THE POWER SECTOR IN: PERU

Issue Area	PERU
I. Current Status of Sector Reform: Key Points	
Power System Overview	Peru's installed capacity by the end of 1998 was 5,513.6 MW, with a generation of 18,579.2 GWh (of which 73% was hydroelectric). Electricity demand grew at 3.3% in 1998 due to the slowdown in the economy in the past years. This levels are expected to increase to around 5.5% per year as the economy recovers and will represent investment levels of around $300-$350 million per year in new generating capacity. Electricity coverage is around 65%. Peru has two interconnected systems, the SICN (Sistema Interconectado Centronorte) and SISUR (Sistema Interconectado Sur), and several isolated regional systems and smaller isolated systems, which provide electricity to rural areas. The SICN has the largest installed capacity with 3,638 MW and SISUR has 778.2 MW.
Structure	The power sector underwent vertical and, to a lesser degree, horizontal restructuring initiated in 1994 following enactment of a new Electricity Concessions Law in 1992. The figure of independent marketer or broker does not exist. The law required the separation of generating, transmission and distribution functions for all sector enterprises except in isolated regions. Electrolima (EL) and Electroperú (EP), the largest enterprises in the sector, were the first unbundled and partially privatized. The regional utilities have been restructured into separate generating, transmission and distribution units. The sector is open to private investors in the generation, transmission and distribution sector, in competition with the existing utilities.
Competition	The wholesale market in Peru is rather competitive as the generation companies compete to supply distribution companies and large consumers in the deregulated market. Open access to the transmission system is enforced. However, competition is impaired because only generation and transmission companies participate in the dispatch pools (COES). Distribution and transmission activities are regulated as natural monopolies. In order to guarantee competition, there is a 15% percent limit to the market share of a company in the generation, distribution and transmission businesses. There is also a cross-ownership restriction, which limits a private company to have more than a 5% market share in only one sector.
Role of the State	Following the electricity concessions law, the Peruvian government has reduced its participation in the commercial power sector by privatizing some of its commercial assets and allowing the participation of private investors. The government still holds the 1,008 MW Mantaro project, 30% of most of the privatized generation and distribution companies and 100% of the transmission companies in the center-north and the south (ETECEN and ETESUR). The Ministry of Mines and Energy is in charge of policy functions. The Energy Tariffs Commission (CTE) and the National Direction of Electricity (DGE) share the regulation activity.
Regulatory Institution	Existing regulatory institutions were modified and given greater authority and definition under the 1992 Concession Law. Jurisdiction is mainly shared between the rate-setting Tariff Commission (CTE) and the National Direction of Electricity (DGE). DGE, under the Ministry of Energy and Mines, issues concessions, sets technical standards, and undertakes other regulatory and oversight functions. DGAA, the National Office of the Environment, issues regulations and oversees compliance with environmental standards and guidelines set by the National Environmental Commission.
Private Sector Participation	The sector is open to private participation in all the commercial activities. Some of these activities (hydroelectric and geothermal generation, transmission and distribution) are subject to concessions, which are granted by the CTE. The 1992 law aimed at complete divestiture of all state-owned sector enterprises. A major privatization program was implemented for the restructured EL and EP distribution and generation units in 1994-1995. The GOP retained 40% of the stock in these assets to sell later; allocating 10% of the total stock in the divested companies to enterprise and public sector employees. CTE has already awarded concession projects to the private sector, such as the southern transmission lines, owned by Red Electrica del Sur and the Mantaro-Socabaya transmission line, which links the Central-Northern

Issue Area	PERU
	System with the Southern System. The Aguaytia natural gas project is also in operation in the market.
Major Outstanding Issues	1. It is uncertain whether the institutional and regulatory agencies in Peru are strong enough to carry out their respective assigned duties with proper insulation from political intervention and pressures. The replacement of the Electricity Tariffs Commission (CTE) with the Energy Tariffs Commission, which will not only have responsibilities in the electricity sector but also in the natural gas sector, has increased fears in this regard. 2. The exclusion of distribution companies and large consumers from the COES deters competition in the market. 3. Some market power issues have been raised due to the movements in the Chilean companies that own shares in Peruvian companies. The acquisition of Enersis by Endesa España means that the two companies now hold more than the 15% share in the generation sector that is permitted by law. 4. The privatization process has slowed down significantly, and the government still holds a significant portion of the commercial activities. The sale of the remaining government shares in Egenor, Edelnor, Etevensa, Cohue and Edegel has been very slow, only a small portion in Edegel was recently sold in the Lima Stock Exchange. The 1,008 MW Mantaro complex is completely government owned, and its privatization is very politically sensitive. The government has only moved forward in the privatization of the regional distributors in the north, awarding 30% of four companies to a local group. 5. In order to promote the Camisea project through the construction of Natural Gas plants, the Peruvian government has imposed a moratorium on new hydroelectric concessions.
II. Legal & Regulatory Framework	
Legal Basis	*Law 25844, 1992, Electricity Concession Law.* This law defined the current industry structure in Peru. It created the Electricity Tariffs Commission (CTE) and the regional COES to be in charge of the dispatch of the system. It set the rules for awarding concessions for commercial operations in a competitive manner and emphasized in the role of the private sector in undertaking commercial operations in the sector. It also defined the new pricing and market entry rules at all levels. This law also required the unbundling of sector generating, transmission, and distribution activities and called for the privatization of all state-owned commercial operating assets in the sector. *Decree 009-93 EM*. This decree regulates the electricity concession law. *Law 26876, 1997, Law Against Monopoly and Oligopoly in the Electricity Sector*. This new law limits horizontal integration between companies in the generation, transmission and/or distribution businesses to 15% of the total market. Companies also may not hold more than 5% of the market in any one sector. Under this new law, companies that are planning to merge or sell their shares must first obtain approval from Indecopi, the consumer protection institute. The government will own "golden shares" in the utilities that are privatized in the future. These golden shares will give the government a deciding vote in decisions on whether to shut down the company, incorporate new shareholders, reduce capital, issue obligations convertible into shares, register shares on the stock exchange, or merge with other companies.
Role of the State	The government is in charge of policy and regulatory functions, which are undertaken by separate agencies under the Ministry of Energy and Mines. The National Direction of Electricity (DGE), the National Energy Counsel (CNE) and the Energy Tariffs commission. The government still holds a significant portion of the commercial assets in the sector, such as the Mantaro project, operated by Electroperú, the transmission companies and 30% of most of the privatized generation and distribution companies.
Institutional and Regulatory Entities and Jurisdiction	The **Ministry of Energy and Mines (MEM)** is ultimately responsible for the sector's policies, concessions and indicative planning functions. Under MEM, a revitalized **Consejo Nacional de Energía (CNE)** directly assumes the formulation and implementation of medium- and long-term strategies and planning functions.

Issue Area	PERU
	The **Dirección General de Electricidad (DGE)**, under MEM, issues concessions and other authorizations for sector participants in all operating activities, sets technical operational standards, oversees contracts and undertakes other regulatory and oversight functions. The **Energy Tariffs Commission (CTE)** sets, modifies and revises tariffs. It has a 5-member Directors' Council, of which the President is nominated by MEM; the Ministries of Economy and Finance, and Industry, Tourism, Integration and International Business each nominate 1 candidate; and the Generating Concessionaires and the Distribution Concessionaires each nominate 1 candidate. **CONAMA**, the Ministry of Environment, sets environmental policies and standards, while *DGAA* is the agency that implements and oversees them in the energy sector.
Sector Planning	CNE is in charge of indicative planning functions.
III. Sector Structure and Participants	
Structure	The two major, vertically-integrated state-owned sector enterprises, Electrolima (EL) and Electroperú (EP) were vertically and horizontally unbundled by function. EL was reorganized into 4 distribution units, divested in 1994, and 1 generating unit, which was divested in 1995. EP was separated into 4 generating units and its high-voltage transmission assets were combined with those of EL to form a national transmission enterprise for the main interconnected system, which is now state-owned. The newly formed entities operate under concession of the Ministry of Mines and Energy. Various new private projects are already competing in the market. The figure of independent marketer or broker does not exist in the Peruvian market. Pending their restructuring, the 9 other regional utilities under joint local and central government ownership were given greater autonomy. Some regional utilities have already been restructured into separate generating, transmission and distribution units. Some of the distribution and generation units have already been privatized.
Participants and Degree of Private Sector Participation	*Generation:* The generation sector in Peru is formed by a large number of companies, which compete for customers in the market. The largest companies are the result of the unbundling and privatization process of Electrolima and Electroperú. Electroperú still holds the largest generating capacity as it owns the 1,008 MW Mantaro Hydroelectric project. Edegel, which was formerly owned by Electrolima has and installed capacity of 825 MW. This company is 60% owned by the Generandes consortium, which is leaded by Entergy (US) and Endesa (Chile). Among the other market participants are the privatized companies derived from Electroperú (Empresa Eléctrica de Cahua, Etevensa, Nor-Perú and Pirurra), the regional companies and the new private concessions. *Transmission*: The transmission enterprises for each interconnected system (ETECEN and ETESUR) are still under public ownership. New concessions have been awarded to the private sector for the construction of transmission lines in the southern system and of the Mantaro-Socabaya transmission line, which will connect the Central-Northern System with the Southern System with 300 MW of capacity. Companies bidding for a concession in transmission are required to have a 15% participation of ETECEN. *Retail Distribution*: The largest distribution companies are those derived from the privatization of Electrolima. Edelnor and Luz del Sur (both with 60% private participation) serve Lima's metropolitan area. Ede Chancay and Ede Cañete serve Lima's surroundings. There are also various regional distribution companies in the north, which are partially owned by private companies, and in the south.
Targets for Privatization	The privatization of the regional distribution companies will continue, but participation most likely will be limited to local companies. In order to facilitate bidding from local companies, the government has reduced the stake to be privatized to 30%. The privatization of the regional generation companies, Egasa and Egesur has been delayed due to the changes in the privatization rules. Other possibilities for privatization are the remaining stakes in the initially privatized companies, in which the government still holds a 30% stake. Even though the government has repeatedly announced

Issue Area	PERU
	that they will not privatized the Mantaro hydroelectric project, there are still discussions on how to involve the private sector in the operation of this project.
New Investments	Most of the new investments in the electricity sector will be developed by the private sector, based on economic/market criteria. Even though the government is aiming to provide incentives to natural gas projects, other projects will also be built, including the 525 MW Cheves hydroelectric plant. The private sector is increasing its participation in the transmission sector, via the concessions awarded by the state.
IV. Electricity Markets: Areas of Competition and Monopoly	
Bulk Power	The wholesale power market in Peru is competitive in theory, as generators can freely negotiate power contracts with distribution entities and large consumers. Generators are dispatched based on their short-term marginal cost and trade deficits/surpluses at the resulting system short-term marginal cost. Open access to primary and secondary transmission systems is enforced. Competition is somehow impaired by the absence of distributors, large customers and marketers from the spot market. Companies may not hold more than a 15% market share in a sector and if a company has shares in various sector activities, it is only allowed to have more than 5% market share in one sector. Companies should notify Indecopi, the consumer protection institute of any possible merger or sale of shares. The acquisition of Enersis in Chile from Endesa España resulted in a participation of these companies of more than 15% in the Peruvian generation market. Indecopi is reviewing this acquisition, as it could go against Peruvian laws. The companies claim that the acquisition occurred before the implementation of the Anti-monopoly law.
Transmission and Distribution (Networks)	ETECEN and ETESUR dominate the transmission networks in Peru. The government is open to granting concessions for new transmission lines in the system, as have been witnessed in the past year. All transmission concessionaires must provide open access to their systems. Transmission lines are divided in primary and secondary systems, which are regulated monopolies.
Retail Distribution	Retail markets for consumers with loads of less than 1 MW are regulated monopolies. Distribution entities have an obligation to serve all consumers within the concession area and those with connecting lines to it. They must also maintain supply contracts with generators sufficient to cover their total supply requirements over a 24-month period in advance, and comply with pertinent environmental, technical and operating criteria for electrical systems. Distribution concessionaires can compete with generators for sales to deregulated large consumers (those with a demand of 1 MW or more). The Government is expected to gradually reduce the threshold for deregulated retail markets. Distribution entities serving a demand of 500 kW or more require a concession from MEM; otherwise local authorities can grant the necessary terms, rights-of-way and other authorizations. Concession contracts include the length of the contract, fixed physical area of service, and quality of service requirements.
V. Load Dispatch and Pool Operation	
Dispatch Entity and Basis	Each one of the systems has an operating committee (Comité de Operación Económica del Sistema, COES) formed by the generation and transmission companies. These operating committees are operated by the transmission owner and are in charge of performing the central dispatch functions for the generators in that system.
Pool Operation	Dispatch is based on economic merit order, which is pre-programmed in hourly units. The power market in Peru is based in two types of markets. A deregulated market for transactions between generators and large consumers, and a regulated market, for transfers between generators and sales to distribution companies. Node prices are set at each node of the system and are based on the weighted average of short-run

Issue Area	PERU
	marginal costs of generation for the entire system optimized over a 48-month horizon. This optimization takes into account water levels, thermal operating costs, capacity expansions, rationing costs and plant availability. Transmission costs are added to these generation costs to reflect the final node price.
VI. Pricing	
Bulk Power	Contract prices between generators and distribution companies and large consumers (with loads above 1 MW) are deregulated. There is also a regulated market, and these prices are used for inter-generator transfers. Regulated prices are reviewed semi-annually (in the months of May and November) and are calculated by each COES. Wholesale power prices are calculated for each busbar (node) on the transmission system based on the demand projections for the following 48-month period. These prices are calculated taking into account economic expansion of the system and the current conditions of fuel prices, reservoir levels, hydrology and discount rate. COES calculates energy and power prices for each hourly block in the market node. Energy prices are calculated as an average of the short-run marginal cost for each one of the blocks. Capacity charges are calculated based on the cheapest generation unit to supply the needed load in the hours of peak annual demand, the price is the annualized investment cost for that unit. For each one of the nodes in the system, COES calculates a factor for power losses and a factor that reflects energy losses in the transmission system. These factors would be equal to 1 in the market node. The final busbar prices are calculated multiplying the market node prices by their respective factors, and adding a transmission toll to the power prices in each busbar. COES notifies its calculations to CTE, which is in charge of approving and commenting the calculations. Regulated prices cannot vary by more than 10% of prevailing market prices.
Transmission/ Distribution (Networks)	Transmission prices include a transmission toll and a connection toll. Each transmission line in the primary system has a total transmission cost, which is calculated as the annualized investment cost plus the annual maintenance and operation costs. Transmission tolls are calculated by each COES based on the power and energy delivered and withdrawn from each node, and are remunerated at the respective busbar price. Connection tolls are the difference between the total transmission cost and the transmission tolls. Generators based on a pro-rate of their firm power pay these tolls. For secondary systems, users negotiate the compensation with the owner, though it is based on the average costs associated with an efficiently run system of its type.
Retail Tariffs	Retail rates are composed of the busbar prices plus an aggregate value of distribution (VAD). The VAD is calculated using a relevant efficient distribution model for each concession area. Rates of return are set every 4-year periods, based on a 25-year operating framework, and consider necessary investments, O&M costs and the New Replacement Value for existing assets. A Discount Rate, or risk factor, is established and periodically reviewed to provide a reference for returns on investments for regulated areas. If the rate of return varies by more than 4 percentage points of the Discount Rate, the VAD must be recalculated and the return adjusted.
Subsidies	Residential consumers with less than 30 kWh per month have subsidies of around 50% of their economic cost of service, while other residential consumers pay rates that cover their cost of service. These subsidies are mostly funded by taxes.
VII. Sector Problems and Priorities	
Framework and Other Issues	1. Even though the government has separate agencies for regulation, policy-making and overseeing activities, all of them operate under the ministry of energy and mines, which deters autonomy for each one of these agencies. They are still subject to political intervention. 2. Generation and transmission companies are the only participants of the regional COES, which deters competition by leaving out other market participants. 3. Market power issues should be considered and the new rules followed in order to prevent future horizontal reintegration in the system.
Operating Needs	1. A considerable amount of investment in new generating capacity is needed, as well as in

Issue Area	PERU
	rehabilitation of the existing sector assets in all functional areas. The government estimates that around $300 to $350 millions should be invested every year to fulfill these needs. Most of these investments should be made by the private sector. 2. The system is heavily dependent on the hydroelectric plants, which puts generation in risk during dry seasons. The government is trying to promote the construction of thermal plants in order to reduce this vulnerability and also to make feasible the construction of the Camisea gas field.
Electrification and Energy Efficiency	1. Distribution concessionaires are responsible for carrying out electrification efforts under the direction of the central government, which defines programs to extend and finance service coverage. From a level of 55% in 1993, providing service coverage is being undertaken more aggressively in the post-reform period. Current electrification levels are 65%, and the government has a 75% benchmark for year 2000. Targeted electrification efforts are financed with electricity consumption taxes. 2. During 1996, the government implemented an aggressive program to promote the use of compact fluorescent lamps with the aim of avoiding power shortages. In addition, for several years the government has used bilateral and multilateral donations to run CENERGIA, an energy efficiency agency. With the help of IDB's Sustainable Markets for Sustainable Energy program the government and the Sociedad Nacional de Minería Petróleo y Energía -a trade association- will implement an ambitious program to promote end-use energy efficiency and cogeneration.

VIII. Sources and Relevant Web Pages

Sources

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