Electric Power Sector Reform in Latin America and the Caribbean

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Washington, D.C.
June 1996, Working Papers Series IFM-104

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Contents

Introduction, Summary and Conclusions

Most countries in Latin America and the Caribbean are in the process of reforming the electric power sector to establish a new regulatory and institutional environment, characterized by greater competition, autonomy of state-owned enterprises, and participation of private capital. This paper analyzes the technical and economic characteristics of the electricity sector, the special conditions prevailing in the region that determine its development, the main issues that were faced prior to the reform movement, and the status and prospects for sector reform in the region. Based on this diagnostic, the paper proposes a common denominator across countries on the general elements of regulatory policy that are essential to meet the basic objectives of public services.

The issues and options on regulatory and institutional matters that are presented in this paper are discussed in detail in the extensive literature that is available on this subject[1]. The main contribution of this paper is to focus on matters that are relevant to the region based on its specific situation and conditions.

Status and Issues

The institutional organization and market structure of the electricity sector in the region has undergone distinctive stages of development during the past 40 years. In the 1960s, most countries in the region developed a national interconnected grid that joined isolated power systems served in many cases by private utilities, and assigned to new state-owned enterprises, holding a monopoly position, the responsibility of developing the generation, transmission and distribution systems to increase service penetration and to meet a high demand growth.

This model of organization worked relatively well from the 1960s to early 1980s, a period characterized by high rates of growth of demand and service penetration, large economies of scale in generation projects, strong economic development, and major support from the national budget for sector investments. However, during the 1980s, under a severe economic crisis experienced by most countries in the region, this model showed its shortcomings and collapsed. The main issues shared by most countries were the political interference in SOEs management and sector policies, a weak regulatory framework, a lack of separation of policy making, regulation and ownership roles of the State, wide-spread subsidies in electricity tariffs, and a lack of incentives for improving efficiency. These problems, complemented by high inflation and devaluation rates, led to a deterioration of SOEs finances, poor performance of SOEs, bad investments, worsening of reliability and quality of service, and difficulties in financing expansion plans. The final result was that in most countries in the region the power sector became a major drain of public finances and a constraint for economic development.

Major efforts were made during the 1980s to improve the performance of SOEs by implementing rehabilitation programs of infrastructure, management and finances. However, most of these efforts failed as they were not supported by any substantial institutional reform.

In the 1980s, motivated by the need to reduce public debt and obtain private financing, Chile introduced a major reform of its power sector based on the separation of generation and distribution activities, establishment of a competitive wholesale power market, deregulation of wholesale prices and extensive privatization of SOEs. In the early 1990s Argentina, Peru and Colombia followed the international trend toward deregulation, competition and privatization and further

[1] See the bibliography at the end of the paper.

developed the scheme pioneered by Chile, by introducing a more competitive environment.

Prospects for Sector Reform

The traditional sector model that prevailed in the region until the 1980's failed in most cases to meet the basic objectives of public services, namely, to ensure the long-run development and provision of service, to achieve economic efficiency and to meet an adequate penetration, quality and reliability of service. Presently, to meet these objectives, most Governments in the region are considering power sector reforms based on new institutional and regulatory arrangements that reduce the role and intervention of the State in the sector, introduce competition and price deregulation wherever feasible, and promote the participation of private capital. However, the transition from a situation of SOEs operating as vertically integrated monopolies to a more competitive environment will be constrained by the political climate, country endowments, socioeconomic conditions and economic considerations. In many cases, the scope and timing of the reform will be determined by special political and economic circumstances that create a window of opportunity for reforming the sector as part of the reform of the State.

The main conclusion of this paper is that there is a great diversity in the characteristics, stage of development, endowments, and prospects for reform in countries in the region. Therefore, the elements of sector reform will also be different across countries, and there is not a single instrument or model of regulation that should be endorsed as the best alternative for all countries.

This paper identifies and discusses three basic and interrelated conditions which limit the policy options available for designing a reform program to meet the objectives of public services: the *scope and degree of competition* that can be introduced, the feasibility of changing the *market structure*, and the possibility for modifying the *ownership* structure. This in turn defines specific options for the design of the *regulatory framework.*

The choice of policy options is a balancing act, as they maybe in conflict in achieving the objectives of public services: competition is introduced to achieve economic efficiency but may increase investor risks and cost of capital; unbundling of generation, transmission and distribution activities is essential to make competition work but increases transaction costs and losses of economies of scale and scope; privatization of generation based on long-term power purchase agreements facilitates project financing but may constraint competition. On the other hand, a decision on the scope and timing of the reform entails a political judgment on the sustainability of the reform.

Scope and Degree of Competition

Competition is generally regarded as the best instrument to improve efficiency and reduce the regulatory burden. However, the degree and scope of competition that can be introduced effectively would depend on the economies of scale and scope, the size and number of competitive firms in the market, the country endowments, and the regulatory framework. Competition in the market, when different firms compete head to head for clients is feasible for generation and supply activities in medium and large countries like Brazil, Mexico, Argentina, Venezuela, Colombia, and Peru, with a relatively large power market that can support the economic operation of several public service companies, with energy resources to sustain the development of competitive medium size generation units, and with a base of large consumers that can have a choice of suppliers at reasonable transaction costs. It is also feasible in small countries like Bolivia, with low cost natural gas that makes small generating units cost-competitive.

Competition for the market, when different firms contest for the right to provide a public service, is feasible and justifiable for distribution services in all countries through the award of concession contracts and licenses, and for generation activities in medium and small countries, where economies of scale and scope are still important, through competitive bidding of new generation plants.

Finally, competition by emulation, when firms providing a similar service in different regions compete to beat the average, is feasible and practiced for distribution activities in most countries in the region where electricity service can be provided economically by assigning several concession areas to distribution companies.

Market Structure

The market structure refers to the degree of vertical and horizontal integration in the provision of services. Vertical separation of generation, transmission and distribution activities and horizontal separation of generation and distribution activities are essential and justifiable to introduce competition in the market. In large and medium-size countries in the region where competition in the market is feasible, the possible losses in economies of scale and scope and increases in transaction costs associated with vertical separation are generally outweighed by the benefits of competition. Vertical separation is also important in medium and small countries in the region to facilitate corporatization and privatization of SOEs, and competition for the market in generation. Increases in transaction costs and possible losses of economies of scope may be compensated by a greater efficiency.

Ownership

It is widely recognized that the participation of private firms is a powerful instrument to improve efficiency and make competition work, provided that an appropriate regulatory framework is established. Making competition work in the region in a sector dominated by state-owned enterprises is an utopia. More importantly, privatization of public services generally requires commitment from government on clear and stable policies on pricing, service penetration and quality of service.

There is a trade off between creating a low-risk regulatory environment for private investors that reduces their cost of capital and facilitates project financing (e.g., concession contracts with exclusivity on an area of service, guaranteed rate of return, long-term power purchase agreements for generators) and creating an environment which fosters competition but increases market risks. This is a important issue for countries in the region which already represent a high country risk for foreign investors and for countries during the initial stages of the reform, when there is not yet sufficient experience with new regulations to comfort investors about market risks.

Another issue is in which order generation and distribution activities should be privatized. Privatization of distribution activities has a larger impact on efficiency improvements and should come first in most countries in the region that have a large share of generation capacity in hydroelectric projects with little room for efficiency gains, face large inefficiencies in distribution (high losses, low labor productivity, low quality of service, high operating costs), and have major price distortions. However, its a sensitive matter for its impact on rate increases and staff reduction.

Regulatory Framework

The design of a regulatory framework consistent with the selected market structure, competition objectives and ownership is essential for the success of a reform program. The paper discusses the main issues that countries in the region would have to face, related to the *regulator*, *price regulation*, and *establishing a competitive market*. The creation of an *autonomous regulator* is widely regarded as a necessary condition to establish a credible commitment to implement a sector reform and provide a stable environment for the operation of private and state-owned firms. The confusion of roles of the State acting as regulator, as well as policy maker and operator in the sector has been a major constraint for improving sector efficiency. However, many small countries in the region lack the human resources necessary to institute an autonomous regulator, and it may be necessary to establish detailed regulatory rules in a sector law and in concession contracts. This limits the discretionary powers of the regulator at a risk of losing flexibility to adjust to unforeseen conditions.

Price regulation of monopolies is, on the one hand, a trade off between capturing the monopolist's rent and providing efficiency incentives and,

on the other, reconciling economic efficiency, financial and distributional objectives. The design of price control mechanisms for transmission and distribution in most countries in the region is particularly difficult due to the following adverse conditions not found in developed countries:

- Large and unsteady investments are required due to a high rate growth of demand, a need to rehabilitate distribution networks in poor condition, low service penetration, and investment lags in distribution.
- Large non-profitable investments are needed to expand service to rural areas and low-income consumers.
- There are a large number of low-income consumers that may need tariff subsidies.
- Only a few distribution companies can operate economically due to a small market size.
- There are high market risks related to an unpredictable demand growth.

Under these conditions, the application of formulas and mechanisms that provide efficiency incentives like price-cap and profit regulation is more difficult than in developed countries, and it may be required to use more traditional mechanisms like reference costs and rate of return regulation.

Most countries in the region do not have the conditions to *establish a competitive wholesale power market* based on spot prices, like the one implemented in Argentina and the U.K. For these countries, the norm would be competitive bidding for new power, power purchase agreements and central economic dispatch. The relevant issues in this case would be how to reconcile PPAs with economic dispatch, whether to allow pass-through of generation costs to consumers, how to provide incentives for economic purchase of power, and how to coordinate efficiency prices charged to the distribution companies with the price structure of PPAs.

Pace of Sector Reform

The three policy options described above determine the institutional and regulatory structure for the sector, but do not address the transition issues related to the reform process. The paper discusses the basic issues that most countries in the region would face, and concludes that:

- Adjusting price distortions is difficult and politically sensitive. If a shock treatment is not possible, a gradual approach may jeopardize any privatization program and the establishment of a competitive market, mainly because low prices reduce the commercial value of SOEs and cross-subsidies are not compatible with price deregulation and competition.
- Changing the market structure is costly and complex. However, a gradual approach may jeopardize the establishment of a competitive environment and the privatization of SOEs, because vertical integration is a major constraint for competition, and restructuring a recently privatized monopoly does not make sense.
- A revolutionary or an evolutionary approach can be taken for sector reform. The first one creates irreversible changes and provides a clear signal of the commitment for change. Its major drawbacks are that it may require costly renegotiations at a latter stage to adjust rules that were not adequate, and that the reform may backfire if the country was not ready to implement it. The second approach would hopefully result in stable and optimal rules of the game. Its main problem in the region, however, is the risk of a reversal under pressure of interested parties that have time to react.
- The success of a sector reform depends on external factors, like the development of institutions and legal frameworks necessary to make markets work, the evolution and stability of macroeconomic re-

form, and the ability to create political consensus to support the reform process. The short experience in the region shows that sector reforms are fragile and represent a continuous process subject to attack and to setback and backlash risks.

Common Elements of Sector Reform

Finally, the paper identifies and discusses a common denominator across countries in the region of the main elements to be included in a sector reform. These are: a clear separation of the policy making, regulatory, and ownership roles of the state; the establishment of an autonomous regulator operating with limited discretionary power; introduction of a market structure that enables competition, or at least does not constraint its development in activities in which it is practicable and convenient; adequate pricing of public utility products and services; application of transparent, well targeted and explicit subsidies; and the commercialization and corporatization of SOEs as a solution in a transition toward privatization.

Characteristics and Main Issues of Electricity Sector Before Reform

Currently most countries in Latin America and the Caribbean are in the process of reforming the electric power sector to establish a new regulatory and institutional environment, characterized by greater competition, autonomy of public enterprises, and participation of private capital. This section summarizes the characteristics, special conditions, and main issues of the sector in most countries in the region, in the early 1990's, prior to the reform movement.

The 1980s and the Collapse of the Traditional Model

The development of the power sector in the region in the 1970s was supported by a healthy country economic growth and it was characterized by high rates of growth of electricity demand, impressive gains in service penetration, and fast development of supply infrastructure by state-owned enterprises-SOEs (national, provincial or municipal companies) holding a monopoly position. However, in general terms, during the 1980s there was a gradual deterioration of the SOEs performance due to macroeconomic factors and the lack of proper conditions to operate as commercial enterprises.

Most of the countries in the region experienced an economic crisis in the 1980s characterized by inflationary pressures, rising interest rates, currency devaluation, and weakened industrial sectors and export markets in the aftermath of the 1970´s oil crises. The economic crisis contributed to worsen SOEs: financial condition: (i) electricity rates declined in real terms in many countries[2] and the rate of growth of electricity demand also declined,[3] reducing substantially the revenues from electricity sales; (ii) also, with the decline of the rate of growth of demand, utilities found themselves with many stranded generation assets that were planned and developed during the late 1970s; and (iii) inflation and devaluation rates were high,[4] increasing administrative and O&M costs and debt service costs.

On the other hand, most of the governments were slow to grant adequate tariff increases to respond to the new conditions and maintained substantial tariff subsidies to medium and low income consumers and price distortions for other consumers. These policies led to a deterioration of SOEs finances and to inefficient price signals to consumers. These problems escalated due to a weak industrial organization, consisting in most cases of vertically integrated SOEs holding a monopoly position; subject to: (i) political interference and government involvement in day-to-day affairs, (ii) a hidden and discretionary regulatory regime and a mandate to meet other socioeconomic objectives of the government unrelated to the provision of electricity service; and (iii) limited autonomy, poor accountability and lack of incentives for utility managers to improve efficiency. As a result, SOEs' performance was poor: high electricity losses[5], low availability and effi-

[2] In most of the countries in the region, residential tariffs declined in real terms in the 1980s and remained at the end of the decade at levels below 50 US/Mwh, much lower than marginal costs (estimated to be en the range of 80 to 100 US$/MWh for a low voltage consumer (see table 1).

[3] For the Latin America and the Caribbean (LAC) countries the annual rate of growth of electricity demand declined from 9.8% in the period 1975 to 1980, to 5.7% in 1980-1985, and 4.6% in 1985-1990 (see table 2).

[4] Inflation rates increased substantially in the 1980s, notably with hyperinflation in Argentina, Bolivia, Brazil, Nicaragua and Peru, and additionally, annual rates over 20% in 9 other countries. Devaluation followed a similar path (see Table 3).

[5] Electricity losses are high. In 1992, total system losses (as a percentage of net generation) in 9 countries were higher than 20%, well above a reasonable target of 10% to 12%, and a decline in performance as compared to 1980, when only 3 countries had losses higher than 20%. This is due mainly to an increase in theft and fraud, lack of investment in distribution networks and poor management.

ciency of thermal power plants, inadequate bill collection practices, bad investments and low labor productivity.

All these factors reduced the ability of most SOEs for self-financing new investment and led to scale down their expansion plans, and in some cases, operate under severe budgetary constraints and default on debt service payments. In many cases, the government had to bail out these enterprises. As a result, the power sector became a major drain on public finances by its increasing cost and share of public debt and the large requirements for financing new investment.

Technical and Economic Characteristics

The technical and economic characteristics of electricity supply and demand in the region will determine key elements that affect economic efficiency in the provision of electricity service and have a substantial impact in options available for sector reform. In the supply-side, there are four distinct activities in the provision of electricity service: generation, transmission, distribution and supply.

High voltage transmission lines made possible the economic transportation of electricity over long distances, the development of large interconnected power networks, and the economic exploitation of the generation resources at the national or regional level. On the other hand, the development of computer technology in the 1970´s and 1980´s made possible the formation of large power pools that captured the economies related to the integrated operation and coordinated expansion of several independent utilities and hundreds of generation plants.

In the 1960s and 1970s most countries in the region developed at a fast pace their electric power infrastructure by integrating, in a national interconnected grid, several isolated power markets, by substantial gains in electricity penetration, and by the development of a large hydroelectric potential. In most countries the generation capacity had to be duplicated every seven years. The generation activity was characterized by substantial economies of scale, long lead times to develop a project, large sunk costs, and site-dependency. The development of the industry mirrored these technical and economic characteristics: creation of state-owned utilities holding a monopoly position and centralized planning and operation of generation and transmission resources.

The power systems and markets that developed in the region share common characteristics: predominantly hydro based generation, modest electricity market size, high and volatile growth of demand, low electricity penetration, and large proportion of electricity consumption in the residential sector. However, within this pattern, there is great diversity (see basic data in tables 4 and 6):

- There are 4 large electric power systems (installed generation capacity larger than 10,000 MW), 7 medium-size systems (between 2,000 and 10,000 Mw), and more than 14 small-size systems (less than 2,000 Mw).

- There are large reserves of oil, coal and gas, but more than 90% of these are concentrated in four countries. Most of the Central American and Caribbean countries depend on imports to meet their energy demand.

- There is a large hydroelectric potential, representing about 4 times the actual generation installed capacity. However, about 65% of the potential is concentrated in 4 countries, and development of a large part of this potential is besieged by environmental concerns, technical difficulties and high costs.

- Installed capacity in power generation is mostly hydro (61%), but while 5 countries have a hydro component larger than 75%, all the Caribbean region has very little hydro (see table 5).

- Industrial consumption of electricity in the region is about 50% of total consumption. However, while 7 countries with large electro-intensive industries

show a participation higher than 50%, in more than 6 countries, with modest industrial development, this is less than 30%.

< Electric service penetration varies from countries with almost 100% of its population served (e.g., Argentina and Costa Rica) to others with only 30% (e.g., Honduras and Bolivia).

The context for the generation activity changed substantially with the advent of high efficiency gas turbines in the aftermath of the big hike in oil prices in the 1970s, the drop in costs for non-conventional sources of energy and cogeneration schemes, the development of large natural gas fields in some countries in the region, the drop in the rate of growth of demand in the 1980s and 1990s and the environmental concerns, technical difficulties and high costs of developing the hydroelectric potential. As a result, economies of scale are not significant in large and medium-size countries, generation sunk costs decreased, lead times shortened, and site-dependency became less important. Consequently, the case for central planning and vertically integrated monopolies weakened, and, as discussed in section III, the introduction of a competitive environment in generation is now possible.

Transmission and distribution activities, considered as transportation of electricity through wires, have the characteristics of a natural monopolies: significant economies of scale and scope,[6] and a cost structure with a very large portion in sunk costs. Almost all countries in the region have developed a national transmission grid operating at voltages of 220 kV or above, generally under the responsibility of a single SOE. The organization of the distribution service in the region shows great diversity that reflects differences in the regional distribution of population, the balance of power between the central, regional and municipal governments, and the economies of scale and scope. Whereas there is a single or a few distribution companies in countries like Uruguay, Paraguay, Panama, Honduras and Mexico, there are several companies in countries like Brazil, Argentina and Colombia. However, in general, there are municipal companies serving only the largest cities, and provincial or national companies serving complete regions.

The supply activity has as a main objective to deliver electricity to the final consumer and includes the purchase of electricity in the wholesale power market, and metering, billing and collection related to the energy sold at the customer=s premises. Up to the 1980s the transaction costs were too high to justify any competition in this activity except for large industrial and commercial customers that could afford to negotiate special contracts and install the required metering equipment. However, new technologies in metering and data transmission now provide technical means to allow medium-size customers to choose its supplier.

The cost structure of electricity service in most countries in the region has the following characteristics:

< At the generation level, it shows strong seasonal variations due to the influence of the hydrology in hydro-based generation systems; moderate hourly variations in energy-constrained systems, and moderate spatial variation in interconnected systems related to transmission losses and transmission constraints. Short-run marginal generation costs are highly volatile in hydro-based systems with relatively small reservoir capacity like in Colombia, Brazil, Peru, Panama, Costa Rica and El Salvador.

< At the transmission level, costs are capacity related with strong spatial variations in radial networks like Chile and Peru.

< At the distribution level, costs are capacity related with strong spatial variations depending on the voltage level and the load density (costs for low voltage loads

[6] Distribution shows economies of scope up to about 100.000 customers. Economies of scale are related to a service area.

and rural areas may be twice as large as costs for high voltage customers).

- Transmission and distribution losses are high and have a major impact on cost of service at low voltages.

- In tropical countries in the region demand has moderate seasonal variations, but strong hourly variations mainly due to the high portion of residential load with low load factors.

Incremental transaction costs between generators, and generators and distribution companies, and suppliers and transportation companies are not significant due to the fact that most national interconnected power systems in the region have modern control centers in operation, and main substations have metering equipment to gather information on wholesale power transactions. However, transaction costs between suppliers and small and medium-size consumers are high due to the low level of consumption and the significant costs of metering and telecommunication equipment.

Externalities are moderate and mainly related, in the supply side, to the environmental impact of hydroelectric and thermoelectric generation projects and, in the demand-side, to the environmental impact of the use of firewood in rural areas.

Institutional Structure

The institutional arrangements prevailing in the power sector in the early 1990s for most of the countries in the region had many similarities:

- The central government, sometimes through a single central agency like a Ministry or a SOE, played the roles of policy maker, planner, regulator, financier, entrepreneur, and operator in the sector.

- A central agency or a SOE generally prepared a master plan which determines the investment decisions in generation and transmission. Regulation was performed by the State or a SOE and was generally limited to rate-setting based on macroeconomic and political considerations.

- The State guaranteed the loans to finance the expansion of main infrastructure and in many cases, had to serve the debt service due to SOEs precarious financial condition.

- The SOEs were not managed as commercial enterprises but, in most cases, as state offices with government interference in day-to-day operations and subject to closed command and control arrangements: participation of government officials in the board of directors; approval of investment programs, annual budgets and foreign currency loans by ministries and planning departments; control of tariff increases by the government; fiscal ex-ante controls through the General Comptroller Office; and imposition of performance plans by the government.

- High level of vertical and horizontal integration, dominated by state-owned monopolies and little participation of private companies.[7]

There is great diversity between countries in the technical and managerial capacity of the public and private sectors, the strength of capital markets and in general, the endowments for supporting the development of the power sector on a commercial basis with the participation of private capital. While countries like Brazil, Mexico, Chile and Argentina are quite developed in this regard, small countries like Guyana and Haiti lack the basic local resources to undertake a sector reform.

[7] In some countries (Venezuela, Guatemala, Bolivia, El Salvador) there were remains of private sector participation after to the nationalization sweep of the 1960s, represented by some private distribution companies working under concession contracts. In Chile, however, a major power sector reform was carried out in the early 1980s with the corporate reorganization of the state-owned enterprises, and in the late 1980s with the privatization of these enterprises.

Main Issues Faced Before the Reform Process

As indicated above, the financial condition and performance of the SOEs in the region deteriorated during the 1980s. In the 1980s and early 1990s many countries in the region made efforts to improve the performance of SOEs through programs that did not involve major sector restructuring, mainly, financial and operational rehabilitation, technical assistance and contract-plans. However, these programs have proven to be ineffective in most cases.[8]

In the early 1990's it was clear that the poor condition of the power sector in the region was related to structural factors and that the prevailing institutional arrangements in most countries were not satisfactory for the future provision of a reliable and efficient electricity service. The main factors were:

- SOEs operated with little autonomy as state offices with conflicting mandates to invest and operate efficiently and, at the same time, to meet vague government's social and political goals. The lack of autonomy and the Government's interference in day-to-day operations have not resulted in a better control for good performance. On the contrary, it has contributed to a lack of management accountability and the weakening of performance targets.

- SOEs operated under a weak regulatory framework characterized by a lack of clear rules and objectives. Regulation of SOEs was usually informal and carried out through direct Government influence or self-regulation in accordance with SOEs interpretation of their own statutes. Usually, price regulation was based on political and macroeconomic considerations and resulted in the application of tariff subsidies that were not transparent nor focalized, distorted price signals and encouraged inefficient consumption, resulted in tariff levels that were not sufficient to cover costs, and were regressive for they usually benefit medium income customers.

- SOEs usually held a legal monopoly position, served a captive market and faced no threats from potential competitors, and therefore, did not have incentives to focus on customers needs or to improve its efficiency.

- The investment decision process used in the 1980s relied on a centralized and sometimes inflexible organization designed to implement a least-cost plan, valid for a set of assumptions on the behavior of key variables and generally comprising relatively large generation plants requiring long preparation and construction periods. In many cases, expansion plans lacked flexibility to adapt to changing conditions and the decision process was too slow to respond to unexpected changes. Furthermore, central planning was used in many cases to please special interests and meet dubious Government objectives, resulting sometimes in the development of large and costly generation projects.

- Governments allocated a major share of public funds and public debt to finance new investment in the sector. This scheme was not longer viable in the future as these resources would have to be assigned to other sectors.

- The indiscriminate application of tariff subsidies and the inefficient operation and control of SOEs have required periodic financial rescue operations with huge transfers from national budget. In general, these operations have been carried out with little planning and poor results: resources are transferred but no signifi-

[8] Programs implemented in Dominican Republic, Colombia, Honduras and Panama to rehabilitate thermal plants, reduce electricity losses, amend sector finances and, in general, improve sector performance through rehabilitation plans and performance plans were not successful.

cant structural changes take place; temporarily, tariffs are adjusted and performance is slightly improved; the same conditions prevailing before the operation surface once again and the cycle starts over.

The main problem probably has been the ownership structure. The State has exercised its rights, as major shareholder of public utilities, to meet other socioeconomic and political objectives unrelated to an efficient provision of electricity service. The nationalization of the power sector, a model that was adopted in the 1950's and 1960's to promote expansion of infrastructure and service penetration, and that served well these objectives until the early 1980's, has become a constraint for sector development during periods of economic crisis. In most countries, the State has not been able to make a credible commitment to maintain and honor stable rules and long term policies in a sector dominated by firms under its direct control.

Prospects for Institutional Reform

The economic and fiscal crisis in the 1980s, the poor performance of the SOEs and the international trend toward deregulation, competition and privatization,[9] prompted most of the governments in the region to consider reforming their electric power sectors. Ordinarily, the reform programs are designed to meet the following basic objectives:[10]

- To ensure the long run development and provision of electricity service. This requires that the utility is remunerated or compensated sufficiently to cover its operating costs and meet its cost of capital, so that required expansion can be financed; that projects required to meet demand are commissioned on time and on cost; and that the technical capacity to provide the service is developed and maintained.

- To achieve economic efficiency in the provision of services and use of electricity through least-cost expansion and operation and efficient management (productive efficiency), and cost-reflective pricing (allocative efficiency).

- To secure social and national objectives. This includes, among other things, improvements in service penetration, security and reliability of supply, environmental goals and provision of electricity service to low income consumers.

In general, the reform programs in the region usually address the failure of existing institutional arrangements to meet these objectives, by introducing competition and private capital as major instruments to achieve economic efficiency and by clarifying the role of the State in the sector. These programs are based on the following basic principles:

- Separation of the policy making, regulatory and commercial functions of the State,

- Creation of a competitive wholesale power market and price deregulation in countries where competition in the market is feasible.

- Establishment of a clear, stable and non-discriminatory regulatory framework, and

- Participation of private capital in the provision of public services.

The following sections examine the current status of sector reform in the region and analyze the main factors which constraint the scope and timing of reform.

Status of Reform Programs

The reform movement was pioneered by Chile in the early 1980s which, motivated by a need to reduce public debt and obtain private financing, established a regulatory framework that separated generation, transmission and distribution functions, promoted competition at generation level, deregulated prices for large consumers, introduced a generator=s pool with energy transactions valued at the system=s short run marginal cost, moved toward indicative planning instead of master planning, introduced incentive price regulation and opened up the sector to private participation. In

[9] It is important to notice that in most cases the main motivation for privatization around the world has not been economic efficiency but the government´s need to generate funds for repaying public debt and reduce the sector's burden on public funds.

[10] The report AThe Regulation of Private Monopoly in Developing Countries,@ Price Waterhouse, April 1994, discusses in detail these objectives.

the 1980s Chile successfully applied the new framework, privatized most of the state-owned enterprises and assets in the power sector and suspended Government=s guarantees for power projects.

In the early 1990s, facing a serious economic and political crisis and with a power sector in disarray, Argentina implemented the most far-reaching reforms of the power sector in the region, which incorporated lessons learned from the Chilean and UK experiences. Its main characteristics were:

- Vertical separation of generation, transmission, dispatch and distribution functions.
- Horizontal segregation of generation and distribution companies before privatization.
- Establishment of a competitive wholesale energy market for generators, large consumers and distribution companies.
- Open access to transmission and distribution networks by third parties.
- Deregulation of prices in the competitive market.
- Creation of an autonomous regulatory commission.
- Price regulation for transmission and distribution based on marginal costs and incentive regulation.
- Privatization of most SOEs in all segments of the business.
- Decentralized expansion planning driven by market forces.

Peru and Colombia have followed with power sector reforms similar to Argentina=s, although in the Colombian case, with a privatization program of limited scope. Bolivia, Jamaica and Trinidad and Tobago are implementing reforms that share the basic element of introducing competition through changes in the market structure and participation of private capital, but are adapted to the special conditions of small countries.[11]

Other countries in the region are considering reform programs that benefit from the lessons learned in the region and in Europe, notably U.K. and Norway, as well as experiences around the world. Generally, the reform programs seek to reduce the role and intervention of the State, to attract private capital, to introduce competition and price deregulation wherever feasible, and, to regulate the residual monopoly areas, in a manner that maximizes the benefits, and reduces the costs, of intervention.

However, one cannot generalize the reform programs implemented in the region and other international cases for discussing the prospects for sector reform in other countries in the region. There is not a unique solution to the problem of designing a sector reform and the underlying legal and regulatory framework. First, one should take into account that the elements of the reform (competition, privatization, changes in market structure and regulation) are not goals by themselves but instruments to achieve sometimes conflicting objectives like attracting private capital to finance sector investment and promoting economic efficiency. Second, one should consider that the peculiarities of the power system, the socioeconomic conditions and the political climate in each country and the endowments of each country are factors that determine the pace and scope of the reform. Third, one should take into account that the reform is an evolutionary process and that it is important to have an orderly transition to implement the new institutional and regulatory arrangements.

[11] Two recent reports by the World Bank provide a good summary of the status of power sector reform in the region: AReforms and Private Participation in the Power Sector of Selected Latin American and Caribbean and Industrialized Countries,@ March, 1994 and AThe Power Sector in LAC: Current Status and Evolving Issues,@ June, 1995.

Determinants of the Reform Program

The main policy elements that a Government has to design a reform program are: the *scope and degree of competition*, *the market structure* and *the ownership structure*. However, as explained below, the peculiarities of the power system, the political climate and the country's endowments and situation constraint the scope of these sector policies: how much competition can be introduced, and the options available for changing the market and ownership structures

Generally, there is a trade off in the choice of policy elements, as they are interrelated and have to be reconciled to achieve the objectives of a reform program: competition is introduced to achieve economic efficiency but may increase the investor risk and the cost of capital required to finance expansion; a market structure with vertical and horizontal separation of generation, transmission and distribution activities facilitates competition but increase transaction costs and may represent a loss in economies of scale and scope; privatization will raise new financial resources, but the maximization of assets' value may require conditions that would constraint competition, like take or pay power purchase agreements for generation plants or monopoly rights over specific distribution areas.

Scope and Degree of Competition

Effective competition is a powerful instrument to achieve economic efficiency and, at the same time, introduce price deregulation and reduce the regulatory burden. Competition has different forms: in the market, for the market, and by emulation.[12] However, the degree of competition that can be attained is mainly determined by whether there are economies of scale or scope in the activity, by the number of firms that can compete in the market, and by the regulatory framework.

Experience has shown that competition in the market and price deregulation can be introduced in the generation and supply[13] activities provided that the market is large and that there are not significant economies of scale or scope.

In general, countries with natural gas reserves, large power markets, large number of companies providing electricity service, or large industrial markets are good candidates to introduce competition in the market for generation and supply (based on information provided in table 4, the candidates in the region would be Argentina, Brazil, Chile, Colombia, Mexico, Peru, Venezuela, Ecuador and Bolivia).

However, these are necessary but not sufficient conditions to achieve full competition in the market. It is also necessary to assure open access to transmission and distribution networks by all agents [14]; to deregulate wholesale energy prices; to segregate vertically generation, transmission and distribution activities;[15] to establish a competitive spot market;[16] to segregate horizontally

[12] In the market, agents compete actively to supply energy to distribution companies and final consumers. For the market, agents participate in competitive procurement for providing a public service; by emulation, agents developing a similar activity in different areas compete to have the best performance, establish better benchmarks for setting regulated tariffs and have higher profits.

[13] The electricity market is divided in a competitive market of large consumers and a non-competitive market of medium and small consumers subject to price regulation. Supply refers to the activity of serving the demand of consumers and comprises negotiating the conditions of supply (for the competitive market), metering and billing. Supplier makes arrangement for purchasing the energy from a generator and for transporting it to the supply point.

[14] Transmission and distribution are natural monopolies. Generators and suppliers should have access to the connection and use of these networks on a non-discriminatory basis. Otherwise, this could become a barrier for competition.

[15] Vertical integration between generation, transmission and distribution make it very difficult for the regulators to assure open access to the transportation networks and may create captive markets.

[16] A competitive spot market is essential to clear the market and match supply and demand in real time, optimize the use of generation resources and establish an efficient spot price that reflects short run marginal costs.

generation and distribution activities; [17] and to eliminate cross-subsidies in electricity prices.[18]

Countries with no natural gas or oil reserves, small power markets, small industrial markets, or very few power utilities have an adverse environment for the introduction of competition in the market for generation, but they would be good candidates for competition for the market (Central America and the Caribbean, Uruguay, Paraguay). In this case, new power capacity is contracted through competitive procedures, ensuring that the lowest price bid is selected. These procedures may achieve least cost expansion, operational efficiency, and reduce the regulatory burden provided that some flexibility is allowed in the bid to propose generation options and that prices are structured to provide incentives for economic dispatch.

International interconnections may play an important role in increasing market size and promoting competition for small countries, mainly in Central America, provided that these countries allow flexibility in the use of interconnections so to large users and distribution companies can select their supplier among national companies or companies in neighbor countries.

Transmission and distribution have the characteristics of natural monopolies (significant economies of scale and scope) and are not suitable for competition in the market. However, effective competition for the market can be introduced by auctioning-off monopoly franchises or concessions to the bidder offering the lowest price to consumers or the highest price to the Government for the concession rights. There are many regulatory issues related to this scheme: monitoring of concession, defining and enforcing investment programs and obligations to serve in the concession area, and giving incentives to provide a reliable service near the termination of the concession.

Competition by emulation is an important instrument for reducing the burden in regulating monopoly franchises or concessions. Comparison of relative performances of agents providing services under similar conditions may provide regulators with criteria to re-bid a franchise and facilitate price regulation. Using average costs for comparable services to determine the remuneration of a firm may provide incentives to beat the average.

Market Structure

The market structure is an essential element for introducing competition. Structure is determined by the degree of vertical and horizontal integration in the generation, transmission and distribution activities. Vertical integration creates serious difficulties in introducing competition in the market in generation and supply, specially in guarantying open access to transmission and distribution networks, and in reducing barriers to entry. Although vertical integration may not pose serious problems in the case of competition for the market, the separation of generation and transmission activities may be advisable, even in the case of relatively small countries in the region, to break the power of a vertically integrated monopoly. However, in small countries in the region there are economies of scope related with vertical integration, and most importantly, benefits of low contracting and transaction costs. A decision on unbundling should be based on the feasibility and potential benefits of introducing competition, and on an evaluation of the lost benefits of scope.

Horizontal integration constraints the number of independent firms developing an activity. For generation and supply activities, in countries in the region where competition in the market is feasible, it is essential to break down firms with market power, to put restrictions on the size of market participation of a firm,[19] and to eliminate barriers to market entry of new agents. For medium and

[17] Effective competition requires the participation of several sellers and buyers. An agent with a dominant position in the market can manipulate prices and put barriers to new entrants as the U.K. experience has shown.

[18] Cross-subsidies and competition are not compatible. New agents will Acherry pick@ the consumers that contributes to subsidies, unless contributions are treated as taxes or subsidies are funded directly by Government.

[19] The case of Chile., where there is a generator with considerable market power, illustrate the problems of non-competitive behavior, like introducing barriers to new entrants.

small countries with economies of scale and scope, horizontal separation may be advisable to introduce competition by emulation, provided that the market size and the relevant economies of scope and scale are taken into consideration.

Ownership

Ownership may have a major impact on the operation of a competitive market. It is argued that a competitive market can operate with state-owned enterprises provided that an explicit regulatory framework is established and that SOEs are managed as commercial firms with financial and managerial autonomy. However, the commitment of the Government to maintain and honor stable rules and long-term policies is weaker in the case of SOEs since the cost of changing the rules is not high. A change in pricing policy may be seen as an internal affair that can be compensated with contributions from national budget or subsidies.[20] With private investors, those changes may be resisted and may jeopardized future investments.[21]

Furthermore, SOEs may be restricted to compete vigorously in the market because of conflict of interest of the Government as sole owner of all firms. Private firms have strong incentive to increase profits and remain competitive. Therefore, the participation of private agents brings other benefits besides financial ones: it represents a commitment to long term pricing and investment policies, and a dynamic element for effective competition.

Private investors may participate in the provision of public services as private generation companies, as concessionaires or franchisees for transmission and distribution activities, as shareholders in mixed (public and private capital) power companies, or as contractors responsible for the administration of a public service.

Crucial to the success or failure of the participation of private capital is how the investor perceives the risk related of investments in a particular project or activity in a country. Risks fall into three general categories: commercial risks that include potential problems during construction and operation of the project and in generating the revenues required to provide an adequate return on the investment; country risks that may include currency and foreign exchange risks, government default on its obligations, expropriation and civil disorder; and force majeure risks.

There are factors that have a major impact on the risks perceived by the private investor and, therefore, determine its cost of capital and its required return on investment, the feasibility of financing new investments and the participation of qualified firms interested in providing a public service on a long-term basis. Some of these factors are:

- Stability of the country's macroeconomic environment.
- A legal structure that clearly defines the rules and procedures for private sector participation.
- An independent legal system that ensures the stability and enforcement of contracts.
- The form of regulation and a clear definition of the wholesale and retail tariff setting mechanisms.
- The level, predictability and stability of public service revenues during the term of the contract.
- The terms and conditions of the concession, franchise or other type of contracts.

From the regulatory point of view there is a trade off between creating a stable low-risk regulatory environment for private investors and creating an

[20] The recent experience in Colombia, where a competitive market with SOEs is being implemented, proves this point: the regulatory Commission, with the initiative of the ministers of state acting as commissioners, slowed down substantially a tariff adjustment program previously approved by the Commission which sought to eliminate subsidies. The SOEs reacted only by asking for more direct subsidies from the Government.

[21] Recent experiences with the revision of the price regulation formula in U.K. and Chile, countries with an electricity industry in private hands, illustrate this point. The price of shares for public utilities traded in the stock exchange proved to be very sensitive to the decisions by the regulatory authority.

environment which fosters competition and provides incentives for economic efficiency. Particularly, implementation of competition in the market, with an active spot market and regulation by licenses may increase the risks perceived by the investor and its cost of capital. On the other hand, competition for the market with regulation based on contracts, and well defined price setting mechanisms would mitigate these risks. To attract private capital to small- or medium-size countries in the region, with relatively high country risks, it would be essential to adopt a method of regulation that minimize the regulatory risks for the private investors.

The Reform as an Evolutionary Process

A reform program may be seen as an evolutionary process toward greater competition and market liberalization, the final goal being conditioned by the country's endowments and situation and the comparative advantages of different institutional arrangements in meeting the objectives of providing the electricity public service.

The initial stages are characterized by a high degree of government ownership and control and the final stages by a high participation of private capital, competition, price deregulation and control of non-competitive practices. Generally, there is a correlation between ownership, market structure and the regulatory regime. Ownership evolves from SOEs run as state agencies, toward the corporatization of these companies, and finally, its privatization. Market structure evolves from vertically integrated monopolies toward vertical separation and limited competition in generation, and finally to vertical and horizontal separation of activities and full competition in generation and supply. Regulation moves from informal regulation by direct Government influence to formal regulation by a separate Government agency which plays the role of a surrogate to competition, to arm-s length regulation of natural monopolies by independent regulators and price deregulation and control of abuses of dominant position of competitive activities.

Generally, the evolution from a monopoly toward a competitive arrangement is justified if the improvements in economic efficiency related with competition and privatization outweigh the relative increase in transaction costs and market risks and losses in economies of scale and scope. The equilibrium point will depend of the country endowment and political climate that will determine the potential for effective competition and private participation and the feasibility of a sector reform.

However, the international experience shows that developed countries can be found in different stages of the reform process, that changes in the market structure, ownership, regulatory regime and competition are not completely coordinated and that some of these countries have found an equilibrium point in the early stages. Countries like France and Austria are in the early stages in terms of competition, ownership and market structure and are not undertaking major reforms; countries like Norway are well advanced in competition but keep a scheme of state ownership; countries like the USA have a long tradition of independent regulation and private sector participation but are in the early stages in terms of market structure and competition; and countries like the U.K. are in the latter stages in all fronts.

Most of the countries in the region are in the early stages of the reform process, dominated by SOEs holding a monopoly position, with limited autonomy and regulated by direct Government influence. Furthermore, most of the countries in the region have a limited potential to introduce competition and privatization. On the other hand, countries like Chile and Argentina, with favorable conditions for introducing competition and privatization, have advanced a long way in the reform process and are in the latter stages by taking advantage of the opportunity to implement reforms created by fiscal or economic crisis.

However, it is not sufficient to take a decision on the final goal of the reform and to design its main elements related to market structure, degree of competition, ownership and regulatory regime. The design of a strategy for the transition toward greater competition and privatization in countries

in the region faces difficult issues that should be analyzed and resolved, related to price adjustments, market structure reform, when and what to privatize, and the pace of the reform process.

Price Adjustments

Correcting tariff distortions and making credible commitments to a clear policy for subsidies is difficult and politically sensitive. However, if a shock treatment for adjusting prices is considered to be not feasible, would a gradual approach work at all and what would be its implications for the reform process?

Besides the impact of price distortions on economic efficiency, it is important to understand its implications for sector reform. First, the commercial value of any asset used in the provision of electricity service is determined by the expected value of the net discounted revenue that this asset can generate in the near future operating under a given regulatory regime. A lack of a credible commitment for cost-reflective tariffs or financial compensation for any tariff subsidies would reduce the value of the assets. This may jeopardize any privatization plan because it is politically difficult to sell assets to private investors at a price much lower that the book value, and it is still more difficult to authorize latter on tariff increases in real terms that would result in a windfall profit for the shareholders of a recently privatized SOE.

Second, cross-subsidies and competition are not compatible. Cross-subsidies creates serious problems in introducing competition related to cherry-picking, stranded assets[22] and inefficient investment decisions supported by price distortions.[23] A good and simple, but difficult, decision is to adjust prices at once. An easy and popular, but messy and bad, decision is to set constraints to the competitive market. A competitive market handicapped by *ad-hoc* constraints and interventions is rarely effective.

Third, price distortions are the main cause of difficulties during the process of introducing competition for the market. Private capital does not participate in new investments because their remuneration is not adequate and stable to compensate the risk; therefore, the government has to intervene through SOEs to expand supply on the grounds that the reliability is at risk. Prices bid by private investors to develop new generation under BOO schemes may be too high because the uncertainties on the financial viability of the client (a SOE); therefore, the government cannot award the contract because the bid prices are above the reference cost (calculated as the economic cost of a SOE operating at no risk).

Market Structure Reform

As discussed above, horizontal and vertical separation are important elements in the reform process. However, changing market structure is difficult due to the costs involved, the legal reforms required and the implications for, among other groups, the labor unions. Therefore, if a quick restructuring is considered to be not feasible, would a gradual approach work at all and what would be its implications for the reform process?

First, competition and vertical integration are not compatible. Separation of accounts and application of Chinese walls between different business of the same firm is a bad substitute for vertical separation of businesses. Generally, this arrangement imposes a burden on regulation and creates serious barriers for competition as shown by the experience with the dominant position of ENDESA in the electricity sector in Chile and British Gas in the gas sector in U.K.

Second, privatization and vertical and horizontal integration are a bad mix. The experience with private monopolies in the region and elsewhere is not good. Furthermore, privatizing first and seeking further horizontal separation latter on may

[22] Cherry-picking refers to the problem of new entrants in the competitive market that select and take away the best customers from the incumbent utility and leaves it with the obligation to serve the worst customers. Stranded assets are generation, transmission or distribution assets that would remain idle because they are displaced by more efficient assets or by the impact of competitive forces.

[23] For example, new entrants may develop a generation project that is not part of the least-cost solution because it can capture a portion of the rent created by the a price set above cost.

prove to be very difficult, as shown by the experience with PowerGen and National Power in the U.K.

Third, one should never underestimate the power of a state monopoly in maintaining the status quo and preventing further institutional reforms or the implementation of a competitive environment.

When and What to Privatize

The factors that have an impact on privatization have been discussed above. However, the issue faced in the transition period, once a political decision has been made about the extent of privatization, is when and what to privatize.

On when to privatize, it is desirable that privatization should come after having established a regulatory framework, corrected price distortions and restructured the market. On the other hand, the participation of private firms is essential to improve efficiency in a pro-competitive environment. As indicated above, it is a dynamic element for making competition work, for controlling the discretionary powers of the regulator, and for committing the government to long term pricing and investment policies. Therefore, a compromise should be reached in the timing of privatization taking into account that usually political and economic events provide a small window of opportunity.

On what to privatize, the issue is whether to start with generation or distribution assets. Distribution should have priority in most countries in the region, that face the situation of having a large share of generation capacity in hydro projects that are operated efficiently, a distribution business in disarray and price distortions. The benefits of improving efficiency are much larger in the distribution case, as well as the benefits of committing to long term pricing policies and eliminating cross-subsidies between the generation and distri bution business. Usually these benefits compensate for larger labor related costs.

Pace of Reform Process

There are two basic approaches for implementing a reform: revolutionary and evolutionary. The first one is an abrupt change of market structure, ownership and regulatory framework like it was done in Argentina and the U.K. The main benefit of this approach is that it creates irreversible changes, uses the window of opportunity for a change when a government is riding high in popularity, and provides a clear signal of the commitment for a change. The major drawback, is that it imposes a time-constraint on the regulator for issuing the rules of the game without proper analysis that may require changes and costly re-negotiation of rules at a latter stage or may impose constraints on the options for restructuring the sector. Particularly, privatization of a vertically integrated monopoly will seriously condition any attempt to introduce competition at a latter stage.

The evolutionary favors the implementation of gradual changes that are analyzed and discussed in detail, and hopefully, would result in stable and optimal rules of the game. The main problem, specially in countries in Latin America where there is a lack of credibility on commitments made by Government and the stability of the laws, is that interested parties, that have something to lose from the reform, have time to react and press the executive and the legislative for a reversal of the process.

It is important to notice that the success of a sector reform depends on factors external to it, like the development of institutions and legal frameworks necessary to make markets work, the evolution and stability of macroeconomic reform, and the ability to create political consensus to support the reform process. The short experience in the region shows that sector reforms are fragile and represent a continuous process subject to attack and risks of reversals and backlash.

Conclusions on Prospects for Institutional Reform

The main conclusions on the prospects for institutional reform in the region that can be derived from the analysis in this section are:

- There is not a unique solution to the problem of designing a sector reform program and the legal and regulatory framework for countries in the region. The country's endowments and situation and the peculiarities of the power sector should be considered carefully for each particular case.

- Besides Chile, Argentina, Colombia and Peru, which have implemented or are implementing a sector reform based on the introduction of competition in the market, only a few large and medium countries in the region have potential to introduce active competition in the market.

- Vertical separation of generation and transmission activities is a minimum requirement to introduce any type of competition in generation. Even in the case of competition for the market through competitive bidding procedures, the participation of private capital may be limited to BOO or similar schemes if a vertically integrated monopoly continues to develop directly new generation projects.

- Competition without a strong participation of private utilities does not make sense. SOEs normally have weak incentives to maximize profits and compete. For the same reason, the commercialization and corporatization of SOE is only a solution as a transition stage toward privatization.

- There are ample opportunities to introduce competition for the market in generation, transmission and distribution activities for all countries in the region. With this arrangement it is possible to meet many of the objectives of electricity service. However, it is critical that concession contracts and power purchase agreements are designed and managed so that there are incentives for allocative and productive efficiency.

- The participation of private capital in generation, transmission and distribution may not be feasible or may prove to be very expensive for most medium and small countries in the region, if there are not in place clear, transparent and stable rules and procedures for developing private projects and for the participation of foreign investors.

Main Regulatory and Institutional Policy Issues

The design of a new regulatory framework to support a power sector reform in the region should deal with basic issues on selecting the activities to be regulated, defining the control mechanisms for price and quality regulation, establishing a competitive market, creating regulatory institutions, and enacting sector laws. The relevance of these issues for a particular country would depend on its policy decisions regarding market structure, competition objectives and ownership of the sector.

Activities to Be Regulated

Transmission and distribution are monopoly activities that are regulated, under any market structure and degree of competition, to ensure economic efficiency and protect consumers against abuses of monopolist pricing. On the other hand, regulation of potentially competitive activities like generation and supply would depend on the market structure that is selected, as discussed below.

Competition in the Market

When competition in the market is feasible, prices in the wholesale energy market are deregulated. The main regulatory issues have to do with the design of the transmission and distribution charges, the regulation of the suppliers of the non-competitive market and the design of the wholesale competitive market (discussed below in section c)).

- ! *The design of the transmission and distribution charges*

In a competitive environment private and state enterprises take autonomous generation investment decisions as a reaction to market signals and regulatory incentives or penalties. Therefore, decentralized planning substitutes for central planning, and regulated transmission and distribution use of system charges should provide an economic signal to generators and suppliers for deciding the location of their plants. Furthermore, they should provide enough revenues to finance the expansion of transmission and distribution networks, and provide transmission and distribution companies with incentives to expand, operate and maintain efficiently their networks.

The charges provide an economic signal if they reflect the cost imposed to the network by an incremental increase in the generation or demand at each node in the network. However, it is necessary to reconcile this objective with the remuneration requirement as well as with the related transaction costs. In general, charges based on short run marginal costs do no remunerate investment requirements and it is necessary to establish a criteria to finance the expansion costs. This is the case in Chile and Argentina, where the charges reflect the costs of constraints (marginal losses or differences in marginal generation costs between nodes in the network) and the cost of network expansion is charged to generators and suppliers who benefit from the expansion.

Another alternative used in Colombia and the U.K., is to charge long run marginal costs to suppliers and generators according to their responsibility in network expansion and adjust the average charge to meet the remuneration requirement. In this case the transmission company operates as a common carrier and is responsible for the cost of transmission constraints and for expanding the network. However, this procedure has other problems: economic dispatch is distorted if

charges are paid based on actual use of the network,[24] and charges are dependent on future location of new generation and loads.[25]

! *Regulation of suppliers in the non-competitive market*

In a competitive market the large consumer can negotiate the conditions for their energy supply with generators or suppliers. However, prices for medium and small residential, commercial and industrial consumers (non-competitive market) are regulated as a combination of pass-through cost and reference costs, combining the generation, transmission, distribution and supply costs incurred to serve the consumer load. Transmission and distribution charges are regulated and, therefore, are passed on directly to the consumer. Generation prices are not regulated, but can also be passed on directly to the consumer provided that they reflect the prices in a competitive market.[26] If the supplier has not purchased its energy in the most economic way, it may not be allowed to pass on this cost to the consumer.

Under this scheme, on average the consumer would have to pay the full cost of supply, and there are not cross-subsidies between generation, transmission and distribution. This poses a problem for countries like Colombia, where residential consumers are subsidized. Unless there are direct subsidies from national budget, the supplier would have to bear the cost of subsidies.

Competition for the Market

Competition for the market requires regulation of generation prices. Generally, under this scheme, new generation is procured centrally by a SOE using competitive procurement procedures. The main issue is whether to regulate procurement ex-ante and allow to pass bid prices on directly to the consumer or to regulate it ex-post and take a view on what portion of prices can be passed on to consumers. As long as least cost expansion is guaranteed through the bidding procedure ex-ante regulation would be adequate. This raises the issue of whether to allow bidders to select the best technology and sitting for the plant or to establish detailed specifications for the new plant. A flexible approach creates some complexities for bid evaluation but may identify better generation expansion solutions.[27]

Power purchase agreements (PPAs) have been used as an instrument to ensure financing and to safeguard the interest of potential investors in independent generation projects developed under BOO or similar schemes. However, PPAs may impose constraints on economic dispatch and distort productive efficiency. For example, simple take or pay contracts for the total installed capacity of a project maybe are attractive for ensuring project financing, but generally cannot be reconciled with an economic operation in an interconnected power system. Two-part prices with a capacity charge paid according to plant availability and an energy charge paid according to actual energy dispatched reduces the risk of out of merit dispatch.

However, the most fundamental problem is that PPAs in many cases are used to create a predictable environment for the private generator by

[24] Charges do not reflect short run marginal costs and are not compatible with economic dispatch. Therefore, these charges should be calculated based on variables that are not dependent of economic
dispatch, e.g., installed capacity and expected peak demand

[25] Generally, a common carrier does not discriminate by vintage (the date when a customer is connected to the network) and, therefore, charges for each node vary according to how the network
is stressed by the expected load flows or the balance of supply and demand in each node.

[26] In Chile, generation prices for the non-competitive market are regulated based on the average spot prices in the pool during a three-year period, and they are passed on directly to the consumer. In Argentina, these prices are estimated annually and adjusted according to the average spot price in the pool. In Colombia, distribution companies should purchase energy competitively, and the regulatory formula for non-competitive consumers is a combination of pass through and reference costs.

[27] In Colombia, a portion of new generation projects are being developed by private investors under BOO schemes, supported by power purchase agreements (PPA) with state generators. From the regulatory point of view, the state generator should sell this energy in the competitive wholesale power market, and should bear the risk of not being able to pass on to the consumer the cost of the PPA.

specifying in a contract, for a 15 to 20 years period, all the conditions (prices, quantities, penalties) for the delivery of electricity. But the real operation of an interconnected power system is not predictable: demand forecasts are not met, merit order for economic dispatch depends on many probabilistic events, technology evolves, etc. Of course, prices and penalties used in the contract cannot predict the real world and, as a result, the operation of the plant responding to contractual parameters is not efficient. The main issue is how to design a financial instrument capable of managing market risks but not at the expense of productive efficiency.

Control Mechanisms for Price Regulation

The design of control mechanisms to regulate prices should reconcile economic efficiency objectives (allocative and productive efficiency),[28] financial objectives[29] and distributional considerations.[30] When competition in the market is implemented, wholesale energy prices are deregulated and are set by the market. Generation prices under a pure competitive market reflect short run marginal costs (including rationing costs) and the economic efficiency objectives are met. Furthermore, a well-designed spot market operating under normal conditions will also meet the financial objectives.

If competition is not feasible, there are several policy issues related to the regulation of a monopoly activity. First, there is a question on what to regulate, the prices charged by the utility or its total remuneration. Regulation of prices focus the attention on regulating both the level and structure of tariffs, while regulation of remuneration focus on the average tariff, leaving decisions on the structure to public utilities, subject to general clauses about cost reflective pricing.

To answer this question, is important to consider the cost structure, the degree of competition and distributional considerations. The cost structure to serve a final consumer comprises generation, transmission, distribution and supply costs. Generation costs determines a substantial part of the time-related cost structure to the final user (seasonal and time of use variations). Transmission and distribution costs determine the cost structure by location and voltage level and can be related with capacity charges. In a competitive wholesale market, the generation cost structure is reflected in the market price and it is not necessary to regulate it. The transmission and distribution cost structure is more simple and can be established by the public utility, specially in a competitive market with vertical separation of activities and strong incentives for efficient operation.[31] On the other hand, if cross subsidies between consumer categories are established, therefore it is necessary to regulate the price structure.

Therefore, regulating remuneration is appropriate in cases of active competition and no subsidies, and regulating prices is necessary in cases of monopolies or limited competition and when distributional considerations are important, as it is the case in many countries in the region.

Second, there is the question of selecting the mechanism to regulate prices or remuneration. Several options are open to the regulator: rate of return, price cap and yardstick regulation.[32] These options have been analyzed extensively in the technical literature and their pros and cons have been identified. Rate of return regulation provides

[28] Allocative efficiency requires pricing at marginal costs. Productive efficiency requires minimization of production costs.

[29] On average, prices should provide a remuneration to the public company sufficient to cover administrative, operation, maintenance and investment costs required to meet demand under efficient conditions.

[30] Subsidies to low income consumers.

[31] A utility with sole responsibility for distribution and distribution and no ties with generators or end user will have a strong incentive to implement cost-reflective pricing, as it would minimize investment requirements and maximize profits.

[32] *Rate of return*: The regulator establishes a maximum return that can be earned on the capital required to provide the service. This is also known as cost-plus regulation. *Price cap*: the regulator establishes a cap on the average price that can be charged. The cap is indexed by reference to a consumer price index adjusted for cost reduction targets. *Yardstick* regulation takes into account the costs of a model efficient firm.

weak efficiency incentives, puts substantial demands on the regulator for cost monitoring and may induce the firm to over-invest.[33] Although price cap regulation introduces efficiency incentives, the determination of the parameters in the formula is difficult specially for countries in the region with a high rate of growth of demand [34]. Besides, the periodic revision of the formula may create uncertainties for the investors, raising their cost of capital [35]. Yardstick regulation raises some problems of lack of transparency related to the subjectivity in selecting the efficient firm and calculating its costs, and demands a major initial effort to determine the reference costs. The problems can be reduced if competition for emulation can be introduced and a more objective standard can be selected [36].

The fact is that in many cases a combination of elements of these mechanisms are normally applied and their comparative differences are blurred. For example, a reference rate of return is used to determine a price cap; lags in revising the rates to conform to the specified rate of return may be equivalent to price caps; and yardstick regulation sometimes is used to set the price structure but the price levels are adjusted based on rate of return considerations.

In summary, the main issues in selecting the price control mechanism are how to provide efficiency incentives, guarantee the financial viability of efficient firms, limit the uncertainties for firms about arbitrary price adjustments, and take into account distributional considerations.

Establishing a Competitive Market

There are several design issues for establishing an efficient wholesale power market when competition in the market is feasible. They are related to power pool operation, access to transportation networks and the role of resource planning.

Power Pool Operation

The power pool is essential to achieve productive efficiency. It is the instrument to coordinate and optimize the operation of the generation and transmission resources in an interconnected system composed by independent agents. A basic design issue is whether to select a cost-based or a priced-based pool. In a cost-based pool the economic dispatch is determined on the basis of operation planning models run centrally by a dispatch center which receives information about costs and operation conditions of agents participating in the pool. This is the case of Chile and Argentina. In a price-based pool the economic dispatch is determined by hourly bids submitted to the pool by competing generators. This is the case of U.K., Norway and Colombia. A price-based pool is a more competitive arrangement but raises some issues in the case of hydroelectric power systems: economic and reliable operation may not be achieved due to market failures related to incomplete information and manipulation of bid prices by agents holding a dominant position .[37]

[33] There is a long experience in the USA with rate of return regulation and it has been analyzed extensively in the technical literature.

[34] Price cap regulation has been introduced in Colombia for the transmission activity. The investment program during the next decade is substantial and the revenue requirements to finance it are not stable during this period and is sensitive to timing of new projects. It was necessary to select a negative X (price indexation higher than the consumer price index) in order to provide a revenue that increases in real terms. There is a risk that the formula would have to be revised to respond to major changes in the investment program.

[35] The recent revision of the price cap for distribution companies in the U.K. illustrates this problem. The regulator had second thoughts in the approval of the new parameters and produced a shock in the stock exchange.

[36] In Chile, yardstick regulation is used for the distribution activity, but is based on average prices of distribution companies operating under similar conditions. However, a recent revision of the formula showed that the methodology used to calculate the reference costs is subjective and the results depend on the assumption made by the analyst.

[37] This issue is being debated in Colombia which has an 80% hydro-based generation system and economic dispatch is subject to uncertainties on hydrology, commissioning dates for new projects and rate of growth of demand. Detractors of market mechanisms claim that bidding prices in the pool will endanger the objectives of economic and reliable operation. However, central operation planning procedures have fared poorly in the past when power rationing had to be imposed.

A second issue is whether to base the pool on contracts or on the spot market. On a contract based pool, distribution companies have an obligation to supply the non-competitive market, and financing of generation expansion is supported by long term bilateral contracts between generators and distribution companies (typical situation of competition for the market). The pool is used mainly for economic transactions between generators and support during emergencies. On a spot market pool, financing of generation expansion is supported by sales at spot prices, and the bilateral contracts are used as financial instruments to stabilize the volatility of spot prices. The second arrangement is superior for ensuring allocative efficiency and is used in Chile, Argentina, Peru and Colombia. However, this arrangement may increase the market risk for private investors and the cost of capital for project financing if the spot prices are highly volatile and long-term bilateral contracts do not develop. In this case, prices for distribution companies can be stabilized by using moving averages of spot prices over a multi-annual period and establishing capacity charges that reflect the contribution of generation plants to the firm energy in the interconnected system (like in Chile and Peru).

A third design issue is whether to have a generator's pool or to allow both generators and suppliers to enter the pool. The participation of suppliers in the pool provides a direct link between prices in bilateral contract and spot prices: generators cannot manipulate the former prices because suppliers have the option to purchase energy in the pool. Argentina, Colombia and U.K. are examples of suppliers having access to the spot market. On the other hand, Chile is an example of a generator's pool, where prices for suppliers are regulated so that they reflect average spot prices.

Access to Transportation Networks

A basic question in the design of the wholesale power market is how to guarantee open access to the transmission and distribution networks. One clear option is to assign the transmission activity to a separate company with no interests in generation or distribution activities. In this case, a key issue is whether to make the transmission company responsible for network expansion. If the answer is yes, the transmission charges should provide enough remuneration to finance expansion and there should be incentives for the transmission company to lessen transmission constraints whenever it is economically justifiable. Colombia has adopted this principle. If the answer is no, the transmission charges normally provide resources only for operation, maintenance and rehabilitation of the network, and network expansion is a responsibility of the users (generators and supplier) who should bear the cost of constraints. Chile and Argentina have adopted this approach.

If the transmission activity is in the hands of a vertically integrated company, the regulation of this activity is very difficult because this company may discriminate against competitors in the supply or generation business. In this case, the regulatory rules normally impose requirements of keeping separate accounts for the transmission business, restricting the use of privileged information, and non-discriminatory pricing. The experience has shown that these arrangement are not sufficient to guarantee open access to the network.[38]

Role of Resource Planning

Resource planning, through least-cost expansion plans or indicative plans will continue to play a role in light of sector reform, conditioned by the scope of competition. In the case of competition for the market in generation, the Government, a central agency, or an utility has to prepare a resource plan for procurement of new capacity, and the regulator would need information from an indicative plan for price regulation purposes. Whether a master plan or an indicative plan is necessary would depend on what is procured, purchase of power or development of a specific plant. In the former event, an indicative plan is necessary to calculate a reference generation price and a planning model is required to make sure that all costs and externalities have been considered. In

[38] In Chile, where ENDESA is a major generator and also owner of the national transmission network, there has been allegations of unfair practices in negotiating connections to the grid with competitor.

the latter event, a master plan is required to determine the basic specifications of the generation plan and to have a reference price for bid evaluation.

In a highly competitive market, in which the market mechanisms can ensure economic efficiency both at the supply and demand side, centralized resource planning is not necessary. However, there have been concerns on whether markets can perform the required coordination of generation expansion to achieve a least cost and reliable supply. For example, a generator holding a dominant position may be interested in reducing the supply and increase the pool price by early retirement of generating plant; or generators in a power system where hydro is the least cost alternative, may not be reluctant to take the market risk of a plant with high investment cost, long lead time and long lifetime. The experience with competitive markets shows that the mechanisms used to coordinate expansion are to provide market signals on the value of investment through capacity charges and to use long term energy contracts between generators and suppliers or distribution companies. If there are proper incentives for investment and active competition, therefore the required coordination may be achieved.

Establishing Regulatory Institutions

The main issues related to the establishment of the regulatory institutions are related to the scope and autonomy of these bodies.

Scope

Should the regulatory institution have jurisdiction over one or several sectors?. In large and medium size countries where competition in the market have been introduced and there is a large pool of qualified experts (Argentina, Chile and Colombia), the regulatory institution is only responsible for one sector. However, in many small countries in the region competition in the market is not feasible, qualified human resources are scarce, and there are SOEs with monopoly power. In this case, it would be more convenient to make the regulatory institution responsible for several sectors.

Should the regulatory institution be responsible for expansion planning? The role of planning depends on the degree and scope of competition. If competition in the market is introduced, indicative plans are prepared for industry information, price regulation and market supervision. In a country with competition for the market, strategic generation expansion planning is done for procurement of new capacity and price regulation. In the former case, planning is closer to regulation and can be a responsibility of the regulatory institution as in the case of Chile. In the latter case, planning is related to investment decisions and should be a responsibility of a separate body. Otherwise, the regulator may become a hostage of its own plans.

Autonomy

It is widely accepted that the regulatory institution should be autonomous, meaning to be independent of the Government. However, it is rarely understood that autonomy is a means and not an end. The main preoccupation should be to establish a credible commitment to implement the regulatory framework and the reform program. This can only be done if the regulator applies the mandates of the law fairly, consistently and using transparent procedures. A technical body, composed of highly qualified personnel, appointed for fixed terms and with independent funding is more likely to fulfill these requirements than an institution composed of Government officials.

Autonomy is also affected by the style of regulation. In countries inclined to pervasive rather than to light-handed regulation, there is a high risk of regulatory capture, whereby the regulators yield under undue influence of the government or the industry, no matter if the government does not participate directly in the regulatory body.[39]

[39] It is generally accepted that the public utilities commissions in the USA, with a mandate to implement an invasive rate of return regulation, have been captured by interest groups like environmentalists and conservationists, notwithstanding that they are regarded to be "autonomous."

However, many small countries in the region lack the human resources necessary to institute a qualified autonomous body, and it may be necessary to establish detailed regulatory rules in a sector law and in concession contracts. This limits the discretionary powers of the regulator at a risk of losing flexibility to adjust to unforeseen conditions.

Enacting Sector Laws

The process of preparing and enacting a law to support sector reforms raises some issues about the legal basis for regulation, the type of law and the minimum requirements to create a credible reform program.

Legal Basis for Regulation

Regulation can be implemented through contract or license. Generally, contracts are implemented by franchising or concession agreements for generation projects, and specific transmission or distribution service areas. In this case, the State transfers some of its powers or attributes to the private sector, regulated by the terms of the contract. The contract specify, among other things, duration, conditions to renew it, price setting formula and constraints, obligations to serve the demand in the concession area, investment obligations, minimum level for quality and reliability of service and conditions for termination. This method of regulation is used in Argentina for transmission and distribution activities.

Regulation by license is implemented through a secondary legislation which establishes the general rules, rights and obligations to carry out an activity like generation, transmission, distribution or supply. The regulator has the ability to force modifications in the conditions of the license to take into account changing conditions, but subject to statutory rules established by law. This method of regulation has been implemented in Chile and Colombia.

Regulation by contract has the advantage of providing clear and stable rules for the company that provides the public service, with little risk of significant variations in the terms. The revenue stream for the company is more predictable, reducing the perceived investor risk and the cost of capital. Additionally, it reduces the risk under the regulatory regime.[40] Its main disadvantage is the lack of flexibility for it is very difficult to anticipate changing circumstances. This method of regulation is preferred in cases where competition for the market is implemented and in small countries that do not have the track record of transparent regulation nor the technical capabilities in the regulatory institutions to ensure the fairness and stability required to attract private capital. However, the concession does not eliminate the need for sector wide regulation.

Regulation by license has the advantage of its flexibility to adapt to changing circumstances and to meet economic efficiency objectives. However, it increases the risk under the regulatory regime and the cost of capital for private investors if there is not a firm tradition of transparent regulation. This method of regulation is recommended for activities where competition in the market is implemented and for monopoly activities in countries with a good regulatory tradition.

General vs. Detailed Law

A detailed law can be drafted if the key policy decisions on the regulatory framework and the institutional reform have been taken. This approach gives more stability to the regulations and less discretionary power to the government and the regulatory institutions. It is more difficult to pass through Congress and, once enacted, it can become inflexible and is more likely to require going back to Congress for adjustments.[41]

A general law is easier to pass through Congress but may not provide sufficient details to grant stability and credibility to the sector reform. The

[40] Provided, of course, that there is a capable and independent judiciary to arbitrate disputes between the Government and the public utility.

[41] This is the case of Chile where a detailed law was enacted. The Government have had difficulties in introducing needed reforms to transmission regulations because the process of going back to Congress have the risk of a Pandora box: unwanted changes can be introduced to other parts of the law.

political risk perceived by private investors may be high because the rules of the game can be easily changed by decrees or laws of lower hierarchy.

Create a Credible Sector Reform

To create a credible sector reform that provides adequate conditions for the participation of private investors and for the operation of SOE on a commercial basis, the law should include as a minimum the following provisions:

- Separate the function of providing the service from the regulatory and policy functions. There is a clear conflict of interest when the Government defines the sector policies, participates as owner of public utilities and has a direct control of sector regulation. This arrangement will increase the regulatory risk and discourage the participation of private investors and commercial firms.

- Establish clearly the functions and responsibilities for the government and the regulator. Again, it is very important that the law limit the role of the government in the sector to policy making and strategic planning. . On the other hand, the regulator should have, among other things, the duty to create conditions to ensure the financial viability of efficient firms operating under the regulatory framework, to ensure the long-run provision and development of the public service, to promote economic efficiency and, if applicable, to maintain conditions for a competitive environment.

- Establish the degree and scope of vertical and horizontal separation of sector activities, make provisions to allow the implementation of the selected market structure and establish, if necessary, clear constraints on cross ownership between activities.

- Create regulatory institutions, determine their authority, autonomy and jurisdiction.

- Establish clearly the activities that will be regulated and the basic criteria for regulating them. This includes price setting mechanisms, basic conditions for concession or franchise contracts, basics rules for the operation of the wholesale power market, basic conditions for access and use of transmission and distribution networks, etc. These rules should be consistent with the market structure and the degree of competition that were selected.

- Establish the basic rights and obligations for developing any of the sector activities by public or private operators, related to quality and reliability standards, investments obligations, obligation to supply demand in specific areas, access to networks, participation in the wholesale power market, economic energy purchase, etc.

- Create mechanisms for allowing access to private capital, as indicated above in the section on ownership.

Essential Elements for Sector Reform

The main conclusion of this document regarding the reform process of the electricity sector is that there is a great diversity in the characteristics, endowments, and prospects for reform in countries in the region and, therefore, the elements of sector reform and the regulatory solution will also be different.

However, there is a common denominator across countries on the general elements of regulatory policy that are essential to meet the basic objectives of public service, mainly, to ensure the long run development and provision of public services, to achieve economic efficiency and to secure social and national objectives (basically, security of supply service penetration). These common elements, which are discussed below, are related to the sector structure and regulatory framework, prices and subsidies and restructuring of SOEs.

Sector Structure and Regulatory Framework

A clear separation of the policy making, regulatory, and ownership roles of the state is essential to foster economic efficiency, improve customer service and promote the participation of private capital.

The separation of the regulatory and ownership roles facilitates the introduction of clarity and transparency to the regulatory process, which is essential to keep the playing field leveled for private or public enterprises, ameliorate the risks perceived by private investors, improve the accountability of SOEs management, implement efficient pricing schemes, promote competition, establish and enforce quality standards and protect the customers rights.

This is a major change to the Aold style@ regulation that exercised control over the public utilities based on ministerial discretion, lack of clarity in the rules, and a fusion of regulation and ownership. Regulation under the Anew style@ becomes a line of demarcation between government and the industry that represents a commitment from the government that it would keep its word, and that long term rights and obligations of investors and consumers, as expressed in the regulations, would prevail over arbitrary administrative actions prompted by short term political considerations.

The separation of policy making and regulation implies that the government should concentrate on its primary role of defining and establishing stable and consistent sector policies for the design of the regulatory framework, service penetration, end use efficiency, security and quality of service, environmental protection, market structure, participation of private capital, contributions from national budget, and prices and subsidies. The implementation and enforcement of the regulatory framework is assigned to a separate body to confer credibility and stability to the new rules.

The establishment of an autonomous regulator operating with limited discretionary power to change the rules of the game is essential to provide credibility and stability to the reform process. The exercise of limited discretion, maintaining independence, prevents the regulatory decision making from being Acaptured@ by short term political interest, the regulated industry, or other special interest groups.

An autonomous regulator places regulation firmly between the government and the utility and reduces the risk of political interference in the regulatory process. The management of utilities are thus able to focus on commercial rather than socioeconomic objectives and, as a result, are more accountable before the owners. Furthermore, it is a safeguard for private investors against the political risk of arbitrary changes in the rules that were originally established.

However, in countries with weak institutions and limited regulatory tradition or with a strong French legal tradition it may difficult to create an independent regulatory body apart from the executive power and the judiciary. The problem of a regulator under the direct influence of government and limited autonomy may be partially solved by detailed legislation or by regulation by contract, represented by concession or franchise contracts. In this case, a compromise should be reached between the stability and flexibility. If the legislation is detailed, specific and rigid the regulator may have little room to pursue efficiency goals and adapt regulation to changing economic, technological and market conditions. On the other hand, if the law is general and the regulator is under the influence of the government, the political risk may be too high to attract private capital or to introduce a competitive environment.

Introduction of a market structure that enables competition, or at least does not constraint its development in activities in which it is practicable and convenient, is a key element to improve economic efficiency and customer service.

Competition reduces the regulatory burden, decreases the risk of regulatory capture and is a powerful incentive for economic efficiency. Competition in the market is feasible and desirable in some activities of electricity where economies of scale or scope are not important. Competition for the market or by emulation is generally feasible and desirable in most activities for all sectors and countries.

However, to introduce any type of competition it is necessary to achieve some degree of vertical or horizontal separation in sector activities. Creation of several local distribution companies facilitates performance evaluation and improves performance. Separation of production and transportation activities is essential to create a competitive environment.

Prices and Subsidies

Adequate pricing of public utility products is essential to fulfill of the main objectives set for the sector: economic efficiency, long term provision of the service and social or national objectives with a minimum of distortion.

The main problem in designing a pricing policy is how to reconcile the conflicts between the main objectives: marginal cost pricing is necessary for economic efficiency, prices that provide a fair return on investment are necessary to finance service expansion, and price subsidies are necessary to make basic services affordable for low-income consumers.

In the case of services provided by SOEs holding a monopoly position, the design task could be solved by determining a tariff level sufficient to meet service expansion targets, and a tariff structure based on marginal costs and corrected to subsidize low-income consumers. However, in sectors open to competition and private sector participation the task is more complex and other considerations should be taken into account.

First, the application of efficiency pricing would depend on the scope and degree of competition. In countries in which competition in the market is feasible, prices determined by market mechanisms would do the job, and the attention should be focused on the design of instruments to prevent non-competitive behavior and abuses of dominant position. For non-competitive activities prices should be regulated so the tariff structure for the value added by the activity reflect economic costs.

Second, tariff levels should be regulated to provide sufficient revenues to cover the cost of an efficient service. In the case of competition in the market, the wholesale market should include instruments like long-term contracts, charges to remunerate reserve, etc. for ensuring that economic projects operating in the market are financially viable. In non-competitive sectors or activities, price regulation should provide incentives for an efficient operation. In this regard, whenever possible, yard-stick and price-cap regulation or any form of incentive regulation should be preferred to standard rate of return-regulation.

Third, when efficiency prices depart from those required to make the service sustainable, it may be

necessary to study the suitability of the available instruments for raising revenues. Regardless of whether the product prices are set higher than their efficiency levels, or benefit taxes are imposed, or both, some losses in the total net benefits created by project are likely to occur in the process. The costs of raising revenues are generally significant. From the point of view of minimizing such costs, benefit taxes are usually to be preferred to departures from efficiency prices.

Subsidies may be justifiable to facilitate access to public services to low-income consumers and promote energy conservation. However, they should be transparent, well targeted and explicit.

The provision of subsidies is controversial. Many schemes used in the region in the past have worked against to the public interest, service penetration, quality of service, welfare redistribution, and allocative efficiency. Therefore, it is necessary to evaluate its justification and the mechanisms used for its application. Subsidies are justifiable from the economic point of view in cases of services with large externalities, in which low-income consumers cannot afford the cost of basic services and, as a result, there are differences in the private and social marginal benefits. They are also justifiable in the energy sector to promote the adoption of more efficient appliances or practices for using energy.

In the past, subsidies have been provided in different ways: via direct subsidies to demand (voucher schemes and cash grants for example), via direct contributions to supply, or via cross-subsidies between consumer classes. Each form has a different set of advantages and drawbacks. Direct subsidies to demand are the most efficient but very difficult and costly to apply in countries and services with a large proportion of consumers below the poverty line and with weak institutions to implement them. Subsidies to supply are easier to apply but to target them it is necessary to have information about investments and consumption related to the beneficiaries. Cross-subsidies are the less efficient and should be limited and targeted to basic consumption of low-income groups through the application of two-part or non-linear tariffs.

The mechanisms for managing subsidy schemes should be carefully designed to ensure that resources allocated to subsidies are efficiently used. In this regard, subsidies should be targeted to the most appropriate social group, the targeted population should have equal access to subsidies, and the selected scheme should be efficient. A combination of subsidies to demand and supply should be preferred.

Restructuring of SOEs

SOEs providing a public service must operate as commercial businesses. However, commercialization and corporatization of SOEs should be considered as a transition stage in a privatization process.

A successful implementation of a new regulatory framework requires that public utilities operate in a non-discriminatory business environment and respond to incentives for a greater efficiency. A necessary condition is the commercialization or corporatization of SOEs. Basically, state-owned enterprises should pay taxes and commercial interests, earn competitive rate of return on equity capital, face hard-budget constraints, be responsible for their own budgets, procurement, staff recruiting, borrowing and management decision, and their board of directors should be accountable for a commercial operation under the provisions of the regulatory framework.

However, it is unlikely that the commercialization and corporatization of SOEs is sustainable as a long-term solution for the efficient provision of electricity service. There is always the risk that the State will exercise its rights as major shareholder of a corporatized SOE and impose other socioeconomic and political objectives in the public utility. Therefore, commercialization and corporatization are solutions only as a transitory stage toward privatization.

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