

Private Sector Participation in Electricity Transmission and Distribution

Experiences from Brazil, Peru, The Philippines, and Turkey





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The Case Studies for this report are available at <http://www.esmap.org/esmap/node/55655>.



FOREWORD

Electric power systems are among the most capital-intensive parts of a modern economy; their successful development requires massive deployment of resources from both the public and private sectors. In recent decades, many countries have embarked on structural reform programs involving private sector participation (PSP) across the entire value chain of the power sector. Often as part of a broader market-oriented reform program, governments have resorted to PSP in transmission and distribution (T&D) for a variety of reasons, including to: (i) offset years of under-investment and poor operating performance under public ownership; (ii) attract considerable private investment to fill the financing gap stemming from new T&D additions amid rapidly growing demand for electricity; and (iii) raise fiscal revenues by offloading state assets. In some cases (e.g., Brazil and Peru), a prolonged electricity supply crisis prompted government into structural reforms of the T&D sector.

The literature on the global experience in power sector reform and privatization is extensive. Reports published by the World Bank in the last decade have been essential reference sources for WBG staff and country clients (Andres, Schwartz, and Guasch 2013; Besant-Jones 2006; Kessides 2004; Vagliasindi and Besant-Jones 2013; World Bank 2004). Based partly on empirical evidence, they provided valuable insights into the T&D sector by focusing on the links between PSP and various dimensions of sector performance such as operation and financial performance, quality of service, and electricity coverage. However, they have mainly focused on the distribution side, leaving the electricity transmission sector largely in a state of *terra incognita* from a PSP perspective. The Energy Sector Management Assistance Program (ESMAP) study summarized here covers PSP in transmission, as well as distribution. Indeed, the four case-study countries—Brazil, Peru, Philippines, and Turkey—were, in part, selected based on the substantial transmission story under their broader electricity PSP experience.



WHY ARE GOVERNMENTS INTERESTED IN PRIVATE SECTOR PARTICIPATION?

Private Sector Participation comprises a variety of forms of private sector engagement in the provision of services that exhibit significant public good characteristics, especially by industries considered natural monopolies such as electricity T&D. The spectrum of PSP models stretches from their lighter varieties such as management contracts to those of deeper private engagement such as concessions and outright divestitures (see Table 1).

A well-designed PSP arrangement allocates tasks, obligations, risks, and rewards among the public and private partners in an optimal way. Consistent with the basic principles of economic efficiency and effective risk management, rewards go to those who take risks, and the contractual obligations are designed to allocate risks to the partners who are best able to manage them.

Among the capital-mobilizing forms of PSP, concession is the most common in electricity T&D. The main difference between a concession and divestiture is that the former does not involve a permanent change of ownership.

Table 1 | Main Forms and Features of Private Sector Participation

	Service Contracts	Management Contracts	Lease Contracts	Concessions	BOT, BOOT, BOO Concessions	Divestiture/ Privatization
Scope	Multiple contracts for a variety of support services (e.g., meter reading, billing, etc.)	Management of entire operation or a major component	Responsibility for management, operations, and specific renewals	Responsibility for all operations, financing, and execution of specific investments	Investment in and operation of a specific major component (e.g., a transmission line)	Responsibility for all operations, financing, and execution of investments
Asset Ownership	Public	Public	Public	Public/Private	Public/Private	Private
Contract Tenure	1–3 years	2–5 years	10–15 years	25–30 years	Varies	License for 25–30 years
O&M Responsibility	Public	Private	Private	Private	Private	Private
Capital Investment	Public	Public	Public	Private	Private	Private
Commercial Risk	Public	Public	Shared	Private	Private	Private
Relative Level of Risk Assumed by Private Partner	Minimal	Minimal/Moderate	Moderate	High	High	High

Source: Authors based on ADB (2008) and World Bank Group (2014).

TRENDS OF PRIVATE SECTOR PARTICIPATION IN TRANSMISSION & DISTRIBUTION

In recent decades, many countries have embarked on reform programs, including PSP, in various segments of the electricity sector, including T&D. The need to attract new investments and improve operating and financial performance of the public utilities was the key driver.

Investments in the electricity sector involving PSP peaked at \$40.7 billion in 1997. Then, after dropping sharply during the Asian financial crisis of the late 1990s, they reached \$76.7 billion in 2012.¹ However, the bulk of the past decade's increase has been in power generation.

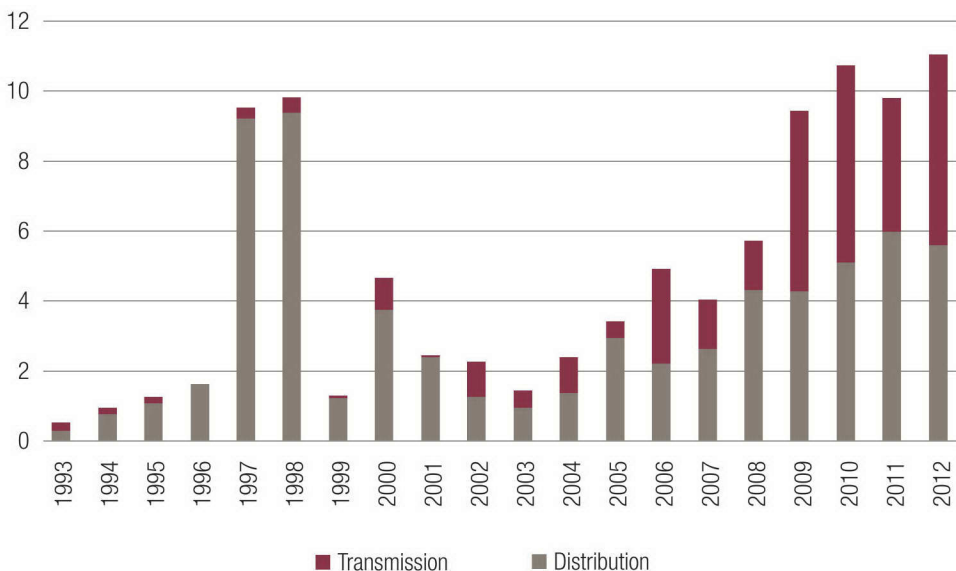
Investment in T&D (Figure1) has exhibited a rising trend in recent years, reaching \$11 billion in 2012 compared with only \$1.4 billion in 2003.

The growth of PSP in *transmission* is a relatively new phenomenon, as governments have been reluctant to free up this subsector (considered “strategic”) for private participation.

South America and Brazil, in particular, stands out in attracting private capital to the power sector, accounting for more than one-third of the global power sector project investment with PSP in developing countries.

Due to its relatively long track record of engagement with the private sector in T&D, Latin America arguably has much insight to offer into experience and lessons learned with grid privatization. However, important recent developments in other regions—such as private concessions of the transmission grid in the Philippines and distribution companies in Turkey—are also of interest to countries considering similar initiatives. This summary

Figure 1 | Investment in Transmission & Distribution* Projects with Private Sector Participation, 1993–2012 (in current \$ billion)



Source: World Bank and PPIAF, PPI Project Database. (<http://ppi.worldbank.org>) retrieved on 06/24/2014.

Note: *Excluding T and D integrated with generation.

draws on the PSP experience of four emerging economies—Brazil, Peru, the Philippines, and Turkey—based on in-depth case studies by ESMAP.

PRIVATE SECTOR PARTICIPATION OBJECTIVES

Transmission. The experience of the countries reviewed suggests that PSP in transmission has been used primarily as a means to mobilize capital for massive new investments. Improved performance of the transmission business, and the power sector as a whole, has been another important goal. An additional goal has been to raise privatization proceeds for the government.

Distribution. Unlike in transmission, where grid expansion was the main driver, PSP programs in distribution have mostly focused on the networks already in place with a view to *improve operational and financial performance*. This subsector suffered from high levels of network losses, low productivity, inadequate maintenance, substandard quality of service, and insufficient revenue.

Table 2 | Main Policy Messages from the Country Case Studies

TRANSMISSION		DISTRIBUTION	
Brazil	<ul style="list-style-type: none"> • A BOOT-type contract can be effective to mobilize substantial private investment for grid expansion. • Investors are attracted when they are protected from risks beyond their control (e.g., demand or generation shortfall, foreign exchange, or inflation shocks). • Under BOOT contracts, a sound balance between the investor and consumer interests can be maintained by: (i) guaranteeing annual revenues to the concessionaire over the regulatory period; and (ii) competitive selection of the concessionaire based on the lowest guaranteed revenue. • Auctions accept both private and public companies as investors in transmission, with most of the investment project capital sourced from the global financial markets. • Multiple transmission owners/concession holders can coexist without compromising efficiency or security of the system. This works successfully as long as the transmission system operator provides effective coordination from the design phase of investment projects through system operations. 	Brazil	<ul style="list-style-type: none"> • Private operation of distribution companies can bring in solutions and levels of efficiency significantly higher than those achieved by state-owned enterprises. Brazil's distribution privatization in 1990s-2000s resulted in a more efficient and financially sustainable power sector. • With proper regulation, efficiency gains from PSP can be shared with customers over time through lower tariffs for distribution services (in Brazil, this was made more difficult due to lax regulation in initial years of privatization). • While the majority of distribution companies are privately operated, the remaining public distribution companies showed improved performance as well, particularly in network loss reduction ("benchmark competition"). • Government's focus on maximizing revenues from privatization may be justified from a macroeconomic/fiscal perspective; however, higher prices paid by the bidders for the concession generally translate to extra costs for consumers.
Peru	<ul style="list-style-type: none"> • Long-term (30-year) concession contracts were applied in Peru for both the existing assets and expansion projects. • The guarantee to recover the amount bid during the auction was a key feature in making the BOOT contract attractive to private investors. • Private investors react positively to a well-organized system-planning framework, removing concerns about cost allocation disputes. 	Peru	<ul style="list-style-type: none"> • Peru's distribution privatization program has contributed to the financial sustainability of the sector, even though many distribution regions continue to be operated by state-owned companies. • Private utilities significantly outperform the public ones on most indicators, including loss reduction, labor productivity, and quality of service, although the positive impact of "benchmark competition" on the public utilities is also apparent.
Philippines	<ul style="list-style-type: none"> • Attracting PSP to a country's core transmission business is a massive undertaking that requires persistence and discipline in the design and enforcement of the legal and regulatory framework. • Concessions adequately serve the same objectives as divestitures, including raising revenue from privatization, without creating the politically risky sentiment of permanent ownership transfer of strategic assets. • Transparency and predictability of the regulatory process is crucial to attracting investors. Key information to bidders, such as the regulatory asset base and related revenue caps, should be calculated and disclosed ahead of the start of the bidding process. 	Turkey	<ul style="list-style-type: none"> • Turkey's comprehensive program to attract PSP to distribution is one of the most recent examples of such undertakings. • In Turkey's TOOR model, assets continue to be legally owned by a public nationwide distribution company while operation in each distribution region is transferred to a private partner offering the highest bid for the right to operate the assets. • Commercial sustainability of the private operators was rapidly boosted by practically eliminating non-payment by the consumers and arrears to suppliers, introducing new technology, and expanding the customer base.



EXPERIENCES FROM FOUR COUNTRIES

BRAZIL: TRANSMISSION

Brazil has experienced high levels of electric load growth recently. Energy consumption has grown 4.4 percent per year in the last decade. The country stands out among other emerging economies in terms of capital mobilized for transmission expansion projects, amounting to \$15.9 billion involving PSP in the past two decades.² Long-term concessions, such as BOOT contracts, have dominated the expansion projects.

While federally owned Eletrobras continues to own the majority of Brazil's transmission grid, new concessionaires have actively entered the transmission sector. Thirty-year renewable concessions have been awarded to bidders offering the largest discount on the initial Permitted Annual Revenues of the auction, meaning the lowest transmission tariff.

Investor confidence is achieved by fixing annual inflation-adjusted revenues for the entire concession period, subject to periodically reset rate-of-return caps. The revenues are insulated from risks beyond control of a transmission operator, including generation volume. At the same time, bidding prices and resulting end-user costs are kept in check by the *competitive auctions* mechanism for the concession, run by the sector regulator. Auctions to build and operate transmission assets have been used for more than a decade. Although the process does not discriminate between publicly or privately owned companies participating in the auctions, the results demonstrate that projects with PSP tend to supply an ample amount of capital to build new transmission capacity.

From 1999 to 2010, 15 auctions were held, with 67 projects awarded, for a total of 21,317 kilometers of new transmission lines. The auctions attracted both public and private capital, with the latter prevailing (Tolmasquim 2012). In more recent years, however, companies controlled by state-owned Eletrobras became more successful in winning the auctions due to lower return requirements by both Eletrobras itself and its foreign partners, such as China's State Grid (UBS 2014).

One of the consequences of opening up the transmission sector to competition for new projects has been the proliferation of transmission companies. The Brazilian experience demonstrates that multiple transmission owners can coexist without compromising efficiency or security of the transmission system. This has worked well because the National System Operator provides ongoing coordination from the design phase through system operations, while concessionaires are required to comply with the decisions of the sector regulator.

PERU: TRANSMISSION

In Peru, PSP in transmission was driven by the need to attract capital—private and public—to remove transmission bottlenecks and improve the operational and financial performance of a distressed power sector. For existing assets and expansion projects alike, a 30-year concession was chosen as the preferred form of contract, which performed satisfactorily.

From 1998 to 2011, Peru mobilized about \$1.3 billion from PSP in the transmission sector, of which about \$1.0 billion was invested in expansion projects. The remaining amount represents government receipts, largely from the concession of the existing transmission assets.³ By 2010, the private sector controlled practically all of the country's high-voltage system, with the public sector owning only sub-transmission lines supplying remote areas.

For the construction and operation of new transmission assets, Peru has adopted 30-year BOOT concessions since the mid-2000s. Two features of this model are important to highlight. First, an auction governs the selection of the concession winner. Second, the concessionaires have a contractual guarantee to recover the amount of the bid made in the auction.

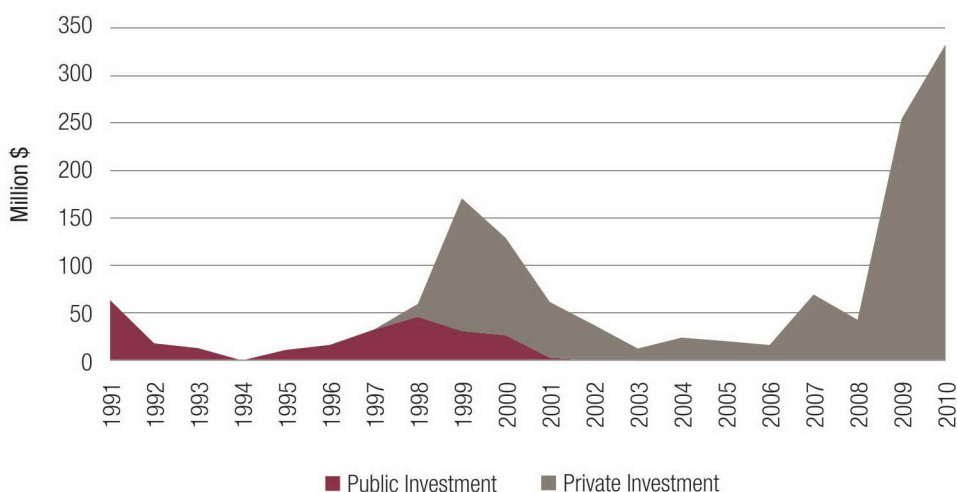
The latter feature was a game-changer in attracting investment from foreign companies. After reaching a bottom in 2004 to 2006, transmission investments rose sharply in 2007 and afterwards (Figure 2), when the BOOT model was applied in its present form (Crousillat 2012).

An additional measure attractive to investors included formalization of centralized and binding transmission planning framework aimed at identifying system expansion needs and thus resolving cost allocation disputes (transmission investors vs. the general public).

THE PHILIPPINES: TRANSMISSION

The Philippines is a more recent example of applying a long-term concession as a form of contract for existing transmission assets to raise capital for the sector and the Treasury. The Philippines transmission sector attracted close to \$4.2 billion, of which \$1.9 billion was invested in physical assets (PPI Database 2014). The main trigger for these cash flows was the National Transmission Corporation—TransCo—concession deal closed in 2007.

Figure 2 | Peru: Investments in Transmission, 1991–2010



Source: MINEM statistics.

Two primary factors made the deal attractive to investors: (i) promising growth prospects in the economy and the sector; and (ii) steadily improving regulatory framework.

The regulatory framework was legally established under a comprehensive restructuring and privatization program known as the Electric Power Industry Reform Act (EPIRA). The energy regulatory commission (ERC) was created in 2001. Consistent with EPIRA, the ERC promulgated a performance-based regulation (PBR) framework, laying down the basic methodology for regulating TransCo’s revenues. The ERC adopted the “revenue cap” approach for the transmission company, whereas the “price cap” approach was applied to the distribution utilities.⁴

However, while essential guidelines were in place since 2003, it took some years for the ERC to firm up the rate-making methodology and impose the necessary discipline for setting the specific revenue cap levels in time. As a result, the project to invite private partners into the transmission business languished until a sufficiently robust tariff regime was established.

The breakthrough came in December 2007, when a sufficient number of eligible bidders were convinced of the quality of the regulatory framework and the integrity of the competitive process for the TransCo concession. The National Grid Corporation of Philippines (NGCP), a corporate vehicle of a group of local and international companies, won the concession by offering the highest bid among the eligible contenders. The figure in Box 1 shows how consistent gradual improvements in the quality and predictability of the transmission tariff-making process contributed to attracting private investors (see Box 1).

BRAZIL: DISTRIBUTION

Brazil’s distribution privatization program utilized a form of long-term (generally, 30-year) contract classified as a concession. However, since the process resulted in the sale of company shares, the nature of the contract was not much different from a divestiture. The peak of capital mobilization in distribution was in 1997–1998.

Box 1 | Predictable Transmission Tariffs Set the Stage for TransCo Concession in the Philippines

The efforts to attract investors to the Philippine transmission business were an essential part of the government's electricity reform program stipulated under EPIRA in 2001. However, the efforts to complete the required auctions failed twice in 2003, and then again in February 2007. Regulatory uncertainty about TransCo's revenue streams was the main concern voiced by investors, even though the ERC had published the first set of essential guidelines on the subject.^a

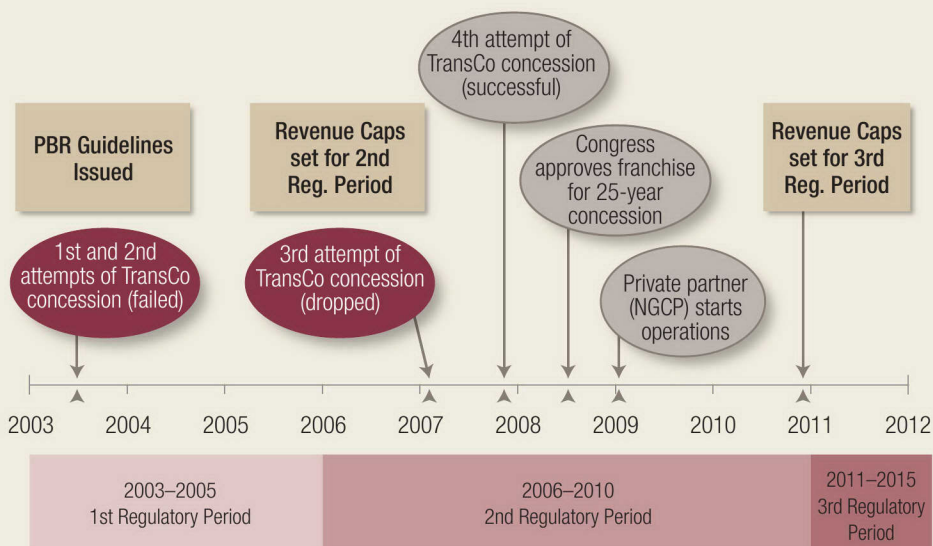
The failure of the first two bids can be attributed to the short track record of ERC and its PBR methodology. An additional source of uncertainty for bidders was the relatively short (three-year) duration of the first regulatory period set by the tariff guidelines. The period would end on December 31, 2005, after which the rates would be subject to revision.

For the second (2006–2010) and third (2011–2015) regulatory periods, the revenue cap methodology still applied. However, the regulatory uncertainty remained high in 2006, as the specific revenue cap levels were still debated. The continued uncertainty undermined the bidders' confidence, and the government finally decided to drop the third tender in February 2007 when only one bidder remained. At this point, the government preferred to announce a new auction rather than negotiate directly with the sole remaining bidder.

The ERC used the opportunity to better prepare for the next auction. The regulatory asset base (RAB), a key component in the estimation of the maximum allowable revenue, was established and could be used by investors in preparing their bids. This set the tone for transparency and predictability of ERC's regulatory process. The payment of the initial concession fee was made easier by requiring an upfront payment of only 25 percent and the deferred payment of the balance under precise terms and conditions set prior to the final bid.

In the new auction in December 2007, the successful bid by NGCP yielded \$3.95 billion, well above the RAB level that was set around \$3.0 to 3.2 billion.

Milestones in the TransCo Concession in the Philippines



Source: Authors.

^a The Guidelines on the Methodology for Setting Transmission Wheeling Rates for 2003 to around 2027 (TWRG) set a regime of performance-based regulation (PBR) and the methodology for determining the rates charged for transmission services in the Philippines.

While the main focus was on raising capital for the Treasury and correcting the country's fiscal imbalances, improved sector performance was also an important goal. In fact, the weak financial performance of the distribution companies prompted the government to begin privatization of electricity in distribution, where companies had suffered from neglect, capital deprivation, and political interference. Privatization held promise for bringing in management skills to restore financial health.

Private concessions for the distribution companies attracted great interest, resulting in considerable premiums over the advertised prices. Most of the shares were sold through public auctions, with minority stakes going to employees, or by public offering. By 2003, 23 companies—representing about 70 percent of the Brazilian energy distribution market—were privatized or put under private concession, for about \$22 billion.

Performance improvement under private concessions is well established. Following the change of ownership, the companies developed and implemented action plans focusing on operational efficiency. The plans addressed commercial management (e.g., reduction of unbilled consumption, regular metering, billing and collection, customer service with proper attention to complaints about service quality). The total power availability improved while the frequency and duration of supply interruptions decreased.

Remarkably, the remaining public distribution companies showed improved performance as well, particularly in network loss reduction. This phenomenon, “benchmark competition,” has also been observed in other countries where private and public distribution companies coexist (Antmann 2013).

However, while Brazil's distribution privatization resulted in productivity gains for the companies, it may have initially failed to benefit the consumers. Not having the required regulatory apparatus in place before privatization is believed to be the reason for such mixed results (Araújo et al. 2009; Brown 2002).

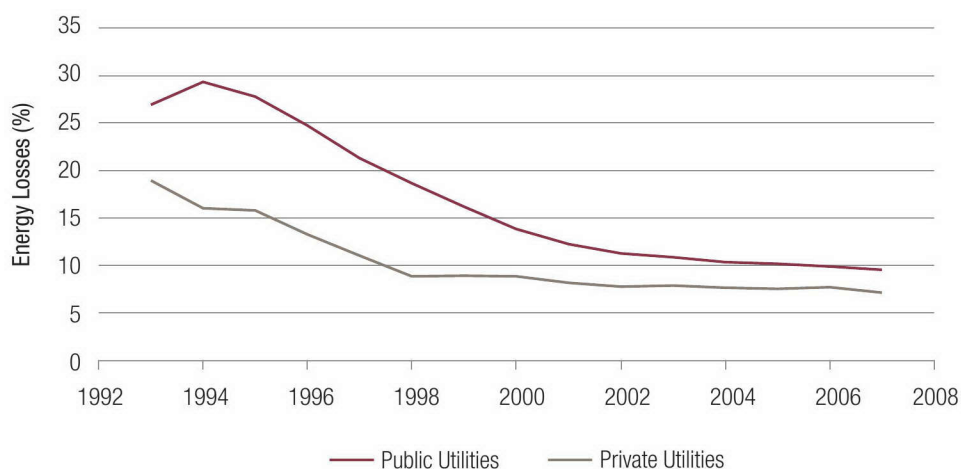
Brazil's experience also highlights the inherent tension between the objective of maximizing privatization proceeds and that of keeping the end-user tariffs at affordable levels. The former objective was championed by BNDES, the country's development bank that was in charge of the privatization program. Arguably, a stronger focus on sector performance priorities, as well as consumer interests, could have been achieved by a competitive process designed to put a downward pressure on the costs passed on to the consumer, similar to Brazil's auctions for transmission expansion.

PERU: DISTRIBUTION

Divestiture was the main form of contract in Peru's PSP in distribution. Over the period 1993 to 2012, Peru's distribution investments with PSP amounted to about \$2 billion, of which \$1.25 billion was used for assets financing (the remainder was fiscal revenue).

Privatization has led to impressive performance improvements. For example, Figure 3 shows loss reduction in the power grid following the privatization, and the relative performance of private and public distribution utilities. The private utilities significantly outperformed the public ones. The public utilities were also able to achieve considerable improvements. In some cases, this was the result of benchmark competition introduced by the government. In the capital city Lima, for instance, the distribution grid was separated into two concessions of similar sizes and split into public and private operated grids.

Figure 3 | Peru: Distribution Losses in Private versus Public Utilities



Source: Crousillat 2012, based on MINEM data.

Furthermore, major improvements were achieved in labor productivity and commercial discipline. As a result, the sector shifted from being a major drain on the public treasury to a source of fiscal income, generating operating profits.

Finally, on the quality of service, private distribution companies demonstrated superior performance, as measured by the duration and frequency of power cuts in Lima (private) and the rest of the country (almost all public) (Crousillat 2012).

Similar patterns of performance improvement in distribution have also been observed in other countries of Latin America (Antmann 2013).

TURKEY: DISTRIBUTION

Turkey's distribution privatization program was launched in 2008 and raised \$12.7 billion over four years (2009 to 2013) as 18 formerly state-run distribution companies were placed under private concession following the Transfer of Operating Rights (TOOR) contract model. The *right to operate the assets* of each regional distribution company was granted on a competitive basis, with the key criterion being the highest price offered by the private partner. Once the legal basis for the TOOR was clarified, the model proved effective in attracting private actors.

As expected, the privatized utilities were quick to introduce technological improvements such as SCADA and GIS systems, improved metering, and registration and maintenance techniques, in order to meet the service quality requirements and the loss reduction targets imposed by EMRA, the sector regulator.

Performance improvements in the distribution companies have been significant across several key parameters. The reduction in theft and increase of the payment collection rates to about 95 percent in the privatized regions is probably the most important one. Overdue receivables were practically eliminated in the first operational year of the privatized utilities. Improvements were also achieved in terms of fewer supply interruptions and more new load served. The improved financial performance of the distribution companies has, in turn, allowed them to settle their payment arrears to generators and wholesalers (Dilli 2012; World Bank 2013).

ENDNOTES

- ¹ Private Participation in Infrastructure (PPI) Project Database of the World Bank and Public Private Infrastructure Advisory Facility (PPIAF): <http://ppi.worldbank.org>. The database records projects in which private parties assume operating risks in low- and middle-income countries. The projects do not have to be entirely privately owned, financed, or operated.
- ² The amount of \$15.9 billion is cumulative over 1993 to 2012 in current dollar terms (PPI Database, July 1, 2014).
- ³ In 2002, transmission facilities of state-owned Etecen and Etesur were transferred to Red de Energía del Perú S.A. (REP) under a 30-year concession.
- ⁴ The revenue cap and price cap are the two main forms of PBR. The primary difference is how the revenue varies with unanticipated changes in demand within a regulatory period. The revenue cap approach links revenues to transmission capacity rather than the sales volume, protecting the operator from the impact of unanticipated changes in demand or generation shortfall. With price caps, the regulated entity is exposed to the risk of low demand while benefiting from increase in new demand (e.g., new household connections to a distribution network).

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ACRONYMS AND ABBREVIATIONS

BNDES	Brazilian Development Bank
BOO	Build, operate and own
BOT	Build, operate and transfer
BOOT	Build, own, operate and transfer
EMRA	Energy Market Regulatory Authority of Turkey
EPIRA	Electric Power Industry Reform Act (The Philippines)
ERC	Electricity regulatory commission
NGCP	National Grid Corporation of Philippines
O & M	Operation and maintenance
PBR	Performance-based regulation
PPI	Private Participation in Infrastructure (a database maintained by PPIAF)
PPIAF	Public Private Infrastructure Advisory Facility
PSP	Private sector participation
RAB	Regulatory asset base
T&D	Transmission and distribution
TOOR	Transfer of operating rights
TRANSCO	National Transmission Corporation of Philippines

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Written by | Victor Loksha

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Production Credits

Production Editor | Heather Austin

Typesetting | The Word Express, Inc.

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