

# **Best Practices Guide**

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**Electricity Regulation in Latin America**

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## ACRONYMS

BOO	Build-Own-Operate	NGO	Non-governmental
BOT	Build-Operate-Transfer		Organization
CC	Combined Cycle	NOx	Oxides of Nitrogen
CO2	Carbon Dioxide	OECD	Organization for Economic
CT	Combustion Turbine		Cooperation and Development
DSM	Demand Side Management	PBR	Performance Based
EPA	U.S. Environmental Protection		Regulation
	Agency	POOLCO	Power Pool Company
FAC	Fuel Adjustment Clause	PPA	Power Purchase Agreement
FERC	Federal Energy Regulatory	RFP	Request for Proposals
	Commission	ROE	Return on Equity
GENCO	Generating Company	R&D	Research and Development
HERA	Hemispheric Energy	RR	Revenue Requirement
	Regulatory Assistance	SIEPAC	Sistema de Interconexión
IOU	Investor Owned Utility		Eléctrica Para Los Países de
IPP	Independent Power Producer		América Central
IRP	Integrated Resource Planning	SO2	Sulfur Dioxide
ISO	Independent System Operator	SRMC	Short Run Marginal Cost
kW	Kilowatt	T&D	Transmission and Distribution
kWh	Kilowatt-hour	TRANSCO	Transmission Company
LRMC	Long Run Marginal Cost	TRC	Total Resource Cost
MC	Marginal Cost	UK	United Kingdom
MR	Marginal Revenue	US	United States
MWh	Megawatt-hour	USDOE	United States Department of
			Energy

## **PREFACE**

**T**he purpose of this guide is to spark thought and discussion about how to achieve more effective, sustainable, and environmentally safe electric utility regulatory reform in Latin America. It has been prepared as part of the Hemispheric Energy Regulatory Assistance (HERA) project of the Institute of International Education.

The guide describes a conceptual framework and best practices to aid its intended audience of power sector regulators, regulatory staff members, government officials and professionals involved hemisphere-wide in restructuring the electricity sector.

It emphasizes regulatory reform in key countries surveyed by the HERA project, namely: Argentina, Brazil, Chile, Mexico, Peru, and Central America, treated as a region, given recent efforts to integrate the power systems there. Some useful information is also included from other countries not formally surveyed (or who did not respond to the survey). Information from the United States focuses mostly on California. (Data availability is uneven across Latin American countries, so information presented in this report does not always include data from the same group of countries.)

The guide highlights the most important issues facing Latin American power sector reform. It does not attempt to be an all-encompassing compendium of lessons learned on each aspect of electric sector regulation. It identifies and describes serious and persistent technical and institutional constraints to sustainable sector reform that have been identified by students of reform and practitioners in the region.

Based on experience in Latin America and elsewhere, the authors suggest a conceptual framework for organizing thinking about minimizing or overcoming those constraints. They then provide suggestions on options available to improve sectoral reform. The reader is invited to discard or adopt any of these ideas as they develop policies and strategies appropriate to their own

country situations.

### **Assumptions underlying the discussion**

The setting for and behavior of the electric sector in each country is unique and reform measures must be tailored to each unique situation. Some experiences are common, however, and lessons learned elsewhere can be useful in designing effective reform measures.

Electric sector reform takes place through the interaction of existing and emerging interest groups in the public and private sectors. Government officials can be counted on to strive to protect the public good but also to sometimes focus more on their own political or bureaucratic interests, undue political influence, inefficiency and too often corruption. New stakeholders in the private sector can be counted on to strive for quality service and efficiency but sometimes to focus on their own interests to the exclusion or neglect of the public good. Lasting reforms will be the result of effective negotiations between public and private stakeholders that end up with each side making a critical contribution. Neither government nor the private sector possesses all of the keys to the solution.

Reform will be flexible or it will be short-lived. No one can predict world economic behavior, climate, political shifts, appetite for risk, or a myriad of other seemingly random events.

### **Organization**

The report begins by describing the context for the current state of sector reform. It briefly summarizes, as this is written in the summer of 2002, how far Latin America has progressed in its reform effort. It then describes the goals of reform that Latin American countries have pursued. Section 2 describes constraints that have hindered sustainable reform and identifies the most important issues facing policy makers in the region. Based on that discussion and the lessons learned from recent experience, Section 3 suggests a framework and

set of best practices that can help to overcome these constraints and resolve outstanding issues. Section 4 describes lessons learned in California that may be applicable to Latin America. Section 5 provides citations to articles, reports and books that the reader may refer to for further reading. Appendix A outlines a description of a model Electricity Regulatory Commission, its functions, procedures and organizational structure and Appendix B contains a country-by-country status report on power sector reform in the Latin American countries that are the focus of this guide.

### **The Authors**

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In addition to the Tinker Foundation, IIE/EG would like to recognize the contributions of other program sponsors. We extend our sincere thanks to the USAID Office of Energy, Environment, and Technology (EET) through which we gained the experience of publishing a lengthy series of such Best Practices Guides in global sustainable energy development. The first in this series, *Implementing Power Sector Reform*, laid the foundation for this specialized, regional report on Latin America.

The U.S. Department of Energy, Office of International Affairs, entrusted the IIE/EG to manage the USDOE 2<sup>nd</sup> Hemispheric Conference of Energy Regulators (March 2002). During the Conference, IIE/EG and RAP presented a draft of this report to the commissioners of many participating regulatory bodies in Latin America, and solicited their input for further enrichment of the Guide.

Many regulators who attended this Conference also

assisted by responding to the survey of regulatory practices developed and distributed for the purposes of this Guide. These regulators include: Juan Legisa (Argentina), José Mário Miranda Abdo (Brazil), Vivianne Blanlot Soza (Chile), Carmenza Chahín Álvarez and David Reinstein (Colombia), Lionel Fonseca (Costa Rica), Dionisio Perez-Jacome (Mexico), Juan Jose Caldera (Nicaragua), and Carlos Rodriguez (Panama).

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## EXECUTIVE SUMMARY

Latin America is radically reforming its electric power sector, from one owned and controlled by government to one driven largely by competitive markets. This report is meant as a guide to spark thought and discussion among Latin America's power sector policy makers, regulators and stakeholders about how best to achieve more effective, sustainable, and environmentally safe electric utility regulatory reform.

To accomplish this the authors surveyed information available and interviewed sector leaders from key countries in the region - Brazil, Chile, Mexico, Peru and the Central American region (Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua, and Panama). The survey determined the status of reform in the region, reform goals that the countries have set for themselves, and important issues and constraints the countries face in achieving those goals. Based on this information as well as experiences elsewhere, the report describes conceptual frameworks and best practices that can help resolve issues facing the Latin American power sector.

The most important results of the survey are the following:

- The countries included in the study have made remarkable progress in many areas of power sector reform.
- National electricity reform goals differ widely even when not explicitly stated, as is often the case.

Goals most often stated are attracting private investment, lowering costs and prices, maximizing government revenues, expanding and improving service, supporting social programs and other public purpose programs. Protecting the environment and promoting end-use efficiency are sometimes explicit goals of national policy, but progress in reaching these goals has been limited and varies widely within the region.

Serious problems that remain to be addressed by the reform effort to date include the following:

- Competition is limited and restricts the

flow of new investments and new entrants to the market; state-owned companies still play a dominant role in some countries.

- Industrial and other large customers have been the primary beneficiaries of lower prices.
- Although the quality of electric service improved dramatically as a result of reforms, the experience of blackouts in Chile in the recent past, and the disruptions in California have served to reinforce lingering concerns about reliability and security. Such concerns now threaten the reform process.
- In several cases, transparency has eluded the regulatory reform process.
- Customer resistance to higher (unsubsidized) prices has threatened reform efforts.

Therefore, future reform efforts within the region must address the following issues:

- Adopting an appropriate sequence in the agenda for reform.
- Enhancing competition in all market segments.
- Dealing with price volatility and exploring "demand response" options.
- Setting rates in noncompetitive segments.
- Choosing between licensing and generic rule regulation.
- Strengthening the technical and oversight capacity of regulatory institutions.
- Fostering private investment systematically.
- Incorporating measures to ensure consumer protection.
- Expanding the role of regulatory measures to promote environmental protection and energy efficiency.

## 1. INTRODUCTION

### 1.1 Background on power sector reform in Latin America

In the 1980s Chile took the bold step of being the first Latin American country to open its power sector to private investment. Argentina embarked on a broad reform agenda in the early 1990s, soon to be followed by Peru, Brazil and Colombia, and by countries in Central America. The resulting flow of private investments to electricity (on a per capita basis) has been most evident in Chile, which leads with approximately \$400, followed by Argentina with about \$340. Venezuela, Mexico and Ecuador have made the least investment, each with less than \$30 per capita. Between 1990 and 1999, the sum of private sector investments in new capacity has amounted to US\$16 billion. These additions to capacity have greatly reduced power shortages in most countries.

The nature and extent of privatization and reform achieved so far vary widely from country to country. Argentina, Chile, Peru, and Brazil have privatized ownership in their generation, transmission and distribution sectors (Data from nine countries can be found in Table 1). Costa Rica, on the other hand, intends

to emphasize the private ownership of new generation assets, while reorganizing the government-owned utility to operate on a commercial, profit-oriented basis. As a stimulus to competition, open access to existing government-owned distribution networks will also be encouraged. El Salvador has also embarked on a policy to privatize the sector, but will preserve the public ownership of hydroelectric generation assets. Mexico has limited the role of private ownership of generation, to self-generation, cogeneration and power export. The state maintains its monopoly over providing electricity service to the general public. Panama initially allowed private ownership in the wholesale supply market but not at the retail level. However, in 1998, the state-owned monopoly was unbundled, allowing for the partial privatization of distribution and generation. (These trends are further detailed in the Appendix B.)

In most countries reforms have been implemented in phases. However, no country can, as yet, claim complete success in achieving all its reform objectives, which, in a number of cases, continue to evolve. Nor should one expect a trouble-free prototype structure for a 'reformed' electricity sector to emerge capable of replication throughout the region. Indeed, the experience gained in the past two decades suggests that each country

	<b>Generation</b>	<b>Transmission</b>	<b>Distribution</b>
<b>Argentina</b>	60	100	70
<b>Brazil</b>	30	10	60
<b>Chile</b>	90	90	90
<b>Costa Rica</b>	10	0	10
<b>Ecuador</b>	20	0	30
<b>Guatemala</b>	50	0	100
<b>Mexico</b>	10	0	0
<b>Peru</b>	60	20	80
<b>El Salvador</b>	40	0	100
<b>Source: InterAmerican Development Bank</b>			

is likely to establish its own particular model of a restructured sector. Moreover, difficulties in the reform effort experienced within the region (and elsewhere, such as in California) are likely to play a role in determining the momentum of reform and cause policy-makers to proceed more cautiously with further reforms.

Reforms in Latin America were initially driven by the fact that at the end of the 1980s the Latin America power sector faced financial collapse. With few exceptions (Colombia, Brazil and Costa Rica), power companies were overstaffed and inefficient, electrical losses were high, reliability was elusive, collections were poor, and return on assets was minimal or negative. By any measure, most of the power companies in Latin America were failing. Virtually all countries realized that business as usual was no longer viable. Reforms were initiated to attract private investment to improve the technical and financial performance of the sector and to free up capital for other pressing financial needs of the region.

The hope, in significant measure fulfilled, was that the reforms would lighten the financial burden imposed by widespread inefficiency in the power sector on national country economies. Unlike the reform process in OECD countries, reforms in Latin America are unlikely to be reversible to some identifiable ‘fall back’ position. It would be financially impossible to return to the state controlled status quo of pre-1980 Latin America.

Regulatory institutions in the region are still at an early stage of development, and suffer, to varying degrees, from lack of independence (real or perceived), continuity, predictability, jurisdictional gaps, and experience. None of the countries has yet completely achieved fully competitive wholesale and retail markets. Nevertheless, regulatory reforms implemented thus far have achieved positive results. Privatization combined with incentive regulation has reduced losses, improved productivity, and increased private investment.

As most economies in Latin America make a transition to liberalized markets, some general trends in the power sector are notable. Markets have generally been separated horizontally and vertically. Many government owned assets have been privatized. Wholesale markets and spot

markets have been established that improve generation efficiency, facilitate trading, and in some cases permit major users to access wholesale markets. Before liberalization, the sole participant in the energy business was the government, whose dominant role in the sector was undertaken through publicly owned enterprises, some of which were quasi-independent agencies with varying degrees of autonomy. Today, with the advent of privatization and the development of competitive markets, the number of participants has expanded considerably. They include foreign and domestic investors, independent power plant companies, banks, financial advisors, and large customers.

The direct participation of government in business activity has been replaced in many cases by a much expanded role as regulator. This new role has required the development of new institutions and regulations to control monopolies such as distribution and transmission, and to enforce safety and service quality standards. The use of cost-recovery and economic efficiency principles is now more widespread in determining transmission and distribution prices. The creation of a market-driven electricity sector has succeeded in attracting investments that have resulted in increased generation capacity and have expanded the production of gas. This has, in turn, allowed expansion of service to customers and has significantly improved both the availability and reliability of the system.

However, all customer classes have not shared these benefits equally. While most market prices have displayed a downward trend in this more competitive environment, the elimination, or reduction of cross-subsidies has meant that residential customers with low levels of consumption have tended to suffer an increase in tariffs, while industrial and other large-use customers have benefited from lower market prices. A country-by-country summary of the status of reform in the Latin American countries studied is attached as Appendix B.

Worth noting is the ambitious step taken by six Central American countries— Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua and Panama to integrate their systems. SIEPAC’s (*Sistema de Interconexión Eléctrica para los Países de América Central*) 1,802

kilometer, 230 kilovolt interconnection line is expected to be completed in 2005. This holds out the promise of greatly improved efficiency since it will facilitate region-wide cost-reduction, particularly in generation. Larger scale generation projects in a regional market will now be viable to serve expected load growth in the region, and will contribute to increased security of electrical energy supply. Regional integration is also likely to reduce investor risk, provide lower prices for consumers, increase reliability of supply, and create a more competitive market by allowing more suppliers to participate in a larger market.

In the post-reform environment, in which government-owned and operated vertically integrated enterprises have given way to an “unbundled” structure favoring private ownership or government-owned commercialized companies, new policy issues are emerging. To a large extent, these issues emerge because the original goals of reform were either too narrow in focus, or, poorly articulated. It is therefore useful to review some of the principal reform objectives that have been pursued in the initial phases.

## 1.2 Goals of power sector reform

Common features of the reform process in many countries are ill-defined objectives and goals. Often, the focus has been on a single dominant objective, such as the need of the power sector to attract private investment and reduce fiscal burdens on public budgets. In the process, other objectives that would assure the long-term sustainability of reforms such as equity, service quality, energy efficiency, and preservation of the environment have been ignored. It is also apparent that where multiple objectives have been established, they have not been articulated explicitly nor evaluated for potential trade-offs, market design-options, or consistency. It is useful therefore to review the typical goals of electricity reform as they have been pursued in both the HERA countries and elsewhere with a view to highlighting the issues that arise.

**Private investment.** Attracting increased private investment in generation has been the single most important objective of the initial phases of electricity

reforms in virtually all countries. As a result, transmission and distribution systems, which also have typically suffered from under-investment, have been neglected. The focus on attracting investments has often been pursued without adequate attention to the establishment of investor confidence in the underlying integrity and stability of the rules by which the electricity sector is governed.

Achieving a single major objective often leads to reforms that are inconsistent with other legitimate goals. For example, attracting private capital may lead to risk allocation and environmental rules that favor investors at the expense of consumers or the environment. The creation of a sound regulatory structure ensures that consumers are treated fairly and that all investors are provided with an equal opportunity to recover costs and to earn a fair return on investment.

**Improved energy efficiency and lower costs.** Lowering energy costs through competition in the market place has been another important objective of reform efforts. Implicitly increasing the efficiency of generation, transmission, and distribution has been a high priority in all countries. To date, the reforms implemented in Latin America have achieved impressive improvements in efficiency in generation and distribution. For example, in Colombia the privatized distribution company CODENSA halved its losses from 24 to 12.5 percent, increased customers per employee from 800 to 1,900 and reduced the frequency of service interruptions and mean interruption time by more than 30 percent in only two and a half years. In Argentina, T&D losses between 1992-1997 were reduced from 27 percent to less than 10 percent, and generation efficiency between 1996-2000 improved, on average by over 60 percent (accounted for by the trend towards more efficient natural gas plants). However, the adoption of end-use energy efficiency as an explicit objective of reform has, in most cases, been noticeably absent in most Latin American countries. Indeed, with the exception of incentives to improve system load factors in the distribution network, unbundling has weakened the incentives to invest in end-use efficiency, in spite of the significant potential for cost reductions. End-use efficiency invariably costs less than the cost of operating existing fossil-fueled power plants,

and costs far less than the cost of building additional power plants and associated transmission and distribution facilities. California's recent experience, notwithstanding the crisis of 2000, demonstrates the ability of investments in end-use efficiency to address critical power needs, restrain market power, and reduce high market prices.

**Lower prices.** Lower costs make possible lower electricity prices. Almost any approach to restructuring that emphasizes the creation of a competitive market structure will also offer the prospect of lower costs. But lower costs do not automatically lead to lower consumer prices. Many countries subsidize some customers while overcharging others. Rapid implementation of electric utility restructuring aimed at the creation of competitive markets has, in some instances, resulted in price increases. It is often observed that the benefits of lower costs have been unequally shared among classes of customers.

Lower costs can result in higher profits for generators or lower prices for consumers, or both. Lower costs will only produce lower consumer prices if a number of additional steps are taken. Especially important are steps to ensure: (1) that power markets are designed to attract investment *and* achieve price stability, and (2) that markets are as competitive as possible and resistant to control. Some countries such as Argentina have done well in this regard by adopting strict structural separation rules, allowing very limited ownership concentration, and adopting bidding rules that discourage gaming and price manipulation. Elsewhere in Latin America, excessive concentration of market power, especially in generation, is a cause for serious concern.

**Maximized government revenues.** When fiscal pressures provide a powerful impetus to the early phases of reform, the sale of government-owned assets in the course of privatization for the highest possible price can be a compelling force that can obscure the other objectives of reform. When maximizing government revenues becomes an end in itself, which has often seemed to be the case in a number of countries, achieving price reduction goals, as an example, may be difficult. Similarly, maximizing the value of government assets has sometimes encouraged the adoption of market rules that stimulate rather than restrict market power, regulatory

approaches that leave all efficiency gains with buyers, and licenses that minimize the social and environmental obligation of prospective bidders.

**Universal service.** A number of Latin American countries have large geographic areas and populations that remain un-served. While many countries proclaim universal service as an important social objective, restructuring and reform must pay specific attention to this objective, especially if expansion of service territory is left entirely to competitive market-driven incentives. The potential load characteristics of new markets in currently un-served areas, and the costs associated with grid expansion may not provide adequate incentives to the private sector. As such, alternative incentives and options such as distributed systems must be explored.

**Environmental improvement.** While environmental improvement is not usually a restructuring priority, development of the electric sector invariably affects the environment. For those alert to the sector's environmental impacts, restructuring is an opportunity to improve the country's environmental quality. When environmental and other national goals are addressed comprehensively and systematically, restructuring can result in increased protection of the environment, and the country's ability to meet other important goals.

Utility regulators do not, of course, have direct authority to establish national priorities for environmental protection. Indeed, such responsibility, even as it pertains to the power sector, is more likely to reside with environmental agencies. Regulatory decisions in the electric sector can, nonetheless, play an important role in meeting national objectives. In a regulated environment, rule making can affect the environmental impacts of emissions, plant location and siting decisions related to thermal and hydroelectric plants, of electric transmission lines and oil and gas pipelines. Specific market design strategies or market rules can have a profound environmental result by influencing the type of new generation, transmission and distribution lines that will be built in the future. Government planners and officials, as well as utility regulators need to be aware of the environmental implications of the decisions they make.

**Quality of service.** Improving the quality of service for consumers is recognized as an essential goal. The frequency and duration of outages, low voltage, and voltage spikes are all problems that affect small, medium, and large customers. Improved service has been a goal for all Latin American countries but has usually been out of reach of the publicly owned power sector due to the large amounts of capital needed to improve the quality of service.

**Public purpose programs.** As an essential element of state and national infrastructure, the electric sector affects the public good in many ways. Environmental protection, as we have pointed out, is a clear example. As public ownership gives way to private ownership in the power sector, and as deregulation of regulated segments of the market becomes more widespread, public purpose programs that pursue specific social objectives assume greater significance. Examples of effective programs include the following:

- Universal service policies, including service to low-income customers and rural areas;
- Energy efficiency investments and other program support for generation, delivery, and end-use services;
- Renewable, sustainable, and less-polluting generating resources investments and development;
- Research and development in electricity generation, delivery, use and impacts; and
- Consumer protection and consumer education programs.

Although publicly owned Latin American electric companies have supported public purpose programs, quite often they have been rhetorical rather than substantive. However, some programs have been effective and useful. The most notable of these country examples include Brazil and Panama (energy efficiency), Chile and Brazil (R&D), and Brazil and Peru (universal service). But as we have noted already, there is much room to expand the role of such programs throughout the region in areas such as end-use efficiency and environmental protection. How

such programs might be maintained and expanded is one of the challenges to be faced by regulation in the immediate future.

## 2. CONSTRAINTS TO REFORM

The countries included in this study have made steady progress in many areas of power sector reform. As noted already, reform in the region has most often been driven by the need to relieve governments of the heavy financial drain caused by the poor financial performance of the power sector. In the initial phases of restructuring and reform, privatization was seen as the path to attracting much-needed investment, and a means of forcing more efficiency. Frequently, however, the rush to privatize was undertaken without sufficient attention to the necessary prerequisite of ensuring the development of competitive markets.

Interviews and literature reviews carried out for this study identified a number of problems that stand out as most serious. These are described below. The results of our interviews are consistent with a recent review by the Inter-American Development Bank. The discussion below draws on results of the survey and the Bank's review<sup>1</sup>. The most significant challenges include the following:

- Competition is limited, as only a few new investors have entered the market. The market share of the three largest firms in six of the countries studied is shown in the following table. State-owned companies still play a dominant role in some countries, and have actually increased their market dominance in some cases.
- Industrial and other large customers have reaped most of the benefit of lower prices. Residential customers have seen higher prices in several countries. The trend toward price liberalization has greatly increased the volatility of prices for residential customers.
- Service has generally not been expanded to new areas. While the reliability and security of electricity supply seem to have improved in most countries, dramatic cases of failure such as blackouts in Chile in 1998 and 1999. The recent disruptions of supply in California have raised serious concerns about the risks associated with continued structural reform.
- The state has been reluctant to curtail expensive social programs that frequently impose a large financial burden due to subsidies and cross subsidies that favor specific social or interest groups at the expense of others.
- Transparency, simplicity and certainty have eluded the regulatory reform process in several cases. Jurisdictional and policy clashes have erupted among regulators, governments and

	<b>Generation</b>	<b>Transmission</b>	<b>Distribution</b>
<b>Brazil</b>	40	60	40
<b>Chile</b>	50	100	50
<b>Costa Rica</b>	100	100	80
<b>Guatemala</b>	70	100	100
<b>Mexico</b>	90	100	100
<b>Peru</b>	100	100	100

legislators. Limited competition and inadequate regulation have combined in a number of cases to produce revenue windfalls for some private sector participants.

- Customer resistance to rationalized, marginal cost-based prices<sup>2</sup> can block or slow the pace of further reform.

These challenges threaten the long-term direction and sustainability of the reform process. If it is to continue uninterrupted, both technical and institutional constraints must be successfully overcome. In examining these specific sets of constraints, it needs to be stressed that they are not necessarily unique to the Latin American countries, and that the issues we have identified are confronted by both developed and developing countries.

### 2.1 Technical constraints

At the beginning of the electrical age at the turn of the 20<sup>th</sup> Century, power companies in many countries were often in fierce competition with each other for both service territory and customers. Each had its own generating equipment and its own set of wires to deliver electricity. Each had its own engineering, marketing, and billing systems to operate their system.

The shift from competition to monopolistic markets was a response, in part, to new technological realities. The availability of economies of scale stimulated by changes in generating technology caused policy makers to alter their perception of the power sector. The emerging view of electricity supply as a natural monopoly took hold. Licensing within allocated territories encouraged the process of vertical integration generation, transmission and distribution functions within single firms with the ambition of becoming the sole providers of electricity in assigned service territories.

Technology advances in the 1970s once again contributed to the emerging competitive paradigm that now has made substantial inroads into regulatory policy and practice in all regions of the world. These advances allowed efficient generation at smaller scales and transmission over longer distances with fewer losses. Competition among distant

plants became more feasible. Regulators in both developed and developing countries began to implement new regulations that moved away from the concept of natural monopoly and towards competition as a means to technical and economic efficiency.

In Latin America and elsewhere, this restructuring process in the electricity sector followed similar and somewhat earlier trends in the telephone and other network industries. Restructuring the power sector has involved the organizational “unbundling” of electricity supply into its components: generation, transmission and distribution and retail supply to end-users. The reorganization has allowed policy makers to consider alternative “market” structures for each segment, based ultimately upon a combination of social and economic objectives. Generation, for both economic and technical reasons, has been amenable to reorganization to promote competitive wholesale markets for power. Transmission and distribution, on the other hand, have been treated more often as “natural” monopolies subject to regulatory oversight and control, on the grounds that it is not economic in many cases to have multiple sets of transmission or distribution wires within a region. In such cases, it remains only to be added that the market determines prices in the competitive segments while regulation determines prices in the monopoly segments.

The challenges to restructuring and reform, even under such a “mixed” approach, flow from the technical characteristics of electricity and the nature of power demands. As a number of observers have noted<sup>3</sup>, among the most important lessons to be drawn from recent experience in the region is the incompatibility of reform measures with these characteristics. It is useful to review the nature of these characteristics and the constraints they might impose on the choice of specific reform options.

1. Electricity is difficult and expensive to store. Consumption varies widely from hour to hour, day to day and season to season and generation must be closely matched to this demand.
2. Unlike telephone or railway networks, the laws of physics (Kirchoff’s Law) dictate that any delivery or withdrawal of electricity from the system affects

- the entire network. Electrons entered or removed from the system make no distinction over who entered or removed them.
3. The marginal costs of generation are high when the system is near full capacity since additions to capacity to meet additional demands “at the margin” are expensive.
  4. Demand for electricity is almost completely inelastic in the short run. (In the longer term, systems can be put in place that will allow consumers to respond to real-time prices that reflect the true time-varying costs of generation).

How do these characteristics affect the design of new organizational structures for the power sector? The first two characteristics require that transmission systems not only consist of complex technical controls but also complex coordination systems with an efficient network administration to coordinate all electricity inputs and outputs in the system. Careful design and planning are critical as well.

The second characteristic poses a significant challenge for measuring and settling financial obligations that arise from transactions between buyers and sellers in a competitive wholesale electricity market. Similar complexities are involved in deciding who pays for investments in network capacity or improvement when individual electrons have no specific owners.

The combination of inelastic supply at peak times and short-run demand inelasticity (the third and fourth characteristics, above) creates the potential for extreme price volatility in the wholesale market. The existence of less-than-perfect competition and market power exacerbate this tendency. In the view of several observers, this was illustrated by the example of California’s recent experience in the summer of 2000.

A number of studies show<sup>4</sup> that tight supply conditions in electricity markets put sellers in a very strong position to exercise market power, raising prices above the level

which would exist in a fully competitive market. As others have pointed out, in market conditions where the demand for electricity is high and the supply grid has little or no reserve capacity available, a producer with capacity to satisfy even a very small share of total demand (even a percent or two) becomes pivotal. The local (buying) utility, under these circumstances, may have no options and must therefore pay exorbitant prices.

These characteristics of the electricity market raise a number of immediate challenges for Latin American policy makers:

*Monopoly power in the wholesale market.* The characteristics of the power sector and the limited number of suppliers make it especially vulnerable to the exercise of market power. How to encourage the growth of competition will be a continuing focus.

*Non-discriminatory access to the transmission network.* Grid administration must be fully independent to assure non-discriminatory third-party access, and to ensure that no particular generator or group enjoys competitive advantages. The independence of transmission from other segments, particularly generation, should be a crucial objective of reforms to promote competition.

*What type of transmission operator to use?* This question assumes significance in view of the alternatives available. Systems can be designed that rely on an independent private transmission company (known as a TRANSCO), or a non-profit independent system operator (known as an ISO), or government ownership and operation.

*How much price volatility is permissible?* Given the potential for price volatility, alternative mechanisms such as long-term contracts to counter this tendency must be carefully considered.

*Reliability.* The issue of acceptable levels of reliability, in addition to price volatility, must be explicitly considered in order to determine the necessary margins of reserve capacity.

## 2.2 Institutional capacity

The course of reforms in Latin America and other parts of the developing world suffer from what has been termed an “institution gap.” Institutions taken for granted in other countries — like the rule of law, clear and accepted property rights, an independent and competent judiciary, mechanisms for peaceful dispute-resolution, contract enforceability, quality of public bureaucracies—are either missing or exist in embryonic form. Good governance is crucial to the long-term sustainability of reform.

While sector reforms in Latin America typically followed models in the developed countries, inadequate attention was paid to institutional disparities that could affect the course of reforms. It must be stressed that the experience and best practices from other countries’ reforms are irrelevant if they are not adapted to meet local needs and conditions.

The small size of many Latin American countries, their dependence on hydropower, their low level of institutional development, and country risk have conspired to weaken country defenses against the strategic behavior of big investors and their resulting market power. Judicial and regulatory institutions will need sufficient resources and powers to address these problems. A country with a weak judiciary will have more difficulty in doing so. The lack of human resources, expertise and experience in regulating a market-oriented electricity sector will limit the chances of creating an effective regulatory environment.

## 2.3 Issues facing the reform process

To summarize, overcoming constraints to reform in the Latin American power sector will involve dealing with the following issues:

- Sequencing reforms.
- Achieving workable competition and avoiding market power.
- Dealing with price volatility and demand

response.

- Setting rates in noncompetitive segments.
- Choosing between licensing and generic rule regulation.
- Strengthening effective regulatory institutions.
- Fostering private investment.
- Providing consumer protection.
- Protecting the environment.
- Incorporating energy efficiency in all aspects of reform.

Each of these issues is discussed in the following section.

<sup>1</sup> Millan, Lora and Micco, 2001

<sup>2</sup> In supply-constrained, monopolistic markets, prices are likely to be higher than regulated, average-cost based prices, even in the absence of subsidies.

<sup>3</sup> Millan, et.al.

<sup>4</sup> Millan, et al.

### 3. FRAMEWORK AND BEST PRACTICES TO OVERCOME CONSTRAINTS

#### 3.1 The sequence of reforms

From the preceding discussion of the challenges now confronting many countries, it is clear that reforms in the past have not always considered the appropriate sequence in which the process should take place. As an example, expanded private sector participation has been the early focus of many reforms, without attention to first establishing the rules and regulations under which such participation is likely to occur. The importance of creating the enabling conditions, in short, has been overlooked. In the absence of an adequate and stable policy environment, the flow of private investment, which early policies sought to encourage, has often been hesitant and unreliable. It is now more widely recognized that an orderly approach to restructuring the sector involves a logical sequence: establish a sound regulatory framework, restructure government assets, and organize market rules *before* privatization occurs and private investments are encouraged. There is also recognition that distribution reforms may take precedence over generation in the agenda for reforms. At the very least, distribution must become a viable activity in parallel with efforts to organize competitive wholesale markets for electricity. Such an orderly approach to the sequence of reforms provides clear signals that encourage investor confidence, and reduces the risks of their involvement in a market where gestation periods are typically long. It also allows a clear articulation of government's role in promoting a competitive environment, and protecting the public interest.

Unfortunately, power sector reform is a political and economic process that has proven to be neither logical nor orderly in Latin America, as in many parts of the developing world. Instead, the process has often evolved as an ad hoc response to financial crises. Power shortages and the inability of governments to support needed investments have led to policies designed to encourage private investment in the sector. Although short-term incentives often succeeded in stimulating the development of independent power plants (IPPs) under a variety of ownership models (BOT, BOO, etc.), these

measures were introduced without regard to the establishment of adequate regulatory mechanisms.

On the positive side, this rush to IPPs did provide momentum to the reform effort and it did relieve power shortages in many instances. On the negative side, however, in countries with ineffective legal institutions, weak bureaucracies and inexperienced regulatory personnel, the problems have been compounded by reform rather than resolved. Examples of such an outcome include the negotiation of expensive power purchase agreements (PPAs) in which the costs have not been supported by collections at the retail level. Under such conditions, private participation in the power sector may have contributed to the further deterioration of government finances.

A case in point involves twelve power purchase agreements in Guatemala that placed a large financial burden on the government, and imposed a level of unanticipated inflexibility in the newly created electricity market. Public resistance prohibited the government from passing on price increases to consumers, forcing it to rely on revenues from its own generation operations to subsidize consumers. Competition in the new market was seriously limited because the government has retained 50 percent of generating capacity to produce the needed income. Honduras and El Salvador have had similar experiences.

In Colombia, three municipal companies held half of the demand with the rest held by distribution companies, nominally owned by the government but in fact controlled by local politicians who used them for patronage. Reform measures in the country were held hostage by these stakeholders and resulted in most distribution companies not being privatized and continuing to function in the fashion common in Latin America before reform: high inefficiency, poor collections, large physical and theft losses, overstaffing and vulnerability to corruption. Brazil provides a contrasting example, where privatization of its distribution companies was attempted as the first step in the reform process. From the

perspective of approaching the correct sequence this was appropriate. But establishing a regulatory framework for the emergence of a competitive wholesale market took a very long time. As a result, there has been little appetite for private investments in new generation capacity.

There remains no easy answer to the sequencing issue. The sharp urgency of the reform effort in the region's power sector in the late 1980s appears to have been blunted by a number of intervening events: many of the most urgent power shortages have been alleviated; the power sector's drain on government finances, while not eliminated, has been reduced; countries have understood that privatization must be approached cautiously; global foreign direct investment has declined as investors have become more risk averse due to the global economic downturn and due to reaction to Enron type scandals. While these factors have slowed the process of reform, policy makers and regulators in Latin America may find it easier now to revert to a more orderly process.

### 3.2 Achieving workable competition and avoiding market power

Regulatory officials interviewed in the region identify at least three prerequisites for competitive markets to work efficiently. First there must be more concerted efforts to restrict the growth of both horizontal and vertical market power. (Horizontal market power occurs when any one firm controls a dominant share of the market for its products or services; vertical market power exists when control by a single firm of an essential component or service such as transmission is used to influence the price in other markets such as wholesale electricity generation.)

The second priority identified is open, non-discriminatory access to transmission and distribution systems. Given the nature of electricity markets, all participants must have equal access to transmission in a regime of non-discriminatory and efficient prices.

The third priority is to create the appropriate environment in which demand response can be used to mitigate price volatility, and the costs of expensive peaking capacity

(for which ultimately all consumers must pay). This requires a focus on removing price distortions. Prices should be undistorted by limited access to information (a prerequisite of competition) and all costs must be internalized. This implies an emphasis on the removal of subsidies. A major benefit of such an environment where prices convey the right signals to all participants in the market would be the possibility of creating a demand response from consumers who might, with the appropriate mechanisms in place, voluntarily reduce their consumption at times of peak demand when capacity constraints are most severe. We turn to a discussion of some of the available options to address these specific priorities.

*Horizontal Market Power:* The most effective tool to limit market power is to create conditions that ensure that there are a large number of suppliers in the market. This may require the establishment of an upper limit on the permissible market share for any single supplier. This type of structural control has proven to be far more effective than alternative approaches. Many countries have experimented with one such alternative: to establish conduct-based rules that seek to assure fair play by all participants in the market. Such systems however, are vulnerable to willful abuse, especially in the case of unregulated affiliates (e.g., generating companies), and regulated monopolies (e.g., transmission or distribution companies). In addition, conduct-based systems rely on aggressive enforcement. This may prove difficult in practice, because the market regulator may lack sufficient access to information to prove suspected collusion or other violations.

The abuse of monopoly power is an ever-present problem. Economists generally favor the creation of market structures that make it very difficult for firms to collude. But political considerations and weaknesses in the legal structure have often made structural solutions difficult to achieve, leading to a reliance on functional separation of affiliates, accounting rules, and codes of conduct to substitute for structural solutions.

In almost every market examined in this study, concentration and market power affect the generation segment and true wholesale competition remains elusive.

The notable exception to this observation is Argentina, where approximately fifty generation companies participate in the market.

Competitive market structures may also prove difficult to encourage in face of economic integration within Latin America. This is reflected in the increasing importance of cross-border energy exchanges, and the growing convergence of gas and electricity markets (a feature that has its parallels in North America). However, in regions such as Central America, where the limited size of national markets may impose limits on the number of market participants, integration may have the effect of stimulating competition. The development of SIEPAC in Central America offers the promise of such a competitive stimulus. It is likely that interconnection of markets within this region will encourage cross-border competition. In addition, SIEPAC may offer the prospect of scale economies to encourage the construction of more cost-efficient, larger plants servicing regional needs.

Elsewhere, however, integration and regional interchange of power, as a number of observers have recently pointed out, may impose a new set of regulatory challenges. The principle challenge will be to stimulate the healthy development of energy markets across international borders, while maintaining the benefits of competitive efficiency at the national level. One obvious regulatory issue is maintaining “price signal coherency” among markets as a result of the impact of duties and tariffs on producers and consumers.

In addition, regulation faces the complex tasks associated with preserving competition on a regional basis. A regional perspective, as Rudnick and Zolezzi have correctly pointed out, can alter “the appearance of things. What may seem a monopolistic position within a country... may not be so in integrated regional markets.”<sup>5</sup> Furthermore, in keeping with global trends, development of Latin America’s energy sector in recent years has seen the emergence of large multinational energy companies such as Endesa, AES, and EdF (based in Spain, the United States and France respectively). The challenge here is how to regulate such entities in the context of ensuring competitive market structures without an adverse effect on their ability to mobilize much needed investment

flows. Consistency in national regulation of access to network resources such as pipelines, transmission and distribution, transparency in pricing, bidding procedures, and the free flow of information are essential ingredients for reforms in the next phases of regulatory evolution.

Market rules can be developed during restructuring to allow regional interchanges to occur without undue restrictions such as excessively high tariffs or outright prohibitions. There is developing experience with this type of interchange as evidenced by the cross border natural gas movements between Argentina and Brazil and Bolivia and Brazil. Jointly owned hydroelectric dams such as Itaipu are good examples of what is possible. Regional cooperation in Latin America has been productive and should be continued and regulators would be wise to encourage and support regional movements of power and other forms of energy. On balance, provided regulators develop a common and cooperatively developed set of rules, regional integration can serve to enhance competition.

*Vertical Market Power.* In order to assure that suppliers are able to compete to serve load, they must be guaranteed non-discriminatory, open access to the transmission system. Open access depends on two key interrelated components of transmission: ownership and operations. Both of these can threaten competitive markets.

When generators also own transmission, they have the incentive and potentially the means to hinder their competitors’ access to the transmission system. Typically, this problem is addressed by transferring control of the transmission system to a third party: an “independent system operator” (ISO). It is the responsibility of the ISO to assure that all generators have equal access to the market.

A second alternative is to transfer ownership of the transmission system to an unaffiliated government-owned or privately-owned transmission company (TRANSCO). While open-access may be protected by the TRANSCO, the incentives may be more limited to explore cost-effective alternatives to expensive capacity growth, such as distributed generation, energy efficiency and load management. This limitation of the TRANSCO model

<b>Table 3 Transmission Systems Organization</b>				
	<b>Ownership</b>	<b>Operator</b>	<b>Wholesale Access</b>	<b>Retail Access</b>
<b>Argentina</b>	TRANSENER	CAMMESA (ISO owned by generators, distributors, large consumers, transmission entities and government)	Yes	Yes (Large Consumers Only)
<b>Brazil</b>	Government	ONS (ISO Government-owned)	Yes	Yes (Large Consumers)
<b>Chile</b>	Private – multiple owners	CDEC (ISO controlled by generators through oversight committee)	Yes	Yes (Large Consumers Only)
<b>Costa Rica</b>	Government (ICE state power monopoly)	Government (ICE state power monopoly)	Yes (from 2003)	No
<b>Mexico</b>	<i>Proposed:</i> Government	COSEN (ISO owned by government)	Yes	No
<b>Panama</b>	Government (Transmission Enterprise)	CND (ISO controlled by the Transmission Enterprise)	Yes	Yes (Large Consumers Only)
<b>Peru</b>	Government (“EL” – national transmission enterprise; some regional transmission enterprises)	COES (operating committee for each “system” – No ISO)	Yes	Yes (Large Consumers Only)

can be overcome with the use of appropriate regulatory tools such as revenue cap performance-based rates.

The present structure of transmission system organization in seven Latin American countries is summarized in Table 3.

In most of these countries, government ownership of transmission assets and operational control vested in an ISO is the dominant model. In almost all countries, countries wholesale access is in place (Costa Rica, the exception, will implement open access by 2003). Retail access, however, is restricted to large customers.

### 3.3 Dealing with price volatility and demand response

Experience worldwide suggests that reform and deregulation almost invariably lead to high price volatility. When regulated prices are replaced with market-derived prices, it is to be expected that prices will change more rapidly and within larger ranges. Cases of such price volatility have occurred in England and Wales, Scandinavia, California and in Latin America, namely, El Salvador.

Factors that influence the degree of volatility include sudden and unanticipated changes in demand or supply conditions, market design flaws and market power. The high volatility observed recently in Colombia’s wholesale

market was driven mainly by weather conditions associated with the El Niño event. In El Salvador, on the other hand, the volatility of prices can be attributed mainly to the exercise of market power.

Price variations as a result of changing competitive market conditions are necessary signals that direct scarce resources to the most efficient uses. Social and political realities, however, will dictate the acceptable bounds for price movements. Regulators, under popular pressure to keep prices stable, may therefore be tempted to reintroduce price regulation or otherwise reverse the reform process. Such interventions become more likely when price volatility is a result of abusive market power as appears to have happened during the California crisis of 2000. However, even under ideal competitive market conditions, regulatory policy makers will face the problem of defining the acceptable limits for volatility and choosing among appropriate control mechanisms and hedging instruments.

A mechanism that has frequently been overlooked in many regions of the world, including the HERA countries, focuses on measures on the demand side of the market that can stimulate customer response to rapid changes in market prices. The integration of “demand response” measures into electricity reforms confronts three critical issues that regulators must recognize.

The first of these involves clearly identifying the different types of demand response that are useful. The most obvious is the ability of customers to reduce consumption when prices are highest, at system peak times. Customers, acting through real-time information or an effective proxy for that information, can, and often will, reduce their consumption to avoid paying high prices.

The second issue is the selection of mechanisms that can be put in place to reveal the value of demand response to *all* major stakeholders: generators, customers, system operators, and government. Experience in the United States and elsewhere has demonstrated that the value of demand reduction at times of system peak can be extremely high – in the order of hundreds to thousands of dollars per megawatt-hour. These benefits accrue to *all* participants, although their individual share of benefits

may not always be visible. For example, in most markets, customers tend to see only average prices for past consumption and are never given an effective means to respond to high on-peak prices. The result can be the inefficient use of capital to build and maintain peaking capacity.

The third and related issue involves the design of appropriate market bidding mechanisms that allow large customers and the suppliers of small customers to bid demand reductions into the market. With the limited exception of a few industrial customers who enjoy interval pricing, markets in the countries surveyed appear to lack meaningful demand response mechanisms. The design of such mechanisms will generally involve arrangements in wholesale markets to allow consideration of demand bids after a first round of supply bids have revealed the price curve. Such a bidding mechanism allows the market price to clear at its appropriate lower level and provides benefits to all customers. Whatever the relative merits of how such mechanisms are designed, it is clear that the failure to incorporate demand response as a component of the market has large impacts in the form of potential windfall profits for generators and lost value to customers. To these costs must be added the social costs implicit in the wasteful use of natural resources and associated environmental impacts.

### 3.4 Setting rates in noncompetitive segments

Latin America’s finance ministers, not its energy ministers, were the first to formally commit their countries to power sector reform. The existing government run utilities were losing money yet they had large capital needs, to meet growing demand. Utilities were not credit worthy so they were unable to finance expansion themselves. Independent power producers invited to provide new generation could not finance plants based on the strength of retail electricity rates. Regardless of the degree of restructuring, for the industry to be able to finance its capital needs, prices should be set so as to enable a utility a reasonable opportunity to recover prudently incurred expenses and to earn a fair return on investment. Ratemaking is thus critical to the

	<b>Generation</b>	<b>Transmission</b>	<b>Distribution</b>
<b>Argentina</b>	Market prices	Concession-based; Price cap	Price caps-10-year concession/ 4-year tariffs
<b>Brazil</b>	Market prices	Cost of Service	Price caps
<b>Chile</b>	Marginal cost	Cost of Service; Concession-based; expansion competitive	Node price of energy and capacity plus cost of distribution service; Efficiency standard
<b>Costa Rica</b>	Market prices after 5 year transition	Cost of service	Cost of service
<b>El Salvador</b>	Market prices	N/A	Efficiency standard
<b>Guatemala</b>	Contract based pricing for privately-owned generation	Cost of service	Efficiency standard
<b>Honduras</b>	Proposed privatization – not yet cost-based	Proposed privatization – not yet cost-based	Proposed privatization – not yet cost-based
<b>Mexico</b>	Proposed competitive market	Proposed five year rate caps	Proposed five year rate caps
<b>Nicaragua</b>	Privatization and vertical disaggregation pending; not yet cost-based	Privatization and vertical disaggregation pending; not yet cost-based	Privatization and vertical dis-aggregation pending; not yet cost-based
<b>Panama</b>	5 Yr. Transition 85% of market on cost of service/ 15% market price; Then market prices for 100%	Efficiency standard	Price caps
<b>Peru</b>	Marginal cost	Efficiency standard	Efficiency standard

restructuring process.

A number of steps are necessary to make this possible: (1) setting prices at levels that reflect real costs and permit the utility to provide a desired level of service and (2) adopting regulatory and ratemaking practices that produce strong incentives for utilities to become more efficient and to support energy efficiency. Many countries

Table 4 above summarizes the various approaches used in eleven Latin American countries.

The approach to pricing varies considerably from country to country, ranging from the use of cost-of-service pricing to market-based pricing. Several countries use “benchmark” approaches, using the estimated costs of a hypothetical efficient company as the basis for

transmission or distribution pricing. There is also increasing discussion of the need for performance-based regulation, price-caps, revenue-caps, and similar mechanisms to provide efficiency incentives. Performance based rates can be particularly useful to:

- Create strong incentives for cost containment.
- Improve incentives for innovation.
- Encourage increased energy efficiency in supply and in end use.
- Encourage increased use of clean and renewable energy supplies.
- Increase customer service and service quality.

Among the countries studied surveyed, performance based rates (PBR) exist in the form of either long-term rate freezes or price caps. In some case, quality-of-service standards are used within the rate, with penalties for failure to meet the minimum standard. For example, Argentina imposes penalties on the transmission concessionaire for failure to meet technical, safety and reliability standards. In both Argentina and Chile, a four-year tariff period is set for distribution companies, using an efficiently run model enterprise as a reference point. Panama uses an efficient cost-of-service concept for setting distribution tariffs, with an adjustment for efficiency gains and allowance for imposing periodic price caps.

In considering the options available for market design in the future it is important to recognize that from a practical standpoint *all regulation is incentive regulation*. It is therefore an important regulatory skill to understand the specific incentives (or disincentives) that are implied in any particular regulatory scheme. To understand performance based regulation one needs a good understanding of the incentive characteristics of traditional cost of service regulation, including price caps and revenue caps.

Under either the price or revenue approach, the caps are typically set for a fixed period of time. The cost cutting incentives for price and revenue caps are identical. The main difference is that price caps may also encourage

increased sales and hence discourage end-use energy efficiency. With revenue cap approaches, the incentives to invest in energy efficiency range from neutral to significant.

Revenue caps make the most sense if one of the goals of the PBR is to encourage end-use energy efficiency, provided that costs do not vary with volume. On the other hand, if end use energy efficiency is *not* an explicit goal, and if costs vary with volume, the use of price caps may be most appropriate. With respect to distribution utilities, costs do not vary with kilowatt-hour volume (on a *per* customer basis), making revenue caps the most sensible approach. The primary difference between price caps and revenue caps is the incentive created for demand-side management or end-use energy efficiency. With the price caps the utilities have an incentive to increase sales and have a very powerful disincentive to encourage or directly invest in end-use energy efficiency.

### 3.5 Choosing between licensing and generic rule regulation

A fundamental choice confronting regulatory design is whether to rely on licensing (franchises or concessions) or on generic rules as the primary instrument of regulatory control. A license-based system establishes most of the conditions of operation in the individual license documents. A rule-based system promulgates most the conditions for market participation through the use of general rules for all participants, supplemented by decisions in specific cases.

Virtually every country studied uses some form of license or concession mechanism for some or all of the components of the electric sector. Table 5 reflects the method employed in those countries for which data was available.

While nearly every country uses some form of concession to license the different sector components, the specific arrangements may not always clearly define the terms of service. In theory, a license-based system has attributes of a firm contract between the government and the utility, with clearly specified terms. A rule-based system, on the other hand, offers regulators the advantage

	<b>Generation</b>	<b>Transmission</b>	<b>Distribution</b>
<b>Argentina</b>	None	Concession	Concession – 99 year contracts with 10 “out” provisions
<b>Brazil</b>	Concession	Concession	Concession
<b>Chile</b>	N/A	Concession – unless on private land	Concession
<b>Costa Rica</b>	State owned with IPP market	State-owned	State-owned
<b>El Salvador</b>	Hydro remains State-owned; Other generation may be privatized – licensure status unclear	N/A	N/A
<b>Guatemala</b>	N/A	N/A	N/A
<b>Honduras</b>	State-owned	State-owned	State-owned
<b>Mexico</b>	None – only State can provide tp public	State-owned	State-owned – but may grant concessions to private parties for operation
<b>Nicaragua</b>	To be privatized – licensure status unclear	State-owned	To be privatized – licensure status unclear
<b>Panama</b>	Concession	Concession	Concession
<b>Peru</b>	Concession	State-owned	Concession

of greater flexibility to meet changing conditions. Effective implementation of a rule-based regulatory approach, however, must be supported by a strong legal and institutional foundation. Weaknesses in this supporting foundation may explain the reliance on licensing arrangements to assure stability to regulatory structure in most countries of the region. It is important to recognize, however, that *every* regulatory system must incorporate flexibility *and* stability. The establishment of mechanisms for dispute resolution and the use of periodic competitive bidding for licenses are two important ways of incorporating flexibility into a license-based system.

The issuing of licenses offers both an opportunity for innovative regulation and a serious dilemma. The opportunity stems from the fact that commissions faced by a multitude of duties and expectations may be able to

use the license agreements as a substitute for generic rulemaking that they do not have the time and resources to undertake. Licenses can, for example, require the licensee to offer certain energy efficiency services, when such services are viewed as necessary to achieving national policy objectives.

However, the dilemma inherent in the use of license agreements is that they can become straitjackets, inhibiting regulatory responses to changing national priorities. This concern will be exacerbated if regulators focus too heavily on suspension and revocation of licenses (rather than on fines or other ratemaking techniques) as the principal means of imposing penalties. Revocation may have little practical significance unless qualified operators are available to step in and is seldom suitable as a remedy for any but the most severe violations.

In short, license agreements cannot, at once, offer guarantees of complete financial stability for incumbent market participants *and* be effective instruments of

under drastically changing market conditions. Given the prevalence of licensing within the region, regulators would be advised to ensure that such

### Box 1 Licenses as a Supplement to Regulation

For licenses to be effective instruments of regulatory control, the following conditions should apply:

- ⇒ The license duration should be limited, especially in uncertain conditions, to a few years.
- ⇒ The regulator should be able to terminate the license for noncompliance with license conditions following appropriate notice, and an opportunity for correction and a public hearing. However, this power should be supplemented by a system of lesser penalties.
- ⇒ Transfer of the license without regulatory approval should be prohibited.
- ⇒ The licensee should have to supply a complete, audited financial statement annually and the regulator should have complete access to the licensee's books and records at any time, as well as the power to compel the timely submission of information.
- ⇒ The licensee's physical premises and plant should be subject to inspection by the regulator at any time.
- ⇒ The regulator should have the power to resolve any disputes between the licensee, its customers, and its suppliers of fuel and electricity.
- ⇒ The license conditions could include targets and time requirements for extension of service to unserved areas in countries where many people lack electricity.
- ⇒ License conditions should include goals for energy efficiency, metering, loss reduction and collections.
- ⇒ The license should specify that service should meet the best established industry standards, or some other acceptable standard, which can be supplemented with specific service quality standards and measures to protect customer rights.
- ⇒ The license should include a requirement that the holder sell to the successor, preferably at prudent original-cost-depreciated prices, as determined by the regulator, in the event of termination.
- ⇒ Licenses should recognize the regulatory right to compel license consolidations to promote economic efficiency or service reliability; providing for appropriate compensation.
- ⇒ The license-awarding authority's jurisdiction should be national or regional in scope, and it should have no financial stake in the success or failure of the licensee.

competition and customer protection. Financial stability and effective competition only go hand in hand for the firms that are performing well. License agreements should aim instead to guarantee fair treatment and unbiased dispute resolution, while also providing for flexibility to adapt to changing national conditions. An example of such a flexible approach is the case of the Dominican Republic where a renegotiation of the terms of the utility's license was permitted to avert bankruptcy

arrangements meet some specific criteria for adequacy. While existing licenses undoubtedly provide for some of these requirements, it would be useful to evaluate their adequacy, based upon the experience gained in other countries. Such a list of requirements is shown in Box 1.

At this time, Argentina has the most advanced license bidding. It requires that distribution licenses be awarded

competitively at the outset and that a controlling share be re-bid at ten-year intervals thereafter, or at anytime that a license is terminated for nonperformance. If performance has been satisfactory, the current license holder may be among the bidders and may retain the license by outbidding all others. In that event, no money changes hands. While an incumbent could retain control with an artificially high bid, such a bid would deny it any opportunity to sell on favorable terms. For conditions on licenses see Box 1 on the previous page.

The Argentine system appears to offer licensees substantial incentives to operate the system efficiently, within the rate setting framework established by regulators. Since rates are regulated (on a price cap basis) and licenses can be terminated for poor performance, customers are protected, provided that regulation is well administered. The mechanism by which prices are reviewed and reset just prior to the ten-year offering will be critical in determining the extent to which benefits are shared between customers and investors. Since Argentine licenses have not yet reached their tenth year, no actual experience with a full cycle is yet available.

As the Argentine example shows, license competition clearly is not a complete substitute for regulation. Because of the impossibility of developing license agreements that anticipate all contingencies, and because of the likelihood of disputes during the periodic license re-bidding, there is an unavoidable need for regulatory oversight on a continuing basis. Impartial regulatory oversight also substantially reduces the risk of politicization of the type that has occurred while cable television industry in the United States where local politicians on city councils have been overseers of the licensing process.

Finally, it is important to acknowledge that we have had little meaningful experience with electric utility license competition. This may be a strong argument in favor of short-term contracts, at least initially, as long as the necessary assurances are provided for full recovery of prudent investment at the time of transfer. Indeed, short-term license contracting could be the first step in a transition toward consolidation of distribution entities, since the more successful distributors would be among

the most obvious candidates to bid for the less successful ones. Short-term contracting could also smooth a transition to rule-based regulation as regulatory agencies mature; although such a strategy would have little appeal if license competition under the supervision of a capable regulatory agency is already working well.

With respect to energy efficiency, a critical issue is whether to build in incentives through a pricing formula (such as a revenue cap) in the license agreement. Such provisions substantially increase investor certainty and may be quite workable if the contract is not for a long period of time, allowing for modifications based on accumulated experience.

A variation of traditional licensing is the application of the bidding concept to specific parts of the distribution utility's functional services. For example, in the United States some regulatory commissions have considered bidding out service to low-income communities for a fixed sum or a fixed sum per customer. A similar approach has been used to serve customers who do not choose a specific supplier, or to provide certain types of energy efficiency services. In countries with significant proportions of the population lacking service, or a substantial level of unmetered service, competitive bidding might be used to serve such market segments within a price ceiling even if the licensee is not required to adhere to a price cap. It is possible that the licensing process can offer innovative solutions to such issues that are common to many countries.

### 3.6 Strengthening regulatory institutions

While our review of the status and development of regulatory agencies in Latin America shows substantial progress, it also indicates that regulatory agencies are generally too small, poorly funded, and lack sufficient jurisdictional authority and independence. In many countries, especially the smaller Central American countries, there is a basic shortage of experienced and qualified people to head and staff the regulatory agencies. It is important, therefore, to review the specific institutional elements that are needed within an effective regulatory agency and to summarize the areas for improvement in the present structure. Table 6 on page 27 shows the nature of the regulatory commissions created and their respective jurisdictions.

The table illustrates considerable variation in the scope of regulatory activity and enforcement authority among agencies in the countries surveyed. Responsibilities generally, the include a combination (or subset) of the following areas:

- Rate or tariff setting.
- General regulatory rulemaking.
- Utility planning.
- Environmental impact assessment (for resource use).
- Conservation and efficiency.
- Consumer protection.
- Financial oversight.
- Protecting system reliability.
- Oversight of utility management and design of incentives to improve administrative efficiency.

It is apparent that these functions and responsibilities may not always be consistent with each other. The challenge facing regulators is to achieve a balance among competing objectives in order to develop a workable overall regulatory framework.

The structure, scope, and powers of a regulatory commission are key to achieving this balance. The key characteristics of an effective regulatory commission

include:

- Credibility.
- Independence from the political process and the regulated enterprise.
- Broad scope of authority including the mandate to protect the public interest.
- Technical expertise in the functions and business of the regulated enterprise.
- Continuing monitoring and enforcement of rules and orders.

The first four characteristics are of particular significance in the context of the countries surveyed.

*Credibility.* Sustainable reforms require that the regulatory authority enjoys a high degree of credibility among *all* stakeholders. Its independence, adequate jurisdictional authority, technical and managerial competence all contribute to building such confidence. It is especially critical, however, that the regulator's actions in the early phases of existence are well received. Since many countries are still in this formative stage, policy makers would do well to ensure that new regulatory institutions approach their role with great diligence and care. The public's perception of any new agency will, in large measure, be created in the initial few years of its operation. It is critical that its first regulatory actions are perceived as being completely even handed. The timing and sequence in which reforms are undertaken, once again, can prove critical. If, for example, reforms require the elimination of subsidies *and* higher consumer prices it would be preferable to undertake such measures *in advance* of other specific measures to improve the risk environment for potential private sector investors. All too often, the intent of regulatory actions, undertaken simultaneously on a broad front, can be easily misinterpreted as favoring specific interest groups. This is all the more likely in the early phases of reform, when urgent actions are necessary, and the institutional capacity to educate and consult all stakeholders is limited. The resulting loss of credibility can be difficult to erase.

*Independence of the commission.* The single most important characteristic of a successful regulatory

	<b>Commission</b>	<b>Jurisdiction</b>
<b>Argentina</b>	Ente Nacional Regulador de la Electricidad (ENRE)	Technical, safety and operating standards and approval of tariffs for transmission and distribution entities, quality of service and environmental standards and monopolistic practices
<b>Brazil</b>	Agencia Nacional de Energia Elctrica (ANEEL)	Price regulation, competitive behavior, technical regulation and standards, concession awards, market oversight, and government electricity policy
<b>Chile</b>	Comisión Nacional de Energía (CNE)	Strategic policy development, tariff setting, service and operational standards, regulation of dispatch entities, and planning for generation and transmission where not pursued by other interests
<b>Guatemala</b>	Comisión Nacional de Energía Eléctrica (CONAE)	Supervision of contracts in generation, transmission and distribution, consumer protection, competitive practices, transmission and distribution tariffs, and open access rules for transmission and distribution.
<b>Mexico</b>	Comisión Reguladora de Energía (CRE)	Enforcement of regulations, inspection of facilities, issuance of permits, regulation of prices, overall supervision of the industry, ensuring adequate supply and security, promotion of competition, and elimination of cross-subsidies
<b>Nicaragua</b>	Comisión Nacional de Energía (CNE)	Formulation of national energy policies, including renewable energy tariffs, rural electrification, promotion of private investment, alternative and renewable energy development, preparation of sector legislative proposals, promotion of relations with capital markets, management of the electric sector Development Fund, and fuel use policies
<b>Panama</b>	Ente Regulador de los Servicios Públicos	Water, sanitation, telecommunications and electricity; concessions, licensing of generation, transmission and distribution, efficiency and performance standards, consumers protection, quality of service, competition and efficiency, monopolistic behavior, tariff setting, conflicts among public service entities, assuring provision of service, public hearings, accounting standards and reporting, and consumer input
<b>Peru</b>	Comisión de Tarifa de Electricidad(CTE) Organismo Regulador Existente (OSINERG)	Tariffs (recently absorbed by OSINERG); Supervises energy investment

commission is its independence from undue political and commercial influence. Such independence can prove crucial in attracting investment flows. Time and again, capital markets have demonstrated their reluctance to respond to the requirements of the power sector in regulatory environments that are subject to undue political control or to manipulation by special interests. Assuring regulatory independence is therefore a pragmatic necessity.

Structurally, such independence depends on how commissioners are selected, the terms and conditions of their tenure, and the scope of their collective budgetary authority. To increase the level of independence, countries can:

- Require that commissioners are professionally qualified.
- Appoint commissioners for relatively long terms that extend beyond the term of those who appoint them.
- Ensure diversity through appointments with staggered terms.
- Provide budgetary authority that is insulated from the political process.

Good governance also protects the independence of regulatory authority. This is especially important in view of the need to make difficult decisions that have divergent impacts on stakeholders. (Pricing decisions are an obvious case in point.). To achieve public acceptance a commission must implement policies that ensure the following:

- Public education.
- An open and transparent process
- Consumer participation in the process.
- A demonstrated rationale for each decision of the commission.

*Independence of the commissioners.* An additional point, deserving special attention, is the issue of the independence of individual commissioners. The public will have confidence in individuals whose reputations and demonstrated experience demand respect in their quasi-judicial role as regulators. One option to safeguard

independence of commissioners is a strong ethical code. Drawing on the experience of a number of countries, the components of such a code might include:

- Prohibitions against any ownership, acceptance of gratuities, or other material benefits from regulated entities or stakeholders, including consumer groups affected by the commission's decisions.
- Provisions to allow any party to request recusals when legitimate concerns arise about conflicts of interest.
- Prohibitions against private communications with concerned parties in pending regulatory matters.
- Protection from political influence or interference.

*Scope of authority.* The scope of the regulatory agency's authority should be broad and should include oversight of competitive generation markets and enforcement of anti-monopoly measures. Latin American countries surveyed either have no anti-monopoly laws or have spread such authority among other agencies. Several commission staff, especially in Mexico and Central America, expressed the opinion that the commission's authority was too limited to effectively review and approve prices, or to oversee competition.

Regulatory agencies need to have full authority over the pricing of monopoly services such as distribution, transmission and generation (when there are no functioning competitive markets); access; service quality, reliability, resource planning for captive customers; and environmental compliance.

The distribution of regulatory authority can be structured to minimize the possibility of institutional conflict. However, such a delegation of authority should not attempt to make artificial distinctions between policy making and regulation. Such attempts frequently create more problems than they solve. Regulatory decisions necessarily involve the establishment of policy. Experience indicates that the best approach is that broad goals such as promoting competition, non-discriminatory

access, or environmental protection should be articulated in basic enabling laws. Implementing authority is then delegated to regulatory agencies whose rules and orders are developed to be consistent with its interpretation of legislative intent. There should, of course, be adequate provision for legal challenges to such interpretations of law that are a necessary component of effective regulation.

*Technical skills and staffing.* Regulatory commissions differ greatly from non-regulatory governmental agencies. The regulatory commissions in Latin American countries are usually specific to the sector they regulate, i.e., telephone companies are regulated by telephone regulators and power regulators regulate power companies. (This arrangement is distinct from the U.S. example where the regulatory commissions and their staff may have jurisdiction to regulate a number of different sectors.) As a result, personnel tend to be specialists who are very knowledgeable about the industry, and in many cases, have worked for the government owned utilities that they now regulate.

Because of the highly technical nature of the subject matter, a commission needs a large number of professionals (attorneys, engineers, economists) and administrative staff. In Latin America, there are sufficient numbers of such professionals in each of the countries. However, they have usually worked for the utilities and although they represent a pool of available talent, they often have ties to their former companies. Such industry ties can threaten the independence of regulatory bodies. Therefore, more checks and balances need to be built into the regulatory process to detect conflicts of interests and to remove those commissioners and staff that are found to be unreliable.

In the longer term, regulatory institutions must develop internal mechanisms to assure a supply of independent professional expertise. Developing a cadre of trained professionals requires systematic efforts to recruit and retain qualified staff at the lowest levels and to provide for their professional development over time. As they gain knowledge and experience they can be promoted and given greater responsibilities. This takes time, but needs to be considered during the restructuring process.

Sufficient technical and administrative personnel and rigorous training procedures are critical to successful regulation. Depending on the regulated industry for a supply of knowledgeable professionals can, at best, be viewed as a short-term solution.

The nature of the staffing requirements and the need for independence from the industry, customers, and politics requires adequate compensation. The type and level of compensation for the commissioners and staff should be competitive with similar professional opportunities available in other sectors of the economy. This is not the case in many Latin American countries surveyed (and is a problem throughout the developing world). The investments needed to assure rigorous and competitive hiring practices and adequate pay scales to attract a trustworthy cadre of professional regulators may be substantial. But viewed in the context of investments in the regulated activities, and the social benefits that can flow from competent regulation, these investments are likely to be relatively insignificant.

### 3.7 Fostering private investment

Attracting private investment to the Latin American power sector has been a critical objective of the reform effort, as already noted. The long-term sustainability of reforms will, in part, rest on the success of these efforts. However, policy decisions that focus on reducing risks and creating an environment conducive to private investments will need to also protect the public interest. Governments and regulators will be called upon to balance risk reduction for the investors with fair prices and good service for their citizens.

The large capital requirements of the electricity sector, and long gestation periods for recovery are well documented. The key to attracting private investment is to guarantee investors an *opportunity* to earn an adequate return commensurate with the risks involved. For investors, evaluating such risks over a long period of time may be often difficult. But it is clear from experience that a major contribution to investor confidence can be regulatory measures that link prices to underlying costs. Legal safeguards that will ensure longevity and

enforceability must be established to support such policies.

But there are special challenges in Latin America, and the countries surveyed. Roughly 70 percent of installed capacity in Latin America is hydropower. Hydro-dominated systems can prove to be difficult environments for the development of competitive, generation markets. The size of initial investments involved, special risks associated with environmental and related social impacts, and the hydrological risks can combine to inhibit private investments. Price stability may also be difficult to achieve from a regulatory perspective. Drought conditions bring periods of very tight capacity and the accompanying pressures to introduce price caps. Periods of heavy rainfall, under competitive conditions, can drive price downwards. There is, unfortunately, no wealth of regulatory experience that can guide governments and regulators towards a balance of measures to protect investors, and consumers from the specific challenges of market development under such conditions.

Private investment risk is reduced when generation expansion involves flexible technologies and lower fixed costs such as gas-fired plants. Combined cycle gas turbine plants have lower marginal costs and have therefore attracted significant amounts of private investment. The lower capital costs and shorter construction periods associated with such plants contribute to reasonable risk profiles, provided adequate rate protection is available. They also offer a degree of portability. Unprofitable plants can be dismantled and sold.

### 3.8 Providing consumer protection

An important goal of sustainable power sector reform is that consumers enjoy a reasonable level of satisfaction with utility prices and service quality. If they are not satisfied they need an efficient and fair process they can use to resolve disputes and complaints.

Separate consumer protection agencies, if they exist, can play a role in electric consumer protection. However,

because of the specialized engineering, finance, accounting, and legal skills that may be required to resolve consumer protection complaints, non-specialized consumer protection agencies may not be up to the task of providing adequate services. The U.S. model of public advocates to represent consumers before commissions is well developed and, while perhaps overly legalistic for most Latin American countries, can still offer lessons for consumer protection.

The utilities themselves represent the first line of defense for consumer protection. However, as a practical matter, it is the regulator that must shoulder the principal responsibility for consumer protection. Because of its technical and regulatory expertise, as well as its on-going historical perspective of the industry, the commission is well suited for this role.

Historically, monopoly utilities had little need to develop a strong and responsive consumer protection function. This is especially true of government-owned utilities that lacked a shareholder constituency and that may have seen little need for developing a positive public image. Certainly, in the case of both government-owned and investor-owned utilities, a monopoly position diminishes the incentives and needs for the company to assure that the customers are both well served and satisfied with their service.

Effective consumer protection involves the following:

- Public education.
- Fairness in fact and fairness as perceived by the public.
- Public access to the commission and its processes.
- Consumer standing.
- Timely resolution of complaints.
- Service and performance standards.

Regulatory experience suggests that the most effective means of consumer protection is that of public education. In most situations, the customer understands very little about how utilities operate, how prices are determined or what the role of the public utility commission plays in

the regulation of the utility. Educational efforts can include the following:

- Information about the customer's relationship with the utility.
- Information about the commission and what role it plays in consumer protection.
- Information about energy usage, conservation, and demand-side management.
- Disclosure of pricing, resource mix, and environmental impacts of energy use.
- Information about low-income assistance programs.
- Information about public safety.

*Fairness* is critical. A few bad cases can do more to damage a commission's overall credibility with the public than all the good cases combined. This requires consistency in results and clearly stated reasons for the disposition of complaints. Where possible, the end result should be easily reconciled with the reasonable expectations of an informed consumer. The commission should manage consumer complaints and the overall issue of consumer protection in a manner that assures a *public perception of fairness*. The complaint procedure should be easy to use for customers and should provide a forum that fosters a sense of confidence in both the process and in the commission. Efforts should be made to ensure that customers are not out-manuevered by the utilities' lawyers through the use of rules or procedures that are not likely to be well understood by the customer.

One lesson learned in the United States for successful consumer protection is to provide for "*consumer standing*" before the commission. This can be accomplished through both procedural rules such as easy access to the complaint process and substantive rules such as fair calculation of line extension costs. Because the utility typically possesses the data necessary to resolve most consumer complaints, the utility should be required to make full disclosure to

the consumer of all information relevant to that consumer's complaint. This is especially true with regard to billing and metering information.

The commission should assure *timely resolution of complaints*. In the case of matters that involve little factual dispute, this can mean disposition in a matter of days or even on the same day, depending on the nature of the problem. More complex cases may require hearings and more time. In addition, the commission should be mindful of the relationship between the type of complaint and its timely resolution. For example, complaints involving the connection or disconnection of service may require more urgent attention than others.

A useful tool in the provision of consumer protection is the establishment of *service quality and performance standards*. The commission should clearly define standards for adequate service quality. These standards should cover acceptable response times for establishing new service, power quality and reliability standards (e.g., outage events per customer, response to weather related events, plant and facility maintenance programs), business office performance (for example, customer call centers, calls answered promptly), customer satisfaction survey results, repair response times, and safety response times.

### 3.9 Protecting the environment

Environmental concerns have become a major issue in the electric sector in many of the South and Central American countries. These concerns are associated with the new and growing role for fossil fuel use. Our review of regulatory practice in the region reveals scant attention to environmental issues in most countries. It is therefore important to identify the steps that regulators can take to reduce the environmental impacts of future expansion in the sector. As environmental factors become the focus of increasing concern it is important to note the diversity of stakeholders concerned. They include not only the consuming public at large, but also those who finance the power sector.

A major step is the design of pricing and other regulations

structured to capture the real environmental costs associated with resource use. In competitive markets, regulatory intervention may be required to ensure that environmental costs are internalized, and explicitly factored into pricing decisions. Equally important is the need to provide equal regulatory treatment to demand-side efficiency options in a full cost comparison with all supply-side options. Such an approach will

effectively yield the least cost portfolio of electricity and resources use patterns that take account of environmental impacts. Investments in energy efficiency (lighting, building shells, heat systems) and renewable energy sources (wind and solar) can be used to reduce both the cost of electricity and to comply with environmental standards. It is also important to recognize that many decisions made routinely by regulators have direct

<b>Regulatory Decisions</b>	<b>Environmental Implications</b>
Stranded Cost Recovery	Including future costs subsidizes inefficient plants
Distribution Pricing	Average pricing discourages energy efficiency
Rate Design	High fixed charges, low variable charges discourage energy efficiency
PBR	Rate caps, as opposed to revenue caps, discourage energy efficiency
Line Extensions	Subsidized prices discourage off grid options
Consumer Protection, Disclosure, and Education	Labeling, disclosure and consumer education make for informed consumers and larger green markets
Net Metering	Absence increases transaction costs and discourages use of very small renewable energy
Distribution Planning	Needed to assure consideration of cost-effective distributed resources
Interconnections	Lack of standard requirements discourages distributed resources
Siting	Siting requirements affect fuel and technology choice
Green Pricing	Provides captive monopoly customers access to green options
Merger and/or Asset Sales	Can create market power and keep older plants from facing serious competition
Public Funding	Vital to delivery of energy efficiency and renewable energy. How the money is spent matters
IRP	Needed more than ever in states without retail competition
Transmission Pricing, Access, and Priority	May ignore the special characteristics of renewable energy and small facilities
Pool Rules	Bidding rules may ignore the special characteristics of renewable energy, small facilities and energy efficiency

environmental consequences. These are summarized in Table 7.

Regulators need to understand these potential environmental impacts that may result from their decisions. Equally important is the understanding that environmental and economic objectives need not conflict with each other. A consultative relationship between electricity regulators and environmental regulators can often reveal opportunities for mutual collaboration.

### 3.10 Incorporating energy efficiency in all aspects of reform

With the exception of Brazil, none of the countries reviewed have explicitly incorporated energy efficiency objectives as a priority for reform. This regulatory gap is probably explained by oversight rather than a deliberate decision to ignore energy efficiency. Incorporating energy efficiency in reforms in power sector reform means:

- Allowing demand reduction to compete against power supply in wholesale markets.
- Adopting ratemaking practices that encourage distribution utilities and transmission utilities to invest in cost effective energy efficiency.
- Adopting small “system benefit” charges or Brazilian-style efficiency funding mechanisms, that ratepayers cannot bypass, to fund energy efficiency.

The first step of incorporating demand reductions in wholesale markets was discussed earlier. Recent California experience has also shown the important role of energy efficiency in improving the markets and reducing market power.

*Integrated Resource Planning.* In the U.S. and some other countries, regulators and utilities first focused on end-use energy efficiency. In doing so, regulators required utilities to incorporate demand-side, end-use efficiency in their capacity planning—a process that came to be known as “integrated resource planning” (IRP). IRP however, required a more complete economic analysis

to evaluate all available choices and technologies, on both the supply and demand sides, to meet the growth in electricity demand. Energy-efficiency improvements and the management of demand were put on an equal footing with traditional supply-side resources to develop a “least cost” expansion plan. Although the deregulation of markets has considerably weakened incentives to undertake IRP, the importance of demand-side options has been widely recognized. Recent experience of market problems has refocused attention on IRP. These problems have stemmed from a lack of planning, poor performance of retail markets, and opportunities to reduce transmission and distribution investment through demand response and distributed resources.

The most important use of IRP may be for developing the resource portfolio used to serve captive customers: the resource-mix of which will determine the prices and risks faced by these customers. The recent experience in California, where nearly all customer power needs were acquired in the volatile spot market, demonstrates the need to serve captive customers with a mix of resources with high price stability.

<sup>5</sup> Rudnick and Zolezzi, March 2001

## 4. THE CALIFORNIA CRISIS LESSONS FOR LATIN AMERICA

The California crisis that came to a head in the summer of 2000 has had a wide impact on the course of reforms in many regions of the world. The HERA countries are no exception. One effect has undoubtedly been a reexamination of the wisdom of deregulating electricity markets at all. More important, however, will be the impact of lessons that can be drawn to improve the course of future reforms everywhere. Its most significant lessons are that the objectives, and constraints of any reform effort must be clearly identified. Furthermore, the regulatory agency must have full authority to fix problems.

*The Causes of the Crisis:* The causes of the California energy crisis are widely misunderstood, thus the contributing factors need to be clearly identified. The four main factors that caused the California crisis were:

1. A shortage of supply from the Pacific Northwest's vast hydroelectric system due to drought conditions.
2. Rapid increases in the price of natural gas.
3. The exercise of market power by generating companies.
4. A market structure that lacked a demand response, that is, the ability of purchasers and consumers to respond to increasing high wholesale prices with lower demand.

These four factors combined to cause dramatic increases in spot prices. In addition, under California's market structure practically all electricity was traded or priced at spot market prices. The financial impact of these large increases was, therefore, widespread.

*Common misunderstandings:* It is important, as well, to identify some common misunderstandings about the genesis of California's electricity problems.

### 1. *Retail rate freeze*

The retail rate freeze was not a "cause" of the crisis.

The price freeze was not imposed on unwilling utilities, but it was part of a complex negotiated restructuring plan, in which the utilities were willing partners. Without their full support, the California restructuring law would not have unanimously passed the California legislature. It was a deal that went well for more than two years and then turned sour. Although during the negotiations the utilities could have insisted on protecting themselves for specific liabilities, they did not do so.

Second, eliminating the price freeze might have helped the financial health of the utilities, but it would not have addressed the underlying problems. If wholesale prices were passed onto consumers immediately, the financial problem for the local distribution company would have been simply shifted to their customers. One could, under such conditions, assume that the ensuing outcry would have caused a political crisis at least as bad as the situation that evolved in 2000. Such a political crisis would most likely arise in any country faced with such huge price increases in so short a time.

### 2. *New plant construction*

There have been very few new generation plants constructed to serve California over the past eight years, but licensing issues are not the problem. Low energy prices for the first two and a half years and uncertain market rules meant there were no significant proposals to build power plants. During the past 10 years, California regulators approved every proposal that was filed. The California utilities were so certain that excess capacity would persist, that in 1995 they asked the federal government (FERC) to overturn a California PUC order requiring the California utilities to buy 1,500 MW of new capacity. The FERC approved the utility requests, and the capacity was not built.

### 3. *Strict environmental laws*

Other regions with siting and environmental laws as strict as California's have had little trouble attracting, siting, and building new plants. In addition, California has now added many thousands of megawatts of new capacity without relaxing its environmental laws.

#### 4. *Load growth*

There is much discussion of increased electricity demand, but demand in California during the immediate period preceding the crisis was well below that of prior years. In addition, California is a national leader in energy efficiency. Unfortunately, other western states have not invested in energy efficiency, and as a result, their growth in electricity use has been very rapid. California relied on imports from these states for a significant portion of its power needs (approximately 25%). However, those imports were not secured through long-term firm contracts and, when capacity shortages developed in those states, the amount of power available for sale in California decreased substantially.

### Conclusions

The lessons to be drawn from California's recent experience are of relevance to regulatory concerns in many countries. Indeed, the analysis we have presented applies to the specific challenges now confronting a number of countries in the HERA region. The major lessons draw on a number of the observations we have already made, and can be summarized as follows:

1. The single most important lesson is that reforms must begin with a clear, comprehensive, and prioritized list of national goals with respect to electricity reforms and an analysis of the major constraints.
2. While spot markets can play an important role in a deregulated market structure, it should be relatively small.
3. Demand response should be incorporated in wholesale market design as an important component of price stability.
4. Regulatory measures should encourage quick response to changing spot market conditions, so that large consumers, energy service companies, and distribution utilities can act in a timely way to changing market conditions. Such quick responses have the collective effect of countering high prices, and benefit all customers. This was one of

the strongest lessons to come out of California and other markets that have suffered similar kinds of price volatility problems.

5. The regulatory approach to transmission and distribution utilities should encourage end-use energy efficiency as well as improvement and expansion of the transmission and distribution system. In doing so, it should be borne in mind that price caps promote increased electricity sales and discourage utility investment in end-use energy efficiency, while revenue caps encourage cost reductions without the same incentives to focus on increasing sales.
6. Retail competition has not been successful so far, and has tended to cause more problems than it has resolved. One critical, but overlooked, aspect of retail competition is that, with retail access, electricity prices are much more volatile than with more traditional approaches. If increased price volatility is unacceptable to the public, retail access may not be a practical option.
7. It is critical to avoid the fragmentation of regulatory jurisdiction. In California, jurisdiction was too divided between various state and federal agencies. As a result, corrective actions were slow to take place and regulatory agencies engaged in recriminatory finger pointing.
8. The scope of the regulatory agency should be broad. It should include oversight of competitive generation markets; anti-monopoly authority; distribution and transmission prices; access; service quality, reliability, and resource planning for captive customers; and environmental performance.
9. Incorporate environmental and economic goals in the restructured

markets. Market rules and market structure need to be consistent with the increased use of renewable energy sources.

10. An important corollary lesson from California is that its efforts to ensure that end-use efficiency and renewable technologies remained a part of the restructured energy sector paid dividends during the crisis. Without the energy efficiency and renewable programs that California pioneered years ago and continued through the electricity restructuring process, the California crisis would have been even more severe.

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