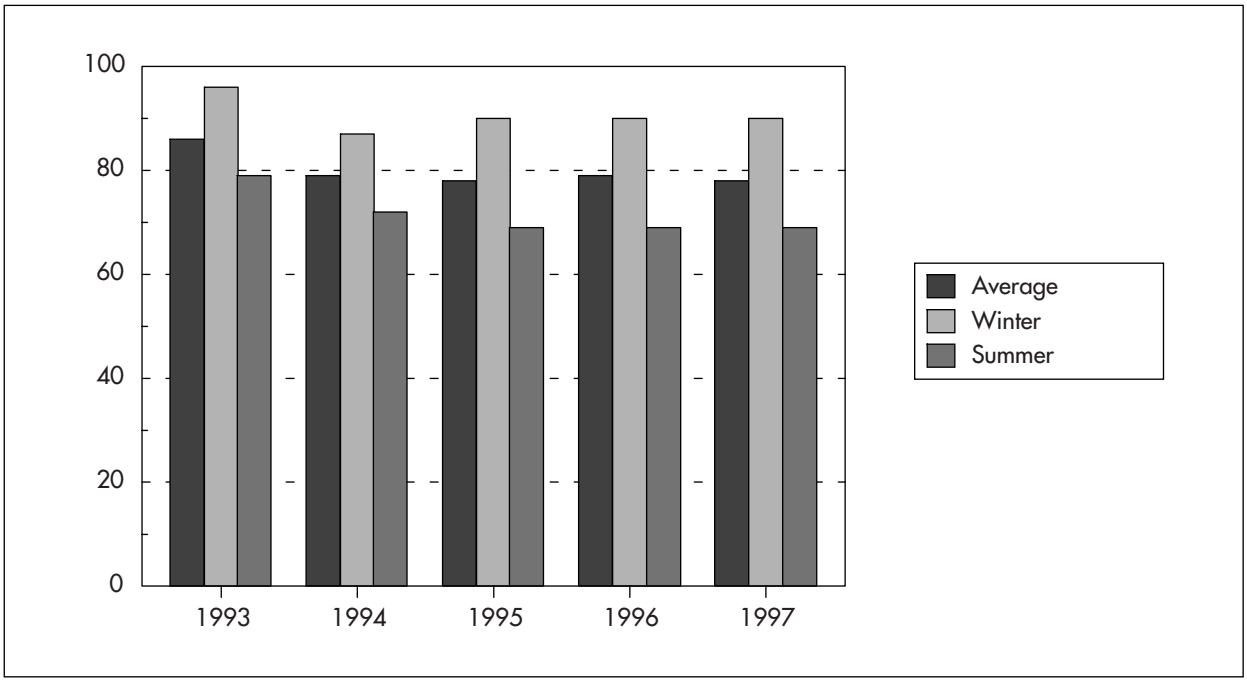
At end-1997, 90% of TGS's nominal capacity and 99% of TGN's capacity were reserved by shippers (mostly distributors) under firm contracts. The total amount of firm capacity reserved by shippers increased from an annual average of 65.5 mcm/day in 1993 to 88.5 mcm/day in 1997; the share of non-distributors in total firm bookings rose from zero in 1993 to 14%. The rate of transmission capacity utilisation declined in the early 1990s, as capacity expansion outstripped the increase in demand, and has been stable since 1995 at just under 80%. Average utilisation in the peak winter months is still very high, at around 90% (see Figure 19).

Figure 18 Gas Consumption by Sector, 1992 to 1997 (Mcm/day)



Note: 1992 sectoral shares are estimated.
Source: Enargas, *Informe Anual 1997* (1998) and *Datos Operativos de las Licenciatarias de Gas* (Monthly Bulletins).

Figure 19 Transmission Capacity Utilisation, 1993 to 1997 (System throughput/nominal capacity, expressed in %)



Source: Enargas, *Informe Anual 1997* (1998).

With the expansion of capacity in the transmission and distribution systems, end users have significantly reduced their reliance on interruptible contracts (with TGS, TGN and the distributors) in favour of firm contracts. Total sales of gas under interruptible contracts fell sharply in 1994 and 1995. The amount of gas interrupted – both in nominal terms and as a percentage of total gas sales — has also fallen significantly (see Table 10). The bulk of interruptible sales are to power stations (CCGTs and open cycle turbines), which are generally the first to be interrupted when winter demand reaches system capacity. The back-up fuels for CCGTs are distillate and LPG; 1%-sulphur-heavy fuel oil is most often the alternative fuel in industry and in single-cycle power plants.

Table 10 Interruptible Sales, 1993 to 1997 (Mcm/day)

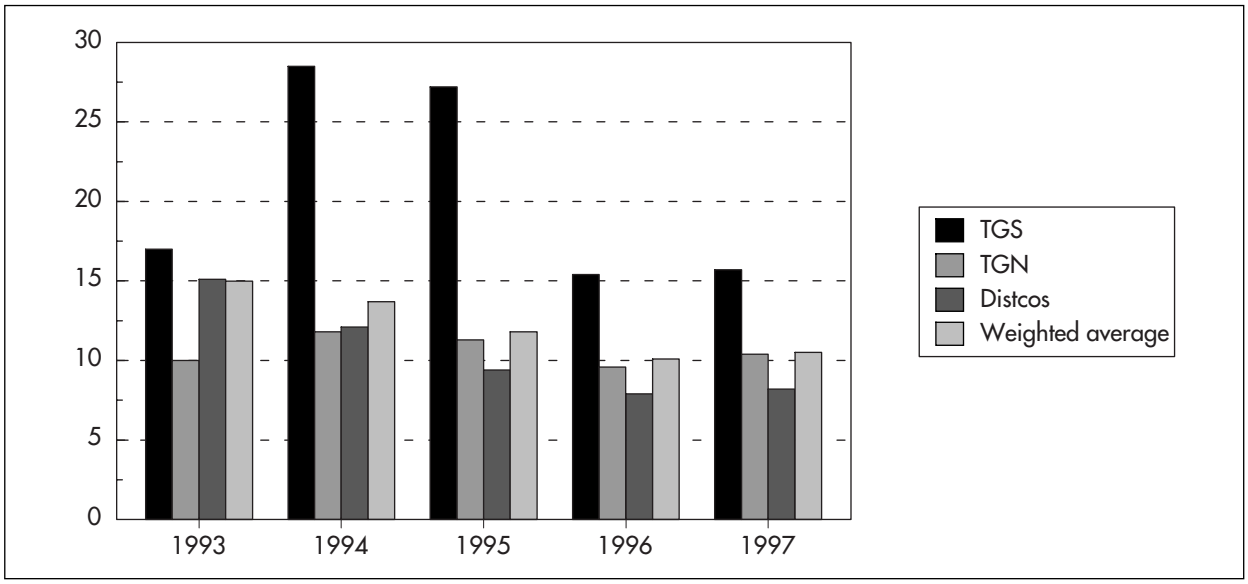
	1993	1994	1995	1996	1997
Interruptible transmission volume (annual average):					
Distributors	3.4	2.9	1.4	1.0	1.5
Others	4.5	3.2	1.8	3.8	4.5
Total	7.8	6.1	3.3	2.8	3.0
Volume interrupted (June-August)	21.4	2.2	5.1	8.1	2.4
Volume interrupted/gas sales to large end-users (June-August)	35.7	3.6	7.9	12.2	3.5

Source: Enargas, *Informe Anual* (1993-1997).

Financial Performance

The licenced transmission and distribution companies have turned in healthy financial performance since restructuring, though net margins and returns on assets have deteriorated generally since the mid-1990s. Returns have been highest for the transmission companies — particularly TGS (see Table 11 and Figure 20).

Figure 20 Transmission and Distribution Company Return on Assets, 1993 to 1997 (%)



Source: Enargas, *Informe Anual* (1993-1997).

Table 11 Licensed Transmission and Distribution Company Financial Performance, 1993 to 1997

		Transmission Companies			Distribution companies	Total licensees
	Year	TGS	TGN	Total		
Gas sales revenue ($ mill)	1993	338.4	115.0	453.4	1 967.8	2 421.2
	1994	366.0	136.5	502.5	2 109.3	2 611.8
	1995	393.5	155.4	548.9	2 151.0	2 699.9
	1996	402.2	163.0	565.2	2 152.8	2 718.0
	1997	412.3	182.1	594.4	2 116.8	2 711.2
Net margin ($ mill)	1993	143.6	39.0	182.6	318.9	501.5
	1994	181.3	50.5	231.8	274.0	505.8
	1995	181.0	52.3	233.3	226.9	460.2
	1996	163.8	44.8	208.6	187.9	396.5
	1997	168.0	52.3	220.3	198.4	418.7
Return on net assets[1] (%)	1993	17.0	10.0	14.8	15.1	15.0
	1994	18.5	11.8	16.5	12.1	13.7
	1995	17.2	11.3	15.4	9.4	11.8
	1996	15.4	9.6	13.6	7.9	10.1
	1997	15.7	10.4	14.0	8.2	10.5

1. Net margin/net assets.

Source: Enargas, *Informe Anual* (1993-1997).

CONTRACTUAL RELATIONSHIPS

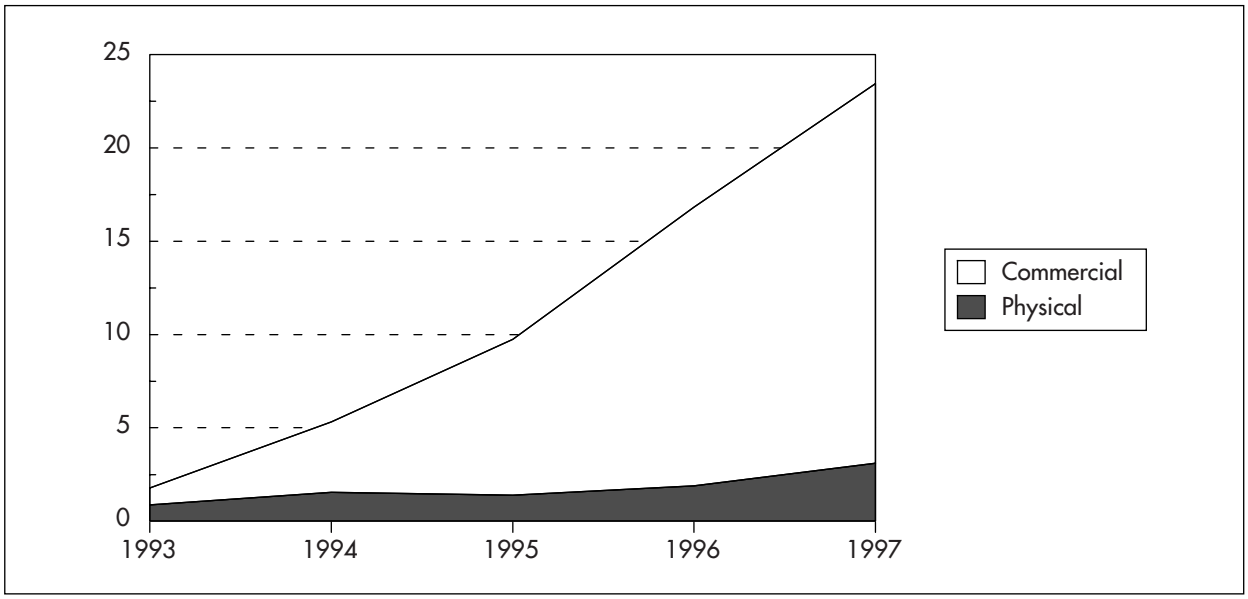
Purchasing of Gas Supplies

The removal of monopoly rights of supply and the establishment of an open access regime in 1992 have encouraged a number of end users to negotiate directly with producers supplies of gas rather than buying from the local distributor. Such "bypass" customers fall into two categories:

- Those that build a direct pipeline link to the high-pressure system of TGS or TGN, contracting with them for transmission services ("physical bypass").
- Those that negotiate use of the local distributor's network in addition to the transmission system ("commercial bypass"). In this case, the customer may negotiate network charges separately with the distributor and the relevant transmission company, or may negotiate a bundled distribution and transmission service with the distributor who, in turn, contracts for transmission on behalf of all its customers.

The total number of bypass customers and the volumes delivered under these arrangements have increased rapidly in recent years, mainly due to the growth of commercial bypass. In 1997, total bypass sales amounted to over 23 mcm/day — 32% of total sales and more than 35% excluding sales to the Cerri gas processing plant and off-transmission system sales — compared with 1.8 mcm/day (3%) in 1993. Of these sales, physical bypass amounted to 3.1 mcm/day — or 4.2% of total sales — in 1997, up from 0.9 mcm/day (1.4%) in 1993 (see Figure 22). Over 80% of all commercial bypass sales involved a bundled distribution/transmission service contract.

Figure 21 Direct Purchases of Gas by End-Users, 1993 to 1997 (Mcm/day)



Source: Enargas, *Informe Anual 1997* (1998).

The growth of bypass has led to greater diversity in gas supply contracts between producers and buyers (distributors and end users). Most contracts with distributors are medium-term, for five or ten years. The wellhead price in contracts signed in the early 1990s was often fixed. Recently negotiated contracts generally contain escalation formulae, based on price indices of competing fuels or an internationally-traded crude oil like West Texas Intermediate and an inflation index, usually US producer prices. Producers are increasingly pushing for inflation indexation in medium- and long-term contracts to protect against a possible price collapse due to over-supply. With a number of five-year contracts now approaching termination, more shorter-term contracts, from one to three years, are being negotiated.

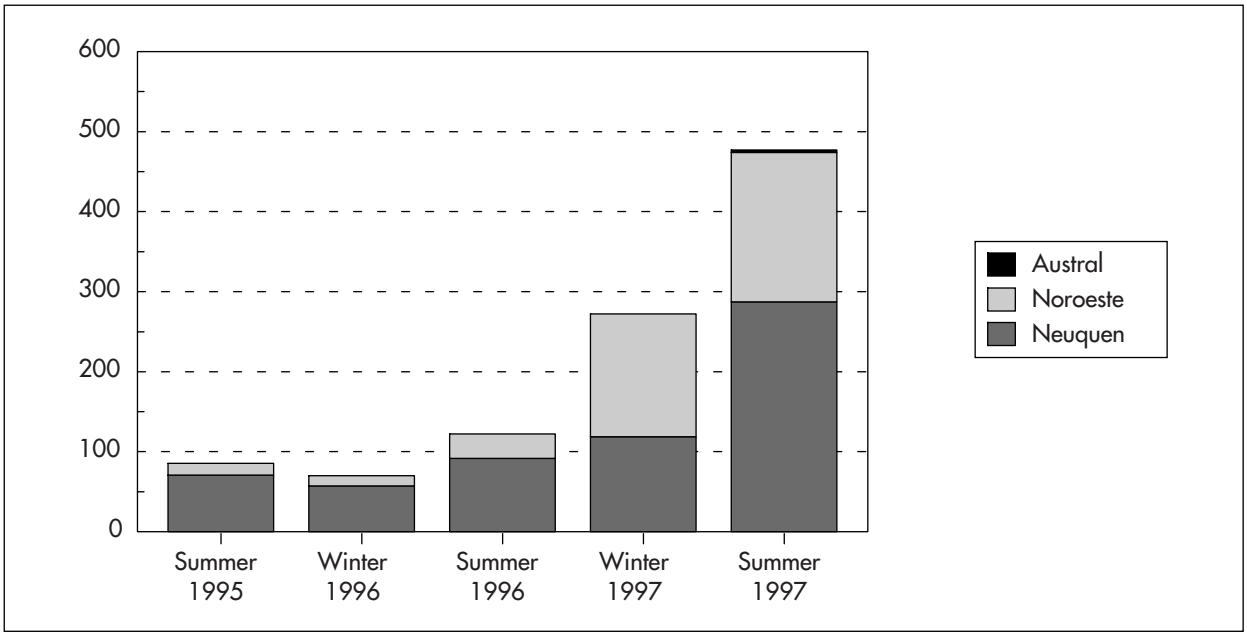
Direct supply contracts with end users vary according to the type of customer: power plants are typically supplied under 15-year contracts, ten-year contracts being the minimum. Escalation formulae often refer to electricity and competing fuel prices. Industrial buyers typically have shorter-term contracts, of one to three years, escalated on competing oil prices, usually gas oil and/or heavy fuel oil. Contracts with distributors and end users generally contain take-or-pay clauses, with thresholds of 70% to 90%; swing varies considerably among contracts.

The spot market — informal over-the-counter trades in short term volumes of gas — has been slow to develop, but it has recently increased in importance (see Figure 22). According to data compiled by Enargas, spot trade amounted to almost 20% of all gas delivered from the Noroeste Basin and over 10% from the Neuquen Basin in summer 1997[10]. Spot trading accounted for only 2-3% of gas sales up to 1996. Most spot trading is done by distributors.

10. In mature competitive markets in North America and Britain, spot trade is significantly greater, exceeding the volume of gas actually delivered due to reselling.

BAN and Gasnor were the largest buyers of spot gas in 1997. BAN obtained 20% of its gas supplies in the summer and 7% in the winter from the spot market. Spot purchases accounted for 22% of Gasnor's summer supplies and 16% of its winter requirements. As yet, there is no regular reporting of spot prices by specialist independent services, as in North America and Europe. There are currently around half-a-dozen licenced gas brokers who handle spot trades on behalf of producers and buyers.

Figure 22 Spot Purchases of Gas, 1995 to 1997 (Mcm)



Source: Enargas, *Informe Anual 1997* (1998)

Contracting for Transmission and Distribution Services

The open-access regime allows any licenced third party (distributor, producer, trader or end user) to contract directly with the transmission companies for firm or interruptible service. In practice, however, the distributors, as the holders of firm capacity prior to restructuring, continue to hold almost all the available firm capacity. At present, more than 95% of all transmission capacity is reserved by the distributors. This has limited the opportunities for producers and end users to contract directly. It explains why most end users who purchase gas directly from producers opt to negotiate a bundled transmission and distribution service with the local distributor (commercial bypass). Although distributors are obliged to pass the cost of transmission capacity on to commercial bypass customers, they are free to negotiate the cost of using the distribution network. The basis for negotiation is generally the notional cost to the end user of building a direct pipeline connection to the nearest high-pressure system.

The 1997 move by Enargas to establish a secondary market for pipeline capacity released by primary holders of reserved capacity was an attempt to promote more efficient use of firm capacity and to discourage hoarding by distributors. However, secondary trading in capacity has so far been minimal for a number of reasons, including:

- Lack of storage, which would provide an alternative to holding firm capacity to meet peak winter demand.
- Limited number of sizable producers.
- The ability of distributors under the current regulatory framework to pass on the full cost of firm capacity even if under-utilised.
- The regulatory cap on the price of released capacity, which prevents holders of primary capacity from realising the full economic value of capacity at peak.

GAS PRICING

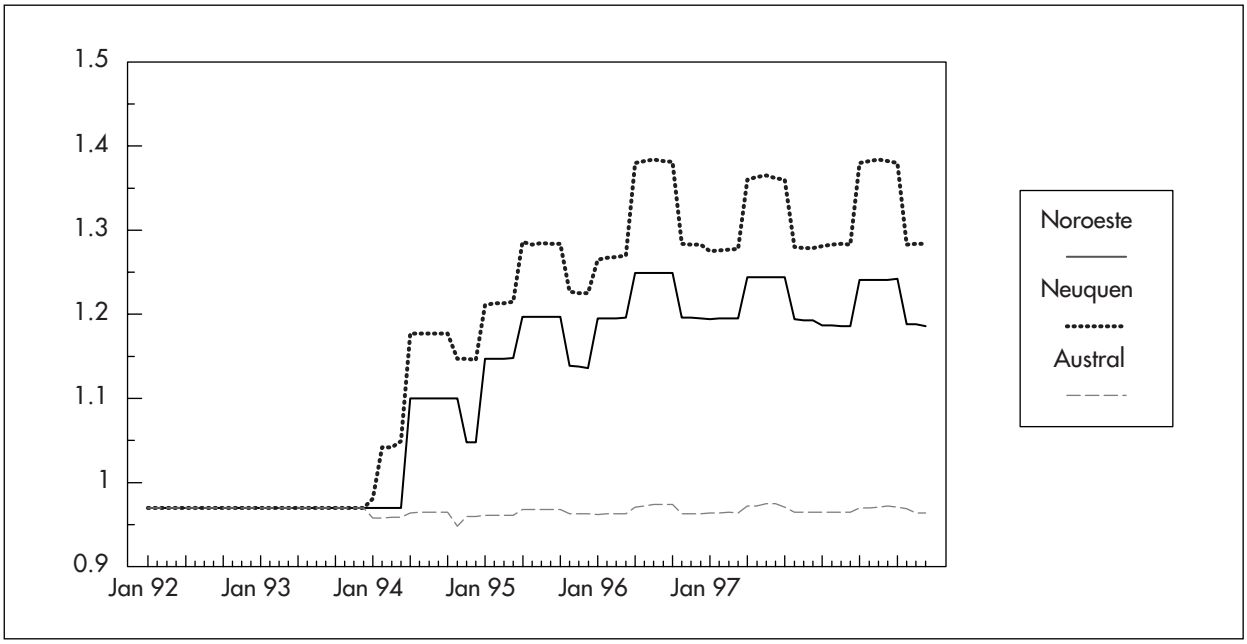
Price Trends

Average wellhead gas prices have increased since restructuring. The removal of price controls, which had equalised prices across the five producing basins, led to a divergence in prices reflecting the netback value of gas delivered to the main consuming area in and around Buenos Aires. On average, effective prices (under prevailing contracts) rose by around 15% between December 1993 and December 1995. They have been stable for the past three years. At end-1997, prices varied from 96.5 cents/Mbtu in the Austral Basin in the South to $1.279/Mbtu in the Neuquen Basin in the East — the closest producing area to Buenos Aires (see Figure 23). A degree of seasonality has emerged in Neuquen and Noroeste prices, reflecting the swing role these basins play in meeting winter heating demand. The rise in wellhead prices is reflected in the average prices paid by distributors authorised by Enargas to be passed on to customers (see Figure 24).

With transmission tariffs and distribution margins fixed, end-user prices followed the upward trend in wellhead prices over the period 1993 to 1997. Prices dropped at the beginning of 1998 with the reduction in transmission tariffs and distribution margins caused by the immediate application of x factors for the period 1998 to 2002. Table 12 shows the recent adjustments in tariffs. On occasion, Enargas has blocked some distributors from passing on all the cost of buying gas on the grounds that the distributors could have negotiated lower prices with producers in different basins. These issues are discussed in sections IV and VII.

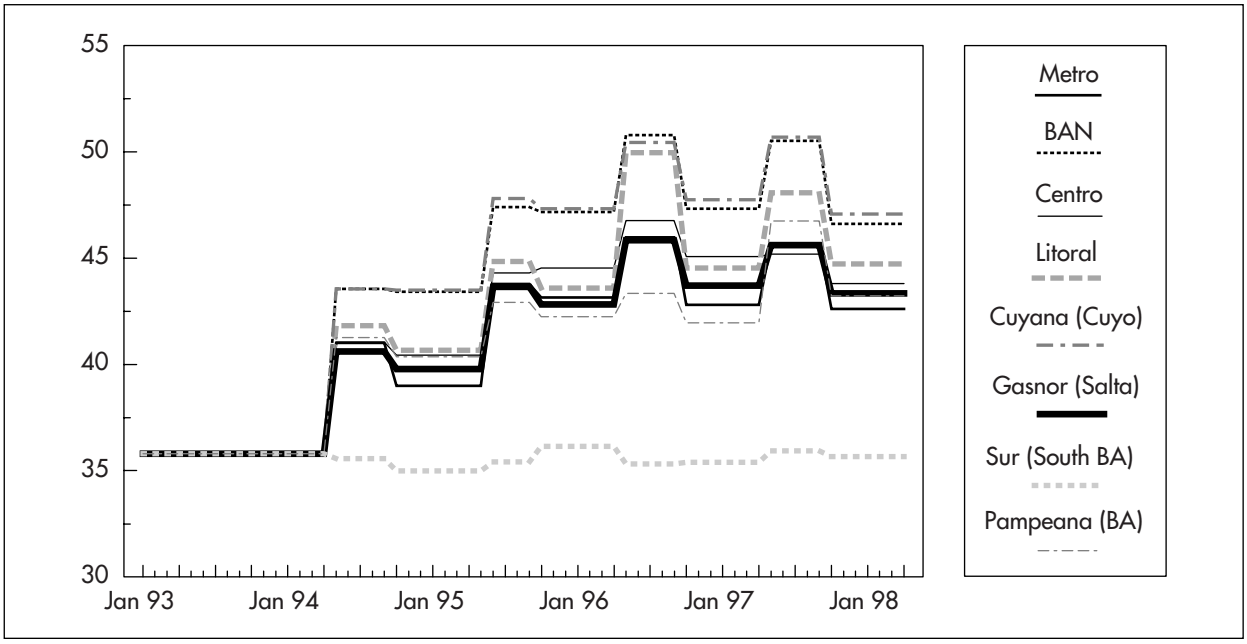
Despite the increase in prices in the two years following the removal of price controls, average wellhead and pre-tax end-user prices remain significantly below those in other major gas-consuming countries in North America and Europe (see Figure 25).

Figure 23 Wellhead Gas Prices, January 1992 to December 1997 ($/Mbtu)



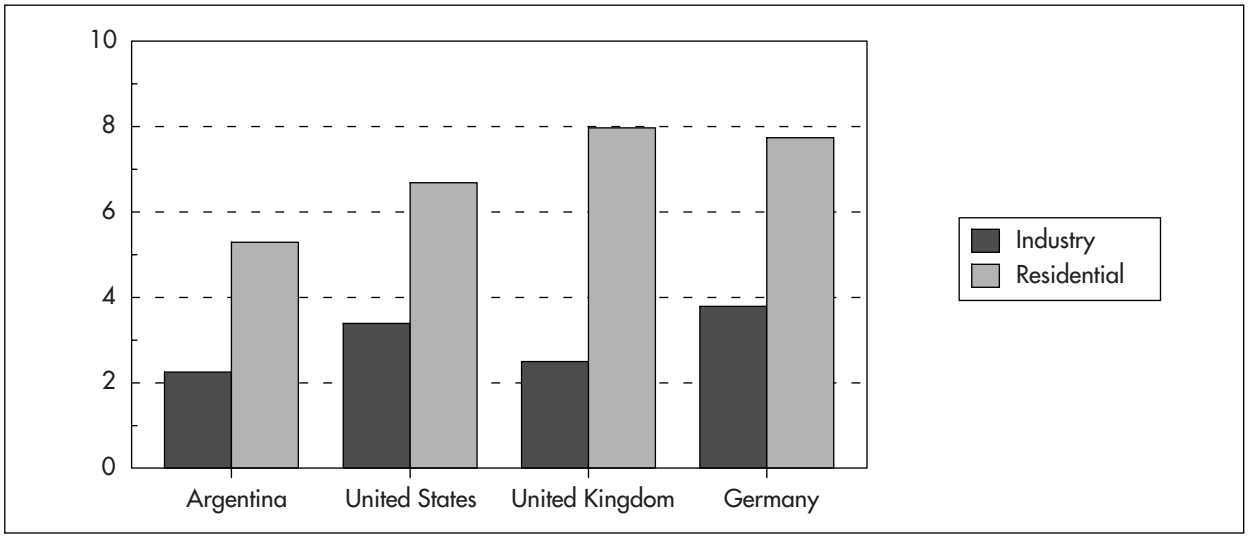
Source: Secretariat of Energy

Figure 24 Average Gas Acquisition Cost to Distributors Passed on to Customers, January 1993 to May 1998 ($/thousand cubic metres)



Source: Enargas, *Informe Anual* (1993-1997).

Figure 25 International Comparison of Natural Gas Prices, 1997 ($/Mbtu)



Note: Argentina prices are for Metrogas, January 1997. Other prices are national annual averages. Germany prices are for 1996. US residential prices include state sales taxes which vary from 2 to 6%.
Source: IEA, *Energy Prices and Taxes* (Paris: OECD).

Table 12 Selected End-User Tariffs, 1996 to 1998 ($/thousand cubic metres)

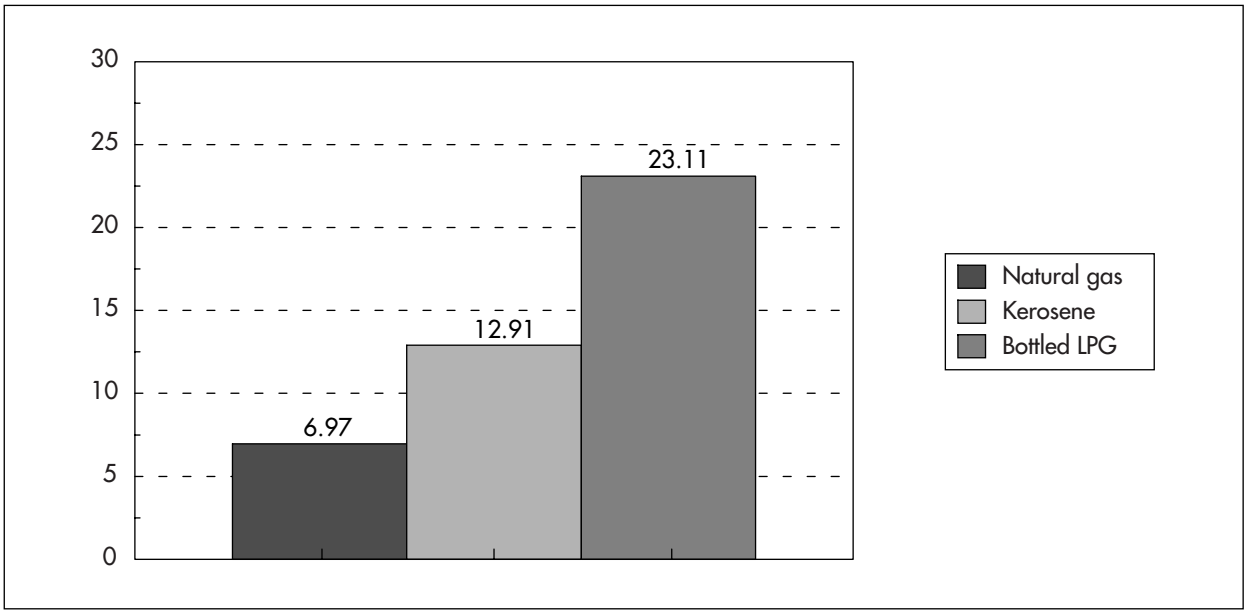
				Adjustment Jan 98/Jan 97 (%)		
Distributor	**Jan 96**	**Jan 97**	**Jan 98**	**Total**	**PPI**	**Gas cost**
Residential (R):						
Metrogas	193.0	194.9	186.8	–4.2	–0.6	–3.6
BAN	202.3	204.7	198.2	–3.2	–2.8	–0.3
Centro	191.6	194.3	188.6	–2.9	–2.3	–0.7
Litoral	185.2	188.3	182.4	–3.1	–3.2	0.1
Cuyana (Cuyo)	185.2	187.7	181.3	–3.4	–3.1	–0.4
Gasnor (Salta)	167.0	169.8	164.5	–3.1	–2.9	–0.2
Sur (Neuquen)	105.3	106.0	102.6	–3.2	–2.3	–0.9
Pampeana (BA)	177.5	179.2	173.9	–2.9	–3.7	0.7
Commercial/small industry (P):						
Metrogas	153.2	154.5	146.6	–5.1	–0.6	–4.5
BAN	152.3	153.9	149.5	–2.9	–2.4	–0.5
Centro	146.1	148.2	143.9	–2.9	–2.0	–0.9
Litoral	131.9	134.2	130.7	–2.6	–2.8	0.1
Cuyana (Cuyo)	142.1	143.9	139.4	–3.1	–2.7	–0.5
Gasnor (Salta)	105.9	107.7	104.9	–2.6	–2.3	–0.3
Sur (Neuquen)	99.4	100.0	96.8	–3.2	–2.2	–1.0
Pampeana (BA)	141.6	142.8	139.3	–2.5	–29.4	27.0
Large industry - interruptible (ID):						
Metrogas	82.5	82.8	76.2	–8.0	0.4	–8.4
BAN	86.5	87.2	86.7	0.5	1.3	–0.8
Centro	77.6	78.6	78.3	–0.4	1.3	–1.6
Litoral	74.5	75.9	76.5	0.8	0.5	0.3
Cuyana (Cuyo)	74.0	74.8	74.6	–0.3	0.6	–0.9
Gasnor (Salta)	62.1	63.3	63.1	–0.3	0.3	–0.6
Sur (Neuquen)	60.6	60.6	64.6	–1.5	0.2	–1.7
Pampeana (BA)	72.1	72.2	70.6	2.1	2.1	0.0

Note: Average tariffs by type of customer, not including taxes. R and P tariffs include fixed charges based on average consumption levels; ID tariff (for interruptible sales off distribution network) is demand charge only.
Source: Enargas, *Informe Anual*.

Gas Price Determination

YPF, as the dominant seller of natural gas in Argentina, effectively sets the price of gas at the wellhead and acts as a price leader for the market as whole. When prices were decontrolled in January 1994, YPF immediately imposed higher prices on the distributors and end users buying gas directly. YPF has not sought any price increase in the past two years, although it has the market power to do so. This is thought to be due to political pressure on YPF not to raise prices, which would contribute to inflation and hurt the poor. YPF is also concerned that the Federal Government might address the lack of competition in the downstream gas and oil sectors. Certainly, prices to all sectors would appear to be considerably below the market value of gas. Figure 26 demonstrates natural gas is by far the cheapest fuel for heating and cooking in the household sector, which explains its very high market penetration. In industry, gas is significantly less expensive than heavy fuel oil, even under firm contracts (see Figure 27). Similarly, in power generation, the fuel cost of electricity generated from gas in existing steam-turbine plants, adjusted for differences in thermal efficiency, is considerably lower than for coal and heavy fuel oil, although coal is marginally more competitive than gas in single-turbine plants (see Figure 28). Fuel costs are by far the lowest in natural gas-fired combined-cycle gas turbines (CCGTs).

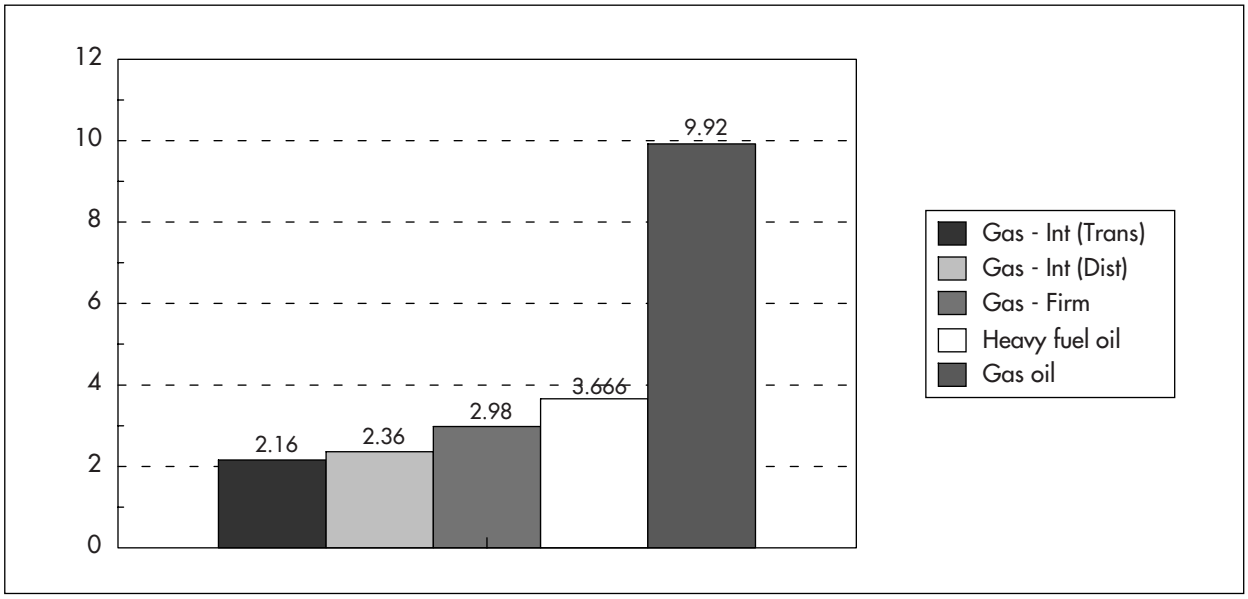
Figure 26 Comparative Fuel Costs to Households, August 1997 ($/Mbtu)



Note: Gas price is for Buenos Aires (Metrogas); kerosene and LPG prices are national averages. All prices include taxes.

Source: Enargas (gas price); *Gas and Gas Magazine*, April 1998 (Kerosene and LPG prices).

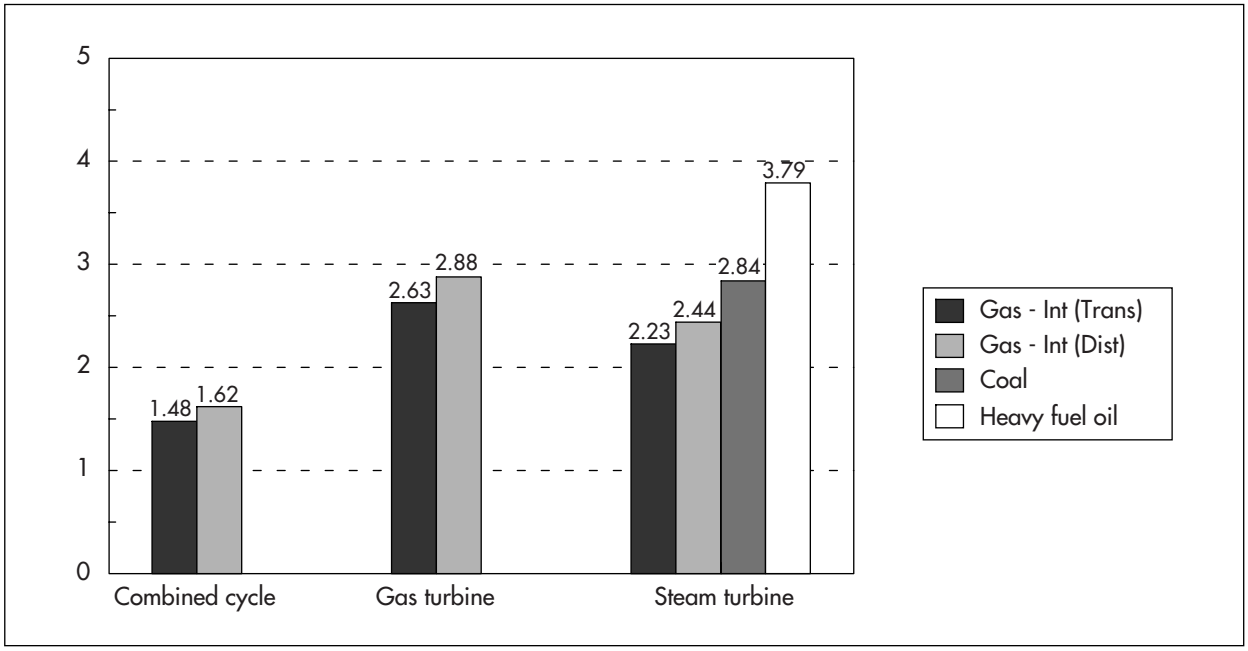
Figure 27 Comparative Fuel Costs to Industry, 1997 ($/Mbtu)



Note: Gas prices are for the first half of 1997 for large users in the Buenos Aires (BAN) area; heavy and light fuel oil prices are national averages for 1997. All prices include duties.

Source: Gas prices: Enargas; fuel oil prices: IEA, *Energy Prices and Taxes* (Paris: OECD).

Figure 28 Comparative Fuel Costs in Power Generation, 1997 (US cents/kWh generated)



Note: Gas prices are for the first half of 1997 in the Buenos Aires (BAN) area; heavy fuel oil and coal prices are national averages for 1997. All prices include duties.

Source: Gas prices: Enargas; fuel oil and coal prices: IEA, *Energy Prices and Taxes* (Paris: OECD).

VI. REGIONAL NATURAL GAS NETWORK INTEGRATION

POTENTIAL MARKET

The Southern Cone countries and their immediate neighbours constitute an enormous potential market with considerable scope for expansion of natural gas use (see Table 13). Energy demand in these countries averages less than a quarter of per capita demand in OECD countries. This percentage and the absolute level of energy use should move steeply upwards in the near future. Projected economic growth in the region is high and there is a particularly close linkage between rates of economic growth and increased energy use at these countries' stage of economic development. With the exception of Argentina, natural gas use is very limited in the Southern Cone region (see Figures 29 and 30).

Table 13 Key Indicators For Selected Latin American Countries, 1996

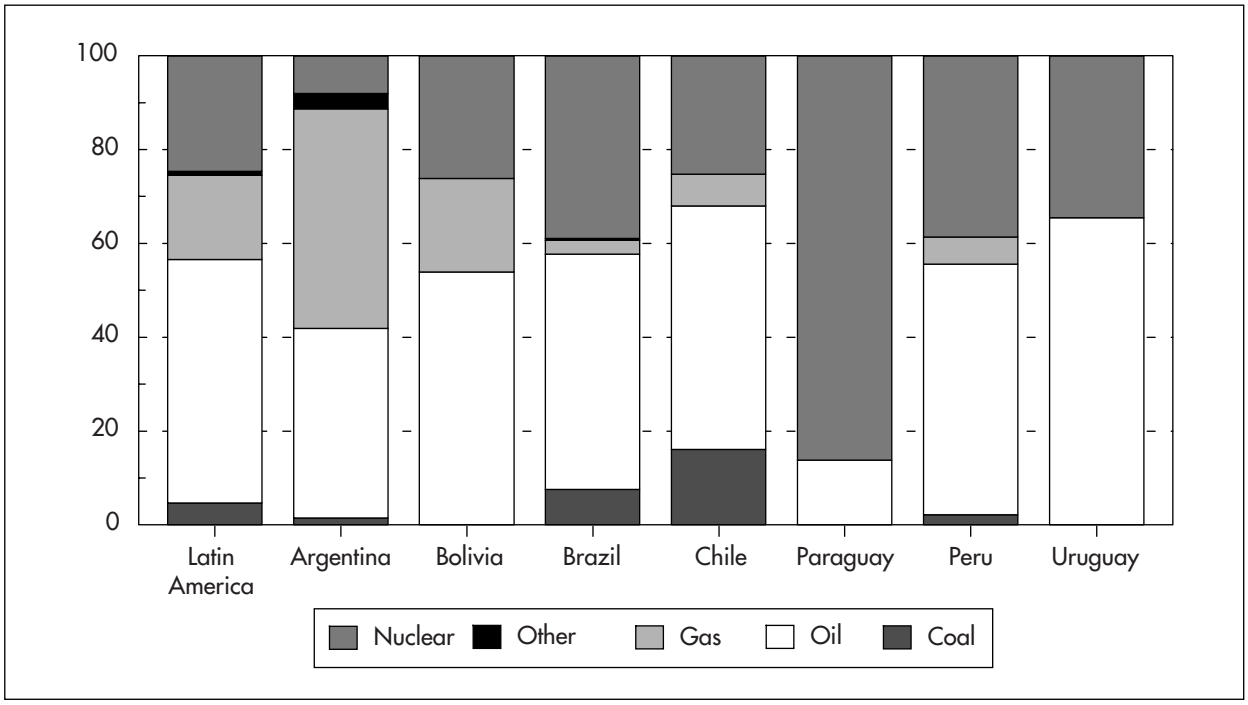
	Population (million)	GDP[1]	GDP per capita[2]	TPES[3] (mtoe)	TPES[3] (toe per capita)
Argentina	35.22	189.38	5377	58.92	1.673
Bolivia	7.59	5.64	744	3.63	0.479
Brazil	161.37	557.75	3456	163.37	1.012
Chile	14.42	46.58	3230	20.46	1.419
Paraguay	4.96	6.25	1261	4.29	0.865
Peru	24.29	45.59	1877	13.93	0.574
Uruguay	3.20	10.40	3248	2.95	0.923
TOTAL	**251.05**	**861.59**	**3432**	**267.55**	**1.066**

1. Billion $ at 1990 prices and exchange rates.
2. $ at 1990 prices and exchange rates.
3. Including combustible renewables and waste.

Source: IEA, *Energy Statistics and Balances of Non-OECD Countries, 1995-1996* (1998, OECD: Paris).

Argentina is well placed to benefit from this potential market as Southern Cone natural gas production and reserves are predominantly in Argentina (see Table 14). The only competition for the foreseeable future comes from Bolivia, where recent gas discoveries have boosted near-term supply potential, and Peru, although plans to develop the large Camisea gas/condensate field have stalled.

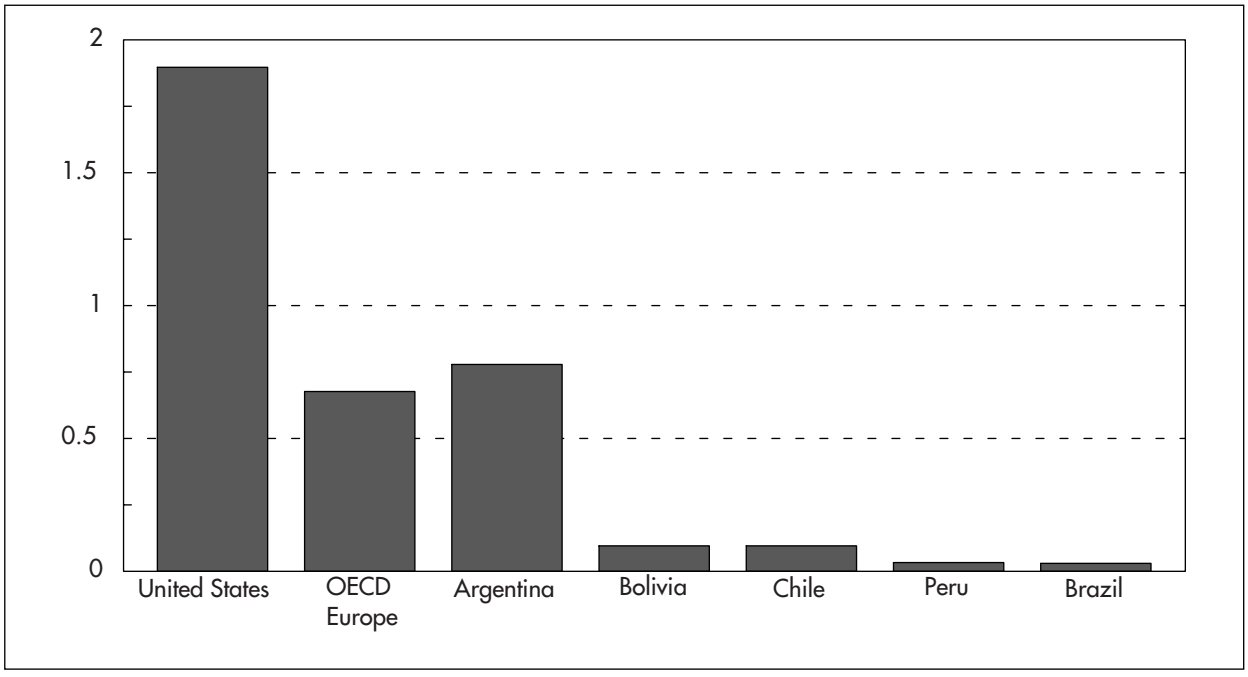
Figure 29 Fuel Mix in Primary Energy Demand in Selected Latin American Countries, 1996 (%)



Note: "Other" includes hydropower and combustible renewables and waste.

Source: IEA, *Energy Statistics and Balances of Non-OECD Countries, 1995-1996* (1998, OECD: Paris).

Figure 30 Per Capita Natural Gas Consumption in Latin America, 1996 (toe/capita)



Source: IEA, *Energy Statistics and Balances of Non-OECD Countries, 1995-1996* (1998, OECD: Paris).

Table 14 Natural Gas Production and Reserves in Latin American, 1997

Country	Production (bcm)	Reserves (bcm)			
		Proven	Probable	Potential	Total
Argentina	37.1	687.9	113.0	NA	NA
Bolivia	6.4	109.6	72.4	25.7	207.7
Brazil	9.2	224.0	87.4	153.2	464.6
Chile	2.7	42.9	80.0	NA	NA
Peru	0.4	198.2	182.6	389.1	769.9
Total	**55.8**	**1 262.6**	**535.4**	**NA**	**NA**

Note: NA = not available.
Source: OLADE; SIEE Database.

Given the environmental benefits of natural gas, the economies achieved by new combined-cycle gas turbines in power generation and the ability of natural gas to substitute for oil in many uses, Argentina's neighbours are very interested in increasing their natural gas consumption. The largest potential market by far is Brazil and, in particular, its southeastern region, which is fast becoming economically integrated into the Southern Cone. Total energy consumption in Brazil is expected to increase by 4.5% per annum in the near future, with natural gas consumption expanding by as much as 22% a year, albeit from a very low base. From 1990 to 1996, Brazil's natural gas consumption increased at an average annual rate of 6.2%. Most of the potential for increased consumption is in the power sector, which is currently almost completely reliant on hydropower. Natural gas has a less-than-3% share in Brazil's primary energy supply. Brazil would like this share to reach 12% by 2011. To accomplish this, Brazil must complement its modest indigenous natural gas production with large quantities of imported natural gas.

Demand for natural gas in Chile, the other sizable potential market, is projected to increase by over 15% annually for the next five years. As noted elsewhere in this report, two pipelines to carry Argentine natural gas to Chile were recently completed and others are under construction or planned. These projects are being driven by Chile's consistently high economic growth rates, its high annual increases in energy demand and concerns about the environment as well as by Chile's limited natural gas reserves and domestic production.

Currently neither Paraguay nor Uruguay produces or consumes natural gas. However, both would like to begin using it as an energy source.

Despite Argentina's abundant gas reserves, a heavy emphasis on gas in its energy mix over the past two decades and clear potential for export, the gas infrastructure of its neighbours is small or non-existent. Until only a few years ago, gas trade in the Southern Cone was limited to around 2.1 to 2.4 bcm/year of Bolivian gas delivered under a 20-year contract through a pipeline to Argentina. Even this modest arrangement was politically inspired, with the aim of assisting Bolivia economically. For most of the supply period the price paid to Bolivia for the natural gas substantially exceeded the world market price as well as the domestic price in Argentina. Reflecting developments in the rapidly evolving Southern Cone gas market, some thought is being given to terminating the purchase arrangement with Bolivia and then possibly reversing the flow

of the pipeline to allow Argentine gas access to the Brazil market via the Bolivia-Brazil pipeline now under construction. Recent gas discoveries in Bolivia, however, may deter or delay this move.

The lack of infrastructure limiting natural gas market development outside Argentina stems largely from past policies in the region which strongly encouraged energy self-sufficiency[11] and the development of state-owned oil and natural gas monopolies. With the advent of more open, market-oriented policies, in particular the encouragement of private sector investment and the reduction of price controls, interest in expanding the use of natural gas in Argentina's neighbours has increased sharply.

Similarly, Argentina's production and consumption of natural gas increased significantly in the 1990s following reforms and privatisation in its energy sector. Argentina now has a mature natural gas market domestically. Hence, if its substantial natural gas reserves are to be fully exploited, the real potential growth market lies with its Southern Cone neighbours. Private investors are well aware of this.

There is also political recognition among Mercosur's members and Associate members that, if the grouping's economic integration process is to continue to move forward, improved infrastructure in and between these countries will be required quickly. This is especially true for the energy sector. Of particular importance are natural gas pipelines connecting Bolivia and Argentina with Brazil's industrial heartland.

CROSS-BORDER NATURAL GAS PROJECTS

Domestic and foreign energy companies have responded rapidly to the opportunities presented by energy sector reforms in the Southern Cone. Many old pipeline proposals have been resurrected and new projects are constantly being submitted. Chile and Argentina, the first countries to implement significant energy sector reforms, were the first to establish new natural gas linkages. Of greater long-term importance, however, are the natural gas connections which would allow Bolivian and Argentine natural gas into southern Brazil. These would form the basis for an eventual hub of natural gas pipelines throughout the Southern Cone (see Figure 31).

Section III outlines natural gas pipeline projects already completed or under construction. However, there are a number of other proposals now underway or under consideration, including the following:

- A major $2 billion, 3 150 km Bolivia-to-Brazil pipeline running from Santa Cruz, via Sao Paulo, to near Porto Alegre. This will be the first pipeline providing imported natural gas to the Brazilian market. For the first seven years, 8-9 mcm/day of Bolivian gas will be supplied. This will rise to 28 mcm/d for the following 13 years. Construction is well under way, with gas deliveries planned to commence for Sao Paulo in late 1998 and for Porto Alegre later the following year.

11. With the exception of bi-national hydro-power projects.

Figure 31 Latin American Natural Gas Pipeline Projects

- A 440-km pipeline from Santa Fe in Argentina to a power plant in Uruguaiana just inside Brazil's border.

- Two lines are planned from Argentina to Chile: Nor Andino, a 3 bcm/year 500 mile line which would run from Northern Argentina to Chile running close to Atacama; and Pacifico, a 1.4 bcm/year 280 mile link from Neuquen to Concepcion.

- A proposed 3 100 km Mercosur pipeline from Salta in northwestern Argentina to Sao Paulo in Brazil. A capacity of some 9 bcm/year is projected, although there are doubts about the adequacy of reserves to support the $1.5 billion investment.

- Another 1 bcm/year line from Northern Argentina has been proposed to supply a power plant at Mato Grasso in southern Brazil.

- A number of possible routes to supply Bolivian gas to Paraguay and possibly southeastern Brazil have been tabled with the authorities, although construction approval has not yet been obtained.

- A proposed 808 km 6.5 bcm/year pipeline running from the proposed Camisea (Peru) pipeline to Santa Cruz, Bolivia where it would link up with the Bolivia-to-Brazil pipeline to provide additional gas for the Brazilian market. Considerable doubt has been cast over the project given the recent decision by Shell, the majority partner in the consortium, not to proceed with development of the Camisea gas/condensate field.

Expanded use of natural gas in Argentina's Southern Cone neighbours will provide a number of side-benefits to Argentina in addition to simply generating additional foreign exchange from a resource it possesses in abundance:

- Increased domestic and foreign interest in supplying these growing markets will bring in new investment, managerial and technical skills to develop Argentina's natural gas resources.

- The expanded number and heightened competitiveness of natural gas producers in Argentina will provide increased competition to YPF, which currently dominates the domestic market.

- Higher natural gas exports should help ensure that domestic prices in Argentina more accurately reflect regional supply and demand conditions.

- The above will serve to facilitate and enhance the effectiveness of Argentina's natural gas regulatory regime.

VII. REMAINING CHALLENGES

SUCCESS OF REFORMS

Experience in several countries shows that there is no catch-all prescriptive model for the process of regulatory reform and restructuring in the natural gas sector, nor for the ultimate regulatory framework once competition has been established. Policy makers and regulators need to take account of specific national circumstances, including the physical characteristics of the pipeline and upstream infrastructure, the ownership structure of the industry and market trends and the institutional framework. Argentina has pursued its own particular approach to gas-sector reform within the context of its overall programme of economic restructuring. That approach, nonetheless, has drawn heavily on the experiences and lessons learnt in other countries, notably Canada, the United States and the United Kingdom.

In many respects, Argentina's restructuring and regulatory reform most closely resembles the UK model, where the gas and oil industry was privatised first (although the downstream company, British Gas, was not split into separate transmission and distribution companies as was done in Argentina). In addition, the regulatory framework in both countries has important features in common:

- Open access to the transmission and distribution network.
- Regulation of transmission and distribution tariffs through an RPI-X formula with pass-through of gas costs and five-yearly reviews of efficiency and investment factors.
- An independent, specialist regulatory authority for the gas sector.

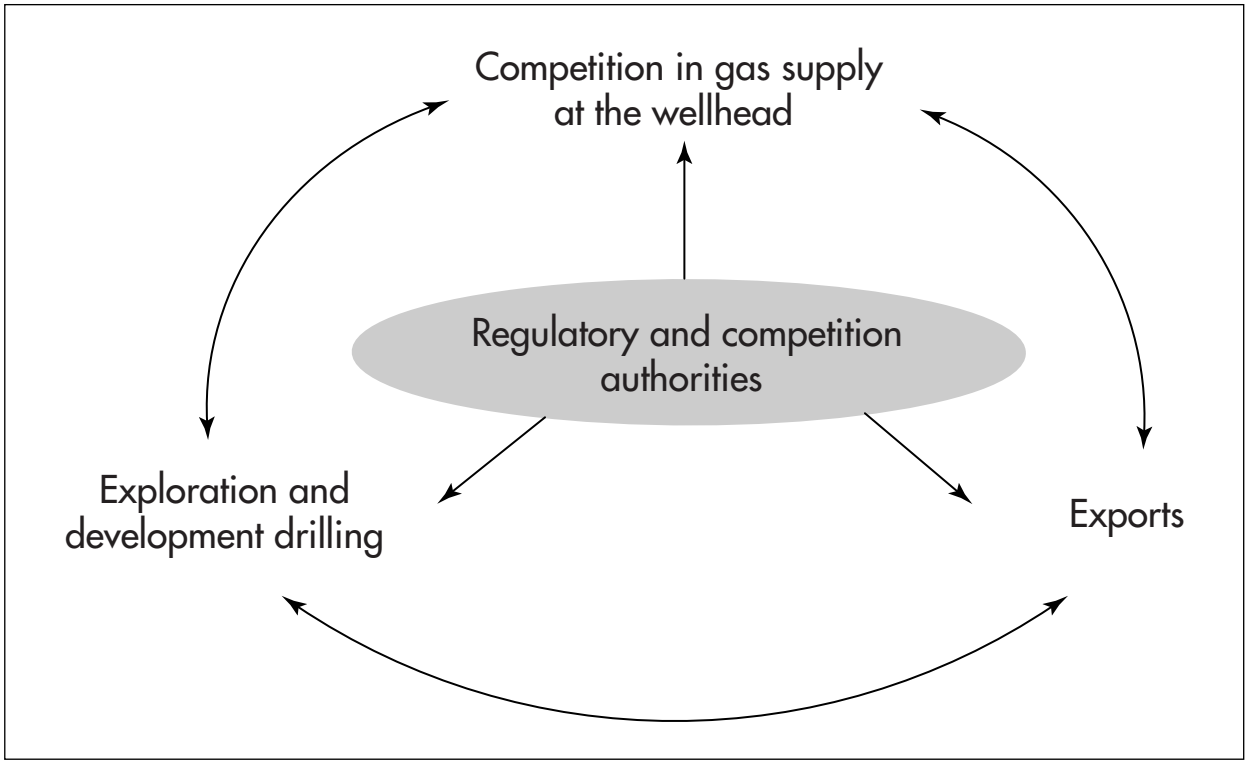
The reform process in Argentina has been highly successful. Gas drilling has picked up and investment in the downstream industry has increased. Transmission and distribution costs have been reduced. Short-term security, in terms of system reliability and deliverability, has been enhanced. Long-term security has also been bolstered by increased drilling and the expansion of international gas trade in the Southern Cone region. Although wellhead prices have risen from the artificially low levels before deregulation, end-user prices have risen more modestly as a result of improved efficiency and capacity utilisation in the transmission and distribution system. Natural gas remains extremely competitive in all end-use sectors and is priced well below the levels in North America and Europe. Critical success factors behind these achievements include:

- A stable and attractive trading, investment and fiscal environment.
- The removal of gas-price controls.
- Diversification of players in the upstream sector through the removal of exclusive rights and the sale to competitors of YPF assets and exploration and production rights.

- The effective separation (unbundling) of the gas transmission business from gas supply and trading, which ensures non-discriminatory third-party access to the transmission system and efficient regulation of tariffs.
- Transparency in the non-price terms and conditions of access to the pipeline. This has also been a key factor in preventing discrimination between shippers and ensuring efficient operation of the industry.
- Explicit rate-of-return or tariff regulation with incentives to reduce costs.
- Clear definition of regulatory responsibilities, with an independent and well-financed authority.

In spite of this impressive progress, there remain a number of challenges for the Government and the regulator. Foremost among these are stimulating competition in gas supply, improving the effectiveness and consistency of downstream regulation, stimulating exploration and production and promoting regional market integration. These issues are inter-related. One way of increasing competition in the Argentine market will be the growth of exports, assuming that competitors to YPF account for the bulk of these incremental supplies. New export projects will, in turn, depend partly on the attractiveness of the legal and fiscal regime in the upstream sector for exploration and development and the success of drilling. The Secretariat, Enargas and competition authorities will play a vital role in promoting the long-term development of the domestic and export markets (see Figure 32).

Figure 32 Key Factors in Future Development of Argentine Gas Market



COMPETITION IN GAS SUPPLY

The biggest disappointment of the reform process launched at the end of the 1980s has been the lack of competition in gas supply — one of the chief aims of the 1992 Natural Gas Act. Despite its divestment of assets and rights before privatisation, YPF remains the dominant producer in Argentina and supplier of gas to the domestic market, accounting for 58% of total supply. It thus continues to play the role of price leader or setter. It can impose prices, pricing formulae and other contractual terms on buyers, though political considerations do in fact deter it from exercising this power fully. YPF is also the dominant player in the domestic oil products market, allowing it to exercise considerable influence over the prices of the fuels that compete with natural gas in Argentina.

The obvious solution to the lack of competition is to reduce substantially YPF's gas (and oil) market share. The Government and the industry recognise this. However, achieving it within the existing legal and institutional framework may be difficult, given that YPF is now in private hands. Argentine competition law puts the onus on third parties to prove abuse of dominant position, as is the case in the European Union, rather than simply outlawing the existence of a dominant position, as in the United States. Any rapid resolution to the problem of lack of competition may, therefore, require tougher anti-trust laws. These would oblige YPF to dispose of many of its existing gas production concessions and exploration permits. The Government would have to weigh the benefits of greater competition against the long-term impact of a such a move on the attractiveness of Argentine industry to foreign investors.

In the absence of such a move, the Government's only leverage would be through the granting of new exploration permits. There would seem to be a very strong case for denying YPF involvement in new exploration licensing rounds. Such action would, however, only affect YPF's domestic and export market shares after several years. The rate at which YPF's market dominance would decline would depend on the level and success of exploration drilling by its competitors, the degree of success in increasing exports and the rate of domestic market growth.

The ultimate aim — once effective competition in bulk gas supply is established — should be to extend competition in gas supply to all end users. Currently, competition is limited to those consuming more than 10 000 cubic metres/day. Such a move would require at a minimum full separation of the accounting and management of distribution companies' pipeline and gas trading and supply activities (retail unbundling) aimed at preventing discrimination against third parties, at encouraging access to distribution networks and at promoting competition[12]. Eventually, a detailed distribution network code setting out contractual and operational obligations, including balancing, would be necessary. Much could be learnt in this regard from the United Kingdom — the only country as yet with experience of full retail competition[13].

12. Complete separation of ownership may also be desirable, whereby the distribution companies would not be allowed to trade in gas — as is already the case for the transmission companies. This would arguably provide water-tight protection against discrimination, but it carries higher costs and would certainly entail practical and possibly political difficulties. A compromise solution would be to require separate stock market listing of the two businesses, which would at least reveal more information to the regulator, although this move would not resolve the potential threat of anti-competitive collusion between the trading and pipeline businesses.

13. There are nonetheless important differences between Argentina and the United Kingdom, most obviously in terms of the separate ownership of transmission and distribution in Argentina and the integration of the two activities in the United Kingdom.

The slow development of the spot market for gas and of trading in secondary pipeline capacity stems, in large part, from the lack of true competition in supply. Enargas's efforts to stimulate activity in these markets are unlikely to achieve much until YPF's market share is reduced. Another negative factor is the negotiated-access regime in the distribution sector. Regulation of distribution tariffs, as for transmission tariffs, may encourage more end users to seek direct purchases of gas (bypass) and broaden the scope for short-term gas trading. Experience in other countries — notably North America and the United Kingdom — suggests that a short-term surplus of gas putting downward pressure on prices may be necessary to "kick-start" the growth of short-term trading.

EFFECTIVENESS AND CONSISTENCY OF DOWNSTREAM REGULATION

Enargas has been remarkably successful in developing regulatory competence, given Argentina's limited experience with independent regulation and competition enforcement and the short time (five years) since its creation. The Government has provided Enargas with adequate resources for it to carry out its tasks effectively. A number of issues have, nonetheless, arisen with respect to the effectiveness and consistency of downstream regulation.

Tariff Regulation

The five-year review of transmission and distribution tariffs launched in 1996 and completed in 1997 raised a number of issues. The regulated transmission and distribution companies have expressed discontent over the manner in which the review was conducted, and especially with the methodology used to determine their x (efficiency) factors. Part of the problem would seem to lie with Enargas's understandably limited practical experience in tariff review procedures at the time of the review. This concern should decrease with time. There may be a case for recruiting some permanent staff with appropriate expertise, rather than relying predominantly on external consultants.

The approach used by Enargas to calculate the x factors was very controversial. A two-part approach was adopted, combining a backward-looking component to determine reasonable cost levels based on general industrial performance and a forward-looking component to take account of actual costs and productivity improvements. The experiment was not convincing, since the two approaches seem to be contradictory. In addition, the empirical basis, framework and underlying assumptions used in determining productivity factors are subject to dispute. The legal basis for using this approach is also unclear, as it was not specified in the licences or the 1992 Act. The next review should involve an approach to the determination of x factors which is both more transparent and more widely acceptable.

Another criticism levied at Enargas by the regulated companies concerns the application of the x factors determined in the recent tariff review in a one-off fashion. The 1992 Natural Gas Act intended the x factors to be applied gradually over the five-year period, as in the United Kingdom. Enargas feels that the modest reductions involved (between 4.4% and 6.5% for the full five year period) warranted their immediate application. This move, however, may not have been entirely consistent with the spirit of the 1992 Act and the long-term aim of establishing a

stable, consistent and predictable regulatory regime. It also favoured the incumbent regulator, since it deprives future regulators of the opportunity to moderate price increases resulting from higher wellhead gas costs and y factor investments.

Some of the regulated companies have also expressed concern at the lack of a consistent regulatory accounting methodology to determine the allowed unit revenue (the price cap), consistent with the required rate of return on assets (cost of capital) and the projected throughput. At present, the nine regulated companies are not required to use similar accounting methods and conventions. Critical issues include:

- Valuation of assets for regulatory purposes, taking account of differences between the market value of the companies (as determined by share prices) and accounting cost values.
- A method for revaluing assets over time, from a starting regulatory asset base (for example, using an inflation index or capital replacement cost).
- Treatment of depreciation.

Enargas accepts the need for regulatory accounts and has indicated its intention to establish them in time for the next tariff review for 2003-2008, which will begin in 2001. This should be given high priority.

There may eventually be a case for introducing greater sophistication into the price-cap regulatory approach. There is a wealth of literature on the drawbacks of this approach, particularly the danger that it provides regulated utilities with an incentive to underforecast throughput so as to overestimate average cost. Any increase in throughput over and above that assumed in the price-cap setting process will automatically lower average costs (because of the large fixed element in total costs) and increase profit. In view of the importance of fixed costs in gas transmission and distribution, a move to a combination of price and revenue caps, an approach which is gaining acceptance in the United Kingdom[14], may be appropriate.

Gas Cost Pass-through

Disputes between Enargas and the distribution companies over the full passing on of gas acquisition costs, which is in principle provided for in the 1992 Natural Gas Act, go back ultimately to the lack of competition at the wellhead. Enargas is rightly concerned that the distribution companies do not always seek to minimise their gas costs, since such costs are usually recovered in final tariffs. They may seek to shift higher gas costs onto customers in the regulated sector. The measures implemented by Enargas were intended to address these problems in a pragmatic second-best fashion. In the absence of true competition in supply, the optional cost-sharing mechanism introduced in 1995 with decree 1020/95 uses a carrot-and-stick approach. It was a sensible attempt to provide the distribution companies with an incentive to minimise total costs. That incentive might be more powerful if the companies were not threatened with financial penalties — the stick — when acquisition costs turn out to be higher than the benchmarks set by Enargas. The mechanism will become more attractive to the

14. The UK regulator, Ofgas, introduced a hybrid revenue/price cap in the 1997 BG Transco price review, whereby only 50% of any increase in revenue due to higher than forecast throughput would be retained by Transco.

companies and more effective in encouraging them to seek out the cheapest gas supplies as the spot market expands. Ultimately, however, the most effective mechanism to minimise costs for all customers is full competition at the wellhead through to final consumers and retail unbundling (see above). Achieving this would also resolve the problem of calculating average gas costs to be passed on to regulated customers.

Dispute Resolution

A broader concern that has been expressed by the industry is the lack of an effective, well-financed competition authority or other body to act as an arbiter in the event of disputes between the regulator and the regulated companies. There may be a case for giving the existing competition authority a more active role in dealing with disputes or establishing a separate advisory body, possibly along the lines of the Monopolies and Mergers Commission in the United Kingdom or the Competition Authority (Autoritta Garante Competencia) in Italy. These issues — and the related issue of competition in the oil and gas sector — would need to be addressed within the context of a general review of the entire framework of competition law, which is beyond the scope of this review.

PROMOTING EXPLORATION AND PRODUCTION

A stable legal framework and an attractive tax and royalty regime are vitally important to the long-term development of natural gas resources in Argentina, which would in turn support higher exports and promote the development of competition in the region. There appear to be good prospects for expanding reserves and increasing production because the Argentine producing gas basins are relatively immature and because most sedimentary basins are unexplored. However, existing legal and fiscal arrangements may no longer be appropriate in view of the restructuring and privatisation of the oil and gas sector and the recent weakness of oil prices. In particular, there appears to be a need for greater clarity over upstream regulatory responsibilities and organisation, less onerous conditions in exploration permits and possibly a reduced fiscal burden on production. These reforms can probably only be achieved through an overhaul of oil and gas legislation. The Government will need to address industry concerns that the proposal to devolve powers over taxation and royalties to provincial authorities could lead to instability and inconsistency in upstream regulation among provinces.

REGIONAL MARKET INTEGRATION

Although the regional market appears large and receptive to increased natural gas trade, this potential can only be fully realised if compatible investment and regulatory regimes are established in all countries in the region. Furthermore, all governments in the region will need to be transparent and consistent in implementing their legislation and regulatory rulings with the aim of eliminating barriers to greater natural gas trade and investment when they occur rather than merely assuming a policing function. The Argentine Government will wish to play an active role in reducing and eliminating barriers to regional trade and investment.

APPENDIX A

ENERGY BALANCE, 1996
(Thousand Tonnes of Oil Equivalent)

Supply and Consumption	**Coal**	**Crude oil**	**Petroleum products**	**Gas**	**Nuclear**	**Hydro**	**Combustible renewables & waste**	**Electricity**	**TOTAL**
Indigenous production	183	42379	–	25688	1944	1977	2690	–	74860
Imports	755	759	1711	1760	–	–	–	315	5299
Exports	–	– 16858	–3662	–	–	–	–	– 26	– 20546
Int marine bunkers	–	–	– 570	–	–	–	–	–	–20546
Stock changes	–50	–75	2	–	–	–	–	–	–123
TPES	**888**	**26205**	**–2520**	**27447**	**1944**	**1977**	**2690**	**289**	**58920**
Transfers	–	–1306	1440	–	–	–	–	–	134
Statistical differences	–4	215	–1148	–1760	–	–	–	–330	–3028
Electricity plants	– 548	–	–977	–8358	–1944	–1977	–135	5999	–7939
Petroleum refineries	–	–24727	23985	–	–	–	–	–	–741
Coal transformation	–81	–	–	–	–	–	–	–	–81
Other transformation	–	–	–	–	–	–	–314	–	–314
Own use	–5	–28	–1059	–3724	–	–	–	–193	–5009
Distribution losses	–8	–	–240	–774	–	–	–	–1097	–2119
TFC	**242**	**358**	**19481**	**12832**	–	–	**2241**	**4668**	**39823**
INDUSTRY	**242**	**358**	**1230**	**5897**	–	–	**1795**	**1916**	**11438**
Iron & steel	129	–	–	–	–	–	–	–	129
Chemicals,	–	358	657	198	–	–	–	–	1213
of which feedstocks	–	358	657	198	–	–	–	–	1213
Non–specified	113	–	573	5699	–	–	1795	1916	10096
TRANSPORT	–	–	**12637**	**906**	–	–	–	**36**	**13579**
Air	–	–	1148	–	–	–	–	–	1148
Road	–	–	11398	906	–	–	–	–	12304
Rail	–	–	–	–	–	–	–	36	36
Internal navigation	–	–	91	–	–	–	–	–	91
OTHER SECTORS	–	–	**4142**	**6028**	–	–	**447**	**2716**	**13333**
Agriculture	–	–	2693	–	–	–	–	40	2733
Commerce	–	–	186	1098	–	–	–	1106	2389
Residential	–	–	1263	4931	–	–	386	1516	8095
Non–specified	–	–	–	–	–	–	–61	54	115
NON–ENERGY USE	–	–	**1473**	–	–	–	–	–	**1473**
Electricity generated (GWh)	1520	–	3800	33706	–	–	289	–	69759

Source: IEA, *Energy Statistics and Balances of Non-OECD Countries, 1995-1996* (1998, OECD: Paris).

APPENDIX B

TGS/TGN TRANSMISSION TARIFFS, Effective 1 January 1998

Reception point	Delivery zone	Firm supply: monthly capacity charge ($/m³/day reserved)	Interruptible supply: (US$/1000m³ transported)	Demand charge[1]: Gas retained for fuel and losses (% of gas received)
TGN				
Salta	Salta	0.122935	4.097849	0.91
	Tucuman	0.256116	8.533769	1.97
	Central	0.471252	15.705002	3.37
	Litoral	0.614676	20.489241	4.60
	Aldea Brasilera	0.658731	21.957723	4.90
	Greater B. Aires	0.706879	23.562626	5.20
Neuquen	Neuquen	0.102446	3.585618	0.69
	La Pampa Sur	0.256116	9.732390	2.09
	Cuyana	0.317582	10.582692	2.43
	Central (Sur)	0.327828	10.931010	2.60
	Litoral	0.471252	15.705002	3.83
	Aldea Brasilera	0.519997	17.333247	4.20
	Greater B. Aires	0.573698	19.157440	4.86
TGS				
T. Del Fuego	T. Del Fuego	0.080845	2.694807	0.49
	Sta. Cruz Sur	0.161687	5.389611	0.98
	Chubut Sur	0.404221	13.474031	3.38
	Buenos Aires Sur	0.474960	15.831986	5.60
	Bahia Blanca	0.727598	24.253254	8.40
	La Pampa Norte	0.747809	24.926956	8.60
	Buenos Aires	0.848864	28.295463	10.35
	Greater B. Aires	0.949919	31.663970	11.27
Sta. Cruz	Sta. Cruz Sur	0.080845	2.694807	0.49
	Chubut Sur	0.323377	10.779225	2.89
	Buenos Aires Sur	0.394116	13.137179	5.11
	Bahia Blanca	0.646754	21.558449	7.91
	La Pampa Norte	0.666965	22.232149	8.11
	Buenos Aires	0.768020	25.600657	9.86
	Greater B. Aires	0.869074	28.969164	10.78
Chubut	Chubut Sur	0.080845	2.694807	0.49
	Buenos Aires Sur	0.151585	5.052761	2.71
	Bahia Blanca	0.404223	13.474030	5.51
	La Pampa Norte	0.424434	14.147731	5.71
	Buenos Aires	0.525489	17.516238	7.46
	Greater B. Aires	0.626544	20.884745	8.38
Neuquen	Neuqeun	0.070739	2.425327	0.49
	Bahia Blanca	0.343588	11.449556	2.80
	La Pampa Norte	0.373904	12.460109	3.15
	Buenos Aires	0.464854	15.491765	3.91
	Greater B. Aires	0.565909	18.897327	4.86

1. Applies to both firm and interruptible transportation.

Source: Enargas Resolutions 555 and 556.

GLOSSARY

B/d Barrels per day.
Bcm Billion cubic metres.

Cammesa Compania Administradora del Mercado Mayorista Electrico S.A.; wholesale electricity market operator.
CCGT Combined-cycle gas turbine power station, usually gas-fired.
City gate Point at which LDC takes delivery of gas; physical interface between transmission and local distribution systems.

Enargas Ente Nacional Regulador del Gas, gas sector regulator.
Enre Ente Nacional Regulador de Electricidad, electricity sector regulator.
EU European Union.

FERC Federal Energy Regulatory Commission (United States).

GdE Gas del Estado, former monopoly integrated gas transmission and distribution company.
GDP Gross domestic product.
GWh Gigawatt hours (unit of energy).

IEA International Energy Agency.

Km Kilometres.
kWh Kilowatt hour (unit of energy).

LDC Local distribution company.
LNG Liquefied natural gas.
Load factor Average daily system throughput (or consumption) divided by peak daily throughput, expressed as a percentage.

Mb/d Million barrels (of oil) per day.
Mbtu Million British Thermal Unit, unit of energy.
Mercosur Southern Cone Common Market, comprising Argentina, Brazil, Paraguay and Uruguay; Bolivia and Chile are associate members.
Mmcf/d Million cubic feet per day.
Mcm Million cubic metres.
Mtoe Million tonnes of oil equivalent.
MW Megawatt.

NGLs Natural gas liquids.

OECD Organisation for Economic Cooperation and Development.

PPI Producer price index.

RPI Retail price index.

Swing A contractual commitment allowing a buyer to vary up to specified limits the amount of gas it can take at the wellhead, beach or border; the maximum daily contract quantity is usually expressed as a percentage of the annual contract quantity (100% equates to zero swing).

Take-or-pay A contractual commitment on the part of a buyer to take a minimum volume of gas, usually over a 12 month period, usually expressed as a percentage of the annual contract quantity.

Third-party access The right or possibility for a third party to make use of the transportation and related services of a pipeline company for a charge to move gas owned by the third party.

TGN Transportadora de Gas del Norte

TGS Transportadora de Gas del Sur.

TPES Total primary energy supply.

YPF Yacimientos Petroliferos Fiscales.

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