Transmission pricing practices in South America are described. The economic background behind open access transmission schemes, the models for transmission tariffs and the schemes for system expansion are described, along with practical applications implemented in Chile. Successes and failures of those schemes are assessed. © 1997 Elsevier Science Ltd. All rights reserved.

Introduction

The basic economic characteristics of the electricity chain where economies of scale are significant (Pérez-Arriaga et al., 1995). Such economies would tend to produce a monopoly in transmission, which must be regulated to prevent the grid owners from overcharging for the service. The need for regulation is all the more acute when the transmission grid is the kingpin of competition among geographically dispersed generators. To overcome the monopolistic characteristics of transmission activity, the trend has been to establish new legal and regulatory frameworks offering third parties open access to the transmission wires. This paper reports on the open access frameworks implemented in Argentina, Bolivia, Chile and Peru, with particular emphasis on the Chilean experience.

Entry barriers to transmission

A key factor that determines market structure and performance is the ease by which equally efficient firms can enter and leave the market. Those markets where entry and exit can take place at no cost are known as perfectly contestable markets (Baumol et al., 1982). In perfectly contestable markets consumers are protected from monopolistic pricing by the incumbent firms because it is possible for any potential entrants to move in, make a profit, and move out at no cost. The ease of entry and exit is what guarantees that the incumbent firms would not get monopolistic rents.

In the electric transmission industry there are several elements that erect entry barriers that proscribe electricity transmission to be characterized as a perfectly competitive or contestable market. Those elements that characterize the transmission industry are:

- large sunk and specific investments;
- lumpy investments;
- need for redundancies to meet security requirements;
- economies of scale in the construction cost in terms of the capacity of the transmission line; and
- economies of scope given by the interconnection of electric systems.

Notwithstanding and distinguishing the technological characteristics that define the industry, the question is at what extend electricity transmission should be treated as a natural monopoly susceptible to tight regulation or is it possible to substitute it for a less than perfect regulation imposed by the market? The electricity regulation operating in Chile can be classified as the second one, giving rise to a form of market competition in the transmission industry, as will be described later.

Deregulation of the electricity power sector

In spite of the need for regulation in transmission, an electricity system can be unbundled to make room for competition in major components of the chain. Equipped with this understanding, a number of South American countries have developed new legal and regulatory frameworks for the electric energy sector, in which the main common elements are:

The authors are with the Escuela de Ingeniería, Pontificia Universidad Católica de Chile, Casilla 306, Correo 22, Santiago, Chile.
Open access models in South America

Deregulation laws in South America make open access compulsory for transmission and distribution companies that are benefited by public rights of ways. To the extent that a company's transmission or distribution assets were constructed pursuant to concessions granted by the government, the company must allow third parties to utilize their installations if there is available capacity. The users on the other hand must participate in the investment to expand the system.

The open access regulations will be described. While a tight government regulation operates in Argentina, Bolivia and Peru, with important state participation, a looser regulation operates in Chile, delegating more responsibility to the market regulating capabilities.

Transmission cost assessment: Investment and operation

The essential economic characteristic recognized for the transportation service is one of capacity, linked to individual equipment maximum loading. The concept is that payments by all users should permit to cover investment costs as well as operation and maintenance. Installations to be considered are all those required to maintain an adequate quality and security of service.

No book values of installations are used, but replacement investment values are considered, providing an expansion cost economic signal. In Bolivia and Peru the replacement value is regulated through the economic adaptation concept explained later. In Argentina a subsidy was provided by the government for existing installations at time of privatization to reflect sunk costs for the benefit of generation competition.

In Chile, the regulation defines that the electric company owning the transmission facilities to be used by a third party, is the one responsible for determining the replacement value. A negotiation takes place between interested parties and if not agreement is reached, disputes are submitted to an arbitration procedure in accordance with the Chilean electricity law.

Transmission cost recovery: Marginal cost income

As a result of the application of full spatial short run marginal cost based pricing, in which generators are paid at marginal cost of generation buses and consumers are charged at marginal costs of load buses, a surplus is collected for the owners of the transmission system. The surplus or ‘marginal cost income’ arises from differences between both energy and capacity locational spot prices (Schwepppe et al., 1988). It could be described as an ‘arbitrage marginal revenue’.

In the Chilean system, marginal costs for energy are calculated through dispatching all generation for a single bus system. Then, nodal or penalty factors are used for distributing the costs, causing that the bus prices change throughout the grid and time, according to power balance.
and network availability. These penalty factors are calculated taking into consideration only marginal losses. The marginal costs for power are based on the development costs for peak units (gas turbines) in one bus, with additional penalty factors that consider only marginal losses.

But in systems that present increasing returns to scale, such as the transmission business, pure marginal pricing does not finance the system operation and development, as marginal costs will be lower than average costs. The marginal cost income only covers the cost of transmission losses and a small part of the investment and exploitation costs. The percentage varies depending on the system. Simulations on the Chilean system indicate that only 10% of the transmission required remuneration is thus collected, while in Bolivia less than 4%. The surplus is directly dependent on the marginal cost differentials through each line. Figure 1 shows percentages collected through marginal income for the largest transmission lines in the main Chilean system.

**Transmission cost recovery: 2-part tariff scheme**

Given the limitations of transmission marginal pricing, these countries have implemented a 2-part pricing method, combining marginal cost considerations as well as average costs. For total transmission cost recovery (average cost) a second part tariff, in the form of transmission tolls, is added to the marginal cost income to fully finance the system. These tolls, or wheeling rates, are charged to users of the system, definition of users and allocation of charges varying from country to country.

**Contributions to transmission financing: use of system approach**

Argentina, Bolivia and Chile determine the toll allocation, based on the area of influence of each individual user, which corresponds to the set of lines and substations directly influenced by the energy and peak power injected by the user. The area of influence pretends to represent the effective use by each user of the transmission network (Rudnick et al., 1995), independent of the commercial contracts of that user. Diverging from that concept, Perú determines the supplementary income based on a postage stamp approach.

The allocation schemes further determine that only those contributing to positive flow pay for the equipment capacity.

Payment of the tolls is allocated only to the generators in the Chilean law. The economic reasoning used to support this scheme argues that transmission services are required by the generators to reach consumers and compete. It also assumes that the combination of the generation and transmission business does not have economies of scale, thus marginal pricing providing enough revenues for the combined business. Toll charges in Perú are made essentially to Geneco, while Discos also participate in Argentina and Bolivia.

**Transmission losses and congestion**

All regulations consider marginal transmission losses as an economic signal to be adequately reflected, but congestion signals are absent, except in the Argentinean model, where congestion rentals will be used to upgrade a restricted transmission corridor from the south of the country. The Argentinean model also includes in transmission pricing a factor that reflects network reliability upon out-of-merit dispatch and unserved energy.

None of these countries has separate transmission congestion contracts or locational price hedging mechanisms provided by the transmission operators.

Thus, transmission charges are an essentially changing amount, according to network and dispatch conditions. However, as the Transec is a passive player, in Argentina its variable revenues have been stabilized on a 5-year basis, according to the ex ante mean value of the variable charges to be paid by the users for that pricing period. Every 5 years, annual variable income is to be adjusted according to the expected variable charges in the following pricing period. The total revenue is adjusted every 6 months by a factor taking into account inflation, but the incomes from fixed charges are reduced annually by a factor aiming to increase the system efficiency (RPI-X criteria, similar to the UK one).

Unlike the other countries, no specific quality standards are defined for transmission in the Chilean scheme and both the regulator and interested parties are assessing a proposed bylaw on that matter. In Argentina the remuneration of the Transec in the first pricing period is based on 100% availability. Any time a facility is out of service, whether planned or forced, a penalty calculated according to outage duration and facility importance is applied to the company. After the first pricing period, a quality standard is to be established, based on previous system performance. Penalties and bonuses will be applied to company income whenever a deviation from the standard occurs (Rudnick et al., 1996b).
Open access and transmission development

Transmission planning and development in a deregulated environment

In the traditional vertically integrated regulated monopolistic electric utility, generating and transmission expansion plans are coordinated, so that the network does not restrict optimal dispatch. The network itself is not overloaded and specific desirable technical conditions are achieved: adequate voltage profiles, damped system dynamics, etc. But these centrally determined plans for the expansion of generation and transmission facilities are a thing of the past.

The environment in an increasing competitive deregulated electrical sector, where generators look for their own individual economic interests, while sharing an open access network, is very different. The development of transmission is seen differently by each of the participants, and while a particular capacity expansion may be of interest to one party, there will be others that may be against it (whether because it will affect their operation and/or income or whether they may be asked to contribute to an investment they may not see as beneficial). Transmission planning in a competitive economic environment is clearly an emerging complex issue (Rudnick et al., 1996b). This environment is rife with challenge and poses many questions as to how to reconcile the private and the public interests in the expansion of the electric power installations.

Economically adapted systems and indicative plans

The Chilean, Peruvian and Bolivian electric regulations have faced the issue of transmission expansion through the coming of a novel concept: the "economically adapted" transmission system. The Chilean electricity law provides a general definition: "an installation is economically adapted when it allows a given quantity to be produced at the lowest cost." Penalty factors, based on the adapted transmission system, are calculated by the regulator and are used to spatially distribute spot prices to main bases. The Peruvian and Bolivian legislation restrict a bit more that definition, indicating that "an economically adapted system is that electrical system where there is an equilibrium between energy supply and demand, aiming for reduced costs and maintaining quality of service." The regulators in these last 2 countries must not only determine what the adapted transmission system should be, but also restrict the transmission owner's income on the basis of that adapted system. The aim is to stimulate efficient investment, maintenance and operation, according to the social planner's point of view.

Economic adaptation and social optimum

The economic adaptation notion relates to concepts formulated by Boiteaux in 1949 (Boiteaux, 1949), based on the economic principle that the social optimum is achieved when in an economy, the goods and services are priced at marginal costs and systems are economically adapted. In such adapted systems, the returns obtained from the sale of all the energy at the instantaneous marginal cost, plus returns from the sale of all power at the development cost of the appropriate units to provide peak power, are equivalent to the cost of capital plus the total operation costs of the generating plants. This can be the case for systems with no economies of scale. It is argued that the combination of the generation and transmission businesses does not have economies of scale, even with transmission itself having such economies. Therefore, it is concluded that marginal pricing provides enough revenues for the combined businesses.

Electrical engineers usually understand an adapted system solely as the one where electricity supply physically matches demand. However, the concept is really an economic one, where the social optimum is looked for, with costs in a wide sense minimized over an horizon of time: in theory, there may be a case where supply and demand do not match during a period of time, if the cost of not serving energy results in a lower global cost. The adaptation has to be evaluated over a period of time, rather than instantaneously. Boiteaux formulated adaptation as a stepwise condition, given the discrete character of investments. In an economically adapted system, short term marginal costs equal long term marginal costs. Boiteaux indicates that "provided there is an optimal investment policy, short term pricing is also long-term pricing, and there is no longer any contradiction between the two".

The challenge in these regulations, for pricing pur-
The transmission system in South America needs to determine the adapted transmission systems, given the existence of a 'previously determined indicative plan' for generation and the recognition or not of stranded investments in historical costs. Transmission is understood as the high voltage meshed network that is shared by all. Radial transmission or subtransmission used by individual generators or consumers is left out. Within the described framework, the economically adapted transmission system is the one that provides the transmission service at minimum cost. However, minimum cost does not only refer to the cost of transmission investment and losses, but should also include variable cost of generation. The economic interpretation of an adapted transmission system requires therefore to optimize transmission development over time. Dynamic planning methodologies are required for the optimization (Rudnick et al., 1996b).

Argentina model for transmission development

In Argentina regulations specify a process where major transmission extensions are to be promoted by interested agents and paid by their beneficiaries (Rudnick et al., 1996b). Extensions require a 'need and suitability' certificate issued by the regulator after an analysis and public hearing process. Major extensions are in charge of an Independent Transport Company (IT) through a Construct, Operate and Maintain contract. Major extensions can be performed by agreements between a user or group of users and the IT or by public call for bids at the request of a group of users totaling 30% or more of the extension’s benefits (rejection requires an opposition of 30% or more). The Transco must give a technical license to the IT and provide overall oversight. The process has not worked without problems and it still has to prove itself as an adequate alternative for other countries to follow.

Industry organization and vertical integration in Chile

Chilean geography is very peculiar, a long and thin country, and this characterizes its 2 main independent longitudinal electrical systems: Sistema Interconectado del Norte Grande (SING) and Sistema Interconectado Central (SIC). The SING serves the northern part of the country, from Arica in the north to Antofagasta in the south. Coal fired steam generators provide electricity to the expanding mining activity of the region. The SIC is the system that serves the central zone of the country, from Talca in the north to the Island of Chiloé in the south. It is the most important electrical system in the country, serving a region that counts for 95% of GNP, 43% of Chile's geographical area, including the densely populated Santiago Metropolitan Region, and 92% of the population. The discussion that follows will focus the analysis only on the SIC.

The SIC system is a relatively small one by international standards, but with a high degree of market concentration. The transmission system was developed, due to geographical reasons, as a long 220 kV and 500 kV corridor, with 4162 and 623 kilometers of lines respectively, that allow hydroelectric plants located in the south to transport their electricity to the central part of the country, where most consumption takes place. In 1995 the SIC generation capacity was 4071 MW, where 3 Gencons, Endesa, Chilgener and Colbún, accounted for 94% of it (Table 1).

Table 1. SIC, Gencons capacity participation, 1995 (Raineri, 1996)

<table>
<thead>
<tr>
<th>Company</th>
<th>Capacity (MW)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Endesa (Pehuenche included)</td>
<td>60%</td>
</tr>
<tr>
<td>Chilgener (Guanacaste included)</td>
<td>22%</td>
</tr>
<tr>
<td>Colbún</td>
<td>12%</td>
</tr>
<tr>
<td>Others</td>
<td>6%</td>
</tr>
</tbody>
</table>

Among the main Gencons only Colbún is state owned, where Endesa and Chilgener were privatized in the late 1980s. In late 1996, 37.5% of Colbún was privatized, after a first trial that lead to a 'desert auction'. The fuel mix of the system is mostly hydraulic, with 23 plants that represent 78% of the capacity and 9 thermoelectric plants that account for the remaining 22%. As a system that is mostly hydroelectric with a wide dispersion of the generators along the country, the reliability of supply depends extensively on the provision of transmission services, services that are largely concentrated in the hands of Endesa, with 1832 MW of generation capacity, through its subsidiary Translec. Translec controls all 500 kV lines and 72.6% of the 220 kV lines (Table 2 indicates ownership shares).

Also, high voltage transformation capacity is concentrated, where all the 500 kV and 37.3% of the 220 kV transformation are managed by Translec (Table 3 indicates ownership shares in transformation MVA capacity).

Also, Endesa and Translec are integrated under a large holding, Enersis, who controls other important companies in the electric industry, Pehuenche, a 585 MW Genco, and Chilrelectrica, the metropolitan Disco with more than a million customers.

The high concentration in transmission and transformation capacity by Translec should not be surprising.

Table 2. SIC, 1996 transmission market participation

<table>
<thead>
<tr>
<th>Company</th>
<th>500 kV</th>
<th>220 kV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gencons</td>
<td>22.4%</td>
<td></td>
</tr>
<tr>
<td>Disco</td>
<td>2.4%</td>
<td></td>
</tr>
<tr>
<td>Other lines</td>
<td>2.6%</td>
<td></td>
</tr>
<tr>
<td>Translec</td>
<td>100%</td>
<td>72.6%</td>
</tr>
</tbody>
</table>

Note: kwh as % of total kwh by voltage level (Raineri, 1996).
Table 3. SIC, 1996 transformation capacity

<table>
<thead>
<tr>
<th></th>
<th>500 kV</th>
<th>220 kV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Genoces</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Endesa</td>
<td>26.4%</td>
<td></td>
</tr>
<tr>
<td>Chilgen</td>
<td>5.9%</td>
<td></td>
</tr>
<tr>
<td>Colbún</td>
<td>27.8%</td>
<td></td>
</tr>
<tr>
<td>Transoc</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transelc</td>
<td>100%</td>
<td>37.3%</td>
</tr>
<tr>
<td>S.T.S.</td>
<td>1.6%</td>
<td></td>
</tr>
<tr>
<td>Discus</td>
<td>19.3%</td>
<td></td>
</tr>
<tr>
<td>Other rms</td>
<td>3.1%</td>
<td></td>
</tr>
</tbody>
</table>

Note: Market participation in MVA/total MVA by voltage level (Raineri, 1996)

because it is related to the hydroelectric generation capacity of its vertically integrated Genoces, Endesa and Peluquín, that together account for 70% of the hydraulic capacity in SIC (Table 4).

Results of deregulation and open access scheme in Chile

Between 1985 and 1995 energy consumption in the Chilean SIC has grown at an annual average of 7% matching the GNP growth rate. To satisfy this growing energy consumption the country has allocated major resources to the industry. Between 1989 and 1995, the SIC has increased its generation capacity at an annual average rate of 6%. The large investments have been financed mostly with the resources obtained by the privatized electric utilities.

Criticism of the Chilean deregulation

There are several issues of the Chilean application of deregulation and open access that have been criticized as not adequately solved, the main ones relating to market power in the SIC. The claims are that there is a high degree of market power due to: vertical integration, high concentration of water rights, and concentration of transmission installations coupled with an inefficient open access law.

The high degree of market concentration previously shown in numbers was a result of the privatization process as well as later actions by the private players. It has given rise to accusations before the Antimonopolies Commission that the Enersis holding (owning the main generation, transmission and distribution) behaved monopolistically. The judicial process is still developing, but the authors have concluded that there are no evident signs of severe market power in the SIC, given the enthusiasm shown by actual and new investors, constantly changing the balances of market power in the industry.

The development of new hydroelectric plants could have been restrained due to the large concentration by Endesa of property rights over the main water resources. This situation has been publicly denounced, arguing that in the short run it has left other Genoces only with chances to increase their generation capacity through the development of thermal plants fueled by oil or coal. Notwithstanding, any possible rent that could have been obtained by Endesa due to its ownership of the main water resources are expected to vanish in the near term. This is the case as in 1997 a natural gas pipeline between Argentina and Chile is expected to be in operation. As Chileans will be able to import natural gas from Argentina, this pipeline will provide an additional fuel resource for other Genoces to produce electricity. Plans are that in the following 10 years 7 new combined cycle gas turbines will add 2350 MW of capacity to the SIC.

Recent technological advances that have increased the efficiency of the combined cycle gas turbines have provided good chances for them to compete with zero operation cost but capital intensive hydroelectric plants. The first combined cycle gas turbine will be in operation in October-November 1997 and belongs to Chilgen, the largest thermoelectric Genoco in the SIC. Additional sources of competition among the Genoces in the SIC are expected to arise from the incorporation of a strategic partner to Colbún, the state-owned Genoco that in October 1996 sold control of the company to private investors, and other investors who are expected to build other combined cycle gas turbines.

There has been further questioning of the open access regulation, which only provides a framework for negotiation, but no strict open access regulation of the vertically integrated Transelc. This less than perfect regulation has, surprisingly, given rise to a sort of competition in transmission services. This competition has been tough and increasing, where Transelc the major Transco in the SIC has been stressed by different forms of competition: direct, by substitution and potential. Direct competition has come from other Genoces who in order to reach directly the most important consumption nodes have built their own transmission lines parallel to Transelc transmission lines, as is the case with Colbún and Chilgen. Colbún building a 220 kV line instead of using a 500 kV corridor. Competition by substitution comes from the locational advantages that new thermoelectric plants have over hydroelectric plants, leaving
some of Transcele transmission lines unused. Finally, the threat of potential intruders has weakened Transcele’s market power and forced it to change its strategies to favor the development of alliances or to sell out the transmission lines to those who originally undermined the firm’s market position. These last ones are the cases of regional Discos who have threatened to build their own subtransmission lines with the risk of leaving Transcele lines unused.

Economic results at the company level

Between 1987 and 1990 the most important Chilean electric utilities were privatized. Tables 5 and 6 show indexes on stock prices versus book values and versus earnings for a selected group of firms: 2 Gencos, Endesa and Chilgener, and 2 Discos, Chilquinta and Chilcesta.

The initial uncertainty that existed among the investors with respect to the final results of the privatization process is reflected in the path shown by these indexes. Initially the indexes show some cautious growth of values of stock prices with respect to the book value of the shares of the utilities. But, after 1990, and when the new political authorities, after the military government, validated the privatization process, the increased confidence by investors pushed stock prices up.

Changes in stock prices were supported by the attractive rents of the industry, where for the 1992–1995 period and for the selected group of firms an annual simple average rate of return of 14% is obtained (Figure 2). Notwithstanding, and with the incorporation of natural gas, these returns are expected to decrease as competition increases when natural gas fueled generators come into operation.

Results at the consumer level

How has the privatization process and the increased competition in the industry affected the final consumers? A good measure of the effects that the changes have had on the final consumers is given by what has happened to electricity prices. Figure 3 provides energy prices for the 3 different markets where Gencos can sell their energy: at marginal spot prices in the pool for transfers among Gencos, at nodal regulated prices for small customers served by the Discos (calculated by regulator based on mid-term projection of short term marginal costs), and at unregulated prices for large customers (customers with consumption above 2 MW). Since the SIC is mostly an hydroelectric system, prices mainly reflect the presence or absence of a dry season in the country. Figure 3 shows that the late 1980s and early 1990s are marked by a dry season that pushed energy prices for all the markets up.

Interestingly enough, it should be noticed that in the 1990s, on average, the spot prices have consistently been below the nodal prices and these last ones below the unregulated prices.

Notwithstanding the increasing consumption of electricity, the increased competition and the development of additional generation and transmission capacity in the 1990s have prevented an increase in electricity prices.

The main success of the Chilean pricing system has been that it has been sufficiently attractive so that the

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**Table 5. Stock price versus book value index (Bernstein, 1995)**

<table>
<thead>
<tr>
<th></th>
<th>Endesa</th>
<th>Chilgener</th>
<th>Chilquinta</th>
<th>Chilcesta</th>
</tr>
</thead>
<tbody>
<tr>
<td>1988</td>
<td>0.20</td>
<td>0.23</td>
<td>0.55</td>
<td>0.54</td>
</tr>
<tr>
<td>1989</td>
<td>0.37</td>
<td>0.52</td>
<td>0.78</td>
<td>0.89</td>
</tr>
<tr>
<td>1990</td>
<td>0.45</td>
<td>0.37</td>
<td>2.05</td>
<td>1.34</td>
</tr>
<tr>
<td>1991</td>
<td>1.58</td>
<td>0.27</td>
<td>2.09</td>
<td>2.05</td>
</tr>
<tr>
<td>1992</td>
<td>1.45</td>
<td>0.99</td>
<td>2.24</td>
<td>2.15</td>
</tr>
<tr>
<td>1993</td>
<td>1.86</td>
<td>1.47</td>
<td>3.54</td>
<td>3.89</td>
</tr>
<tr>
<td>1994</td>
<td>2.75</td>
<td>1.65</td>
<td>2.56</td>
<td>3.92</td>
</tr>
<tr>
<td>June 1995</td>
<td>1.96</td>
<td>1.22</td>
<td>2.26</td>
<td>5.20</td>
</tr>
</tbody>
</table>

**Table 6. Stock price versus earnings index (Bernstein, 1995)**

<table>
<thead>
<tr>
<th></th>
<th>Endesa</th>
<th>Chilgener</th>
<th>Chilquinta</th>
<th>Chilcesta</th>
</tr>
</thead>
<tbody>
<tr>
<td>1988</td>
<td>2.50</td>
<td>2.79</td>
<td>4.50</td>
<td>7.60</td>
</tr>
<tr>
<td>1989</td>
<td>5.30</td>
<td>4.00</td>
<td>4.20</td>
<td>4.80</td>
</tr>
<tr>
<td>1990</td>
<td>7.10</td>
<td>4.20</td>
<td>11.10</td>
<td>6.70</td>
</tr>
<tr>
<td>1993</td>
<td>17.73</td>
<td>18.94</td>
<td>24.35</td>
<td>27.47</td>
</tr>
<tr>
<td>1994</td>
<td>18.79</td>
<td>20.60</td>
<td>33.10</td>
<td>22.76</td>
</tr>
<tr>
<td>June 1995</td>
<td>22.24</td>
<td>11.01</td>
<td>35.73</td>
<td>17.02</td>
</tr>
</tbody>
</table>
required generation investment has taken place without
government intervention.

Changes to the Chilean model

The regulator has been concerned with some limitations
on the existing regulations and has for some years been
assessing changes, particularly on the transmission open
access ruling. However, the strong private companies
operating in the sector have challenged any changes to
the status quo. These companies have been strengthened
even further by successful investments in the electricity
sector in Argentina, Brazil, Colombia and Peru, which
have transformed them in energy multinationals. This
strong lobbying, coupled with weak regulatory institu-
tions, has delayed any modifications.

Some of the changes related to open access that have
been explored are: a regulated definition of the Genco
area of influence in the network, an improvement of the
mechanism to set access charges for the distribution and
the subtransmission networks, quality of service defini-
tions for every stage of the electricity chain, a reduction
in the 2000 kW limit for unregulated customers, changes
in the operation of the pool, the promotion of a more
active market for energy contracts.

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