Available online at www.sciencedirect.com
ScienceDirect
Energy Economics 30 (2008) 1420–1461
Energy Economics
www.elsevier.com/locate/eneco

Transmission expansion in Argentina 3: The evolution of policy

Stephen C. Littlechild [a,*], Carlos J. Skerk [b]

[a] *Judge Business School, Trumpington Street, Cambridge CB2 1AG, UK*
[b] *Mercados Energéticos, Buenos Aires, Argentina*

Received 26 February 2005; received in revised form 21 December 2007; accepted 22 December 2007
Available online 25 January 2008

Abstract

Argentina's 1992 electricity reform introduced the Public Contest method, which made major expansions of the transmission system the responsibility of users rather than the transmission company or regulatory body. Policy evolved to allow incumbent transmission companies as well as users to propose expansions. In 1999 a second round of reforms envisaged financial transmission rights and At-Risk expansions to complement the Public Contest method, and to achieve more effectively the original aim of economic efficiency. In addition a Federal Transmission Fund was introduced with provision for expansions determined by federal and provincial governments. With a change of presidency in December 1999 the former modifications were mostly not implemented but a Federal Transmission Plan was launched. Especially since the economic crisis of early 2002, and the advent of a new presidency in 2003, the role of government has increased further, almost to the exclusion of the Public Contest and other methods. Extensive transmission expansions are now underway, reflecting federal financing and political pressures from outlying provinces, rather than users' decisions and economic considerations.

JEL classification: L33; L51; L94; L98

Keywords: Argentina; Electricity; Transmission; Regulation

1. Introduction

As part of its 1992 electricity reform program, Argentina gave transmission users the responsibility for initiating and approving major transmission expansions, rather than the owners and operators of these systems or the regulatory body. This was the Public Contest method. A

* Corresponding author.
E-mail addresses: sclittlechild@tanworth.mercianet.co.uk (S.C. Littlechild), cskerk@me-consultores.com (C.J. Skerk).

0140-9883/$ - see front matter © 2008 Elsevier B.V. All rights reserved.
doi:10.1016/j.eneco.2007.12.011

delay to an early expansion – the Fourth Line – led the regulatory body and numerous commentators to argue that this method was defective. Recently there has been some re-examination of Argentine experience, and a re-evaluation of this view. Other papers in this Symposium have documented the reasons why the policy was adopted in the first place, looked again at experience with the Fourth Line, evaluated overall performance since 1992, especially during the period 1994 to 2001 when the policy was most clearly applied under normal conditions, and examined how the policy has been applied in Buenos Aires province.[1]

The purpose of this paper is to document the evolution of transmission expansion policy in Argentina since its initial formulation in 1992, and to understand why these changes were made and what the consequences have been. The paper examines in turn the seven major modifications or phases since that time, namely:

- the creation and conditions of application of the Salex Fund 1994 and 1996;
- the quality of supply and extended-proponent modifications 1998;
- the 'second round of reforms' including the concept of 'risk-bearing expansions' 1998–99;
- the introduction of a Federal Transmission Fund and then a Federal Transmission Plan and the Open Season method 1999–2001;
- the temporary reversal of that policy and reaffirmation of a revised original approach 2001;
- the economic crisis, price freezes, further modifications and upgrade expansions 2002;
- the reaffirmed Federal Transmission Plan and other arrangements from 2003 to the present.

2. Electricity reform

Details of the early reform have been set out elsewhere. Briefly, in August 1989 Administrative Reform Law 23696 established the basis and principles for privatising all state-owned companies. The first version of the Market Regulations for electricity appeared in Resolution SSEE 38 on 19 July 1991. The Electricity Regulation Act (Law 24065) of 19 December 1991 came into effect on 3 January 1992. Those parts of the electricity industry under federal control were completely restructured and many generation and distribution companies were privatised separately. Transmission was restructured into a national Extra High Voltage (EHV) network called Transener, operating mainly at 500 kV, and six regional high-voltage sub-transmission networks operating mainly at 132 kV. Transener was privatised in 1993. Its owners later purchased one of the sub-transmission networks (Transba).

A Wholesale Electricity Market Managing Corporation called CAMMESA[2] was created as the independent system operator (ISO). It was a not-for-profit company with directors from government and the industry and chaired by the Secretary of Energy. The Secretary of Energy retained access to knowledge and influence as chairman of CAMMESA. He also had control over the Market Rules, which could be changed by ministerial resolution.[3]

An electricity regulatory body Ente Nacional Regulador de la Electricidad (ENRE) was established at the federal level. It had similar duties as a regulatory body in, say, the UK, but was

[1] Littlechild and Skerk (2004a,b, 2008-this issue-a,b,c,d), Littlechild and Ponzano (2007), Galetovic and Inostroza (2008-this issue), Pollitt (2008-this issue).

[2] Compañía Administradora del Mercado Mayorista Eléctrico Sociedad Anónima.

[3] This continuing government involvement was a risk for investors, but may not have been perceived as serious at the time of reform. From the perspective of those promoting reform, it facilitated introduction and revision of the reforms, and resistance to critics or pressure groups. However, it meant that the system was vulnerable to change by later governments of different political and economic persuasion.

Table 1
Office holders related to transmission regulation 1991–1999

Office	1989–95	1995–99
President[7]	Menem	Menem
Minister Economy[8]	Various/Cavallo	Cavallo/Fernández
Secretary Energy[9]	Various/Bastos	Bastos/Mirkin/Mac Karthy
UnderSec Energy	Sperman/Mirkin	Mirkin/J Sanz/Sbértoli
ExecVP CAMMESA[10]	–/Caruso/Mirkin	R Sanz/Blanco

[7] President: Carlos Menem 1st election 14/5/89, in office 8/7/89–10/12/1995; 2nd election 14/5/1995, in office 10/12/1995–10/12/1999.

[8] Minister of Economy: Domingo Cavallo 1/3/1991–6/8/1996.

[9] Secretary of Energy or equivalent: Carlos Bastos 3/4/1991–10/10/1996, Alfredo Mirkin 10/10/1996–10/12/1998, César Mac Karthy 10/12/1998–10/12/1999. Appointment dates of Under-Secretaries typically matched those of the Secretaries.

[10] Executive Vice President CAMMESA (created July 1992): Luis M Caruso August 1992–June 1993, Juan Carlos Berra July–August 1993, Alfredo Mirkin September 1993–July 1995, Ramón Sanz August 1995–November1998, Horacio Blanco December 1998–February 2004.

more restricted in terms of ability to initiate policy. The basis of this regulation was essentially established in the Market Regulations of November 1992.[4]

Existing transmission systems and new expansions were regulated separately. Existing systems were subject to incentive price caps, that are not the subject of this paper. Four methods of expanding transmission systems were identified. Three were by Contract between Parties, Minor Expansions (under $2m in the main EHV system) and Private Expansions (Article 31).[5] The Public Contest approach applied to major transmission expansions (over $2m), which had to be proposed and approved by the market participants involved, who also had to pay for these expansions. As part of this approach, costs and votes were determined according to the calculated usage of the proposed expansion, calculated according to a so-called Area of Influence method.

Although privatisation had been discussed a little earlier, Carlos Bastos, Secretary of Energy 1991–96, led the privatisation of the electricity sector within the general policy framework of the Minister of Economy Domingo Cavallo. Table 1 notes the main office holders who contributed to policy in the electricity sector during the two successive Menem governments (1989–1999), primarily the Secretary and Under-Secretary of Energy and the Executive Vice-President of CAMMESA.[6]

There was relative stability of personnel (and of policy) during the near-decade to 1999.[11] This stands in contrast to the turnover in the years 1999 to 2003, especially around the time of the

[4] Market Regulations Annex 16, per Resolution SE 137/30 November 1992, ratified in Decree 2743/29 December 1992 (which also created Transener) and in force from February 1993. This superceded the first version of the Market Regulations in Resolution SSEE 38/19 July 1991.

[5] The symbol $ is used to denote the Argentine peso as well as the US dollar. For most of the period following reform, the peso was equal to the dollar, and it is not necessary to distinguish the two. After the economic crisis at the end of 2001, the Argentine peso fell to about one third of the US dollar. The convention nowadays is to express values in US dollars using an exchange rate of 3 AR$ to 1 US$, and then to convert to AR$ at the exchange rate obtaining on the day of payment. Unless noted otherwise, the post-2001 $ values used in this paper refer to US dollars or equivalent.

[6] Other office holders obviously had an impact on the industry, such as the President of ENRE: Carlos Mattausch (6/4/1993–10/10/1997) and Juan Antonio Legisa (10/10/1997–19/6/2003). Legisa had been Secretary of Energy for the six months preceding Bastos. Alberto Devoto was Vice-President of ENRE (6/4/1993–5/4/2002) and Secretary of Energy (8/8/2002–24/5/2003).

[11] Menem was president for over ten years, Bastos was Secretary of Energy for over five years, and his successor Mirkin held the post for over two years following five years as Under-Secretary.

macro-economic crisis in early 2002.[12] There has again been stability (with a different policy) from 2003 to the present.[13]

3. Transmission expansion arrangements and the Salex Funds

3.1. Congestion revenues and transmission expansion

The incentive to invest in transmission expansions derived in significant part from the nodal and congestion pricing mechanism established under the 1992 regulations. When a line is congested, generators at the exporting end receive a lower 'local' price than they otherwise would, and demand at the receiving end pays a higher price. The difference in prices is accumulated as congestion revenues. These were initially used to stabilise transmission company revenues. However, the high level of congestion revenue soon demanded a different treatment.[14]

3.2. The Salex Funds 1994

Rather than use the congestion revenues for quite other purposes, the Secretary of Energy specified in August 1994 that, in future, revenues from nodal price differentials deriving from congestion (i.e. local prices) should be put into so-called Salex Funds, one for each of seven transmission corridors. These Salex Funds could be used to reduce the cost of transmission expansions using the Public Contest method. However, to be eligible for support, the expansions had to produce reductions in the transmission constraints that generated local prices in the corresponding corridor.

The Salex Funds were thus not an integral part of the Public Contest method of transmission expansion. They were envisaged as a constructive solution to the disposal of revenues arising from the use of nodal congestion pricing. They would have the additional advantage of facilitating a competitive market in generation.[15] Moreover, they contained an inherent limitation against abuse, since any particular application of the funds would reduce congestion and the associated revenues that led to the funds in the first place.

3.3. The Fourth Line and associated modifications in 1996

By the end of 1994, the government (as owner of the Yacyretá plant) had put three major EHV lines totalling 853 km out to competitive tender under the Public Contest method. Several plants

[12] During the two years of the De La Rua presidency from December 1999 to December 2001 there were four Secretaries of Energy. Their tenures ranged from 8 months to 20 days, with an average tenure of six months. In the one and a half years following that time there were four presidents (three of whom served from 2 to 8 days) and three Secretaries of Energy.

[13] The subsequent office holders were in post for the whole duration of Mr Kirchner's presidency (over four years from May 2003 to December 2007): President Néstor Kirchner, Minister of Infrastructure [Federal Planning, Public Investment and Services] Julio De Vido, and Secretary of Energy Daniel Cameron. Mr De Vido has been confirmed to continue in office under Mrs Kirchner's presidency.

[14] See Littlechild and Skerk (2004a).

[15] "The practical effect of doing this is to give adequate direction to the funds originating from local pricing towards the expansion of transmission capacity. It is necessary to remove constraints on the free dispatch of generation, and necessary to give precision to the use of the funds derived from local prices that remain in the Apartamientos Accounts." Resolution SE 274 of 26 August 1994. (The Apartamientos Accounts were where the congestion revenues were previously accumulated.)

had connected to the EHV system using the Contract between Parties method. There were other minor expansions.

The Fourth Line between Comahue and Buenos Aires has been thoroughly discussed elsewhere. The first proposal to construct the Fourth Line was made in September 1994. At the vote in February 1995 it failed to attract sufficient support. The generators then worked together to secure mutually acceptable conditions for the expansion. As part of this, they suggested two modifications to the operation of the Public Contest method. The modifications were accepted.[16] They were minor in terms of principle but significant in terms of impact.

First, the proponents of an expansion, if they wished to do so, could specify a maximum acceptable fee instead of having to put forward an actual proposal including a fee. The aim was to create a more competitive market for construction, and to avoid giving a 'first mover advantage' to the initial proponent of an expansion.

Second, Salex Funds could henceforth be applied against the initial cost of constructing a new line: they were not limited to reducing the payments in subsequent years. This modification was in keeping with the initial aim of using Salex Funds, though the possibility of such an application seems not to have occurred to policy makers at the time. The modification also limited to 70% the proportion of the expansion cost that could be defrayed by the Salex Fund. (It was considered desirable to leave some construction risk on the beneficiaries in order to maintain an incentive to act efficiently.)[17]

3.4. Policy after 1996

The size and applicability of the Salex Funds played a critical role in the passing of the second proposal for the Fourth Line. They were also applied to various more economic expansions over the next few years. The use or misuse of the Salex Funds became a significant issue from 2002 onwards, as discussed below.

There were other modifications to the regulatory framework in 1998 and 1999, primarily to do with quality of service, the role of transmission companies and transmission property rights. However, their impact was mainly after 2001. Fig. 1 shows the extent of the national EHV transmission network before the 1992 reform program, and the expansions that took place between then and 2001.

4. Quality of supply and extended-proponent modifications 1998

4.1. Concerns about quality of supply and CAMMESA's investigation

In general, the quality of electricity supply in Argentina improved considerably after privatisation. It was nonetheless sometimes argued that the distribution companies were not given sufficient funds, or sufficient incentives or penalties, to propose and support transmission expansions to improve quality of supply. Another argument was that transmission companies themselves did not have a sufficient role in the process. In consequence, it was said, the Public Contest method failed to secure investments needed to improve quality and reliability of supply.

[16] Resolution SeyT 105 of 29 April 1996.

[17] This resolution also provided that if the Salex Funds accumulating in a particular corridor are not used within 7 years, they are transferred to a general account and may be used to finance transmission expansions in other parts of the transmission grid.

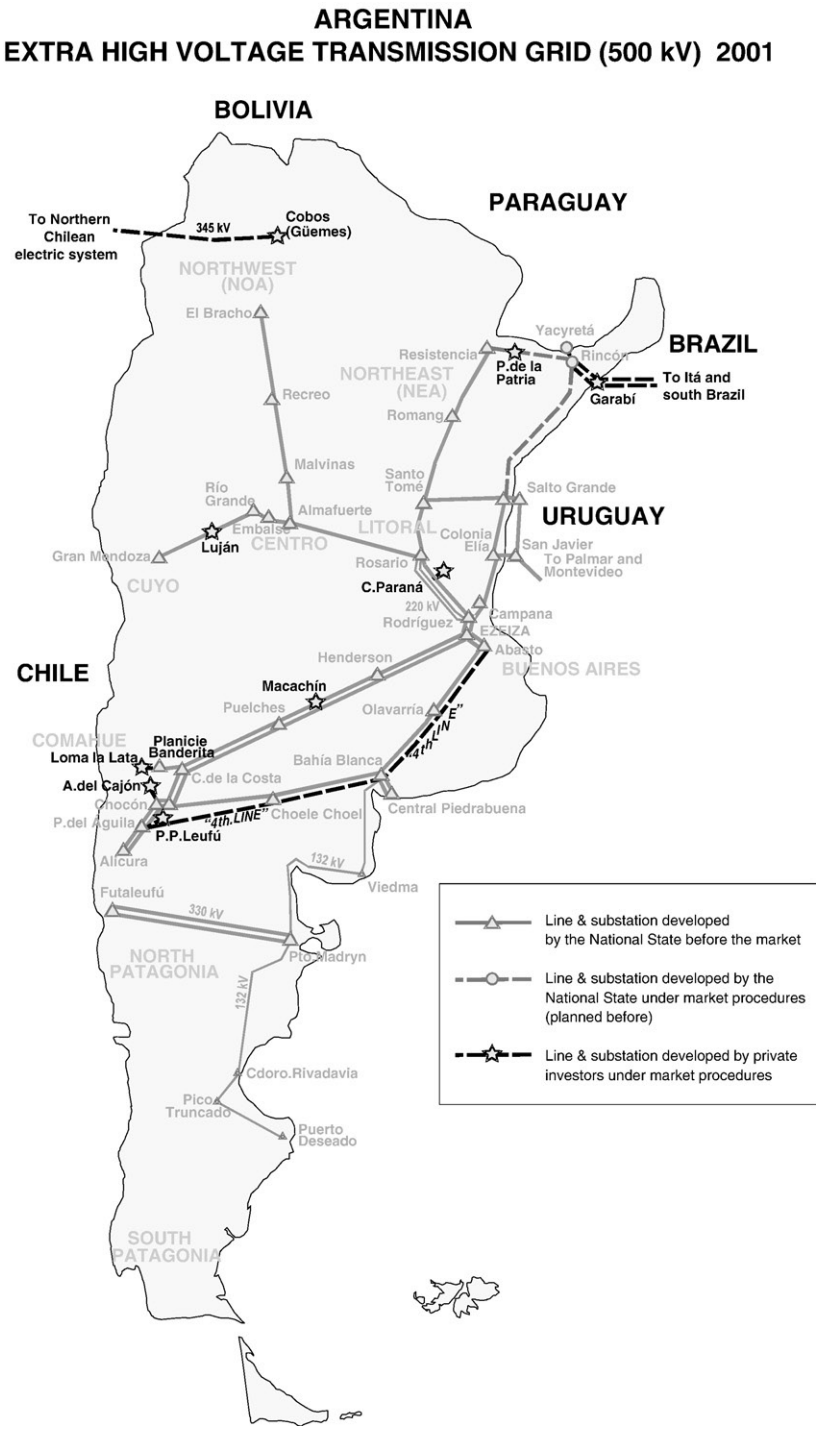

Fig. 1. Argentine EHV transmission network 2001 (source: Mercados Energéticos).

Transmission and distribution companies began to lobby for changes, for example to pass through to customers' end-user tariffs the costs of transmission expansions designed to improve quality, so as to allow the development of such expansions.

The Secretary of Energy – now Alfredo Mirkin, who had succeeded Carlos Bastos in October 1996 – asked CAMMESA to investigate the basis of such arguments. To that end, CAMMESA examined the quality of service on the main 500 kV EHV transmission network, and reported in late 1997.[18]

CAMMESA concluded that only two particular investments were appropriate to improve quality of service on the main transmission network. One possible investment was not directly related to transmission, but involved a different use of government-owned hydro-generating facilities. To date the government has not implemented this recommendation. The other proposal was the refurbishment of the Northwest transmission corridor as said to be requested by the regulatory body ENRE. Arguably it was more properly seen as a straightforward project to expand the export capacity of the northwest corridor than as a quality of supply expansion. In fact one large generator paid for the investment.[19]

4.2. Resolution 208 on quality of supply and extending the set of proponents

The limited nature of these two investments indicates that in late 1997 CAMMESA did not find any significant lack of investment needed to maintain or improve quality of supply in the 500 kV network. Nevertheless, to meet any concerns, Regulation 208 introduced in 1998 modified the 1992 Regulations by ensuring that all types of transmission expansion and new investment were covered by the Public Contest method. It also allowed transmission concessionaires and the Secretary of Energy as well as beneficiaries to propose expansions, and where necessary it defined or redefined the set of beneficiaries appropriately.[20]

Taking these aspects in turn, Resolution 208 authorised a new kind of expansion under the title 'transmission expansions for additional quality and security of supply improvement, including Special Expansions'. Special Expansions are those that increase capacity in a transmission corridor rather than quality of supply, but cannot be associated directly with particular lines or substations.[21] To shorten the consultation time needed for these new expansions, the transmission concessionaires would make information available in advance for evaluation by ENRE and all the beneficiaries. ENRE had to be satisfied that these quality and security of supply expansions were economically beneficial.[22]

Resolution 208 also enabled a transmission concessionaire to initiate an expansion process for any transmission expansion, whether a capacity expansion as before or an expansion associated

[18] "Shortages and Non-supplied Energy", study by CAMMESA submitted to Secretary of Energy, 21 October 1997.

[19] Littlechild and Skerk (2004b, p. 7).

[20] SE Resolution 208 of 27 May 1998. Until this Resolution, Transcos had an entirely passive role in transmission expansion: in order to provide a picture to market participants, they had to indicate which expansions were necessary in their view, without any obligation or ability to propose or develop such expansions.

[21] Special Expansions might include (e.g.) electronic power stabilisation devices, and static VAR and reactive power equipment that stabilise voltage profile along a corridor, both of which expansions thereby increase transmission capacity, devices for automatic disconnection of generation or load, etc.

[22] Resolution 208, Appendix C to Annex 16 Section 2 iii. For Generation zones 'economically beneficial' was defined as where the annual charge to cover the cost of construction, operation and maintenance of the expansion is less than the expected annual reduction in costs of non-supplied energy. This was a specific way to apply the Golden Rule (see Littlechild and Skerk, 2008-this issue-a) for quality of supply expansions. Appendix D sets out additional conditions for Demand zones, defined as where distribution companies and large users constituted more than 70% of the beneficiaries.

with quality or security of supply, and by any of the existing methods (Public Contest, Agreement between Parties, Minor Expansion).[23] The only constraint was that this new expansion should be limited to adding equipment to existing facilities (typically a new transformer in an existing substation) and should not be part of any other major expansion.

In proposing such expansions, the transmission concessionaire had to provide, in addition to information required for any Public Contest request, a detailed budget cost breakdown into engineering, inspection, materials and installation costs. It also had to provide technical, economic, reliability, security, transmission capacity and/or system response studies. ENRE had to be satisfied that these studies justified taking forward the proposal, and that the budgeted operation and maintenance costs were acceptable. ENRE had to inform the beneficiaries of the proposal. With a view to ensuring transparency, ENRE had to publicise any intention by the transmission company to participate in the tender process for construction, and the beneficiaries had to approve this participation (as well as approve the expansion proposal as a whole). The work would be put out to tender. The concessionaire of the transmission system involved would inspect the installation and be remunerated for its reasonable costs in doing so.

The Secretary of Energy was also given the power to propose the new kinds of expansions to provide additional quality and security of supply. This had to be on the basis of information provided by CAMMESA.

The definition of Area of Influence was modified for quality expansions, so that the beneficiaries were all those market participants whose expected non-supplied energy would reduce as a result of the expansion (in this case, distribution companies and directly-connected users). They participated in the canon (monthly fee) according to the expected reduction in their non-supplied energy in the first two years after the expansion is brought into service. Resolution 208 gave specific rules for how the costs of Special Expansions were to be covered.[24]

With the exception of security of supply expansions, the beneficiaries of quality of service expansions would still have to vote to approve proposals for transmission expansions. In the special case of security of supply expansions – "those that reduce the risk or the effects of a partial or total collapse in the system" – the decision whether such expansions should go ahead was a matter for the Secretary of Energy, provided there was support by CAMMESA, rather than for the beneficiaries. The total cost would be paid by demand via the capacity payments. (These capacity payments were payable by distribution companies and any eligible large users in proportion to their peak demand. Part of the revenues was paid to generators as an incentive to keep capacity on the system.) Distribution companies were able to reflect such payments in their tariffs, as part of the wholesale price of energy.

4.3. Evaluation of Resolution 208

In economic terms, Resolution 208 of 1998 can be seen as a response to concerns about information and externalities. It enabled a wider set of agents – the transmission company and the Secretary of Energy as well as the users (beneficiaries) of the network – to propose quality of service expansions of the transmission system, and expansions at existing substations. For these

[23] Regulations Artículo 16, new para 15 bis et seq.

[24] Automatic generation/compensation disconnection devices should be paid for by the generators in a corridor, independently of whether it was an importing or exporting area. Stabilisation devices should be paid for by all producers that sell energy in the market, in proportion to their transmission capacity payments to Transener. Automatic load disconnection devices should be paid for by producers in the case of an exporting area according to the traditional Area of Influence method, and by demanders in the case of an importing area according to the same criteria.

expansions the set of beneficiaries was modified appropriately. Amongst other things, this gave distribution companies a more explicit ability to propose and vote for expansions to improve quality of supply. There was also a more explicit role for the Independent System Operator (CAMMESA) and the regulator ENRE in Res 208 expansions.

The circumstances under which responsibility was transferred to other parties were carefully defined. Quality and security of supply expansions could explicitly not be obtained, either partially or totally, for the purpose of increasing the capacity of the transmission network under normal conditions: they were only for the purpose of reducing the risk of non-supplied energy.

Except for the modifications mentioned, in other respects the same mechanism applied as for transmission investments generally. This included the requirement that the beneficiaries approve all such expansions, whoever proposed them. The only exception to this principle was the new category of security of supply expansions, where the power to authorise was given to the Secretary of Energy. This category of investment was very tightly defined.[25] And CAMMESA's support was needed for the Secretary of Energy to authorise an expansion to improve security of supply.

In the event, transmission companies did propose a series of expansions under Resolution 208. Most were delayed by the economic crisis but several eventually proceeded. Littlechild and Skerk (2007c) show that distribution companies and other beneficiaries did indeed support most expansions put to them under Resolution 208.

5. Second round of reforms

5.1. Reviewing the market

Over the first five years following the initial reform, there were various achievements and concerns.[26] Alfredo Mirkin and Roque Fernández, respectively successors to Secretary of Energy Bastos and Minister of Economy Cavallo, decided to take stock of the situation in the electricity sector with a view to a possible second round of reforms. In March 1997 Mirkin commissioned a review by consultants NERA.[27] This was not an indication that the transmission expansion mechanism had failed and needed to be replaced. On the contrary, the scope of the review was wide-ranging, covering six major topics, of which transmission and distribution combined were just part of one topic.[28] Moreover, the Government made clear that the aim was to extend de-regulation and the market approach, not to limit or replace it.[29]

[25] Resolution 208/1998 made clear that "at the time of issuing this resolution, only black start facilities and equipment for allowing operation of the system in isolated areas are included in this category". (The definition was later widened by Resolution SE1/2003, see below.)

[26] For example, the state-owned entities had been replaced by many private owners. Generators were concerned about wholesale spot prices. They and distribution companies were pressing for generation contract costs to be passed through to end-consumers. At the same time, support for a market approach was less strong than before and the Federal Council reflecting the provincial governments (see later) was gaining strength.

[27] The authors of the NERA report were Kent Anderson, Sally Hunt, Hethie Parmesano, Graham Shuttleworth and Stephen Powell.

[28] The six topics were "Price signals in the Wholesale Power Market (MEM) in Argentina; Development of the contract market and its role in the quality of supply; The systems of commercialisation that are currently in place, and those that might be developed for the future; The coherence of regulations governing the different players, with special emphasis on the transmission and distribution of electricity; The mechanism for setting costs and prices in the distribution concessions; and The relationship of the Electricity Sector to Gas and Hydrocarbons Markets." NERA (1998, p. 3).

[29] The terms of reference stated "The main output of this project should permit a deepening of the current wholesale power market in Argentina, as well as the implementation of certain de-regulating mechanisms that will facilitate easier and more efficient transactions in this market." NERA (1998 p. 3).

NERA's report in January 1998 referred to the highly sophisticated 'state of the art' design of the Argentine system, "[O]n the whole the results have been impressive. … judged by the results… there is not very much wrong with the system". (p. 3) It noted that "transmission expansion is the major problem we have found in the system". But even here the concern was qualified: it acknowledged that the delayed Fourth Line did in fact get built and that there was no internationally agreed best approach to transmission expansion.[30] NERA identified four major distortions related to transmission expansion.[31] The two most problematic features were "the absence of transmission rights and the use of the Area of Influence method to assign responsibility for payment". Of these, NERA considered the former the most fundamental, and recommended the introduction of transmission rights. NERA did not recommend the abolition of, or changes to, the Area of Influence method or the Public Contest method within which the Area of Influence method played a role.[32]

After further analysis, the Government introduced reforms in October 1999 in almost all aspects of the electricity sector. These were embodied in Resolution 543 on transmission and Resolution 545 on all other aspects of the electricity sector.[33] Resolution 543 addressed the outstanding transmission issues. Significantly, it did not change the much-discussed Area of Influence method. Instead, it introduced the financial transmission rights that NERA proposed, and a novel concept of 'risk-bearing expansions'. Resolution 545 sought to enhance generation markets.[34]

5.2. The Area of Influence method

The Area of Influence method is used to implement the Public Contest method. It allocates costs and votes to transmission users in proportion to usage (of a proposed transmission expansion) rather than in proportion to economic benefit. From the time it was first adopted, economists (and others) have been much concerned about this. NERA shared this concern.[35] An associated concern was the designation of Buenos Aires as the 'swing node'. It was said that these two characteristics would effectively disenfranchise the distribution companies and large customers in Buenos Aires, and would lead to inefficient investments.

[30] "The only major problem has been the delay in constructing the fourth transmission line; but despite the problems encountered in getting agreement to build the line, the line was successfully put out to bid in 1997." (p. 3). "Transmission expansion is one of the most difficult analytical problems, and every competitive system has a different method for dealing with it. No country has developed a system that is agreed to be state of the art." (p. 11)

[31] NERA (1998, p. 11). "We believe that the current system gives rise to four major distortions. They work in different directions, some encouraging building and some discouraging it. In any particular case the outcome depends on the mix of factors. The four distortions… are as follows: The generators may not be willing to pay for economic lines until long after they should have been started.The use of the Salex Fund may encourage uneconomic construction of transmission.Generators may have an over-incentive to commit funds to expansion (which might offset the first distortion in some cases, but cannot be assumed to do so).The combination of these factors may encourage uneconomic location decisions." NERA (1998, p. 55).

[32] This was not because NERA wished to limit the extent of change. It made recommendations for significant change in the other areas examined, notably to eliminate bidding restrictions and the peak capacity payment, increase the scope for demand bidding, encourage the development of a standardised forward contracts market, reduce contract restrictions, and increase retail access.

[33] Respectively Resolutions SE 543 on 19 October 1999, and SE 545 on 21 October 1999.

[34] Resolution 545 extended to 486 pages and covered a wide variety of areas. Its main aim was two-fold: to make the market for energy more competitive by reducing restrictions on bidding and reforming capacity payments, and to encourage markets for reserves (such as ancillary services, short- and long-term reserves and frequency regulation, and enabling demand-side involvement etc.).

[35] "A key problem of the Area of Influence method is that it does not in fact identify beneficiaries or accurately measure users' share of benefits." NERA (1998, p. 70). For an early concern, see Abdala (2008-this issue-a), also Abdala (2008-this issue-b). Most of the later commentators reference Chisari et al. (2001), see also Chisari and Romero (2008-this issue). For further references see Littlechild and Skerk (2004a, 2008-this issue-a,b).

The designers of the Area of Influence method were aware of such considerations. Nevertheless, they defined the Area of Influence method as they did for a clear reason. They considered this would be more practicable and less susceptible to subjective interpretation and manipulation by interested parties. (Littlechild and Skerk, 2008-this issue-a).

In the event, when the review of electricity reforms took place, neither NERA nor the Secretary of Energy deemed changes to the Area of Influence model to be necessary, whereas significant other changes were in fact made. In fact, the Area of Influence method was not even mentioned as an issue. Why was this? Three reasons suggest themselves.

There was no pressure for change from market participants themselves. They were accustomed to the Area of Influence model being used to determine the allocation of costs on a daily basis in the generation dispatch system, and had no significant objection to it.

No convincingly superior alternatives had been put forward. This was the conclusion that NERA reached. It listed several alternatives to the Area of Influence method, but pointed out that each of these alternatives had drawbacks, and it could not find a better method.[36]

NERA considered that any drawbacks of the Area of Influence method would not be a serious problem. Financial transmission rights would significantly reduce the use of the Public Contest method including the Area of Influence method.[37]

5.3. Financial transmission rights

Generators in Comahue had expressed concern about free-riding on transmission expansions, which in their view were deterring further transmission expansion. NERA was well aware of their views. Various commentators saw transmission property rights as a desirable development. NERA agreed: such rights would solve or help to solve the problems that NERA had identified.

Financial Transmission Rights (FTRs) would give the owner of any line the right to the difference in nodal prices along that line. NERA said that this would make a generator more willing to pay for a new line, replace the potentially distorting Salex Fund, reduce the incentive to over-expand, and remove the incentive to over-build generation at removed locations and in Buenos Aires. NERA also acknowledged two problems of this approach: the need for the regulator to determine the MW amount of rights to be assigned to a particular line, since this might vary substantially from time to time, and the problem that the addition of capacity in one part of the network might have positive or negative effects on capacity in other parts. But it considered that these problems could be overcome.

NERA's case for reform reflected the prevailing view at the time: that the delay to the fourth line was a major problem and that, in most other countries, "the need to expand transmission

[36] "Alternatives to the Area of Influence method include methods that allocate costs by: estimated benefits, MW capacity or demand, MW-distance, or MWh output or usage. Like the Area of Influence method, each of these methods has drawbacks. Most of the methods are also somewhat arbitrary and open to dispute, also like the Area of Influence method. The most logical alternative – to allocate costs on the basis of estimated benefits – is not arbitrary, but is the most difficult to accomplish. … It might be possible to improve the allocation of payment responsibilities through a benefits-related calculation, but we doubt that a satisfactory method could be found." NERA 1998, p. 71. In the view of several commentators this is still the situation today. E.g. Pérez-Arriaga and Rubio (1996, 2000). Pérez-Arriaga notes that the 'Beneficiaries method' explored in New Zealand and California depends critically on the assumptions made, including about extent and location of future investment and demand response. (Personal communication, 28 June 2004).

[37] "We believe that the adoption of Financial Transmission Rights (FTRs) would make the method of funding by private coalitions so much more attractive that the alternative method of allocating payment responsibilities by regulatory formula would eventually be used only rarely." NERA (1998, p. 71).

capacity rapidly is not so acute as it is in Argentina". In retrospect, this view is questionable.[38] Nevertheless, the case for financial transmission rights is one that several economists have advocated, and generators and others in Argentina were generally sympathetic.[39] NERA reflected this view, and drew attention to potential distortions in the absence of such rights.

NERA did not establish how far the identified distortions actually did operate in practice in Argentina, nor in which overall direction. And it is not clear that any economic investments actually were precluded or delayed by the absence of financial transmission rights in Argentina. Nevertheless, concerns about free-riding in the absence of such rights may have been a factor influencing some generators to vote against the Fourth Line on the first occasion.[40] And in drawing up initial policy the transmission privatisation team may have underestimated the extent to which more gas-fired generation capacity would be built in Comahue if the Fourth Line were built to meet the demand from existing hydro-capacity there. To that extent, hydro-proponents of a transmission expansion would be deprived of some of the benefit.

NERA's recommendations were attractive to the Government in many respects, insofar as they promised to strengthen the role of market-based decision-making. And whereas granting physical property rights to network users seemed inconsistent with the fundamental principle of open access to Argentine networks, financial transmission rights seemed a way of reconciling open access with the need to protect new investors against free-riding.

However, the best form of implementation of financial transmission rights was not obvious at the time.[41] The Energy Secretariat needed time to consider the issue.[42]

Energy Secretary Mirkin stepped down at the end of 1998, as did other officials that had worked with him. The analysis was substantially finished by then; it was accepted in principle by the incoming Energy Secretary Cesar Mac Karthy and Under-Secretary Luis Sbértoli, who put it out to consultation.

Mac Karthy introduced the 'second round of reform' modifications in SE Resolution 543 of 19 October 1999. They included congestion rights to developers of new lines — more precisely, the rights to differences in nodal prices. The congestion rights to existing lines were to be auctioned on an annual basis, and the proceeds of these bids assigned to the Salex Fund, which would

[38] It now seems that the delay to the Fourth Line was not harmful nor was the need to expand transmission capacity acute, at least in terms of building more lines. Indeed, the transmission system was already over-expanded and the initial reform policy reflected the acute need to *stop* building long and expensive lines. Littlechild and Skerk (2004a, 2008-this issue-a,b).

[39] Hogan (1992) had proposed Transmission Congestion Contracts (TCCs) shortly before then. Abdala, Arrufat and Torres (1997), advising the Comahue generators, developed the idea of granting incremental transmission capacity rights so as to alleviate free riding problems. See also Abdala and Chambouleyron (1999), Gómez-Ibáñez (2003).

[40] See Littlechild and Skerk (2004a, 2008-this issue-b). As noted there, the term free-riding has to be interpreted with care. It is not the case that existing generators pay for the expansion then entrants come along and ride for free. If an expansion is approved then all users pay for it, not only those users that vote for it. If entrants make use of the new line to the same extent as incumbents, then they pay the same charges for it. The concern of hydro-generating incumbents was a slightly different one: that they might vote for an expansion that would be profitable for them if no entrants appeared, but if this caused thermal generators to appear and preclude them from using some peak capacity, then they would have committed themselves to fund an investment that was not necessarily profitable for themselves.

[41] See Gómez-Ibáñez (2003, p. 318).

[42] The Secretariat had been expecting recommendations to do with the Area of Influence method and was surprised by the emphasis on FTRs in the final NERA report. It wondered whether these recommendations were appropriate to Argentina, and considered that FTRs might be part of the solution rather than the whole or main solution. The analysis that NERA had begun was therefore continued and developed in detail in the second half of 1998 by an Expert Group directed by the Energy Secretary Alfredo Mirkin. The Group comprised Ignacio Pérez-Arriaga, Alex Papalexopulus and Larry Ruff, together with three representatives of the Secretary of Energy: Beatriz Arizu, José Sanz and Ramón Sanz.

continue to be used for transmission expansion. No change was proposed to the Area of Influence method. This was perhaps not surprising, given the original thinking, subsequent experience, and NERA's remarks. But a novel method for building new transmission lines was introduced, in addition to the previous three methods. This was called the 'At-Risk' expansion method.

5.4. At-Risk expansions

Financial transmission rights were not in fact the Secretariat's first priority for transmission reform. The Energy Secretary's main proposal was called the At-Risk expansion method.[43] It has been summarised as follows.

This method would be initiated when a group of investors who promised to assume responsibility for at least 30% of the cost of a line approached ENRE. ENRE would then conduct two auctions. The first would be to determine which investors would get to finance the line. The investment rights would be awarded to the group of investors that forecast the highest percentage utilization of the line.[44] The second auction would be to award a concession to construct, operate and maintain the new line [as in the Public Contest method].

The At-Risk method differed from the [Public Contest] voting method in that the investors proposing the line did not have to be generators or other participants in the wholesale power market. Moreover, the investors, rather than the users, would be directly responsible for making the fifteen annual payments to the COM concessionaire. In return, the investors would have the right to charge users a toll equal to the payment due the COM concessionaire times the ratio of the actual to the expected utilization of the line. This scheme forced investors to assume part of the risk of whether the new line was needed. Investors would lose money on the tolls if utilization was lower than they expected and make profits if utilization was higher. In addition, the investors would have the rights to the TCCs [Transmission Congestion Contracts] from the line.[45]

Two additional features might be noted. First, Resolution 543 provided that this At-Risk expansion method could draw on the Salex Funds for up to 30% of the construction cost if the bids received did not fully cover that cost. Access to Salex Funds was necessary to prevent the lack of this feature distorting choice between expansion methods. It reduced the waiting time until enough parties were willing to support a line, and it constituted a contribution from 'passive' network users that might benefit in a general way from a new facility. Nevertheless, since reliance on use of Salex seemed inconsistent with the concept of investors bearing risk, the limit was put at 30% of the cost whereas the Public Contest method was able to draw on Salex Funds for up to 70% of the cost.

Second, the hurdle for automatic vetoing of a proposed At-Risk expansion was set at 60% of the votes, calculated according to the traditional Area of Influence method, compared with 30%

[43] These 'expansiones a riesgo' are literally 'expansions at risk' or 'risk-bearing expansions'. However, they might be called 'equity expansions' to indicate that the proponents put up risk capital and earn profits to the extent that they correctly forecast an unfulfilled demand for transmission capacity, as well as bear the associated risks. These investments are not necessarily riskier than other transmission expansions.

[44] "In this first auction the initiating investors and any other interested parties submitted sealed bids for the capacity rights. The bid would specify the proportion of the line's construction cost the bidder wanted to assume and the average percentage of the total capacity of the line the bidder believed would be utilized during the fifteen year amortisation period. ENRE would rank the bids in descending order of expected capacity utilization and then go down the list until 100% of the construction cost was covered. The expected capacity utilization of the last bid accepted would be used later in calculating the remuneration of the investors." (footnote in original).

[45] Gómez-Ibáñez (2003, p. 318). Note that the provision for users paying a toll equal to the concession payment multiplied by the proportion of actual to expected utilization of the line was also a means of reducing payments in the early years before the line had reached its full capacity.

under the Public Contest method. This was to discourage unjustified opposition, on the basis that if some investors were willing to assume a risk there was no cause to oppose them. Also, the existence of financial transmission rights could make some users immune to congestion and uninterested in supporting an expansion. They might even favour congestion because it increased the value of their transmission rights, and therefore oppose expansion that would reduce this value. If opposing votes were not above 60% but there was nevertheless "well-founded opposition according to ENRE criteria", it was open to ENRE to examine the 'social benefit' of the line, to which end it could request consultants to investigate the matter.[46] But it could only do this if opponents of the proposal presented some convincing evidence that the social benefits of the line were actually negative, and it could only veto the proposal if its investigation confirmed this. ENRE had to inform participants of its final decision within 90 days.

The At-Risk expansion method was not mentioned in the NERA report. It seems to have been developed within the Secretariat of Energy and its advisory group rather than to have been urged on them by consultants, economists, generators or other market participants. It does not appear to have been taken directly from the economic literature, though it reflected economists' interest in a process for encouraging the revelation of benefits, as a response to the problem faced by a regulator having to measure these benefits. The proposal was also informed by then-recent experience in the UK telecommunications sector, where spectrum auctions had led to higher bids than could have been predicted by an ex ante regulatory evaluation of benefits (albeit in retrospect perhaps overbid).

The Secretariat of Energy seems to have been conscious of allegations that the Public Contest method for transmission expansion was not working. But there was no suggestion of abandoning the method, or of transferring responsibility for expansions to the regulator or government. Rather, the aim was to achieve greater flexibility in proposing and financing transmission investment. If worthwhile investments might be held up because market participants were unduly pessimistic, the new method would allow others to step in and enable the investment to go ahead. It would enable others to take the investment risks about future usage that market participants might be reluctant to assume. It could thereby reduce transactions costs.[47]

5.5. Initial response to the second-round reforms

Resolution 543 embodying transmission rights and At-Risk expansions was passed on 19 October 1999 (followed on 21 October by Resolution 545 reforming the rest of the electricity sector). These two resolutions represented the culmination of a carefully considered 'second round of reform' in the Argentine electricity sector. With the exception of a brief interlude to be discussed shortly, these were the last reforms consistent with the original philosophy.

The reforms in Resolution 543, which were partly unexpected, had a mixed reception.[48] In one respect they marked a departure from the previous approach. Generators, in particular, objected

[46] The Secretariat of Energy envisaged that 'social benefit' would be evaluated in conventional economic terms (aggregate change in consumer surplus plus producer surplus). However, this was not written into Resolution 543, thereby introducing uncertainty about its interpretation.

[47] Other measures were considered but not implemented. For example, some parties had indicated that they were not willing to propose an expansion by Contract between Parties because other parties would use the capacity but pay only operation and maintenance cost, with no contribution to the cost of construction. Deputy Secretary Luis Sbértoli considered the possibility of an expansion method that allowed a Contract between Parties to levy on other users a regulated capacity charge to recover the cost of construction that had been put out to tender.

[48] For example, generators supported congestion rights but argued that the rights for existing lines should be allocated to existing users rather than auctioned for the benefit of the national government (via the Salex Fund or otherwise).

that (in contrast to the Public Contest method) the At-Risk expansion method left them with substantial obligations to finance new capacity but with no say in whether the expansion should be undertaken. In contrast, the reforms in Resolution 545 were largely discussed with the market before implementation, and substantial consensus was reached.

There was little time to appraise the effect of these reforms. On 24 October 1999 the general election took place, and President Menem's government fell. The new government was due to take office on 10 December 1999. The fate of the reforming resolutions is explained shortly. But one further set of resolutions was passed in the days immediately before the change of government took place. This introduced the concept of a Federal Transmission Fund.

6. The Federal Transmission Plan

6.1. The Federal Electricity Council

Argentina is a federal country in which the provincial governments have significant political power. This had caused difficulties even before privatisation.[49] It also caused difficulties in reforming the sector, and the parties had to come to an accommodation. A priority was to resolve the inadequate (and sometimes non-existent) payments made by provincial utilities to the national energy companies. This was problematic: some provinces declared unilateral discounts to themselves or demanded that they should pay lower than commercial prices, other provinces were in financial difficulties. The Government therefore offered a further inducement to participate in reform: "the provinces which adhere to the tariff principles emanating from the new organization will be eligible to participate in a Subsidy Fund for Regional Compensation of Tariffs to End-Consumers".[50]

The Electricity Regulation Act (Law 24065 of December 1991) provided for a surcharge (sometimes called a 'stamp') of up to $3.00/MWh on purchases by large users and distribution companies in the wholesale electricity market. The criteria for the allocation of these funds were determined by the Federal Electricity Council (CFEE), a pre-reform vehicle for negotiating with the provinces.[51] Article 70 of Law 24065 provided that 60% of these surcharge revenues would be distributed to provinces that adhered to the federal scheme for distribution tariffs, in order to subsidise consumers. The remaining 40% of the revenues would be directed to another Fund for electricity development in the country's interior, including rural electrification. In effect, this was a concession to the provinces by Energy Secretary Bastos in exchange for their accepting the Electricity Regulation Act.

The surcharge was initially set at $3.00/MWh in 1991, then reduced to $2.40/MWh in 1993.[52] During the 1990s, the role of the Federal Council was limited to spending the revenue from this

[49] Bastos and Abdala (1996, p. 134).

[50] Bastos and Abdala (1996, p. 136).

[51] The Federal Electricity Council (Consejo Federal de Energía Eléctrica, or CFEE), created in 1960, is "a national organization in which the provinces are represented together with the SEE [Secretariat of Electricity]. CFEE acts as adviser to the National Executive Power (NEP) [the Executive Branch of the National Government] and coordinates and administers various specific project funds created to develop the sector." Bastos and Abdala (1996, p. 63).

[52] Resolutions SE 317 of 15 October 1993 and SE 335 of 29 October 1993. During the course of the 1990s the level of purchases in the wholesale market increased from about 40,000 to 70,000 GWh/year, and the total proceeds of the surcharge increased accordingly. From 1993 to 2000 the 60% proportion intended to subsidize tariffs yielded a total of $642m (an average of $80m/year). The 40% proportion available for electricity development in the country's interior, at the disposal of the Federal Council, yielded a total of $428m. To this latter figure should be added $413m from a liquid fuel tax. Source: www.cfee.gov.ar. The liquid fuel tax derives from Law 23966, Articles 7 & 19, of 1 August 1999.

surcharge. This funding is understood to have had a significant impact on the development of the sub-transmission and distribution networks. However, the Federal Council had no impact on the expansion of high-voltage 500 kV lines, or on sector policy generally. This was now to change.

6.2. The Federal Transmission Fund

Throughout the 1990s, there were strong political and industry pressures to make more transmission expansions than the Public Contest method had delivered, and beyond what the newly introduced provisions for congestion rights and At-Risk expansions were expected to provide. Many new lines were canvassed. The Federal Council was particularly active in criticising federal policy and advocating a larger role for government planning. In 1998 it commissioned a study of what it regarded as needed high-voltage expansions. This study expressed the Federal Council's viewpoint and became the basis for the subsequent Federal Transmission Plan.[53]

Criticisms of the Public Contest method intensified after the failure of the Edesur distribution system in February 1999, even though this was irrelevant to transmission expansion. The government felt constrained to respond to the pressure for regional expansions, and held discussions with the Federal Council.

On 3 December 1999, Secretary Mac Karthy issued Resolution SE 657 to finance additional regional expansions by increasing the amount of the surcharge, to be put into a Federal Transmission Fund, and involving the Federal Council in the spending of the proceeds. Resolution 657 was expressed quite differently from previous statements of President Menem's Government and its other Energy Secretaries. Those statements had emphasised the role of competition and markets following the Electricity Regulation Act (Law 24065 of 1992).

In contrast, Resolution 657/1999 harked back to an Electricity Act from a previous era (Law 15336 from 22 September 1960) that had set up the Federal Council and embodied a different philosophy. Resolution 657 now recalled that the Secretary of Energy, advised by the Federal Council, had responsibility for planning and coordination of projects and integrated services of the National Interconnected Network. It noted that, to this end, the Federal Council had made a feasibility study to identify potential beneficiaries of possible high-voltage transmission expansions, including a preliminary analysis of closing the high-voltage rings.[54]

[53] "… it is evident that the model then current was not capable of generating the economic signals that would induce the market participants to invest in this way, which was aggravated by the total disappearance of the State both from planning and from investment itself. This was clearly perceived by the Council in 1998, in which year it commissioned studies to identify the most urgent projects at 500 kV, a process that culminated in November 1999 with an agreement among all the provinces to implement what became known as the Federal Plan of Electricity Transmission, with the objective of securing the execution of four projects at 500 kV, that is to say, the Mining Line [to the northwest, see fn 55 below], the interconnections NEA-NOA [between the Northeast and Northwest], the interconnection MEM-MEMSP [between the main national system and Patagonia] and the interconnection Comahue–Cuyo [from around Chocón in Comahue to Gran Mendoza in Cuyo]. // To make this a reality, a totally novel financial engineering was designed, which among other things assumed the already evident necessity of a strong participation by the state, and no less importantly by the private sector, all this in a strategy designed so that state participation was the trigger for the private, to make it economically feasible. …// In short, at the heart of CFEE, all the Argentine provinces assumed the necessity of planning in this vital area where it was not being done, and of participating in investments if these were to be carried out in the necessary time periods." CFEE, Tenemos Mucho Que Hacer [We Have Much To Do], at www.cfee.gov.ar, as accessed 2 August 2004.

[54] "Equally intriguing was the potential for new ring or circumferential transmission lines to improve the reliability of the electricity system. The biggest need was for a medium- or high-voltage ring around the Buenos Aires metropolitan area. … There were also some advocates in the industry for another high-voltage ring line to connect the outer regions of the country (for example, Comahue–Cuyo–Northwest-Northeast)." Gómez-Ibáñez (2003 pp. 316–317). The Federal Council's study itself was not made public.

Resolution 657 then argued as follows:

- that a regime of competition such as the MEM [the national interconnected electricity system excluding Patagonia] requires political action on the part of the national state, so as to guarantee transparency and access by consumers to the markets;
- that it was the responsibility of the national state to establish and preserve adequate conditions in the market, particularly in those zones or regions where there were monopoly situations or the risk of them;
- that there were economies of interconnected networks;
- that the procedures initially developed for the expansion of the transmission network implicitly assumed an underlying growth and homogeneity of supply from the high-voltage network to all the provinces;
- and that this assumption was appropriate for zones of relatively high growth and concentration of demand, but did not envisage the situation of some provinces and regions caused by asymmetrical growth in the high-voltage network.

The 23 provinces in the Federal Council had earlier asked the Secretary of Energy to increase the surcharge from $2.40/MWh to $3.00/MWh: he now did this with effect from May 2000. The additional $0.60/MWh was to be put into a Federal Transmission Fund (FFTEF) that the national government could use for extending the 500 kW transmission system by means of 'expansions intended to meet demand'. To facilitate this, the Federal Council was allowed to initiate At-Risk expansions. (Other methods were not mentioned.) The criteria for such expansions were that they would be of benefit to the Electricity System to improve quality and/or security and/or reduce the costs of dispatch in a scenario of progressive integration of the regions; that they were unlikely to be realised exclusively by the private sector "for reasons of scale"; and that they would constitute investment for "expansion of a federal character".

No figures were mentioned at this stage, nor was there any definition of 'benefit'. With an annual demand of about 70,000 GWh, the increased $0.60/MWh would yield about $40m/year for such new projects.[55]

Resolution 657 establishing the general policy framework for regional expansions was introduced on 3 December 1999. On the same day the Secretary of Energy declared that the interconnection with Patagonia was financeable — that is, it had met the conditions of Resolution 657. Its purpose was "to interconnect a remaining isolated area". It had been chosen for support under this policy. The Secretary of Energy instructed the Federal Council to prepare the documentation to start the process.[56] Four days later, he extended this support to the so-called Mining Line, whose purpose was "to improve conditions for developing mining activity in marginal areas".[57]

[55] Other provisions of Resolution 657/1999 included 1) an instruction to the Federal Council to write the statutory rules for the Federal Fund before 1 March 2000, which resulted in the Federal Council's Acta 97 discussed below, and 2) a rule that a line cannot be financed by the Federal Fund if the average participation of generators is greater than 20% (of average net present value discounted at 10%). The Fifth Line (Comahue–Cuyo version) did not fit this rule, and the criteria were later relaxed.

[56] Resolution SE 658 of 3 December 1999, defining the Patagonia interconnection as the line between Choele–Choel and Puerto Madryn.

[57] Resolution SE 665 of 7 December 1999, defining the Mining Line as Gran Mendoza–San Juan–La Rioja–El Bracho.

6.3. Why the change in policy?

Why was there such a sudden change of policy on the part of President Menem's administration? In its closing days, it is not uncommon for an outgoing Argentine administration to pass resolutions (sometimes hundreds) as an acknowledgement for past or future political support, knowing that it will not have to carry out these resolutions and the incoming administration can reject them if it wishes. The Resolution accepting the Mining Line was issued just two days before the Menem administration left office on 9 December. Perhaps these were simply empty political gestures, and the Federal Transmission Fund would not have been introduced if the Menem government had been re-elected.

On the other hand, three factors suggest that the government might well have taken a similar decision even if it had been re-elected.

First, the government was under very considerable political pressure to build new lines in the provinces. Some saw its proposal to create a new class of lines, with political as well as market characteristics, as a reasonable way to accommodate that pressure without conceding an undue role for national planning.[58] Tying these lines to the At-Risk expansion method meant that the new Fund would be used to 'finance' rather than subsidise them.

Second, existing Law placed an obligation on the government to bring about a single interconnected system in the country. Patagonia was the only area not yet interconnected, and plans had been prepared before reform started to remedy this. It was difficult to reject that Law and associated policy with respect to Patagonia.

Third, in addition to the political and statutory considerations, the lines could be said to offer at least some prospect of economic benefit.[59]

The new policy was thus not simply a concession motivated by the forthcoming loss of office. Arguably it was part of an aim to combine very strong political and social pressures and obligations with a predominantly market-based policy, while maintaining good relations with the provinces. The Federal Council pressed for the new policy to be introduced before the Menem government left office because it was not convinced that the incoming government would be sympathetic to that policy. In the event, the incoming government turned out to be more sympathetic than the outgoing one.

[58] Such a policy had in fact been discussed earlier. Secretary of Energy Mirkin and staff had considered the possibility of some limited federal assistance to facilitate non-radial lines in order to better integrate the market, while leaving the majority of the risk and decision-making with market participants. Policy continued to be strongly debated within government. Under-Secretary Sbértoli would have preferred a separate law to be passed justifying each proposed regional expansion, together with provision for an associated increase in the surcharge, rather than a blanket increase to $3.00/MWh that would create an expectation of further expansion. In contrast, Secretary of Energy Mac Karthy, himself from Patagonia district, was sympathetic to the policy proposed by the Federal Council.

[59] The Patagonia Line would help to resolve an embarrassing and artificial situation whereby electricity prices in that system were two to three times the average level in the rest of the system. The Line would provide reliability backup for the monopoly generator there; it would at the same time facilitate suspending and revising the Market Regulations that led to high prices; and in the longer term an interconnected system would eliminate the problem. The Patagonia Line could also offer prospects of revenue from new generation transmitted in the opposite direction, into the main system. The Mining Line too was considered to have economic prospects if the anticipated growth in demand materialised. Provision of adequate power facilities would have been beneficial to mining companies and reliability would be improved. On a favourable scenario it would have been a worthwhile investment and the Fund would be repaid. (But for alternative evaluations of both lines, see Sections 6.8 and 6.9 below.)

6.4. The Federal Transmission Plan

Whatever the explanation of the previous decision, it turned out to be a sign of a changing political climate. The new post-Menem administration led by Fernando De La Rua, which had been elected on 24 October, took office on 10 December 1999. Its initial approach reflected an increased – indeed central – role for government.[60] Within a few months this approach began to supercede the previous market-oriented approach.

On 18 May 2000 Daniel Montamat, Secretary of Energy in the new administration, explained that he was in course of formulating a Transmission Development Plan, in conjunction with the Federal Council, that envisaged the application of the additional surcharge just put into effect. This Plan would require a thorough reappraisal of transmission expansions, which could conflict with the possible At-Risk expansions and the congestion rights created by Resolution 543/1999. No expansions had yet been proposed under the At-Risk expansion method. Accordingly, he was suspending forthwith the application of the changes introduced in that Resolution.[61] Two weeks later he also suspended Resolution 545/1999, which embodied the second-round reforms other than in transmission.[62]

The new approach was introduced over the next few months. On 30 June 2000 Resolution SE 174 confirmed that the transmission surcharge would be a permanent policy. The Federal Transmission Fund would be used to finance projects that the Secretary of Energy would identify as 'high-voltage transmission expansions intended to meet demand', as provided by Resolution 657/1999. But in addition – and no doubt this reflected further pressure from the provinces – the Fund could also be used for "projects to interconnect electrical regions in order to improve the quality and/or security of supply". The Secretary of Energy would take the final decision on the lines, but it was envisaged that the Committee of Administration (CAF) of the Federal Transmission Fund – composed of two representatives of the Secretary of Energy and one from the Federal Council – would propose them. Resolution 174 also endorsed the concept of the Federal Transmission Plan introduced earlier by the Federal Council. Under the extended criteria, all five lines in the Federal Transmission Plan were specified as financeable from this Fund, not just the two lines already declared financeable.[63]

[60] Bouille et al. (2002, p. 47).

[61] Resolution SE 133 of 18 May 2000. In addition, some flaws had been perceived in the At-Risk expansion method. Beneficiaries had to pay a proportion of the fee according to the load factor of the line, without any transference to them of congestion rights. This left them vulnerable to proposals by investors who retained all the congestion rights. Secondly, 60% of the votes seemed a difficult hurdle to overcome for those who opposed a line. Third, there was some concern about the subjectivity of 'convincing evidence' on social benefit, and about how reliable ENRE's evaluation of social benefits could be.

[62] The new Government was not necessarily opposed to Resolution 545/1999, which introduced the other (non-transmission) reforms in the electricity sector, but was not sure what abolishing them would imply, hence wanted time to consider them first. To that end, Resolution 153 of 31 May 2000 suspended Resolution 545 pending review. In the event, a formal review was never completed, and there were reportedly political differences within the Government as to the role of the market. Eventually (see below) Resolution SEM 128 of 9 February 2001 derogated (i.e. repealed) Resolution 545 entirely.

[63] The declaration that the five lines in the Federal Plan were "financeable" means that they were eligible for financing, not that there were sufficient funds to pay for them all. The real feasibility test is carried out when the line is finally approved. This happens when a Promotion Contract is signed between the initiators of the project and the CAF, and the Execution Committee (formed by CAF and the private initiators) is formally constituted. At that stage, all the parties, including CAF, have to commit a firm bid (in $) that determines the participation of each one in the investment and in the ownership of the transmission rights.

The five lines presented for consideration by the Federal Council are shown in Fig. 1. They totalled 2934 km. The Federal Council's summary comments were as follows:

Northwest-Northeast (NOA-NEA) Line (1015 km):

– An interconnection associated with the expansion of generation in NOA, and to give the possibility of exporting generation (these exports would need to be postponed without the expansion of the line).

Patagonian Line (354 km):

– Interconnecting the national system (MEM) with the Patagonia system (MEMSP) to permit the optimisation of both systems, and improve joint operation and economic reserve for MEMSP.

Comahue–Cuyo Line (660 km):

– To improve the transmission of generation from Comahue and to improve the quality of service in Cuyo. From 2003 this will take on great importance for Cuyo (where local prices are predicted to be greater than in the national Wholesale Market).[64]

Mining Line (555 km)

– Interconnecting Cuyo and NOA, with 3 possible sections (175 km, 165 km and 215 km, total 555 km), the most economic means of facilitating mining growth in the mountain area.

Buenos Aires–Mar del Plata Line (350 km):

– To solve the historical problems of the Mar del Plata city supply.

6.5. Financial Transmission Rights and the Open Season concept

On the same day as Resolution 174 endorsed the Federal Transmission Plan, Resolution 175 introduced some new arrangements for initiating transmission expansions and inviting joint private/public funding.[65] It incorporated the Federal Transmission Fund, represented by CAF, as a 'special participant' within the existing transmission expansion methods. It introduced a new method called "Expansions through Financial Transmission Rights (FTR) Allocation".[66] Financial Transmission Rights were defined in exactly the same way as the previously envisaged

[64] The Comahue–Cuyo line is sometimes known as the 'Fifth Line'. Lines to and from Cuyo refer to the node at Gran Mendoza.

[65] Resolution SE 175 of 30 June 2000. This also provided that the Salex Fund could be an initiator of transmission expansions too, if the other initiators or the CAF requested use of its funds, provided that ENRE approved. On the Salex Fund see Section 3 above and Littlechild and Skerk (2004a, 2008-this issue-a,b), plus later sections below.

[66] Recall that Resolution 133/2000 had suspended Resolution 543/1999, which among other reforms had introduced the At-Risk expansion method and the concept of congestion rights based on differences in nodal prices. So a method of transmission expansion was needed that had similar properties. Like the At-Risk method but unlike the Public Contest method, it should enable investors to take forward an expansion, and should not be dependent on a proposal and support from beneficiaries. Like the At-Risk method, it should re-introduce congestion rights as a means of funding all or part of the cost. Resolution 175/2000, as subsequently clarified and re-specified by Resolution 178/2000, defined such a method.

congestion rights, in terms of rights to differences between nodal prices.[67] The new approach also provided some greater protection for existing and subsequent market participants than the previous At-Risk method had done.[68]

Resolution 175/2000 also created the concept of Open Season to take forward the Federal Plan. This was a new way to initiate a transmission expansion, using any of the existing methods. By declaring an Open Season on a particular expansion, and specifying the duration of that process, the government would invite the private sector to participate in financing it along with the Federal Transmission Fund.

In an Open Season, the government would announce the estimated annual fee for each expansion, reflecting the estimated cost of constructing and operating it, the extent of any contribution from the Salex Funds (approved by ENRE), and the annual benefit of the expansion, reflecting the savings it would bring.[69] It would also announce the extent of participation of CAF (representing the Transmission Fund).[70] Private sector investors would be invited to participate in the proposed expansion, receiving a share of FTRs corresponding to their share of the total investment. If the sum of the offers received including the announced participation of CAF were enough to cover the estimated fee, the proposed expansion would be accepted and put out to tender.[71]

An Open Season can be requested in order to initiate an expansion by any of the available methods. The methods have different implications for the sharing of costs and risks. If the expansion is by Public Contest, then the cost is paid by the beneficiaries identified by the Area of Influence method. If the expansion is with FTRs (comparable to the previous At-Risk expansions) the initiators pay the cost, receive the FTRs, and take the risk that the revenues may be less (or more) than the costs. If the expansion is by Contract between Parties, the initiators agree to pay

[67] Resolution SEM 178 of 8 November 2000, which clarified the Open Season arrangements and replaced SE 175/2000 (see below), says that "FTRs are those rights to receive congestion and losses charges". Note that Locational Marginal Pricing in Argentina includes both components (congestion and losses) so it is more appropriate to use the term Financial Transmission Rights (FTRs) rather than Congestion Rights.

[68] Generators were concerned that Resolution 543/1999 meant that they would have to pay for expansions that they had not voted for. The idea of the new FTR method was that initiators of a line would pay for it and own the FTR Allocation. Any other existing beneficiary (identified through the Area of Influence method) would not have to pay for the line. In the event of a new (or Non-Initiating) beneficiary being identified (e.g. via an increase in demand or the arrival of new generation) each initiator that had been paying for the line would have two options: to retain the FTR without any charge to the new beneficiary for use of the line, or to oblige the new user to pay a share of the fee in proportion to its use of the line, transferring to it a corresponding share of the FTR Allocation.

[69] Resolution 175 introduced the concept of 'benefit to the electricity system' for the Open Season process. This benefit was defined as the difference between the total expected cost of the system with and without the investment in question (excluding the cost of the investment). For those expansions where support from the Federal Fund was requested, the detailed methodology to evaluate benefits was to be developed by CAF, but in the event this did not happen.

[70] The participation of CAF has to be supported by a technical study on the benefits of the proposed line, which has to be presented previously to the SE for approval (Article 26, para (a) of Annex I to Resolution SEM 178, 8 November 2000). In principle, the upper limit of CAF participation (using the Federal Transmission Fund) is the total estimated benefit, as specified when the open season is announced. (This benefit is also the maximum admissible fee in the tender for any approved expansion.) However, the methodology does not define exactly how the CAF participation is to be determined.

[71] If the sum of the offers exceeded the estimated fee, they would be reduced pro rata. If the sum of the offers were not sufficient to cover the expected fee, the CAF (on behalf of the government) would ask for new offers. If the estimated fee were not reached after the second call, the expansion would be abandoned. If the Federal Fund did not have sufficient funds to support all the lines presented, priority would be given to those lines with higher expected profitability. Resolution SEM 218/2000 specified that profitability is calculated on the basis of the estimated fee and expected benefit, without clarifying that further.

the costs without receiving FTRs, and other beneficiaries identified by the Area of Influence method will not have to pay for the expansion (though they do pay an Operation & Maintenance fee for use of the network). If the hybrid Public Contest method (explained below) is used, the initiators will receive a share of FTRs corresponding to their share of cost, and beneficiaries identified by the Area of Influence method will pay the remaining share of the cost.

The Open Season method was a means by which the Government and the Federal Council could propose and implement high-voltage expansions in conjunction with the private sector. It incorporated an attempt to reveal the willingness of the private sector to participate in such investments. With the FTR and hybrid Public Contest, the Federal Fund (using public funds obtained via the transmission stamp) would be one of the investors that assume the risk of the investment (perhaps all the risk if there are no other investors). Some within the Government were still keen to ensure that the Open Season method remained consistent with a primarily market methodology. The Open Season method and the concepts of FTRs and hybrid Public Contest were subsequently used in practice as the vehicle for implementing the Federal Transmission Plan, including where the Federal Transmission Fund and its transmission stamp revenue was involved. But several features of the method remained unclear, such as what criteria the government would use to select expansions when no private interest was manifest, as with the Mining Line.

6.6. The first Open Season and the hybrid Public Contest method

A week later, the Secretary of Energy declared Open Season for the five lines in the Federal Transmission Plan. (Resolution SE 182 of 7 July 2000) All of the lines adopted would get a Financial Transmission Rights (FTR) Allocation. Since the Regulations and processes were not entirely clear, there was a period of discussion, lobbying by interested parties, and government clarifications. Four months later, on 8 November 2000, the Secretary of Energy (now Debora Giorgi) clarified and re-specified the process of the Open Season.[72]

Resolution 178/2000 also introduced a hybrid method of transmission expansion that combined features of the original Public Contest method and the new "Expansions through Financial Transmission Rights (FTR) Allocation" method. This hybrid method is called "Public Contest with Transmission Fund participation". This method applies in those cases where offers received in the open season, including the participation of the CAF (on behalf of the Transmission Fund), are not enough to cover the estimated fee, but where the initiators would have enough votes under the Area of Influence calculation to develop such an expansion under the original Public Contest method. (That is, they would have at least 70% of the votes, so that any opposition would have less than the 30% of the votes needed to block a proposed expansion.) In this case, part of the expansion is developed by FTR (in proportion to the total offers received towards the total fee), and the other part is paid by beneficiaries as if it were a pure Public Contest method. (Any congestion charges corresponding to the share paid according to the conventional Public Contest method go into a Salex account.)

In announcing an Open Season, the initiators indicate which method they think will finally result from the offers received. They indicate the FTR method when they believe that enough offers will be forthcoming to cover the whole of the cost of the expansion. They indicate the

[72] Resolution SEM 178 of 8 November 2000 derogated Resolution SE 175/2000 and re-specified the arrangements with some adjustments. This Resolution 178 is currently considered to be the "base" of the Federal Plan structure, enabling the CAF to participate in an Open Season as initiator using funds collected from the transmission stamp.

hybrid method when they expect that the proposed expansion will not receive enough offers in the Open Season. Regardless of which method is indicated beforehand, the final (definitive) categorisation emerges after the Open Season according to the result obtained. So if an expansion proposed as Public Contest with Transmission Fund participation receives offers that sum to more than the estimated fee, this expansion continues under the FTR allocation method and not as a hybrid expansion. Similarly, if an expansion indicated as FTR fails to receive sufficient support, it can continue as hybrid Public Contest if the initiators have sufficient votes to carry this proposal.

In choosing the preferred method of expansion, and whether or how far to participate, a private sector market participant would consider the costs and likely benefits, including the extent and likelihood of congestion revenues and the impact on nodal prices, etc. From the perspective of the State wishing to build lines to "sponsor growth and development" in areas of low traffic, which were unlikely to command sufficient votes or participation from market participants, the FTR method allowed the Federal Fund to take such lines forward, without needing approval, and if necessary financing all the cost (within the stated guidelines). However, this could be expensive. Where there is a prospect of at least some support from users, the hybrid method in effect allows the Federal Fund to subsidise the investment sufficiently to make it attractive to users to vote for it and thereby pay a part of the cost.

6.7. The Federal Plan

Although the processes had now been clarified, several potential investors expressed concern that the Federal Plan was unclear, and that there were significant uncertainties about the money that the government would finally commit for each line. The Federal Council therefore decided to clarify the expansion projects. Resolution SEyM 218 of 20 November 2000 approved details of the projects and allocation criteria and also listed the expected benefits and the estimated fee and methodologies to be applied for each expansion, as per an earlier publication of the Federal Council.[73] The focus was now on four Lines, total length 2584 km. The main details of the revised Federal Plan were as follows (at this stage the pesos and $US were still at parity):

Northwest-Northeast Line:

– Hybrid PC method with Federal Fund support, estimated annual fee $49.4m reduced to $48.4m by using Salex Funds totalling $4.1m, benefit $12.8m/year.

Patagonian Line:

– FTR allocation method, estimated annual fee $19.4m, benefit $23.4m/year.

Comahue–Cuyo (Fifth Line):

– Hybrid PC method with Federal Fund support, estimated annual fee $43.0m, reduced to $35.5m by using Salex Funds totalling $33.0m, benefit $9.3m/year.

Mining Line (first and second sections):

[73] CFEE Note No. 14400, 15 November 2000, previously approved in plenary session of 28 July 2000, as cited in Annex II of Resolution SEyM 218 (20 November 2000).

– FTR allocation method, estimated annual fee $33.1m, benefit $36.6m/year.

Mar del Plata Line:

– Abandoned, no benefits identified.

The Federal Council explained that the two Lines (Northwest-Northeast and Comahue–Cuyo) for which it proposed a hybrid Public Contest method were 'market lines'. That is, it believed that existing market participants would be willing to develop them, with some contribution from the Federal Fund to help cover the cost.[74] The covering Preliminaries to the Resolution noted that, after the Patagonia line payments, up to 30% of the available funds in the Federal Fund would support investments in these two Lines. The remaining 70% of the available funds would support the Mining Line, which it was not expected the market would presently support. The implicit justification for developing the Patagonia Line and now the Mining Line before the demand for it existed was to promote growth in regional economies. No funds were available for the Mar del Plata line.[75]

This increased information was a response to the private investors that had requested more detail about the expected contribution of the Federal Funds to each of the projects. In order to justify contributions from the Federal Transmission Fund, the government published figures showing that there were benefits associated with each line. However, there was no discussion of how the annual costs (fees) and benefits were calculated, over what time period they extended, what discount rate was used, whether the same time periods and discount rates were used for benefits as for costs, etc. How rigorously these studies were carried out is debateable, and it is believed that benefits may have reflected relatively relaxed criteria for evaluating contributions to quality of supply, increase in regional employment, etc. Nor was there any discussion of the significance of benefits exceeding costs (fees) in two cases and falling considerably short of them in two other cases. The allocation of funds indicated in the Preliminaries was not proportional to the stated benefits and was not explained in terms of any profitability calculation: it seems to have been a political decision rather than an economic one.

The annual fees totalled $144.9m. These would be reduced by the amounts of the Salex Fund contributions, total $37.1m, which reflect the balance of the corresponding Salex accounts at that time. The total investment cost was not stated explicitly, but Presidential Decree 1135 issued 9 days later, on 29 November 2000, indicated that the Federal Transmission Plan envisaged a total investment of US$750m. (Although the annual income of the Federal Fund was only about $40m, it was hoped to attract substantial private participation.).[76]

[74] At that time it was expected that the NOA-NEA line would be used to export electricity produced by thermal generators located near the wellheads in northwest Argentina, just as electricity had previously been exported to northern Chile. In the present situation this seems implausible, given the drastic reduction of natural gas reserves in Argentina since the crisis.

[75] Whether it was more economic to build the Mar del Plata Line than to install local generation depended on the precise assumptions. However, there was a political problem with supporting investments in this region. Even if Buenos Aires city or province were willing to contribute, the Federal Council was reluctant to spend funds on projects in this region, which was perceived as sufficiently wealthy not to need federal support. The Mar del Plata Line was characterised as having no benefits in Annex II of Res SEM 218 2000 and was removed from the Federal Plan.

[76] The Transmission Plan in Resolution 218/2000 does not specify periods of time or the discount rate(s) used. If $750m is recovered by annual fees of $144.9m, the annual capital recovery is 144.9/750=0.193. This implies a relatively high discount rate and/or a short recovery period, such as 14% over 10 years.

Decree 1135 also confirmed Resolution 657/1999 establishing the Federal Transmission Fund (FFTEF) "which shall have as its objective the financing of transmission expansions that the Secretary of Energy identifies as financeable."[77] The underlying aim was reaffirmed: "From the economic point of view, this measure is indispensably driven by the goal of sponsoring growth and development of the sector, the positive effects of which will propagate themselves throughout the rest of the economy." Further delay would be highly undesirable.[78] The Committee of Administration (CAF) of the Federal Transmission Fund would have a higher profile.[79]

6.8. Outcome of the Open Season

The only accepted offer from the private sector during the Open Season was for the 400 kV Patagonia line.[80] There was limited interest in taking forward the other lines:

- Northwest-Northeast Line: Generators in the north–west were interested in a line to the north–east in order to export to Brazil, but only if they did not have to pay for the line. If they did have to pay, then the possibility of further exports westwards to Chile was more attractive.
- Comahue–Cuyo Line: Mendoza province in Cuyo region was interested in this line, but the Comahue generators were unwilling to pay for a Fifth Line (or even 82% of a line after allowing for Salex Funds) that would increase the export capacity of Comahue by only a relatively small amount (about 500 MW compared to the existing capacity of about 4600 MW), especially so soon after the Fourth Line had significantly increased export capacity in 1999. Note that the $9.3m calculated "benefits" of this Fifth Line include the reduction of probability of non-supplied energy in Cuyo, so the calculated benefits for the Comahue generators would have been correspondingly less.
- Mining Line: The first section of this line (Mendoza to San Juan) was primarily for the benefit of the city of San Juan. The second section of this line (from San Juan northwards) was supposedly for the benefit of the mining companies in the northwest, who needed cheap power supplies in order to expand. However, many of them already had contracts to buy power supplies from Chile, which was more economic than building a new line.

[77] The Decree was said to speed up the normal constitutional process; it also helped to reassure the Federal Council, which feared that Resolution SE 657/1999 by the Secretary of Energy might be insufficient to ensure the promised funding. (Tax increases can only be approved by Congress.) The Budget Law for 2001 (Art. 74, Law 24501 of 29 December 2000) also made provision for the $0.6/MWh surcharge.

[78] "[A] new delay in the project would have prejudicial effects on the development of the prized plan, and even the uncertainty about its statutory basis would bring the risk of lack of investment and the stagnation of a sector with ample possibilities of growth, in view of the possible desertion of those potentially interested in developing the expansion".

[79] Resolution SEM 228 of 30 November 2000 provided that CAF would now have four members instead of the previous three, comprising the Secretary of Energy as President, another representative of the Secretariat, and two representatives of the Federal Council instead of the previous one. In practice, CAF works in the same offices as the Federal Council, as an internal division of it, and most representatives are or were members of the Federal Council. The present Secretary of Energy, Daniel Cameron, was also a previous member of the Federal Council.

[80] The Aluar aluminium plant, which also owns and is supplied base load by the 472 MW hydroplant at Futaleufú in the Patagonia system, proposed to contribute 20% of the cost. The company was considering expanding its aluminium plant and needed additional generation, probably via a CCGT, but could use the line as backup and to export energy into the national system. It was eventually agreed that the company would contribute 31% of the cost and the government 69%, as noted below. In January 2001 Aluar offered $4m for the transmission rights to the Patagonia line, subject to the signing of a promotion contract. Resolution SEM 33/2001, 12 January 2001.

6.9. Subsequent policy developments

Until now, Resolution 545 of 21 October 1999 remained suspended. This was the Resolution in which the previous government had introduced all the second-round reforms to the electricity sector other than transmission expansion. There was much internal discussion about it, reflecting the support or otherwise for a market approach. On 9 February 2001, Resolution SEM 128 formally derogated (repealed) Resolution 545.[81] This suggests that the pro-market forces within the De La Rua government had not prevailed.

The Public Contest method still applied, however, and indeed was actively of interest given the accumulating funds in the Salex Funds.[82] Generators wished the Salex Funds to be used for expansions for their own benefit rather than in some other way, and argued for these Funds to be used to develop the Comahue–Cuyo line together with additional support from the Federal Transmission Fund. Negotiations between the Comahue generators and the Federal Government continued through much of 2000 and 2001.

At this point, the Federal Transmission Plan was clearly leading the investment process, rather than the market participants as before. Transener and other transmission companies naturally supported the Plan in public presentations. But how far it could be called a Plan, and how far it was economic, are both debatable. It reflected studies carried out by the Federal Council, of lines proposed by the provincial governments. New transmission lines were argued to be economic. But this was on the basis of assumptions proposed by the provinces via the Federal Council. These assumptions typically involved no generation capacity being added in the regions. The implications of alternative assumptions were not explored in any detail (and were not of interest to the Federal Council). Moreover, a transmission expansion no longer had to meet the Golden Rule — it was sufficient that the Secretary of Energy found that an Open Season expansion was 'feasible' based on its 'social benefit'.[83]

None of the lines now said to be important had been identified as needed in CAMMESA's study in 1998. The Patagonia Line, now chosen as the first priority, was no doubt useful to its primary beneficiary Aluar. But whether this line was economic according to the usual criterion of net present value of total costs or benefits is doubtful.[84] In issuing the Certificate of Convenience

[81] Resolution SE 133 of 18 May 2000 had already suspended the previous government's Resolution 543 of 19 October 1999 that had introduced the transmission reforms.

[82] The Comahue Corridor December 1999 account, set up after the Fourth Line, reached $54 million at the end of February 2001.

[83] The Federal Plan says that, at the request of CAF, the Secretary of Energy has to evaluate the feasibility of a line based on the associated 'social benefit' (without further explanation of this term) before a line is declared financeable. This feasibility evaluation substitutes for the Golden Rule, and has to be carried out according to the methodology that CAF proposes at the beginning of the Open Season process.

[84] In supporting the line, the Federal Transmission Plan referred to the optimisation of both systems, and improving joint operation and economic reserve. As noted, the line provides reserve for supply to Aluar's aluminium plant (and better peaking conditions for it) but not for the rest of the Patagonia system. In principle Aluar could export energy into the national system, but in practice this benefit is limited since Aluar's power station Futaleufú has to compete with Comahue generators for use of the Comahue–Buenos Aires corridor. This corridor is congested in peak hours when hydro-energy is available in Comahue, which is typically when water is available in Futaleufú. Other statements refer to the line reducing monopoly power in the Patagonian system. The extent to which the line could do this is very limited, since the new 354 km line to the Aluar aluminium transformer goes only half way to the remaining load centres of Patagonia. The existing 132 kV line over the remaining distance to those centres (some 400 km to the nearest one) effectively constitutes a bottleneck on further supply from the national system.

and Public Necessity, ENRE did not claim that the line passed the Golden Rule, referring instead to the previous evaluation of feasibility by the Secretary of Energy.[85]

The Federal Plan thus provided a mechanism for greater influence by ministers, the provinces, transmission incumbents, constructors, generators in exporting regions and large consumers in importing regions. All these parties found attractive the pre-reform policies of transmission expansion financed by other parties (actually over-expansion from an economic perspective). By the end of 2000, a politically driven central planning approach to transmission expansion had thus reasserted itself over the market approach embodied in the reforms of the 1990s.

7. Temporary reversal of policy

7.1. Bastos returns

At this point, the worsening macroeconomic crisis in Argentina took precedence over qualms about the role of the market. In March 2001 President de la Rua invited Domingo Cavallo to become Minister of Economy again. This led to a rapid change of direction.

Cavallo, and the team he brought with him, reasserted the need for market discipline and significant public sector reforms. Cabinet ministries were reorganized, and Carlos Bastos – the chief architect of the reform and privatisation of the electricity sector in the early 1990s – was named Minister of Infrastructure and Housing, which included the Secretary of Energy and Mining. In June 2001, Bastos suspended Mac Karthy's executive order establishing FFTEF [the Federal Transmission Fund], and issued a separate decree that reaffirmed the original electricity reforms. The decree introduced a new market instrument (congestion licenses) intended to make investments in transmission more attractive. Additionally it established a transmission reimbursement fund to provide additional payments to transmission companies, parties to BOM contracts, or holders of congestion licenses, if and when their investments enhanced the overall stability of the transmission system.[86]

The new policies proposed by Bastos are of particular interest in the present context because they did more than simply repeal recent policy and reinstate the previous policy of 1992 or 1999. As the quotation indicates, they involved new arrangements for transmission expansion that combined the roles of market, regulation and government. They were set out in Presidential Decree 804 followed shortly by Resolution 135.[87]

The preliminary statement to Decree 804 introduced the following ideas regarding transmission expansions. During the last few years, transmission investments had been proportionately lower than those in generation and distribution, even though several different cost allocation measures had been implemented.[88] Investments under the Federal Plan required a high degree of state

[85] See the exchange with environmental organization Mayday Foundation at the public hearing on the Patagonia line. ENRE 474/2001.

[86] Bouille et al. (2002 p. 47).

[87] Presidential Decree 804 of 19 June 2001, and Ministry of Infrastructure and Housing Resolution MIV 135 of 25 June 2001.

[88] Resolution MIV 135 refers to a 'prospective report' of the Secretariat of Energy, dated 2000, as identifying these delayed investments, which were mainly in regional transmission. It may seem surprising that Bastos identified lower investment in transmission as an implicit concern when it was actually an achievement of his earlier reform to have prevented excessive expansion and to have used existing transmission lines more efficiently. Perhaps it was a way of acknowledging the political concerns associated with the Edesur incident, before explaining that there was a better way than national planning to solve such problems.

financing, as indicated by the outcome of the Open Season process; this could not be justified, and consequently the Decree would derogate the Federal Plan. Those transmission expansions developed by the market should be treated separately from transmission services that are in the public service. Several transmission projects could be developed at private risk, so a certificate of public convenience and necessity was not needed for them. At the same time, some expansions to improve reliability needed to be considered under an alternative regime, different from the regime to be applied to expansions developed at private risk. The existing methodology for transmission expansions tended to socialise congestion rent (that is, spread it over all transmission users), which was not effective for developing new investments. It would be better to allocate this rent between those parties that assumed the risk of developing the investment.

Decree 804 included the following provisions. It recognised as market participants those who own 'congestion rights' (presumably because they trade energy along the line, capturing rent from price differences). It made the Federal Government the owner of the congestion rights associated with existing lines. These rights would thereafter be sold via a public tender. It identified as a congestion right that amount of money collected by nodal energy prices and transmission capacity charges.[89] It derogated Decree 1135/2000 (and related Resolutions such as 657 and 174) that had confirmed the Federal Plan and authorised the increase of $0.6/MWh in the tariff surcharge. It provided for ENRE to define which elements of the transmission grid under concession require a certificate of Public Convenience and Necessity. It created a Transmission Remuneration Fund (Fondo de Remuneración del Transporte) that replaced all the existing transmission accounts and funds. Among other things, reliability expansions would be financed through this new general account. Only demand would pay for such expansions, according to a methodology to be determined.[90] It instructed the Ministry of Infrastructure and Housing (then headed by Bastos himself) to implement detailed regulation.

Resolution MIV 135, issued a week later, provided a little more detail about Bastos' thinking. It approved 'guidelines' for the reform and delegated the development of detailed regulation to the Energy Secretariat. These 'guidelines' were not sufficiently detailed to replace the existing Market Regulations based on Resolution SSEE 61/1992 and associated Resolutions. (This indicates Bastos' haste in the prevailing circumstances.) The main provisions of MIV 135 were as follows. Congestion rights associated with expansions developed by an independent transmission company would be owned by that company. The Salex mechanism was derogated. Transmission expansions were divided into two types: reliability expansions and other expansions. The latter should be developed according to private initiative and risk, and for approving such expansions ENRE should only check technical compatibility with the existing system and quality standards.[91] Transmission revenues should consist of four specified components.[92] Capacity

[89] Previously congestion rights (and before that the Salex Fund) extended only to revenues from differences in nodal energy charges. The additional reference to capacity charges implicitly accepts that nodal prices are not sufficient to remunerate transmission investment, as some argued earlier. (Littlechild and Skerk, 2004a).

[90] The new methodology was never published. It is understood that it would be based on load flows, and that the Secretariat of Energy would rank expansions through a centralised decision mechanism, without any specific allocation of collected funds by area or corridor. To avoid relying on the Federal Council to select expansions it was planned to use the remaining UESTY (Special Unit for Yacyretá Transmission System) team at the Secretariat.

[91] That is, there was no question of checking the Golden Rule for these expansions. It was also envisaged that the Public Contest and Contract between Parties methods would be superseded by the At-Risk expansion method, with the latter complemented by the more extensive and clearly defined congestion rights.

[92] These were i) differences due to nodal energy prices; ii) capacity charges, with specified maximum values of $0.40/MWh for each 100 km of lines whose length is less than 250 km, and $0.50/MWh/100 km for lines exceeding 250 km; iii) a reliability charge of $0.05/MWh for each 100 km of line; iv) connection charges as implemented by existing regulations.

and reliability charges would be paid only by energy buyers, who would pay in proportion to their use of the transmission system, which would be proportional to their energy purchases as well. Generators would pay transmission charges only through nodal prices and connection charges.[93]

7.2. Response to Bastos

This reversion of policy was controversial. As already noted, generators had reservations about the allocation of congestion rights and the At-Risk expansion method. However, their more specific objection to Decree 804 did not involve transmission issues at all. (They were more concerned at how the Decree dealt with capacity payments.)

Opposition also came from the Federal Council. Bastos had suspended the Federal Transmission Fund, which was the main vehicle by which the Federal Council (and hence the Provinces) exercised influence in this sector. Furthermore, he had done this by using a Presidential Decree, based rather controversially on a special emergency power given to Minister of Economy Cavallo for managing the economic crisis. This created a fear that he might next abolish the Federal Council itself (by derogating the earlier law establishing it). Given that the Federal Council mirrored the political complexion of Congress as a whole, its opposition to Bastos was a much more serious matter than the concerns of the generators.

Bastos attempted to implement the new reforms.[94] However, Congress repealed Bastos' policy in September 2001, just three months after it had been introduced.[95] De la Rua, Cavallo and Bastos resigned in December 2001 as Argentina's economic crisis deepened.

8. The crisis and afterwards

8.1. The economic crisis, pesification and the tariff freeze

After the resignation of De La Rua on 20 December 2001, there were three different Presidents in twelve days. By the end of the year, Argentina had defaulted on its international debts. On 2 January 2002 President Duhalde took office on an interim basis to normalise the situation, without any deadline to achieve that. In the event he remained in office for somewhat over one year.

The Emergency Act (Law 25561) came into effect on 6 January 2002. It declared a state of public emergency in social, economic, administrative, financial and exchange matters. It abolished the previous convertibility system and delegated powers to establish a new system of exchange rates. To meet the economic crisis, the peso was allowed to float. Within six months it had fallen from parity with the US dollar to 3.6 pesos to the dollar.

The Emergency Act also gave the President the power temporarily to regulate the price of critical supplies, to nullify foreign currency adjustment clauses and other index mechanisms in

[93] The Energy Secretariat was to develop the charging methodology, and was instructed to analyse whether these reforms were suitable for regional (sub-)transmission companies as well, or whether the reforms needed modifications to make them suitable there. As Bastos came to realise that his reforms would be derogated he left the details to the Secretariat, and the task was never completed.

[94] MIV 259 of 15 Aug 2001 provided that the reforms established in Resolution 135 would be put in force on 1 February 2002. SEM 190 of 17 Aug 2001 formally terminated the Open Season process for the Northwest-Northeast interconnection. ENRE 474 of 22 Aug 2001 issued the Certificate for the Patagonia interconnection, which had already been accepted by the government and was unaffected by the derogation of the Federal Plan in Decree 804.

[95] Law 25468 of 12 September 2001, put into effect 12 October 2001, nullified his use of the special Decree. There were reportedly discussions between Bastos and the Federal Council to consider a way forward, but to no avail.

contracts entered into by the public administration, and to renegotiate contracts for public services. In February 2002 the tariffs for all regulated services including electricity were frozen at their previous peso levels. By decree, bank deposits denominated in dollars were converted to pesos at the rate of 1.4 pesos to the dollar and converted into government bonds.

All this obviously caused great difficulties for investors as well as for citizens generally.[96] Most companies, who had borrowed in foreign currency, were left shouldering heavy losses. The utilities and their foreign owners were often blamed for the economic crisis. Not surprisingly, the private sector was now significantly less willing to invest in Argentine utilities, including in the transmission system. At the same time Government funds were strictly limited. There were contractual disputes between the companies and the government, which have not yet been resolved.

8.2. Modifications in Salex and bidding

The Comahue generators continued to seek application of the Comahue corridor Salex Funds, which had reached US$99 million at the end of December 2001, but had fallen to $70 million with the devaluation. The generators feared that the government would wish to use the Funds for other purposes such as compensating frozen tariffs.

The new Secretary of Energy, Alberto Devoto, was sympathetic to transmission expansion.[97] After much discussion, his Resolution SE 1 of 20 August 2002 allowed the Salex Funds to be used to pay for 100% of the costs of capacitors on the Third and Fourth Lines in the Comahue corridor, plus the replacement of five reactors on the Third Line, at an eventual cost of US$15.5m (plus VAT).[98] These went forward as a Public Contest expansion (#26a,b).

In addition, for this expansion, Resolution 1/2002 replaced the concept of the maximum annual or monthly fee by a maximum price, and specified that the contract would be for Construction only. This facilitated regulation of the interest rate for capital remuneration. Transener would Operate and Maintain the new capacitors according to a tariff to be set by ENRE.[99] A similar practice was adopted when other expansions initiated by the transmission company were renegotiated after devaluation.[100] The fee excluding O&M is specified in dollars and automatically recalculated each month in pesos according to the current exchange rate.

---

[96] "Most privatised utilities were under foreign control at the start of the crisis and had prices that were officially pegged to the US dollar. This was the contractual underpinning of the large investments which overseas companies have made in Argentina since 1990. In the electricity sector total investment was $12.5 bn (much of it coming from overseas investors)." Pollitt (2008-this issue, p. 3).

[97] Alberto Devoto, Secretary of Energy 8/8/2002 to 24/5/2003, had previously been Vice President of ENRE (6/4/1993–5/4/2002). During this period ENRE had expressed concern about the limiting effect of the post-1992 arrangements for transmission expansion.

[98] This special exemption to the 'maximum 70%' condition was justified on the grounds that most of the cost of the expansion was denominated in US dollars for imported components, there was now (since the crisis) a lack of credit for new investments, and the conversion of the Salex accounts (originally denominated in dollars) at 1.4 pesos/dollar had not reflected the real inflation at 3.6 pesos/dollar.

[99] The latter aspect reflected the provisions for an expansion proposed by a transmission company at its own substation under Resolution 208/1998. This expansion thus became a hybrid case: proposed by generators under the normal Public Contest method, but treated as a substation expansion initiated by a transmission company because only the construction element would be put out to public tender.

[100] The maximum price was set partially in US dollars and the rest in pesos. For example, for the Campana transformer (#20 in Appendix of Littlechild and Skerk, 2008-this issue-c) ENRE approved an amortisation period of 24 months, with a maximum price comprising one component of US$4.18m and another of 1.03m pesos.

8.3. Upgrade expansions

In a subsequent Resolution SE 1 of 2 January 2003, Secretary of Energy Devoto announced a process for what were called Upgrade expansions, to ensure that the networks continued to meet security conditions in the face of growth in demand. This was said to be a "transitory measure" for a one-off process (although in the event it became a mechanism for taking forward regional transmission expansions generally, particularly transformers and other devices rather than new lines). The Upgrade expansions were of two types. 'Security expansions' as previously provided for by Res 208/1998 were now defined more precisely and more liberally as those required to meet a specified minimum standard, namely, that the proportion of non-supplied energy should not exceed 30% of the demand in any area for ten days running.[101] 'Adequacy expansions' were small expansions required to achieve or maintain the original design standards of the transmission equipment, on the assumption that the economic crisis had delayed such expansions. These adequacy expansions were not strictly within the definition of expansions as specified in Resolution 208/1998, but rather 'minor urgent expansions'. It was possible to use the Salex Funds to meet the financing requirements for both kinds of Upgrade expansions.

The Secretary of Energy now invited the transmission concessionaires (Transener and the regional sub-transmission companies) to identify potential Upgrade (security and adequacy) expansions under this new Resolution 1/2003. They should indicate the projects to CAMMESA before 30 January 2003, with a detailed description, explanation and estimate of cost. CAMMESA was to check these, prioritise them, define the collection of projects that would minimise the risks to supply, and possibly propose alternative and more economic ways of dealing with the problems. ENRE was to give an opinion, and to indicate whether other related investments were in process. It would then be for the Secretary of Energy (rather than users) to decide which works to authorise.[102] Where appropriate there would be a competitive tender.

Adequacy expansions were awarded directly to the incumbent transmission concessionaires, explained as the fastest way to implement such small but urgent expansions. (Again this was presented as a transitional measure but subsequently became a more established way of procedure.) However, the provision of all major equipment (as specified by the Secretary of Energy) had to be put out to tender. Because builders of transmission expansions were no longer able or willing to finance expansions themselves, the aim in all cases was to provide finance for developing expansions.

The Secretary of Energy decided that in the circumstances of the time it was opportune to use the uncommitted funds in the Salex Fund to help finance these transmission expansions. However, because the Salex Funds were earmarked for expansions to reduce congestion, they could only be loaned (rather than spent) for these reliability projects. Because of the lack of credit, the Salex Funds were used to pay cash up front, and the costs were recovered over time from capacity payments (and 30% of the costs from beneficiaries in the case of security expansions).

[101] For these security expansions, Resolution 1/2003 established that 70% of the cost has to be paid by the demand side through a capacity payment (rather than 100% with Res 208 expansions), and the remaining 30% by beneficiaries defined according to the Area of Influence method. (The security expansions envisaged by Res 208 were required in order to reduce the risk of collapse of the system as a whole, whereas the security expansions envisaged by Res 1/2003 refer to expansions in a particular part of the grid that were significantly delayed by the crisis that would threaten the security of supply in that part of the grid if they were not developed.) For the adequacy expansions, 100 % of the cost was payable through the capacity payment.

[102] Resolution SE 86 of 30 January 2003 created a new Commission to advise the Secretary, comprising professionals from the Energy Secretariat, CAMMESA and ENRE. Here and often elsewhere, strictly speaking CAMMESA's responsibilities fall to the dispatch entity OED, which is a part of CAMMESA.

Within two months of announcing the availability of Upgrade expansions, the Secretary of Energy reported on progress. The transmission concessionaires had proposed projects and CAMMESA had ranked them.[103] The Secretary of Energy approved three security expansions (three transformers with a total cost of AR$33m or US$10.3m), and seven adequacy expansions (capacitors, reactors and other auxiliary devices costing the same amount in total, namely AR $33m or US$10.3m).[104] Some of these expansions were in Transener's 500 kV network, others in the 132 kV sub-transmission networks.

9. Policy since 2003

9.1. The Federal Plan re-launched

President Kirchner was elected on 27 April 2003. Tariffs to most end-users remained frozen at 2001 levels in pesos. This was still said to be a transitory policy but without any deadline for ending it. This remains the case in September 2007.[105]

In June 2003 the government re-launched the Federal Transmission Plan for using the Federal Transmission Fund (that is, using the proceeds of the additional surcharge or stamp of $0.06/MWh).[106] It focused on the four Lines for which positive benefits had been calculated (see Section 6.6 above). The Government indicated that it would choose between the Lines based on a variety of considerations, including the contribution from users or other sources. It gave first priority to the link with the Patagonia system.[107] It is understood that the Federal Transmission Fund contributed 69% of the total cost and the private investor the remaining 31%.[108] At about the same time, the government added a second section of the Patagonian Line to the Federal Plan.[109]

[103] SE Resolution 106 of 28 February 2003. ENRE had not commented except for noting that two projects had already been considered in the context of the tariff revisions of one of the concessionaires.

[104] The reserve transformer at Alicura for Bariloche, previously rejected under the Public Contest method (#21 in Appendix of Littlechild and Skerk, 2008-this issue-c,d) was top of the list of security of supply expansions. A transformer at Henderson substation, previously proposed by Transener but rejected as inappropriate by the local distribution company, was also included in the new list of approved security expansions. (Littlechild and Skerk, 2004b fns 35, 142; 2008-this issue-d) As of August 2007, 10 of these Upgrade expansions were commissioned, 1 was in progress and 1 was being launched. For further detail see Littlechild and Skerk (2008-this issue-c), and the discussion of subsequent policy below.

[105] Policy is to renegotiate contracts with public utilities, but as yet agreement has not been reached. For one suggested approach, see Urbiztondo (2003).

[106] SE 4 of 13 June 2003, SE 832 of 7 November 2003 and minor modifications in SE 830 of 6 November 2003.

[107] SE 5 of 18 June 2003. After ENRE had issued the Certificate for the Patagonia interconnection in August 2001 (fn 97 above), the government and the interested market participant (Aluar, the aluminium factory in Patagonia) were in negotiation about the proportion in which each would participate in this project in the new post-crisis circumstances and the maximum acceptable cost of the project under these new circumstances. A promotion contract (between the government and Aluar) was signed 27 June 2003. The Line was then constructed and came into operation in 2006.

[108] As with all public tenders since the Economic Emergency Law was put in force, the decision would also take account of buying Argentine materials. Some noted that since Aluar produced aluminium conductors it would presumably provide these materials for this line.

[109] This is a 500 kV line from Puerto Madryn to Pico Truncado, just north of President Kirchner's province of Santa Cruz. Although the line would be financed through the Federal Fund, there seemed to be an expectation that financial support for the line would come directly from the national treasury, which turned out to be the case. It seems difficult to identify significant benefits with this line, and there is an element of circularity in the justifications. In the absence of generation based in the oil fields near Pico Truncado, it is difficult to see who the users would be, but it would only be economic to develop and export generation from that area if the cost of transmission were near zero.

9.2. Debate on the Salex Funds

For their part, the generators continued to be concerned about the government's intention to use the Salex Funds for other purposes, notably to compensate generators for the disparity between their actual costs and the end-user tariffs that had been held down by the pesification and price freeze. (The generators feared that using the Salex Funds for tariff compensation would delay the structural adjustments in end-user tariffs that were necessary after devaluation.) They were keen to propose projects of more value to them while the Salex Funds were still available. From their perspective, given that the additional capacitors and reactors had been funded (Resolution 1/2002), the best use of the remaining substantial funds in the Comahue corridor account was now the Fifth Line (Comahue–Cuyo). They therefore promoted this line, supported by the Federal Council and Transener.

In November 2003 Law 25822 formally ratified the Federal Transmission Plan as developed in previous resolutions. In addition, it put the Federal Transmission Fund at the disposal of the Federal Council and authorised Open Season for the Comahue–Cuyo Line and the first tranche (Mendoza–San Juan) of the Mining Line.

The Law as put to the President contained additional provisions that the Salex Funds should be used exclusively to finance expansion of the transmission system; and that the Salex Funds corresponding to the Comahue–Buenos Aires and Central Cuyo corridors would be applied in their entirety to financing, respectively, the Comahue–Cuyo Line and the first tranche (Mendoza–San Juan) of the Mining Line, for the next 24 months. The President noted these provisions but rather pointedly did not approve them.[110] These provisions had been included to reassure the generating companies and secure their support for the Law. However, the government presumably wished to keep control of scarce funds and to maintain flexibility for their use for other purposes.

Fig. 2 charts the evolution of the Salex Fund (Comahue corridor) over the decade since it was created in 1994. It shows that the Government did indeed use the Salex Fund for other purposes, including transferring $49.8m in January 2004 to the Liquid Fuels Reserve Fund to compensate the generators for the disparity between actual generation costs and frozen end-user tariffs.[111] There may have been further deductions, but the accounts since 2004 are no longer as clear as they used to be.[112]

9.3. Contributions from the provinces

As at 31 December 2003 the Federal Transmission Fund stood at AR$116.6m plus US$25.6m (total US$64.7m). This was not sufficient to finance all the lines in the Federal Plan. The problem was much exacerbated after the devaluation, since investments are now only made if paid for in cash. This led the Government to allocate funding to the Federal Fund direct from the National Treasury (see below). It also led some provinces to reconsider their stance on financing transmission expansions.

For example, nearly five years after it was first proposed and endorsed, effectively nothing had been done towards advancing the Mining Line. In 2000 the Federal Government had said that 70% of the Federal Transmission Fund would support the Mining Line, but in June 2003 it gave

[110] A Law only has force with respect to the provisions that the President approves (unless the Congress later approves it by special majority, needing more votes than required for normal approval).

[111] This Fund was set up to compensate generators for the costs of liquid fuel needed in winter because of constraints on natural gas supply. These costs are set by international markets in US dollars, while tariffs are frozen in Argentine pesos.

[112] It has been said that the Salex Fund was used to pay a $350 million debt owed to various hydroelectric entities including the Binational company Yacyretá. *IBL Troubled Company Reporter*, Vol 4, Issue 249, 17 December 2003.

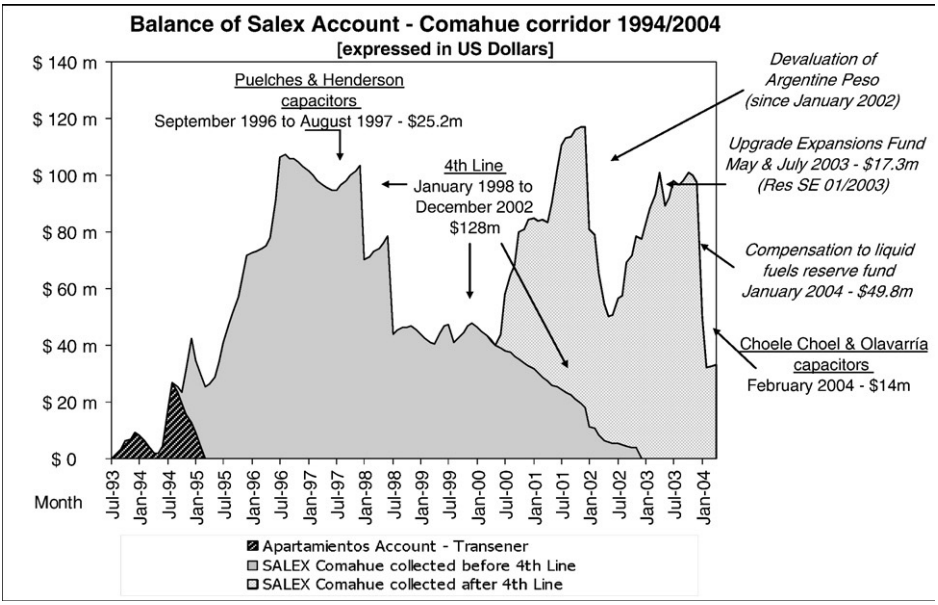

Fig. 2. Evolution of Salex Fund 1994–2004. Source: Authors' analysis on the basis of CAMMESA reports.

priority to the link with the Patagonia system. In November 2003 Law 25822 announced another Open Season on the Mining Line.

Meanwhile serious supply problems were forecast for San Juan province if the existing interconnection was not reinforced. In Provincial Law 7480 of 29 April 2004, the San Juan provincial regulator announced that it would allow the costs of the 500 kV line from Comahue to Mendoza (the first part of the Mining Line expansion) to be passed through to end-users (in the form of a so-called 'stamp' added to the charges of the provincial distribution company) in order to help to provide additional funding for the line. Under the provisions of the Open Season transmission expansion method, San Juan province initiated a proposal for the first stage of the Mining Line, providing 30% of the total cost of the line from this provincial 'stamp'. The Federal Government agreed to provide the remaining 70% of the cost from the Federal Transmission Fund (the national 'transmission stamp').

The line was put out to tender in July 2005. The expected total price at the time was AR$100m (US$33m), to be recovered over a 10 year period.[113] There were four bids, all of which required payment during construction rather than over ten years. The lowest bid was AR$200m ($66.7m) as the total price; after negotiation the bidder accepted a final price of AR$178m ($59.3m) in February 2006.[114] The original National Transmission Plan of November 2000 (Section 6.7

[113] This implied an annual fee of $6.4m for 10 years, assuming a Capital Recovery Factor of 0.1932. See http://www.diariodecuyo.com.ar/home/new_noticia.php?noticia_id=142705.

[114] A press release issued by the Presidency quotes the price as AR$182m ($60.7m) rather than AR$178m ($59.3m). It was earlier envisaged that the provincial and federal 'stamps' would cover the monthly fee resulting from the project for a period of 10 years. When it was subsequently agreed that the 10 year fee would be replaced by payments in cash during the construction of the line, the Province and the Federal Fund provided cash for 30 and 70% respectively of the construction cost, and are recovering this from the proceeds of the 'stamps' over 10 years.

above) refers to $33.1m (pre-crisis) as the estimated annual fee for the first *two* stages of the Mining Line over a period of 15 years. Thus, the first stage of the Mining Line, that had originally been expected to cost about half of this $33.1m, updated to $33m 2005, finally cost $59.3m. The line has been in operation at 220 kV since August 2007. A similar 30% provincial sharing arrangement is also underway for the third stage of the Mining Line (see below).

9.4. Reforming regulation?

Other policy developments could have impinged on transmission regulation, and indicate the trend of thinking. For example, on 24 August 2004 the government sent to Congress a draft bill creating a new Federal Public Utility Services Regime. Its stated intent was to address the inappropriate regulatory regime introduced at the time of privatisation. It introduced several new (and restrictive) conditions for concessions, licenses and permissions.[115] As with all public service concessions, the Federal Government would explicitly introduce an investment plan for each concession.[116]

It was not clear how this bill would be implemented for electricity transmission companies, but it would surely have increased the extent of regulation and central planning. In the event, the bill was not taken forward. In practice, the federal government retained the ability to direct major transmission investments via Upgrade expansions and the National Transmission Plan, financed by the Federal Fund and, increasingly, by explicit funding from the National Treasury, as discussed below.[117]

9.5. More Upgrade and other expansions

Resolution 106/2003 had listed 3 security of supply expansions and 7 adequacy expansions under the concept of Upgrade expansions introduced by Resolution 1/2003. After that time many other Upgrade expansions were added by several successive resolutions. As of June 2007 the number of security expansions approved under Resolution 1/2003 had increased to 12, and the number of adequacy expansions to 50.

The Cañada Honda substation (#13), which was originally rejected under the Public Contest method, was introduced as a 'special case'.[118]

---

[115] These include, for example conflict resolution exclusively under Argentine jurisdiction, contracts required to be in local currency, and regulated tariffs calculated according to costs and a regulated return. Rates are to be fair and reasonable, and "the mean minimum rate must be an instrument to encourage economic development and the highest level of social equity".

[116] Article 5 entitled Duties of the State provides that "In order to foster the country's economic development and a more equitable distribution of income, the State shall... (f) demand that execution of the investment plan ensure long-term supply of service with the most suitable technology...." Article 6 provides that "Pursuant to the mandate of Article 5 of this Law, the Executive Branch of Government shall in all cases define the investment plan to be carried out during service provision, and shall specifically include it within the related contractual framework".

[117] The Government, which hitherto has a majority in Congress, has allocated funds in the annual Budget to the Federal Fund in order to finance several specified major transmission lines. It also has power to reallocate unused funds previously allocated by Congress to another use. This power dates back to the Emergency Act of 2002, supplemented by Article 37 of the Financial Administration Act (Law 24156) reformed on 2 August 2006. A Resolution of the Secretary of Energy would then suffice to authorise funds for desired transmission expansions.

[118] It was special since it was financed 100% by the same fund in San Juan province as financed part of the first stage of the Mining Line, rather than by using Salex Funds, but was classified as Res.1/2003 in terms of the expansion procedure (it was awarded directly to the incumbent transmission concessionaire in order to solve a serious supply problem in a short time). Resolution SE 2017 of 16 December 2005.

Resolution SE 821 of 13 June 2006 introduced a new type of expansion called 'demand supply' expansions, defined as those required to keep expected non-supplied energy under 5% of total demand supplied during the 50 h of the year of highest peak load. (This could be interpreted as a relaxation of the previous security standards.) The Resolution approved two such demand supply expansions. As with Resolution 1/2003, Resolution 821/2006 was described as a "transitory measure" though it is still not clear how long this transitory period will last.

These Upgrade and other expansions have now reached 65 in total (12 security, 50 adequacy, 1 special and 2 demand supply) compared to the 10 expansions originally accepted in 2003. Several of these expansions are actually minor, like replacement of intensity transformers or other devices that are limiting transmission capacity in some line or substation. Other expansions are not minor, since they involve new 500/132 kV transformers.

As of July 2007, 57 of these 65 expansions had been commissioned, costing $31m at 3$AR/USD compared to budget estimates of $43.2m.[119] Three expansions are in progress (costing $10.4m against budget $9.2m) and the remaining five are being launched (budget $55.3m). The actual cost of the commissioned and in progress expansions, plus the budget cost of those being launched, thus amounts to about $97m compared to the sum of $22m (AR$66m) envisaged in Resolution 106/2003. That is, the use of this approach has increased more than fourfold since 2003.[120]

9.6. Extensions to the Federal Transmission Plan

The original Federal Transmission Plan in November 2000 included four Lines of length 2584 km (excluding the Mar del Plata Line) at an expected cost of some $750m (Section 6.7 above). The Federal Plan was re-launched in June 2003 and a second stage of the Patagonian connection (340 km) was added. The Federal Plan was subsequently extended by adding two additional major 500 kV expansions, namely, a third stage in the Patagonian Line in order to reach the southern tip of the Patagonian territory (618 km), and a third corridor from Yacyretá (Northeast) to Buenos Aires (about 900 km) in order to transmit the expanded generation capacity at the government-owned Yacyretá hydro-electric plant. By May 2004 the Plan extended to 3512 km and was projected to cost $827m.[121] Certain other modifications were made to the National Transmission Plan between 2004 and 2006. For example, the Mining Line and the NOA-NEA Line were rerouted and extended in order to reach at least one substation in each province.[122] With these adjustments and extensions, every province will have a 500 kV line and

[119] Source: Secretary of Energy http://www.energia-comision1.gov.ar/listado-de-obras.php. The convention nowadays is to use an exchange rate of 3 AR$ to 1 US$, and to express values in US dollars. For new Public Contest expansions the offers are able to be part in US$ and part in AR$. ENRE uses a rate previously announced for converting them to pesos and comparing them. Transactions in US$ are converted to AR$ at the exchange rate on the day of payment.

[120] Recall that Res 105/1996 provided that loans from Salex Funds could be used to finance up to 70% of Public Contest expansions. Resolutions 106/2003 and 821/2006 in fact refer to loans from Salex Funds to make feasible from the financing point of view those expansions envisaged by Res 1/2003. These loans are used to pay for construction by the time of commissioning, then are repaid by stamp revenues paid into the Salex Funds. The repayment period is relatively brief on small sums (usually two years or less), so some loans have already been repaid to the Salex Funds and reutilized.

[121] http://www.cfee.gov.ar/Actual/disc6/PlanEnergetico2004-2008.ppt.

[122] Specifically, the 3rd stage of the Mining line was rerouted from La Rioja to Recreo, and a 500 kV node planned in La Rioja province. The NOA-NEA Line was extended from Cobos to Sanjuancito in order to reach Jujuy province, and was extended from Resistencia to Formosa in order to reach Formosa province. The substation envisaged at P.R.S.Peña was replaced by one at Monte Quemado in order to have one substation in Santiago del Estero province. (P.R.S.Peña is in Chaco province, which already has Resistencia substation.).

substation except Tierra del Fuego. (This is the island at the southern tip of the country. One wonders whether a 500 kV line across the Strait of Magellan will be proposed to address the isolation of this province.).

Adding the newly proposed lines (2168 km including modifications to original estimates) to those originally included in the Federal Transmission Plan (total 2584 km excluding the Mar del Plata line) makes a grand total of 4752 km new EHV lines, at a recent estimated cost of $1899m. The present state of play on the latest Transmission Plan, with updated line lengths and actual or budgeted costs in US$, appears to be as follows[123]:

Northwest-Northeast (NOA-NEA) Line:

– Interconnection (1220 km, est. $641m): tender for construction 12 October 2007

Patagonian Line:

– First stage (interconnection) (354 km, $94m): in operation since March 2006
– Second stage (543 km, $193m): under construction
– Third stage (510 km): tender in preparation

Comahue–Cuyo ("the Fifth Line"):

– Interconnection (660 km): process delayed

Mining Line:

– First stage (165 km, $61m): built, operating provisionally at 220 kV
– Second stage (215 km): process delayed
– Third stage (165 km, est. $58m): tender in preparation[124]

Yacyretá–Buenos Aires Line:

– Third corridor (920 km, $350m): tender completed.

From the original Federal Plan of November 2000, only the interconnection of the Patagonian system (354 km) and the first stage of the mining line (Mendoza to San Juan, 165 km) are yet in operation. Lines to and within Patagonia (the region from which the current President comes) are progressing relatively fast.

[123] Source: http://www.presidencia.gov.ar/Articulo.aspx?cdArticulo=3060 and online newspapers. For the three lines where actual or budget figures are not available (Patagonian Line 3rd section, Comahue–Cuyo Line, Mining Line 2nd section) the aggregate estimate is 1385 km, $502.

[124] The third stage of the Mining Line does not depend on the second stage because it is connected to the existing 500 kV system at the northern end. The path of the third stage was modified so as to enable the city of La Rioja to be supplied from the existing substation at Recreo. As with the first stage connection to San Juan, La Rioja province will pay for 30% of this third stage of the line. The result of the tender for the 3rd stage of the line without substations was AR$151m, the estimated cost of the substation at La Rioja is AR$24m, total AR$175m=US$58m @AR$3=US$1. Source Transener: http://www.transener.com.ar/menu_esp/finanzas/esp_03-07.pdf.

The Northwest-Northeast Line has been financed by a loan from the IADB.[125] The second and third stages of the Patagonian Line, the Northwest-Northeast interconnection and the Yacyretá–Buenos Aires third corridor are being wholly or partially funded from the federal budget instead of from the transmission surcharge or 'stamp' collected from transmission users. How long such funding from the federal budget can continue, given the growing deficit in the public accounts, remains to be seen.

Fig. 3 shows the proposed National Transmission Plan as of mid-2007. This 4752 km program of 500 kV lines far exceeds the 2960 km of 500 kV lines built during the period 1992 to 2002, most of which was not subject to a proper market test or was found wanting.[126] The present Plan is almost comparable with the 6870 km of construction during the period 1974 to 1987 when the interconnected EHV system was first developed (many argue that it was over-developed). These comparisons suggest the scale of the present EHV transmission expansion program and how far it departs from what might be justified on economic grounds.

10. Summary and conclusions

10.1. The original transmission expansion policy

When President Menem's government reformed the Argentine electricity sector in 1992, the aim was to ensure that transmission expansion was carried out more efficiently than it had been in the past. That meant not only lower cost expansions, perhaps more importantly it meant avoiding unnecessary or premature expansions. The solution adopted by Secretary of Energy Bastos and colleagues was to take away from the incumbent transmission companies and regulatory bodies the power of initiating and approving major expansions, and to give that responsibility to the transmission users that would have to pay for the expansions. In addition, the construction, operation and maintenance of the transmission expansions that they supported had to be put out to competitive tender. This institutional innovation was embodied in the Public Contest method.

Over the period 1992 to 1998 there were a small number of modifications to the Public Contest method, intended to make it more effective at achieving its original aim. Allowing proponents of a line to specify a maximum acceptable price before the public contest, and allowing Salex Funds to be used to defray initial construction costs as well as subsequent fees, increased the effectiveness of the competitive bidding process. Allowing transmission operators and the system operator to propose quality and security of supply expansions recognised and took advantage of the greater information and broader perspective possessed by these parties, while still leaving users responsible for actually deciding on expansions.

Concerns by commentators about possible distortions due to the Salex Fund and the Area of Influence method were noted but no changes were made in these respects. This was partly because there was no pressure from market participants, partly because no better alternatives were immediately apparent.

[125] http://www.iadb.org/projects/Project.cfm?project=AR-L1021&Language=English.

[126] Three lines (total 1123 km) were financed by the federal government for its Yacyretá generation plant, the InterAndes line (409 km) was financed by a Chilean generating company and is separate from the interconnected Argentine system, and nine lines (total 136 km) simply connected particular generation plants to the grid. Littlechild and Skerk (2008-this issue-c) Apart from these lines, only the Fourth Line (1292 km) was passed by the Public Contest method, and that Line has subsequently been shown to be uneconomic. (Littlechild and Skerk, 2008-this issue-b).

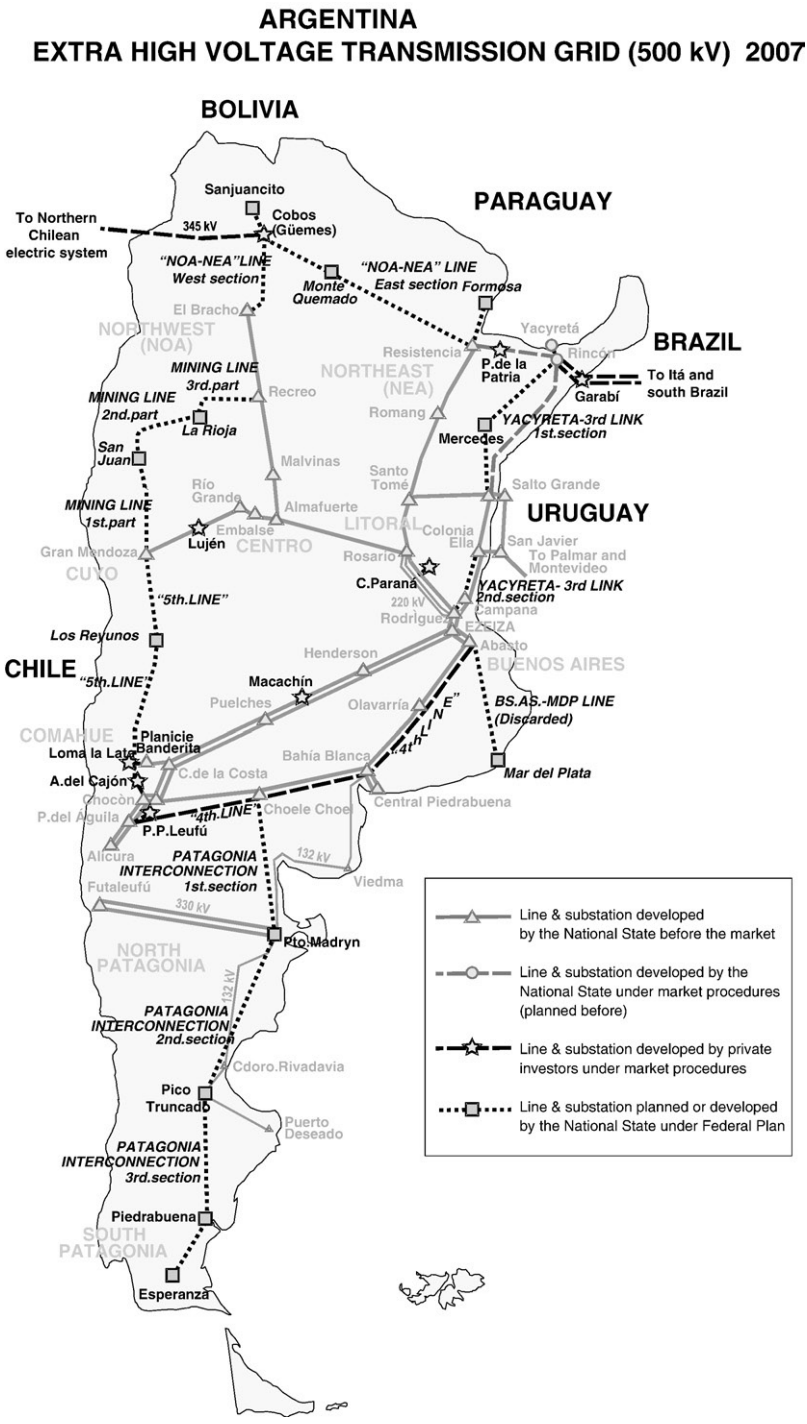
ARGENTINA
EXTRA HIGH VOLTAGE TRANSMISSION GRID (500 kV) 2007
BOLIVIA
PARAGUAY
BRAZIL
URUGUAY
CHILE
Sanjuancito
Cobos (Güemes)
To Northern Chilean electric system
345 kV
"NOA-NEA"LINE West section
"NOA-NEA" LINE East section
Monte Quemado
Formosa
El Bracho
NORTHWEST (NOA)
NORTHEAST (NEA)
Resistencia
Yacyretá
Rincón
P.de la Patria
To Itá and south Brazil
Garabí
MINING LINE 3rd.part
MINING LINE 2nd.part
Recreo
La Rioja
Romang
Mercedes
YACYRETA-3rd LINK 1st.section
San Juan
Malvinas
Santo Tomé
Salto Grande
Río Grande
Almafuerte
MINING LINE 1st.part
LITORAL
Embalse
Lujén
CENTRO
Colonia Ella
San Javier
To Palmar and Montevideo
Gran Mendoza
CUYO
Rosario
C.Paraná
220 kV
YACYRETA- 3rd LINK 2nd.section
"5th.LINE"
Rodríguez
Campana
EZEIZA
Los Reyunos
Henderson
Abasto
BUENOS AIRES
"5th.LINE"
Macachín
Puelches
Olavarría
"4th.LINE"
BS.AS.-MDP LINE (Discarded)
COMAHUE
Planicie Banderita
Loma la Lata
Bahía Blanca
Mar del Plata
A.del Cajón
C.de la Costa
Chocón
Central Piedrabuena
P.del Águila
"4th.LINE"
Choele Choel
P.P.Leufú
Alicura
PATAGONIA INTERCONNECTION 1st.section
132 kV
Viedma
Futaleufú
330 kV
Río Madryn
NORTH PATAGONIA
132 kV
PATAGONIA INTERCONNECTION 2nd.section
Cdoro.Rivadavia
Pico Truncado
Puerto Deseado
PATAGONIA INTERCONNECTION 3rd.section
Piedrabuena
SOUTH PATAGONIA
Esperanza
Line & substation developed by the National State before the market
Line & substation developed by the National State under market procedures (planned before)
Line & substation developed by private investors under market procedures
Line & substation planned or developed by the National State under Federal Plan

Fig. 3.

More substantial changes were in any case expected to reduce the significance of these concerns. The 'second-round reforms' in October 1999 augmented the original and distinctive approach by introducing financial transmission rights and a novel concept of At-Risk expansions. These enhanced the role of incentives and market decision-making, opening up transmission expansion to investors as well as users. Both modifications were aimed at the same original goal of efficient transmission expansion: to discover and meet the needs of transmission users where it was economic to do so. To this end, the modifications of the original policy continued to provide only a very limited decision-making role for the incumbent transmission companies, the regulatory body ENRE and the government.

10.2. The change in policy: the Federal Transmission Plan

In the event, the Menem government fell at the end of 1999 and the 'second-round reforms' were repealed before they could be tested. By the end of 2000 a change of policy was in effect. This comprised the introduction of a Federal Transmission Plan, with a significant role for the Federal Council in designing and implementing this, funded by an increase in the transmission surcharge or 'stamp'. A new Open Season method was introduced, which invited private sector participation in the Federal Plan.

In mid-2001, as economic conditions deteriorated, Bastos returned and attempted to terminate this policy and reinstate a market-oriented policy — in fact to enhance the role of the market still further. This attempt was short-lived. By the end of 2001 Argentina was embroiled in an economic crisis from which it has not yet recovered. In early 2002 the pesos was devalued and utility rates were frozen at their previous levels in pesos. In early 2003 the Secretary of Energy announced Upgrade expansions to be decided by the government and financed out of the Salex Funds. These provided the only significant component of transmission expansion around that time.

In May 2003 President Kirchner's new government reinstated the Federal Transmission Plan. This is financed in part by across-the-board surcharges or 'stamps' on transmission charges at the federal and/or provincial levels, but increasingly by allocations of funds from the federal budget. Sometimes it involves bilateral negotiations with interested parties. The Federal Plan now specifies a program of EHV transmission line construction in outlying provincial areas that far exceeds the extent of EHV line construction over the previous decade, and rivals the scale of the program when the national interconnected EHV system was first set up. This approach nowadays dwarfs the role of the Public Contest and other user-determined methods of transmission expansion, at least on the EHV system.

10.3. Why the change in policy?

What explains the change of approach and the correspondingly diminished role of the Public Contest method? It was hastened and/or strengthened by the change of government at the end of 1999 and the economic crisis of 2001/2. In fact, however, an indication of a change in approach actually predates those two events. In late 1999 the same Menem government that had proposed the 'second-round reforms' to augment the original market approach also proposed a Federal Transmission Fund "which shall have as its objective the financing of transmission expansions that the Secretary of Energy identifies as financeable". This would be financed by an increased levy or 'stamp' on electricity sales, and would be "indispensably driven by the goal of sponsoring growth and development of the sector, the positive effects of which will propagate themselves throughout the rest of the economy". The Federal Council, comprising representatives of federal and provincial governments, would advise on the choice of projects. Private sector participation

would be invited in public sector ventures. This policy was endorsed and extended by successive governments, rather than introduced by them.

Why did the Menem government see the need to propose a Federal Transmission Fund as a complement to the Public Contest and related methods? It was not that the Public Contest and other methods were unworkable: users had approved or put in process a dozen or so transmission investments under the Public Contest method by the end of 1999, and another nine or so were in process by mid-2001. About fifty more transmission expansions had gone forward by agreement between interested parties plus about a hundred minor expansions. There is no evidence that any transmission expansion that was economic failed to be taken forward under the original arrangements. Nor, apart from the Fourth Line, did the Public Contest method lead to transmission expansions that were uneconomic.

The Public Contest method was intended to achieve economic expansion of the transmission system, and to prevent uneconomic expansion, and it achieved both these aims. That, if anything, was its limitation. It was superceded at the federal level, especially, by arrangements designed to deliver political rather than economic expansions, especially additional EHV lines in the provinces. These arrangements, as embodied in the Federal Transmission Plan, now involve building some 4750 km of EHV transmission lines to and between the outlying provinces of Argentina. It is doubtful that any of these lines are justifiable in economic terms, and transmission users would not have contemplated building them under the Public Contest method.

Public Contest is still available as a method of transmission expansion, and is particularly relevant in those areas (such as Buenos Aires province) where federal funding cannot routinely be expected. But economic conditions and government policy since the crisis have not been conducive to private investment in utility infrastructure generally. There is also little incentive for users to propose to pay for lines that might now be achievable via other means, with taxpayers or other parties footing the bill.

Was it inevitable that the Public Contest method would thus be superceded? One possibility is that more radical reform could have been introduced earlier, leaving less scope for political pressures for uneconomic transmission expansions.[127] Another possibility is that economic and political ends could have been combined in a more disciplined way. In late 1999, when the outgoing Menem government proposed to increase the transmission stamp in order to finance regional transmission expansions, an alternative proposal was to discipline these regional expansions by requiring separate and explicit approval of funding for each such expansion. In 2001, Bastos suggested a distinction between transmission expansions paid for by the market and reliability expansions in the public service that would be financed by congestion revenues in a Transmission Remuneration Fund but paid for by the demand side. Could any of these options have successfully incorporated broader public policy and political considerations into a predominantly market mechanism for determining transmission expansions? Unfortunately, the change in circumstances after 2001 precluded exploration of these ideas.

Acknowledgements

We are grateful for comments and information from many people who have participated in the development of this industry, including (on the topic of this paper) Carlos Bastos, Alejandro Capara,

[127] Carlos Bastos has suggested that, with the benefit of hindsight, he would have dissolved the Federal Council at the beginning of the reform process. He would also have separated distribution and supply businesses and introduced retail competition, established congestion rights and facilitated markets to manage risk, reduced the emphasis on the wholesale spot market and provided a greater role for long-term contracts. (personal discussion 7 March 2006).

Luis Caruso, Sally Hunt, Jorge Karacsonyi, Alfredo Mirkin, Ignacio Pérez-Arriaga, José Sanz, Ramón Sanz, Luis Sbértoli, and Ruy Varela. None of these is responsible for the use we have made of their advice. The first author is grateful to the (then) Judge Institute of Management Studies and to the TSEC grant to the Electricity Policy Research Group at Cambridge University for supporting this research.

References

Abdala, Manuel A., 1994. Transmission pricing in private-owned electricity grids. An Illustration from the Argentine Electricity Pool. XXIX Reunión Anual de la Asociación Argentina de Economía Política. LaPlata. November.

Abdala, Manuel A., 2008a. Transmission Pricing in Privately-OwnedElectricity Grids: An Illustration from the Argentine Electricity Pool. Energy Economics. 30, 1284–1305 (this issue). doi:10.1016/j.eneco.2007.12.010.

Abdala, Manuel A., 2008b. Governance of competitive transmission investment in weak institutional systems. Energy Economics. 30, 1306–1320 (this issue). doi:10.1016/j.eneco.2007.12.009.

Bastos, Carlos M, Abdala, Manuel A., 1996. Reform of the Electric Power Sector in Argentina. Buenos Aires. (originally published in Spanish in 1993).

Bouille, Daniel, Dubrovsky, Hilda, Maurer, Crescencia, 2002. "Argentina: market drive reform of the electricity sector". Chapter 3. In: Navroz, N.K. (Ed.), WRI Power Politics. World Resources Institute, Washington DC, pp. 31–50.

Chisari, O.O., Dal-Bó, P., Romero, C.A., 2001. High-tension electricity network expansion in Argentina: decision mechanisms and willingness-to-pay revelation. Energy Economics 23, 697–715.

Chisari, Omar O., Romero, Carlos A., 2008. Investment decisions in transmission of electricity: the case of a club with imperfect representation. Energy Economics 30, 1321–1333 (this issue). doi:10.1016/j.eneco.2007.12.014.

Galetovic, Alexander, Inostroza, Juan Ricardo, 2008. A lesson from Argentina: setting transmission tolls in a competitive auction is *much* better than regulating them. Energy Economics 30, 1334–1366 (this issue).

Gómez-Ibáñez, Jose A., 2003. Designing Capacity Markets (with Martin Rodríguez-Pardina), Chapter 12 in Regulating Infrastructure: Monopoly, Contracts, and Discretion. Harvard University Press, Cambridge, MA.

Littlechild, Stephen C., Skerk, Carlos J., 2004a. Regulation of transmission expansion in Argentina: Part I — State ownership, reform and the Fourth Line. Cambridge-MIT Institute Electricity Project, CMI Working Paper 61, CWPE 0464, The Cambridge-MIT Institute, 15 November.

Littlechild, Stephen C., Skerk, Carlos J., 2004b. Regulation of transmission expansion in Argentina: Part II — Developments since the Fourth Line. Cambridge-MIT Institute Electricity Project, CMI Working Paper 62 CWPE 0465, The Cambridge-MIT Institute, November.

Littlechild, Stephen C., Ponzano, Eduardo A., 2008. Regulation of transmission expansion in Argentina: the Regional Electricity Forum of Buenos Aires province. Energy Economics 30, 1491–1526 (this issue). doi:10.1016/j.eneco.2007.12.005.

Littlechild, Stephen C., Skerk, Carlos J., 2008a. Transmission expansion in Argentina 1: the origins of policy. Energy Economics 30, 1367–1384 (this issue). doi:10.1016/j.eneco.2007.12.003.

Littlechild, Stephen C., Skerk, Carlos J., 2008b. Transmission expansion in Argentina 2: the Fourth Line revisited. Energy Economics 30, 1385–1419 (this issue). doi:10.1016/j.eneco.2007.12.007.

Littlechild, Stephen C., Skerk, Carlos J., 2008c. Transmission expansion in Argentina 4: a review of performance. Energy Economics 30, 1462–1490 (this issue). doi:10.1016/j.eneco.2007.12.006.

Littlechild, Stephen C., Skerk, Carlos J., 2008d. Transmission expansion in Argentina 6: distribution companies, regulation and the Public Contest method. Energy Economics 30, 1527–1535 (this issue). doi:10.1016/j.eneco.2007.12.008.

Nera, 1998. Analysis of the reform of the Argentine Power Sector: Final Report, New York. January.

Pérez-Arriaga, Ignacio J., Rubio, FiJi., 1996. Marginal pricing of transmission services: an analysis of cost recovery. IEEE Transactions on Power Systems, Vol 10, No. 1, February. Reprinted in M. Einhorn (Ed.), 1996. Electricity Transmission Pricing and Technology, Kluwer Academic Publishers.

Pérez-Arriaga, Ignacio J., Rubio, F.J., 2000. Marginal Pricing of Transmission Services: A Comparative Analysis of Network Cost Allocation Methods. IEEE Transactions on Power Systems 15 (1), 448–454 February.

Pollitt, Michael, 2008. Electricity Reform in Argentina: Lessons for Developing Countries. Energy Economics 30, 1536–1567 (this issue). doi:10.1016/j.eneco.2007.12.012.

Urbiztondo, Santiago, 2003. Renegotiation with public utilities in Argentina: analysis and proposal. Fundacion de Investigaciones Economicas Latinoamericanas, Buenos Aires, Working Paper 77, October.