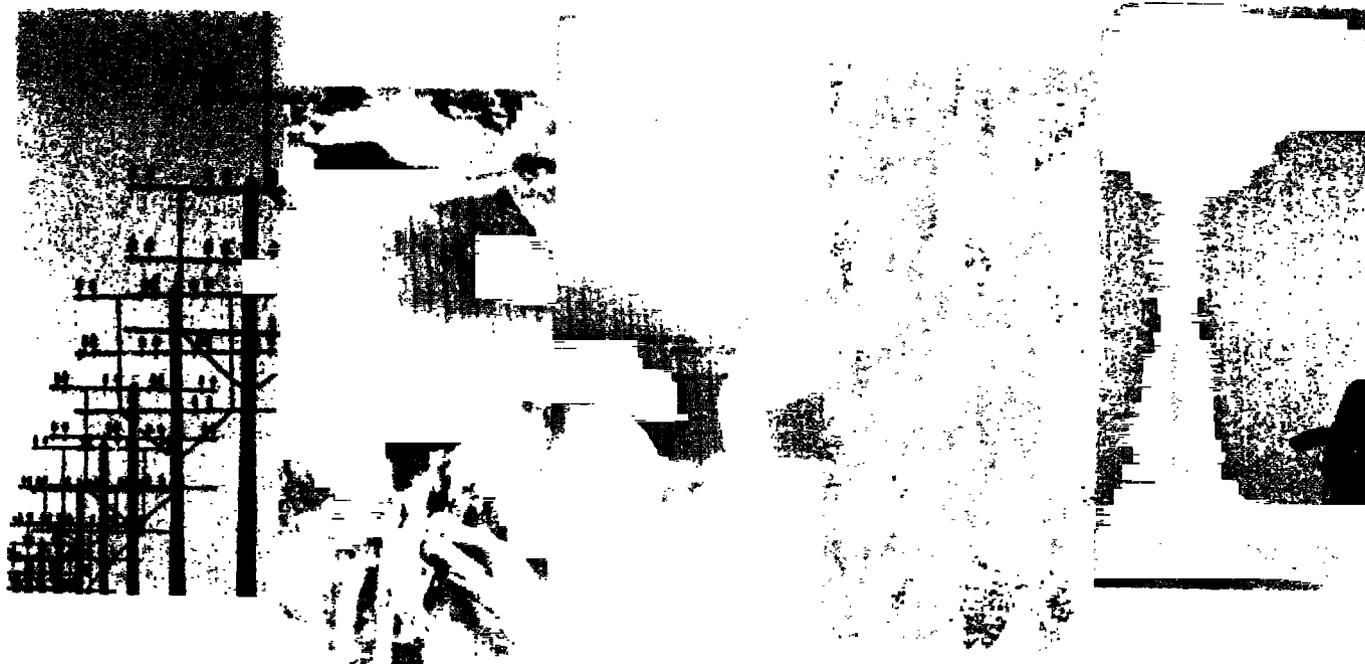


ESMAP TECHNICAL PAPER

016

*Regional Electricity Markets Interconnections —Phase I
Identification of Issues for the Development of Regional
Power Markets in South America*

23875



Energy

Sector

Management

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December 2001



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Regional Electricity Markets Interconnections
Phase I
Identification of Issues for the Development of
Regional Power Markets in South America

December 2001

**Joint UNDP/World Bank Energy Sector Management Assistance Programme
(ESMAP)**

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Purpose

1. This report is the result of Phase I of the CIER03 Project. It analyses current restrictions to the efficient development of interconnections and international power trade amongst the countries of the South American region. In particular, restrictions arising from technical, operational and commercial standards and from existing regulations are reviewed. Phase II of CIER03 Project, currently under execution, is expected to provide a set of options aimed at removing such restrictions to permit the establishment of a competitive regional power market. This report covers the following ten countries: Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, Paraguay, Peru, Uruguay, and Venezuela.

2. The review focuses on institutional and technical issues. Institutional issues include policies, and regulations governing electricity trading between two or more countries. The technical issues are related to standardization of regulations, to rules and procedures to ensure service reliability and to the efficient and safe development of interconnections.

Regional Electricity Markets In South America Phase I

Identification of Issues for the Development of Regional Power Markets

Executive Summary

Purpose

- i. This report presents the conclusions of Phase I of a study (CIER03) commissioned by the Regional Power Integration Commission (*Comisión de Integración Eléctrica Regional -CIER*), in cooperation with the World Bank's Energy Sector Management Assistance Program (ESMAP) and the United States Department of Energy (US DOE). The study aims at providing recommendations on how to foster further development of regional interconnections in South America. The CIER03 study is an integral part of a series of projects that CIER is currently working on; which are aimed at supporting regional electric integration.
- ii. The trust for carrying out the CIER03 study is that interconnections could be further developed. As the private sector participation in the South American energy market is predominant, the analytical framework and proposals are focused on the necessary requirements that interconnections must meet to be implemented by private developers. Consequently, it is assumed that incentives to increase international power trade should be given mostly through economic signals.
- iii. The report follows up on a study (CIER02; Wholesale Markets and Interconnections Project) carried out recently by the Regional Power Integration Commission (*Comisión de Integración Eléctrica Regional -CIER*) that estimated the potential benefits of regional interconnections. These benefits come from optimized loading of units, export of hydro energy that would not be dispatched in an isolated system --particularly in years of high hydrological conditions--, global optimization of reservoirs' regulating capacity, and capacity reserve sharing. The interconnection benefits were established by evaluating the difference of the aggregated operational costs of the systems when each country operates independently and when they are integrated over selected power corridors.
- iv. The CIER02 study concluded that potential cost savings in most of the cases exceed the cost of realizing the interconnections. Cost savings --from energy generation only-- would cover the annuity of investments of a 2,300 Km line connecting Argentina and Brazil, an 11,000 Km line connecting Peru, Ecuador, Colombia and Venezuela, a 2,200 Km. line connecting Brazil and Uruguay and a 2,100 Km. line connecting Chile and Peru. The construction of these lines would permit the establishment of three power corridors: (i) the Andean sub-system, with a 1000 MW capacity interconnection between Colombia and Venezuela and a 400 MW capacity interconnection between Colombia and Ecuador and Ecuador and Peru; (ii) the Southern Cone sub-system with a 4,000

- MW capacity interconnection between Brazil and Argentina or, alternatively, a 500 MW capacity interconnection between Brazil and Uruguay, and (iii) the Chile–Peru 200 MW capacity corridor, which would allow for the interconnection of these two countries.
- v. The materialization of interconnection requires compliance with some prerequisites on contractual, economic and regulatory matters that are not still in place in the South American Region. To facilitate discussions that could foster a higher degree of energy interchange and trade in the region, CIER, in cooperation with the World Bank’s Energy Sector Management Assistance Program (ESMAP) and the United States Department of Energy (USDOE), commissioned the CIER03 study. This study is aimed at the identification, comparison and critical analysis of technical, institutional and regulatory issues that restrict further development of regional interconnections. The study covered the following ten countries: Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, Paraguay, Peru, Uruguay, and Venezuela.
 - vi. This report covers Phase I of CIER03 and deals with the identification of barriers to international interconnections and trade. Phase II of CIER03, currently under execution, will propose measures and implementation models to overcome such barriers.

Requisites for the Development of Electricity Markets

- vii. The establishment of a Regional Energy Market would allow for (i) an increasingly efficient supply to meet the regional demand; (ii) development of larger scale projects; (iii) increased competition; (iv) increased market liquidity; and (v) reduced power supply risks. The result would benefit all consumers in the region by lowering prices and improving power supply quality and safety and would eventually result in a reduced environmental impact due to power development.
- viii. The efficient development of regional markets requires that the national markets involved in interconnections abide to sound market rules. They should: (i) provide open, non-discriminatory access to transmission grids and allow for international exchanges; (ii) provide for economic dispatch including any additional supply and demand from international interconnections; (iv) observe safety and quality of service criteria agreed upon under interconnection agreements; (v) provide access to pertinent data, and (vii) ensure legal compliance with agreements.
- ix. To ensure a sound legal and regulatory framework for operating international interconnections, international agreements would be required to ensure compliance with the above-mentioned conditions. Then, and only then, private investors could be interested in the development of interconnections at their own risk, provided they can retain an adequate portion of the cost savings that interconnections would provide.

Incentives to promote international interconnections

- x. A higher degree of private sector participation in transmission expansions and interconnections, with investors assuming full responsibility for system operations and efficiency, requires strong economic signals through adequate market prices. These signals should be clearly established during the planning and implementation process of the interconnection. If prices on both sides of the interconnection correctly reflect the costs of products to be traded --such as energy, capacity, transmission services and ancillary services--, decisions by investors participating in the market should be consistent with estimates made during the planning stage and will they be willing to invest. If prices depart from costs, potential investors may shy away and the benefits of the interconnection would not be fully realized.
- xi. Profitability of interconnections may vary over time. Initially, when there are sizeable differences in the long-term marginal costs between the two systems, the profitability of the interconnection could be limited to the capture of the cost differences between both markets. If no common market is in place and, consequently, links are weak, investors will seek bilateral agreements that would reduce their market risks and would secure the recovery of their investments. At this stage, a good incentive for expansions is simply the avoidance of any regulatory restrictions on the execution of contracts, such as minimums for firm transmission capacity, surcharges or fees imposed on supply contracts or penalties for supply interruptions.
- xii. Once interconnections have been in operation for some time and a reliable common market is established, interconnections contracts gain complexity and drain additional benefits from transactions based on opportunity, quality and provision of ancillary services. Even if long-term marginal costs are similar in both systems, interconnection expansions may be profitable on the basis of system complementarities and structural asymmetries. At this stage, or whenever interconnections are not feasible on the basis of bilateral contracts only, it is necessary to ensure fair remuneration for available capacity and for the provision of ancillary services and to avoid the imposition of any additional costs on transactions.

Signals received by potential investors in the countries studied

- xiii. As shown in this report, a review of existing market models and the regulatory rules prevailing in the countries in the region shows uneven rules for energy trade and some important shortcomings that constitute barriers for the materialization of interconnections or uncertainties for the potential investor. The most relevant of these shortcomings are summarized below.

Argentina — The inadequate remuneration of the transmission system, the lack of real application of rules for firm capacity transport, and the limitations to extending such rules to opportunity exchanges are factors that discourage the consolidation of interconnections. An adequate level of standardization on reliability levels has not been achieved yet.

Bolivia — The national transmission service’s rate structure –that allocates charges on the basis of use by a “postage stamp” charge-- may introduce restrictions to optimizing interconnections. Besides, rates for the use of transmission lines outside the Trunk Interconnection System, to export electricity, must be negotiated between the exporter and the transmission company, which introduces a differentiated system between national and international trade that does not necessarily reflect costs. Further development is necessary to establish consistent standards on reliability levels.

Brazil— The following limitations were identified: (i) firm export commitments are subject to eventual rationing based on energy availability, (ii) there are still no rules in place for capacity payments, and (iii) remuneration for provision of ancillary services has not been defined for international transaction. The following features of the design of the transmission service should be reviewed: (i) payment of a portion of the transmission service as “postage stamp” charges, (ii) payment of export transportation charges on the basis of maximum requirement, and (iii) exclusive use and the need to negotiate free access assigned to international interconnections. The Brazilian system has not reached a standardization level on reliability levels that would be suitable to market requirements.

Chile— The use of transmission networks based on agreements between parties and arbitration --if no agreement is reached-- hinders the performance of efficient interconnections. Allocation of curtailments in proportion to demand, the lack of definition of the commercialization function (as a separate function from distribution) and the lack of a long-term definition for capacity payments, may be perceived as discouraging elements by investors, particularly for two-way exchanges. Chile has made no significant progress in defining: (i) service reliability – such as operational rules, controls, etc.– that would define a certifiable quality standard, and (ii) ancillary services remuneration.

Colombia— Firm contracts are subject to: (i) planned curtailments in case of energy shortages for contracts with duration of five years or longer, and (ii) interruptions under rationing conditions for firm contracts for terms shorter than five years. Some elements of the current regulations for transmission services should be reviewed in the context of a regional integration framework, such as the “postage stamp” charge paid by the recipient and the requirement that terms of international interconnections are to be negotiated between the parties. Colombia has not reached the required standardization level with regard to quality of service standards.

Ecuador— Trading is restricted because the commercialization function has not been defined and generators are prevented from contracting in excess of their firm power. The regulatory approach towards energy exports is likely to be rather restrictive, they tend to discriminate between domestic and foreign demands and surpluses may only be exported once the domestic demand has been fully met.

Paraguay — There is no bulk supply market in this country and any interconnection agreements must be agreed upon with ANDE. No clear rules for negotiating such contracts exist.

Peru — Regulations for energy export and import are not clearly defined. Peru has not reached a suitable international standardization degree regarding system reliability.

Uruguay — Uruguay has not developed a power market and, consequently, any new interconnections must be negotiated with UTE. Current rules seem to indicate that importers or exporters with firm power contracts must pay for the maximum capacity contracted within the next twelve months. Such signals would discourage the opportunity use of transmission facilities.

Venezuela — Though Venezuela issued recently a new electricity law; the country has not implemented yet the market model. The potential development of interconnections could be reviewed only once the respective regulations are issued.

Restrictions to the efficient development of international interconnections

- xiv. The review summarized in this report shows that the development of regional trade is currently seriously limited in terms of scope and efficiency due to the following factors: (i) economic signals not always encourage the efficient use of available capacity, (ii) spot, opportunity and occasional transfers are restricted by market rules; (iii) ancillary services are not shared (iv) quality standards do neither meet standardization requirements nor allow for an adequate payment of quality transfer; (v) gas and electricity pricing policies introduce inefficiencies in the energy system, and (vi) there are no reciprocity policies among the countries for the treatment of power exports and imports. Furthermore, in the Northern area, current international agreements do not allow for interconnections of the “Single Market” type.

Action Plan

- xv. A vital requisite for the removal of current restrictions to interconnections in the region is the preparation of an action plan with the clear long-term goal of establishing a regional energy market that would follow the same policies and rules the national markets follow. This would require a detailed work carried out with due coordination and a regional perspective and focused on the regulations of each national market and in the interconnection agreements.
- xvi. The eventual implementation of an agreement along the lines of the Mercosur agreement could certainly facilitate the implementation of some interconnections whose economic viability has been demonstrated. A regional market organized under simple and consistent rules would not only strengthen exchanges as a result of a better organization but it would also create a regional environment encouraging the reduction of inter-countries inefficiencies and asymmetries and promoting regional trade.

- xvii. As it has been widely proven, an efficient and sustainable national market requires: (i) vertical disaggregation to promote competition and secure transmission independence, (ii) clear and transparent regulations for energy transmissions and transactions, (iii) capable institutions securing system reliability and effective administration of the bulk supply market, and (iv) a suitable information system. This experience may be fully transferred to the regional level: maximum efficiency will only be attained when a regional market, meeting the organization guidelines established for national markets, is created.
- xviii. Similarly, if regional interconnections are to be developed by private investors, the regional market should abide to the following rules: (i) the regional trading model should be a market model, (ii) regional institutions are to be lean and non-intrusive, and (iii) regional regulations should be clear and transparent and should be applied by a capable and reliable institution.
- xix. Reliability is an important element for market development. As reliability criteria within each country will be different it will be necessary to develop – and agree on—a set of regional product quality criteria and clear evaluation procedures allowing for the costs of deviation from agreed standards to be evaluated and their values made part of the financial transactions.

Next steps

- xx. This report also defines tasks for Phase II. Aiming at the creation of a regional market with two sub-markets at different levels (the Northern sub-market and the Mercosur sub-market), under Phase II, the following tasks will be performed:
 - Task 1: Regional electricity market. Conceptual design.
 - Task 2: Regional electricity market. Development plan
 - Task 3: Regional transmission system
 - Task 4: Quality and reliability standardization.

The scope of each of these tasks is summarized in section VIII.

1

Introduction

Although some South American countries are moving towards an electrical integration -- mostly to share hydroelectric resources and to export gas-based generation-- power trading in the region is limited with regard to available opportunities. The long distances involved, weaknesses of the national grids and the energy strategies that rely on self-sufficiency are obstacles that have so far prevented a greater degree of integration.

Electric integration in the region would bring substantial benefits to the consumers in terms of savings in energy bills and improved reliability and quality of service. These benefits would come from:

- Improvements in investment and operational efficiencies that result from the diversity in demand and resources for generation.
- Economies of scale and better operation of large projects conceived at a regional scale.
- Larger markets with greater competition that would better attract private investors' participation.
- Mitigation of the risks assumed by private investors.
- Reduction of environmental impact of developing generation resulting from a better usage of energy sources and generation plant siting.

Most countries in the region have introduced significant regulatory and institutional changes during the last decade and great progress has been made in the privatization of state-owned enterprises. The countries that have liberalized their sectors expect that the private sector will provide investments for interconnections. To achieve this end, a sound design of the commercial and technical regulations is needed to ensure that signals given to private investors are clear, that there are sufficient incentives to foster efficient integrations, and to ensure consumer protection.

There are still countries in the region where the development of the power sector continues to be centrally planned and where any decisions regarding interconnection expansions must be done by the state or by state-owned utilities. Even in such cases a sound evaluation of the important benefits interconnections provide should be sufficient to encourage the governments to develop the required infrastructure.

A particular issue to be dealt with in the context of interconnections is what levels of system reliability are compatible with international trade of energy products, and how to value deviations from internationally agreed levels. When power development was centrally planned this issue used to be exclusively a technical problem that was addressed by establishing minimum performance standards. In the presence of private investors, service reliability must be seen as a source of business opportunities, which should be encouraged with proper economic signals, suitable regulations and a clear product definition. Thus, the reliability of the system within each country should be predictable and the cost of any deviations from a reference value should be properly evaluated.

2

The Wholesale Markets and Interconnections Project (Cier 02 Study)

The main conclusions of the CIER02 Project are presented in Annex 1 and summarized as follow:

- Latin American interconnections would result in substantial increase of operational efficiency.
- Potential operational savings come from:
 - Hydroelectric complementarity among countries with different hydrological regimes, that allows for water spillage reduction and storage optimization.
 - Hydrothermal complementarity among national systems, that reduces hydrological risks and provides the possibility to take advantage of fuels availability and costs, mostly gas.
 - Complementarity of peak demand timing, due to load chart differences among the various systems and seasonal variability.
- The estimated cost reductions of integrated system operations exceed the costs of building transmission facilities.
- Interconnections that would realize such savings are:
 - Andean Pact: Peru, Ecuador, Colombia and Venezuela (mostly exports from Venezuela and Peru to Colombia and Ecuador).
 - Mercosur group, particularly Argentina-Brazil, Argentina-Uruguay and Brazil-Uruguay (secondary energy exports from Brazil and thermal power exports from Argentina and Uruguay, in periods of low hydroelectric production in Brazil).
 - Chile-Peru (exports from Chile to Peru).
 - Chile-Argentina (exports from Argentina to Chile).
 - Bolivia-Brazil (exports from Bolivia to Brazil).
- Reduction of operating cost resulting from an integrated operation, as compared to each country isolated operation, would be:

- Argentina-Brazil: US\$ 652.9 million/year
 - Perú-Ecuador-Colombia-Venezuela: US\$ 310.6 million/year
 - Brazil- Uruguay: US\$ 63.1 million/year
 - Chile- Peru: US\$ 60.5 million/year
- The above benefits could only be materialized if there is an international agreement to share energy resources. Any restrictions to energy interchanges would result in reductions of the overall benefits to the region.
 - If a full integration level could not be achieved, then regulatory measures would be required to impose limits in the interchanges and define revenue allocations. However, in the absence of the necessary degree of political commitment, regulatory tools would not be able to make the market work.

3

Impact of Interconnections on the Involved Countries

Electric interconnections between two countries will have an impact on prices and in price volatility in both countries. A detailed analysis of these issues is presented in Annex 2 and summarized below.

Impact on Prices

Short term effects

The benefits attained in the short term come from the difference between the marginal costs of both systems. For the importing system benefits are the difference between the benefits attained by the users (for the reduction of the marginal costs as a result of importing lower cost generation) less the losses incurred by local generators (which is given by the loss of profit associated to the marginal price less cost savings by the reduction in the local generation level). Accordingly, the net balance on the importing system is made up by a reduction in the generators' profits and an appropriation of interconnection benefits by domestic users.

In an exporting system, domestic prices will increase to reach the new marginal cost of the system corresponding to the new overall demand (domestic plus exports), and domestic users will suffer a loss. Generators' profits result from the marginal cost increase less the production cost. In the short run, a positive net balance for both systems may be obtained; however, the distribution of income may be inefficient in the long run and have a negative impact on consumers.

Long-term effects

Exchange effects in the long run are associated to the degree of system integration and to the availability of resources. If there is a full integration between two markets in terms of security of supply and free interchange based on price only between systems, a single, marginal cost could be reached in the long run provided no differences are introduced by transmission costs. In such a case, the long run marginal cost would be reduced as a result of operative efficiency gains and the use of investments resulting from integration.

If integration does not provide for the unrestricted sharing of integrated resources, then only eventual power exchanges can take place. Any international demand for the exporting country is short-term, and it is neither firm nor a permanent demand in the medium or long run. As this demand is not included as a permanent demand in the market of an exporting country, it becomes a demand for surpluses. If the transactions in the exporting country are based on prices that include the external demand, the real expansion requirements of the exporting country may be distorted as such market would increase its production capacity (as a response to price signals) based on a demand that might disappear in absence of long term commitments.

Impact on Volatility

Spot price volatility results from demand and supply fluctuations in the different national systems, including the effect of interconnections. Volatility may be very high in intensive hydroelectric systems with short-term price determinations. The main effect on interconnections on price volatility is that countries facing higher volatility induce higher volatility in the countries they become interconnected with. Under such circumstances, appropriate regulations are needed to shields volatility effect on supply and demand for instance by controlled pricing of hydraulic resources and by the obligation to execute long-term agreements.

4

Electricity Markets and International Interconnections

Requisites to Attract Developers.

Interconnections can be developed by the private sector, at its own risk provided they can retain an adequate portion of the revenues such interconnections would produce. To ensure that private investors will participate, benefits should be duly assessed and established in long-term contractual agreements.

The development of regional markets within an integrated market framework requires that national markets comply with certain minimum requisites, such as:

- Authorize international exchanges and promote efficiency: The electricity sector organization and trading model in the country should be open to international exchanges and permit power purchases and sales among utilities located in different countries. Furthermore, they should encourage operational efficiency to promote purchases of the least-cost electricity available, regardless its origin.
- Non-discrimination and reciprocity: Purchases and sales should be non-discriminatory. Any necessary restrictions to regional transactions should be based only on previously agreed quality and safety standards.
- Due execution of contracts: Contracts should be administered as firm commitments with execution priority. Accordingly, commitments resulting from free agreements between an agent in a country and a utility in another country should be honored in both countries.
- Compliance with general reliability standards agreed upon in interconnection agreements: Technical standards and procedures to define performance values (voltage, frequency, etc.) should be set forth, together with operation coordination regulations. Criteria for compliance as well as procedures for compulsory observance should be clearly defined.
- Open access to transmission: An open access to the available transmission capacity should be provided. Every country should have a transparent, objective and non-discriminatory method to determine tolls according to the economic costs, which

should allow for power resulting from international transactions to flow between generation and consumption centers.

- Open access to information: Access to relevant data related to the system (features and restrictions) and to the market must be secured by the regulations.
- Respect to compliance with legal framework: Long-term investments by private investors require a sound business environment whereby regulatory risks are mitigated by ensuring that rules will be respected by all parties. Rulings by the regulatory authority in charge of operation and business transactions should be credible, transparent, and efficient and should provide observance of the regulations spelled out in the legal agreements.

Additionally, agreements between countries should comply with certain regulatory, institutional and implementation requirements, as follow:

- Methodologies for interconnection expansion should be consistent with regulatory signals. If the realization of interconnections is expected to depend on the market forces, the due appropriation of benefits and freedom for transactions should be provided.
- Ancillary services should allow for the use of equipment available in the different countries, optimizing the use of equipment with a regional perspective.
- Security of collections. An efficient market requires certainty in the operation of the export and import payment and collection chain. Regulations should provide for the necessary securities of payments and collections. Import or export taxes may hinder the efficient development of an integrated market, and thus they should be avoided to the maximum extent.
- Dispatch simulation should be predictable: Investors should be able to simulate system behavior to be able to project their cash flows. Models representing an integrated system should be reasonably accurate and should foresee prices, expected behaviors of agents.
- Ensure coordination. The necessary measuring and communications systems to manage exchanges coordinate interconnection and maintain operation within the safety and quality standards that have been agreed upon should be provided.

Supply Reliability and Safety Requirements

In many South American electric systems, system performance criteria are neither specified nor observed and, consequently, preservation of the electric system quality and reliability cannot be secured. International trade suffers similar shortcomings. Though service reliability and quality in a system could improve due to the contribution made by the other system to cope with emergency or temporary conditions (trading quality), lack of quality and reliability agreements has caused interconnections to operate in sub-optimal conditions.

To strengthen the development of interconnections, both the necessary reliability standards and the rates for the transactions of products should be agreed upon. Additionally operational

guidelines to define performance of quality parameters such as voltage, frequency, etc. and rules to coordinate operations should be agreed upon to secure observance of the criteria.

In the implementation phase the following aspects need careful consideration:

- Selection of cost-efficient parameters to define system performance on the basis of economic benefits of increased quality versus the cost of providing the quality.
- Consumer willingness to pay for a given service quality in different countries may be different. The settlement of the cost of traded quality needs the establishment of, and agreement on, values applicable to traded quality and on the operational rules to settle the economic values¹.
- Cost of reaching agreed upon reliability levels should take into account short-term actions (usually deviations from the purely “order of merit” dispatch to compensate for transmission shortcomings), and long-term actions (investments to improve system reliability).
- A set of regulations and control policies is required to secure consistency of requirements from the different players. Such regulations must take into account the history and behavior of the different markets.

¹ Assessments based only on the costs of non-supplied energy as it is established by the regulations in some of the countries in the region do not necessarily compensate the costs incurred to support reliability during short-term disturbances.

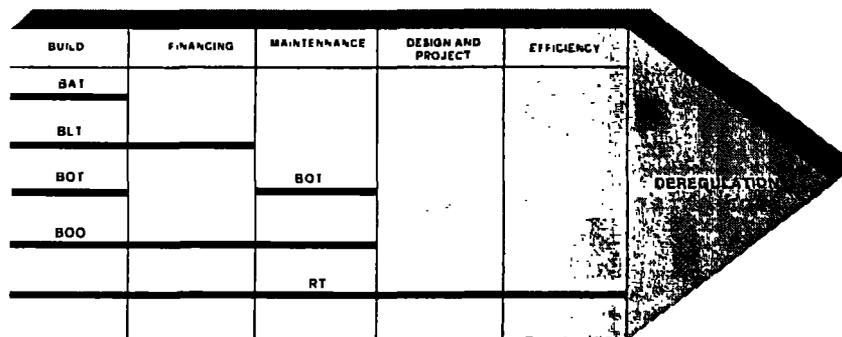
5

Incentives to Build International Interconnections

This section discusses options for private sector participation in international interconnections and the conditions for their realization.

Options for Private Sector Participation

The available options for private agents in transmission system expansions are represented in the graph (from a lower to a higher degree of deregulation) and detailed below:



- **BAT (Build and Transfer):** Contract to build transmission facilities and transfer them to a power transportation utility.
- **BLT (Build, Lease, Transfer):** Contract to build transmission facilities, lease them during the contract life and transfer them to a power transportation utility.
- **BOT (Build, Operate, Transfer):** Contract to build transmission facilities, operate them during the contract life and transfer them to a power transportation utility.
- **BOO (Build, Operate, Own):** Contract to build transmission facilities, operate them during the contract life and keep the property of such facilities after contract termination.
- **RT (Risk Transfer):** Investor decides his transmission investment according to the tolls he expects to collect or according to executed power supply contracts. It resembles a BOO but construction is made at investor's risk and not under a contract.

The degree of private sector participation depends of the sector institutional setup and regulatory framework, the corporate arrangements for transmission and the type of economic signal induced in the sector. The lower degree of participation for the private sector, such as the BAT scheme are generally associated to monopolistic transmission utilities under centralized planning whereas larger participation schemes are associated to more liberal systems where the State only plays a regulation and control role.

The creation of competitive power markets impacted also the transmission segment of the power industry. Increasingly willing to take risks, the private sector developed new participatory schemes. For instance Argentina, Peru, Colombia and Brazil choose the BOO scheme for which transmission systems implemented by private developers include design, construction funding and operation.

Additional progress has been made whereby the investor takes full risk as it was done for interconnection investments in Argentina and Brazil. This scheme is similar to contractual arrangements in the gas market, where the investor is responsible not only for the construction, operation and funding of an expansion work but also for its economic efficiency. In fact, this is equivalent to a merchant power plants operating in a competitive market.

Interconnection planning and rate signals

Expansion of a power transport system should be considered in the context of sector planning because the functioning of a system is more than a mere addition of its elements. However, in practice overall system planning is not always possible because it is associated to an uncertain future, and it is subject to the often-unpredictable decisions of participating agents.

Centrally Planned interconnection

Unconstrained optimal interconnection expansion in a centrally planned integrated system is the result of a classical planning exercise aimed at minimizing the integrated total system development costs. The results of this exercise are: (i) the optimum system expansion of the various systems considered as an ensemble, and (ii) the benefits associated to the interconnection (by comparison with the cost of developing the various systems in an isolated way). However, even in centrally planned economies there may be restrictions to the efficient development of interconnections due to economic distortions such as: (i) lack of adequate bilateral agreements for interconnections, (ii) political decisions to keep certain levels of production within the national territory, or (iii) static or incomplete evaluation of their benefits. Given the major trend of the region towards private sector, the centrally planned interconnection model is gradually being abandoned and thus this report focuses rather in deregulated sectors.

Interconnections by risk investors

As interconnections have an impact on individual businesses within the various segments of the industry, their consequences should be predictable so as to permit a thorough evaluation of their effects in the different countries. In fact investors are no longer concerned on the characteristics of the physical system but first and overall on the prevailing business environment and second on the price signals they receive.

If prices on both sides correctly reflect costs of traded products (power, generation capacity, transmission and ancillary services), decisions of bidders should be consistent with those assumed at the planning stage. Otherwise, interconnections will be sub-optimal. Consequently, to assess whether or not interconnections are actually driven by market forces, economic signals, free access and participation in the market should be analyzed.

Products and services traded in an interconnection

Products and services traded and exchanged in interconnections are:

- **Energy:** Depending on the type of exchange, energy may be traded on a firm contract or on opportunity basis.
- **Capacity:** It is traded under medium or long term agreements (firm capacity agreements) in short term transactions or as cold reserve.
- **Ancillary services:** these services are associated with system operation, quality of service and reliability requirements.
- **Transmission services:** that are required to deliver the above-mentioned products or services.

Characteristics of international interconnections

Interconnection costs need to be recovered independently of its profitability, and consequently they may be assimilated to a capacity payment, that is usually secured through a bilateral firm power sales agreement. In an initial integration stage, generally aimed at capturing differences in long-run marginal costs between systems, interconnections may be based on agreements with a low flexibility level. To realize interconnections benefits, in this stage there must be no restrictions to the execution of firm contracts (such as application of charges additional to the supply agreement, interruptions of service induced by their parties, or failure to certify firm transmission capacity by the system operator).

Once the market becomes more reliable and predictable, interconnections may profit from opportunities offered by both markets, such as opportunity energy transactions and the sales of quality and ancillary services. Even if marginal long-term costs in both systems are close, complementarities and structural asymmetries may render interconnections very profitable. At this stage, firm bilateral agreements are not sufficient grounds for realizing interconnections benefits and it is necessary to any limitations to free trade such as: (i) inadequate recognition of capacity and/or ancillary services payments, and (ii) imposition of fees or any additional costs to exchanges.

Assessing initial incentives

The political framework each interconnection is inserted in must be considered when assessing incentives to build interconnections. In the region there are different degrees of integration that can be roughly classified within two frameworks: (i) “Integrated Market”, systems with full integration agreements, and (ii) “Partial Trade” agreements, whereby interchanges are limited to the execution of specific interchanges.

Integrated Markets. The Mercosur treaty fostered the realization of a power trade agreement that foresees a high degree of integration² and is a good example of a full integration of several systems (Argentina, Bolivia, Brazil, Chile, Paraguay, and Uruguay). The agreement provides for interconnections based on an integrated market and, consequently, as the supply and demand of a country is treated under the same terms and conditions as the supply and demand of a neighboring country, exchanges could be considered as long-term commitments.

The agreement is based on the following rules:

- To ensure competitive conditions of the power generation market, that should be free of subsidies, with prices reflecting efficient economic costs and avoiding discriminatory practices.
- Distributors, traders and large users should be allowed to freely contract their supply from any supplier in any member country.
- Ensuring the execution of purchase and sale contracts that have been freely agreed upon by electric power agents and ensure that no discriminatory restrictions on international trade are established.
- Ensuring that regulations governing an electricity market allow for the provision of supply reliability required by selling agents of another market, regardless of any requirements applicable in the supplying market.
- Allowing demand in a particular market to be met by least cost sources under economic load dispatches, including the supply of international power surpluses.
- Respecting non-discriminatory open access for available transmission and distribution capacity, including access to international interconnections.
- Observing power supply safety and quality as defined by the different markets for the operation of their domestic networks and systems.
- Securing an open access to information related to electric power systems, markets and transactions.

Partial Trade Agreements. The rest of the countries, in the region (Ecuador, Peru, Colombia and Venezuela), do not count with a general framework for international trade. They base their interchanges on specific agreements that take advantage from substantial differences in marginal costs and discriminate between short term and long term prices.

² “Memorandum of Understanding Concerning Power Exchanges and Electricity Integration”

6

Regional Signals to Investors

A comprehensive review of the current legislation and regulations in the ten countries analyzed shows an uneven situation with regard to regional interconnection incentives. Annex 3 presents a set of tables that compare the characteristics of the markets and factors that affect interconnections. Annex 4 presents a detailed review of most outstanding issues for each country and a polar representation of the situation with regard to incentives or disincentives for implementing interconnections. Interconnections incentives are evaluated considering the potential benefits of each of the following transactions that can be captured by the interconnection:

- Firm contracts
- Opportunity exchanges
- Emergency exchanges
- Ancillary services trade
- Quality transactions
- Power transit toll regulations
- Reliability

General Comparative Review

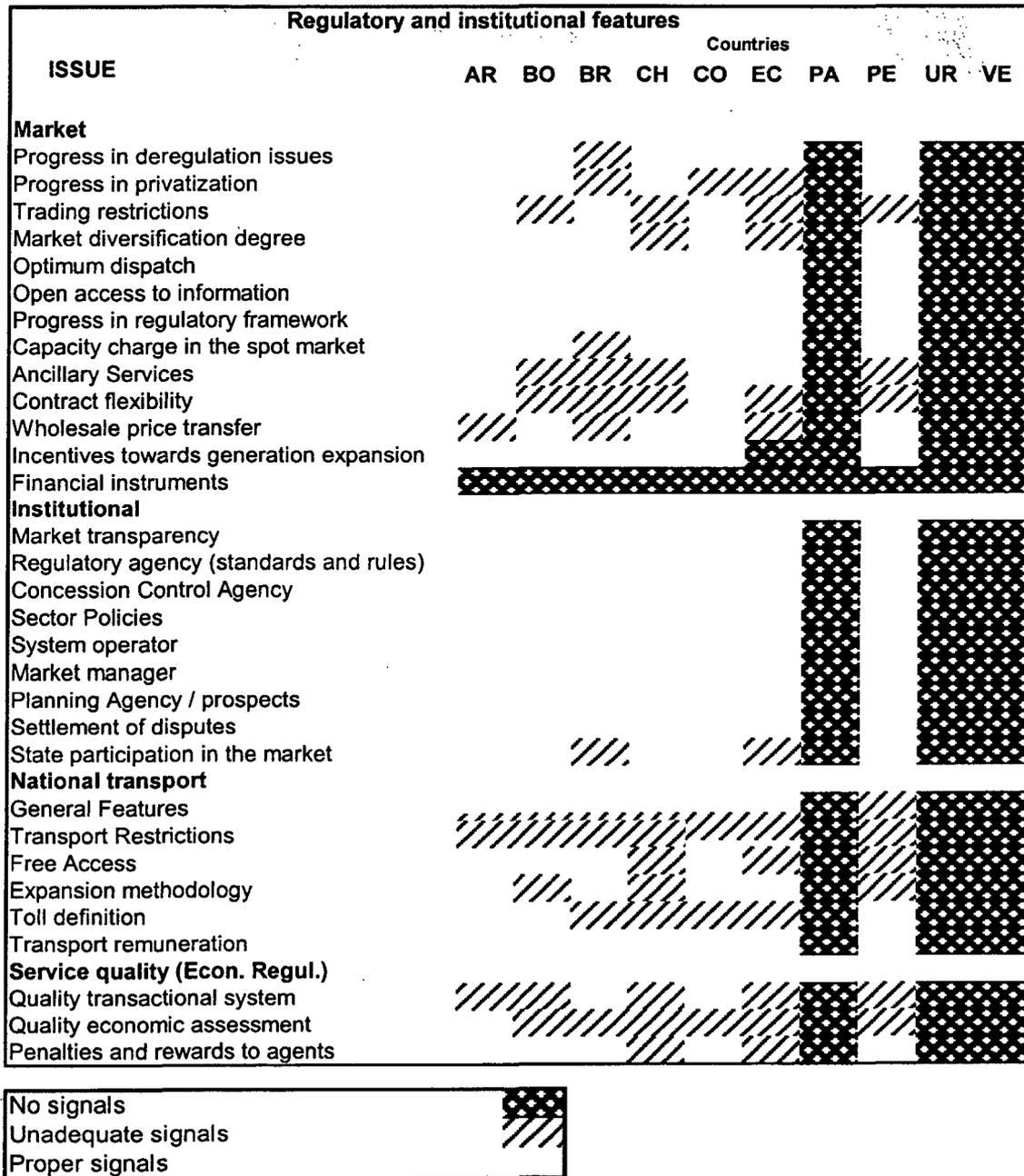
Some general characteristics of all national markets in the region introduce restrictions to the development of electric power regional exchanges. Problems that affect the whole region are the following:

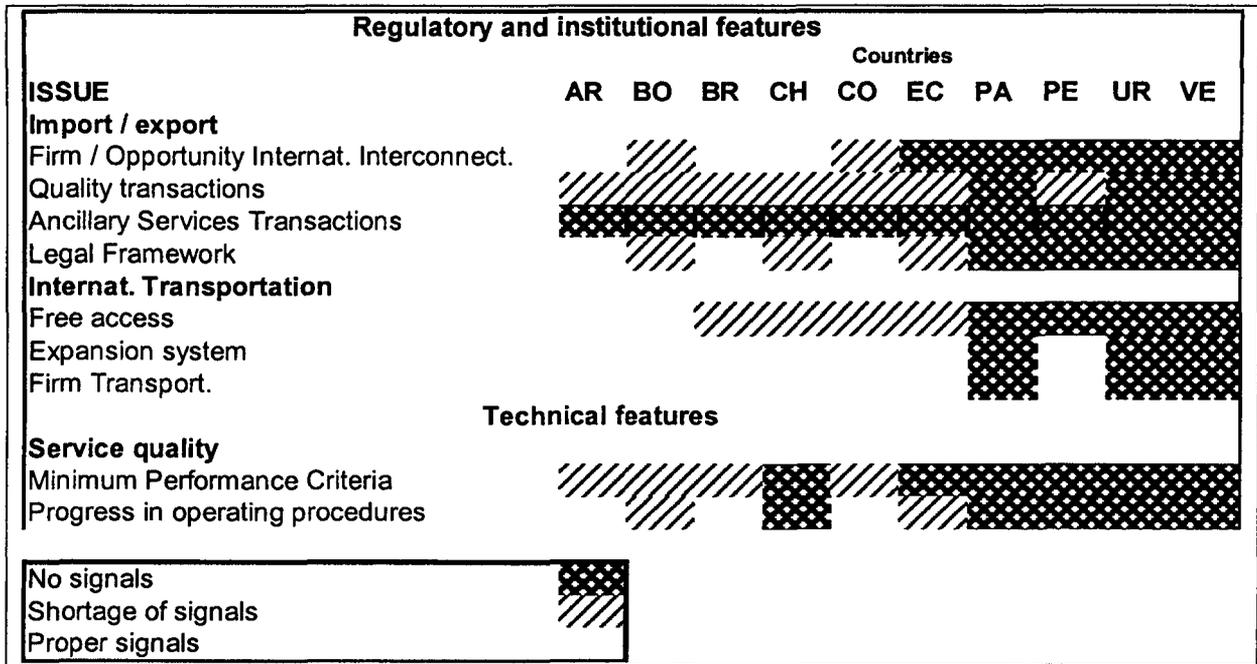
- Ancillary services are not shared.
- Economic signals not always encourage the efficient use of available power.
- Spot transfers are restricted.
- Standards for quality of service are not certified, which does not permit a proper evaluation of quality of service transfers amongst systems.
- Gas and hydroelectric power represent asymmetries that introduce inefficiencies in the system.

- There is no reciprocity among countries for the treatment of export-import transactions.

In addition there are problems that affect some of the countries. Interconnection agreements, whenever they exist, introduce additional restrictions because, in most cases, they were executed in the pre-reform era when the sector structure and the regulations were different. For instance, in the Northern Area of South America, the development of “Single Market” interconnections is not possible due to lack of adequate international agreements.

The following charts show the main characteristics of the different markets and their most noticeable disincentives.





Analysis of the Main Restrictions to Interconnections by Subject

The following charts show the main restrictions to interconnections by subject.

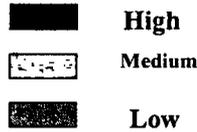
Restrictions to firm interconnections realized by private investors



High
 Medium
 Low

Country	REMARKS
ARGENTINA	The existing regulations include no specific provision about Transit requirements.
BOLIVIA	The national regulations include no specific provision about transit requirements. The need for an agreement between parties in international transportation represents a transit restriction.
BRASIL	Postage stamp charges and the exclusive use of international Interconnections represent a transit restriction.
CHILE	Transmission system use requires a previous negotiation between the Parties.
COLOMBIA	Payment of national transportation demand postage charges and the need for previous agreements between the parties in international transmission represent transit restrictions.
ECUADOR	Export restrictions and demand postage stamp tolls represent trading restrictions.
PARAGUAY	Agreement with ANDE.
PERU	No specific export and import regulations available.
URUGUAY	Agreement with UTE.
VENEZUELA	Agreement with owners.

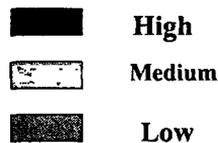
Restrictions to transit requirements



Country	COMMENTS
ARGENTINA	The existing regulation includes no specific provision about Traffic requirements.
BOLIVIA	The national regulation includes no specific provision about transit Requirements. The need for an agreement between parties in International transportation is a restraint to use in transit.
BRASIL	Postage stamp charges and the exclusive use of international Are a restraint to use in transit.
CHILE	Use of transmission system calls for a prior negotiation between the Parties..
COLOMBIA	Payment of postage charges for the demand and the need for an Agreement between the parties for international transportation Purposes, are a restraint to use in transit.
ECUADOR	Restraints to exports and postage stamp tolls for the demand are a restraint to marketing.
PARAGUAY	Agreement with ANDE.
PERU	No specific export and import regulation available.
URUGUAY	Agreement with UTE.
VENEZUELA	Agreement with owners.

Restrictions to opportunity transactions

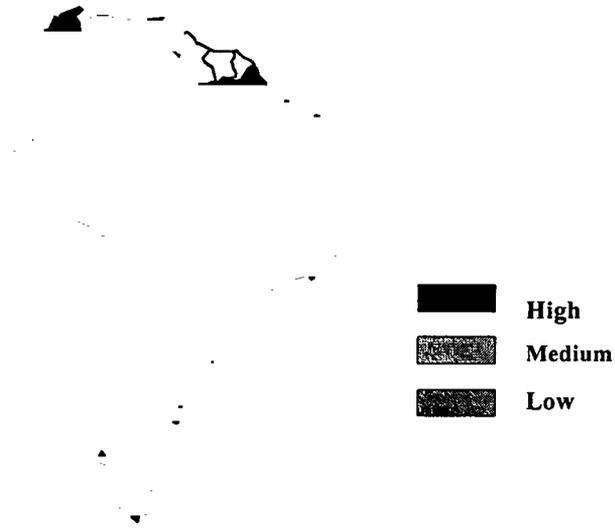
Whenever there is an established power market, bidding procedures and price calculation methods have adopted the characteristics of that particular market. This introduces a certain degree of restrictions for other countries with different characteristics. Besides, Ecuador and Colombia impose certain export restrictions.



Restrictions to ancillary services transactions

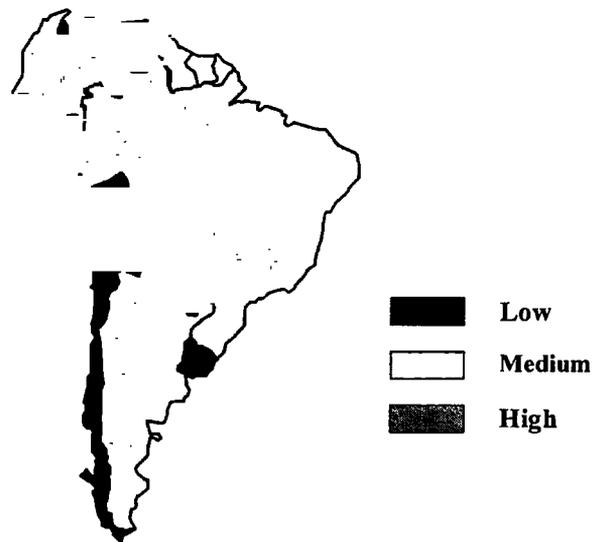
In general the region has no developed a clear and stable set of rules for the provision of ancillary services and their remuneration. In some countries provision of ancillary services have not been recognized as services that must be remunerated. In others countries there are no clear rules concerning obligations to provide the services. Finally rules for ancillary services in some countries are at a development stage (Brazil, Bolivia, Chile, Peru and

countries with no market). In no country in the region provision of international ancillary services are authorized.



Level of Certification of Quality of Service

There are no international quality transactions in the region and, in general, service quality in the countries has not reached the proper certification level. Additionally, in some countries -- Bolivia, Chile, Peru, Ecuador-- service quality level requires more precise definition.



7

Efficient Development of Regional Interconnections

This section proposes an implementation plan for the improvement of the current conditions under which energy trade is made in the region.

Scope for Improvement of Regional Power Supply

Power efficiency and reliability can be improved in the region if the following conditions can be met: (i) energy is dispatched on purely economic basis, regardless the country where production is installed, (ii) international trade is substantially strengthen, (iii) all obstacles to commercial development of interconnections are eliminated, and (iv) the region maintains systems reliability at technically feasible and economically sustainable levels.

Potential Benefits of Integrating the Markets

To meet the above conditions, the existing restrictions to interconnection should be eliminated through a detailed work that would make compatible the regulation of each market and interconnection agreements. An efficient regional market can be achieved under the same policies and guidelines that have encouraged the development of the markets of each country in the region. A Regional Energy Market (REM) would provide for: (i) a more efficient supply to meet the regional demand by better use of resources, (ii) possibility of development of large-scale projects, (iii) increased competition, (iv) increased market liquidity, (v) reduced supply risks, (vi) improved supply quality and reliability, and (vii) reduced environmental impact.

A Model for the Regional Market

A regional market organized under simple and stable rules would increase exchanges and would reduce inefficiencies. As indicated by the wide experience gained during the development of national markets, an efficient and sustainable market, requires: (i) a set of rules allowing for power transmission and transactions that would strengthen national markets and would respect investments made in such markets, (ii) credible institutions securing system reliability and market management, (iii) a sector structure which would foster competition and secure transmission independence, particularly by unbundling the segments of the industry (iv) an universal reliability level that would meet product quality criteria and allow for

deviation costs to be assessed and charged for, and (iv) an adequate data system. The work program for implementing the model is attached as Annex 4.

8

Conclusions and Recommendations

This report presents an evaluation of national policies and regulations of ten South American countries with regard to international interconnections and energy trade and evaluates up to what extent efficiency and reliability could be increased if a regional market is created. In general it concludes that current regulations should be adapted because they were developed for organizations oriented towards national markets with or without bilateral exchanges with neighboring countries.

The analysis describes the regulatory elements that are critical for the development of interconnections by the private sector. A difference was established between the situations prevailing in the Northern Area and in the Mercosur area on account of political agreements existing in the latter.

The report concludes that the elimination of barriers to international trade requires the establishment of a regional market that would, in turn, require changes to regulations, institutions and technical requirements in each country. The degree of changes needed varies upon the status of development of a real competitive market in the particular country.

The second phase of this work will aim at the development of the requisites for the creation of the international market and will comprise the following steps: (i) conceptual organization and regulatory principles, (ii) implementation plan, (iii) preparation of guidelines to establish a regional transmission network, (iv) preparation of guidelines for firm, opportunity, ancillary services and quality transactions, and (v) preparation of guidelines to achieve an upgraded regional quality certification degree.

Annex 1 — The Wholesale Markets and Interconnections Project (Cier02) and its Conclusions

CIER developed the Wholesale Markets and Interconnection project to evaluate the potential benefits that could be derived from interconnecting the electrical systems of the South American countries. The benefits were estimated as the difference between the operational costs of the systems when they function isolated and integrated. The operational costs were assessed by simulating the operations of the systems on selected power corridors over a period until 2010, the horizon year.

The main results and conclusions from CIER02 --that provide a reference framework for CIER03--, are as follows:

- Electricity demand in South America is expected to grow at a 4.7%, annual average cumulative rate in the period 1996/2010. Consumption would increase from 545 TWh in 1996 to 1030 TWh in 2010. An additional supply of 95 GW from new power plants will be required, with a hydroelectric share in the order of 68% of overall supply.
- There are operational potential savings in the region due to:
 - Hydroelectric complementarity among countries with different hydrological regimes, that allows for water spillage reduction and storage optimization.
 - Hydrothermal complementarity among national systems, that reduces hydrological risks and provides the possibility to take advantage of fuels availability and costs, mostly gas.
 - Complementarity of peak demand timing, due to load chart differences among the various systems and seasonal variability.
- Selected interconnections and resulting power flow directions were:
 - Andean Pact: Perú – Ecuador – Colombia - Venezuela: Mostly exports from Venezuela and Perú to Colombia and Ecuador.
 - Mercosur group, particularly Argentina – Brazil; Argentina - Uruguay; Brazil - Uruguay. Secondary power exports from Brazil and thermal power exports from Argentina and Uruguay, in periods of low hydraulic production in Brazil.
 - Chile – Peru: Exports from Chile to Peru.
 - Chile – Argentina: Exports from Argentina to Chile.
 - Bolivia – Brazil: Exports from Bolivia to Brazil.
- Operating cost reductions resulting from an integrated operation, as compared to isolated operation, were estimated for each group of systems under consideration. In every case, interconnection showed significantly favorable operating costs savings. The most significant annual average savings were:

- Argentina -Brazil: US\$ 652.9 million/year
- Perú- Ecuador- Colombia- Venezuela: US\$ 310.6 million/year
- Brazil- Uruguay: US\$ 63.1 million/year
- Chile- Peru: US\$ 60.5 million/year
- Natural gas, either with locally produced or imported, will be the most widely used fuel for power generation, mostly for gas fueled combined cycle power plants. Installed capacity in gas turbines (open cycle and combined cycle) would grow from 7.4% of overall installed capacity in 1996 (9025 MW) to 21.2% in 2010 (45993 MW). Such growth represents a 410% increase for the 1996/2010 period with a 12.3% annual growth rate.
- There are large potential savings in operating costs by increasing and reinforcing interconnections among the different national systems by developing the following interconnection corridors:
 - Andean Corridor, including Venezuela, Colombia, Ecuador and Peru (linking the Central Northern Peruvian system to the Ecuadorian system). Currently only Venezuela and Colombia are interconnected with exchange capacity limitations. In this corridor, operating costs savings would amount to 21% of the 2000 operating costs. To realize savings in the range of 25% of operating costs, transportation capacity should be increased to 1000 MW between Colombia and Venezuela and to 400 MW in Colombia – Ecuador and Ecuador – Peru interconnections during the next decade.
 - Chile – Peru Corridor, interconnecting the Southern Peruvian system to the Chilean Norte Grande system. A 200 MW transportation capacity between both systems would allow for a 12% reduction in joint operating costs for the year 2000, with savings in the order of US\$ 40/ year. Should the transportation capacity of this line be doubled, savings in operating costs would increase to US\$ 40 million by the year 2005 and to US\$ 60 million in 2010, i.e. 7% and 9% of total estimated operating costs.
 - MERCOSUR Area, which integrates the Brazilian market and the Argentine and Uruguayan markets. It is worth pointing out that the shared use of hydroelectric developments between Brazil and Paraguay, Argentina and Paraguay, and Argentina and Uruguay, has already produced strong interconnections among countries holding the joint-ownership of power-plants and has fostered power trading although limited due to asymmetries in system sizes. A first 1000 MW link between the Brazilian and Argentine systems is currently under construction. If the transportation capacity of such interconnection were increased to 3000 MW, the joint operating costs would be reduced by 41%, with savings in the order of US\$ 500 million in that year. In the next decade, operating savings could increase to about US\$ 160 million/year (13-15% of overall operating costs), if transportation capacity is increased to 4000 MW. Alternatively, a 500 MW line interconnecting Brazilian and Uruguayan systems would provide additional savings in the range of US\$ 60 million/year.

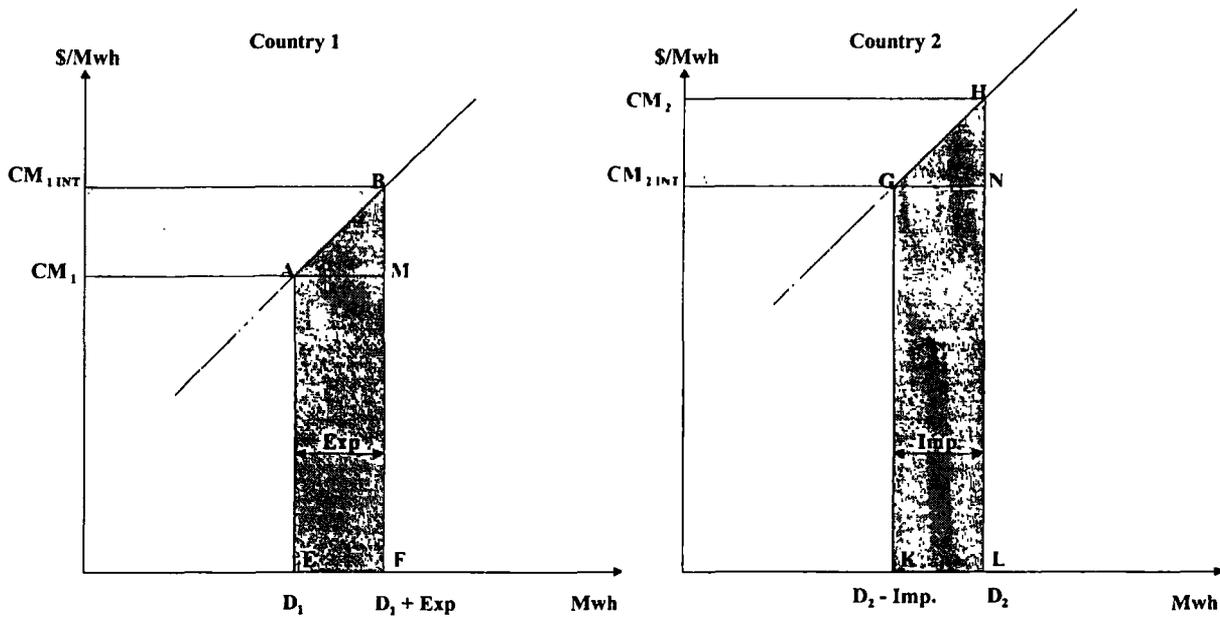
- The potential impact of interconnection on price volatility was evaluated for every market. The conclusion was that effects depend on the particular characteristics of each system and on the power exchange conditions. A beneficial effect is expected for markets that are facing the risk of being incapable of meeting the demand (Venezuela in 2005 and Brazil in 2000). Volatility would be limited in those systems benefiting from permanent import flows, such as Ecuador and the Southern Peruvian system. On the contrary, systems supplying secondary hydroelectric power would face an increased volatility in their prices, depending on the relative size of the importing system with regard to the exporting system. Argentina and Uruguay would face such situation when they integrate their markets with Brazil, especially in the event of energy shortages in the Brazilian system.
- Environmental Aspects: Currently, due to the high share of hydroelectricity in the in overall generation (78% in 1996), power plants contribute only with 9.4% of total gas emissions. Fuel savings derived from power integration would allow for a further 10-12% reduction in gas emissions from thermal generation, --depending on the capacity of the interconnections. Thus, electricity system integrations carry the potential of mitigating climate change in the region. Should the Kyoto Protocol be ratified, regional interconnections will be eligible to participate in Clean Development Mechanisms, which might become one of the financing sources for non-polluting or “0” emission expansion projects.

Annex 2 — Impact of International Interconnections on Internal Prices

Electric interconnections between two countries will have an impact on short-term and long run average prices in both countries, and in the price volatility.

Short-term effects

Assuming investment plans are not modified, the short-term effects on importing and exporting systems are shown in the following chart:



For the importing system, the purchase price to be paid by users is determined on the basis of the new national marginal cost, both for locally purchased demand and for imported electricity. Accordingly, the import effect on users is given by

$$\text{Users' Benefit}_{\text{Imp.}} = (CM_2 - CM_{2\text{int}}) D_2.$$

The “int” sub-index shows that the price is determined with an “Imp” capacity exchange in the interconnection.

On the other hand, the loss incurred by generators in the importing system is given by the loss of profit associated to the marginal price less cost savings by the reduction in the local generation level. Therefore, the losses incurred by generators will be:

$$\text{Generators Loss}_{\text{Imp}} = (CM_2 - CM_{2\text{int}}) (D_2 - 1/2 \text{ Imp})$$

Accordingly, the net balance on the importing system is made up by a reduction in the generators' profits and an appropriation of interconnection benefits by domestic users, i.e. the difference between both expressions

$$\text{System Balance}_{\text{Imp}} = (\text{CM}_2 - \text{CM}_{2\text{int}}) * \text{Imp}/2$$

Conversely, in an exporting system, domestic prices will increase to reach the new marginal cost of the system corresponding to the new overall demand (domestic plus exports), and domestic users will suffer a loss to be given by

$$\text{User Loss}_{\text{Exp}} = (\text{CM}_{1\text{int}} - \text{CM}_1) D_1$$

In an exporting system, generators' profits result from the marginal cost increase less the production cost. Accordingly, the total impact on domestic generators may be estimated as follows:

$$\text{Generators' Income}_{\text{Exp}} = (\text{CM}_{1\text{int}} - \text{CM}_1) (D_2 + 1/2 \text{Exp})$$

The net balance of the Exp-Imp exporting flow effect of an interconnection on the exporting system --an addition of impacts on consumers and generators with their own sign--, is:

$$\text{System Balance}_{\text{Exp}} = (\text{CM}_{1\text{int}} - \text{CM}_1) 1/2 \text{Exp}$$

In the short run, a positive net balance for both systems may be obtained; however, the distribution of income may be inefficient in the long run and have a negative impact on consumers.

Long-term effects

Exchange effects in the long run are associated to the degree of system integration and to the availability of resources. If there is a full integration between two markets - i.e. if there is an "Integrated Market" that in terms of security of supply and free interchange based on price only between systems, a single, marginal cost could be reached in the long run provided no differences are introduced by transmission costs.

In such a case, the long run marginal cost would be reduced as a result of operative efficiency gains and the use of investments resulting from integration.

An "Integrated Market" requires an agreement providing for the use of existing resources based on overall system optimization and allowing for short-term requirements to provide market signals encouraging investments in the country where they are more cost effective. Under these principles there is neither imposed self-supply limits, nor discrimination between demand and production in either country. These principles were the basis for the regulations issued in Brazil, Argentina, Chile and Bolivia.

If a full integration agreement that provides for the unrestricted sharing of integrated resources is not in place, then only eventual "Power Exchanges" can take place. Any international demand for the exporting country is short-term, and it is neither firm nor a permanent demand in the medium or long run. As this demand is not included as a permanent demand in the market of an exporting country, it becomes a demand for surpluses. If the transactions in the exporting country are based on prices that include the external demand, the real expansion requirements of the exporting country may be distorted as such market would

increase its production capacity (as a response to price signals) based on a demand that might disappear in absence of long term commitments.

Under these conditions, the spot market prices composition allows for expansion signals given by the market to be consistent with its firm demand supply requirements. These principles served as the basis for the regulations established in Colombia.

Impact on Volatility

Spot price volatility results from demand and supply fluctuations in the different national systems, including the effect of interconnections. Volatility may be very high in intensive hydroelectric systems with short-term price determinations. The main effect on interconnections on price volatility is that countries facing higher volatility induce higher volatility in the countries they become interconnected with. Under such circumstances, appropriate regulations are needed to shields volatility effect on supply and demand for instance by controlled pricing of hydraulic resources and by the obligation to execute long-term agreements.

Annex 3 — Comparative Tables on Characteristics of the Power Sector Institutional and Regulatory Features of the Countries in the Region

<i>I. SUBJECT</i>	<i>II. ARGENTINA</i>	<i>III. BOLIVIA</i>	<i>IV. BRAZIL</i>	<i>V. CHILE</i>	<i>VI. COLOMBIA</i>
I. Institutional and Regulatory					
Deregulation progress	Permanent.	Very stable framework, law dates from 1994.	A 1995 law defines the regulatory framework.	Framework law dates from June 1982. A very stable market.	A very stable market. Some privatizations are pending. ISO and Market Administrator to be appointed.
Privatization progress	Practically completed	Completed	Sector is in transition towards a market model	Completed	Privatization of transmission, generation and distribution companies is pending.
Trading restrictions	Consumers over 30 KW may select suppliers. Trader is defined. Lack of incentives for distributors to execute long-term contracts	Trader function is not defined. There are large users from 1MW	There are large users from 3MW. Trader function is defined.	Large users from 2MW. No trading restrictions. Only generation participates in the spot market.	No trading restrictions.
Market diversification degree	Supply and demand are highly diversified	Supply diversification level is low	Competition level is not high due to the transition process. However, market concentration levels will be limited in the future	Competition is affected by three companies that have an important market share	There are rules banning vertical integration. Generation has not been fully privatized
Market restrictions	No access barriers	Lack of regulatory definitions for transmission expansion	Lack of regulatory definitions for transmission, power recognition and energy prices and interconnections are for exclusive use	Access to transmission system requires an agreement between parties or arbitration. Arbitration tends to be slow and has resulted in access restrictions	No access barriers.
Optimal Dispatch	In liberalization process, to be based on price offer. Distributors are subject to seasonal prices.	Optimal dispatch is made on the basis of costs. No demand participation	Optimal dispatch is made with thermal generator prices and water value and dispatch is determined by ONS.	Optimal dispatch is made with semi-annual costs.	Dispatch based on price offers.
Open Access to information	Available for all agents.	Information is available for all participants	Available for all agents.	Information is available for all participants	Available for all agents.
Procedures for regulatory modifications	Participatory approach for modifying rules, which assures a high regulatory stability	There is an active participation in regulatory changes	Rules are modified after a process of active participation, which assures a high regulatory stability	Sector model has been maintained for many years	Rules are modified after a process that, in general, has an active participation, which secures regulatory stability

<i>VII. SUBJECT</i>	<i>VIII. ARGENTINA</i>	<i>IX. BOLIVIA</i>	<i>X. BRAZIL</i>	<i>XI. CHILE</i>	<i>XII. COLOMBIA</i>
Capacity charge in the spot market	Several items are remunerated under the new regulation in an attempt to recognize the services required in the long, medium and short runs	Power recognition changes are under discussion. The conceptual model recognizes efficient dry year firm power.	Capacity payment will be recognized for available, undispached and non-contracted generators.	Power recognition is under discussion. There is no definition as to whether it will be on a long or short-term basis. The conceptual model seems to require that power be evaluated as a short-term requirement.	Dry year mean energy power recognition
Ancillary Services	Frequency primary regulation, reactive power, load relief, frequency secondary regulation, black start and control system for island survival	A thorough revision of general regulations is underway. Reactive power and general reserve are recognized	Frequency regulation, reactive power and load relief are services hired by ONS	There are no rules in this respect. Ancillary services are not established as such and currently they must be assumed by generators	AGC, the rest is being analyzed
Contract flexibility	Minimum term 1 year	Minimum term for distributor contracts is 3 years; however, observance of this requirement was not always possible	Minimum term is two years for a captive demand. Nor restrictions for the rest	Minimum contract term is two years	Minimum term: 1 day
Freedom for Distributors to pass through to end-users the cost of executed contracts.	Seasonal price is determined by an estimation of spot market prices	Estimated node price is passed through to users subject to price fixing	Users subject to price fixing are passed through the price determined by ANEEL as market price for each source	Users subject to price fixing are passed through the node price limited by contract prices (+-10%)	Price to end users is determined by the price of the contracts executed by the trader and limited by the mean prices of executed contracts
Generation expansion driving force	The Spot market	The Spot market	Contracts to distributors or large users	Contracts to distributors or large users or the spot market	The Spot market
Market transparency	Market transparency is secured.	Market information is available to all participants	Market information is available to all participants	Market information is available to all participants because CEDC was made up by the generators who know all administration details	Market transparency is secured in all its organization

<i>SUBJECT</i>	<i>XIII. ARGENTINA</i>	<i>XIV. BOLIVIA</i>	<i>XV. BRAZIL</i>	<i>XVI. CHILE</i>	<i>XVII. COLOMBIA</i>
Regulating Agency (issuance of rules)	National Energy Regulating Agency (ENRE), an independent agency	Vice-Ministry of Energy & Hydrocarbons/Office of the Electricity Superintendent, independent agency	ANEEL, independent agency	CNE, an agency that reports to the government	CREG, independent agency
Concession Control Agency	ENRE.	Office of the Electricity Superintendence, independent agency	ANEEL	SEC (Office of the Electricity and Fuels Superintendent)	CREG
Sector policies	Energy Secretariat	Ministry of Economy and Economic Development	Ministry of Mining and Energy	CNN	Ministry of Mining and Energy
System Operator	CAMMESA, non-profit corporation. The State has a minority share.	CNDC with the participation of generation, demand and the State	ONS All agents participate	CEDEC Only generation participates	CON -All agents participate
Market Manager	CAMMESA, a non-profit corporation	Ditto	MAE, Wholesale Market of Energy	Ditto	CND
Planning Agency/prospects	The Energy Secretariat (SE) only at an informative level	Vice-Ministry of Energy and Hydrocarbons	CCPE whose director is the Secretary of Energy	CNE, indicative planning	UPME Mining and Energy Planning Unit
Settlement of Disputes	ENRE	Office of the Electricity Superintendent	ANEEL	It is a very transparent process but it takes too long to settle disputes and it is not always predictable	Public utilities Superintendent's Office
State Participation	Regulation and control	Regulation and Control	Planning, regulation and control	Regulation and Control	Planning, regulation and control
1. National Transportation					
General Characteristics	Existing transmission companies are not in charge of expansions. Expansions are executed by those who will benefit from them.	There is a regulated tariff that recognizes capital costs of an adapted company	Tolls are partly determined by the expansions required (node methodology) and partly by the postage stamp charge.	Free toll negotiation and free construction of lines	Existing transmission companies are not in charge of expansion. Expansion is made in a competitively way. Expansion is planned

<i>II. SUBJECT</i>	<i>ARGENTINA</i>	<i>BOLIVIA</i>	<i>BRAZIL</i>	<i>CHILE</i>	<i>COLOMBIA</i>
Transportation Restrictions	There are local prices that are important for expansion	There are no local prices. Forced generation is paid for.	There are local prices but surpluses are not allotted	Node prices and surpluses are allocated, in principle, to the transmission utility owner. Node and not spot prices are considered for tariff income. Not assigned to the owner on a definite basis	There are no local prices but cost overruns
Open access	Free, unrestricted access to generation	Free access to residual transportation capacity	Free access to residual transportation capacity	Access is free but negotiation is slow and complex. New agents bear expansion costs unless there are other beneficiaries, in which case a negotiation must be settled	Free, unrestricted, access for generation
Expansion Methodology	Beneficiaries decide and the ENRE gives authorizes	Proposed by each interested party or by the transmission company	Defined by the ANEEL upon ONS's or CCPE's request during the transition period.	Developed by the respective interested parties	There is a planning system
Toll Definitions	Connection charges and use capacity in terms of distance	Methodology of use in terms of distance. Users pay a postage stamp charge	Partly by a postage stamp charge and partly based on CMLP	By the use/firm power methodology. It is not defined	Charges for connection and postage stamp charges for demand
Transportation Remuneration	O&M and fixed charge for new works plus variable income	It is the New Replacement Cost (VNR) + Operation & Maintenance (O&M) of the adapted company	Cost recognition for existing companies and fixed charge for new companies	New Replacement Cost (VNR) plus Administration and Operation and Maintenance (AYOM) are recognized	New Replacement Cost (VNR) + Administration and Operation and Maintenance (AYOM)
Network use Opportunities	In all those places where may be very competitive or there are surpluses of transmission	Only the effective remaining capacity of the system	Those negotiated among the parties	Those negotiated among the parties	Only if there are transportation surpluses

III. SUBJECT	ARGENTINA	BOLIVIA	BRAZIL	CHILE	COLOMBIA
Transactional quality system	The current system assigns all responsibility to distributors without compensation for failures of other agents	There is an annual penalties system administered by the Office of the Electricity Superintendent	There are consistent annual indexes associated to penalties consistent for the different stages of the system	None. Planning defines them as system standards. Penalties and cuts should be transferred	There is a penalty system with annual targets for agents
Economic quality appraisal for Transportation and Distribution System	Cost of not supplied energy=1500US\$/Mwh For relays of load shedding 3000US\$	Cost of non-supplied energy = 7 times the market price	Cost of non- supplied energy (cents): US\$500 / kWh	Only long-term service interruptions are appraised. Short-term service interruptions are associated to penalties. Cost of non- supplied energy (cents.) =US\$150/Mwh	Penalties to compensate affected users are imposed. Cost of non- supplied energy (CENTS)= US\$150/Mwh
Penalties and rewards to agents	There is a penalty system for carriers in terms of service interruptions and for distributors in terms of service quality	There is a penalty system for carriers in terms of service interruptions and for distributors in terms of service quality	There is a penalty system for carriers in terms of service interruptions and for distributors in terms of service quality	There are penalties and rewards but their payment is not regulated. It depends on the evaluation of each particular case	There is a penalization system for transmission and distribution utilities
1. Imports/Exports					
Firm/Opportunity international exchanges	By opportunity and by contract	By opportunity and by contract	By opportunity and by contract Toll costs may be paid as generation and demand. Demand rationing is consistently distributed.	By opportunity and by contract Toll costs may be paid as generation and demand. Demand rationing is consistently distributed.	Minimum firm contract life: five years
Quality Transactions	Not foreseen	Not foreseen	Not foreseen	Not foreseen	Not foreseen
Ancillary Services Transactions	Not foreseen	Not foreseen	Not foreseen	None. Chilean regulation as regards markets allocations prevail	Not defined
Legal Framework	Authorized	Authorized. Regulatory details are under analysis	Authorized. Regulatory details are under analysis	Currently under analysis	Authorized

<i>SUBJECT</i>	<i>ARGENTINA</i>	<i>BOLIVIA</i>	<i>BRAZIL</i>	<i>CHILE</i>	<i>COLOMBIA</i>
2. International Transportation					
Free Access	To the residual capacity	See national transportation	There is free access. However, international installations are used on an exclusive basis	There is free access to surplus capacity. It corresponds to secondary network	Corresponds to the connection network
Expansion System	By requirement of traders	See national transportation	By traders decisions	By agents decision	Depends on agents decision
Firm transportation	Firm transportation is assigned to those who bear expansion cost	See national transportation	There is an exclusive use	For the primary use of the interconnection construction agent	For the primary use of the interconnection construction agent
IV. Quality of Service					
Minimum Performance Criteria	Are established associated with N1 and use of automatic disconnection of generation economic	There are general criteria. Details are currently under analysis	There are detailed criteria. However, the operation is decided by ONS	The N-1 criterion has been established. However there are no detailed rules	The N-1 criterion has been established
State of Operating Procedure	Highly developed	Adequately developed	Highly developed	Poorly developed	Highly developed
Operation Control	CAMMESA	DNC	ONS	CDEC	CON
Interconnection Operation Standards	Currently under development	Not developed	Currently under development	Not developed	Not developed

<i>SUBJECT</i>	<i>ECUADOR</i>	<i>PARAGUAY</i>	<i>PERU</i>	<i>URUGUAY</i>	<i>VENEZUELA</i>
V. Regulatory and Institutional					
Deregulation progress	Advanced in regulatory terms, not in practice	Framework law is currently under discussion	Permanent. Regulations dates from the beginning of the 90's	Only the framework law was passed	Only the framework law was passed
Privatization progress	State-owned companies have not been privatized	No privatizations	Privatization is practically completed	No privatizations have been made.	No privatizations have been made.
Trading Restrictions	Marketing Agent is not foreseen. There are Gus as from 1 MW	ANDE is the only trader	Only generation participates in the spot market. There are GUs as from 1 MW	GUs are defined but only contracts within UTE's scope have been signed	To be regulated
Market diversification degree	In the future only 25% of generation may be controlled	There is no market	Authorization to participate in more than 15% of the market is required	There is no market	There is no market
Market restrictions	It cannot be evaluated in this stage of development	ANDE has a leading position that hinders the presence of other investors	There are not barriers	UTE has a predominant position that hinders the presence of other investors	No free access
Optimal Dispatch	Costs offer There is a volunteer retirement of demand in the second stage	Dispatch is not subject to regulation	Costs offer Demand does not participate	Costs offer. Demand does not participate	Dispatch is based on bilateral contracts.
Open access to information	Available for all agents and other interested parties	It is not established	It is available for all COES participants	Not established	It is subject to company policies

<i>VI. SUBJECT</i>	<i>ECUADOR</i>	<i>PARAGUAY</i>	<i>PERU</i>	<i>URUGUAY</i>	<i>VENEZUELA</i>
Procedures for regulatory modifications	It cannot be evaluated as of the date of this report	It cannot be evaluated as of the date of this report	Modification procedures are transparent	It cannot be evaluated as of the date of this report	It cannot be evaluated as of the date of this report
Capacity charge in the spot market	Several concepts are remunerated	It is not established	Firm power generation is remunerated with a methodology that has been subject of discussions	Not established	There is no market
Ancillary Services	RPF, reactive power	Not established	Generators are committed to supply them	Not established	Not defined
Contract flexibility	Minimum Term, 1 year	There is no market	Minimum term 1 year	Import contracts are temporally limited to 1 year	There is no market
Freedom for Distributors to pass through to end users the cost of executed contracts	Short-term reference price	Not fixed	Mean free use contract price is passed through	Not established	There is no market
Generation expansion driving force	Planning by CONELEC	Entrepreneurial decision	The commitment to be 100% contracted	UTE is in charge of expansion planning	Entrepreneurial decision
Market transparency	It cannot be evaluated as of the date of this report	None	It is a market restricted to generation	None	It cannot be evaluated as of the date of this report
Regulating Agency	CONELEC-self independent agency	ANDE	Ministry of Energy and Mining/ CTE, independent agency	The creation of UREE (Electric Power Regulatory Agency) is foreseen	Electric Power National Committee, to be created
Concession Control Agency	CONELEC	Ministry of Finance and Ministry of Public Works and Services	OSINERG – independent agency	UREE	Ministry of Mining and Energy

VII. SUBJECT	ECUADOR	PARAGUAY	PERU	URUGUAY	VENEZUELA
Sector policies	CONELEC	Ministry of Finance and Ministry of Public Works and Services	Ministry of Energy and Mining	Ministry of Energy and Mining	Ministry of Mining and Energy
System Operator	CENACE, Non-profit private corporation	ANDE	COES SICN and COES SUR only generators are represented	ADME is foreseen, with State participation	National Management Center, to be created
Market Manager	CENACE, Non-profit private corporation	ANDE	COES	ADME is foreseen, with State participation	National Management Center, to be created
Planning Agency/prospects	CONELEC	ANDE	Ministry of Energy and Mining	Not established	To be defined
Settlement of Disputes	Arbitration and Mediation Law	Legal Claims	OSINERG	Arbitration procedure is foreseen	Legal Claims
State Participation	Planning, regulation and control	Full	Transmission Company Regulation and Control	Not established	High participation, as of the date hereof
VIII. National Transportation					
General characteristics	Transmission agent plans and CONELEC approves	There is no transmission services system	Systems are developed by agents. A difference is established between main and secondary transmission systems	Oriented planning and expansion by interested parties is foreseen	There is no transmission services system
Transmission restrictions	There are not local prices, restriction is borne by the transmission agent	Ditto	Transportation restrictions are assigned according to responsibilities	Not established	Ditto
Open access	Capacity Reserve	Ditto	Access to remaining capacity of principal system is free	Free access to surplus capacity	Ditto
Expansion methodology	Carrier plans and CONELEC approves	Ditto	Interested parties plan	Not established	Ditto

<i>SUBJECT</i>	<i>ECUADOR</i>	<i>PARAGUAY</i>	<i>PERU</i>	<i>URUGUAY</i>	<i>VENEZUELA</i>
Toll definitions	Postage stamp capacity charges for demand and connection.	Ditto	They are established for firm power, in terms of predominant flow. In the main system, tolls are paid by generators in terms of contracted consumption	Tolls assigned by zone	Ditto
Transportation remuneration	It includes optimal expansion and depreciation and 10-year Operation & Maintenance	Ditto	It includes optimal expansion and depreciation and 10-year Operation & Maintenance	Appropriated costs	Ditto
Network use opportunities	Only those with surpluses	Ditto	Only those with surpluses	Only those with surpluses	Ditto
Transactional quality system	Not developed	Not developed	Generators assume responsibilities for failures and carrier compensates them	Not developed	Not developed
Quality economic appraisal for Transportation and Distribution System	Cost of non- supplied power (CENTS)= US\$350	Not developed	Cost of non- supplied power (CENTS)= US\$250	Cost of non- supplied power (CENTS)= US\$450	Not developed
Penalties and rewards to agents	Not developed	Not developed	There are not pre-established cases. It is penalized in terms of damages caused to generation	Not developed	Not developed
IX. Imports/Exports					
Firm/opportunity international exchanges	Both are authorized	Not developed	Not developed	Both are authorized	Not developed
Quality Transactions	Not foreseen	Not developed	Not developed	Not foreseen	Not developed
Ancillary Services transactions	Not foreseen	Not developed	Not developed	Not foreseen	Not developed
Legal Framework	Approval is pending		Not developed	Approval is pending	

<i>SUBJECT</i>	<i>ECUADOR</i>	<i>PARAGUAY</i>	<i>PERU</i>	<i>URUGUAY</i>	<i>VENEZUELA</i>
X. International Transportation					
Free Access	National transportation rules apply	Not developed	Not developed	Not developed	Not developed
Expansion system	National transportation rules apply	Not established	Not developed	Not established	Not developed
Firm Transportation	National Transportation rules apply	Not developed	Not developed	Firm transportation on a national level	Not developed
XI. Quality of Service					
Minimum performance criteria	They are established, associated with N-1	Not developed	Not developed	They are established by UTE	Not developed for the market
State of operating procedures	High development		Relatively developed	Highly developed for integrated company	Highly developed
Operation Control	CENACE	ANDE	ETECEN	DNC	OPSIS
Interconnection Operation Rules	Not developed	Not developed	Not developed	Not developed	Not developed

Annex 4 — Review of Main Incentives and Disincentives to Implement Interconnections in the Region

An evaluation of the soundness of the existing regulatory framework with regard to international trade is presented below for each country. This includes comments on the general characteristics of the national markets on the following potential transactions:

- Firm contracts
- Free access and trading
- Recognition of power services
- Opportunity exchange
- Ancillary services
- National transmission service, and
- Reliability

The result of the evaluation is represented then empirically as a polar graph with the seven factors mentioned above. For these purposes it can be noted that a full circle would represent the perfect case, in which incentives for implementing interconnections are the maximum.

a) **Argentina**

Argentina has a well-developed power market and the overall signal received by investors is positive. They are as follow:

Firm contracts. Current regulations allow for the execution of firm energy contracts and the related transmission contracts. Regulated access to residual capacity has been authorized and, although this may reduce incentives for investors, it allows for a more efficient use and the development of a competitive market.

Free access and trading: There are no limitations to free access to transmission. The trading business is authorized although it is restricted by the methodology utilized to assign prices to captive users that makes the execution of contracts rather difficult.

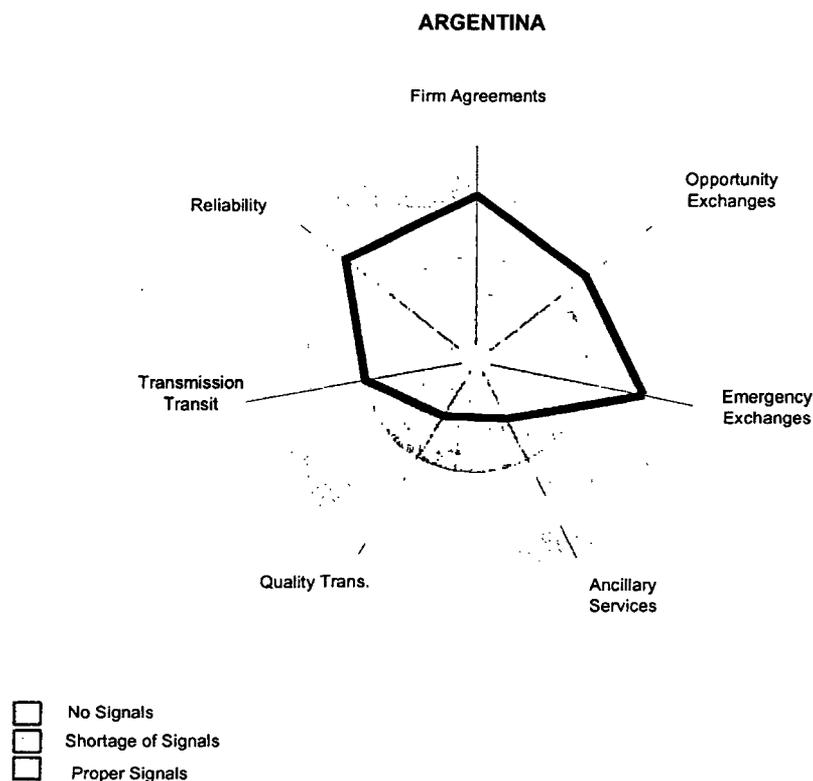
Recognition of power services. The regulations in force fail to recognize the various power services that may be provided.

Opportunity exchanges: Current restrictions are associated to the lack of a common market with coordinated rules, such as capacity costs in spot exports, transmission expansions and remuneration of transmission services.

Ancillary services: They are recognized only at a national level and responsibilities are passed through assuming that liabilities of international traders are similar to those of national agents’.

National transmission service: Although transmission service is fully open to the access of new traders, some of its design aspects should be revisited within the framework of the regional integration. In particular the lack of recognition of investments and the impossibility of expanding the transmission system on the basis of opportunity exchanges, are limiting factors to the consolidation of international interconnections.

Reliability: Although much progress has been made in Argentina on reliability issues, a proper certification level has not been achieved and the system allows for service quality transfers without proper monetary compensation.



b) **Bolivia**

Bolivia has a well-developed power market, but there are still some regulatory issues that should be improved.

Firm contracts: Firm contracts are governed by the current regulation, which provides a definition for such contracts. However, firm transportation in interconnections has not been defined yet.

Free access and trading: There are no restrictions to transmission access. Trading functions, however, are limited due to the market size and the lack of a legal definition.

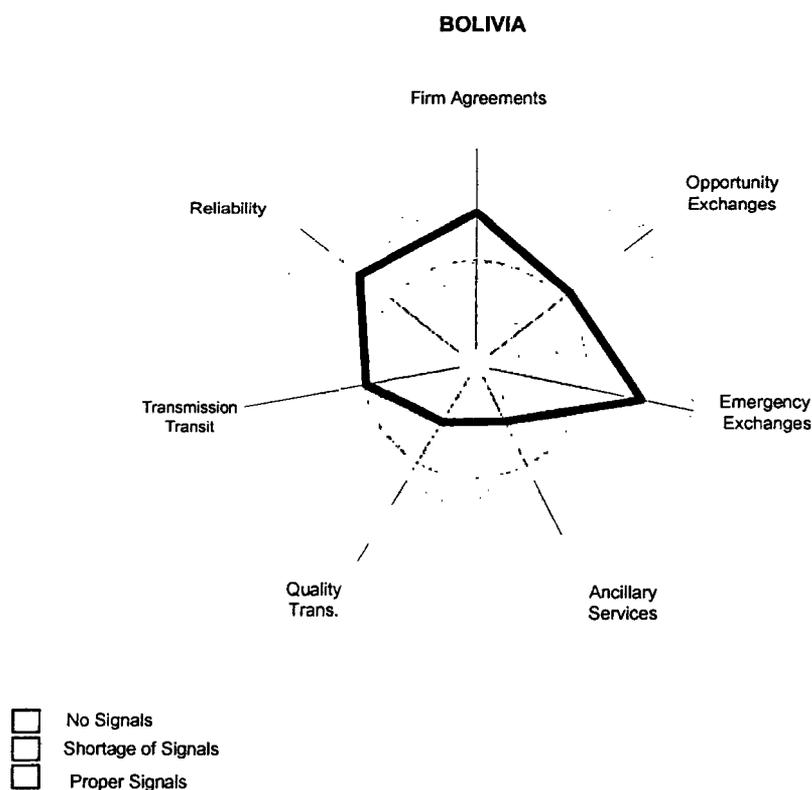
Recognition of power services: Regulations related to power recognition are currently discussed. The various services in which available power may be broken down are not recognized.

Opportunity exchanges: No operational standards have been developed as yet on this matter.

Ancillary services: Detailed regulations have not been issued on this matter.

National transmission service: Transmission services are paid according to the use by area of influence, and separated charges are allocated to generators and to the purchasers in proportion to its requirements. There are no clear rules for the use of transportation facilities that are outside the National Interconnection System for exports. The potential exporter and the carrier must agree on the corresponding use of system fees for these cases. This represents a discriminatory treatment for exports with regard to business oriented to the national market.

Reliability: Studies to define minimum performance levels are being carried out and current standards are provisional. Considerable work needs to be done to achieve a reliability certification degree.



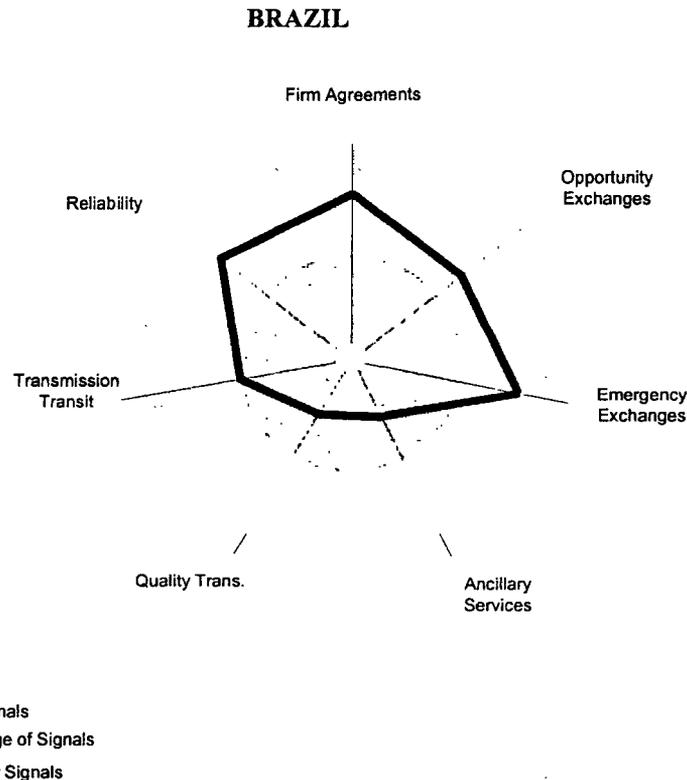
The above-mentioned restrictions have no major practical consequences for interconnections to be made between Brazil and Bolivia. Because the differences in the sizes of the systems, the interconnections may well be considered as the connection of an isolated generator.

c) Brazil

Brazil is the great driver of regional interconnections because of the large size of its market, and thus, Brazilian policies are critical for the development of regional trade. Despite well-developed regulations, the Brazilian power sector is still undergoing a transition period particularly due to pending privatizations and the existence of initial contracts that will mature in 2003 and beyond.

Firm contracts: Firm contracts are properly governed by current regulations that define firm contracts and exclusive use of transportation. However, in emergency situations power failures are allocated to all loads despite the existence of firm contracts, which may discourage exports.

Free access and trading: There are no restrictions to the free access to transmission. However, market freedom is restricted by transmission planning methodologies that may hinder the realization of an interconnection if it does not fit the expansion plan. Also, the exclusive use assigned to the interconnection and the need to negotiate free access may represent restrictions to opportunity exchanges.



Recognition of power services: Power payment recognition is currently under development.

Opportunity exchanges: Opportunity exchanges are subject to restrictions as mentioned before and those resulting from the lack of a regional market.

Ancillary services: Ancillary services are recognized only within the national market and there are no rules governing international exchanges.

National transmission service: The design of the regulatory system for transmission services should be revisited within the framework of an efficient regional integration. The elements to be reconsidered include payment of a proportion of transmission postage stamp charges and payment of export transmission charges in terms of maximum requirements.

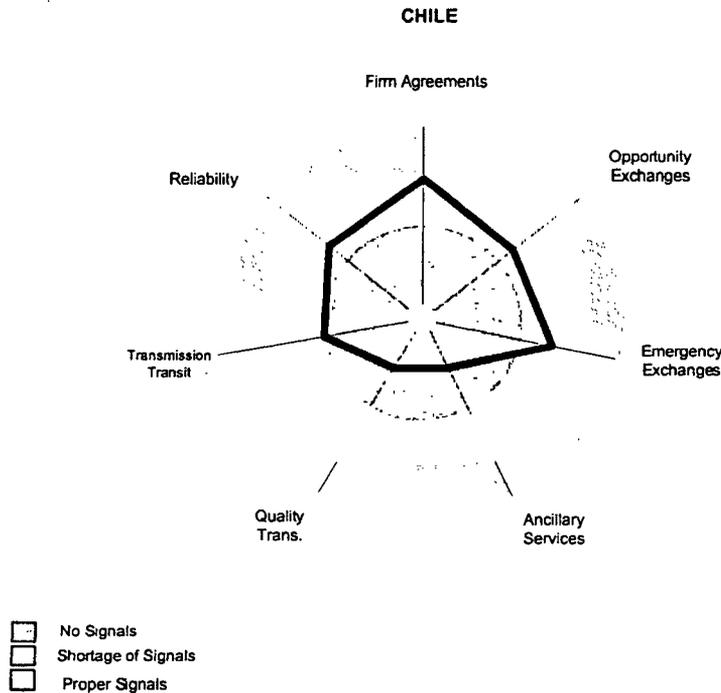
Reliability: Although the Brazilian system is well developed, it has not reached the proper certification level, particularly because its market is not fully subject to the market forces. Generation disconnection level and the use of transmission under emergency conditions should be more precisely defined.

d) Chile

Chile has a well-developed market but regulatory provisions are unclear or inexistent with regard to international trade. Some of them are particularly critical for the Argentina-Chile interconnection, because such interconnection would be profitable only if it allows for free two-way exchanges. Some regulatory changes are needed which are being prepared to respond to the evolution of the national market and possible international trade.

Export and import regulations have not been approved. This fact hinders the implementation of interconnections; because there may be restrictions to exports and current regulations permit various interpretations of firm transport capacity, on how to calculate the amount of payments for capacity transfers and wheeling charges for firm and opportunity energy trade, etc.

Free access and trading: There are no restrictions to transmission access provided there is additional capacity available in the transmission system. Trading functions have not been defined as yet in the Chilean regulations, which would make difficult for a trader to exercise these functions in Chile. However, by acquiring any generation a trader could circumvent this situation.



Recognition of power services: Regulations regarding capacity payments are currently being discussed, in particular whether capacity valuation should be based on short or long run terms. This situation currently discourages investments for two-way exchanges.

Opportunity exchanges: Opportunity exchange regulations do not exist as yet. These should be issued to foster this type of transactions.

Ancillary services: Ancillary services –which are currently provided by generators-- are recognized only within national transactions.

National transmission service: Although the transmission service is open to the access of new traders, it includes some design factors that should be reconsidered within a regional integration framework, particularly the lack of established fees for transmission charges and thus, the need for any energy trader to negotiate wheeling charges with the transmission agent, including the eventual need for arbitration in cases of disagreements.

Reliability: Chile has made no significant progress in issues related to service reliability, which would define a certified quality level, such as operating standards, controls, etc.

e) Colombia

Though Colombia has a well-developed market, some regulatory changes are being made which respond to the evolution of the system, that includes completion of pending privatizations, and the appointment of the: (i) independent system operator, and (ii) the commercial transactions operator. Energy price differences with neighboring countries would permit the development of profitable interconnections, but these have not been realized due to lack of adequate development of the regulatory framework and/or unsuitable business environment in the neighboring countries.

Firm contracts: Regulations identify clearly the national market and the international markets and hence, export prices have no impact on the domestic market prices. Firm contracts for terms exceeding five years are permitted in the current regulations. However, such contracts are subject to the same levels of rationing any other consumption would have in cases of energy shortages. Furthermore, firm contracts for shorter terms are penalized by priority interruptions under load rationing conditions.

Free access and trading: Transmission access is not restricted, but for international interconnections, access should be agreed upon between the parties.

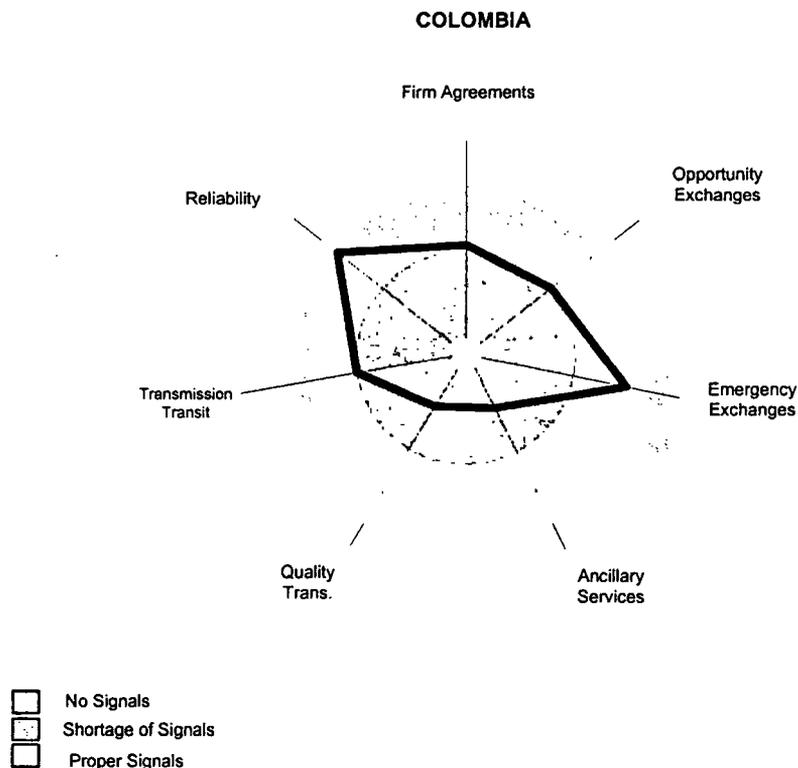
Recognition of power services: Capacity payments for dry hydrological conditions are recognized by the Colombian regulations but no fees for other ancillary services are recognized.

Opportunity exchanges: Opportunity exchanges are limited by restrictions to the use of the transmission system and transmission overcharges assessed over energy exports.

Ancillary services: They are recognized only within the national scope.

National transmission service: Transmission services regulatory rules include factors that should be reconsidered within the framework of a regional integration. In particular the use of a “postage stamp” charge applied to the demand could represent restrictions for the efficient development of interconnections.

Reliability: Although Colombia has made significant progress in terms of service reliability; it has not achieved a proper certification degree.



f) **Ecuador**

Prospects for international trade in Ecuador are uncertain because its institutional and regulatory frameworks are being transformed and state-owned utilities have not been as yet privatized.

Firm contracts: The regulatory approach towards energy exports is restrictive, because only surpluses may be exported once the domestic demand has been fully met. Exports would not affect internal prices as local and foreign demands are discriminated. However, considering extremely low current energy prices and energy shortages in the Ecuadorian market, such restriction seems to be irrelevant in the short term.

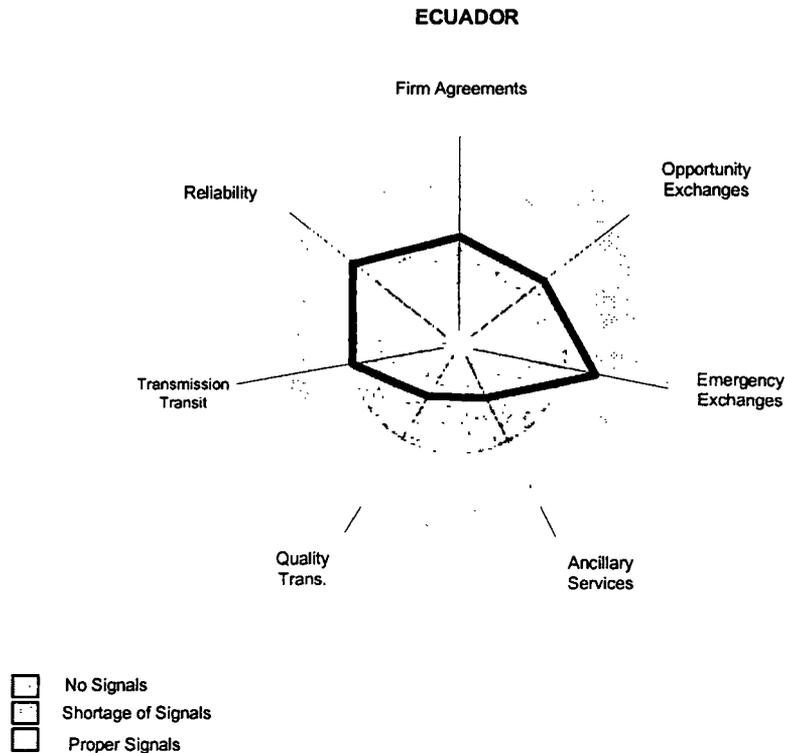
Free access and trading: Access to transmission is not restricted. The commercialization function is not defined in the legislation, which would eventually limit the exercise of this function.

Recognition of power services: Regulations to be applied will eventually define a set of fees for power services that depend on the client requirements. However, the demand would not be able to provide such services by permitting supply interruptions.

Opportunity exchanges: Detailed regulations that would provide rules for opportunity exchange are still missing.

Ancillary services: They are recognized only within the national scope.

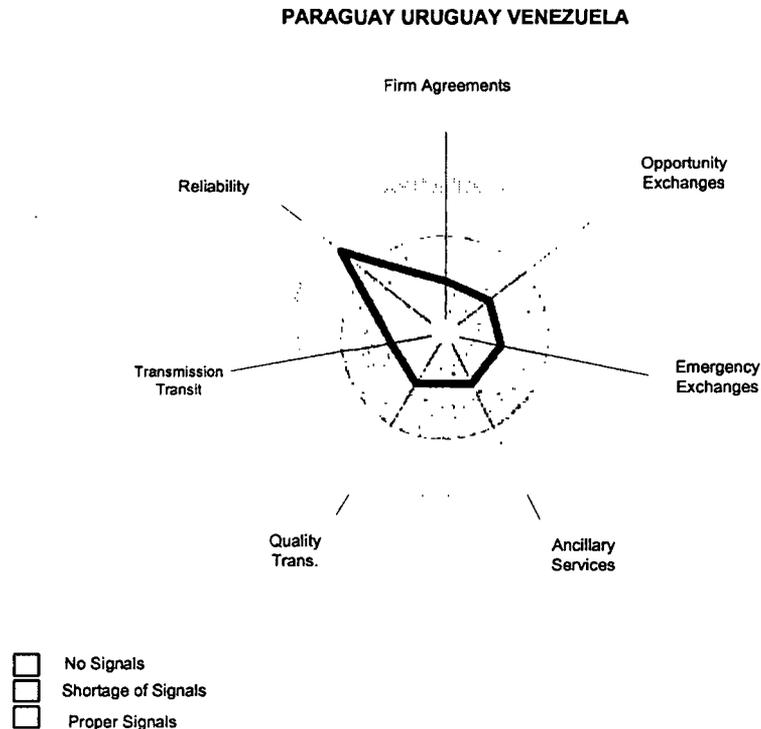
National transmission service: Transmission tolls are assessed on the basis of a “postage stamp” system and are paid by the demand, which may introduce restrictions to the development of unplanned expansions.



Reliability: Further regulations are required to develop certifiable rules for service reliability.

g) Paraguay

There is no power market in Paraguay, as the country has not introduced any reforms in its power sector. The sector structure is vertically integrated and the national utility, ANDE, is a state-owned monopoly. Any potential interconnection business must be negotiated with ANDE, though there are no legal restrictions to execute contracts for the purposes of building an interconnection.



h) Peru

Peru has a fairly well developed market though export and import regulations are incomplete and should be further developed.

Free access and trading: Transmission access is not restricted. Any expansions to the existing transmission system are to be undertaken by interested parties.

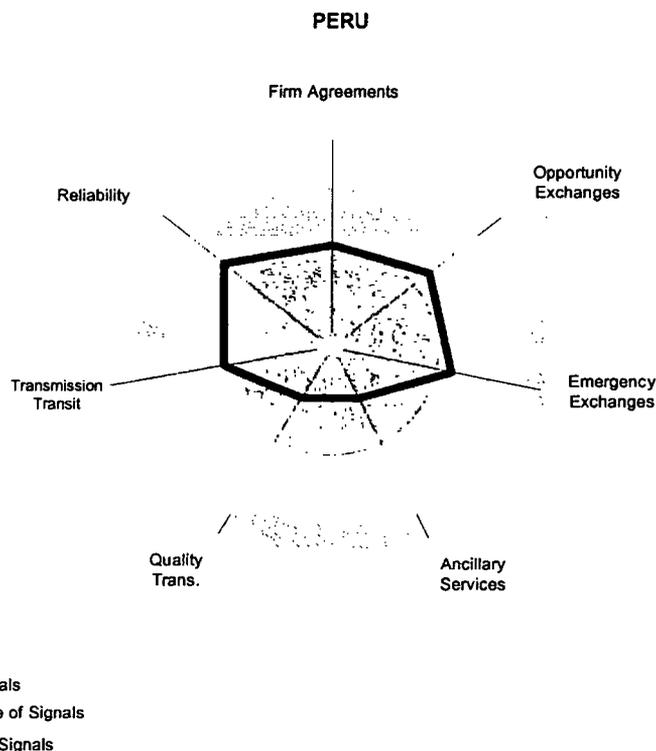
Recognition of power services. Current regulations fail to recognize and remunerate adequately the different power services.

Opportunity exchanges: There are no regulations available.

Ancillary services: Generators are obliged to provide ancillary services, but interconnection ancillary services have not been defined as yet.

National transmission service: Generators provide transmission services according to their contracted firm capacity, which could be considered an incentive to opportunity use.

Reliability: Service reliability has not reached the proper certification level.



i) Uruguay

Uruguay has an undeveloped market and, consequently, interconnections must be negotiated with UTE, a national monopoly. UTE has developed a transmission tariff system that provides tolls for the use of the trunk transmission system, plus tolls for different zones. Importers or exporters with firm power contracts must pay annually up-front for the contracted capacity for the next twelve months, which would discourage the opportunity use of transmission facilities.

j) Venezuela

Although a new electricity law was recently passed, no market model has been developed as yet in Venezuela. Development of interconnections in a market environment could only be analyzed once regulations are issued. The new law includes the definition of the trader function but provides that any international power exchanges are subject to the approval of the Ministry of Energy and Mining. Exchanges should neither impair service quality and supply nor increase energy or electricity prices in the domestic market. Transmission System expansion should be consistent with the Development Plan and it will be open to all investors.

Annex 5 — Work Plan for Phase II

Implementation Plan

The following tasks will be developed during Phase II of the present study:

- Task 1- Regional Electricity Market. Conceptual Design.
- Task 2- Regional Electricity Market- Development Plan
- Task 3- Regional Transmission System
- Task 4- Quality Transactions and Reliability Certification.

Task 1 – Regional Electricity Market - Conceptual design.

The conceptual design will be aimed at the definition of the main characteristics of the market to be created and the preparation of the rules that will govern international transaction. This will comprise the following steps:

- Definition of main features of the Regional Electricity Market (MER)
 - Analysis of sub-regional markets; characteristics and asymmetries.
 - Basic requirements for national systems and regulations
 - Premises for the development of a regional market
 - Key design decisions for institutions, participants and regulations
 - Guidelines concerning functions required from the institutions:
 - System operations
 - Market management
 - Regulation and Control
- General guidelines for the regional electricity market:
 - Traded products and services
 - Participants
 - Price system and bidding methodology
 - Economic transactions system
 - Contracts market
 - Opportunity exchanges market
 - Transmission function and the market
- Analysis of regulatory policies necessary to achieve a more competitive gas market at a regional level

- Guidelines concerning requirements to increase trading and analysis of the impact produced by the introduction of trading gates in the regional sector.

Task 2 – Regional Electricity Power Market- Development Plan

This step should define the requirements associated to the establishment of the market, an implementation schedule and the political decisions necessary for its development. Given the substantial differences in the degree of development of markets in the North and the South (Mercosur) areas, differences in the treatment for these two sub-regions are taken into account. The task includes the following aspects:

- Regional market characterization; definition of areas on the basis of market development level and current restrictions.
- Definition of steps towards the development of a regional market; transition process
- Northern Area
 - Institutional aspects; organization
 - Identification of the steps required for the development of a regional market
 - Basic regulatory requirements for the development of firm interconnections and bilateral transactions requiring the use of third-country systems
 - Necessary studies and participation, training or publicity requirements
 - Required simulation models. General Specifications
 - Real time system. Areas and general characteristics required
- Mercosur Area:
 - Institutional Aspects; Regulatory Agency and Operator Organization.
 - Basic regulatory requirements for the development of a regional market
 - Definition of the required transition process.
 - Necessary studies and participation, training and publicity requirements.

Task 3 - Regional transmission system

General guidelines should be established for the general transmission system:

- Analysis of the general requirements for each market development stage
- Regional transmission system definition
- Access and residual capacity
- Remuneration, tariff and regional transmission expansion system
- Priority of use and transportation rights

Task 4 Reliability certification and quality transactions

- Guidelines for the development of regional reliability certification level and associated economic transactions should be proposed:
- Guidelines to determine quality transaction costs
- Guidelines to determine minimum performance parameters
- Guidelines for supplementary services recognition
- Guidelines for emergency transfer maximization policies

Joint UNDP/World Bank
ENERGY SECTOR MANAGEMENT ASSISTANCE PROGRAMME (ESMAP)

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	Technology Assessment of Clean Coal Technologies for China Volume II—Environmental and Energy Efficiency Improvements for Non-power Uses of Coal	05/01	011/01
	Technology Assessment of Clean Coal Technologies for China Volume III—Environmental Compliance in the Energy Sector: Methodological Approach and Least-Cost Strategies	12/01	011/01
Thailand	DSM in Thailand: A Case Study	10/00	008/00
	Development of a Regional Power Market in the Greater Mekong Sub-Region (GMS)	12/01	015/01
Vietnam	Options for Renewable Energy in Vietnam	07/00	001/00

LATIN AMERICA AND THE CARIBBEAN (LAC)

	Regional Electricity Markets Interconnections — Phase I Identification of Issues for the Development of Regional Power Markets in South America	12/01	016/01
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GLOBAL

	Impact of Power Sector Reform on the Poor: A Review of Issues and the Literature	07/00	002/00
	Best Practices for Sustainable Development of Micro Hydro Power in Developing Countries	08/00	006/00
	Mini-Grid Design Manual	09/00	007/00
	Photovoltaic Applications in Rural Areas of the Developing World	11/00	009/00
	Subsidies and Sustainable Rural Energy Services: Can we Create Incentives Without Distorting Markets?	12/00	010/00

<i>Region/Country</i>	<i>Activity/Report Title</i>	<i>Date</i>	<i>Number</i>
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	Sustainable Woodfuel Supplies from the Dry Tropical Woodlands	06/01	013/01
	Key Factors for Private Sector Investment in Power Distribution	08/01	014/01

12/31/01



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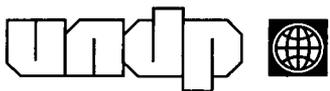
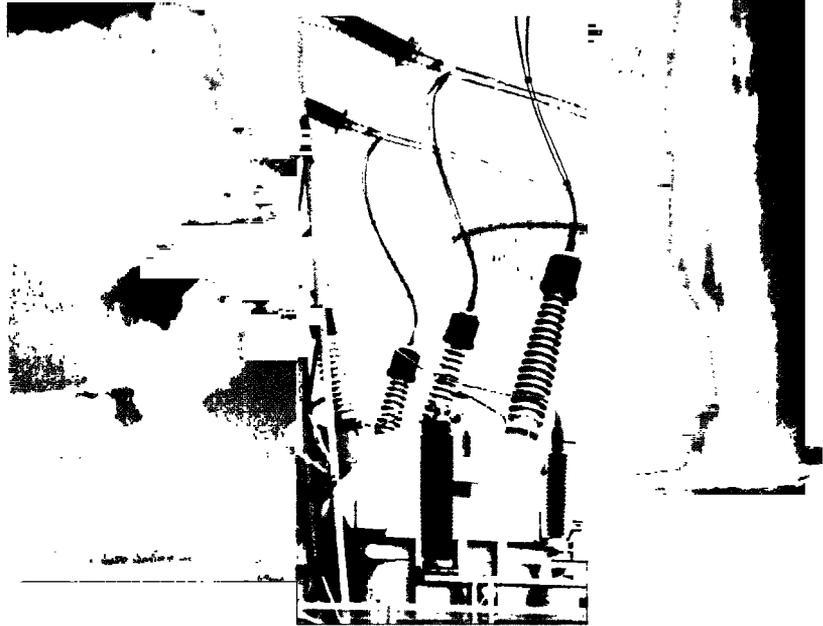
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