

The Quest for Energy Security in Argentina

Roberto Kozulj

2010

Abstract

This report deals with the problem of energy security in Argentina, an issue that first emerged in 2004 as a consequence of the particular modalities adopted by the macroeconomic structural and energy sector reforms of the 1990s, which are still in place today. Because of this, Argentina faces many challenges. Since the reforms, energy supply expansion has depended primarily on the private—mainly international—sector rather than on the state, adversely affecting attempts to ensure supplies, since international investors have prioritized obtaining local revenues to be reinvested outside Argentina. The growing dependence on gas supplies has been the result of such strategies, since the monetization policy for gas and oil reserves has minimized the exploratory risk and led to a situation of inadequate gas supplies, which since the 1990s has jeopardized electric supply security. Other sources of energy have not been able to compete efficiently with cheaper gas supplies. Furthermore, since the reforms were based on a macroeconomic scheme of an overvalued currency that was unsustainable in the long term, the initial price signals—valid for the first 10 years—have been modified as international prices have risen, thus further delaying the investments required to increase supplies and increasing the gap between investments and demand growth. Despite the government's more proactive approach since 2008, which encourages investment in other sources of energy, supply security in Argentina will remain dependent on gas, presumably through imports. Finally, the development of huge hydroelectric projects will be subject to the achievement of bilateral agreements with Brazil.

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Published by the International Institute for Sustainable Development

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Trade Knowledge Network Series on Trade and Energy Security – Policy Report 2

The Quest for Energy Security in Argentina

Roberto Kozulj

2010

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This study is part of a larger, multi-region TKN project that seeks to understand better the impacts of trade policy on energy security. It includes country case studies and regional analyses from South America and Southern Africa. It was made possible through the generous support of the Norwegian Agency for Development Cooperation (NORAD). The project outputs are available on the TKN website.

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About the author

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His publications include books and numerous articles in specialized journals, as well as documents for the ECLAC Natural Resource and Infrastructure Division and for other international bodies.

Abbreviations and acronyms

ABB	Argentina-Bolivia-Brazil
BOE	barrel of oil equivalent
E&P	exploration and production
EUR	euro
FO	fuel oil
GDP	gross domestic product
GO	gas oil
Gw	gigawatts
GwH	gigawatt hours
IAPG	Instituto Argentino de Petróleo y Gas
kBOE	thousand barrels of oil equivalent
kW	kilowatt
LNG	liquefied natural gas
MBTU	millions of British thermal units
MC	mineral coal
Mm ³	million cubic metres
MW	megawatts
NES	National Energy Secretariat
OLADE SIIE	Organización Latinoamericana de Energía Sistema de Integrado de Información Energética
Repsol-YPF	Refinería de Petróleos de Escombreras Oil-Yacimientos Petrolíferos Fiscales
RW	rest of the world
USD	U.S. dollar

Executive summary

Argentina faces serious challenges regarding the policies it needs to implement in order to guarantee the country's energy security in the short, medium and long term. This report analyses the causes and consequences of such situation, as well as likely future actions leading on from policies that have already been implemented.

Several focal points are developed:

- the causes and consequences of displacing energy sector investment decisions from the public to the private sector after the privatization process of the 1990s;
- the causes and consequences of private investment decisions regarding the electricity generation matrix, with a particular emphasis on changes in total generation composition and the hydro-thermal balance;
- Argentina's dependence on natural gas as a fuel for thermal generation in relation to company strategies implemented by natural gas producers;
- the description of the limited possibilities of diversifying the country's energy matrix in the short and medium term—particularly by using clean and renewable fuels—as a consequence of the problem of tariff impact and the financial restrictions faced by the public sector; and
- impacts of this situation on the energy security and environmental question.

The report is divided into sections dealing, respectively, with each of these issues. Section 2 describes the behaviour of electric power demand and supply over the last four decades. The purpose of this is twofold. On the one hand, it aims at showing the dissimilar trends in the growth of both variables (key issues in order to understand the precarious situation Argentina faces in terms of energy security) and on the other, it seeks to describe the factors that have determined these trends' dynamics and direction.

This emphasizes the effect of the peculiar ways in which the reforms of the electricity and natural gas regulatory frameworks have determined the behaviour of demand and investment. It explains the relation between electricity reforms and those of other energy chains and the Convertibility Plan that was in place between 1992 and the beginning of 2002, the resulting division of tariffs and energy costs into their expression in U.S. dollars and Argentine pesos (as a consequence of the structural currency overvaluation guaranteed by an explicit legal framework), and the meaning of such price signs for company strategies and consumers. These links reveal that the relative prices of the economy over the 1990s oriented electricity demand towards the commercial, service and household sectors, both because Argentina became a net importer of commodities and because consumption loans were increased. All of this led to an increase in the demand for all kinds of electric appliances and a strong expansion of consumption units in trades and services, which determined very high growth of electricity demand. A reverse trend was shown by industrial demand during this period, since it grew at levels below those of the other sectors as a consequence of the policies of commercial and financial opening with an overvalued currency for a long period, which led to deindustrialization and recession.

Since the Convertibility Plan was unsustainable—as it implied not less than 10 billion dollars a year worth of foreign loans with no possibilities of convergence and solvency—the impacts on the period following the 2001–02 crisis are also described. This period ended in a strong devaluation of the

Argentine peso, which radically affected energy tariffs and costs. In this new context, Argentina could not go back to tariff levels in dollars, which were the prior reference for investors. Furthermore, the increase in international oil prices in the same period created a further distance between domestic price levels and opportunity costs. This affected demand in two ways. On the one hand, the new global situation of relative prices produced a marked industrial reactivation that in turn increased electricity demand from this sector. But at the same time, low electric power prices discouraged electricity and gas consumers from increasing energy efficiency.

On the supply side, the two situations described above—the Convertibility Plan and its discontinuation in 2002—generated specific behaviours related to investments and the orientation of the energy matrix. In the period when the Convertibility Plan was in operation, investment was directed towards the setting up of thermal plants with combined cycle technologies with the aim of achieving better efficiency in the wholesale electricity market and quickly monetizing gas reserves (the Convertibility Plan was not perceived by investors as being feasible for any sustained length of time). Over the post-convertibility period, on the other hand, price signs were not sufficient to attract new investment. All this led to a growing dependence on natural gas both to ensure electricity supply and to provide users with natural gas through the grid, and to serious restriction on gas and electricity supply produced by the lack of investment. Whereas neither of these macroeconomic situations described produced sufficient or high risk investment, supply grew well below demand in the electricity and natural gas markets. In the latter case, another way of monetizing reserves had been to promote exports, which then had to be gradually reduced. This affected Chilean electricity supply seriously, and that country also had to redirect its energy matrix towards a larger dependence on liquid fuels, and had to build a regasification plant in order to import liquefied LNG or Liquefied Natural Gas.

Since after the reforms supply expansion no longer depended on state investment, and bearing in mind that most of the investment depended on foreign companies, the analysis carried out in section 3 focuses on the strategy implemented by one of these companies, Repsol-YPF, the one with the largest share of the market. This section therefore deals with the question of company behaviour and shows that there has been a displacement of hydrocarbon revenue in Argentina towards investments in other regions of the world. Such investments ensure energy supply in the countries where they come from and improve their international position in the world energy markets. The key argument is that, in the absence of the obligation to reinvest and—to a certain extent irrespective of the question of the distance between domestic prices and opportunity costs—the Argentine case is paradigmatic of the fact that redirecting investments by means of market mechanisms in order to guarantee supply has turned out to be impossible. At the same time, given the lack of state mechanisms, private actors may establish objective maximization strategies very different from those of the country where they carry out most of their operations and from which they get their main revenue. Likewise, market competition has proved to be an inefficient mechanism to diversify the electricity matrix, leading Argentina to an overdependence on a scarce and non-renewable fuel such as natural gas.

Consequently, section 4 examines other energy sources such as hydroelectricity, nuclear energy and renewables. Since over the convertibility period these energy sources did not have a chance of coming into the market by means of private investments (given their high capital costs, the time such investments need to mature and the mechanisms of a competitive market), the penetration of such sources simply stagnated. It was only with the gas supply crisis in 2004 that the search for a diversified energy matrix became necessary in order to reach a reasonable level of energy security. However, it was evident that, without state investment (or private investment, induced through tax or financial mechanisms), these sources could not be developed. Nonetheless, although this was already clear at the

time, it was only by 2008 that government initiatives were put in place for the development of renewables, hydroelectricity and new nuclear power-based projects. Whereas in this last case development depends, exclusively on the financial capacity of the public sector, and will continue to do so, in the cases of new hydroelectric projects and the development of clean and renewable energy sources, the state uses tenders and return of programmed private investments to attract private initiatives.

However, several factors still need to be dealt with for these strategies to be consistent. In the first place, tariffs should increase, which implies high political costs. On the other hand, fiscal accounts, which produced a surplus until 2008, no longer do so nowadays. The reason for this is the enormous impact of energy sector subsidies deriving from the differences between tariffs and the costs incurred by energy generators and producers.

Besides, despite the fact that this matrix diversification is under way, demand projections indicate that gas supply for electricity generation and other uses, and hydroelectricity supply will need to be increased to a very large extent. In the first case, foreign supplies of liquefied natural gas (LNG) will be acquired, but not before the next five years, simply because Argentina has not yet built a regasification plant. In the second case, future large-scale hydroelectric works depend on binational agreements where Brazil plays an important role.

Section 5 states the conclusions, summarized in several simultaneous considerations. On the one hand, given the context described above, it is quite likely that consumption of liquid fuels and LNG (through regasification vessels) will increase. Larger consumption of liquid fuels—already recorded systematically as of 2004—certainly implies reversing the trends of a clean matrix that Argentina had achieved through the use of hydroelectricity, nuclear power and an extensive use of gas for power generation with efficient technologies towards another less environmentally friendly matrix.

On the other hand, although a door has opened for clean and renewable energies, and their use may even increase, the question of inadequate structure, tariff levels and prices of other energy commodities still has to be resolved. This coincides with a complicated fiscal situation that looks difficult to overcome, which creates uncertainties.

So, while supply security has gradually become more precarious, it does not look as though the situation will improve in the next five years. Necessarily, then, as imports become more important, the outlook should become clearer, even though a high political cost may have to be paid.

Finally, strong energy integration with Brazil could ease this serious situation in the medium term, were binational hydroelectric projects to be initiated. Similarly, any strategy aimed at trying to reactivate gas supplies from Bolivia would be highly beneficial. So far, however, none of this has been clarified.

1. Introduction

This report deals with the complexities of Argentina's attempts to achieve energy security, an issue that first emerged in 2004 as a consequence of the particular modalities adopted by the macroeconomic structural and energy sector reforms of the 1990s, which are still in place today. Section 2 describes how the context of electric power demand and supply has evolved over a long period, in an attempt to show the forces that drove each of them at various key stages in Argentina's energy supply history:

- before the reforms (1976–90);
- for the 10 years that the reforms and the so-called Convertibility Plan lasted (1991–2001); and
- since the abandonment of this plan to the present.

Two facts arise from the discussion: (1) demand has increased well beyond supply, and (2) in the coming years, electricity supply security will be inevitably be dependent on gas supplies.

Based on these conclusions, section 3 studies the behaviour of the main energy conglomerate, Refinería de Petróleos de Escombreras Oil-Yacimientos Petrolíferos Fiscales (Repsol-YPF), since its strategy in great part determines future gas supplies. An analysis of this group's investment strategy concludes that, as is the case for many other such groups, a policy of investments outside Argentina and the region has been favoured. Section 3 also discusses Argentina's options to obtain imported gas. The difficulties of obtaining gas supplies from Bolivia are discussed, as well as the implications of importing liquid natural gas (LNG).

Section 4 explores the remaining sources for power generation, analyzing the scope of each, as well as the financial difficulties they pose and the way Argentine authorities are facing the problems affecting them. The analysis highlights how the state adopts the role of subsidizing agency regarding price policies and investments for the development of new projects, as a response to the insufficiency of private investments.

The report therefore concludes that, even though Argentina has recently resorted to developing non-conventional energy sources by establishing auctions and future energy prices for these sources through mechanisms that ensure that private investments achieve adequate returns, the space for clean and renewable sources remains reduced. The same applies to hydroelectric and nuclear energy sources, so the main challenges are to find new natural gas supplies in time to avert an energy supply crisis, and to speed up regional integration in order to take advantage of the potential for bilateral hydroelectric projects.

However, together with the factors mentioned above, Argentina's failure either to improve its price signals or implement demand management programs to reduce consumption, together with the fact that subsidies are of the utmost importance within a context of a fragile public account balance, constitute the major obstacles preventing Argentina from achieving a reasonable level of energy security.

Finally, although Argentina has a relatively clean generation matrix (basically gas, thermal, hydroelectric and nuclear) and has actively encouraged the use of renewable energies, a step back is looming, since a natural gas shortage has driven it to more polluting alternatives, such as fuel oil and diesel oil.

2. The context of electricity demand and supply

2.1 Long term demand behaviour

At the beginning of the 1990s Argentina started a vast program of energy sector reform comprising the vertical unbundling of energy chains and the privatization of almost all state run companies. Before the implementation of this program, state run companies provided and produced all energy services, which was also the prevailing model in almost all Latin American countries (Díaz de Hasson, 1995; Pistonesi, 2000; Kozulj, 1993; 2000; 2002a; 2002b; 2005; 2009a; 2009b; Kozulj *et al.*, 1993).

Some of the reasons for these reforms and the privatization of public assets were the high levels of indebtedness of these companies, the fact that their management was sometimes guided by political interests, and the fact that prices and tariffs were based on certain targets extraneous to the energy industry, e.g. as part of attempts to reduce inflation. However, in the case of Argentina, although these factors were also present, reforms and privatizations were also part of a package of measures that, together with the Convertibility Plan, were crucial to the process of renegotiating the country's high foreign debt.¹

One of the main consequences of this reform process was that the expansion of energy supplies no longer depended on the state, but on investment decisions made by private companies belonging to the different segments into which the energy supply system was broken up. This affected regulation issues and other issues related to energy supply expansion. Investments were then short term oriented, as almost no obligations to either invest or expand supplies were required by the terms and conditions of the privatization process, since it was assumed that the need for such actions would arise naturally from price signals and the market (Kozulj, 1993; Solanes, 1999; Ruiz Caro, 2009; Maldonado & Palma, 2004).

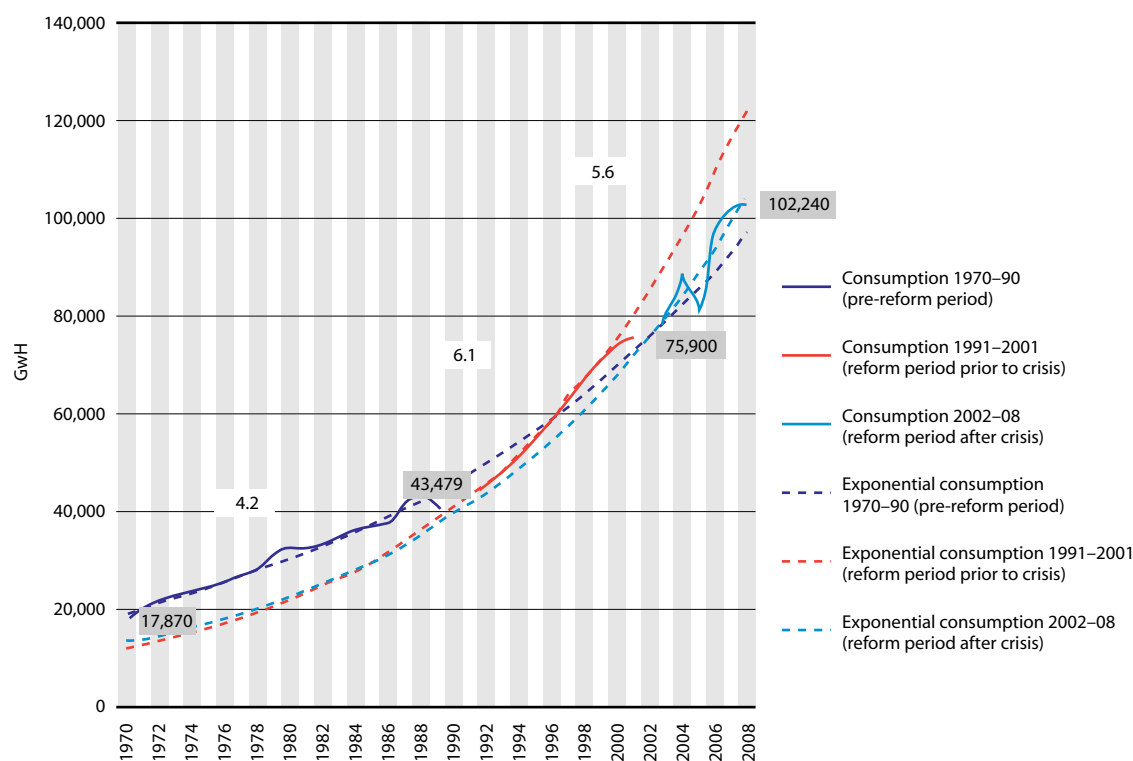
Another consequence of privatization was the rapid growth of electricity demand, motivated by easy energy access, low price policies, socioeconomic transformations, and cultural and technological factors. In order to understand the Argentine case, it is necessary to consider the effects of currency appreciation, the Convertibility Plan and the policy of split pricing (prices expressed in U.S. dollars and in the local currency), all of which will be dealt with below. For now, it is only necessary to highlight that, while the degree of currency appreciation doubled the tariffs in dollars, in general it reduced them in the local currency, encouraging high levels of power consumption. Whereas between 1970 and 1990 average growth in demand reached 4.2 percent per year, after the reforms it rose to 6.1 percent per year during the first implementation stage, and 5.6 percent during the second (4.3 percent as of 2001). This growth rate was therefore affected by the drastic policy implementations after privatization and legislative changes (Figure 1).

Over the first stage of the implementation of the reforms, electricity demand grew mainly as a consequence of the enormous increase in commercial, public and service consumption (9.3 percent per year) and consumption by the household sector (6.4 percent per year). These sectors, then, accounted for 65 percent of the increase in electricity consumption between 1990 and 2001. However, after the 2001–02 crisis, which meant the discontinuation of prior policies regarding tariffs and other aspects of

1 Unlike other Latin American countries, Argentina's foreign debt did not originate in infrastructure investments or in the importation of capital assets to modernize the country, but in monetary policies that led to financial speculation.

electricity regulation,² growth was due to an increase in consumption in the industrial sector, which accounted for 55 percent of total demand (Figure 2).

Figure 1: Growth of electricity demand in Argentina, 1970–2008 (GwH)

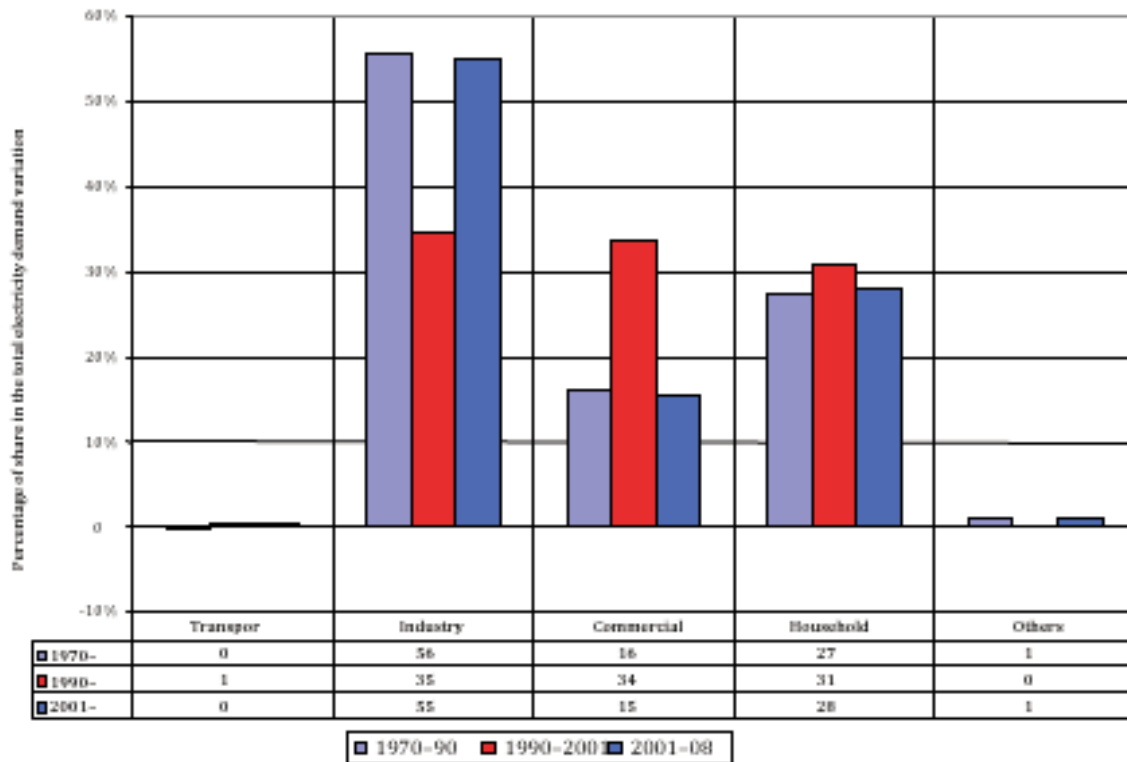


Source: Author's estimates using data supplied by Organización Latinoamericana de Energía Sistema de Integrado de Información Energética (OLADE SIIIE), 2010

This demand behaviour was certainly affected by the socioeconomic reforms that took place between 1990 and 2001 and were related to the Convertibility Plan discussed above. This plan was based on a currency board regime, with monetary overvaluation that had several simultaneous effects: (1) it induced consumption of imported goods;³ (2) it concealed tariff and energy price increases behind their expression in U.S. dollars; (3) it guaranteed a high investment recovery rate within a context of legal certainty; and (4) it provoked an unprecedented deindustrialization process. It is therefore natural that the commercial sector should have grown so much over this period, with the consequent growth of electricity consumption in a context in which its cost was low in the local currency, i.e. the Argentine peso (Kozulj, 1993; 2002a; 2002b; 2005; Suazo, 2002; Rozenworcel, 2008).

- As will be explained below in more detail, the Convertibility Plan implied the automatic conversion of Argentine pesos into U.S. dollars at one-to-one parity. But this parity was based on an overvaluation of the peso, which led to severe overindebtedness and deindustrialization; the implicit real equivalence or equilibrium exchange rate was more like two pesos per dollar. Therefore, the Convertibility Plan was not sustainable without continuous foreign capital inflows. From 1998 to 2001 the country entered a deep recession and also required more than USD 90,000 million dollars to support its economy. At the end of 2001 the system collapsed and at the beginning of 2002 the peso fell three times or more in value. Tariffs in USD decreased proportionally while the abandonment of convertibility was translated into a simultaneous tariff freeze, expressed in Argentine pesos, in a process known as 'tariff pesification'. Consequently, the industrial growth profile (reactivation) was modified. Energy sector investments were modified as well, since incomes for private actors from the sector were diminished by these 'pesified' tariffs.
- It should be highlighted that the availability of heating, ventilating and air conditioning units at very low prices was an important factor in the growth in electricity demand.

Figure 2: Variations in electricity demand according to changes in the electricity regulation model, 1970–2008 (GwH and %)



Source: Author's estimates using data supplied by OLADE SIE, 2010

After the 2002 devaluation, electricity tariffs remained practically frozen, but in dollars, the cost was divided by almost three or more. In this new socioeconomic context, the industrial sector grew once more, causing an increase in electricity demand of 5.2 percent per year. Along with these changes, household and commercial consumption also reached high rates, considering the new threshold that had been reached after the reforms (2.8 percent and 4.2 percent per year, respectively).

In turn, there were belated attempts at implementing demand management measures, for which a well structured program still does not exist even today. Another important factor to explain the growth in electricity demand was the adoption of electrically powered air conditioning systems, whose spread was a consequence of their low purchase and installation costs for the household, commercial, services and industrial sectors.

Finally, it should be added that, even though the idea of exporting electricity as a means of maximizing sales and revenues after privatization was among the strategic investment decisions made by the power sector, this never actually materialized. For this reason, the following section deals with this issue, since electricity exchanges did not significantly affect electricity demand, which was mainly internal. On the other hand, this export strategy *did* increase demand for gas, oil and petroleum products.

2.2 Long term supply behaviour

The growth of electricity supply underwent several qualitative and quantitative changes after both periods of reform, which is crucial in order to explain the Argentine energy crisis after 2004. Although, by definition, the net generation of losses is identical to consumption, the increase of the system's capacity was well below the increase in demand (Table 1).

Table 1: Installed capacity trend in Argentina, 1970–2008

	1970	1980	1990	2000	2008
Capacity (Gw)	6.7	12.0	17.2	25.9	28.1
Average generation (GwH) (= consumption)	17,875	32,889	40,341	74,525	102,240
Theoretical maximum capacity (GwH)	58,613	105,269	150,383	227,386	245,834
Average use factor	30%	31%	27%	33%	42%

Annual average increase (%)

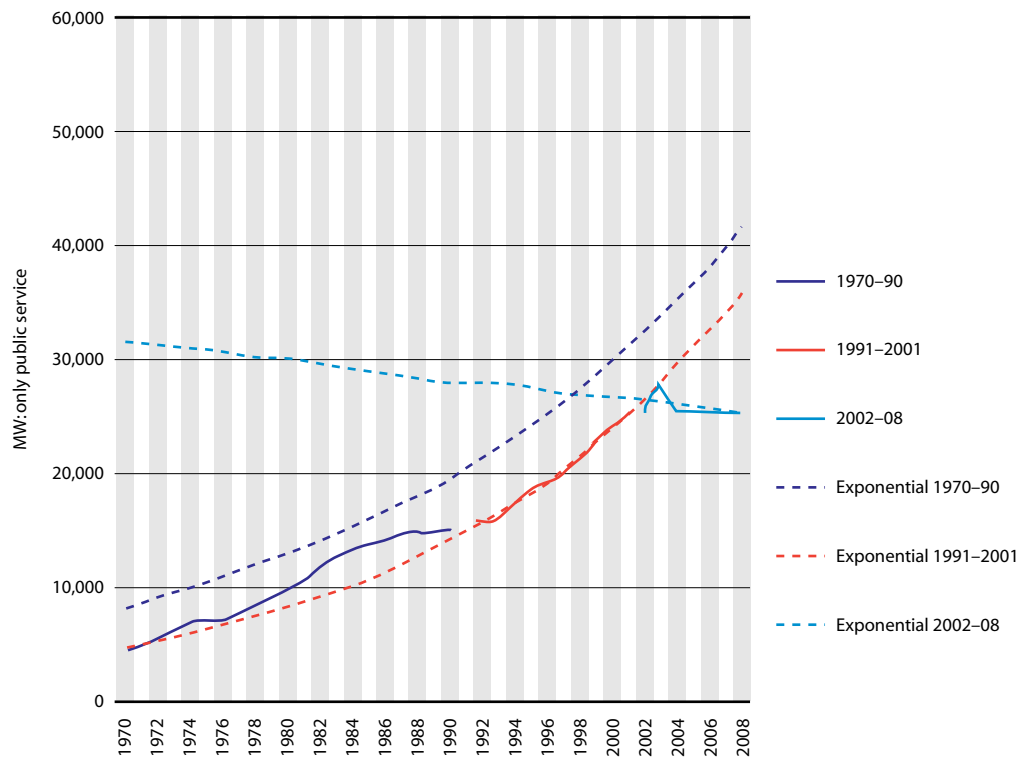
	1970–80	1980–90	1990–2000	2000–08	1990–2008
Capacity (Gw)	6.0%	3.6%	4.2%	1.0%	2.8%
Average generation (GwH) (= consumption)	6.3%	2.1%	6.3%	4.0%	5.3%
Theoretical maximum capacity (GwH)	6.0%	3.6%	4.2%	1.0%	2.8%
Average use factor	0.2%	-1.5%	2.0%	3.0%	2.5%

Source: Author's estimates using data supplied by OLADE SIE, 2010

Supply behaviour, expressed in terms of the growth of installed capacity, has been in line with the different socioeconomic and electricity sector models in force before and after the reforms. Between 1970 and 1990 growth of installed capacity greatly exceeded growth in demand. The installation of large national and binational hydroelectricity and nuclear power plants created an atmosphere of supply security that collapsed at the end of 1989, when a high level of unavailability was evident in terms of old conventional thermal capacity requirements. However, after the reforms, this capacity recovered thanks to a series of minor investments made by the private sector immediately after privatization. By the end of the 1980s Argentina, like many Latin American and other countries, faced serious domestic and foreign debt problems, which limited the budgets of their public companies, which sometimes reported deficits as a consequence of taxes with net tariffs below the real cost of electricity. In fact, the Convertibility Plan was meant to overcome—at least in the medium term—the limits to domestic and foreign financing derived from this situation and from an inflationary process that in Argentina has been severe since 1975. However, electricity sector investments were highly dynamic in spite of this context.

Figure 3 shows that towards the end of the 1980s there was relative stagnation of the increase in installed capacity, but between 1970 and 1990 the trend of investments in generation capacity exceeded investments over the reform period. After the convertibility crisis (2002), however, stagnation continued, and capacity even decreased, because some thermal plants were taken out of service as they reached the end of their working lives.

Figure 3: Installed capacity trend, 1970–2008 (MW)



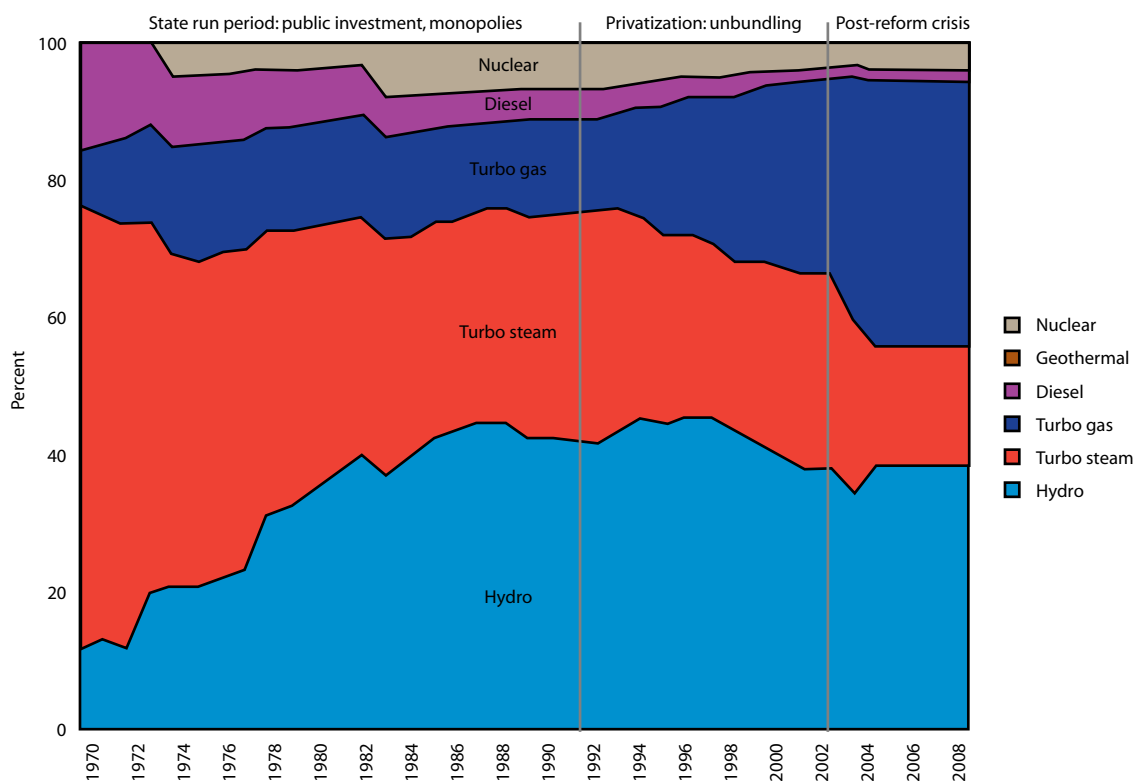
Source: Author's estimates using data supplied by OLADE SIE, 2010

2.3 Thermal generation and the problem of natural gas supply

One of the most important results of the structural transformations of the 1990s was the drastic change in the pattern of technology that was used. As is well known, the introduction of high efficiency combined cycle technologies was an outstanding feature at the global level as of the beginning of this decade. In Argentina, this trend was also boosted by the vertical and horizontal reintegration of energy chains, which led to the emergence of energy conglomerates. As a consequence, interactions between the gas and electricity markets became highly dynamic.

The growing trend of thermal generation, mainly using natural gas, was correlated with a dramatic increase in gas demand (Figures 4 and 5). This trend, which was already evident before the reforms, intensified after they were put in place.

Figure 4: Generation trend by type of technology, 1970–2008 (% of generated total)



Source: Author's estimates using data supplied by OLADE SII, 2010

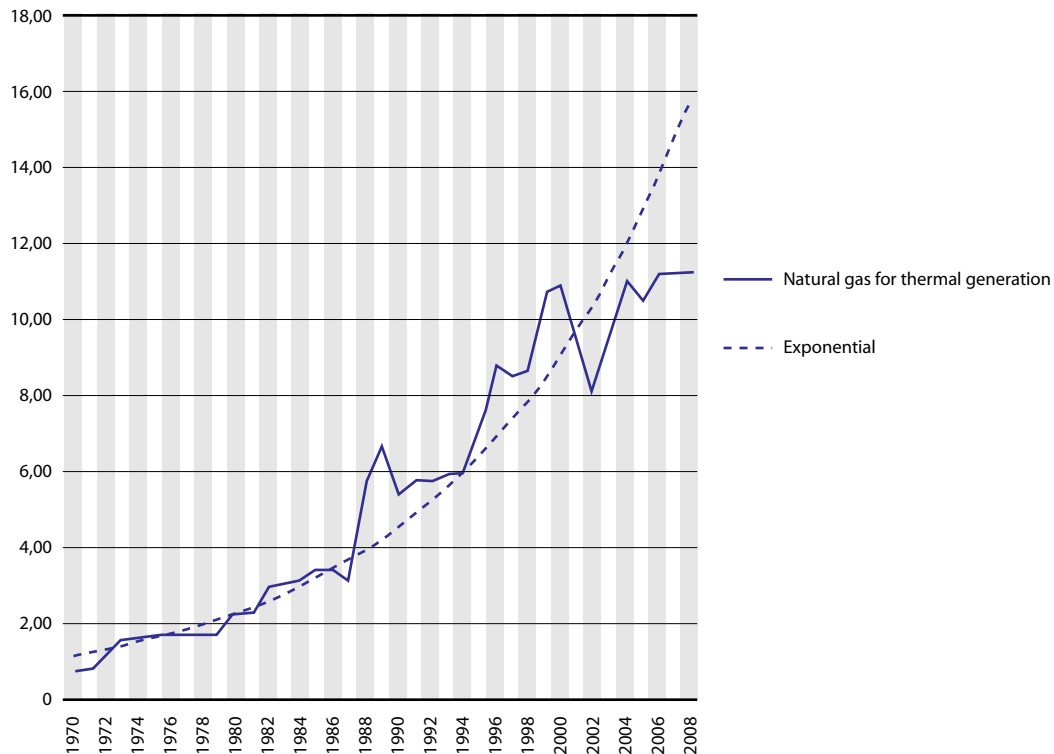
Several factors contributed to this expansion of electricity supply. On the one hand, during the 1980s several countries became indebted for different reasons, but in many cases in Latin America the building of large scale hydroelectric facilities required massive investment and foreign loans. In Argentina, such projects—particularly those in the Limay River basin, carried out by the state run company Hidronor—were financed by a creative and efficient system comprising domestic funds coming from oil revenues. In the case of binational works, however, delays, overpricing, and the growing importance attributed to their environmental and social impact restricted the construction of new hydroelectric power plants. The Yacireta case was emblematic of this in that the cost per installed MW greatly exceeded initially expected costs.⁴

On the other hand, the reform process enabled private groups to gain access to gas reserves and electric generation assets. This created opportunities to expand generation with pre-existing conventional thermal plants and with new combined cycle plants, which, thanks to investment and operating costs being kept low by low cost gas, led to a rapid increase in the value of the purchased reserves and

⁴ The initial budget had been estimated at around USD 1.5 billion. By 1979 it had already reached USD 5.35 billion. Without the current expansion, it is estimated that the cost is over USD 3,600/kW; this figure should be compared, for example, to the approximately USD 2,000/kW for Itaipú, which was also affected by high costs. During the 1990s, these values were compared to the investment costs for combined cycle plant technology, which were estimated at USD 600–800/kW, with low operating costs due to the low natural gas price and the efficiency of this technology, which was new at the time.

guaranteed high returns on investments in the electricity and hydrocarbon sectors. Vertical integration, permitted to a certain extent, and the horizontal integration of gas and electricity chains brought about the emergence of private electricity conglomerates with interests in Argentina, but also in other Latin American and Caribbean countries and the rest of the world.

Figure 5: Natural gas consumption trend for thermal generation, 1970–2008 (Mm³/year)^a



^a Mm³ = million cubic metres.

Source: Author's estimates using data supplied by OLADE SIIIE, 2010

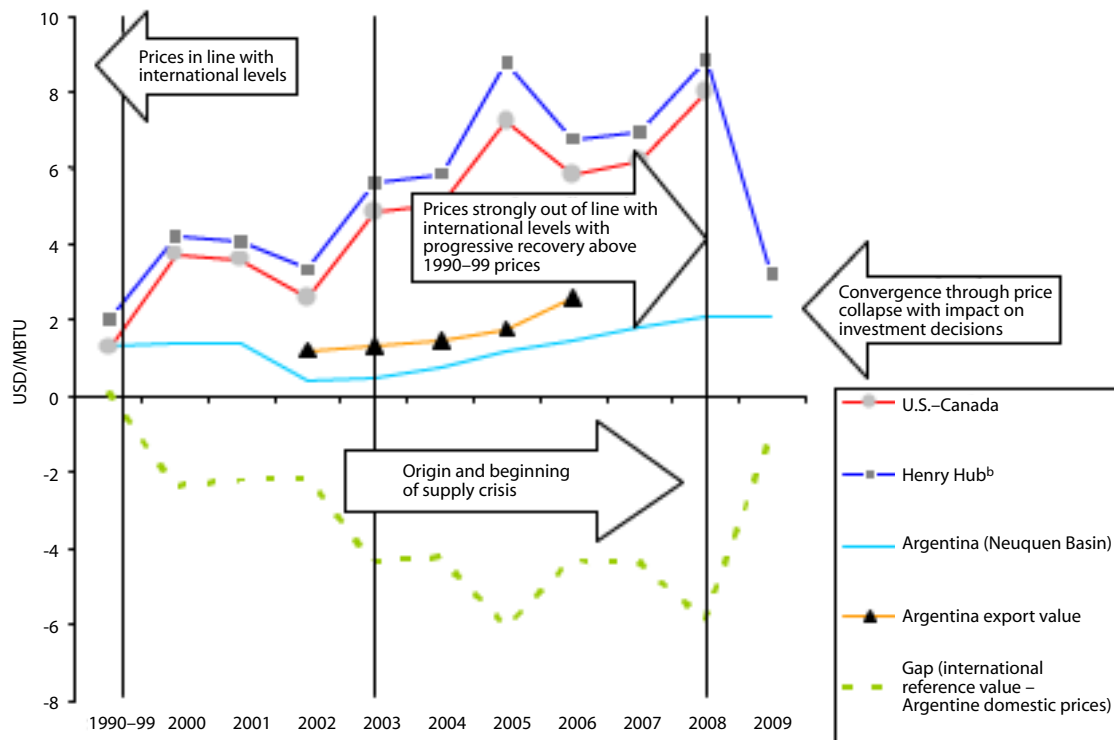
One of the features of this new strategy was that the main actors also tried to expand their markets through natural gas and electricity exports. In fact, much of the capacity installed between 1992 and 1997 was meant to be sold to Brazil, which demanded ever larger amounts of energy. Likewise, in order to monetize their reserves, gas producers started exporting gas to Chile, Brazil and Uruguay, much of which was intended for electricity generation. In Chile, expansion restrictions imposed on hydroelectric generation boosted the installation of combined cycle facilities running on cheap gas imported from Argentina.

A prevailing idea at the time was that plenty of gas was available and that prices would not rise. It must be remembered that for most of the 1990s the price of oil stayed around an average of USD 18 per barrel. In Argentina, export reference values for gas were near the Canadian gas price for exports to the United States, which did not differ much from Argentine domestic prices and from export prices to Chile and Brazil. In this context, there was amazing growth of gas production in Argentina. However, since no investments were made in exploration, this policy resulted in reserves depleting rapidly.

Since the aim was to monetize reserves, and proven reserves were overvalued, very little exploration was carried out. In fact, the number of oil wells increased by over 52 percent between 1990 and 2004 in relation to those drilled between 1973 and 1990, whereas the average number of exploration wells *decreased* by more than 32 percent. Producers used to report reserve increases on the basis of figures that had decreased thanks to the recategorization of reserves prior to privatization. At that time, proven reserves were thus transferred to the unproven category (Kozulj et al., 1993; Kozulj, 2000). As time went by, reserves that had always been proven were reported as discovered. No correlation existed between exploration wells and the report of reserve discoveries by area. Year after year, the amounts produced were compensated for by reports of reserve increases that did not correlate with the low levels of exploratory activity (Kozulj, 2000).

On top of this, the 1999–2002 economic crisis did not favour high risk investments. The domestic market remained stagnant and oil and gas exports continued to grow. In 2004 several factors combined to make the problem evident. On the one hand, after the 2002 crisis, Argentina ‘pesified’ its gas price, which meant dividing its dollar value by three between 2002 and 2004. On the other hand, as of 2003–04, the price of crude oil, gas and related commodities started to rise. In this context, the difference between domestic and international prices became an additional factor to freeze both high risk and development investments (Figure 6).

Figure 6: Domestic and international gas prices, 1990–2009 (USD/MBTU^a)



^a MBTU = millions of British thermal units.

^b Henry Hub is a natural gas exchange for suppliers and large consumers and traders. Its prices are often taken as a reference for natural gas contracts in the United States, but also for contracts between distributors, large consumers, etc. in Latin American and the Caribbean.

Source: Kozulj (2009b)

In Argentina, the gap between domestic gas prices and international reference prices for gas transactions between the United States and Canada was almost non-existent between 1990 and 1999, but it widened as of 2000–03, reaching almost USD 4/MBTU in 2003–04, and USD 6/MBTU in 2005. In this complex domestic and international context, the Argentine authorities permitted a relaxation of certain regulations⁵ so that the gas price could reach similar and even higher levels than it had had over the reform period (1993–2001), but in the new price context, these ‘market signals’ were still far from producers’ expectations, as they wanted to establish domestic gas price signs based on opportunity cost. From the point of view of security of supply, this situation became absolutely crucial for Argentina.

The first measure that the unavailability of gas brought about was the progressive discontinuation of exports to Chile.⁶ Consequently, private Chilean investors had to invest in diesel plants; reinvest, partially at least, in hydroelectricity; and also build a regasification plant, which has recently started operating. But this discontinuation of Chilean exports was not enough to avoid the growing consumption of alternative fuels, such as fuel oil (FO) imported from Venezuela, gas oil (GO), mineral coal (MC) and even LNG imported by the main energy operating company. Since the authorities did not adjust end user tariffs either, much of the cost was absorbed by the state by means of subsidies and compensation granted to generating companies.

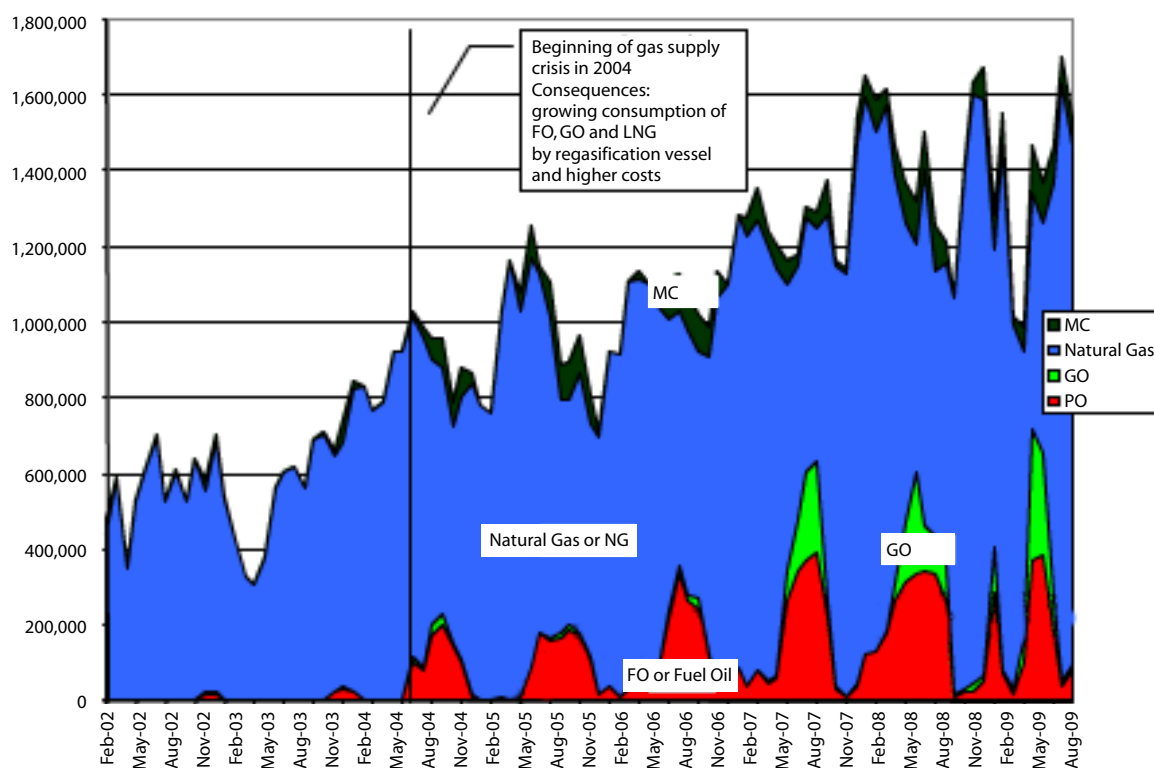
The peculiarity of the Argentine case is not only that the country maintained a distorted scheme of prices and tariffs, but also that, in spite of state intervention in this policy area, it was neither able nor willing to change its main institutional and regulatory model to adapt it to the crisis described above.

The negative impact of gas nationalization in Bolivia on private investments was probably a contributory factor that helped prevent a radical course of action in Argentina (Mora Contreras, 1998). Negotiations carried out by the authorities aimed at improving producers’ and generating agents’ incomes by means of subsidies seem to have been the prevailing option so that the crisis could be faced without resorting to a deep change in the model and, on the other hand, without dealing with the domestic political costs that price liberalization would have implied (Bariloche Foundation, 2005).

As stated above, however, the gas supply situation has become critical in that, since 2004, the system has exceeded a thermal generation average equivalent to 55 percent of total electricity generation, including imports, with a share that reached 70 percent in the hours of peak consumption. Such a situation deserves a special analysis for at least two main reasons: (1) investments meant to increase gas supplies and reserves are not made by the national government, but by external private actors; and (2) the possibility of diversifying the electricity generation matrix is a limited option in the short and medium term, and does not depend entirely on the government either. Strong as these statements might sound, they are not so when the context is taken into consideration. Thus, special attention will be devoted to this issue in the following section.

5 A first step to restore the price of gas by agreeing a minimum supply with producers barely below the price that was in effect during the convertibility period. This measure was accompanied by the expansion of a market for free contracts in the deregulated market. Both measures helped to bring the average price obtained by producers to a value close to USD 2/MBTU, which was higher than that obtained during the convertibility period, but lower than the international reference price. Recently, the government launched the Gas Plus program, which acknowledges international prices for all ‘new’ gas added to the supply.

6 Although private actors developed the gas exports, the Argentine government authorized them. But authorization was granted on condition that internal demand had to be satisfied first. For this reason, when the first symptoms of shortages appeared, exports were progressively interrupted. As Chilean investors had invested around USD 5,000 million in gas power plants and gas transportation and distribution infrastructure, the only solution was to import LNG. For this reason, in 2004 the decision to build a regasification plant was made.

Figure 7: Fuel consumption for thermal generation using Natural Gas, 2002–09 (in 1,000 m³); and FO, GO and MC (in tons)

Source: Author's estimates using data supplied by Compañía Administradora del Mercado Eléctrico Mayorista

Firstly, although it is true that energy price signs have played a role in the development of this situation, and that this is what the authorities could modify, there is no certainty that private actors would respond to them with larger investments in order to guarantee the gas or liquid fuel supply necessary for thermal generation. Secondly, Argentina has a relatively limited number of hydroelectric projects, since the largest projects are binational. Even though the promotion of renewable fuels launched by the National Energy Secretariat (NES) by means of the GENREN⁷ program could overcome both problems, the program involves 15-year contracts entered into by tender, and these contracts comprise only a total of 1,145.7 MW distributed across more than 30 projects offered by 27 private companies.⁸ Each one of these aspects will be analyzed below.

7 This program, launched at the end of 2009, was for the supply of 1,000 MW worth of renewable energy by means of 15-year contracts to be awarded by the state run company ENARSA. It should be made clear that ENAR is actually a government office in charge of project, works and energy purchase management, not an energy company with physical assets. The GENREN program will put 50 MW modules out for tender, with a repayment mechanism that will allow for the rapid recovery of investments in new generation projects. Initially, it was expected that 50 percent of the 1,000 MW could be produced by new wind farms. Also, an additional amount of 150 MW was to be produced by thermal plants running on biofuel, 120 MW by waste, 100 MW by biomass, 60 MW by minihydro, 30 MW by geothermal, 20 MW by solar power and 20 MW by biogas. If these NES projections are fulfilled, investment by 2016 should range between USD 2,200 and USD 2,700 million. However, although the supply exceeds the expected 1,000 MW, it comprises 85 percent wind farms (source: <<http://www.energiaynegocios.com.ar>> and ENAR).

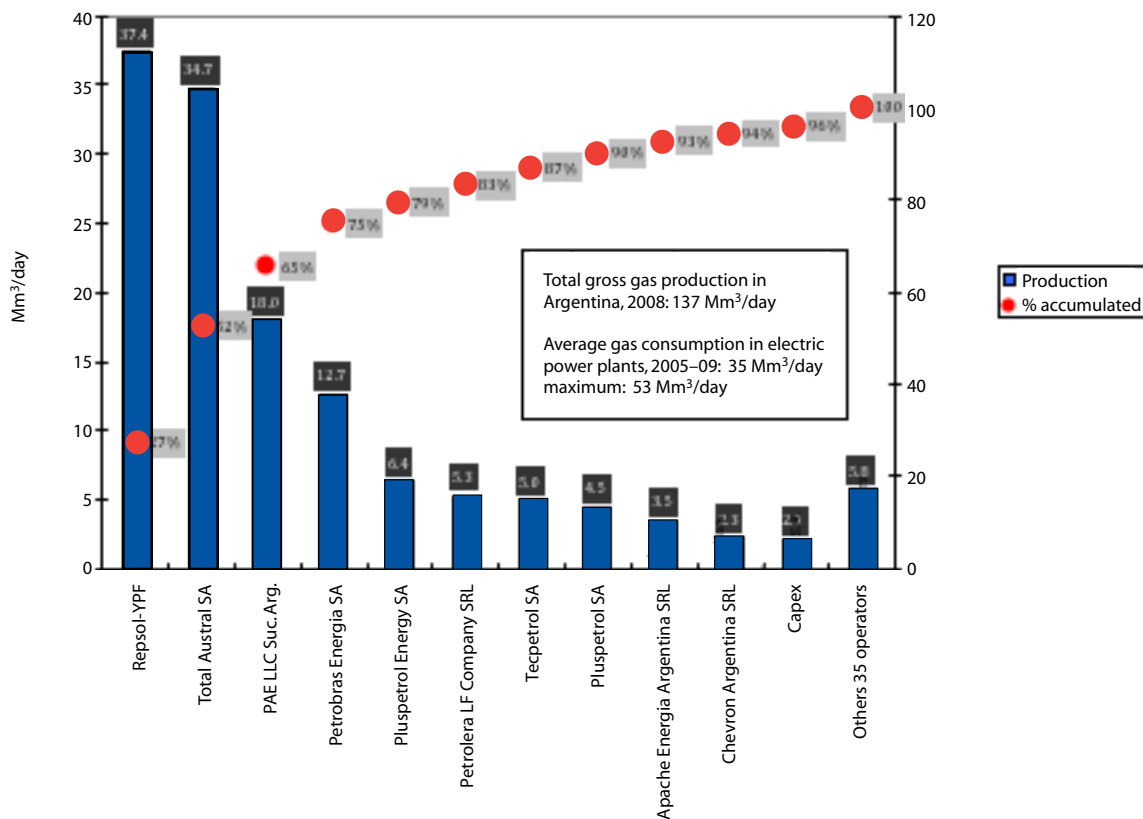
8 The GENREN program has been awarded to local equipment producers like Industrias Metalúrgicas Pescarmona and to international operators too, such as ENDESA and AES.

3. Problems faced by Argentina in the achievement of gas supply security for electricity generation

3.1 Natural gas supply and company strategies adopted by the main actors

The natural gas supply market has always been highly concentrated in Argentina. When considering only gas production amounts by the main operating companies, Refinería de Petr leos de Escombreras Oil-Yacimientos Petrol feros Fiscales (Repsol-YPF),⁹ currently called YPF SA in Argentina, accounts for 27 percent of the total, according to 2008 NES figures. It also operates the largest gas field in the country (Loma La Lata-Sierra Barrosa), accounting for 50 percent of the total reserves or resources of the Neuquen basin. This in turn accounts for only 23 percent of total gas resources in the country. Even if it is difficult to estimate this group's actual share of reserves and production—both because of a lack of official data and because the company also trades in gas from other operating companies where it is not among the main actors—its leading position in the market is beyond question. Figure 8 shows the other operators.

Figure 8: Gross natural gas production by the main operators, 2008 (Mm³/day)



Source: Author's estimates using NES data

⁹ Repsol was founded in 1987, originally comprising a group of companies previously belonging to the National Hydrocarbon Institute, whose activities included exploration, production, transport, and the refining of oil and gas. When in 1999 Repsol took over most of the assets of the state run Argentine company YPF, the corporation was named Repsol-YPF, becoming an integrated multinational oil and natural gas company and one of the largest private oil companies in the world, with operations in more than 30 countries. It is also the largest private energy company in Latin America in terms of its assets, and employs over 37,000 people worldwide.

The strategic position of Repsol-YPF is also a consequence of its production concentration in the Neuquen basin, which is only 1,300 km away from Buenos Aires, whereas the second main operator, Total Austral, although also operating in the Neuquen basin, concentrates mainly on the Austral basin, most of which is offshore and with a transport infrastructure that needs to extend over 3,000 km in order to reach the main consumption points. Also, transport capacity from the Neuquen basin is three times that from the Austral basin.

In this context, and considering that proven, probable and possible reserves until the end of the current operating companies' concessions represent 85 percent of the total in the country, an analysis of the strategy adopted by Repsol-YPF becomes a key element in any attempt to understand the vulnerability of the Argentine electricity supply system.

3.1.1 Repsol-YPF production and investment strategy¹⁰

Once the strategic importance of the Repsol-YPF group for Argentina's energy supply security has been established, it is necessary to examine what the impact of YPF privatization on the growth of Repsol-YPF international activities, the role played by institutional changes in Spain, and how investments have shifted from Argentina and other Latin American countries to regions such as North Africa. The latter is a crucial step to supply Spain with hydrocarbons and improve the cost effectiveness profile of the global LNG market (Iza, 2007; Kozulj, 2009b).

Before purchasing 99 percent of the total YPF share issue in 1999, Repsol was a Spanish state run company with no significant international activities. Its operation in Argentina took place within a context of a generalized aggressive investment by Spanish companies in every energy sector areas and in other public services at the beginning of the 1990s. The importance of this strategy was outlined together with financial actors such as the Spanish banks BBVA and La Caixa. The aim was to strengthen the position of Spain's state companies operating in Latin America in relation to that of other European companies, with the support of the most powerful members of Spain's private financial sector. The Repsol takeover of YPF meant the entry of the Spanish state run company into almost every Latin American country, since before being purchased by Repsol, YPF had acquired Maxus assets, which in turn operated in Peru, Bolivia, Ecuador and other Latin American countries. At the same time the little share of PEMEX in Repsol property gave it access to the Mexican and U.S. markets (Iza, 2007). However, the plan of action of the Spanish government and Spain's public companies changed as Spain started its own privatization process.

It is necessary to examine how the pursuit of clear objectives regarding supply security in Spain in the context of the opening of the European market has conditioned supply security in a periphery country such as Argentina in terms of the exploitation of its natural resources (Rozas, 2008a; 2008b; 2009). The importance of this issue lies in the fact that the emphasis on market liberalization in Argentina implied, among other things, that the state would be freed from the financial burden of investment expansion in the energy sector in order to devote its efforts to social objectives, while supply security would be safeguarded by a process of private investments attracted by the incentives and advantages granted to the international private sector through the design of new rules of the game.

10 The contents of this section come from research work carried out by the author for the Economic Commission for Latin America and the Caribbean in 2009. La participación de las fuentes renovables en la generación de energía eléctrica: inversiones y estrategias empresariales en América Latina y el Caribe, forthcoming august 2010

This is not a side issue, since it reveals one of the weakest points in Argentine energy policy, which based the expansion of the country's energy supplies on market opening and liberalization rules. This went against the energy companies' policy of reserve monetization, which were conceptually far from the government's objective of ensuring internal supply.

The purchase of YPF brought about a 140 percent increase in Repsol's assets, whereas its long term liabilities grew to 349 percent and its short term ones to 267 percent. However, Repsol-YPF considerably reduced its debt between 2001 and 2002, a fact that cannot be explained either by disinvestment in physical assets or net operational income (Table 2). Strangely enough, this debt reduction process occurred at the same as the huge currency flight from Argentina that took place between March and December 2001. Although no formal evidence can be provided in this sense, it is a curious fact that Argentina's main private banks were Spanish and shareholders of the Spanish oil company.

Table 2: Repsol-YPF's balance sheet after the 1999–2000 YPF takeover, and its debt, 1998–2003 (EUR million)

Year	Debt (EUR million)	Variation
1998	3,534	
1999	17,136	13,602
2000	20,398	3,262
2001	16,555	-3,843
2002	7,472	-9,083
2003	5,047	-2,425
Repsol's balance sheet		Variation from 1998 to 1999
Operating income		38%
Results before tax		16%
Operating results		59%
Total assets		140%
Assets		140%
Equity		107%
Minority stakes		24%
Long term financial debt		349%
Other long term debt		85%
Non-current liabilities		61%
Short term financial debt		267%

Source: Kozulj (2009b)

As a consequence of policy changes in Spain and of the company's search for private investment opportunities, as of 2004 Repsol-YPF ceased to be state run and was controlled by a principal shareholder related to the construction business, the Sacyr Vallehermoso group. In 2008 its total share issue comprised: Sacyr Vallehermoso: 20.0 percent; Criteria Caixa:¹¹ 14.1 percent; Chase Nominees: 9.8 percent; PEMEX: 4.9 percent; AXA: 4.2 percent; Barclays Bank: 3.2 percent; Mutua Madrileña: 2.0 percent; Caixa Cataluña:¹² 1.62 percent; stock exchange/minority shareholders: 40.18 percent. However, the Spanish government still considered Repsol-YPF a relevant actor in the Spanish energy policy in the context of the opening of the European energy market.

11 Through Criteria and Repinves.

12 Through Repinves.

As has already been mentioned, most of the assets controlled by Repsol-YPF in Latin America derived from the prior purchase by YPF of Maxus oil company, which had assets in Bolivia and other countries in the upstream sector. This is how Repsol-YPF became one of the main regional actors (Table 3).

Table 3: Repsol-YPF's main assets and contracts in the upstream sector in Latin America

Argentina

YPF has mining rights over 113 blocks in Argentina:

- 21 exploration blocks, with a net area of 50,221 km²
- 92 exploitation blocks covering a net area of 26,501 km².

Brazil

- Repsol participates in 22 blocks in Brazil's main exploratory basins: Cuenca de Campos
- It is the operating company in 11 of those blocks.
- It is the first private company with offshore exploratory mining domain in the Santos Basin.
- It holds 10% of one of the largest oilfields in the country. It is currently one of the main energy integration bases in Latin America.

Bolivia

Repsol has mining rights over 31 blocks:

- 6 exploration blocks with a net area of 7,022 km²
- 25 exploitation blocks with a net area of 1,489 km² in the Beni, Pie de Monte, Subandino Sur and Subandino Norte basins.

Peru

Repsol has mining rights over 8 blocks: nos. 39, 57, 90, 109, 76, 103, 56:

- 6 exploration blocks with a net area of 31,395 km²
- 2 development blocks, with a net area of 202 km².
- Repsol operates the consortium that will exploit the Kinteroni X1 field situated north of blocks 88 and 56, also shared by the company and from which the Camisea project production comes.
- In 2008 the Camisea Consortium, in which Peru has a 10% share, announced the start of operations in block 56 with commercial extraction from the Pagoreni oilfield in Cuzco, Peru.

Ecuador

- Repsol has mining rights over 2 development blocks with a net area of 770 km².
- Block 16, in the eastern province of Orellana, together with Tivacuno and Bogi-Capiron, extends across 220 thousand hectares.
- The agreement signed in Ecuador extended the exploitation period to six years—from 2012 to 2018—for block 16, and a transitional one year period was established.

Colombia

Repsol has mining rights over 9 blocks:

- 7 exploration blocks with a net area of 4,278 km²
- 2 exploitation blocks (Capachos and Cravo Norte) with a net area of 268 km².
- Three new discoveries took place in 2008, two of which were with Cosecha Z and Cosecha Y Norte test drillings in the Cosecha block of the Llanos Orientales basin, where Repsol has a 25% share and Oxy (with 75% share) is the operating company.

Venezuela

Repsol has mining rights over 6 blocks in the eastern and western regions of the country, specifically in Quiriquire, Barrancas, Mene Grande and Yucal Placer:

- 2 exploration blocks with a net area of 669 km²
- 4 exploitation blocks with a net area of 443 km².
- It has exploratory rights in the Cardon IV project belonging to the Rafael Urdaneta project.

Mexico

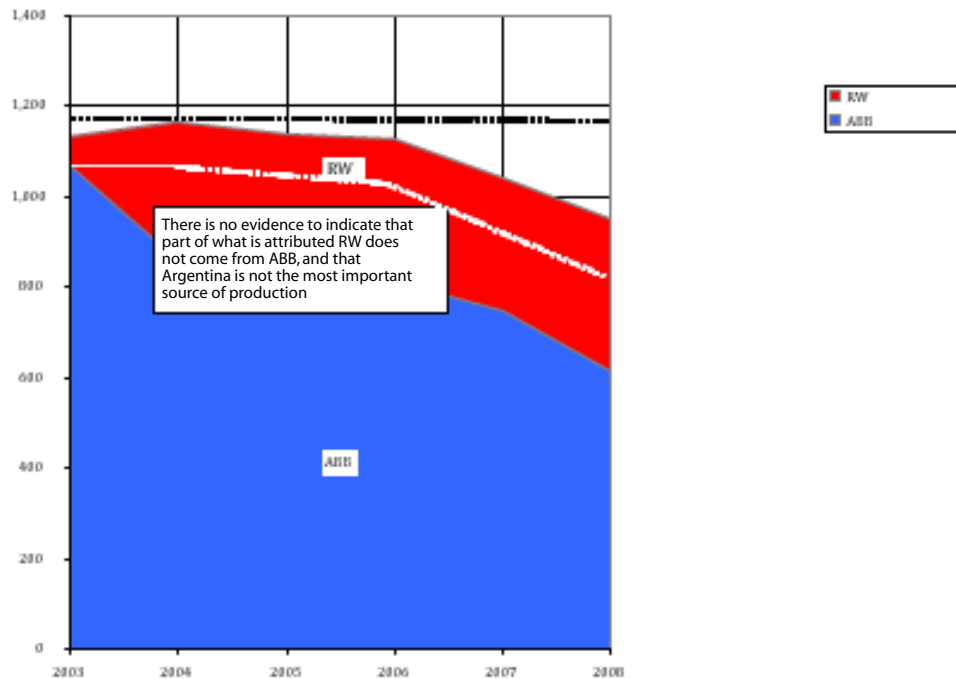
- Repsol has a multiple service contract over one development block called Reynosa-Monterrey in the Burgos basin in the north of the country.
- Initially, it is a 20 year contract.
- It will be enforced as of December 2014.
- Original area: 3,538 km²
- Current area: 373 km²
- It has 51 active oilfields.

Source: Author's estimates using Repsol-YPF data.

Over the period 2003–08 important changes took place in the orientation of Repsol's¹³ investments, with an important displacement—as was evident in its financial results—in the space relation (or relation by geographical areas) among origin of production, origin of income and purpose of investments.

In order to fully understand this process, it is necessary to examine a series of figures that will show the strategy adopted by the group (Figures 9–13). Firstly, Figure 9 shows the origins of production in the upstream sector.

Figure 9: Trend of Repsol's upstream production for E&Pa activities in Argentina-Bolivia-Brazil (ABB) and the rest of the world (RW), 2003–08 (kBOEb/day)



Note: The classification was modified in 2005. 2004 figures for Argentina and the rest of Latin America no longer correspond to ABB, and RW increases with a category previously corresponding to the Argentine region and the rest of Latin America and the Caribbean. Total figures coincide, so that the 2003–04 decrease results from the reclassification. In 2008 accounting data is reclassified again. YPF Argentina appears on its own and new categories appear in RW. The figures, therefore, conceal the weight of ABB in the actual trend and, particularly that of Argentina. Therefore, between 2003 and 2008, oil and gas production in the region is higher than the figures shown by the reclassification.

^a The activities that Repsol classifies as E&P (exploration and production) refer to activities of the upstream sector within the hydrocarbon industry chain, i.e. exploration, exploitation and development in the oilfields to produce hydrocarbons (gas and crude oil).

^b Thousand barrels of oil equivalent.

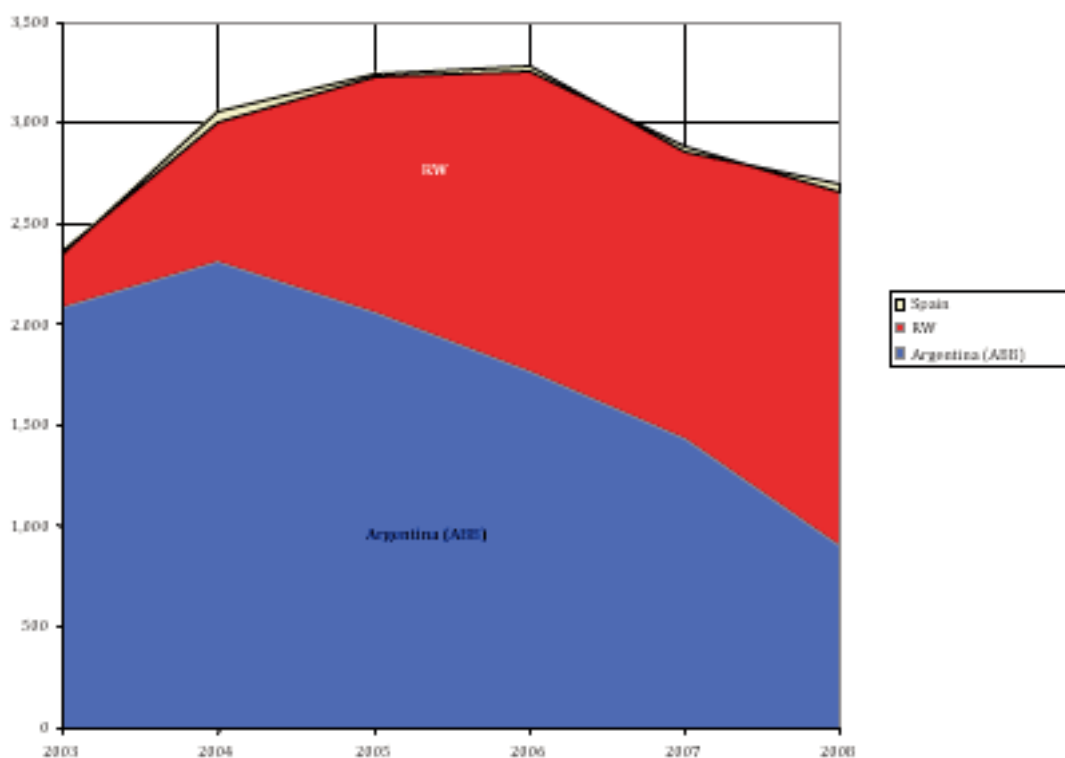
Source: Author's estimates using Repsol data

Even though the real contribution of the ABB region to production cannot be assessed accurately because of the modifications introduced to the method of classifying the origin of production between 2003 and 2004 (and after 2008), total production clearly decreased as of 2004. But it is essential to point out that most of the hydrocarbon volume is extracted in Latin America, with Argentina as the main source.

Operating results, however, followed a different pattern mainly as a consequence of the price policies implemented in Argentina, and secondarily in Bolivia, as of 2006; see Figure 10.

13 For convenience, Repsol-YPF will from now on simply be referred to as Repsol.

Figure 10: Upstream sector operating result trend for E&P activities in ABB and RW, 2003–08 (EUR million)



Note: In this case, part of the results in RW may also come from some ABB country as a consequence of change in classification criteria effected in 2004 with respect to 2003, and in 2008 with respect to 2004–07.

Source: Author's estimates using Repsol data

In order to understand the extent to which price policies affected changes in the total production profile in the various geographical areas, the quotient between Repsol's operating result values¹⁴ and production levels in the upstream sector was estimated (Figure 11).

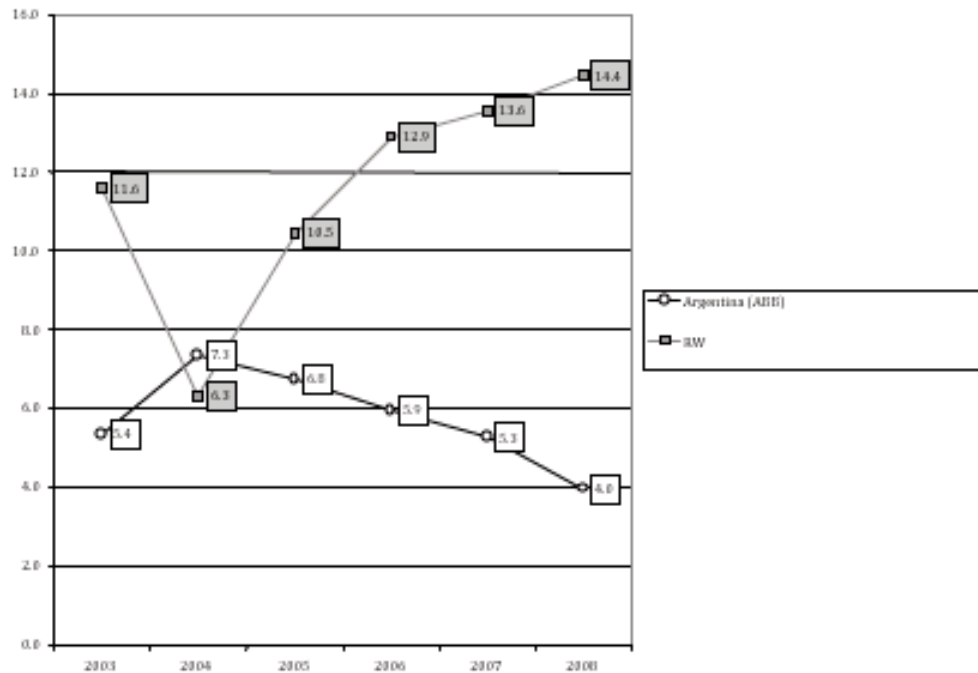
Although these results are also a consequence of the different as-oil mix in each region, they reflect the impact that diverse price policies have had in the ABB region, basically dominated by the results for Argentina, with respect to the rest of the world. Thus, whereas the ad hoc regulations imposed in Argentina and the changes in Bolivian legislation tended to reduce the net profit per unit obtained in the exploration and production stage, in the rest of the world this profit per unit grew according to the international price trend.

However, the low profit per unit obtained in each case and the high average total costs per unit implied (euros per BOE), according to estimates based on Repsol's balance sheet,¹⁵ are quite striking.

14 For this estimate, values of the item 'operating results' before financial costs and taxes in Spain as displayed in the figures submitted by Repsol were taken into account, as well as those for amount of production.

15 According to the author's calculations, the difference between the international average reference price (as estimated with data from BP, 2009) and operating results according to Repsol's balance sheets and production quantities would yield average total costs for 2003–04, including all the 'government take' in ABB (with Argentina as the main country) and the rest of the world, of 45 USD/BOE in Argentina (ABB) and 39.4 USD/BOE in the rest of the world.

Figure 11: Trend of net benefits per unit before financial costs and taxes in Spain, 2003–08 (EUR/kBOE)



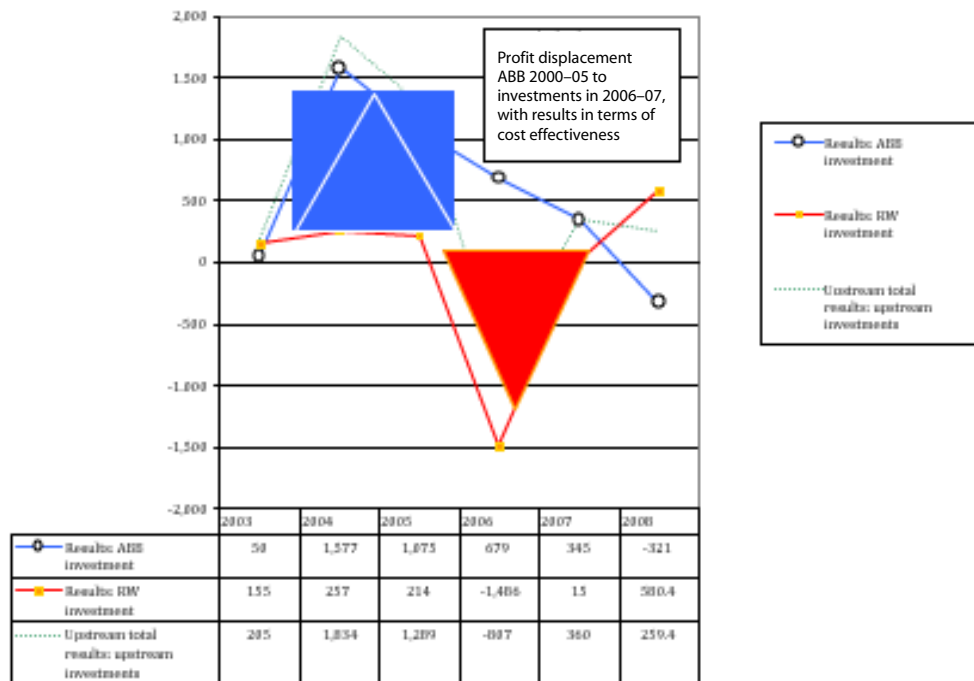
Source: Author's estimates using Repsol data

However, Repsol's decision to invest abroad was particularly emphatic as of 2004, irrespective of the fact that operating results for that year in ABB exceeded those of 2003. This is not a minor matter, since it reveals that it is quite likely that better price signs would not have meant larger investment in Argentina anyway—something that cannot be either confirmed or refuted. Yet it does draw attention to the crucial fact that countries tend to search for their own supply security and better levels of cost effectiveness, especially after the changes in the global energy market from 2003, when China and other emerging countries became major consumers and potential foreign investors in the search for gas and oil reserves worldwide. In a country such as Argentina, in turn, the strategy of basing its supply security on private investments has not brought positive results. To sum up, the arguments in this discussion tend to confirm that while most countries—Spain in relation to Latin America in this case—had the strategic side of energy security very much in mind in a world dominated by global geopolitical factors, Argentina took for granted that microeconomic and macroeconomic interests would coincide, and market forces would bring this about; it was also believed that the energy sector was not necessarily of strategic importance, since resources were superabundant.¹⁶

The symmetric displacement of Repsol's investments with profits obtained in ABB (mainly Argentina) towards the rest of the world may be verified by subtracting operating results for each geographical region each year from total investment for the same year in each region. This is represented in Figures 12 and 13.

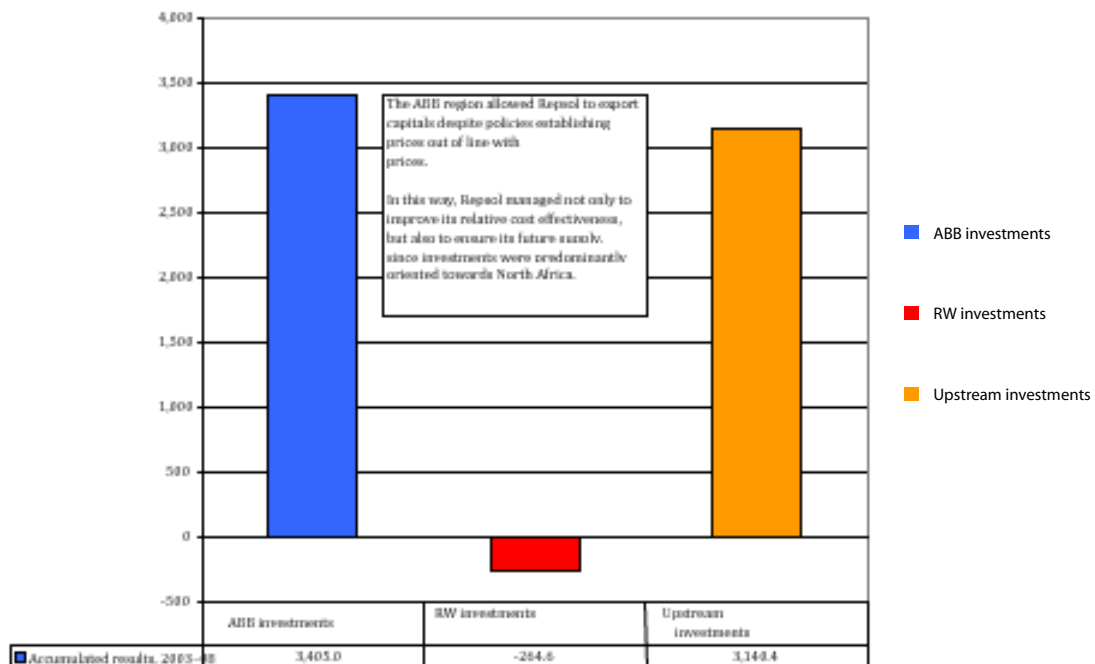
¹⁶ This view was made explicit at the initial stage of the privatization of Argentina's oil companies during Carlos Menem's term as president. It was even argued that leaving unexploited reserves in the ground would be unwise, since oil would be replaced in the future by new energy forms and that considering oil as an 'strategic good' instead of as a simple 'economic good' was a huge conceptual mistake (cf. Kozulj *et al.*, 1993).

Figure 12: Operating Results net of Investments by region, 2003–08 (EUR million)



Source: Author's estimates using Repsol data

Figure 13: Accumulated operating results net of investments by region, 2003–08 (EUR million)



Source: Author's estimates using Repsol data

If the targets of improving global cost effectiveness and increasing supply security in Spain are taken into account, this strategy could hardly have been reversed only by means of improved cost effectiveness in ABB, since declining oil production—and also declining gas production, according to Repsol—would be a geological fact, not merely an economic one. It could have been reversed only by means of heavier investment in exploration from the beginning of the reforms, which was not the case precisely because the strategy implemented was to monetize reserves. Whereas this mechanism is correct from the entrepreneurial point of view, it is clear that it has become a serious obstacle to improving supply security in the ABB region, with strong implications for the electricity sector.

However, some facts need to be highlighted in this analysis. Firstly, Repsol did not get better total operating results from its upstream activities at the global level in 2007 and 2008, which were the best years for oil companies all over the world as a consequence of the combination of high prices and growing demand. Secondly, production levels so far have been declining, and investments in the rest of the world were not enough to produce an increase that could compensate for the decline in ABB until 2008/09.

In this context, the fact that the majority shareholder in the Repsol group, Sacyr Vallehermoso, is largely an actor in the construction industry has meant that financial vulnerability has been transferred from one economic sector to another.¹⁷

Similarly, public purchase offers for Repsol in 2009 must be considered within this context of uncertainty, which has had a heavy impact on the ABB region. This has been so both because of the strategy followed by Repsol and because of the 2008–10 crisis of the international financial system—in turn derived from the real estate market crisis in the United States and other countries. The impact of these trends has obviously not been the same in each of the countries, but it was certainly very serious in Argentina¹⁸ and Bolivia.

However, it is quite likely that Repsol's most profitable business in Latin America and the Caribbean is in Mexico, where the synergies among SDG Natural Gas, Unión FENOSA, Repsol and PEMEX (one of Repsol's shareholders) have strengthened. Among other factors, this has been a consequence of the validity of the concept of independent energy producers, which, by preventing the massive privatization of public companies in the energy sector, has managed to achieve the participation of these private actors in groups of companies not so subjected to public regulations restricting their profits.

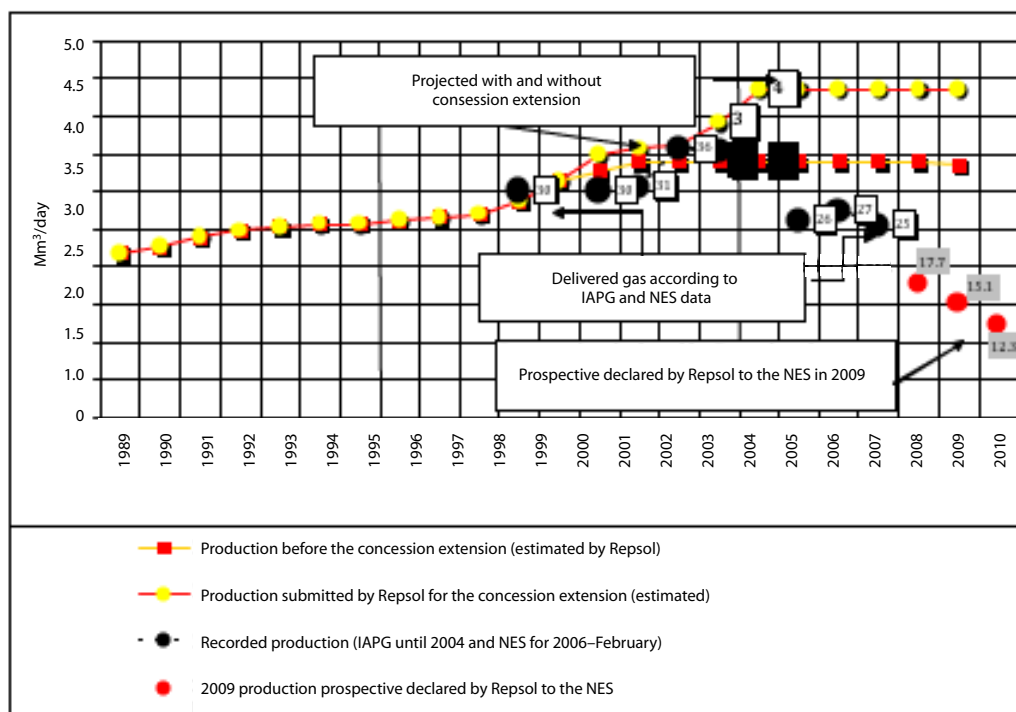
17 Sacyr Vallehermoso, Repsol's majority shareholder and an important actor in the construction industry in Spain (involved in the construction of the third set of locks of the Panama Canal, which was awarded to Grupo Unidos por el Canal, of which Sacyr Vallehermoso is a leading member) is indebted by around USD 16 billion. Although the company states that negotiations to pay off its debts are being carried out 'case by case' and on a continuous basis, formalizing them by operations, without syndicated collective agreements, and that it considers that there will be no 'important problems' in rolling over the rest of the debts which are due in 2009, offers by some groups for Repsol in 2008 and 2009 apparently originated in such debt. For now, however, the Repsol group seems to have strengthened after the purchase of Unión FENOSA via SDG Natural Gas S.A. (now Natural Gas Fenosa). There was a critical moment when, at the end of 2008, the Russian oil company Lukoil made a bid for Sacyr, which produced a division in Spain between those who supported the incorporation of such a majority partner as long as Repsol was still managed by Spaniards and other groups that opposed it because they considered it politically risky. The takeover of ENDESA by ENEL may have played a positive role in renegotiations with Spanish banks. The cancellation of part of the debt with Citigroup using proceedings from the sale of Itinere, a company working in the freeway sector, meant that the debt is now only with Spanish banks other than La Caixa and BBVA. However, after the recent (2010) crisis in Greece, Spain is still facing significant financial challenges, which increases the uncertainties regarding Repsol's future and, even more, its future in the region.

18 If the fact that most of the investment incurred by Repsol was in Argentina is taken into account, and if the total foreign investment received by this country from the European Union (EU) is compared across all sectors of the economy, the result is that almost 40 percent of direct foreign investment from the EU in Argentina between 1998 and 2008 corresponded to Repsol's investment in E&P. The purchase of YPF in 1999 would certainly account for over 80 percent of the direct foreign investment from the EU in Argentina and at least a third of the regional total.

All of the above indicates that the new global context emerging from the 2008–10 crisis is different in certain respects. It no longer has to do with the fact that national governments manage their energy policy by means of private investment, but with the fact that this investment, which has a speculative nature in countries with a weak institutional character such as Argentina, is also exposed to more complex financial strategies and affected by high risk factors completely outside the energy sector, but with an impact on it through the behaviour of its actors and its own difficulties.

After this brief account of Repsol’s strategy, it is still necessary to examine what it has meant in terms of gas production in Argentina. In order to do this, the case of the Loma La Plata gas field will be considered, since it is the most important in the country. Figure 14 gives production figures related to the renegotiation of the concession extension to 2026 submitted by Repsol in 2000 to the government of the province of Neuquen, including delivered production for the period 1989–2010, according to Instituto Argentino de Petróleo y Gas (IAPG) and NES data, and the production prospective declared by Repsol in 2009.

Figure 14: Loma La Lata natural gas and oil field production and production prospective, 1989–2010 (Mm³/day)



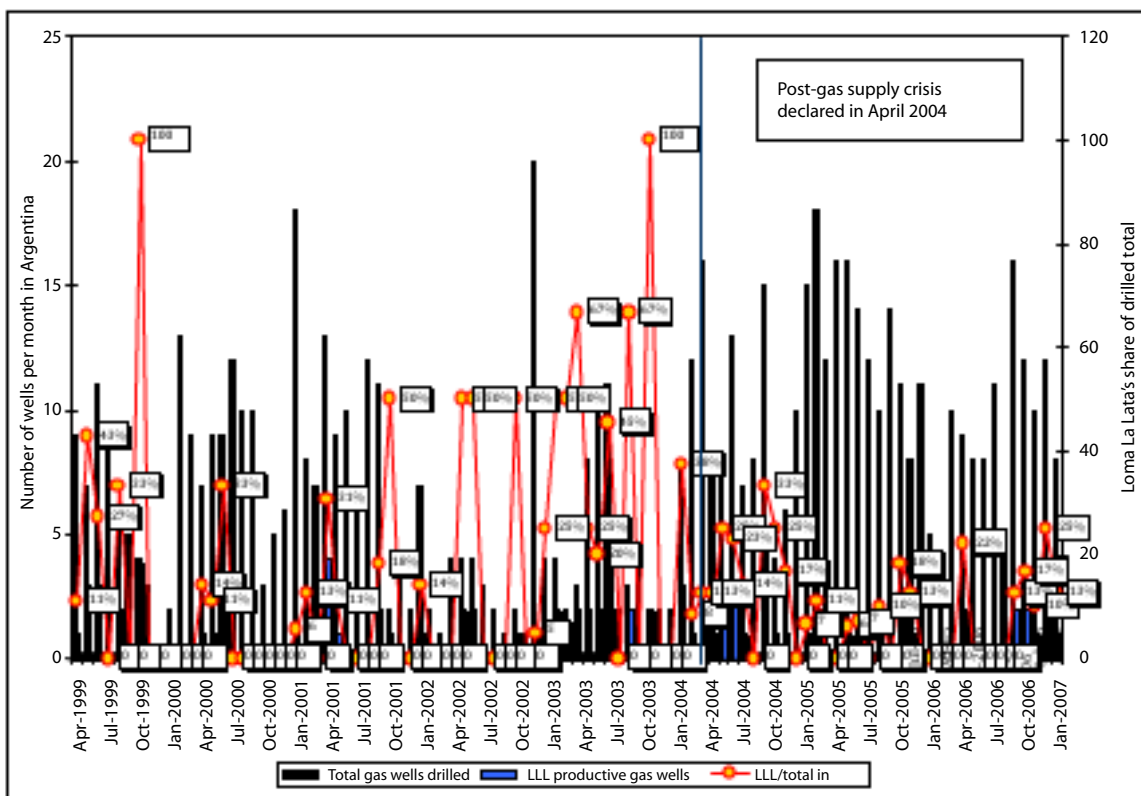
Source: Author’s estimates using data from Repsol, IAPG, NES and the government of Neuquen Province

In order to be granted the concession extension to 2026 for the Loma La Lata gas field, which expired in 2016, in 2000—only a year before completing the purchase of YPF—Repsol submitted two likely production alternatives. The argument put forward was that it could invest in Bolivia or in Argentina, but, since the concession expired in 2016, investing in Argentina in order to increase production levels by 10 Mm³/day was not justified because without the additional investment, production would be around 34 Mm³/day until at least 2010. If, in turn, the concession was extended by 10 years (expiring in 2026), Repsol committed itself to investing in order to extract up to 44 Mm³/day.

However, at the time of the 2004 crisis, Repsol announced that there had been a mistake in the prospective estimates for Loma La Lata, that the gas field had undergone severe depressurization and that it would not be able to deliver more than 25 Mm³/day. According to Repsol experts, the depressurization had been caused by excessive extraction in order to meet the growing gas demand. As Figure 14 shows, however, production in Loma La Lata never exceeded the foreseen upper limit, except in 2003—and that was in relation to the lower limit, never to the 44 Mm³/day that the company had promised. As of 2005, the amount delivered was even below the lower limit, and since 2007, production forecasts have revealed ever decreasing amounts.¹⁹

When considering the gap between the projected production that would derive from the concession extension and the amounts delivered, it can be concluded that only this gas field produced a growing deficit of at least 9 Mm³/day with respect to the lower projections (i.e. not considering investment from contract renegotiation) and of more than 19 Mm³/day considering the expected increase in production that had been promised. On the whole, the Argentine authorities seemed to have ignored these issues and had accepted that Argentine gas reserves were limited.

Figure 15: Gas wells drilled in Argentina and Loma La Lata, 1999–2007



Source: Author's estimates using NES data

19 Undoubtedly, this strategy also reveals an interest in increasing the LNG export business, in which Repsol is a major international actor.

Investment in Loma La Lata stagnated as of 2004, as shown by the trend in both the total number of gas wells drilled in Argentina and the number in this gas field. This is also reflected in Repsol's financial statements and coincides with the process of reinvestment of earnings coming from the exploitation of Argentine resources, those from abroad and from the ABB region. The company then devoted the surplus to regions such as North Africa, where Repsol gets part of the gas required to supply Spain. The Repsol group is one of the main actors in the LNG market. In fact, it supplied Argentina with LNG from a regasification vessel in periods of peak demand during 2009, and since then it has been supplying the fuel on a continuous basis at a high cost (USD 18/MBTU).

To sum up, then, and looking into the future, it is very unlikely that the process by which Repsol reoriented its investment outside Argentina can be reversed. The Argentine authorities have tried to send international price signals since 2008 by means of the Gas Plus program. Yet this initiative seems to be more in the way of increasing domestic supply by means of lax regulations that will allow operators—Repsol among them—to report discovered and not declared gas as 'new gas' (and, as such, subject to international market prices), which, as has been explained, was an accepted practice.

3.1.2 Production and investment strategies adopted by other private operators

The second largest strategic gas operator in Argentina is Total Austral, a subsidiary of the French group Total.²⁰ Unlike Repsol, its assets in Argentina are not a significant portion of its global portfolio. The growth of gas supplies coming from the Austral basin depends on whether transport capacity from the southern gas field is increased. However, gas transport tariffs and the depletion of the fiscal surplus that Argentina achieved up to 2007 make it very unlikely that gas supplies from the Austral basin will become significant in the midterm.²¹

The third operator in strategic importance is PAE, although it can now be considered second after its partnership with Total. PAE is a consortium of the British company BP, which absorbed important assets from Amoco, and the Argentine company Bidas. The latter has recently sold part of its share in PAE to the Chinese state-owned company China National Offshore Oil Company for USD 3.1 billion.

According to official reports from the group, investment in gas development meant that PAE contributed 60 percent of all the gas that Argentina added to its energy supply between 2002 and 2008.

Some of the milestones in these developments have been as follows:

- Between 2001 and 2006 PAE increased daily gas production of UTE Acambuco area (Salta) fivefold, rising from 1.4 Mm³ (49.4 million cubic feet) to 7.8 Mm³ (275 million cubic feet). After the Macueta 1003 well started operating at the beginning of September 2007, daily gas production in the area in 2008 was 8.4 Mm³ (297 million cubic feet).

20 Total was founded in 1924 under the name Compagnie française des pétroles (CFP), with private and public investments (from the French government). In 1985 it was renamed Total-CFP, and in 1991, simply Total SA. After Total's takeover of the Belgian company Petrofina and after it acquired Elf-Aquitaine in 1999, the company became known as Total Fina SA, and later, on 22 March 2000, as Total Fina Elf SA. Finally, on 6 May 2003 it was renamed Total SA once more.

21 Total has also been involved in hydroelectric generation since it participated in the AES deinvestment process in Argentina. It thus acquired 70 percent of the Argentine generating company Hidroneuquén from AES Gener at USD 72.5 million, and it also assumed USD 50 million worth of liabilities. In August, AES, which controlled AES Gener, had sold Total Final Elf 64 percent of the shares that Gener had in the Argentine generating company Central Puerto, at USD 255 million. All these operations form part of an agreement between AES and Total Fina ELF for the former to sell its assets to Gener in Argentina, after having taken over the Chilean generating company last year. Part of the agreement also provides for the sale of Termonandes to Total Fina Elf.

- As of 2001 PAE developed gas production in the Cerro Dragon area (Chubut), when the Tres Picos gas field started operating. The area injects 6.3 Mm³ a day (222 million cubic feet) into the gas pipelines.
- Between 2001 and 2006 an amount of USD 485 million was invested by the Cuenca Austral Marina consortium in the development of the Carina-Aries gas field in the Tierra del Fuego sea. Today, Carina-Aries is the main offshore gas field in the country. The Cuenca Marina Austral block has a daily gas production potential of 15.3 Mm³ (540 million cubic feet), equivalent to 10 percent of Argentine gas demand.

However, despite the fact that PAE is the most dynamic group, the reserves it exploits in Argentina could not compensate for the decreased supply caused by the strategy adopted by Repsol.

Next in importance comes Petrobrás. Since the second half of the 1990s, Petrobrás has been using the privatization and deregulation processes going on in Latin American countries to change its transnationalization strategy. In the case of Argentina, for example, Petrobrás entered the picture in 2002 at the time of the devaluation, by purchasing from PECOM Energy, an important national operator, its block of shares, during the initial stage of privatization. It thus increased its international investment, which is always lower than in Brazil, and concentrated it in the region, at the same time that it added new segments (such as refining, petrochemical, fuel commercialization, electricity generation, and natural gas distribution and transport in Brazil). It grew to such an extent that it became the eighth largest transnational company in the world belonging to a developing country, the third in Latin America and the first in Brazil, with operations in all five continents.

In this way, Petrobrás investments abroad in general, and in Latin America in particular, started to grow on a yearly basis. The company used to invest in associations and oil concessions; in fact, in 1997 it operated in nine countries, among them Argentina, Bolivia, Ecuador, the United States, the United Kingdom and Angola. It then started to buy companies in different sectors of the energy chain.

As explained above, the 2001–02 crisis in Argentina meant an opportunity for Brazil, when Petrobrás bought PECOM Energy and thus positioned itself as a strong actor in the Argentine market. The expansion of Petrobrás activities in the rest of Latin America and the Caribbean was favored by the opening of, for instance, the Bolivian and Colombian markets. Although the 2006 nationalization in Bolivia and the 2002 pesification in Argentina affected the company's potential cost effectiveness, these later crises and changes never weakened its regional position, and even less so its domestic position in the Brazilian market. On the contrary, the high potential for profitability after the implementation of an international price policy in the domestic market contributed to the group's self-financing capacity, so that it is still expanding at the extraregional level, particularly as a consequence of its forerunner role in deepwater exploration.

However, the Bolivian nationalization in 2006 had a strong impact on its decision to enter into further agreements with that country, and to concentrate investment in Brazil, with a view to becoming a net long term exporter of liquid and gas hydrocarbons. Another impact, possibly with historical roots, was a tendency towards continuing a relatively high share of hydroelectricity with respect to the expected potential for generation by means of combined cycles.

In spite of its international expansion, investment outside Brazil barely exceeds 20 percent of the total investment made by the company. Petrobrás has acquired companies all over the world: it bought a

refinery in Japan from Exxon and 50 percent of another one in Pasadena, Texas, and it has carried out extraction operations in West Africa. Nonetheless, its operations have concentrated mainly on diversifying its assets throughout Latin America. Its behaviour in these countries is not very different from that of other transnational companies. However, according to its investment plan for the future, Latin America will not receive as much capital as the United States.

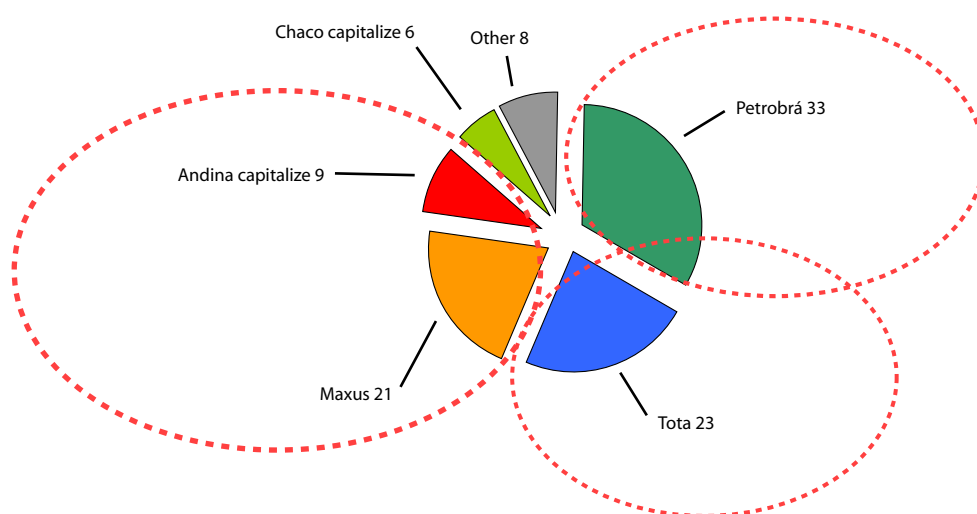
Therefore, supply expansion in Argentina seems not to be capable of reversing the gas supply situation in the mid-term in the case of Petrobrás either.

3.1.3 Gas supply from Bolivia and the NEA gas pipeline

At the beginning of the 2004 crisis and prior to the 2006 nationalization, Argentina oriented its future gas supply strategy towards Bolivian reserves. Indeed, the 2004–08 Energy Plan meant that the country expected to receive not less than 20 Mm³/day of Bolivian gas transported through a new pipeline that would connect the Bolivian gas fields with the Argentine Litoral region and the city of Buenos Aires. However, events in Bolivia at the time—the 2005 referendum and the subsequent nationalization by means of a Supreme Decree in 2006—brought about several consequences for Argentina, and also for Bolivia itself and Brazil.

On the one hand, Bolivian reserves are also operated by the same main actors as in Argentina (Repsol, Total, PAE and Petrobrás; see Figure 16). On the other hand, in spite of agreements signed with Argentina, Bolivian export commitments to Brazil existed prior to the Argentine ones, and are of a higher priority. The lack of investments since the nationalization has then led to a gas production deficit that has made it impossible so far to guarantee both the volumes for the new pipeline and other more restricted commitments (7 Mm³/day) transported through existing infrastructure.

Figure 16: Main operators of gas reserves in Bolivia



Source: Author's estimates using YPFB²² data

22 YPFB is a Bolivian state owned oil and gas company.

A new gas pipeline was planned, the NEA, that would connect Bolivian reserves with Argentine markets through the Argentine north-eastern region (called NEA) and would reach Buenos Aires, covering a distance of 1,500 to 1,700 km, with a capacity of 30 Mm³/day. However, the outlook for this pipeline is still uncertain. Work should have started in 2004 and it should have been inaugurated in 2006, but it was still in the bidding stage for construction and had an uncertain bid opening date in mid-2009.

Although the PAE²³ consortium had announced investments in the upstream sector in Bolivian gas fields in order to increase production, the chances of Bolivia increasing its gas supplies are still unlikely. This, of course, can improve the chances for the construction of the NEA gas pipeline.

3.1.4 LNG as an alternative

Given this outlook, and because gas supplies are essential for Argentine energy security, the state run company ENARSA and the Venezuelan oil company PDVSA in a joint venture are preparing the bidding for the building of a regasification plant in Argentina, with a similar capacity to that of the Quinteros plant in Chile (10 Mm³/day).²⁴ It would mean the setting up of a liquefaction plant in Venezuela supplied by gas from the Mariscal Sucre basin, and a complementary unit in the Argentine coastal region. This would probably be in Bahía Blanca, where the main gas node and the core of the petrochemical industry are located in Argentina.

Uruguay is considering the building of a similar plant, which could export gas to Argentina. This is a joint initiative involving ENARSA, the Uruguayan state run electricity company UTE and the oil company ANCAP. Among likely gas suppliers for those projects are Repsol, Petrobrás, Total and BP. Yet the plants may not be ready before 2015, assuming that four or five years may be necessary between the feasibility study and the actual building.

In this context, it is interesting to see that Repsol, together with the Italian company ENI, has discovered reserves in the Perla I field. If production in this gas field is confirmed, Repsol is entitled to 32.5 percent of the resources, the same proportion as the Italian group. The remaining 35 percent will belong to the Venezuelan state run company.²⁵

23 In turn, one of PAE's Argentine partners, Bidasas, has announced the sale of its assets and the likely participation of Chinese capital, which makes the prospects for production even more unsettled, since China focuses on catering for its own supply security.

24 According to ENARSA, pursuant to the National Executive Power objectives regarding natural gas supply security in the mid and long terms by diversifying energy supply, and to the memorandum of agreement signed between Argentina and Venezuela, ENARSA and PDVSA have agreed to start development of the project known as Liquefied Natural Gas Regasification Plant, to be set up in Argentina jointly by ENARSA and PDVSA. The initial natural gas capacity of the project is meant to be 10 Mm³/day, with a potential to expand to 20 Mm³/day. There has already been a call for potentially interested companies to participate in the development of feasibility studies (extended conceptual visualization and engineering) of the facilities for the LNG regasification plant. The main objective is to obtain a well grounded pre-feasibility study in terms of technical, economic, environmental and regulatory parameters identifying at least three alternatives for the micro location of the plant, the port terminal and the gas pipeline to connect to the Argentine gas transport system, as well as to identify and choose the most suitable technology and calculate the estimated cost of the project.

25 Source: <<http://www.20minutos.es/noticia/515673/0/chavez/gas/repsol/>>.

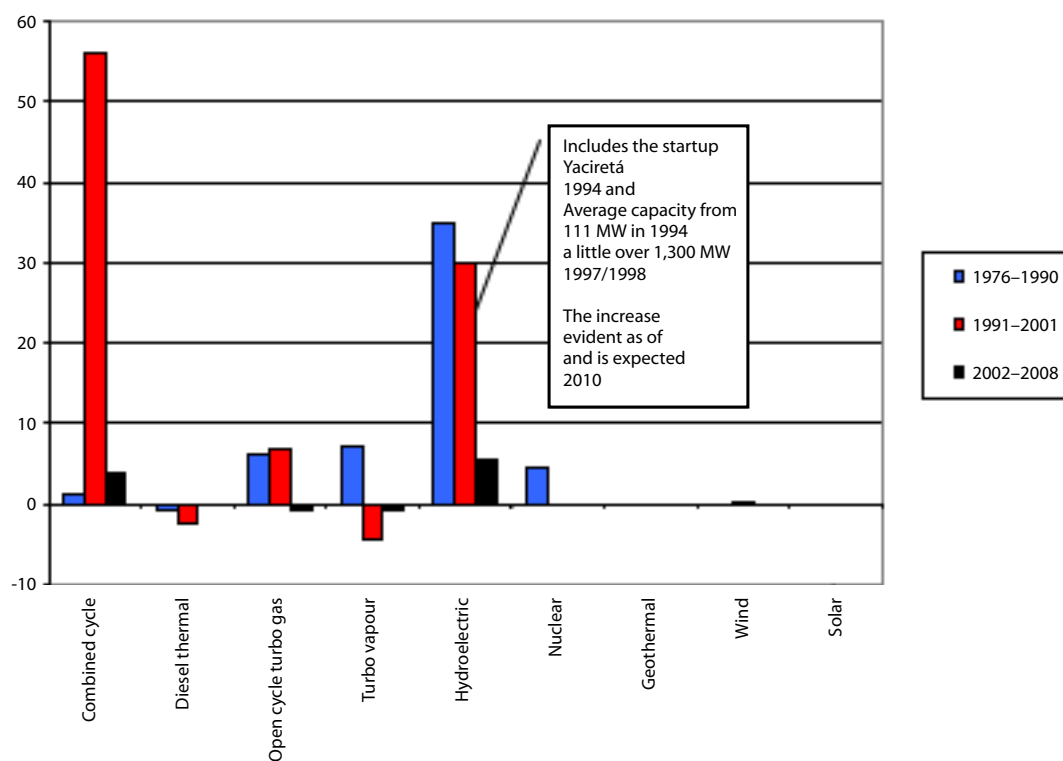
4. Alternatives for the diversification of the energy matrix in electricity generation

4.1 Hydroelectric projects

The policy in Argentina in the 1990s was clearly opposed to the development of new hydroelectric facilities, for which the country does not have many independent options now. In fact, the NES cancelled research into hydroelectric uses and only resumed studies in this respect in 2004. At the time it also decided to finish the Atucha II nuclear plant, construction of which had been interrupted as a consequence of the state's withdrawal from its entrepreneur and energy generation roles. Contrary to policy in Chile and Colombia, the Argentine government has only very recently promoted private hydroelectric projects. This has to be considered in a context of inexpensive and supposedly abundant gas, and with relatively low investment costs for combined cycle plants. No large works in this field based on market remuneration rules would then have been feasible.

Figure 17 shows this change in the pattern of installed generation capacity that has already been described. Had it not been for the startup of Yacireta and other plants that were being built because of prior policies, practically 99 percent of new installed capacity would have been produced by combined cycle plants dependent on gas supplies. Between 1991 and 2002 plants of this type accounted for 65 percent of new installed capacity, thus changing the previous hydrothermal balance.

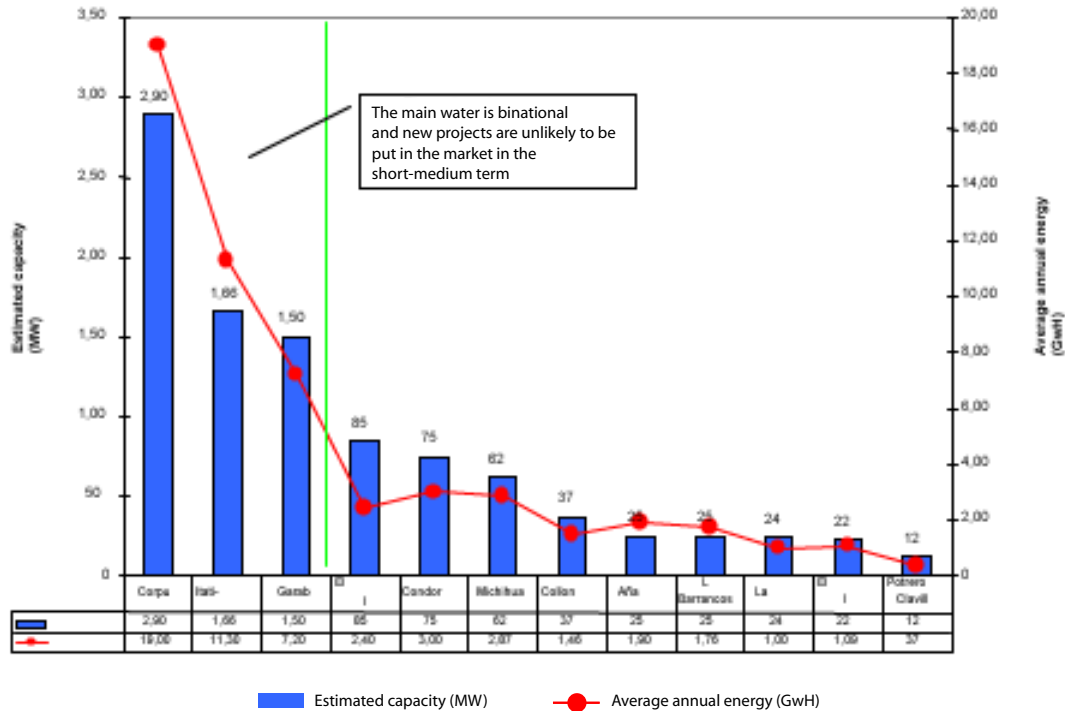
Figure 17: Average installed capacity per year by type of plant in the pre-reform period, during the reforms and in 2002–07 (MW per year)



Source: Author's estimates using NES data

Figure 18 shows that hydroelectric projects are limited in Argentina.

Figure 18: Argentine hydroelectric projects



Source: Author's estimates using NES data

Projects such as Condor Cliff (750 MW), Chihuidos I (850 MW) and others could be part of future mid term capacity, since bids have been accepted or are about to be soon. In any event, startup will not be before 2015.

The largest contributions, however, are expected from binational works such as Corpus, Garabi and others, which are more difficult to agree upon because they depend on joint decisions and access to financial markets. The countries involved in such decisions have recently been unable to agree about issues such as surplus energy exchanges (Brazil), or raising the Yacireta water level (Paraguay), not to mention unresolved financial problems between Brazil and Paraguay.

Delayed decisions about increasing hydroelectric supply with new projects is another question affecting supply security in Argentina. However, there seems to be clear interest by the private sector, given the conditions imposed for the bidding, which require not less than 30 percent of private financing and an investment repayment with 15-year concession grants. In fact, important national groups in the field of turbine construction such as Industrias Metalúrgicas Pescarmona or cement industries such as Odebrecht (Brazil), associated to Cartellone (Argentina), are participating in these bids, offering amounts well above the minimum. The Brazilian state owned bank BNDES could supply some of the financing, but the origin of government funds is not clear, and neither is the nature of foreign loan guarantees. The high cost of the plants is also one of the problems that need to be overcome.²⁶

26 The estimated cost per MW in hydroelectric plants for private projects ranges between the following values: Caracoles, USD 3.85 million; Punta Negra, USD 5.6 million; Chihuidos I, USD 2.4 million; and Cónдор Cliff-La Barancosa, USD 2.3 million.

4.2 Nuclear power projects

Although Argentina has a long standing tradition of using nuclear technology, the fact that this tradition was interrupted in the 1990s created an important gap when compared to other developed countries such as the United States or France. These nations have strengthened the nuclear option in view of the challenges that guaranteeing future energy supply poses in a context of scarce natural resources and growing demand. In 2004 Argentina decided to continue with the construction of Atucha II, when almost 80 percent of the project was already finished. Although the relaunching of the work was delayed, it is expected that the facility will start operating before the end of 2010. This would contribute a capacity of almost 695 MW to the system.

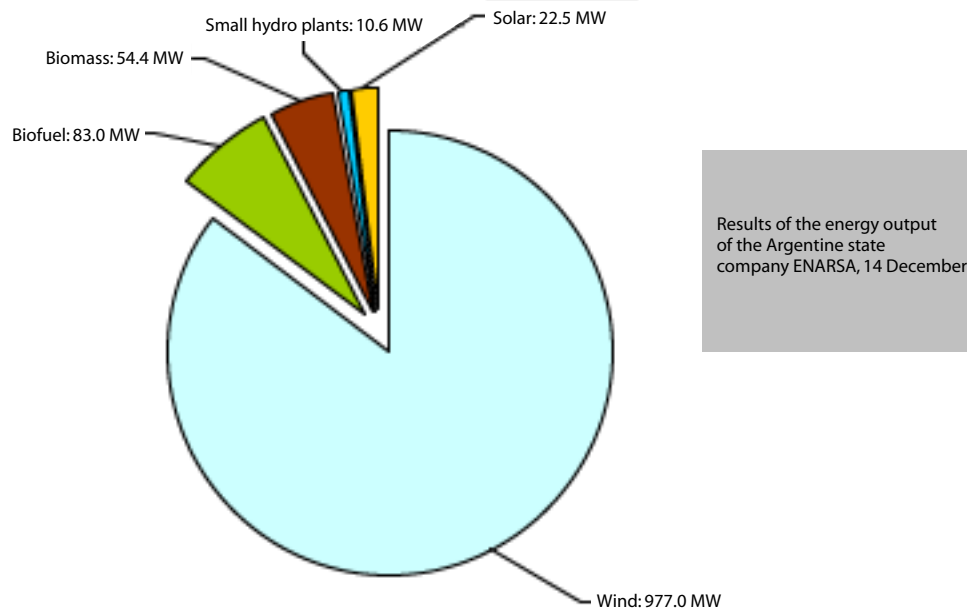
On the other hand, the Argentine company INVAP (SE) has developed a prototype called CAREM that might be implemented before 2015, with efficiency well above third generation designs and a range of low and medium capacities. This model already has competitors that, although behind in their development, are advancing rapidly. They are the IRIS (Westinghouse, U.S.), SMART (DAERI, South Korea), IMR (Mitsubishi, Japan) and PBMR (South Africa). The extent to which Argentina will set up more high capacity reactors or will resort to the CAREM prototype is still to be defined. Although global resistance to nuclear power plants has partially decreased, financial obstacles and concerns by environmental groups may delay a new Argentine Nuclear Plan. The first such plan contained the strategy that led to the building of the two plants now in operation (Embalse and Atucha II). In any event, larger nuclear power contributions cannot be expected before 2015 and 2020 either. Yet as of 2009, government support to the nuclear sector has been significant.

4.3 Renewable energy projects

Just as in other countries, the promotion of renewable energy in Argentina has mainly taken place by means of bids or tenders in which the bidders describe the project to be developed, the MW it will contribute, and its characteristics and cost. The government, in turn, ensures repayment of investments. Even when comprehensive tariff revisions are still pending in Argentina, the authorities will surely implement feed in mechanisms to buy the energy and repay the investment. Although transmission networks are operated by Transener, a private company with national and foreign capital and a small state portion, it is assumed that free access rules and inherent problems will not constitute an obstacle.

In 2009 the Argentine government passed Law 26190, which established the national scheme for the promotion of renewable energies for electricity generation. Pursuant to this law, 8 percent of electricity consumption has to be supplied by renewable energies within 10 years. The law was regulated by Decree 562/2009, and the first round of bidding exceeded the expected offers for 1,000 MW by almost 15 percent. The tendency towards wind energy was evident, as well as the presence of national and international actors that have lately made important investments in the development of that technology (see Figure 19).

Figure 19: GENREN program projects at the end of 2009 (MW offered and % of the 1,147.5 MW total offered by 27 private partnerships)



Source: Author's estimates using ENAR data

5. Conclusions

Electricity consumption in Argentina has grown at a rate well above the net gross domestic product (GDP) in the last years, whereas capacity increase has been slower than consumption increase. Even when statistical deficiencies make it difficult to estimate energy demand elasticity in relation to the economy's growth, for an average GDP growth of about 2.5 percent per year, electricity consumption is estimated not to grow by less than 3 percent per year. Even at these modest rates of demand growth, it is estimated that without improving average levels of capacity use, it would be necessary to increase supply by at least 1,000 MW a year between 2010 and 2020, i.e. by around 10,000 MW.

The hydroelectric potential still not used according to the inventory of relatively feasible projects is approximately equivalent to that amount, but over 60 percent of this depends on large scale binational projects. The goal of catering for 8 percent of the demand with non-hydro renewable energies by 2020 means not less than 4,000–5,000 MW coming from those sources, particularly because their use factor may be very low. In both cases, the cost of installed capacity would exceed USD 2 million per MW, which means not less than USD 20,000 million of investment for the next 10 years.

Like many other countries, Argentina went through a period of prosperity between 2003 and 2008, but has seen a decline in its economy in 2009–10. In this context, the possibility of financing projects with public funds becomes more difficult. In particular, the growing fiscal surplus between 2003 and 2008 has been reduced mostly by the incidence of energy sector subsidies, which in 2008 used almost all the tax resources coming from the energy sector itself (Kozulj, 2007a: 2007b). Therefore, the first question to be answered has to do with the origin of the funds necessary to expand electricity supply with renewable

fuels, including hydroelectric projects. Tender results are encouraging in terms of bids, but they will require tariffs to be reengineered as a consequence of the displacement of costs between 2002 and 2009.

The possibilities of significantly diversifying the Argentine energy matrix imply, then, a qualitative step forward with high investment costs. In spite of the important delay in definitions, nuclear, hydroelectric and renewable options have been launched since 2009. As it is still not possible to schedule all these projects, many of which are in their initial stages, it is not possible to estimate with any accuracy how much installed capacity they will contribute in the coming years. It is clear, however, that in the next five years supply security will still be precarious, particularly because there has been no progress on demand management policies either, and because the impact of higher tariffs on factors such as governability may be considerable obstacles.

In the short term, although the right steps are being taken to reduce the dependence of electricity supplies on non-renewable energies, dependence on gas or liquid fuels for thermal generation will continue to grow. It is not possible to estimate accurately the amount of capacity that will be installed with each type of technology in the next 10 years, but the fact that not less than 3,000 to 5,000 MW must come from conventional thermal plants is problematic. This will necessarily increase natural gas demand.

Considering that the displacement of investment decisions from the public to the private sector has led to strategies for the territorial relocation of hydrocarbon exploitation revenues, investments in the supply of larger amounts of gas or other fuels will also be very difficult and costly.

To sum up, in the next 10 years Argentina will face serious challenges in its attempts to achieve a reasonable level of electric power supply security and, if it manages to achieve this, it will be at prices several times higher than in the last decades. In the medium term the situation is even more complex because of both the low levels of supply and the terms required to increase the supply of hydroelectric, nuclear, and renewable energy capacity and gas supply infrastructure.

Only a rapid solution of the gas production problems in Bolivia, then, as well as strong regional agreements with Brazil can alleviate the foreseen situation, which is serious if we consider that all the estimates on which this reasoning is based are, quite frankly, modest.

All the above makes it impossible to foresee how and when Argentina will be able to fix the current distortions of its energy policy and ensure its energy security context. Historically, solutions to energy policy inconsistencies have come from ruptures caused by extreme critical phenomena, usually accompanied by structural changes in macroeconomic factors. However, history will not necessarily repeat itself. Internal political confrontation certainly jeopardizes any attempt to fix prices and achieve better public funding, but the process still lacks a clear definition.

Finally, in spite of all the above, Argentina seems to be going in the right direction of reducing greenhouse gas emissions through high levels of natural gas use for electricity generation, as well as of the likely development of hydroelectric and nuclear plants, together with a progressive use of wind energy. Even though Argentina is not a major emitter of greenhouse gases, its position in relation to climate change has always been favourable. A backward step to greater use fossil fuels is considered temporary. But to keep this temporary and prevent it from becoming structural, obstacles affecting internal governability must be overcome and strong regional agreements must be achieved, specially with Bolivia and Brazil. Both of these issues lack a simple solution.

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