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ESMAP
Energy Sector Management Assistance Program

Background Paper

INTERNATIONAL EXPERIENCE WITH PRIVATE SECTOR PARTICIPATION IN POWER GRIDS

PERU CASE STUDY

WORLD BANK GROUP
Energy & Extractives

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EXECUTIVE SUMMARY

This case study is part of an analytical effort aimed at advising World Bank staff and country clients on options for private sector participation (PSP) in transmission and distribution. The report is based on data collected on the Peruvian case, the review of literature, as well as on a set of interviews held with power sector agencies, including the regulator and system operator, power sector companies and experts in the field.

Rationale for Private Sector Participation in Peru

By the late eighties, Peru had fallen into a dismal performance with an economy ravaged by hyperinflation, falling output and real wages, external debt in arrears and exhausted foreign reserves. The power sector also went through a deep crisis characterized by a very low quality of services, inefficient public utilities and serious financial difficulties. Power restrictions in 1989 reached 13-20 percent of demand and the returns of the sector utilities had been negative since 1986.

The problems of the power sector were linked to its structure, a legal framework that guaranteed a public monopoly and the use on subsidies as a political tool to redistribute income and control inflation. The crisis justified measures in line with a thorough neoliberal economic reform that was underway. This reform included the reduction of an oversized public sector and the unbundling and privatization of the power sector.

The privatization of transmission was justified on the grounds of attracting fresh capital and achieving greater efficiency. PSP in distribution was justified on the same grounds, plus another important factor, it was seen also as a way to prevent or minimize government interference on the day-to-day operations of utilities and, most important, to avoid the politicization of electricity tariffs.

Challenges and Barriers and how were they addressed

Having decided to undertake a power sector reform, a first challenge was how to overcome the resistance of an old culture of state control that had been justified by the view that the power sector was a natural monopoly and that power supply was a strategic matter that had to remain under state control. The magnitude of the crisis was such that these inertial factors were counterbalanced by the recognition that the public monopoly model had failed and by the urge to improve the sector's performance.

Besides its political acceptability, a main challenge of PSP was how to attract private investment, both at the initial divestiture stage and the subsequent expansion period. Given the magnitude of the crisis, the only solution was a comprehensive reform of the economy, i.e. the departure from unsustainable policies and the adoption of a sound management of the economy. In power, this meant the need to create an environment where the electricity business was acknowledged as a commercial operation under rules of competition, profitability and accountability. Within this approach, PSP was not seen as a single course of action, but a very important policy measure that, together with other measures, was expected to contribute towards the recovery of the sector.

The Peruvian reform focused on the following main actions that were implemented, to a great extent, in a sequential manner:

i. Establishing an appropriate set of rules through the enactment of new legislation, strengthening regulation and a separate system operator;
ii. Unbundling of generation from transmission and distribution;

iii. Privatization of assets to the extent that it was politically possible.

The reform; A new legal framework was established by the Law of Power Concessions in 1993 (*Ley de Concesiones Eléctricas* - LCE). Subsequently, the ownership of most generation, transmission and distribution assets was transferred from public to private hands, together with concessions for their management and operation. The LCE created a sector regulator, OSINERGMIN (*Organismo Supervisor de la Inversión en Energía y Minería*) and stipulated procedures for rate setting, granting of concessions, customer service guidelines and accountability of operators. The role of the State was limited therefore to sector policy, regulation, granting concessions and a rather weak planning.

The LCE recognizes two categories of electricity public service users: the large unregulated users, that is, those with a demand greater than 1 MW, and the small (captive) users. Large users contract their electricity supply directly with generators within an energy wholesale market, in competition with many other buyers. Distribution companies supply electricity to small users in their concession areas at a regulated price. The operation of the power system is executed by the COES[1], a quasi-independent entity where most power sector players are represented. The LCE established also the open access to transmission and distribution facilities. The Peruvian electricity tariff scheme is designed on the basis of the full recovery of efficient costs. While a large share of the energy consumed is sold within the energy wholesale market (accounting 44% of national consumption), transmission and distribution tariffs are regulated for all types of users.

The reform did not encounter many obstacles during its initial years, in spite of the fact that it meant the elimination of most subsidies and a large increase in tariffs. The poor quality of the power service and poor reputation of public utilities were factors that allowed a smooth privatization. However, during the late 1990s the privatization process slowed down considerably due to domestic and foreign factors, such as the impact of the Asian financial crisis and a marked decline of public approval.

The reform, complemented by a favorable external environment, fueled a remarkable economic recovery and high economic growth. This successful performance implied also a quick growth of the power sector, as energy production grew at an average rate of 5.2% between 1993 and 1997, and 6.7% during the last decade.

Unbundling and Privatization of Assets; It was recognized that a competitive market required an effective unbundling plus separate ownership. This implied the privatization of generation, transmission and distribution assets, as well as the separation of generation from transmission. The privatization of generation and distribution assets started in 1994 and progressed smoothly until 1997 through a system of public bids. As the process lost political support, the privatization of generation and distribution could not be completed –the public sector kept by the early 2000s half of the generating capacity and its distribution utilities served about half of the residential clients. The national transmission system was fully privatized a few years later, in 2002.

The sale of existing assets and granting of concessions was done in the following manner:

- Creation of an entity (CEPRI) in charge of the privatization process;
- Selection of concessionaires through an open and transparent international public bidding process on the basis of the best price offered;

[1] Comité de Operación Económica del Sistema Interconectado

- It was a requirement for any eligible bidder to include a leading company with extensive experience in the pertinent field.
- With the exception of transmission, all concessions are open ended.
- Transmission was privatized in a different sequence, going first through a PPA period and, once the transmission was integrated into a single national system, utilities were privatized.

Since the reform, the expansion of the sector was dominated by the private investors. By 2010, the private sector owned 74% of the generating capacity and practically all the high voltage transmission system. In distribution the role of the private sector is more limited; at present, only 2.1 million consumers (of 4.9 million) are served by privately-owned distribution companies.

Second Generation Reform; During the last decade, Peru introduced a set of second generation reform measures to address concerns that the pricing system and market rules did not provide sufficient incentives for investors to expand generation and transmission capacity. After a drop in private investment and a severe drought, new legislation enacted in 2006[2] introduced a set of measures to ensure future supply, including the strengthening of planning, a more inclusive organization of COES, improvements in the pricing policy – particularly for transmission– and the establishment of BOOT low-risk contracts for transmission concessions. There are, however, a few outstanding issues that have yet to be resolved such as the poor performance of public distribution utilities and the increasing difficulties faced by developers in obtaining social and environmental licenses for new transmission projects.

Impact of PSP and Drivers for Success

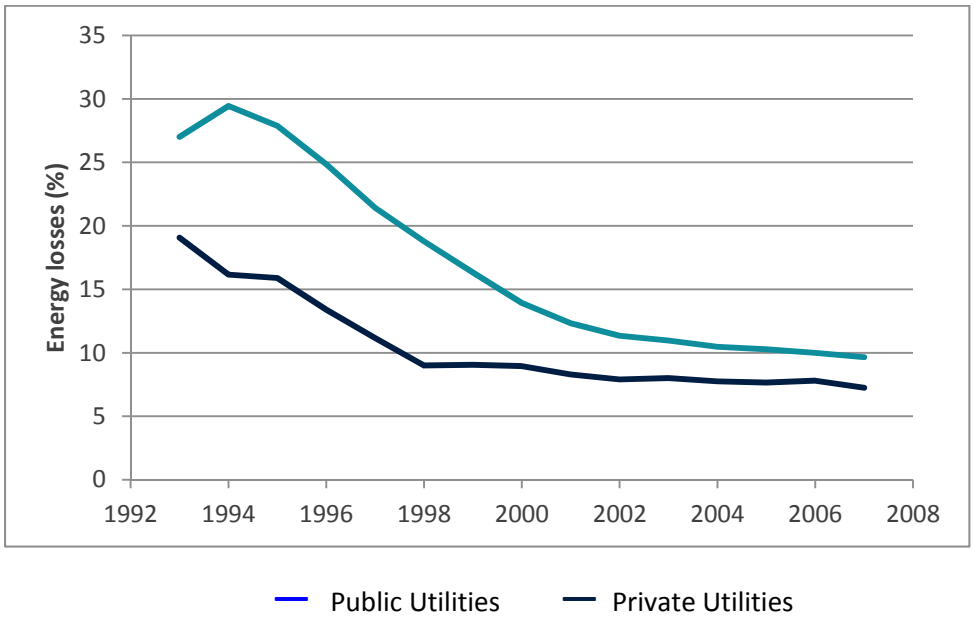
Upon the reform of the 1990s, the Peruvian power sector achieved an impressive improvement, maintaining stable and competitive cost-based prices, attracting investment and achieving a clear recovery in the technical, commercial and financial performance of the sector as a whole. The figure below presents one of the many accomplishments of the reform: the reduction in distribution losses[3]. Since the reform relied on a set of measures that acted together, it is not possible to isolate the impact of each of them. There are, however, areas where PSP had an obvious and clearly noticeable impact, in particular, when comparing the performance of public and private distribution utilities.

Private investment played a leading role in the expansion of the sector. During the period 1994-2010 it accounted for 87% of total investment in transmission, 56% in distribution and 73% in generation. This dominant presence of private companies was instrumental in improving the performance of the sector.

[2] Law No 28832 to "Ensure the Efficient Development of Electricity Generation."

[3] Other achievements include improvements in the quality of the service, labor productivity and the sound financial performance of private utilities.

Figure. Distribution Losses, 1993-2007



Source: author, based on MINEM data

The following lessons can be drawn from this case study:

- The Peruvian case illustrates the benefit of putting in place a set of rules prior to the privatization process. These rules included a new legislation that opened doors to PSP, a cost-based pricing system, and a separate operator of the power system;
- The good functioning of the transmission system shows that the strategic concerns associated with the transmission business are not an impediment for its privatization. In fact, regardless of its ownership, its success relied on the assurances given by a separate system operator and a sound regulatory framework;
- Privatization of power sector assets is a challenging task that can face serious constraints associated with each country's political environment and legitimate economic and social pressures;
- Extensive experience of bidders was a key factor of success of the privatization effort. Conversely, the absence of such experience explained some failures;
- The risks of vertical and horizontal concentration of assets call for a clear and effective legal and regulatory framework to establish the criteria and procedures for authorizing, or prohibiting, operations that could challenge the market;
- Initial difficulties in attracting investment in transmission illustrate the importance of: (i) an objective transmission planning to establish expansion needs; and (ii) a predictable tariff system based on competitively driven costs.
- The Peruvian experience highlights the limitations of marginal-type transmission pricing approaches. Two specific cases were: the 'new replacement value' approach and the locational marginal prices; and

- The increased difficulty in achieving the social license and related authorizations for transmission projects casts doubts on whether the private sector has the capacity to deal with it successfully without the support of public agencies.

PERU CASE STUDY

1. BACKGROUND

Reliable and affordable supply of electricity is a key driver of economic growth. Accordingly, electric power systems operating reliably, efficiently and competitively are high on the agenda of developing economies. In recent decades, many countries have embarked on efforts to introduce more competition through structural reforms, including sector unbundling and increased private sector participation across the entire power sector. World Bank country clients have identified the modalities of Private Sector Participation (PSP) in transmission and distribution (T&D) systems as an area of interest to policy makers in developing countries. In response, the Energy Sector Management Assistance Program (ESMAP), a global energy sector technical assistance facility administered by the World Bank, has embarked in an analytical study covering this subject.

Typically, participation of private agents has been first introduced in generation and distribution, while the high-voltage transmission segment has remained predominantly publicly owned because of its perceived strategic role from the national perspective and the strong natural monopoly character of transmission grids. However, transmission systems have gradually opened up for PSP in both developed and developing countries. Also, examples of successful private sector participation in distribution are numerous worldwide. In many cases, however, the risks for private investors are quite high, including that of excessive and politicized price controls by the state/regulatory agencies driven by end-user affordability concerns. An important issue for a developing country to explore is how PSP and regulatory/policy reforms (e.g., adoption of cost-reflective tariffs) should be sequenced.

2. STUDY OBJECTIVES AND ACTIVITIES

2.1 Objectives

The key objective of this analytical effort is to advise World Bank staff and country clients on options for PSP in T&D, drawing on best practice examples and lessons learned from international experience while taking into account specific country circumstances. In the process of concept development, a brief scoping exercise was undertaken to select the case studies of most relevant countries and regions. This selection considered the following factors: (a) demonstrated level of success in implementing PSP in T&D; (b) potential for replication of successful models among World Bank client countries; and (c) availability of exceptionally valuable lessons learned, both positive and negative.

The list of countries selected for the case studies is as follows: Brazil, Peru, Turkey, Philippines and India. This report pertains to the case study of Peru.

2.2 Activities

This report is based on the information obtained through the following activities:

- Data collection: The main data sources were;
  - i) Statistical Annual Report of the Ministry of Mines and Energy (MINEM), 2009-2010.
  - ii) Energy Sector Annual Statistical Reports for the period 1992-2010 prepared by the regulator OSINERGMIN (and its predecessor CTE: *Comisión de Tarifas Eléctricas*);
  - iii) Evolution of the Power Market Indicators, 1995-2010, Ministry of Energy and Mines;
  - iv) Power legislation enacted between 1993 to 2008; and
  - v) Complementary data obtained at interviews with different power sector entities, private and public.
- The report benefited also from the data and analytical work of previous studies on the Peruvian power sector[4].
- Interviews: A set of eleven interviews was held with government agencies, power sector companies (private and public) and experts in the field, including the Ministry of Energy and Mines (MINEM), the regulator OSINERGMIN, the system operator COES, Edelnor (distribution utility), Distriluz (largest public distribution utility), ISA (*Red de Energía del Perú*, largest transmission company), Kallpa (private generator), Electroperu (public generator) and experts who had a long engagement in the sector during the last decades. The report benefits also from interviews held prior to the study with several additional private companies and public institutions associated with the power sector. A complete list of the people and institutions met is included in Annex 1.

3. The Reform of the Power Sector in Peru

3.1 Crisis and the Urge for Reform

The eighties was a lost decade for Peru. The country had fallen into a dismal performance caused by inconsistent macroeconomic policies within a strategy that was heavily interventionist and distrustful of international linkages. Consequently, the government that took power in 1990 inherited an economy ravaged by hyperinflation, falling output and real wages, with seventy percent external debt in arrears and exhausted foreign reserves.

Like the rest of the country, the power sector also went through a deep crisis that was reflected in a very low quality of services, inefficient public utilities and extremely serious financial difficulties. Power restrictions in 1989 reached up to 13-20 percent of demand. The returns of the sector utilities had been negative since 1986 (losses exceeded one billion US$ during the period 1989-90) as the average revenue fell to a small fraction of actual costs. The ratio between administrative and technical staff was close to 3:1. Energy losses for the whole system reached 20% and in some regions exceeded 25%.

The problems of the power sector were linked to its organization and legal framework, which guaranteed a public monopoly in all aspects of the electricity business and didn't allow private ownership of any sort,

[4] In particular, three sector studies undertaken by the World Bank in Peru; (i) Peru: Recent Economic Developments in Infrastructure, 2010; (ii) Assessing the Impact of the Financial and Economic Crisis on Energy Sector Investment Requirements in Latin America and the Caribbean Region. Case Study: Peru, 2010; and (iii) Revisiting Standard Policy recommendations in the Power Sector: The Optimal Degree of Unbundling – Peru Case Study, 2009; plus the report "Sistema Tarifario del Servicio Público de Electricidad: una evaluación desde el punto de vista de los usuarios", 2003; prepared by Giovanna Aguilar for the Defensoría del Pueblo (Public's Ombudsman).

and to interventionist policies that relied strongly on subsidies as a political tool to redistribute income and control inflation. Also, over-regulation and lack of autonomy of the public utilities inhibited corporate dynamics and weakened the accountability of public utilities.

The magnitude of the crisis justified a drastic change of policies. This change included the reduction of an oversized public sector through divestiture and a radical reform that entailed a restructuring of the sector through an advanced degree of unbundling. There was also a much-needed shift in the sector's culture, including;

- A redefinition of the role of the State in the power sector, clearly separating its policy/regulatory role from its role as owner of public utilities;
- Recognition that the power business should be profitable, that private sector investment and operation should be encouraged within a competitive environment, and that government utilities should be transformed into commercially oriented enterprises;
- Recognition that electricity prices should reflect economic costs.

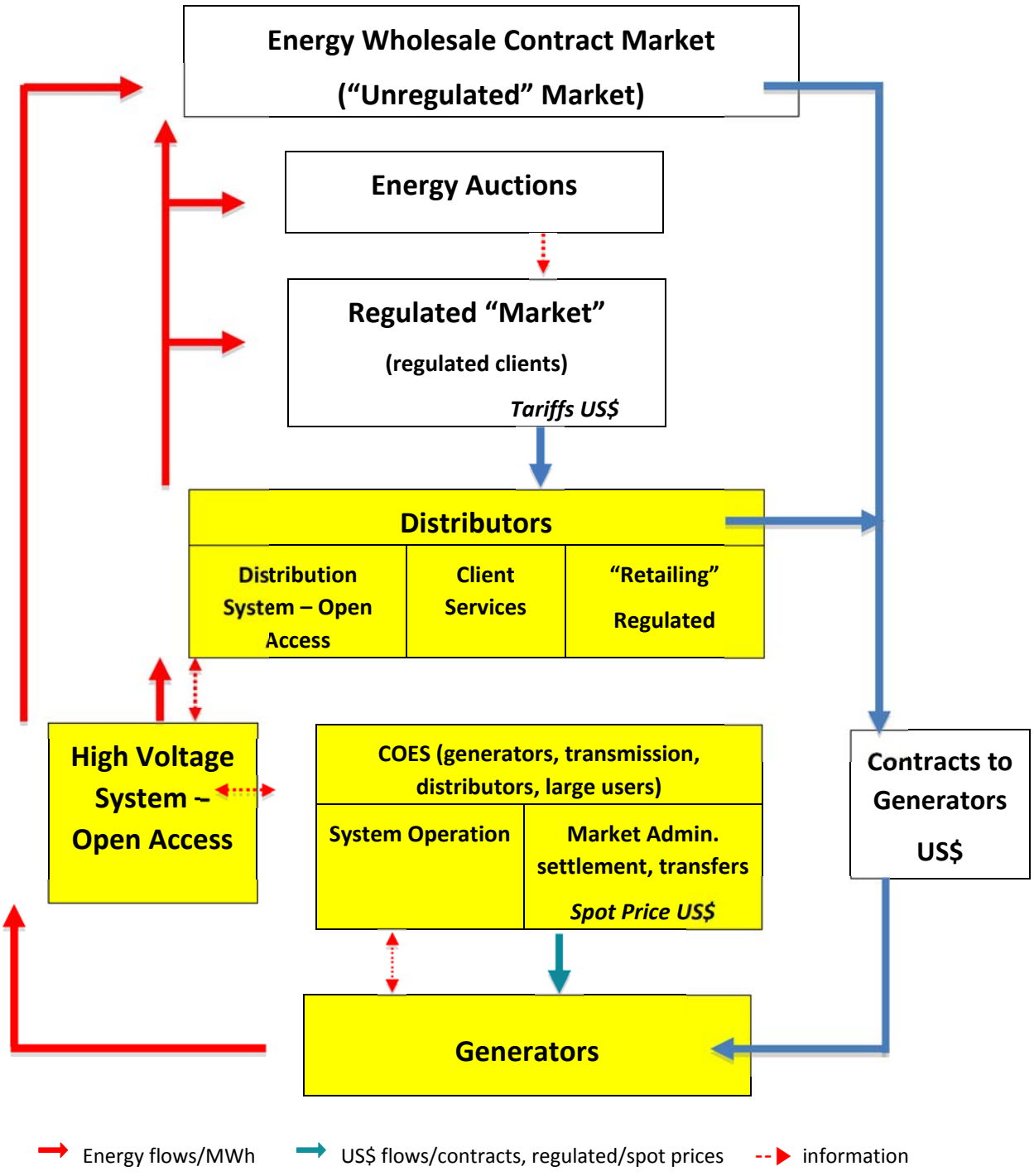
The power sector in Peru was reformed in line with a nationwide economic reform. The intention was to improve the overall performance of the sector and mobilize great part of the required financing from private sources. Therefore, the private sector was expected to be the principal player.

3.2 What was Done: The Reform of 1992-1993

The power sector was reformed and restructured between 1992 and 1993, followed by a privatization and concessions process. To this end, a new legal framework was set up through the Law for Power Concessions (*Ley de Concesiones Eléctricas* – LCE) and other complementary laws. The LCE established a system of private concessions for generation, transmission and distribution, its pricing system and an unregulated wholesale energy market.

The ownership of great part of the generation, transmission and distribution assets was transferred from public to private hands, together with a concession arrangement for their management and operation. The new legal framework created a sector regulator, OSINERGMIN (*Organismo Supervisor de la Inversión en Energía y Minería*) and stipulated the methodology for rate setting, granting of concessions, customer service guidelines and accountability of operators. The role of the State was limited therefore to sector policy and general regulations, the granting of concessions and a rather weak sector planning.

Figure 1: Structure of the Peruvian Power Market

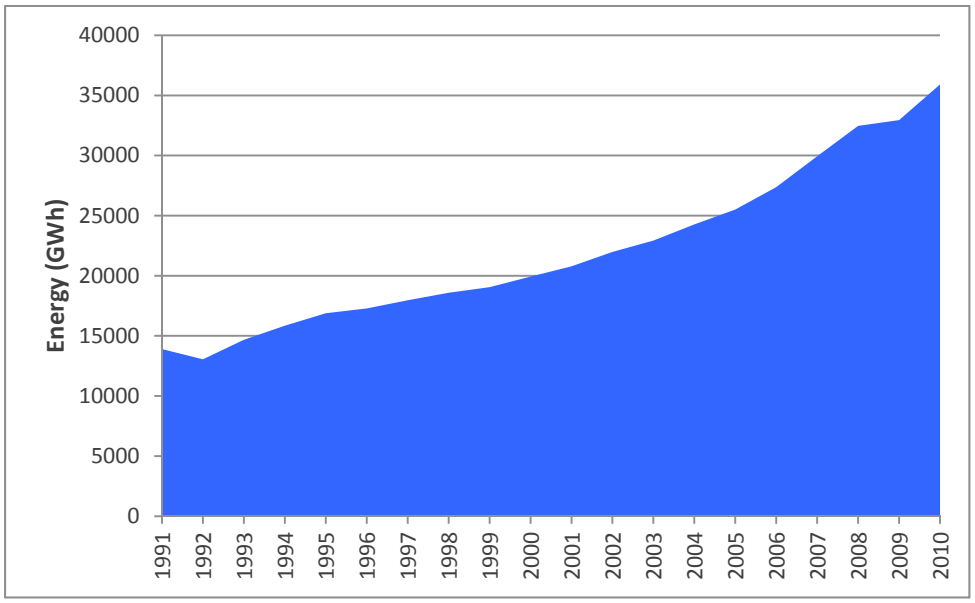


Source: Author.

The LCE recognized two categories of electricity public service users. The "large users," that is, those with a demand greater than 1 MW, and the "small" regulated users. Large users (also known as "free" or unregulated users) contract their electricity supply directly with generators through bilateral, freely negotiated contracts, in a competitive energy wholesale market. Distribution companies have the obligation to supply electricity to small users within their concession areas at a regulated price. The operation of the power system is executed by the COES (*Comité de Operación Económica del Sistema Interconectado*). The new legislation established also the obligation of transmission and distribution concessionaires to allow unregulated third parties utilize their systems for the transport of electricity. Figure 1 displays the structure of the Peruvian electricity market as established by the reform of 1993, including the amendments of a second generation reform held in 2006.

In retrospect, many interviewees believe that, while in balance the reform has been clearly beneficial –as evidenced by a noticeable improvement in the technical, commercial and financial performance of the power sector– the reform was performed with excessive optimism and without a full understanding of its implications. A Chilean model, that had yet to be tested, was adopted with minor modifications and without any significant political resistance. The reform momentum did not encounter many obstacles during its initial years, in spite of the fact that it meant the elimination of great part of the subsidies and a subsequent increase in tariffs by more than five hundred percent. The extremely poor quality of the power service, which had become a serious constraint to many productive activities and residential use, and the poor reputation of public utilities and their unions –that had been associated with the previous government– were factors that allowed at that moment a smooth privatization process.

Figure 2: Energy Production 1991-2010



Source: MINEM statistics

As mentioned above, the crisis justified a comprehensive reform of the economy, the need to abandon unsustainable and politically driven policies, and the adoption of a credible macroeconomic management.

In fact, such reform, complemented by periods of favorable external environment, allowed Peru to experience a remarkable economic recovery, to the extent of becoming the fastest growing economy of the Western Hemisphere. GDP grew at an average rate of 7% during the period 1993-1997 and, after a three-year slowdown, it achieved even higher growth during the past decade. This successful economic performance implied also a quick growth of the power sector, as energy production grew at an average rate of 5.2% between 1993 and 1997, and 6.7% during the last decade. In fact, electricity production has grown more than 160% since the reform started (see Figure 2).

3.3 Price Regime

The Peruvian electricity tariff scheme is designed on the basis of the full recovery of efficient costs in each of the three segments: generation, transmission, and distribution systems. Transmission and distribution tariffs are regulated for all types of users. Generation, on the other hand, has different price regimes; a generation tariff for small users[5], established by the regulator, and two options for large users: (a) negotiating electricity quantities and prices directly with suppliers within the wholesale energy contract market; or (b) participating in the supply auctions, as part of an aggregated demand with distributors. Further explanation of the price regime is included in section 5.1.2.

3.4 Second Generation Reform

During the last decade, Peru introduced a set of second generation reform measures to address concerns that the energy prices and market rules did not provide sufficient incentives to private investors to expand generation and transmission capacity. After a drop in private investment in generation and a severe drought in 2003-2004[6], new legislation enacted in 2006[7] introduced a set of measures to ensure future energy supply, focusing mostly in generation and transmission (section 5.6 develops further these issues).

4. RATIONALE FOR PRIVATE SECTOR PARTICIPATION

Fresh capital and greater efficiency; The key rationale for PSP in the transmission business is the need to attract large amounts of fresh capital to remove possible transmission shortages and bottlenecks without placing an excessive burden on public finances. For private investors, investments in transmission can be an attractive long term venture if risks can be maintained at a low level. From a national economic perspective, it can be argued that the corporate dynamics inherent to a private operation is likely to bring a more efficient and reliable operation of the transmission facilities, including the reduction of system losses.[8] In the Peruvian case, the privatization of transmission was rationalized on the basis of the concepts mentioned above: (a) attracting fresh capital; and (b) achieving greater efficiency. Also, PSP in transmission, as well as in distribution, was consistent with the ideological shift toward liberalism that the

[5] In fact, a purchase power cost transferred to retail consumers.
[6] Hydropower has been the major source of electricity in Peru, traditionally supplying 70 to 80 percent of electricity requirements nationwide, and more recently down to 60% upon the large-scale development of gas-fueled plants.
[7] Law No 28832 to "Ensure the Efficient Development of Electricity Generation."
[8] The corporate dynamics inherent to a private operation contrasts with the less dynamic public operation which is usually characterized by a strict government control on its day-to-day operations, slow procedures on procurement and budget approval, an unattractive salary policy, etc.

country went through during the early 1990s after the disastrous outcome of a highly interventionist populist regime.

De-politicizing the sector; PSP in distribution was justified on the same grounds as in transmission; that is, efficiency and the mobilization of financial resources. There was, however, another important factor. Private ownership in distribution assets was seen also as a way to prevent or minimize arbitrary government interventions on the day-to-day operations of utilities and, most important, on the risk of having electricity tariffs used as a political instrument.

While the risks threatening the distribution business are associated mostly to governance issues (stability of regulation, legal framework and pricing policies), transmission investments usually face, in addition, a set of project risks linked to unforeseen construction events and, nowadays more important, the difficulties and possible delays associated with the social licensing of transmission projects.

5. CHALLENGES AND BARRIERS AND HOW WERE THEY ADDRESSED

Aftermath of public monopoly period; Having decided the need to undertake a power sector reform in line with a thorough neoliberal economic reform, a first challenge was how to overcome the resistance of an old culture of state control and publicly-owned utilities. In the power sector, this was reflected by the presence of a state-owned vertically integrated monopoly –in those times, a common feature worldwide– that had been justified by the belief that the power sector had strong elements of a natural monopoly and, hence, there was not much room for competition. Also, power supply was perceived by many as a strategic matter of national interest and, hence, it was argued that it had to remain under the control of the State, i.e. private ownership was considered risky and, in fact, former legislation prohibited it. An important practical consideration linked to this concept was that departing from the publicly-owned monopoly meant also renouncing to use prices as a tool to redistribute income and control inflation[9] as well as a significant loss of political power. By 1990, the magnitude of the crisis was such that these inertial factors were counterbalanced by the urge to undertake a drastic reform. Nevertheless, resistance forces remained within the country's political environment and, in a later moment, became an insurmountable constraint to the continuation of the privatization process.

Attracting private investors; Besides its political acceptability, a main challenge of PSP in transmission and distribution was how to attract private investment to these areas, both at the initial stage of divestiture and the subsequent expansion period. Given the magnitude of the crisis, which surpassed the boundaries of the power sector, it was understood that the only solution was a comprehensive reform of the economy, the departure from unsustainable policies and the adoption of a credible management characterized by prudent fiscal balances, respecting the autonomy of the central bank, minimizing the use of price distortions and maintaining low levels of inflation and a flexible exchange rate. In the power sector, this meant the need to create an environment where the power business was acknowledged and respected as a commercial operation working under rules of competition, profitability and accountability. Within this approach, PSP was not seen as a single course of action, but as one very important policy

[9] The fully public power sector had been easy to manipulate. On the other hand, the presence of private ownership in different activities of the sector became an important constraint to political interference in setting prices; in fact, it was rightly perceived as a way of de-politicizing prices.

measure that, in addition to other complementary measures, was aimed at contributing towards a better functioning of the sector.

In order to address these challenges, the power sector reform focused on the following main actions (pre-requisites), which were implemented in an orderly fashion:

i. Implementing an appropriate set of rules through the enactment of new legislation, a sound cost-based pricing policy, the strengthening of the regulatory capability and establishing a separate system operator;
ii. Unbundling the assets ownership of generation from those of transmission and distribution; and
iii. Privatization of generation, transmission and distribution assets to the extent that it was politically possible.

5.1 Setting a New Power Sector Framework

5.1.1 Legislative Measures

A new legal and regulatory framework was established during the 1990s through the following laws:

- The Law for Power Concessions (LCE for its Spanish name, *Ley de Concesiones Eléctricas*) and its regulations enacted through the Legislative Decree N°25844, and Supreme Decree (DS) N°009-93-EM, respectively; that establishes rules and guidelines for the development of the power business and private sector participation;
- Antimonopoly and Anti-oligopoly Law for the Power Sector (Law N°26876), which regulates, inter alia, the vertical and horizontal concentration of ownership with the supervision of INDECOPI, the regulatory entity responsible for the good functioning of markets; and
- Law for the Agencies Regulating Private Investment in Public Services (Law N° 27332); which establishes new functions for OSINERGMIN and its merger with the former Tariffs Commission.

This legal framework was amended last decade (2006) as part of a set of second generation measures aimed at addressing a set of outstanding sector performance issues (addressed in section 5.6).

The Law of Power Concessions (LCE), passed in December 1992, was the cornerstone of the reform. It created a system of concessions for generation, transmission and distribution, which established the rights and obligations of concessionaires to use public goods as well as rights-of-way for the purpose of providing power sector services. In fact, the LCE is the legal measure that re-established PSP in the country after a long period of public monopolies and a strict control of the State on the sector. The MINEM and the regulator OSINERGMIN are responsible for the enforcement of the law and existing technical rules[10]. LCE established, inter alia, the conditions of the concessions, including the system of prices for the three main activities (section 5.1.2), the existence of unregulated and regulated markets, and the obligation of transmission and distribution concessionaires to provide open access to their facilities by third parties. The LCE established also the composition and operating rules of a new entity: a quasi-independent operator of the system (COES; *Comité de Operación Económica del Sistema*).

[10] These include:
The National Electricity Code, approved in 1955 and amended in several occasions (the latest in 2001 and 2006), establishes preventive rules and safeguards for a safe supply and use of electricity. The code is complemented by a process for the certification of materials and equipment as well as for the qualification of staff. It does not include specifications for the standardization of transmission and substation facilities that, according to some interviewees, would help reducing expansion costs.
Technical Norms for the Quality of Electrical Services (D.S. N°020-97-EM), that established minimum levels of quality for the services.

Below, some selected parts of the LCE;

- Concessions can be terminated under specific conditions established by the law, such as failure of compliance with the concessionaire's obligations; otherwise, the concessions have no termination date (Art 22).
- The distribution of the Public Service of Electricity in a specified zone, can be undertaken only by a single concession holder in an exclusive manner (art. 30).
- Transmission concessionaires have the obligation to allow third parties to use their facilities. Third parties should bear the cost of expansion, when this is necessary, and pay for the use of such facilities (Art. 33).
- Distribution concessionaries have the obligation to allow third parties to use their grid for the transport of electricity, except when this is done with the purpose of supplying regulated consumers (Art. 34, (d)).
- Sets the criteria for the transmission tariffs (Art. 59) – to cover the annuity of investments and standard O&M costs for an "economically adapted system", i.e. the costs of an efficient replacement of existing assets.
- Sets the criteria for distribution tariffs (Art. 63-66), based on the standard costs of an "efficient model company".
- Establishes a set of guarantees in protecting private investment in distribution, transmission and generation (Art. 104-107).
- The activities of generation and/or transmission belonging to the Principal System and/or the distribution of electricity cannot be undertaken by the same concession holder or by a party that exerts a direct or indirect control of such activities (Art 122).

Hence, LCE establishes open-ended concessions. Also, it does not allow more than one distribution concession per a specific area, establishes clearly the open access by third parties to transmission and distribution facilities, provided that, for the latter, this is done for the service of unregulated consumers (i.e. regulated/captive clients can buy only from their distribution concessionaire). In this respect, LCE's regulations establish that in case of discrepancies between consumers and transmission or distribution concessionaires –for the purposes of Articles 33 and 34– such discrepancies should be resolved by OSINERGMIN following a procedure established by the same law.

The law also prohibited for a concessionaire to be engaged in generation and/or transmission and/or distribution activities at the same. However, this prohibition was reviewed and modified by subsequent legislation upon a growth in ownership concentration caused by a set of mergers (section 5.4). This new legislation provided some room for flexibility establishing that vertical or horizontal concentration could be allowed if this does not restrict competition and the free concurrence of the market.

Also, the LCE establishes a set of guarantees and specific measures to promote private investment. These include the following conditions relevant to PSP in transmission and distribution:

- It is established that all concession contracts registered in the Public Registry have a character of law.
- Establishes the obligation for compensation in case that concessions are terminated for reasons not contemplated by the law. In such case, compensation should be made effective in a single

payment and based on the net present value of future revenues that would be generated by the said concession.

- Establishes the following rights of concessionaries:
    - payment of import taxes during a period of up to 36 months;
    - all the guarantees of the legal and tributary stability regimes;
    - free access to foreign exchange.

5.1.2 Price Regime

Direct Sales to Large Consumers; While transmission and distribution tariffs are regulated for all types of users, generation has different price regimes; a generation tariff for small captive users, established by the regulator as explained below, and two options for large users: (a) negotiating electricity quantities and prices directly with suppliers (generators or distributors); or (b) participating in the supply auctions, as part of an aggregated demand with distributors. However, capacity charges are regulated in all cases.

The market of large users (the "free" market) in Peru represents 44 percent of the overall demand[11]. In 2010, the average energy price in the free market was US$56.1/MWh, incorporating capacity charges. Figure 3 shows the monthly variations of prices in the free market during that year and the busbar (high voltage) regulated generation tariff for comparison. The figure shows that free market and regulated prices did not differ much during that period. This is no coincidence since the LCE, in an attempt to introduce a market driven constraint, establishes that the regulated tariffs set by OSINERGMIN should not differ by more than 10% from the market prices[12].

Due to the opportunities offered by the reform –including principally an open wholesale contract market and open access to transmission and distribution– many self-producers that were formerly isolated, decided to connect to the system and join the market. This is made evident buy the sharp decline of self-producers that went down from 32% of total energy production in 1994 to 15% in the year 2000 and has remained at that level since then[13].

Electricity Tariffs in the Regulated Market; The electricity tariff scheme is designed on the basis of the full recovery of efficient costs in each of the three segments: generation, transmission, and distribution systems. The generation regulated "busbar" [14] energy tariff, and its adjustment formulas, are established by OSINERGMIN every year, according to: (i) the expected evolution of demand and generation supply capacity, and its viable expansion, for the next 48 months; (ii) a least cost operation of the system; and (iii) expected marginal costs for the said expansion on a time of day approach. Adjustment formulas include the main uncertain variables: price indexes, tax rates, exchange rates, fuel prices. Since 2006,

[11] After reaching a peak of 46% in 2009, prior to the impact of the world economic crisis.

[12] While the specific practice of setting a constraint to the regulated tariff was not intended to have an impact on the market, it is the view of various observers that the sole existence of a regulated price had an impact on the market prices, i.e. in periods when market forces would have justified higher or lower prices (e.g. upon higher or lower prices of fuel), negotiated prices tended to follow the regulated price. This rather counterintuitive behavior would be explained by the tendency of using the regulated price as a 'safe' reference in justifying price agreements.

[13] Great part of the remaining isolated self-producers are located in remote areas where connecting to the power system would be uneconomical. Typical cases are mines located in remote rugged areas and the oil and gas developments in the midst of the Amazon jungle (the largest being Plus Petrol, the operator of the Camisea natural gas field) as well as off-shore oil operations.

[14] The term "busbar" is used to refer to the network nodes of the transmission grid, i.e. the main substations of the system. Differences between "busbar" prices are a function of the transmission losses specific to each node and the operational constraints of the transmission system. The way of addressing the operational constraints has changed with time.

upon a reform that established a system of energy auctions for short and long term supply contracts, the regulated energy tariff incorporates also the resulting prices of these auctions[15].

Figure 3: Prices in the Wholesale Market (monthly values for 2010)

Source: MINEM statistics

Real-time dispatch of generation supply is carried out by COES, a quasi-independent system operator, following a cost-based, merit-order procedure, independently of any bilateral contracts or the contracts resulting from energy auctions. The gap between bilateral contracts and the merit-order dispatch is addressed through hourly transactions between generators, distribution companies, and large users that are done at the "marginal/spot" price (of the last unit in the dispatch merit order)[16].

The tariffs of transmission and sub-transmission are regulated under an economic cost-based procedure (for existing assets) and the results of competitive bidding for transmission facilities that are required according to a transmission planning exercise (for new lines since 2006). Further elaboration is presented in section 5.5, on transmission issues.

The Distribution Tariff (VAD, *Valor Agregado de Distribución*) is regulated under a cost-based efficient model company, for each of five "typical distribution sectors" (urban high density, urban medium density, urban low density, urban-rural, and rural). Tariffs are computed for each distribution utility and for each typical sector taking into account a set of variables including, inter alia, annual consumption per client,

[15] The rules for the regulated component of the power market, which accounts for 56 percent of the total demand, were modified in 2006 through the incorporation of compulsory auctions for energy. This implied a gradual move from an administrated, though efficient cost-based, tariff to a market mechanism. Such auctions did not start until the period 2008-2009, once the procedures mandated by law were completed.
[16] In setting tariffs, the day is divided into two blocks, a 5-hour "peak period," when demand is highest, and the "off-peak period". The energy tariff is calculated on the basis of marginal costs and prices are offered by generators for these two blocks. Due to the cost-based, merit-order operational dispatch, peak energy price is higher than the off-peak price.

installed capacity in medium voltage substations, length of medium and low voltage lines. Values are adjusted on a monthly basis using adjustment formulas established by law. These formulas include various price indexes, exchange rates and import taxes. The values and formulas are recalculated by OSINERGMIN every four years. The tariff for a typical regulated final user consists of the generation tariff + the transmission tariff + the sub-transmission tariffs + the distribution tariff (VAD).

5.1.3 Sector Regulation

OSINERGMIN was established in 1996, according to the rules and functions set by the Law for Power Concessions (LCE). In 2000, it merged with the Commission of Electricity Tariffs, an entity that pre-existed OSINERGMIN and became an important technical branch. OSINERGMIN is a public institution responsible for the supervision of the enterprises of the power, hydrocarbon and mining sectors and the enforcement of the law in such activities. It is operationally and, perhaps most important, financially autonomous. Its functions are that of a typical regulator, including technical and commercial supervision, regulation, monitoring and sanctioning, claims resolution and the solution of controversies. The strengthening of OSINERGMIN, as well as of other regulators, has been a priority of successive governments in Peru and the energy sector regulator is at present a technically strong and independent institution that has gained the reputation of being a trustworthy and objective regulator. This reputation greatly contributes towards a business environment with clear and reliable rules that are appreciated by both investors and electricity consumers.

5.1.4 System Operator

COES was established by the law of 1993 (LCE) as a club of enterprises working on the supply side, i.e. generators and transmission companies, with the main objectives of: (a) taking care of the operation of the system following a merit order (least cost) criteria; and (b) acting as an administrator of the so called short term (spot) market, keeping account of the transactions made and the differences to be paid at marginal costs, i.e. solving the gap between the commercial commitments of existing contracts and the actual merit order dispatch. COES is organized as a non-profit private entity with a board of five individuals elected by its members for five-year periods. Since its creation, it has been able to build a strong management and technical team that acts quite independently and has gained the trust of all power sector players. However, COES' management is not fully independent since its budget is not established automatically by the contribution of all of its members, but approved on an annual basis. Hence, board members can exert discretionary powers on the scope, magnitude and orientation of COES' activities[17].

Upon the set of amendments of 2006, COES has assumed the responsibility of undertaking the planning of transmission nationwide, issuing a binding plan every other year. Further explanation of these amendments is included in section 5.6.

5.1.5 Rules for Entry

Clear rules in the licensing process for new generators and large consumers, i.e. the right of entry to the market as a large buyer or seller, constitute a key condition for the correct functioning and growth of the wholesale energy market and, thus, in offering the guarantees required by investors. The licensing process (including connection approval) contemplates the following steps:

[17] Actually, cases of 'interference' have been limited to the approval of specific analytical work, e.g. studies on automatic frequency control that implied possible installation costs that were not recognized by the regulator.

1. A pre-operative (definitive) study for generators and consumers with a demand greater than 10MW. The study checks power flows, system balance and the need for reactive compensation, filters, etc. that, if required, should be paid by the interested party. The opinion of COES is requested. Also, COES planning exercise determines which transmission lines are paid by the system and which not;
2. Environmental licensing – seen by the pertinent agencies of the public sector, i.e. MINEM and the Ministry for the Environment;
3. Operative study – analogous to the pre-operative study but using the information of actual equipment, which is reviewed by COES; and
4. Tests – upon satisfactory tests COES provides a certificate for commercial operation.

5.2 Unbundling the Sector Structure

It is worth noting that prior to the reform of the early 1990s, there had been already some sort of unbundling in the early 1980s, as the distribution function of Electroperu, a major state-owned vertically integrated utility that worked in all the country except Lima, was unbundled and a set of public distribution companies was created. Electroperu remained as a generation and transmission company. The other state-owned company, Electrolima, remained unchanged keeping its generation, transmission and distribution role in the area of Lima, the capital city and largest power market. This measure did not render any significant benefits since the 1980s was a decade of heavy political intervention that inhibited corporate dynamics and was aggravated by the country's economic crisis. Furthermore, this effort was mostly aimed at separating the accounts of different public entities with the objective of 'commercializing' them, but not to establish an energy market.

There was, therefore, the recognition that in order to achieve a competitive market an effective unbundling had to separate ownership. This implied the privatization of generation and distribution assets, as well as the separation of generation from transmission. To this effect, two public transmission companies were established (Etecen and Etesur)[18] with view to merge them once the national power system would be fully interconnected and privatize them thereafter.

Also, considering that the market was large enough, and aiming at the benefits of a comparative performance, the distribution utility of Lima was divided into two companies of approximately equal size.

5.3 Privatization of Assets

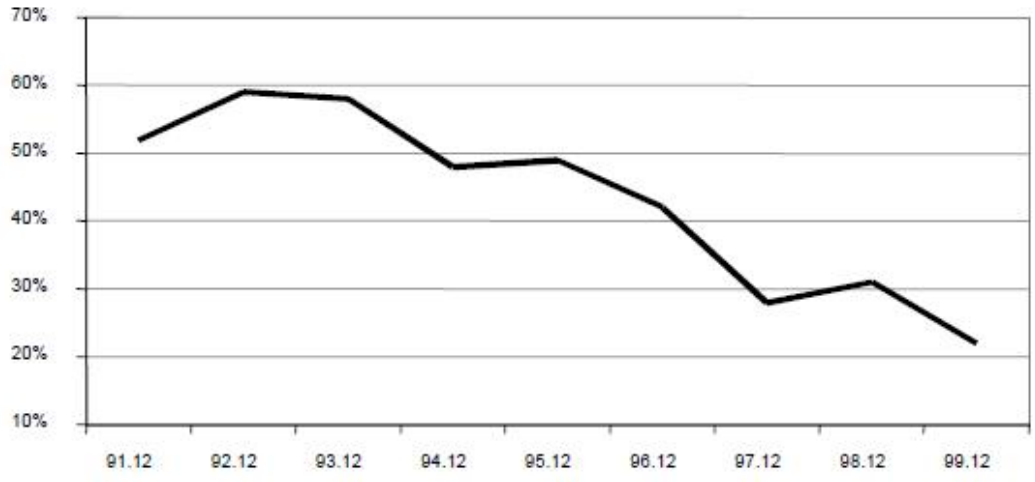
The privatization of generation and distribution assets actually started in 1994 and progressed successfully until 1997 through a system of public bids. Most generation assets were privatized except for the largest: the Mantaro hydropower plant that remained in hands of Electroperu and two smaller hydropower plants located in the southern provinces. Distribution assets were privatized in Lima and five provinces. The national transmission system was privatized a few years later, in 2002. During the late 1990s the privatization process slowed down considerably due to domestic and foreign factors, such as the impact of the Asian financial crisis and a marked decline of public approval. Figure 4, shows the results of

[18] Etecen and Etesur were public transmission companies' owners and operators of the North-Central interconnected system and the Southern system, respectively.

government surveys indicating that, by 1999, only 22% of the public approved the privatization policy (a drop from 59% in late 1992).[19]

The loss of political approval to the government's privatization policy was not exclusive to the power sector. In fact, public resistance was larger in other sectors, such as water supply, where little was achieved in privatizing existing utilities. The marked decline in public approval can be attributed to the following factors: (a) an overall perception of increased inequalities associated with the recovery of the economy, which included a drastic reduction of subsidies in all sectors; (b) an appeal to nationalistic feelings as great part of the assets were bought by foreign companies; this was aggravated by the (still surviving) concept that energy was a strategic sector of national interest and, hence, had to remain in local hands; and (c) a common political feature: the weakening of a government that remained in power too long[20]. The fall of political approval was not linked to a question of performance. With few exceptions, and more clearly in the power sector, privatized utilities succeeded in improving its performance from the beginning of the reform (further elaboration on this in Section 7). It could be argued, however, that the government was too adamant in implementing its privatization program, presumably without acknowledging the magnitude and causes of the declining public approval, while failing to get through the message that the improved performance of the power sector, and of the privatized utilities in particular, was benefiting a large majority. In fact, there were a few communication blunders that ignited protests against the privatization program and caused social unrest[21].

Figure 4: Public Approval of Privatization Policy



Source: COPRI – Comisión de Promoción de la Inversión Privada.

[19] It should be noted that the privatization policy involved all economic sectors including, in addition to power, oil and gas, water supply, transport, mining and industry.

[20] Fujimori's regime lasted eleven years (1990-2001). This political continuity offered the opportunity to consolidate policies that required a sustained (longer) support, but also came with an increased questioning of the government's legitimacy and declining approval.

[21] Some government television ads aimed at justifying the privatization process were perceived as depicting the opposition in a disrespectful manner or, at least, of very bad taste.

By the early 2000s, the privatization process had lost political support. In 2002, a last attempt to re-engage in privatization had an important setback, when under strong regional opposition and public outcry, the government had to cancel the privatization of two publicly owned generating companies (Egasa and Egesur) serving southern provinces. The privatization of distribution suffered also an important setback as four regional utilities were taken back by the State in 2001 upon the failure of a local concessionaire to comply with its payment obligations.[22]

While the privatization of generation and distribution assets was not completed –the public sector kept by that time about half of the generating capacity and its distribution utilities continued serving around half of the residential clients– all transmission assets belonging to the national grid were privatized.

The sale of existing assets and granting of initial concessions was done in the following manner:

- Creation of CEPRI (*Comité Especial de Promoción de la Inversión Privada de las Empresas Regionales de Electricidad*), an entity in charge of transferring the existing power sector assets to the private sector;
- The selection of concessionaires was done through an open and transparent international public bidding process on the basis of the best price offered;
- Other aspects considered in the bidding process were the commitment to invest (though this was usually limited to specific expansion requirements), and the financial soundness and operational expertise of the consortium;
- Main features of the sale of assets were: (a) 60% of the shares were offered during the initial international bidding; (b) 10% were offered to the company's workers; and (c) the rest was kept by the State with view to sell them through public auctions;
- It was a requirement for any eligible bidder to include as the leading entity of their consortium (with a 51% share or more) a company with extensive experience in the pertinent field.[23]
- With the exception of transmission, all concessions are open ended.
- Privatization of transmission assets was done in a different sequence involving the following steps:
    i. Establishment of two main public transmission companies, Etecen and Etesur, that corresponded to two physically separated transmission systems;
    ii. Etecen and Etesur promoted a PPA (Private Public Association) approach for the expansion of the system through specific transmission projects. Etecen and Etesur retained 15% of the ownership;
    iii. Such expansion was done through a BOOT model for 30 years, selected through international bidding;
    iv. Once the main transmission systems interconnected into one single national system (i.e. when Etecen and Etesur physically merged) the remaining public assets were privatized (in 2002).

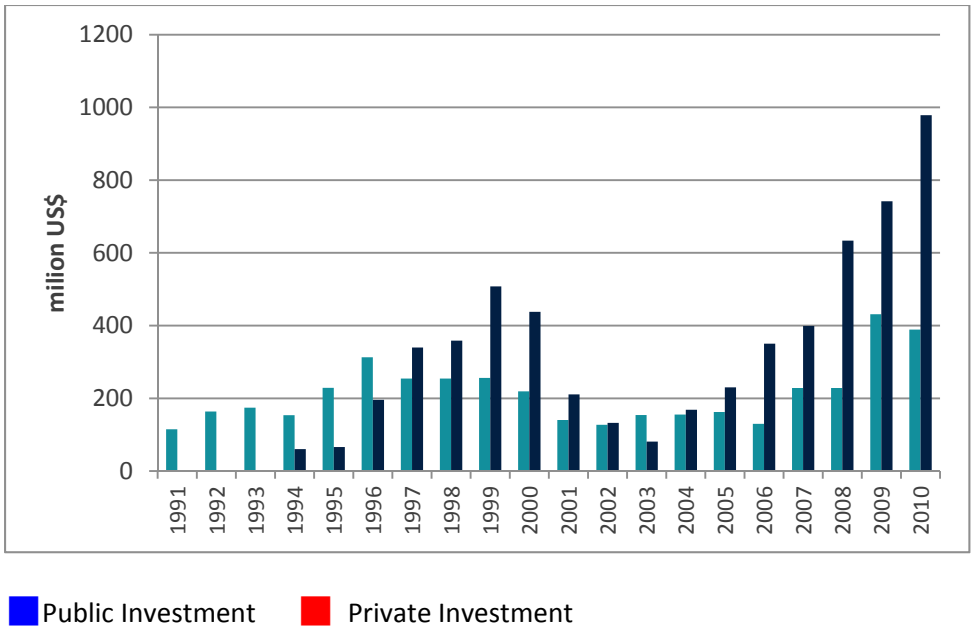
[22] Upon the failure of the local group Rodriguez Banda to comply with its payment obligations the regional utilities Electro Norte, Electro Centro, Electro Noroeste and Hidrandina, accounting for about 800,000 clients, were taken by the state-owned holding company Distriluz. The said group –a large dairy products industry that saw the privatization process as an opportunity to expand to other lines of business– had no previous experience in the power sector and, presumably, lost interest in this endeavor after two years of operation.

[23] However, it appears that this condition was not complied with in all times. The retreat of the Rodriguez Banda group from the distribution business (and return of four regional utilities to public hands) was apparently caused by the group's lack of experience in the field.

Nine companies (five generators and four distributors) were transferred to the private sector during the period 1994-1996 and five more during 1997-1998. Also, the concessions for four transmission projects were awarded during the period 1998-2002, prior to the privatization of Etecen and Etesur.

Subsequent expansion; Also, almost all the expansion in generation undertaken since the reform started has been based on private investment through a system of concessions established by the 1993 law and, in recent years, following an auction system for long term contracts (Figure 5 shows the evolution of public and private investment in the power sector). As mentioned, expansion in transmission was based initially on a PPA approach. As this approach proved to be insufficient upon the adverse impact of an uncertain tariff system (section 5.5), the government established in the mid 2000s a new bidding process for BOOT concessions that has been working effectively since then (in section 5.6).

Figure 5: Power Sector Investment - Public and Private (1991-2010)



Source: MINEM statistics

Table 1 below shows the most important private electricity companies operating in Peru, and their parent international corporations, in each one of the three business segments of generation, transmission and distribution. The table shows a majority presence of foreign companies among parent corporations. The Peruvian success in attracting foreign investment from the beginning of the power reform can be attributed to the following factors: (a) the credibility gained by the government's political will to undertake a sound macroeconomic policy; (b) putting in place a sound legal and regulatory framework that guaranteed an attractive business environment, i.e. predictability of prices and associated regulations and the legal protection to investment; (c) the country's fast economic recovery and subsequent demand for power expansion; and (d) the perception of an open and transparent bidding process for the transfer of assets.

Table 2 below presents the participation of the private and the public electricity companies in each business segment. This shows a relatively large number of suppliers competing in the market as well as an important disaggregation in the distribution business. The relative size of each business is shown in Figure 6, that displays the investments in each segment since the reform started. Total power investment reached US$ 8.4 billion during the period 1994-2010, excluding rural electrification. Power generation accounted for 53.4% of total investments, while transmission and distribution accounted for 15.4% and 31.1% respectively. Private investment accounted for 70% of total investment within the same period.

Table 1: Main Private Local Companies and Parent Corporations in Electricity

Generation		Transmission		Distribution	
Local Company	Parent Corp.	Local Company	Parent Corp.	Local Company	Parent Corp.
SN Power (former Cahua and Electroandes)	Statkraft / Norfund (Norway)	Compañia Transmisora Andina	Barrick Cayman (Cayman)	Edelnor	Endesa (Spain)
		Cohenhua	Cia de Minas Buenaventura	Electro Sur Medio	Iate (Argentina)
Duke Energy Egenor	Duke Energy Corporation (US)	Consorcio Transmantaro	Interconexion Electrica S.A. E.S.P. (Colombia)	Edecañete	Sempra Energy / Ashmore Energy (US)
		Isa Peru S.A.		Luz del Sur	
Edegel	Endesa (Spain)	Red de Energía del Peru			
Empresa Eléctrica de Piura (EEPSA)		Red Eléctrica del Sur	Red Eléctrica Internacional S.A.U. (Spain)		
Chinango					
Fenix Power	Ashmore Energy (US)	Eteselva	Aguaytia Energy LLC (US)		
El Platanal S.A.	Cementos Lima S.A.				
EnerSur	GDF Suez (France)				
Kallpa Generación	Inkia Holdings (Israel)				
Shougesa	Shougang Corp. (China)				
Termoselva	Aguaytia Energy LLC (US)				
Sinersa	Chaimon Corp.				

Source: author, based on MINEM information and others

5.4 Assets Ownership

As of December 2010, there were about 7,309 MW of installed firm generating capacity in the market, of which the private sector owns 74% (some 5,435 MW). Edegel (of the Endesa Spain group) with 1,583 MW, is the largest privately-owned generation company, and ENERSUR (of the Suez Energy group) the second

largest, with 1,086 MW. In the public sector, Electroperú with 1,096 MW is the largest generating company and *Empresa de Generación de Arequipa* (Egasa), the second largest with 331 MW.

The private sector practically owns all the high voltage transmission system (with the public sector owning only some sub-transmission lines to supply remote areas). *Red de Energía del Perú, Consorcio Transmantaro* and ISA Perú (all of them part of *Interconexión Eléctrica*, ISA, of Colombia) own around 5,300 km of 220 and 138 kV transmission lines, which represent close to 80% of all high voltage transmission assets.

The distribution segment of the electricity service has at present roughly 4.9 million customers, of which 2.1 million are served by privately-owned companies, and the remaining 2.8 million are served by various regional public-owned distribution companies. The two largest distribution private companies are Luz del Sur and Edelnor, which serve the capital city Lima, with 1.9 million costumers. These two companies have a concentrated and profitable market, with good technical and financial indicators.

Distriluz[24], a holding of four regional companies (Electro Centro, Electro Noroeste, Hidrandina and Electro Norte), is the largest public-owned company, serving a diverse market that includes several medium-sized cities with moderate load concentration (with 1.63 million customers, or about 8 million people). Distriluz's market is not highly profitable but has a return sufficient to sustain the business and expand the market modestly.

Two other distribution companies that serve the cities of Cusco (Electro Sur Este, with 306 thousand customers) and Arequipa (Sociedad Eléctrica del Sur Oeste or SEAL, with about 292 thousand customers) have similar characteristics to Distriluz. The remaining public-owned distribution companies serve a few medium-sized and relatively small cities and towns with low load concentration, and rural areas with disperse communities and low demand.

Ownership concentration; It is important to note that the distribution utility Edelnor and the large generating company Edegel are both owned by the same group (Endesa from Spain). Also, the new generating company Fenix (which is about to commission its first power plant south of Lima) is owned by Ashmore Energy, a majority shareholder of the distribution utility Luz del Sur. These are cases of an existing and future vertical concentration that could raise concerns about possible conflicts of interest within the energy market.

After the initial privatization process, changes in the ownership of generation and distribution assets have caused some degree of horizontal and vertical concentration that motivated a review of the country's anti-trust legislation in order to define what or how much concentration should be allowed. Upon the merger of the Spanish Endesa group with the Chilean companies Enersis and Endesa, the first group was able to control three generating companies (Edegel, EEPSA and Chinango) accounting for 26% of the installed capacity while also serving –through the distribution utility Edelnor– 22% of the regulated consumers. Also, Endesa's sales share in the free market was close to 30%, although this has declined in recent years upon the entry of new generators.

[24] Distriluz was privatized in 1998, only to be returned to public hands in August 2001, after the private operator failed to comply with its contractual obligations with the State.

Table 2: Participation of the Most Important Companies (Private and Public)

Ownership	Generation[1]		Transmission[2]		Distribution	
	Company	MW	Company	km	Company	# clients
Private	EDEGEL	1,583	REPSA	4,306	EDELNOR[3]	1,060,409
	ENERSUR	1,086	TRANSMANTARO	750	LUZ DEL SUR[3]	829,128
	DUKE EGENOR	695	REDESUR	428	ELECTRO	166,052
	KALLPA	602	ISA PERU	392	SURMEDIO	29,085
	SN POWER	264	ETESELVA	392	EDECAÑETE	11,515
	EL PLATANAL	220	ETENORTE	342	TOCACHE	27,828
	TERMOSELVA	203	CONENHUA	148	Others (8)	
	CHINANGO	185	ABENGOA N.	46		
	EEPSA	159				
	SHOUGANG	68				
	ATOCONGO	42				
	SINERSA	39				
	SDF ENERGIA	39				
	Others (25)	251				
Total Private		5,435		6,802		2,124,017
Public	ELECTROPERU	1,096			Hidrandina[4]	538,722
	EGESA	331			ELECTRO CENTRO	502,327
	ELECTRO ORIENTE	156			ELECTRO	313,089
	SAN GABAN	122			NOROESTE	306,066
	EGEMSA	109			ELECTRO SURESTE	291,666
	EGESUR	60			SEAL	278,733
					ELECTRO NORTE	172,338
					ELECTRO PUNO	174,660
					ELECTRO ORIENTE	119,601
					ELECTRO SUR	52,307
					ELECTRO UCAYALI	5,130
					INADE	
Total Public		1,874				2,754,678

Notes: 1. Installed capacity figures refer to those integrated to the power market; in addition, 1,303 MW are installed in isolated areas belonging mostly to private large consumers.

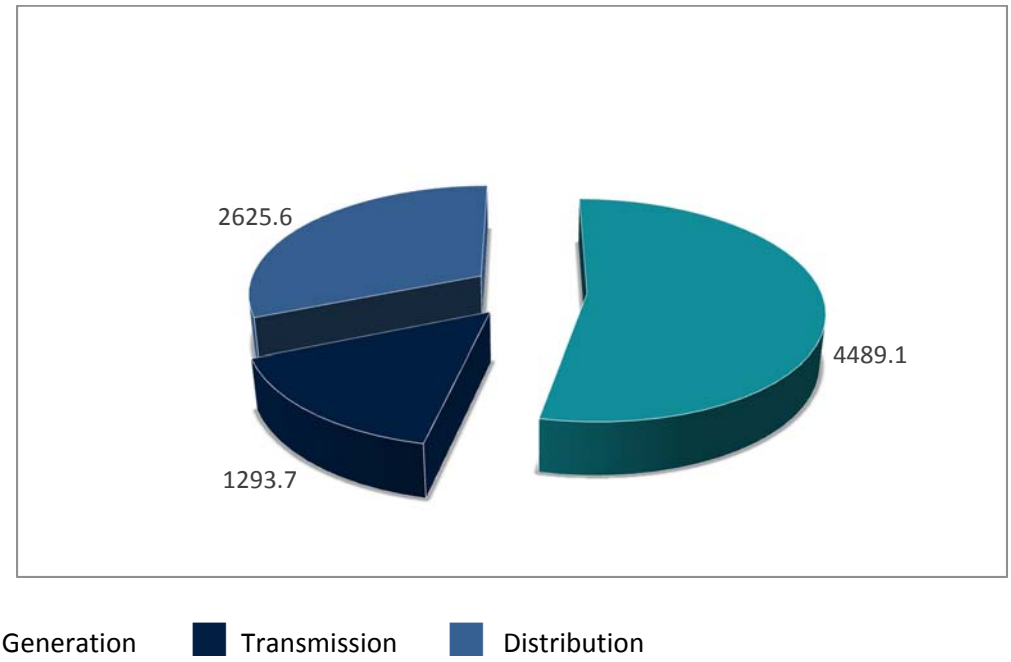
2. These figures refer to the main transmission grid (220kV and 138kV) providing services to the market; adding isolated systems plus lines owned by generating companies the total reaches 10,115km; including sub-transmission owned by distribution companies 17,065 Km.

3. Edelnor and Luz del Sur are the two distribution utilities serving the city of Lima.

4. The group Distriluz comprises the public utilities Hidrandina, Electro Noroeste, Electro Centro and Electro Norte.

Source: author, based on MINEM and OSINERGMIN information

Figure 6: Power Investments by Business Segment 1994-2010 (US$ million)



Source: MINEM statistics

The LCE established in 1992 that a single concession holder could not hold concessions in generation, distribution and/or transmission, thus setting limits to vertical concentration. However, it was not specific about the controls that could be exerted by economic groups through subsidiary companies. The anti-trust law of 1997 made possible the option of vertical integration that was previously prohibited, but established a set of measures to control mergers and acquisitions within the sector. In principle, it prohibits acts of vertical and horizontal concentration that have a negative impact on competition and the free concurrence of the markets. It established that vertical concentrations that involve companies with a market share greater than 5% require the authorization of INDECOPI prior to their merger. In regard to horizontal concentration, is was establish that INDECOPI should evaluate and, if deemed viable, authorize operations that involved a market share of 15% or greater.

After assessing the possible impact of Endesa's merger, INDECOPI concluded in 1999 that, given the existing regulatory framework, it was unlikely that the said merger could bring risks of monopolistic practices. Nevertheless, INDECOPI's resolution came together with two constraining conditions: (i) that the distribution utility Edelnor should be obliged to follow an open bidding process for each of its energy purchases, something other distribution utilities are not obliged to do; and (ii) to restrict the representation of the Endesa group in COES, reducing it from three to two votes.

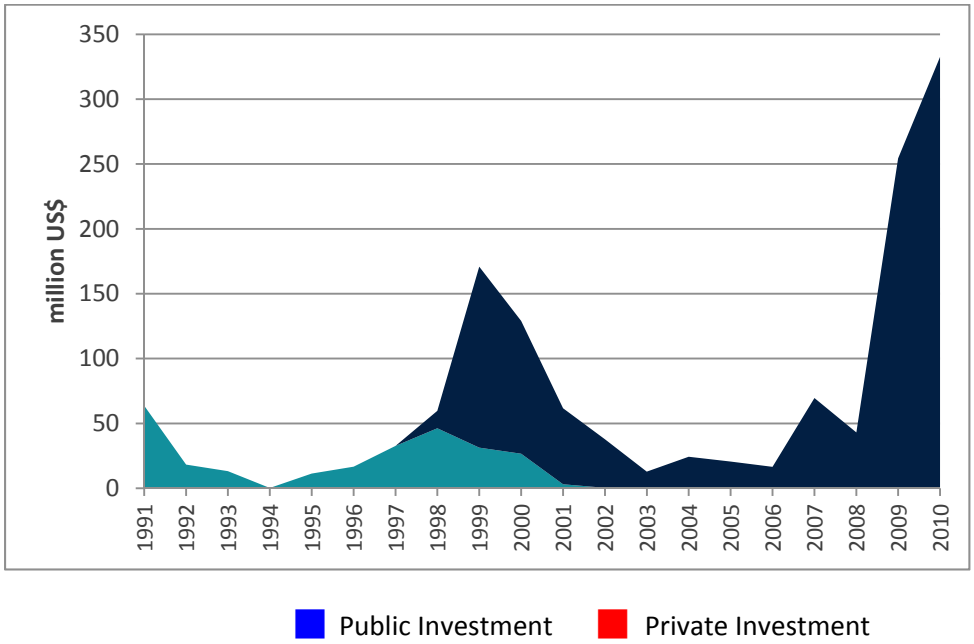
5.5 Transmission Issues

A well functioning and sufficient transmission system is essential to guarantee meeting the electricity requirements of a country. Also, a transmission system with open access to third parties is essential for the adequate functioning of a competitive energy market. When the transmission system of a country is

fully developed, the cost to connect often constitutes a minor component of a power plant's investment cost or a large consumer. However, in countries with a relatively large and rugged territory and an underdeveloped transmission system, such as Peru, transmission requirements could be a serious barrier to development both at the supply and demand sides.

The legal framework of 1993 established a transmission system structure under which transmission lines, and associated substations, were considered to be part of a "Principal" or a "Secondary" transmission systems. The Principal transmission system was the high voltage network that connects generation and main demand centers. The Secondary system referred to transmission at intermediate voltage levels (mainly 33/69 kV) to connect the Principal transmission system to demand substations or to individual generating plants.

Figure 7: Investments in Transmission 1991-2010



Source: MINEM statistics

Investment in transmission was expected to rely on the private initiative. However, by 2005, investment in the Principal system was quite limited and started to be a cause of alarm (Figure 7). This low level of investment was attributed mainly to the transmission tariff scheme, which did not provide enough guarantees for the recovery of the investment. Although consumers were paying for the Principal transmission system through a "postal stamp" charge, the calculation of this charge was not based on the real costs of the system but on figures estimated by OSINERGMIN on the basis of what many investors perceived to be an arbitrary evaluation scheme. Tariffs for the use of the Secondary system -by third parties- were also established by OSINERGMIN, through cumbersome procedures, constantly disputed by the owners of these lines.

The tariff for transmission set by the LCE 1993 law was based on the concept of "economically-adapted transmission system." Under this concept, transmission costs considered by OSINERGMIN were based

on: (i) a new replacement value of the existing system; (ii) a least cost expansion; and (iii) efficient operation and maintenance costs for a system that was "optimally" loaded (usually at 80% of its capacity) in meeting demand during the next 15 years. This computation did not acknowledge the concept of sunk costs for existing assets and, therefore, yielded different tariffs for each computation. It was argued that this scheme tended to underestimate transmission requirements and was unrealistic regarding transmission loading patterns. Also, it ignored needed transmission reserve capacity but, most important, resulted in volatile transmission tariffs thus introducing a major source of uncertainty that proved to be unacceptable to investors.

The reform of 2006 (discussed further in section 5.6 below) reduced considerably the uncertainty associated with the transmission tariff and incorporated market forces in setting tariffs. This was achieved through the acknowledgment of sunk costs for existing assets (i.e. setting a fixed economically efficient cost for these assets, instead of the former new replacement value that yielded volatile results) and the incorporation of bidding costs for all new transmission lines.

Another problem associated with the initial transmission regulation was that there were no clear guidelines on which transmission investments should be included as part of the Principal system and which should be excluded. Therefore, large users and/or generators requiring dedicated transmission facilities to connect to the nearest substation, saw the opportunity to lobby OSINERGMIN and MINEM for the inclusion of their particular transmission investments as part of the Principal transmission system, and hence transferring payment of these facilities to all consumers through the transmission tariff. The new regulatory framework addresses this problem through the mandatory transmission plan prepared by COES, which determines which investments should be included as part of the Guaranteed system and which should be excluded and, hence, paid by specific interested parties.

Due to the lag in transmission investments of the mid 2000s –coupled by the fast development of gas-fueled generation plants near the city of Lima– the Peruvian system experienced problems of congestion during the period 2006-2008. This congestion caused considerable losses to some generation companies since they had to purchase energy in remote nodes at a much higher price in order to comply with their commercial commitments. Generators complained arguing that the locational marginal price system caused inefficiencies and a 'cross-subsidy among generators'. Since then, the marginal approach to nodal energy prices has been replaced by a single energy cost (adjusted at the nodal level by transmission losses only)[25]. This amendment implies: (i) a departure from an economic approach based on the 'right' price signals and, hence, weakening the incentives system; and (ii) a move towards a more regulated system that is based on a binding transmission planning prepared by COES upon the Government's mandate.

A last and growing problem faced by the expansion of the transmission system is that of social licensing (discussed also in section 6).

5.6 Recent Developments: Second Generation Reform of 2006

After about ten years of reform it was clear that some amendments were needed. As mentioned above, the period 2001-2004 was characterized by a sharp decline in private investments for generation

[25] In this new approach, the higher costs of more expensive generation caused by congestion in remote areas is 'socialized' through its inclusion in the transmission tariff, i.e. it is charged to the transmission side and paid by all parties according to their use of such system.

expansion resulting in a low reserve margin. Also, investments in transmission had never fully responded to the country's requirements (Figure 7) and, due to the fast development of gas generating plants the transmission system was growing in a radial fashion that increased the risks of congestion. Another problem was a large number of disputes associated with the inclusion of new transmission facilities into the Principal system. A severe drought in 2003-2004 and supply crises in neighbor countries (Brazil, Chile) were also factors that highlighted the urgent need to take corrective measures.

Consequently, new legislation was passed in 2006 (Law No 28832 to "Ensure the Efficient Development of Electricity Generation") introducing a set of measures to ensure future energy supply, the strengthening of planning, a more inclusive organization of COES and a set of improvements in the pricing policy for generation and transmission. These measures included:

1. Formalization of a centralized and binding transmission planning (undertaken by COES every other year upon the request of MINEM) aimed at identifying the system's expansion needs and, through this exercise, resolving disputes caused by the conflict between the common (system) interest vs. specific projects interests when dealing with transmission investments (i.e. what should be included within the Principal system –and paid by all consumers- and what should not).
2. Establishing 30 year concession under BOOT (Build, Own, Operate and Transfer) contracts under competitive bidding procedures to develop the transmission projects included in the plan. The new contract system is aimed at guaranteeing the revenue requirements of the investment and, thus, reducing considerably project risks. However, environmental and social licenses are responsibility of the bidder. More details on this process are presented in the box below;
3. Reduction of the uncertainty in the transmission pricing system through the abandonment of a tariff system based on a theoretical 'New Replacement Value' that yielded different results every year and was not linked to actual costs. This approach was replaced by a tariff system for transmission that recognized the sunk costs of existing assets and captured actual expansion costs resulting from a competitive bidding process;
4. Changing the composition and governance of COES with the incorporation of distribution companies and large users as new members. Currently, its membership includes 16 generators, 7 transmission companies, 10 distribution utilities and 36 large unregulated consumers. It is understood that the presence of the three main groups of interest –generation, transmission and consumers– helps in arriving to balanced decisions, particularly with respect to the expansion of the transmission system, as the interests of different groups tend to counterbalance each other;
5. Establishment of a system of energy auctions to ensure short to long term supply of energy. That is, the obligation of distribution companies to meet the demand of the regulated market with long term energy supply contracts awarded under competitive bidding procedures, with the provision that energy prices under these contracts can be passed through to electricity tariffs. Large consumers can participate in these auctions as part of an aggregate demand together with the distribution companies; and
6. Incorporation of the generation prices resulting from the auction process into the methodology for setting regulated tariffs. This meant an important shift from a purely administrated regulated tariff to a more market oriented tariffs system.

The reform of 2006 had a rather slow start since great part of the procedures mandated by the said law were not completed until 2008-2009. No further laws have been enacted since then, with the exception of a few incentives for the development of renewable energy.

Box 1: The Transmission BOOT Model

Upon the declining level of investments in transmission and the growing number of disputes on which investments should be included as part of the Principal system, the second generation reform of 2006 established a new BOOT model for transmission. This model involves the following steps:

- The system operator COES prepares every other year a Transmission Expansion Plan based on a least-cost/multi-attribute criteria that is approved by MINEM prior review of the regulator OSINERGMIN. This plan identifies what is called the high voltage Guaranteed System and is binding to all parties;
- Transmission projects included in Guaranteed System go through an international bidding process;
- The criterion for selection of the winning bidder is that of the lowest Guaranteed Annual Return (i.e. the annual return required by bidders to cover its investment and operation and maintenance costs);
- A BOOT contract is signed guaranteeing the revenue requirements of the winning bid for a period of 30 years;
- The transmission project revenues are paid by all clients (generators, large consumers and distribution utilities) in proportion of their energy consumption and maximum demand, thus introducing an incentive among consumers to move away from peak hours;
- The main obligations of the project are: project design, construction and operation and maintenance, including the required environmental and social licensing;
- Project risks are borne by the transmission project, while market risks are borne by the system as a whole.

While some of these measures were aimed at improving the transmission business environment and, consequently, succeeded in attracting new investment in this area, other sector wide measures (such as improving the governance of COES or ensuring a more reliable energy supply) contributed to a better functioning of the sector and, indirectly, benefitted the transmission and distribution businesses. The marked increase in transmission private investments (Figure 7) are a clear evidence of the positive outcome of these second generation measures.

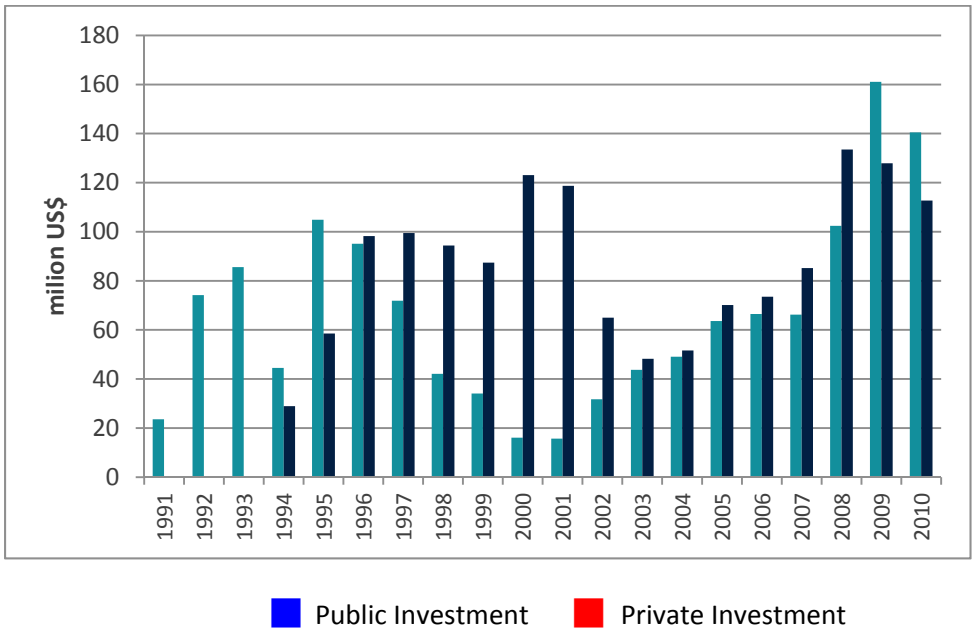
6. OUTSTANDING ISSUES

The following outstanding issues, to different degrees, tend to have an impact on satisfactory performance of the transmission and distribution sub-sectors.

- **Poor performance of public distribution utilities;** public utilities are subject to a set of government controls that impose serious constraints to their satisfactory performance. These limitations include an excessively strict control on all its expenses by the Ministry of Finance[26], serious constraints imposed by a statewide unattractive salary policy, a slow procurement procedure and, in practice, insurmountable difficulties in getting the authorization to incur in any debt. These constraints result in a poor performance of all public distribution utilities that reflects in almost all commercial, financial and technical indicators, and contrasts strongly with the performance of private utilities. Besides, the concessions of most public utilities are characterized by the presence of a large number of lower income consumers and sparse populations, thus increasing unit costs and reducing revenues per consumer. Many interviewees argued that a critical area, and potential Achilles heel of the power sector, is sub-transmission. That is, substations 220/60 or 138/60 and the 60kV transmission which, some interviewees argue, are close to collapse. So far, no solution to this problem is envisaged, since subsequent administrations have remained hesitant about supporting or strengthening public utilities, as if they still kept the hope –perhaps not convinced of the likelihood of public enterprises to perform well– of privatizing them. Furthermore, many of the public distribution utilities are used still as a tool to satisfy the governments' political objectives through an ambitious expansion of rural services that add to their financial burden. While this is not strictly a PSP problem, the important role played by public utilities in this sub-sector (a large, and growing, 56% of the market; Figure 8 displays its renewed role in the expansion of distribution systems) poses a threat to the overall performance of the sector and draws attention to the convenience of completing the privatization process that was interrupted ten years ago.
- **Social Licensing of Transmission Projects;** the number of social/political conflicts associated with the development of infrastructure projects is skyrocketing in the country, and transmission projects are no exception. Currently, an important transmission project is on hold and other two projects are being delayed by the completion of a new consultation law. These delays are expected to cause transmission congestion next year (2013) and the subsequent increase in energy costs in the respective regions. According to current practices, developers are responsible for each project's environmental and social licenses. A case can be made on the convenience of returning to older practices (prior to the reform of 2006 that established the current BOOT system) whereby transmission projects were bid after these licenses had been obtained through the direct intervention of the public sector. It is argued that public agencies are in a better position to deal with these issues due to their permanent presence in the regions and because –several interviewees claim– they tend to generate a milder adverse reaction from local communities.

[26] Through the SNIP (Sistema Nacional de Inversión Pública), an administrative system that controls tightly the project cycle of all public investment projects.

Figure 8: Investment in Distribution 1991-2010



Source: MINEM statistics

- **Weak power sector planning;** as seen above, transmission planning is undertaken by COES, the operator of the system. This is a recent development resulting from the generation reform measures of 2006 which are certainly helping to overcome past uncertainties associated with the expansion needs of the power sector. However, besides this activity very little is done regarding sector planning. Since the beginning of the reform in 1993-1994, the State has taken a relatively passive role limited to setting conditions for private investment without revealing a long term strategic view. In fact, the government has no effective central body to plan for the sector. This has led to a few problems that tend to impact negatively on the efficient functioning of the sector. Thes include:
  i. Lack of integration of the planning for hydropower and natural gas development;
  ii. Lack of significant investment in hydropower, resulting in an increasing share of thermal generation and carbon emissions, the development of a radial transmission system and associated risks of congestion;
  iii. Lack of attention to energy efficiency;
  iv. Lack of attention to regional energy integration;
  v. One of the lowest rates of access to electricity in rural areas in Latin America.
  vi. There is also a weak coordination between the country's energy plans and its social and environmental objectives. This has become particularly important since, in recent years, a set of political conflicts associated with social and environmental issues have become a serious constraint to the development of transmission projects.
- **Obstacles to open access in distribution**; several interviewees stated that the current legislation is not fully effective in this respect. It is reported that some distribution companies tend to place obstacles to the connection of new unregulated customers (i.e. new large consumers

interested in buying directly from the wholesale energy market) in an attempt to force them to buy energy through the utility. Cases of coercion have been reported. While it is the role of the regulator to intervene in these disputes, it was argued that the process is often times too long and new consumers tend to yield to the utility's pressure. This is an unresolved problem that distracts management, causes additional costs (dispute resolution costs to clients and the utility) and tends to constrain the wholesale energy market (discouraging private investment). However, it is not clear which is its magnitude of this problem[27]. Causes of this problem are: (a) the possible lack of neutrality of the tariff system, i.e. that the distribution utility would find a financial benefit in engaging in energy sales as opposed as limiting its service to the transport of energy and the commercial services associated with the distribution activity; (b) the aftermath of a culture of monopoly and exclusive rights (a distribution company argued "it is our concession", when addressing the issue; in fact, they did not consider this to be a problem); and (c) a dispute resolution process that does not accommodate to the timing requirements of new consumers/investors.

7. Evidence of the Impact of PSP on Transmission and Distribution

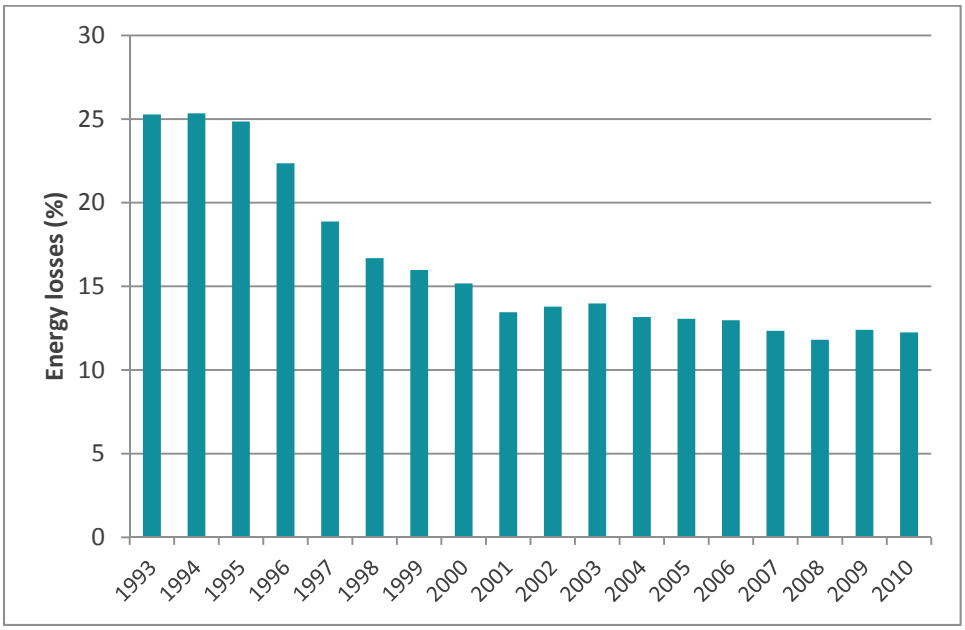
In the Peruvian case, PSP in transmission and distribution was justified on the basis of two main objectives: (a) attracting fresh capital; and (b) achieving greater efficiency.

Upon the reform of the 1990s, the Peruvian power sector experienced an impressive improvement in its performance which was evidenced in its capacity to maintain stable and competitive cost-based prices (Figure 3), attract the required investment (Figures 5 through 8), and achieve a clear improvement in the technical, commercial and financial performance of the sector as a whole. As mentioned in previous sections, the reform relied on a set of measures that acted together in achieving these gains. Therefore, it is not possible to isolate the impact of many of these measures. For example, the success in attracting investment in distribution cannot be attributed to a single measure –such as the decision to privatize– but to the favorable business environment made possible through a set of conditions including, inter alia, the presence of a trustworthy regulatory framework and the government's political will to respect the power sector as a commercial operation. There are, however, areas where PSP had an obvious and clearly noticeable impact, in particular, when comparing the performance of public and private distribution utilities.

In spite of the fluctuations shown in Figures 5 through 8, private investment has played a leading role in the development of the power sector since the beginning of the reform. During the period 1994-2010 it accounted for 87% of total investment in transmission expansion, 56% in distribution and 73% in generation. The dominant presence of private companies brought also a noticeable progress in the performance of the power sector.

[27] It is worth noting that in the Peruvian power sector a large part of the unregulated consumers –mostly mining and large industry that account for 38% of national electricity consumption– are not located within the boundaries of distribution utilities, while those located within the concessions account for 6% only.

Figure 9: Total Power Sector Losses 1993-2010[1]



1/ Transmission and distribution losses plus own consumption of power plants.

Source: Author, based on MINEM data

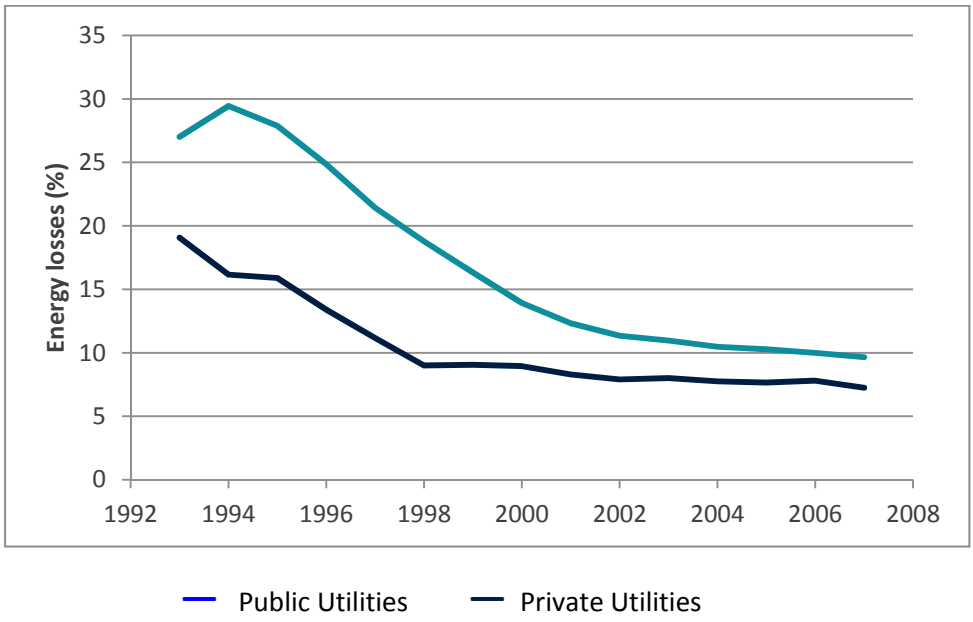
7.1 Operational Performance of Privatized T&D Assets

Figure 9 shows one aspect of the remarkable improvement seen in the Peruvian power sector: a reduction in energy losses (including own consumption in power plants) from around 25% in 1993 to a level below 12% at the end of the past decade. This improvement responded to several factors, including the implementation of a system based on incentives of profitability and accountability, and the presence of private corporate dynamics. Comparing the two main private distribution utilities –both serving the city of Lima[28]– with the four of the largest public distribution utilities[29] we see a great difference. Figure 10, which compares the average losses for these two groups, reveals two important features: (i) overall, private utilities always maintained lower losses than public utilities; and (ii) private utilities were able to react faster, thus reducing their losses earlier, upon the establishment of market oriented rules in the early 1990s.

[28] Edelnor and Luz del Sur, accounting for 1.9 million clients.

[29] Hidrandina, Electro Centro, Electro Noroeste and Seal; 1.65 million clients.

Figure 10: Distribution Losses 1993-2007



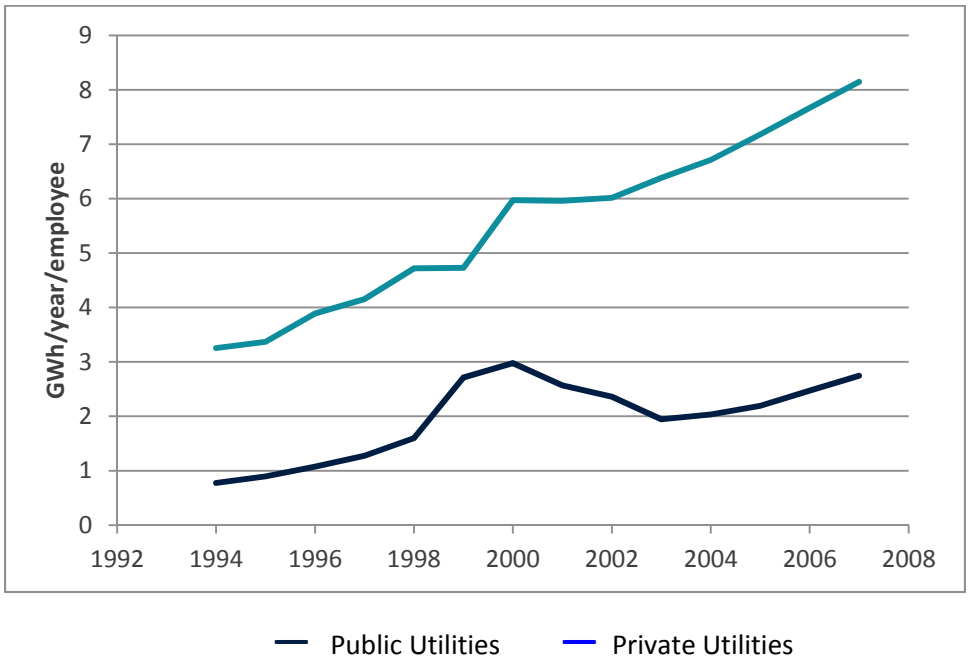
Source: author, based on MINEM data

Differences in labor productivity are presented in Figures 11 and 12, which show indicators of energy sales and the number of connections per employee, respectively. It is worth noting here that, while there are marked disparities between the performance of private and public utilities–in favor of the former–there are factors other than ownership that explain part of that difference, particularly for the sales per employee indicator. That is, the concessions of the private utilities in the city of Lima are characterized, on average, by higher income residential clients that consume more electricity per connection and a more dense grid, while the concessions of the four public utilities, though mostly urban, include clients of lower income levels.

The rather erratic behavior of the clients per employee indicator for public utilities (Figure 12) is explained by changes in staff categorization practices during the period 1999-2002, when an important component of the staff was for some reason accounted as outsourced. On the other hand, the increasing trend of the same indicator in recent years responds to the aggressive rural electrification program that has incorporated close to half a million new residential clients, most of them served by publicly owned distribution companies. This trend explains also the decline or stagnation of the sales per employee indicator of public distribution (Figure 11) since the large majority of these new rural clients have very low levels of energy consumption.

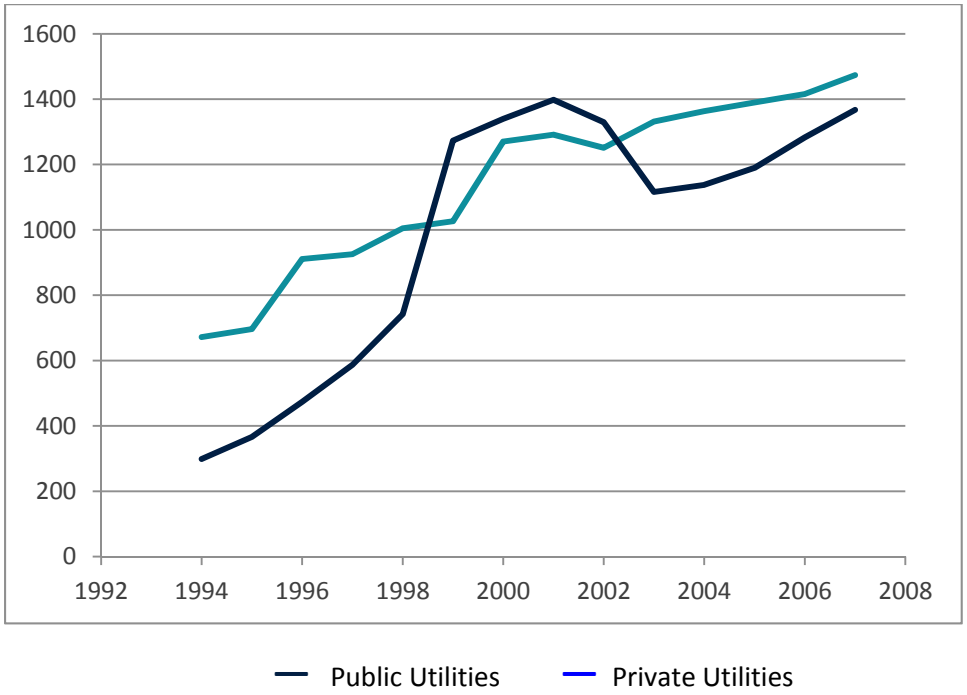
Finally, the quality of service, as measured by the duration and frequency of power cuts in Lima (private) and the rest of the country (almost all public) reveal also a much better performance of private distribution utilities (Figures 13 and 14). Here again, the nature of the power grids –more dense and somewhat easier to service in Lima– is another explanatory factor, though minor, of the evident contrast in utilities' performance.

Figure 11: Annual Sales per Employee 1994-2007



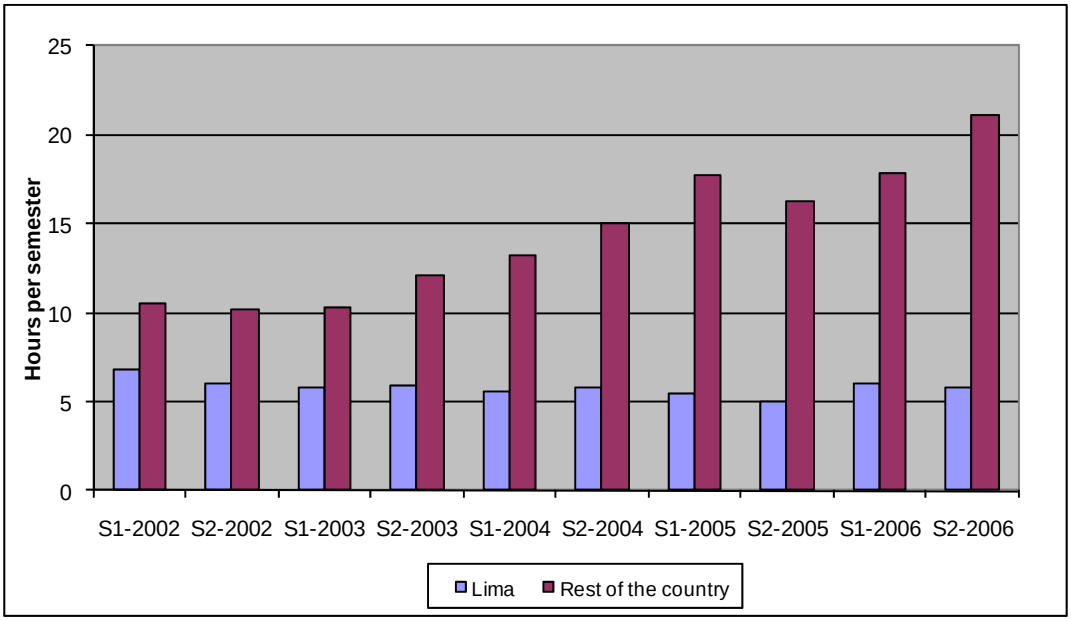
Source: author, based on MINEM data

Figure 12: Clients per Employee 1994-2007



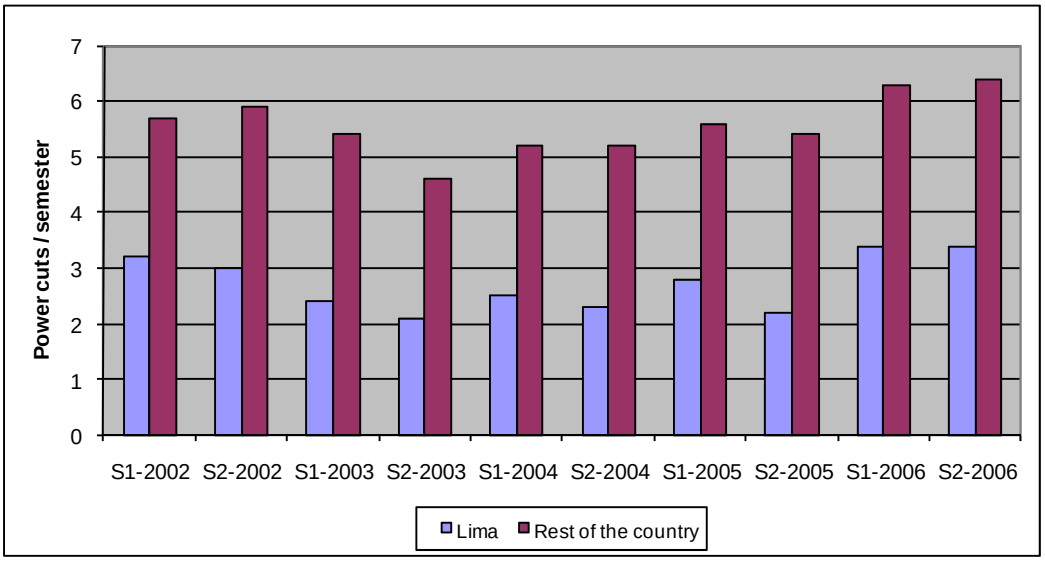
Source: author, based on MINEM data

Figure 13: Duration of Power Interruptions in Lima and rest of the country, 1998-2007



Source: World Bank; Peru: Recent Economic Developments in Infrastructure, 2010.

Figure 14: Frequency of Power Interruptions in Lima and rest of the country, 1998-2007



Source: World Bank; Peru: Recent Economic Developments in Infrastructure, 2010.

In sum, the better performance of private utilities can be attributed in great part to the corporate dynamic inherent to a private enterprise as compared to public utilities that are constrained by multiple public sector administrative and budgetary constraints and respond to a public corporate culture where commercial objectives are often mixed with social and political objectives.

8. DRIVERS OF SUCCESS/LESSONS

The following lessons can be drawn from this case study:

- The Peruvian case illustrates the convenience of putting in place a set of appropriate rules prior to the privatization process. This set of rules was established through the enactment of new legislation that opened doors to PSP, a sound regulatory framework, including a cost-based pricing system, and a separate operator of the power system;
- The good functioning of the Peruvian transmission system, and the confidence it conveyed to all parties, shows that the strategic and/or monopoly concerns associated with the transmission business are not an impediment for its privatization. In fact, regardless of the type of ownership of the transmission assets, its successful operation and expansion relied on the presence of a separate system operator and a sound regulatory framework that established the right incentives, i.e. a system dominated by cost-based and predictable tariffs that was able to attract the required investment;
- Privatization of power sector assets is a challenging task that can face serious constraints associated with the nature of each country's political environment and the perception of often legitimate economic and social concerns (e.g. growth of inequalities associated with privatization). The Peruvian experience illustrates the need for carrying on an effective and open communications strategy (e.g. in getting through a message on the policy's achievements) as well as the cost of failing to do so;
- Extensive experience of bidders in the pertinent field (distribution and transmission) proved to be a key factor of success of the privatization process. Conversely, the absence of such experience explained the failure of some cases;
- The failure to complete a privatization process, or to privatize partially, can bring the following costs/problems: (a) an uneven performance of utilities –in Peru the poor performance of some public distribution utilities could threaten the good functioning of the power system; and (b) the loss of a level playing field in the market, since public and private companies usually operate under different regimes (e.g. strict government control of public utilities, political interference in corporate decisions, different financing conditions);
- The risk of vertical and horizontal concentration of assets call for a clear and effective legal and regulatory framework that should establish the criteria and procedures for authorizing, or prohibiting, operations that could attempt against the good functioning of the market;
- The difficulties faced during the initial years in attracting investment in transmission illustrate to importance of: (a) clarifying expansion needs on the basis of an objective transmission planning exercise; and (b) a predictable –non volatile– tariff system based on competitively driven costs.
- The Peruvian experience highlights also the limitations of a marginal-type pricing approaches in setting adequate tariffs. These limitations were evident in two specific cases associated with transmission tariffs –the 'new replacement value' approach and the locational marginal prices that caused price volatility and losses to generators, respectively– that required corrective actions with the support of a centralized transmission planning effort; and
- The increased difficulty in achieving the social license and related authorizations for transmission projects casts doubts on whether the private sector has the capacity to deal with it successfully without the support of public agencies.

Table 3 aims to capture the main findings of the study, so far. It summarizes the key factors for the success of the Peruvian power sector reform with a special emphasis on the achievement of PSP benefits in transmission and distribution, that is, attracting private investment in these areas and sustaining an efficient operation.

Table 3: Factors contributing to the success of the PSP in Transmission and Distribution

Factor/driver for success	Relevance			Comments/association with Private Sector Participation
	Very important	Important	Not that important	
Government's political will to carry on a sound macroeconomic policy and respect the reform of the power sector.	√			Governance condition necessary for a favorable business environment.
Establishing a clear legal framework consistent with the reform's objectives.	√			Governance condition necessary for a favorable business environment.
Solid and trustworthy regulatory framework.	√			An essential component in providing confidence to investors in transmission and distribution
Government's ability to monitor effectively the reform process and to take corrective actions.		√		The capacity to respond to the shortcomings of the initial model was essential in attracting more investment in transmission.
Predictability of pricing policy in both transmission and distribution.	√			Proved to be very important in attracting investment in transmission –after a set of amendments– and distribution.
The country's fast and sustained economic growth		√		A challenge, but also an opportunity that attracted the attention of investors worldwide.
The potential for cheap and abundant energy resources			√	The availability of natural gas for power generation, plus a large hydropower potential helped the rapid growth of the power sector as a whole at relatively low prices.
Perception of transparency and fairness of the bidding processes.	√			An indispensable condition in attracting investors to the divestiture process of transmission and distribution assets.
Separation of Lima's distribution grid into two concessions of similar sizes.		√		Effective system to compare performances and achieve an some degree of competition.
Quasi-independent System operator.		√		An essential component in achieving the (unbiased) technical-economic operation of the transmission system and, as such, guaranteeing the growth of the energy market.
Open Access to transmission facilities		√		OA to transmission makes possible a competitive energy market and, as a whole, a more competitive power sector. Essential for the acceptance of private transmission.
Electricity code			√	While the Electricity Code establishes a set of preventive rules and safeguards that is essential for the good performance of the distribution and transmission grids, utilities did not consider it to be a main factor for success (taking it for granted).

ANNEX 1 | PERU CASE STUDY LIST OF INTERVIEWS

Name	Position/Institution
Manuel Kiyan	Advisor to the Director General of Electricity (DGE), MINEM. Former DGE and author of power legislation,
Edwin Quintanilla	General Manager/Osinergmin
César Butrón Eduardo Antunes de Mayolo, Edgar Rosell	President/COES (Comité de Operación Económica del Sistema Interconectado Nacional). COES – Analytical team for the power system. Presentation on the Transmission Planning task.
David Grández	CEO/Electroperú
Felipe Repetto Sánchez Alberto Pérez Morón	General Manager/Distriluz Projects Corporate Manager/Distriluz
Juan Miguel Cayo Alfonso Valle	Manager for Regulation/Edelnor Distribution Manager/Edelnor
Javier García Burgos	General Manager/Kallpa
Luis Lazo Velarde	Business Manager/ISA Red de Energía del Perú S.A.
Flavio de Albuquerque Castelo Branco	Manager/ Eletrobras Sucursal Andina
Julio Bustamante	Manager/ JBP Ingenieros - desarrollo de proyectos de generación
People Met Prior to 2012	
Victor Ormeño Jaime Mendoza	Tariffs Team/Osinergmin
César Tengan	General Manager/Electroperú
Hector Gutierrez	General Manager/Duke Energy International
Mile Cacic	CEO/Luz del Sur
Mario Gonzales del Carpio	Operations Manager/FONAFE (Holding of State-owned Enterprises)