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Reforming Power Markets in Developing Countries: What Have We Learned?

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The World Bank, Washington, D.C.



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A compilation and sourcebook of lessons of experience, such as this paper, naturally relies extensively on the work of others in the same field. This paper could not have been written without the benefit of drawing on the 240 or so referenced documents on experience with reforming power markets in developing countries. This paper also benefited from advice, suggestions, and corrections about the numerous technical issues involved in power market reform that was given by colleagues. I therefore express my gratitude for this help to Douglas Barnes, Philippe Benoit, the late Mathew Buresch, Charles Feinstein, Vivien Foster, Jonathan Halpern, David Kennedy, Kari Nyman, Ignacio Rodríguez, Richard Spencer, Tjaarda Storm Van Leeuwen, Bernard Tenenbaum, and Alan Townsend. I also want to thank John Prakash for his help with the references. Nevertheless, as the author, I am responsible for any errors and omissions.

ACRONYMS AND ABBREVIATIONS

BL	build and transfer	MW	megawatt—equivalent to 1,000 kilowatts
BLT	build-lease-transfer	NGO	nongovernmental organization
BOO	build-own-operate	OBA	output-based aid
BOOT	build-own-operate-transfer	OECD	Organisation for Economic Co-operation and Development
BOT	build-operate-transfer	OGN	<i>Operational Guidance Note for Public and Private Roles in the Supply of Electricity Services</i>
BTO	build-transfer-operate	PPI	private participation in infrastructure
disco	distribution company	PV	photovoltaic
EGAT	Electricity Generating Authority of Thailand	PRG	Partial Risk Guarantee
FSU	former Soviet Union	ROM	rehabilitate-operate-maintain
GDP	gross domestic product	ROT	rehabilitate-operate-transfer
genco	generation company	SEB	State Electricity Board (India)
GW	gigawatt—equivalent to 1 million kilowatts	SME	small and medium enterprises
GWh	gigawatt-hour—equivalent to 1 million kilowatt-hours	SOT	supply-operate-transfer
IDA	International Development Association	TI	Transparency International
IEA	International Energy Agency	TOOR	transfer of operating rights
IFC	International Finance Corporation	TPA	third party access
IPP	independent power producer	transco	transmission company
ISO	independent system operator		
kW	kilowatt		
kWh	kilowatt-hour		
LAC	Latin America and the Caribbean		
MDB	Multilateral Development Bank		
MIGA	Multilateral Guarantee Agency		

FOREWORD

The global movement to reform electric power markets has advanced considerably since it started during the 1980s. Developing countries and transition economies have participated widely in this movement, despite huge challenges for implementing such complex changes in their economic condition. To date, about 70 developing countries and transition economies have embarked on reforming their power markets—some to a considerable extent, others more tentatively. Together their reform programs show variety and innovation in accommodating the wide range of physical and economic characteristics found in these countries. All of these countries, and other developing countries contemplating reform of their power markets, face considerable challenges to both complete and sustain their reform programs. A considerable amount of experience in reforming power markets in developing countries and transition economies has now been accumulated and publicly documented.

The World Bank Group has substantially supported these reforms and contributed extensively to documenting them. In 2004 following a review of the effectiveness of this support, the World Bank issued an *Operational Guidance Note for Public and Private Roles in the Supply of Electricity Services* for the use of its staff working in this field. This Note provides guidance to World Bank Group staff on assessing the suitability of available options for public-private roles in the financing and provision of electricity in developing countries. The guidance is based on experience to date and recognizes the variety of conditions among the Bank's client countries.

This paper complements the World Bank's Operational Guidance Note by compiling lessons of this experience that help in applying the Note's guidance. These lessons are taken from the rapidly growing literature on power market reform in developing countries. They cover the range of issues that are involved in reforming power markets comprehensively, but cover them concisely to maintain its broad perspective. Details of the various aspects covered in the paper can be found in published references, for which the paper also acts as a sourcebook of about 240 documented references to this reform experience. The paper includes Web links for most of these documents to make them easily accessible to readers.

Although the paper is intended for use by Bank staff, I am happy to offer it to other participants in reforming power markets of developing countries, and in particular to our clients' representatives working in this field and to our colleagues in other donor agencies, as well as to everybody else with an interest in this subject.

Jamal Saghir

Director, Energy and Water
Chairman, Energy and Mining Sector Board
June 2006



1. OVERVIEW

About 70 of the 150 developing countries and transition economies have embarked on reforming their power markets since the early 1990s. The drivers of this reform movement are disenchantment with the poor performance of state-owned power utilities, the need for new investments and modernization to meet rapid growth in demand, and fiscal pressure, along with the desire to protect and help the poor. The reforms have generally been tentative and incomplete, however, particularly in relation to market structure, degree of private participation, and development of the regulatory framework. The countries that have embarked on power market reform cover a broad range in physical, economic, and institutional terms. The most advanced countries in reform are located in Latin America and in Eastern Europe, where they also have relatively larger power systems and higher levels of per capita national income compared with other developing countries and transition economies (“developing countries”).

1.1 Context of the Paper

This paper compiles the lessons of experience from the reforming power markets of developing countries and transition economies. It focuses on reforms that address the generally poor performance of power markets in developing countries. It also covers reforms in those developing countries with power markets that are performing reasonably well. These lessons are taken from the rapidly growing literature on power market reform in these countries. The paper also acts a sourcebook of about 240 references to this documented experience.

The paper complements the World Bank’s Operational Guidance Note for Public and Private Roles in the Supply of Electricity Services (OGN; World Bank 2004b). It follows the sequence of reform components adopted in this Note in order to ease cross-referencing between these documents. First, the paper covers the context and background of power market reform in developing countries. It then covers the strategic components of reform to power markets, starting with enterprise restructuring and corporate governance, including the respective roles of state-owned enterprises and private enterprises in the provision of electricity services. It next deals with market structure and restructuring power systems, the experience with independent power producers (IPPs), and competition in the power market. It then looks at regulation of power

markets and—subsequently—at the social issues associated with power market reform for access and affordability to electricity services for the poor. Finally, the paper examines issues for implementing a reform program, including government’s roles and responsibilities, sequencing of reform steps, and transition issues for reform programs.

1.2 Strategic Elements of Power Market Reform

Power market reform in developing countries should be assessed against three outcomes that reflect the drivers for reform. These outcomes are better service quality for electricity consumers to support economic growth and welfare, improvement in government’s fiscal position, and more affordable access to electricity for the poor. They reflect the main drivers of reform. The main elements of reform—restructuring power utilities and markets, regulation, competition, and the roles of public and private participants—are the means for achieving these outcomes.

The most important lesson from reforming power markets in developing countries is that “cookbook” solutions for reforming their power markets are ruled out by the extensive range of economic and institutional endowments of these countries. This lesson emphasizes the importance of country and power market starting conditions for reform, since these conditions determine the initial—and often subsequent—scope and composition of reform. Countries with better endowments should be able to achieve more ambitious outcomes from power market reform than countries with lesser endowments. Reforms based on substantial market restructuring for large middle-income countries, for example, would be infeasible for small low-income countries. Conversely, modest reforms designed for the limited economic and institutional capacities of small low-income countries would have unacceptably low outcomes in large middle-income countries. The paper shows how power market reform can be designed to suit the specific conditions of these two groups of countries.

The experience gained from implementing power market reform is as important as the considerable experience gained about designing power market reform. In order to show how implementation affects design, this chapter brings together the design lessons summarized in the paper under the following four strategic elements for implementing power market reform:

1. Power market reform has many dimensions.
2. Power market reform must be adapted to starting conditions.
3. Power market reform is a process—not an event.
4. Power market reform is an opportunity to help the poor.

Element 1: Power Market Reform Has Many Dimensions

Many dimensions of power market reform are important in developing countries. Under mounting experience, power market reform in developing countries has increasingly emphasized the social, legal, and political dimensions of reform in defining the techno-economic dimension. This reflects the reality that reform has to confront underdevelopment of energy and financial markets, weakness in legal and governance systems, bouts of macroeconomic instability, and major concerns about access and affordability of electricity services at the prevailing low income levels. Few developing countries can contemplate the technically sophisticated power market reforms, such as radical market restructuring and private risk investment with competition in both the wholesale and the retail markets for electricity, that are feasible under the much higher economic and institutional endowments of Organisation for Economic Co-operation and Development (OECD) countries.¹

Change to commercially oriented governance is fundamental to achieving sustainable reform of power markets. Power market reform in a broad sense can be viewed as a means to improve governance of the power market and its participants. The traditional model of governance under state ownership is not sustainable in most developing countries. Commercially oriented governance irreversibly removes the management and development of power supply from political and bureaucratic control to achieve commercial standards in management practices, financial performance, and the pricing of products and services. Changing these deeply ingrained attitudes is a major challenge for power market reform in developing countries.

Social and political factors are important for all power market reform programs. Government must generate public acceptance and stakeholder consensus for these programs. Power market reform based on market

restructuring and private sector participation involves complex social and political issues for market investors, utility employees, and electricity consumers. Even the basic initial reform step of separating the generation, transmission, and distribution businesses of a power utility can provoke huge social and political problems with utility employees and their political supporters. The complexity of these issues can sometimes match the complexity of the technical issues involved in reforming power markets.

Distributional issues are often at the heart of designing power reform programs. Reforms must not only offer benefits that substantially outweigh the costs of reform, but also provide the means for compensating losers or mitigating the impact of reform on them to overcome their opposition or redress inequities against them. Although reforms to power markets have delivered substantial benefits to society overall through efficiency gains, most of these benefits have been shared by power producers, service providers, higher-income consumers, and commercial businesses, but have not reached other segments of society, including the poor.

The impact of power market reform on the poor is a critical distributional issue. The poor have obtained a low share of the benefits of power market reform in developing countries, and some have even suffered welfare losses. Some of the poor have gained from reform by receiving otherwise unavailable connections to electricity supply. Some of the poor who have lost from reform were obtaining some electricity service before reform—albeit illegally and of poor quality—but were disconnected or now have to pay for their consumption. Other groups of the poor continued to receive legal service, but at higher tariffs as subsidies and cross-subsidies were removed under the commercial pressure on service providers introduced by reform.

Governments must sustain their political commitment in the face of considerable political risks for reforming their power markets. Maintaining momentum for reform involves political costs and thus requires political commitment through successive phases of the reform process over one or more electoral cycles. Reform yields uncertain benefits in the long term because unanticipated events can derail reform programs, yet reform can also incur substantial unavoidable costs in the short term. Governments often have to deal with opposition from the losers under reform (subsidized consumers, utility employees, or the beneficiaries of corrupt procurement)

¹ Differences in physical endowments are not a factor, since many developing countries have much greater primary energy resources than most OECD countries.

and by society at large to privatizing this essential public service, especially when the new service providers are foreign parties. Increases in electricity prices that are perceived as entirely a consequence of reform are vulnerable to a public backlash. Yet reform proponents have often underestimated the importance of these risks when considering techno-economic issues.

Element 2: Power Market Reform Must Be Adapted to Starting Conditions

Starting conditions in the power market are important for designing power reform programs. These conditions include the size of the country and its power system and market, the country's location relative to other power markets, its income level and macroeconomic condition, its political situation, and the capacity of its domestic financial markets and institutions. They reflect the many dimensions of power market reform and critically influence the feasibility of reform programs and hence the outcomes that can be achieved from them in the short to medium term. The variety of starting conditions among developing countries partly explains the diversity of their power market reform programs and the development of innovative power market and industry structures and regulatory arrangements.

The variety of market structures is one indicator of the range of reforms to power markets. From the prereform structure of a monopoly, market structures can be categorized according to the increasing degree of competition, starting from a purchasing agency—also known as a single buyer—through whom passes all or most trade in wholesale and who therefore manages competition for market share among generators and independent power producers. In developing countries the competitive structures are based on trading arrangements in the wholesale power market that allow distribution companies and large users of electricity to purchase electricity directly from generators either in a power exchange or bilaterally.

The economic case for breaking up a vertically integrated power utility rests on various factors. The gains from breaking up (or “unbundling”) the utility by separating the generation component from the distribution component are worthwhile when they exceed the costs of transactions among the separated segments introduced by unbundling. The relevant factors are power system size and country institutional capacity to manage complex trading mechanisms. The case for unbundling is strongest in large power systems in countries well endowed

institutionally. The case for unbundling is weakest in small systems in countries with undeveloped institutional capacity and weak economic conditions.

The numerous countries whose power systems are too small for a competitive power market have intermediate reform options. Unbundling the generation and distribution segments of the power supply chain into tiny entities would not make sense in these systems, because economies of scale and scope would be lost without gaining the benefits of competition. Forming power trade areas with neighboring countries can be facilitated by separating the generation, transmission, and distribution components of supply chains even in relatively small systems. This trend is noticeable in some regions of the developing world. Even in small power systems, however, separation of these components helps regulation of power service providers by revealing information about their costs, increasing the transparency of price setting, and helping benchmark costs and service standards. These systems can adopt a purchasing agency or single buyer until they can reap the benefits from greater separation of the supply chain.

The variety of ways for the private sector to participate in the supply and delivery of electricity services is another indicator of the range of reforms. The role of private participants should match their capacity to take on investment risks under specific country conditions. Their roles can range from virtually no at-risk investment under management contracts through some investment risk under long-term concessions to accepting all investment risks under divestiture of ownership to the private sector. Problems—even failures—as well successes, have been associated with these forms of private participation in power markets. As more risk and responsibility are passed to the private participants, the incentives become more powerful for these participants to improve services, which would lead to greater benefits for the country and its power consumers in the absence of severe economic disruptions.

The case for bringing the private sector into power supply functions rests on how well this would achieve the desired reform outcomes under the prevailing operating conditions. Latin American experience shows that privatization of power market assets can improve services at reduced costs and with fiscal benefits, provided that stable macroeconomic conditions prevail. However, many developing countries do not offer the necessary conditions for attracting substantial amounts of private investment in this way to their power markets. Many of them have

attracted substantial investments by independent power producers, but only by giving contractual protection against most noncommercial risks to these producers. Public-private partnerships have brought private management and technical expertise into countries with poor investment climates.

The public sector will remain an important source, and often for the medium term the main source, of investment for a power market where country and market risks deter private investors. The public sector will also remain the main source of investment for network segments of the power system and certain types of generation assets—such as hydropower—that are kept under public ownership as a matter of policy. In many countries, some public investment will be needed to rehabilitate nonviable generation and distribution businesses as a prerequisite for attracting private investment in them or during the early years of concessions for distribution businesses. The public sector can play a financing or risk-bearing role by means of investment financing and the provision of subsidies and guarantees under public-private partnerships through management contracts, leases, and concessions. Finally, public financing will also be required to restructure power sector debt arrears before privatizing many power supply entities.

The range of approaches to establishing the credibility of power market regulation is a third indicator of the range of reforms to power markets. Credibility of regulation is needed to attract long-term private at-risk investment in electricity services. It covers autonomy to carry out duties, transparency in procedures and processes, and accountability to government and consumers. The principal means for developing credibility is a designated regulatory agency that discharges its duties in a neutral and depoliticized manner. A regulatory agency needs the legal status that gives it substantial autonomy from political and market influences, the authority to set parameters for contracts and monitor their implementation, and the discretion to respond to rapidly changing market conditions, but with restraint on arbitrary actions.

Specific contractual arrangements may be needed to provide stability and credibility for private investors under a new regulatory regime. Private investors place importance on the stability and enforceability of laws and contracts, and they contend that a credible regulatory system requires more than a newly formed regulatory entity. This is because many regulatory agencies begin performing their functions with the disadvantage of limited

autonomy and capacity. In many Latin American countries, the means by which regulatory discretion is limited yet regulatory commitment is provided is by embedding specific rules and procedures in concession agreements and licenses provided to operators or in legislation (“regulation by contract”).

Empirical analysis presented in the paper indicates that a clear threshold exists among developing countries in relation to size and income for the composition of power market reform. This threshold is formed by a combination of system size larger than 1,000 MW and national per capita income above US\$900. A large middle-income group of countries is formed by a combination of size and income above these threshold values, and a small low-income group is formed by a combination of size and income below these threshold values. About two-thirds of developing countries fall into these two groups. Although these two variables influence all components of power market reform, they have relatively stronger influences on different components. Country income level has a relatively stronger influence than power system size on the roles of the public and private sectors and on access and affordability to electricity services. It also has a stronger influence on the regulation of power markets on the basis that institutional capacity increases with income level. Power system size has a relatively stronger influence on market structure. Table 1 shows how this feature of developing countries influences the design of coherent power reform programs for country and power market conditions typically found in these two groups.

Element 3: Power Market Reform Is a Process—Not an Event

Pressures for rapid results should not obscure the point that reforming power markets is a long-term process that requires patience to achieve the desired outcomes. This is because such outcomes as improving service quality for electricity consumers, strengthening the government’s fiscal position, and providing affordable access to electricity for the poor take time to accomplish. This situation applies especially to countries starting with weak governance structures for power utilities and poor investment climates.

Power market reforms in developing countries are generally tentative and incomplete, and are still works in progress. To date, most reform programs have reached interim positions—such as the single buyer model of power trade—and still need to find ways to attract

TABLE 1. Types of Power Market Reforms with Different Starting Conditions

DEVELOPING COUNTRY GROUP		
	SMALL LOW-INCOME COUNTRIES	LARGE MIDDLE-INCOME COUNTRIES
COUNTRY STARTING CONDITIONS		
Power system size Access to electricity Investment climate Institutional capacity Governance rating	Very small Low Too poor to rate Very weak Poor	Small to large High Low to medium Low to good Poor to good
INITIAL REFORM CHARACTERISTICS		
Market structure	Limited vertical unbundling. Single buyer with some simple bilateral trading for wholesale power.	Substantial vertical and horizontal unbundling. Bilateral trading or a central exchange for wholesale power.
Regulation	Semi-autonomous regulatory agency mainly responsible for oversight of concessions.	Autonomous regulatory agency with power to issue licenses and approve retail tariffs and trading arrangements.
Role of private sector	Mainly independent power producers (IPPs); concessions in distribution under public-private partnerships.	Privatized generators and IPPs. Privately owned and financed distributors under long-term licenses.
Role of public sector	Continued ownership of most power supply facilities. Primary responsibility for financing sector development.	State ownership in sensitive generation sectors (hydro, nuclear), transmission, and nonviable distribution service areas.
Role of competition	Limited to bidding for long term agreements by IPPs and by private operators for distribution concessions.	Competitive bidding for wholesale power contracts under bilateral trading or bidding into a power exchange.

private investment sustainably and develop their regulatory capacity. These achievements are unlikely to be sustainable over the long term without deeper reforms because the interim positions do not change the traditional model of governance under state ownership.

The initial transition stage is critical to the success of power market reform and the most vulnerable period for derailment of the reform process by many developing countries. For market structure, transition concerns the separation of the industry structure into its main components and the adoption of a single buyer trader for wholesale power. For private sector participation, transition focuses on private sector roles that fall short of full risk taking, such as management contracts and other forms of private participation, with temporary risk

mitigation mechanisms, such as by setting limits on the amount of financial risk initially faced by private operators of power distribution and generation facilities. Transition arrangements to provide stability and credibility for a new regulatory regime revolve around regulation by contract under which regulatory rules and procedures are incorporated into concession agreements.

Sequencing of power market reform should follow a sound strategy:

- The legal and regulatory framework necessary for creating the new market structure and trading arrangements is put in place before privatizing power supply entities and setting up new market trading arrangements.

- Restructuring of power markets progresses from an integrated structure to partially unbundled structures and eventually for some countries to a fully unbundled structure.
- Restructuring of wholesale power trading arrangements progresses from only internal transactions within an integrated power utility to the entry of IPPs selling their output to a single buyer, then to opening access to power networks by large users of power, and eventually to bilateral trading between generators and distributors or to a central power pool under competitive trading.
- Major organizational and financial restructuring precede the creation of private ownership rights to avoid problems with stranded costs.
- Whether to give investments in new generating capacity lower priority than investments in distribution, especially in a situation of bulk power shortages.

Reform benefits take longer than expected. Consumers usually expect better services from private companies than from state-owned enterprises. Consumers understandably lose patience and blame the regulators if tariffs go up immediately but service improvements lag behind. Therefore, it is not surprising that most regulators, when faced with this situation, will try to find ways not to raise tariffs. The preservation of protective features, such as “life-line” rates, may be necessary, even if they mean continuing subsidies within income classes, as well as from industry to residential consumers.

Element 4: Power Market Reform Is an Opportunity to Help the Poor

Some countries have skipped the early stages of these sequences, and others may do so in the future. A sequenced process, however, is less risky and more sustainable than a single-staged (“big bang”) process for reforming power markets in the conditions of developing countries. Reform sequencing should not, however, follow an overly cautious approach that runs the risk of delaying reform benefits and losing political momentum for reform.

Developing countries face major challenges to improve access and affordability to electricity services for poor households. These countries have responded to the challenges differently according to their income levels. Some developing countries have met these challenges with some success since the 1990s partly by attracting some private investment. These countries have an extensive energy infrastructure and basic coverage service of electricity services. The least-developed countries, such as those in Sub-Saharan Africa, have yet to meet challenges that are particularly daunting where typically less than 10 percent of their population is connected to electricity networks.

Sequencing of power market reform also raises tactical issues. A general approach would not be applicable in the case of tactical sequencing issues, given the wide variety in starting conditions for power market reform found among developing countries. Tactics should be specifically designed for each set of local conditions to address problematical issues, such as the following.

- Whether to increase tariffs before or after investments to improve the quality of service to power users.
 - Whether to try improving the commercial performance of loss-making utilities and distribution entities before bringing in private participation or with private participation.
 - How to base the reform of distribution entities on a feasible allocation of viable urban and nonviable rural areas among the entities, as well as the sequencing of privatization in one or more rounds of transactions.
 - Whether to start the privatization sequence for poorly performing power markets with distribution entities before privatizing generation entities.
- Extending access to affordable modern energy services—including electricity services—for poor households is one of the most practicable ways of improving their welfare.* This is because expanding access to these services from the low levels found in numerous developing countries helps to increase household incomes and meet basic needs, such as improved health and primary education, as well as support social empowerment and environmental sustainability. The cost of these services to users is often considerably lower than the corresponding traditional energy alternatives used by poor households without access to these services.
- The causes of poor electricity access and service for low-income households originate in policy and regulatory constraints.* Policies that grant a legal monopoly to a power utility in low-income service areas may impede

the flow of private finance to the power sector and discourage innovation in service delivery methods. Regulatory frameworks often raise the biggest barriers to decentralized options for electricity supply, including barriers to alternative power technologies for locations not served by electricity and fuel distribution networks. Poorly formulated taxes and subsidies often undermine electricity service markets by favoring one fuel over another, giving consumers distorted price signals and creating disincentives for entrepreneurial solutions to electricity supply. Finally, power market reforms designed and implemented by technical groups at the national level that allow users little say in the design and delivery of electricity services can end up hurting—rather than benefiting—the poor.

Reform provides an opportunity to rectify the policy and regulatory constraints on electricity access and service for low-income households. Reform can overcome entrenched attitudes to providing electricity services and introduce different kinds of electricity services better suited to the poor. Opening up the main power market to new entrants can stimulate incentives specifically designed to attract new entrants into markets serving poor areas. The establishment of a new regulatory system for the main power market provides an opportunity to introduce regulations that help the poor. Reforms that place the power market on a sound commercial footing, however, will not automatically improve access and affordability of electricity services to low-income households. They may make little difference to this situation, or even worsen it. It is important to ensure that reform does not adversely impact access and affordability.

Access and affordable consumption of electricity by poor households can be promoted by various policy instruments. Instruments that promote access require service providers to extend access, reduce connection

costs, and increase supply options. Extending electricity service to urban low-income households requires improvement to the existing power system. Extending access to electricity for rural households often involves creating the entire energy infrastructure network and developing viable new electricity service providers. Instruments that promote affordability protect low-income households from general increases in tariffs and costs of service and facilitate payment of bills. They stimulate services through nonstandard service delivery mechanisms, service types, and tariff and payment mechanisms appropriate to low-income households.

Even under successful power market reform, poor households need help with financing the costs of connecting their premises to the network and installing meters at the points of consumption. Well-designed subsidies provide good incentives to service providers—both specifically for serving low-income areas, as well as generally—to attract private sector participation through concessions and asset sales. The substantial empirical evidence, however, questions the effectiveness of many existing subsidy schemes as a means of helping low-income electricity consumers. A number of approaches have been developed to improve the targeting and cost-effectiveness of subsidy delivery for extending access to electricity services by low-income households. They include output-based aid (OBA) approaches and other competitive approaches, as well as more traditional input-based approaches. Competitive approaches offer the advantage of allowing private innovation for finding solutions to extending electricity services.

2. CONTEXT OF POWER MARKET REFORM IN DEVELOPING COUNTRIES

This paper compiles the lessons of experience from reforming power markets of developing countries and transition economies.² It is intended to complement the World Bank's OGN on Public and Private Roles in the Supply of Electricity Services (World Bank 2004b).

The paper also provides a sourcebook of references to documented experience for reforming power markets in these countries and for a deeper treatment of the technical issues for designing reform components, such as corporate restructuring, power exchanges, regulatory rules, and privatization transactions.

The paper focuses on reforms to the generally poorly performing power markets in developing countries.

It also covers reforms in those developing countries with reasonably performing power markets, for which it draws selectively on the experience with the sophisticated power markets that have been established in some OECD countries. The paper does not cover the technicalities of these OECD power markets because they are too complex for conditions in most developing countries.

The paper serves as a sourcebook by providing a comprehensive listing of about 240 published reference documents about experience with power market reform in developing countries, including case studies about power market reform in nearly 30 developing countries.³ These documents reflect the rapidly growing literature on experience with power market reform. They are supplemented with references to power market reform in OECD countries that clarify technical issues for power market reform.⁴ This literature covers empirical evidence from a variety of sources that include cross-country econometric analysis of power market reform, efficiency and productivity analysis of power companies and sectors, as well as single-country case studies of power market reform. The paper also uses published reviews of experience with electricity reform generally and of specific aspects of reform by international agencies and in technical journals.

The paper broadly follows the structure of the OGN:

- The rest of this chapter sets out the techno-economic basis and the importance of political and institutional factors for reforming power markets in developing countries.
- Chapter 3 covers the current extent and outcomes of power market reform in developing countries.

The next four chapters cover the strategic components of reform to power markets:

- Chapter 4 covers enterprise restructuring and corporate governance, including the respective roles of state-owned enterprises and private enterprises in the provision of electricity services.
- Chapter 5 covers market structure, including restructuring power systems, the experience with independent power producers, and competition in the power market.
- Chapter 6 covers regulation of power markets.
- Chapter 7 covers ways that power market reform can support access and affordability to electricity services for the poor.

The final chapter of the paper—chapter 8—covers reform implementation, which complements the subjects covered by the OGN. The chapter covers three main aspects: (a) the challenges for implementing power market reform, including governments' roles and responsibilities in this endeavor; (b) the sequencing of power market reform; and (c) managing reform transition, especially the importance of starting conditions.

The appendix to the paper examines the relevance of experience with power market reform in OECD countries for reform in developing countries.

² The term *developing countries* is used in this paper to encompass both developing countries and the transition economies of Eastern Europe and the former Soviet Union.

³ Internet addresses are included for these documents. Most of these documents can also be found through the Google search engine (www.google.com). Internet addresses for articles in journals that allow online access only to subscribers are specifically for access on the World Bank's internal Intranet through the Joint World Bank–International Monetary Fund Library (Jolis). The numerous documents in Spanish about power sector reform in Latin American countries are not included, but are also invaluable sources of information.

⁴ The supplementary list of references to experience in OECD countries is a relatively small sample of the copious documentation on power sector reform in these countries.

Each chapter opens with a summary of the OGN's guidance on the particular aspect of power market reform covered in the chapter. Sourcebook references for each chapter are given at the back of the paper.

2.1 The Techno-Economic Basis for Power Market Reform in Developing Countries

Reform of the power markets in developing countries generally starts from a market structure that is dominated by a state-owned national power utility or utilities. This structure is typically backed by a legally endowed or de facto monopoly and a vertically integrated supply chain in which all the main supply functions—power generation, transmission, distribution, and customer services—are the responsibility of a power utility, especially in Africa, Asia, and the Middle East. The prereform industry structure in some countries, notably in South America, placed distribution and customer services with local companies, separate from national companies that provided power generation and transmission. This structure emerged during the 1940s and 1950s from a global wave of consolidation and nationalization of previously fragmented power markets composed of privately and municipally owned local power monopolies.

The General Case for Reform

The justification for adopting the prereform industry and market structures rested on four grounds. First, this structure minimized the costs of coordination between the functions in the supply chain and the costs of financing the development of power systems. Second, state financing was favored by the large-scale investments in production and network assets with high fixed costs that were needed to capture economies of scale, but which had little market value in alternative uses to mitigate investment risks. Third, state financing was also favored by the view that the substantial degree of natural monopoly in the market should be kept under state stewardship to enhance consumer welfare from these services. Finally, governments also considered the power market to be critical to national economic security, as well as a means for pursuing economic and social distributional objectives.

Under the prereform structures, however, power supply has deteriorated to critically low levels and has been failing to meet national needs in most developing

countries. Notwithstanding the alleged advantages of the prereform structures, from the early 1990s these countries have been experiencing power shortages and frequent interruptions. Their power generating plants emit toxic pollutants, their power utilities are bankrupt, their power tariffs do not cover costs (particularly for residential users), electricity is widely stolen by customers (frequently with the active support of existing employees), many citizens—especially those in rural areas—lack access to electricity supply, and the power sector drains the government's fiscal resources.

Worldwide, government policy, public attitude, and the intellectual environment have changed substantially for power markets since the 1980s. Both OECD and developing countries became aware during the 1980s that a lengthy period of state ownership without the forces of competition or the incentives of the profit motive to improve performance, is liable to result in the excessive costs, low service quality, poor investment decisions, and lack of innovation in supplying customers in these markets. The little synergy that power generation has with transmission and distribution weakened the case for vertical integration.⁵ The current movement toward breaking up these monopolies and reintroducing the private sector goes back partly to preconsolidation and prenationalization structures, but with the important difference that it also now encompasses arm's length regulation and competition.

In principle, three separate sources of improvement in economic performance are postulated from power market reform:

- *First, with regard to overall allocation of resources, making consumers pay at the margin what it costs to produce and supply them is expected to achieve a better economywide use of resources. Issues of income distribution and support for the poor are increasingly regarded as being supportable by targeted subsidies to needy groups, rather than by across-the-board subsidies that have the effect of generally distorting patterns of the consumption of energy. The extraordinary levels of subsidies seen in some countries (IEA 1999) have produced major welfare losses in relation to overall economic welfare.*
- *Second, the profit motive gives a stronger incentive for efficient use of inputs—both lower-cost combinations of inputs and reductions in inputs—required to produce a given output, than any incentives offered by an*

⁵ The two business activities differ fundamentally. Power generation produces a tradable commodity—where cost discipline and risk management are essential for competitive success, whereas the transmission and distribution of power is a regulated service business based on network management.

enterprise controlled and managed by a bureaucracy (World Bank 1995).

- *Third, competition, where it is possible, provides the most likely means to reduce supply costs and pass benefits on to consumers.* If the power sector can be made to cover its costs and be profitable, firms will have an incentive to invest, and they will also have an incentive to seek out new markets that can be profitable. New entrants, also attracted by profit opportunities, can seek out specialty market niches—particularly in rural areas—that may not appeal to firms supplying mainstream market segments.

The conventional wisdom of electricity restructuring usually envisions six main elements of reform (box 1). Reform starts with moving the state-owned enterprise

from the day-to-day control of the politicians and bureaucrats in government, and transforming it into independent legal business units (corporatization and commercialization) under a transparent system of economic regulation, often leading to the sale of assets to private investors (privatization). The subsequent elements consist of creating a market in which to trade power by requiring these newly independent units to compete and by allowing new firms to enter the market. These elements are designed to create accountability and efficiency through competition for capital and customers. Such reforms depend on complementary reforms that liberalize access to capital markets and create institutions, particularly an independent regulator that can regulate prices and access to transmission and distribution networks, since the services provided by these facilities are natural monopolies.

BOX 1. Elements of Full-Scale Power Market Reform

Following are the elements of full-scale market reform:

1. **Obliging electricity enterprises to operate according to commercial principles.** These principles require that enterprises pay taxes and market-based interest rates, earn commercially competitive returns on equity capital, and have the autonomy to manage their own budgets, borrowing, procurement, and labor employment.
2. **Restructuring of the electric power supply chain to enable the introduction of competition.** This involves breaking up (“unbundling”) the incumbent power utility into multiple generators and distributors of power that trade with each other in a competitive wholesale power market.
3. **Development of economic regulation of the power market that is applied transparently by an agency that operates autonomously.** In the wholesale market, the focus of regulation is to prevent anticompetitive abuses of market power and to ensure appropriate investment in new supply capacity. In the retail market, the focus of regulation should be on balancing the interests of suppliers with the interests of their captive customers.
4. **Privatization of the unbundled electricity generators and distributors under dispersed ownership,** generally in developing countries to bring in financial resources and technical and managerial expertise that will rectify the prevailing low standard of electricity supply by state-owned power utilities. Privatization is also necessary in those countries that intend to develop competitive power markets, because competition is unlikely to develop properly between entities that are under common ownership—whether state or private.
5. **Development of competition in the generation and supply segments by development of power exchanges.** Competition in the network segments (transmission, distribution, and system control) is not feasible because these functions are natural monopolies.
6. **Focusing government’s role on policy formation and execution.** This role is performed with least conflict of interest when government also ceases to be the major owner, investor and controller of the entities that constitute the power supply chain, particularly in wholesale generation and retail supply of electricity.

Although much attention has been given to the construction of a standard model based on these elements, such a model has rarely been applied fully in practice. The divergence between theory and practice stems from three factors. First, the special technical aspects of electricity markets—in particular, the need for real time balancing of supply and demand because of the high cost of electricity storage—have complicated market design in ways not fully anticipated. Second, the proper operation of electricity markets requires many complementary institutions—such as independent regulators—that have proved difficult for many countries to satisfy, especially where the “rule of law” is largely absent. Third, many of the prescriptions for the standard model for reform, such as leaving electricity tariffs to market forces, are particularly difficult for democratic societies to implement (Heller, Tjong, and Victor 2003).

Reforming the electricity sector involves far more than changing technical and institutional models. Power market reform is taking place in the context of larger processes of globalization—notably the opening up of markets, the growing role of private capital, and efforts to weave national power markets into the fabric of international economic integration (World Resources Institute 2002).⁶ The reforms are influenced by an emergent global ideology that the state should refrain from controlling resources that markets could allocate more efficiently, and instead focus its resources on a limited category of social spending—mainly health and education, and that this retreat by the state is a precondition for investor confidence (World Bank 1995).

The Case of Developing Countries

The following forces have stimulated reform of the power markets of developing countries:

- a. *The poor performance of state-run power sectors* that has resulted in high costs, much of the population remaining unconnected to the public power system, and those who are connected often receiving unreliable service.
- b. *The inability of state sectors to finance needed expenditures on new investment and maintenance.* Many power utilities are financially distressed because of their poor governance environment comprising endemic corruption, rampant theft of power, political interference, and an inability by stakeholders to work toward long-term solutions. In the middle-income developing countries, power supply has been scaled up to the extent that the financing and management needs of the sector have generally outgrown the capacity of state institutions.
- c. *The need to remove or reduce the fiscal stress from state involvement in power supply in order to release state financial resources for other pressing public needs.* Electricity tariffs often do not come close to covering the current costs of service provision, but low tariffs do not benefit most of the poor, who largely lack access to electricity. By the end of the 1990s in Eastern Europe, for example, the combination of high technical losses, nonpayment of bills to the power utilities, and electricity tariff levels well below cost recovery levels imposed a fiscal cost that averaged 7.5 percent of gross domestic product (GDP) (Estache and Gassner 2004b). Severe fiscal problems from power sector deficits have also existed in India (box 2).
- d. *The desire to raise immediate revenue for governments through the sale of power sector assets.* In some cases, this driver was the need to reduce the high debt load of the sector under state ownership, which drove the design of the privatization process in some Latin American countries, notably in Argentina and Brazil.
- e. *Eastern European countries* have the additional incentive of complying with the requirements of the European Union’s Electricity Directive of 1996 in preparation for accession to the European Union (European Union 2003).⁷

Pressure for power market reform has often arisen in the context of a major economic crisis for the country. These crises have driven changes in public policy toward power markets within a broader drive for economic reform, which have made restructuring and private sector participation politically feasible. This was particularly the case in Latin America during the 1990s, where the opening up of power markets to competition reflected the replacement of the import substitution model led by public investment to a market-oriented model of economic development.

⁶ These views stemmed from two important advances in economics that took place in the 1980s: namely, research on the impact of the structure of property rights on the decisions and behavior of firms, and the theory of incentive-based mechanism design. Ideally, privatization would bring an end to political control over firms, yielding reductions in costs and efficient prices.

⁷ The EU Directive focuses on breaking up vertically integrated supply chains to allow competition in the power market, regulated or free third party access to the grid, coexistence of regulated and competitive markets side by side, and freedom for large (“eligible”) consumers to choose their suppliers.

BOX 2. Fiscal Burden of the Indian Power Sector

In India, the combined dues of all the Indian state electricity power utilities to central power suppliers and fuel suppliers amounted to about US\$5.5 billion equivalent in 2001. (Figures relating to financial losses and so forth are drawn from Government of India Planning Commission 2001 and Ahluwalia 2001.) To put this magnitude into perspective, this amount was about half of what all the state governments in India combined were spending on all levels of education every year. It was double what they were all spending on health, and three times what they were spending on water supply. If power sector financial losses were reduced by only one-third, the savings from a single year would have been sufficient to fill every teacher vacancy in the country and provide every school with running water and toilet facilities.

State governments face huge accrued liabilities for guarantees for bonds issued by the state electricity boards (SEBs) to central power and fuel suppliers, for the pension funds of SEBs, and for contingent liabilities under their guarantees to independent power producers that sell output to SEBs. Moreover, the Indian financial sector faces huge risk exposure to the power sector.

The subventions provided by Indian state governments to their SEBs undermine state budgets, even though these subventions are rarely paid in cash, but usually take the form of offsets against payables from government agencies to the SEBs and debt-servicing payments on behalf of the SEBs. State governments help the SEBs meet their debt serving obligations to avoid defaults that would provoke calls on the guarantees provided by state governments for these debts. Otherwise, a call on these guarantees would threaten the credit ratings on state governments' own borrowings.

Central power and fuel suppliers, equipment suppliers to the power industry, and financial institutions have borrowed heavily via bonds from Indian financial institutions to finance their operations because of their high receivables from SEBs. SEBs have securitized large amounts of their dues to central power and fuel suppliers through bonds issued in favor of the respective suppliers.

Power market reform has faced substantial difficulties and departed from the conventional economic model for reform, especially in developing countries.⁸ This is because fundamental reform of a power sector is an extraordinarily complex undertaking, even for reforms that fall short of attempting to introduce a fully unbundled, competitive market. Yet many governments have been attracted by complex, “state-of-the-art” market models and regulatory regimes that were designed and, to some degree, implemented in countries much better situated for this approach. In most cases, the funding agency staffs, politicians, regulators, and the host government had a poor conception of the difficulties involved—the scale and scope of needed changes and the realities of the physical, social, legal, commercial, and political constraints. In other words, the selected reforms were too ambitious for the country conditions (Rosenzweig, Voll, and Pabon-Agudelo 2004).

The objectives for reforming power markets differ significantly between OECD and developing countries. In general, reform in OECD countries is discussed in the context of raising the level of existing commercial standards of performance by means of competition. In developing countries, however, reform is generally concerned with investing in sufficient power supply capacity to meet growth

in demand for electricity, expanding access to public electricity supply by the population, and relieving fiscal pressure from supporting the power sector.

Although the techniques and instruments of power reform are generic, conclusions reached from empirical analysis about reform outcomes in OECD countries should be applied with caution to developing countries. This need for caution arises from the key differences in the main reform objectives between OECD and developing countries, as well as the huge differences in their starting conditions in relation to economic development (the appendix). Hence, reform in many developing countries may have the opposite outcome to reform in OECD countries. For example, the general direction of retail prices as efficiency improves following market reform is downward in OECD countries because prices already generally cover supply costs, whereas retail prices usually move upward in developing countries that are under pressure to remove subsidies and cross-subsidies. In addition, developing countries do not have the substantial amounts of economic and institutional resources available to OECD countries that are needed to support complex reforms to their power markets.

⁸ Chapter 3 reviews the record of reforming power markets in developing countries to date.

2.2 The Importance of Political Factors for Power Market Reform

Power market reform based on private sector participation and competitive markets involves complex issues for stakeholders—and in particular for governments, investors, employees, and consumers. Yet reform proponents have underestimated the importance of managing this process relative to techno-economic design and implementation issues. If reform were only a matter of economics, power systems would not have been experiencing the problems experienced in so many countries. Political factors cover both the importance of politics and many vested interests, and they include the willingness or opposition of politicians to support a political consensus in favor of power market reform. This consensus is needed because reform entails a redistribution of property rights (to remove politics from the management of public service providers) and formulation of new ground rules (introduction of competition and market-oriented incentives) through changes in laws and regulations. Governments must generate public acceptance and stakeholder consensus for these programs.

The Political Nature of Power Market Reform

Power market reform is an inherently political process. The political actors that support or oppose it—in government, industry, finance, labor unions, and civil society—are motivated to do so for reasons that may be irrelevant to economic theory, but are often quite relevant to the shaping of the actual policies created. Policies are implemented within institutional contexts—utilities, markets, courts, and regulatory bodies—that are profoundly influenced by political concerns. Finally, the impacts of reform are not confined to improvements in economic efficiency within the electricity sector itself. Rather, they can affect matters of broad public concern, such as employment, dependence on foreign energy supplies, and environmental pollution.

The important role of electricity in the national ideology of many developing countries forms part of the political dimension of power market reform. This is because electricity is a symbol of the social compact between state and citizen, as well as being a practical necessity of industrialization. For newly independent developing

countries, as well as the former Soviet Union (FSU), electricity represented the good life—well-illuminated homes and workplaces, modern factories and transportation, escape from the drudgery of manual labor—that had been denied most people. In propaganda and popular consciousness alike, images of a society with universal and affordable electricity became an important expression of state-led development.⁹ The promise of an electrified future served governments as a justification for present sacrifices. For some countries, electrification projects involving massive public investment and labor mobilization (such as the construction of large dams) became nation-building exercises and, upon completion, symbols of fulfilled development promises.

Far from a dry techno-economic calculation, electricity reform is often an arena of conflict between competing interests that are of fundamental importance to society. A broader context is needed to examine and design sustainable reforms to power markets in developing countries. The implicit social compact mentioned above was double-edged, because the definition of electricity as a public good represented a long-term claim by citizens on the state for provision of electricity, which would be a potential source of discontent if this aspiration should go unrealized. This ideological discourse left out economic concerns, such as competition and profitability; environmental and social constraints; and governance issues, such as transparency, accountability, and public participation.¹⁰

Experience with reforming power market suggests that political forces are difficult to align for reform. This is shown by the tendency for reforms—especially in developing countries—to start with independent power producers and marginal reforms in the generation sector, and to defer the task of reforming tariffs and the retail end of the market generally. Reforms that fail to address social and political concerns—for example, by attempting to raise tariffs on the poor without a compensating plan for protecting access to vital electric services—create their own political opposition and usually fail. In developing countries especially, the preservation of the “social contract” has occurred in large part through the deferral of difficult decisions, such as restructuring of tariffs, even where such decisions are essential because low tariffs create perpetually loss-making enterprises (Heller, Tjong, and Victor 2003).

⁹ The case of China exemplifies this point (Zhang 2003; Yeh and Lewis 2004).

¹⁰ This paragraph and the two before it are largely taken from Williams and Dubash 2004.

The gap between the apparent appreciation of the need for reform and actual implementation of reform measures is an important feature of power sector reform to date. These measures apply particularly to privatization, antitheft measures, and tariff rationalization. With few exceptions, mainly in Latin America, such as in Argentina and Chile, the currently reformed power systems among developing countries only partly resemble the theoretical market-oriented model, since market forces operate only at the margins of these power systems that remain dominated by the state. The explanation for this difference is often attributed to the influence of politics, poor rule of law, and generally weak institutions that obstruct the operation of markets, and hence the ability of the governments to implement reform plans (Heller and Victor 2004). Governments with weak institutions have performed poorly even when they had ambitious reform plans. Conversely, governments with strong institutions and sustained commitment to reform have fared much better, even when pursuing modest reforms (Tongia 2003).¹¹

Consolidation of power market reforms is not automatic, since it depends on management of the links between reform performance and the political process for the simultaneous creation of traditions of respect for the rights of investors and consumers. Consolidation hinges less on formal changes than on the existence of an effective system of social checks and balances and on mobilizing those interests that favor reform. The interests of investors and consumers are balanced by good regulation in the short term, and in theory they should converge in the long term.

The timing of reform relative to the electoral cycle can be critical for the privatization of electricity entities and for unpopular increases in electricity tariffs. The success of a privatization program often depends on divesting most of the state's ownership before the government faces the next election, which can force a compromise with long-term efficiency objectives for the sector (as happened in England and Wales). A crucial window of opportunity may be created by a change of government because the incoming group may have the mandate, strength, and time to carry out the program. In many countries, although the problem and possible solutions became evident early in the 1990s, action was not possible for several years because of the political priorities facing the incumbent governments around that time.

The scheduling of some power market reforms to fit perceived political windows of opportunity has often not been sustainable. These opportunities are usually linked to a compliant or interested incumbent politician who faced an impending reelection against politicians that opposed power market reform. This threat of a cutoff in government support led to short deadlines for reform tasks that were totally unrelated to the scale, scope, and difficulty of the tasks involved. This rush to introduce an "irreversible" step that would lock in future governments has proved to be counterproductive. In practice, no step is so irreversible that it forces a reluctant government to continue the reform. Some Latin American countries, for example, are under pressure to reverse their power market reforms because of the lack of public support for privatization and the succession of recent crises and events, such as macroeconomic crises and droughts in power systems dependent on hydropower.

Carrying out structural reform and attracting and sustaining private investors are extremely difficult during conditions of economic and associated political turmoil. This lesson is shown by the experience in Latin America, Eastern Europe, and the FSU (box 3). Power market reform involving restructuring and privatization of the unbundled entities was most difficult in countries that experienced prolonged turmoil (Georgia, Moldova, the Russian Federation, and Ukraine). Reform was less difficult in countries that achieved economic stabilization more quickly (Hungary, Lithuania, and Poland). Although private operators of distributors improved cash collections during such turmoil, they could not reach the levels needed for viability.

In developing countries, contrary to OECD countries, environmental issues (including renewables and energy efficiency) generally have not figured prominently in the process of reforming power markets. This difference may reflect different political priorities. It may indicate that developing countries will face a growing problem if such environmental concerns are not addressed at the time that private firms are encouraged to invest in long-lived capital stock that "locks in" particular environmental regimes.

¹¹ Evidence for this latter point is provided by the experience of the Indian state of Andhra Pradesh in the period around 2000 (see chapter 4).

BOX 3. The Impact of Economic Turmoil on FSU Power Sectors during the 1990s

One of the priorities for governments during periods of intense economic turmoil is to combat severe nonpayment of electricity bills induced by macroeconomic factors, according to the experience of countries in Eastern Europe and the FSU. The required measures are macroeconomic stabilization, removal of constraints—legal, political, and attitudinal—denial of service to defaulters, promotion of budget discipline to eliminate payment defaults by government agencies, and improvement of procedures for the recovery of arrears and debts by utilities (Krishnaswamy and Stuggins 2003).

During the 1990s these countries experienced a collapse of industrial production, continuous GDP contraction, hyperinflation, massive devaluation of their local currencies, severe fiscal and current account deficits, high levels of unemployment, and hence low and falling household incomes. Consequently, electricity demand dropped, and the ability of people and industries to pay for their consumption of energy was seriously eroded. Underpricing of energy—including electricity—and nonpayment to energy suppliers were a major source of fiscal subsidies in many of these countries (Freinkman, Gyulumyan, and Kyurumyan 2003). Tight monetary policies under the need to contain fiscal deficits to bring down the massive inflation left government agencies and state-owned enterprises with no funds to pay their utility bills.

Both during periods of economic turmoil and some years thereafter, the utility sectors in many of these countries faced acute nonpayments. In the worst cases, collections from electricity users dropped to 60–70 percent of billings, and cash collections fell to only 20–30 percent of the billings until late in the 1990s under the rapid increases in electricity and gas prices as the costs of imported fuels rose toward international levels. Thus, industrial and residential consumers and government agencies defaulted on payments to utilities, which in turn defaulted in its payments to domestic and foreign fuel and energy suppliers, payment of wages to staff, and payment of taxes to the government (Krishnaswamy 1999).

Ukraine's economy, for example, was barter-based at the time that it attempted major restructuring of its power market. Salaries and pensions were in arrears, and consumers could not be made to pay for electricity with cash because the government condoned the culture of nonpayment. In such an environment, the introduction of an advanced model of a competitive power market was bound to fail. Market reform objectives should have been more modest and targeted to improving technical, institutional, and financial problems.

Source: World Bank 2003b.

The Political Incentives to Reform

Politicians may be willing to give up the benefits from existing arrangements for power supply by supporting reform only if they have an incentive to do so.¹² To provide this incentive, the reform must fulfill at least one of the following conditions for politicians: it must (a) enhance their political support; (b) not meet with overwhelming opposition; and (c) provide benefits and avoid heavy losses for their supporters (Tongia 2003). Reform will happen only if a dedicated cadre of bureaucrats and politicians can withstand opposition from groups that stand to lose from reform, since the likely losers are typically better organized than the eventual winners are. New conceptual frameworks from economic theory have been developed for explaining this type of behavior (box 4).

Experience with power reform in many countries supports the view that “interest groups” constitute a major impediment to reform. These groups include rent-seeking interests, such as protected domestic industries, unionized labor forces, politicians with short time horizons, and electricity consumers that benefit from subsidies. Those aspects of the reform that are being blocked by vested interests or simple inertia can be distinguished from those that are publicly resisted because of legitimate concerns or different viewpoints. The latter arise when most power consumers are unconvinced that power market reform is designed to help them, and when few among them believe the promises that reform will eventually improve power supply and services. This indicates that reform is less likely in areas where its costs are concentrated on a small number of powerful actors while the benefits are dispersed among a wide

¹² These benefits often include patronage opportunities through commissions on contracts for construction, plant and equipment for power supply capacity. It also includes indirect fiscal support to governments through nonpayment for electricity by government agencies. Even if the power sector is not commercially viable, it can be a source of jobs and other favors.

BOX 4. Political and Institutional Concepts Applied to Reform of Power Markets

The institutional issues for reforming power markets can be analyzed in relation to three approaches developed for microeconomic reforms: the transaction-cost politics approach, the new institutional economics, and the new political economy.

The transaction-cost politics approach. This approach proposes that an instantaneous switch to a first-best world is a chimera. A tradeoff between the political feasibility of the reform and the elimination of economic rents is likely to exist. Multiple interests will put the new order under conflicting pressures, thus reducing the scope of the original goals or altering their intended direction. The changes that are feasible may therefore be modest. Regulation of public services takes place under asymmetric information and limited possibilities of commitment, because the rules of the game can be skewed, skipped, or modified. Under the informational limitations of policy designers, regulation is posed as the solution to a problem of incentives between agents (the firms regulated) and a principal (the regulator).

This approach contrasts with the normative approach that predominated up until the 1980s, and which contended that markets and government were equally efficient, the role of government was to remedy market failures (in regulatory terms, this meant preventing the exercise of monopoly market power), to produce public goods, and to redistribute income. The implicit assumption was that the government in question was perfect and would maximize welfare.

The new institutional economics. This approach characterizes institutions as crystallized beliefs. It stresses the support of customers and the role of complementary institutions (such as the judiciary and the antitrust bodies) as the two ultimate pillars of reform sustainability. In the case of regulation, the population should perceive that the increased cost of a service is offset by tangible benefits (for example, freeing up fiscal resources and using them to provide social services). It should be anticipated that changing beliefs about the benefits of a regulatory reform could operate under loss aversion conditions documented in experimental studies on decision making under uncertainty (the population may be risk-loving over regulatory losses and risk-averse over regulatory gains at the same time). This would explain, in part, the unfavorable perceptions of reform documented in opinion surveys like those of *Latinobarómetro*, even in situations where there are positive gains.

The new political economy. This approach stresses the need of permanently assessing the net balance of political support at each instant of time so as to calibrate the depth of reform changes and its sequence. It can be used in examining the issue of the order and speed of the measures that are introduced under a reform. The two extremes are shock therapy ("big bang"), which involves all the required changes taking place at the same time, and a gradual approach, which involves the measures being taken separately and over time ("gradualism"). Gradual progress would be preferable where there is uncertainty about the results of reform, about the higher costs of getting it wrong under the big bang approach, and where the suggested measures reinforce each other at each step.

Source: Benavides 2003.

number of prospective beneficiaries (who may not even be aware of their beneficiary status). A stakeholder analysis is needed to identify the range of interests for and against reform.¹³

In many countries, politicians have not had an ideological bias for or against reform, but have approached the issue pragmatically. They have neither opposed it wholeheartedly nor advocated it coherently. In power markets where politicians have had incentives to pursue reform, they have done so; otherwise, they have not.

Pragmatism can be their guiding principle when, for example, fiscal distress compels a country to give priority to power reform because this sector is a serious drain on the state's financial resources. However, the risk with this approach is that reform is publicly perceived as just a bankruptcy workout without social objectives for the power sector, under which power consumers bear the cost of this reform with little noticeable benefit in improved service. In this situation, reform does not receive the required public support and hence only lukewarm political commitment.¹⁴

¹³ Examples of comprehensive stakeholder analysis can be found for Guatemala (Fundación Solar 2002), Colombia (Ayala and Millán 2002), and Honduras (Walker and Benavides 2002).

¹⁴ This section draws on an unpublished paper by Sumir Lal entitled "Political Factors Affecting Power Sector Reform in India."

Political Issues for Reforming Power Markets

The fundamental issue for public acceptance of a power reform plan is credibility. In many countries, the power utilities are publicly viewed as corrupt, mismanaged, and in a financial plight of their own making.¹⁵ The ingredients of credibility include full government ownership of the reform, managing expectations, building in compensatory mechanisms with believable assurances of carrying them through, and committing to stability of the new policy. These, in turn, depend on the government's reputation with its constituents, the prevalence of political checks and balances, and binding the new policy to wide ownership and statutory commitments. Without this credibility, the public may sense that a reform plan is being forced on them "from above," and that they are expected to pay for the utilities' inefficiencies and corruption. If politicians fail to recognize and address this perception, they will struggle to make power consumers believe that the reform effort is intended to benefit the wider public, and they will be unable to create pro-reform constituencies.

Certain aspects of reform are endorsed when the need for reform is widely accepted in principle, but other aspects often remain unaccepted. The publicly acceptable aspects usually include making state-owned power utilities autonomous of government, corporatizing these utilities, establishing an autonomous regulator, and introducing transparent accounting mechanisms for power suppliers. By contrast, key areas of public concern are usually the removal of subsidies and cross-subsidies, unbundling of a vertically integrated power utility, and privatization of components of power supply. The first set that is little disputed deals with institutional issues related to governance of the power market, whereas the second describes a particular reform model that is questioned as an ideological choice. A public consensus generally emerges that the market must be better governed and made more efficient, but it often fails to cover what would be the appropriate way of doing so.

Competition and private ownership in the power market is vulnerable to a public backlash if consumers perceive that increases in electricity prices are a consequence of this reform. Generally, private management and ownership has brought about significant improvements in performance at the enterprise level, but much of this improvement has not been translated into corresponding improvements at the economic and social levels. Electricity prices did not fall in all countries that liberalized their power markets.

In El Salvador, electricity prices to final consumers increased slightly after reforms were implemented, creating a public backlash against the reform. In Bolivia, electricity prices rose as a result of an increase in the price of natural gas used for generating electricity (World Energy Council 2001). The elimination of cross-subsidies between consumer categories led to tariff increases for consumers from whom the subsidies were removed.

Private investments in generation are vulnerable to financial problems in the distribution end of the industry and to local vested interests that are defending the status quo. The sustainability of private investment in generation depends crucially on collecting payments in full from electricity consumers. Introducing competition among generators without reforming distribution and retail consumer services to achieve commercial standards can impair the effectiveness of the overall reform program. Yet power utilities in most developing countries—generally in South Asia and Sub-Saharan Africa, but also in many countries elsewhere—are financially insolvent.

Political will to support necessary increases of prices for electricity is usually one of the most critical factors in a viable reform process. Any reform of power markets is seriously handicapped without such commitment. The design of these reforms in the past, however, has generally taken for granted the existence of the necessary political support to convince customers and voters to accept higher power prices and to curtail inconsistent or corrupt behavior by customers and employees (Rosenzweig, Voll, and Pabon-Agudelo 2004).

The treatment of utility employees affected by privatization raises important issues. Sorting out employment issues before privatization through formal agreements with labor unions helps attract investors to power sectors. Power market reform usually leads to lower employment levels under commercialization of supply functions, and reforms that result in heavy job losses elicit tremendous political resistance. This was the case in Hungary where some of the privatization receipts were used to secure employee cooperation. These receipts can also be used to fund severance compensation. The possibility of allocating to staff some shares in privatized entities was an important element in some of the private participation deals in Latin America, including the Chilean practice of vesting shares into pension funds on behalf of the employees. Elsewhere, as in Ukraine, employees merely sold their shares quickly to investors to supplement their low wages.

¹⁵ In some countries, public perception of corruption and mismanagement has extended to contracts by power utilities with independent power producers, especially those concluded without public scrutiny.

Power consumers need to understand and accept the proposed reforms. Since reforming electricity tariffs in developing countries is complicated by the legacy of highly subsidized prices for the population, reformers should explain the rationale for tariff increases and demonstrate that in return, consumers will experience tangible benefits, such as improved service. Tariff increases for low-income households should be tempered to keep electricity affordable for them. Public expectations about power tariffs inherited from the prereform era can be a major obstacle to reform. Reforming electricity tariffs in the FSU countries, for example, has been complicated by the legacy of highly subsidized prices for the entire population, the public sense of entitlement for such continued service, and the vital importance of reliable energy services during the long and cold winters. Electricity tariffs rose during the 1990s in local currency

terms by about 200 percent to cover costs, and they became a significant component of household expenditure (Krishnaswamy and Stuggins 2003).

Foreign ownership of power supply entities is often an issue for the political feasibility of power market reform. In countries that have a relatively small, internal, formal financial structure (compared with the size of the sector) and possibly no stock market, privatization inevitably means foreign ownership in part or in total. Control of such a key domestic sector by foreign companies must be clearly linked to the underperformance of the power sector, and the government must have the support for implementing this policy of those groups that are likely to determine its future. This issue has arisen in countries, such as El Salvador and Bolivia (chapter 3).

3. CURRENT EXTENT AND OUTCOMES OF POWER MARKET REFORM IN DEVELOPING COUNTRIES

OGN's Guidance on the Current Extent and Outcomes of Power Market Reform

Infrastructure services are critical to economic growth, poverty reduction, and the achievement of the Millennium Development Goals. However, the investment volumes required to provide the capacity to deliver these services are enormous.

Reform of the power market will be needed to foster the financial viability of electricity service providers, and hence attract on a sustainable basis the public and private financing needed over time to expand services.

At the heart of most power market reform efforts are a set of interrelated challenges: changing the manner in which new investments are financed, increasing the efficiency and development effectiveness of those investments, and increasing operational efficiency, while addressing equity concerns as the market expands.

It is now broadly recognized that pure public financing and provision have failed to adequately support economic and social development under the poor governance standards found in most of the Bank's clients, and that they have imposed high opportunity costs on society.

The private sector has shown that it can deliver efficient investments and improved services to customers of the power market provided that the right business incentives are in place to attract investment—but that putting this framework in place can be challenging in many countries.

The substantial investment needs of the power sector mean that increased investment from the private sector will be needed. Sector-specific measures to address this will be important.

This chapter outlines the context and background to power market reform in developing countries and then summarizes the current extent and outcomes of power market reform in developing countries since the start of the reform movement in the early 1990s (World Bank 1993a and World Bank 1993b).

3.1 The Extent of Power Market Reform

About 70 of the 150 developing countries have embarked on reforming their power markets since the early 1990s in response to poor technical and financial performance and lack of public financing needed to expand power supply. Reforms of these markets, however, are generally tentative and incomplete, and are still works in progress (Bacon and Besant-Jones 2002). The remaining countries have retained the traditional structure of a vertically integrated monopoly, in some cases because they felt it impossible or undesirable to embark on any reform strategy that entails opening electricity production or sales to private participants.

The countries that have embarked on reform have progressed to date to various stages, which can be categorized in ascending extent of reform as follows:

- A vertically integrated monopolist with independent power producers (IPPs) that sell power to it.
- A national generation, transmission or distribution entity, a combined national generation and transmission entity or a combined transmission and distribution entity acting as the only wholesale power trader (single buyer) with IPPs that sell power to it and regional distribution entities unbundled from the monopolist that buy power from it.
- Many distribution entities and generation entities and a transmission entity formed from unbundling the monopolist, in which the transmission entity acts as a single buyer of power from the generators and IPPs and sells power to the distribution entities and large users of power.

BOX 5. Developing Country Groups by Current Power Supply Structure

Developing countries fall into the following groups according to their current structure of power supply:

Vertically integrated monopolist (79 countries)

Angola, Antigua and Barbuda, Azerbaijan, Barbados, Belarus, Benin, Bhutan, Botswana, Burundi, Cape Verde, Central African Republic, Chad, Comoros, the Democratic Republic of Congo, the Republic of Congo, Djibouti, Dominica, Equatorial Guinea, Eritrea, Ethiopia, Fiji, Gabon, the Gambia, Grenada, Guinea, Guinea-Bissau, Guyana, Haiti, Islamic Republic of Iran, Iraq, Kiribati, Democratic People's Republic of Korea, the Kyrgyz Republic, Lebanon, Lesotho, Liberia, Libya, Madagascar, Malawi, Maldives, Mali, Marshall Islands, Mauritania, Micronesia Fed. Sts., Mongolia, Mozambique, Myanmar, Namibia, Nicaragua, Niger, Paraguay, Rwanda, Samoa, São Tomé and Príncipe, Saudi Arabia, Seychelles, Sierra Leone, Solomon Islands, Somalia, South Africa, St. Kitts and Nevis, St. Lucia, St. Vincent and Grenada, Sudan, Suriname, Swaziland, Syrian Arab Republic, Tajikistan, Timor-Leste, Togo, Tonga, Turkmenistan, Uruguay, Uzbekistan, Vanuatu, Venezuela, the Republic of Yemen, Zambia, Zimbabwe

Vertically integrated monopolist + IPPs (36 countries)

Bangladesh, Belize, Burkina Faso, Cambodia, Cameroon, China (most provinces), Costa Rica, Côte d'Ivoire, Croatia, Cuba, the Czech Republic, the Dominican Republic, the Arab Republic of Egypt, Ghana, Honduras, India (most states), Indonesia, Jamaica, Lao People's Democratic Republic, Malaysia, Mauritius, Mexico, Morocco, Nepal, Nigeria, Oman, Pakistan, Papua New Guinea, Senegal, Sri Lanka, Tanzania, Thailand, Trinidad and Tobago, Tunisia, Vietnam, West Bank and Gaza

Single buyer as a national genco, transco or disco,

or a combined national genco-transco or transco-disco+ IPPs (16 countries)

Albania, Algeria, Armenia, Bosnia and Herzegovina, Estonia, Georgia, India (Andhra Pradesh, Karnataka, New Delhi, Orissa, Rajasthan, Uttar Pradesh), Jordan, Kenya, Latvia, Lithuania, the former Yugoslav Republic of Macedonia, the Philippines, Serbia and Montenegro, the Slovak Republic, Uganda

Many discos and gencos, including IPPs, transco as single buyer with third party access (6 countries)

Bulgaria, Ecuador, Hungary, Moldova, Poland, Russian Federation

Power market of gencos, discos and large users, transco and ISO (13 countries)

Argentina, Bolivia, Brazil, Chile, Colombia, El Salvador, Guatemala, Kazakhstan, Panama, Peru, Romania, Turkey, Ukraine

- An organized market of generation entities, distribution entities and large users in which power is traded competitively, supported by a transmission entity, a power system operator and a power market administrator.

The stages outlined above can be viewed as progressive stages through which countries pass on a graduated reform path. Power market reform programs in developing countries currently exhibit this variety of progress, particularly in market structure, degree of private participation, and development of the regulatory framework. This variety is shown by the lists of countries in box 5 that have reached each reform stage.

The countries that have embarked on power market reform cover a broad range in physical, economic and institutional terms. Reform is unevenly spread among

regions (table 2A). Countries in Latin America and the Caribbean and in Europe and Central Asia account for all the countries that have progressed to the two most advanced stages described above. In Africa, Asia and the Middle East, progress to date is generally limited to the first two stages with long-term contracts by IPPs to supply incumbent utilities (ESMAP 1999). Some countries in East Asia, for example, have made tentative steps to further their reforms, as in the cases of China (Yoeh and Rajaraman 2004; Zhang and Heller 2004) and the Philippines (Sharma, Madamba, and Chanc 2004). Many of these countries have announced plans to take their reforms to more advanced stages, and many others have announced plans or intentions to start the reform process.

TABLE 2. Distributions of Power Supply Structures in Developing Countries**TABLE 2A. Distribution of Power Supply Structures in Developing Countries by Region**

REGION AND TOTAL NUMBER OF COUNTRIES IN REGION		POWER SUPPLY STRUCTURE GROUP				
		VERTICALLY INTEGRATED MONOPOLIST	VERTICALLY INTEGRATED MONOPOLIST +IPPS	REGIONAL DISCOS, IPPS, A GENCO-TRANSCO AS SINGLE BUYER	MANY DISCOS, GENCOS, IPPS, TRANSCO AS SINGLE BUYER	POWER MARKET GENCOS, DISCOS AND LARGE USERS, TRANSCO-SO
Africa	49	39	8	2	0	0
EAP	17	10	6	1	0	0
ECA	28	7	2	10	5	4
LAC	32	14	8	0	1	9
MENA	13	6	5	2	0	0
SAR	11	3	7	1	0	0
Total	150	79	36	16	6	13

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TABLE 2B. Distribution of Power Supply Structures in Developing Countries by Installed Power Supply Capacity

INSTALLED POWER CAPACITY GROUP (MW)		POWER SUPPLY STRUCTURE GROUP				
		VERTICALLY INTEGRATED MONOPOLIST	VERTICALLY INTEGRATED MONOPOLIST +IPPS	REGIONAL DISCOS, IPPS, A GENCO-TRANSCO AS SINGLE BUYER	MANY DISCOS, GENCOS, IPPS, TRANSCO AS SINGLE BUYER	POWER MARKET GENCOS, DISCOS AND LARGE USERS, TRANSCO-SO
<300	44	5	0	0	0	0
301–1,000	13	8	1	0	0	0
1,001–5,000	11	13	10	2	3	3
>5,000	12	11	5	4	8	8

TABLE 2C. Distribution of Power Supply Structures in Developing Countries by National Income

INCOME GROUP (PER CAPITA IN 2003)		POWER SUPPLY STRUCTURE GROUP				
		VERTICALLY INTEGRATED MONOPOLIST	VERTICALLY INTEGRATED MONOPOLIST +IPPS	REGIONAL DISCOS, IPPS, A GENCO-TRANSCO AS SINGLE BUYER	MANY DISCOS, GENCOS, IPPS, TRANSCO AS SINGLE BUYER	POWER MARKET GENCOS, DISCOS AND LARGE USERS, TRANSCO-SO
Low	43	15	3	1	0	0
Lower middle	22	13	9	3	8	8
Upper middle	15	9	4	2	3	3

Note: EAP—East Asia and the Pacific; ECA—Europe and Central Asia; LAC—Latin America and the Caribbean; MENA—Middle East and North Africa; SAR—South Asia.

Sources: World Bank 2005 for country income levels; Energy Information Administration 2002 for country installed power capacities; various documents for country power supply structures.

Some Latin American countries have advanced power market reform with private participation and competition in the power market. Their experience provides invaluable lessons for later reformers (Covarrubias and Maia 1994; Fisher and Serra 2000; Inter-American Development Bank 1999; Millán and von der Fehr 2003; Moscote, Maia, and Vietti 1995; Mota 2003; Rudnick and Zolezzi 2001; World Energy Council 2001). These countries learned from the experience of earlier reforming countries, and in particular from the Chilean experience during the 1980s. The evolution of reforms under this process has led to less regulation of segments that are or can be made competitive (generation and energy supply services), and regulation of the noncompetitive markets (transmission and distribution network services) combined with the unbundling of competitive and noncompetitive segments of the industry. Even in these countries, however, reform is still incomplete and in some cases may not be sustainable, especially since a backlash against these reforms that has emerged in some of these countries (Lora and Panizza 2002; Millán, Lora, and Micco 2001).

Reform has progressed mostly among developing countries with relatively larger power systems. Restructuring of power supply arrangements through unbundling of an integrated structure is a sure indicator of whether a country has started to reform its power market radically. Unbundling is a feature of the larger power systems to date, however, and has not occurred in the smaller power systems (table 2B). Thirteen of the 71 countries with power systems smaller than 1,000 MW have opted so far to contract for power supplies from IPPs without any unbundling. On the other hand, 15 of the 39 countries with power systems that lie between 1,000 MW and 5,000 MW have been unbundled, and 28 of these systems have IPPs. Moreover, power supply has been extensively unbundled in 17 of the 40 countries with more than 5,000 MW of power supply. Most countries that have unbundled their power supply chain (generation from distribution, in particular, with transmission in a separate entity or combined with one of the others—"vertical unbundling") have further unbundled their generation and distribution sectors into numerous entities ("horizontal" unbundling).

Reform has also progressed among developing countries with relatively higher levels of per capita national income. This feature is shown in the relationship between the stage of power reform in a country and the national income classification used by the World Bank (table 2C).¹⁶ Only four of the 62 countries in the low-income group of countries have undertaken any unbundling of their power supply chain, whereas 20 of the 55 lower-middle-income countries and 9 of the 33 upper-middle-income countries have undertaken some or extensive unbundling.¹⁷

The tendency for countries of similar economic, legal and political backgrounds to adopt similar power market reforms indicates the importance of these basic characteristics for designing market reforms. It shows clear regional groupings, with Latin America the most advanced in restructuring, Asia (APEC 2000; Fairhead and others 2002) and Africa (Estache and Gassner 2004a) the least restructured, and the level of restructuring in Eastern Europe falling in between (Bacon and Besant-Jones 2002; EBRD 2001).

Many Latin American countries have adopted competition in the wholesale power market (box 6). They adopted a mixture of two variants of this structure (the power pool design of the Chilean model, the independent transmission and system operator of the England and Wales model) and divested most of their state-owned assets in combination with structural reform and greenfield investment by the private sector (Argentina, Bolivia, Brazil, Chile, Colombia, and Peru).¹⁸ This model led to increased sector investment and improved sector performance in these countries. This model also spread the impact of shocks throughout sector stakeholders, thereby improving its robustness (but even this model could not withstand the huge macroeconomic shocks of 2001 in Argentina). Eastern European and Central Asia countries have also implemented variations on this model, particularly for the use of bilateral contracts between power generators and distributors (box 7).

Many countries in East Asia and South Asia opted for attracting private investment in generating capacity with greenfield power plants developed and operated by IPPs. These countries include Bangladesh, China, India,

¹⁶ Developing countries are classified by the following per capita income groups: low—US\$765 or less; lower-middle-income—US\$766 to US\$3,035; and upper-middle-income—US\$3,036 to US\$9,385. Per capita incomes are computed according to the World Bank Atlas method (http://www.worldbank.org/data/aboutdata/working-meth.html#World_Bank_Atlas_method).

¹⁷ The correlation between power system size and national per capita income in developing countries is not sufficiently strong to allow only one or the other to be used. On the other hand, national income should not be used instead of per capita income because it is strongly correlated with power system size.

¹⁸ "Greenfield investment" refers to investment in new facilities on undeveloped sites—typically for power generation. A related concept is "brownfield investment" which refers to investment in existing facilities. Greenfield investment has been the dominant mode for IPPs in Asia, brownfield investment has been the dominant mode for IPPs in Eastern Europe, and both forms are widely used in Latin America and the Caribbean.

BOX 6. Evolution of Power Market Reform in Latin America

Power market reform in Latin America proceeded in three distinct rounds. The first round started in Chile in the late 1970s with the development of new legislation that was introduced in 1982, and ended with the privatization of the major electricity firms between 1986 and 1989. Chile's neighbors carried out the second round of reforms in the first half of the 1990s, an example of the demonstration effect of reform. The third round took place during the second half of the 1990s, and it included most of the remaining Latin American countries. Reform designers attempted to extend the scope and depth of competition in each round. Moreover, reforms were accomplished faster. The changes made in Argentina from 1990 to 1992 took a whole decade to achieve in Chile.

The Chilean reform contained three major innovations. First, competition was introduced to the wholesale market, in which power generation companies and large customers and distribution companies established long-term supply contracts, and transmission services were provided by a separate entity to introduce open access to the transmission network. Second, investment in generation capacity was left to market forces, specifically the profitability of developing new capacity as rising demand leads to higher wholesale power prices. Third, incentive regulation was used to compute the value added of network services provided by the distributor.

Reform introduced more pro-competition regulation and restructuring of the market. Vertical integration of generation and distribution was either prohibited outright or limited. Horizontal unbundling of the generation segment helped promote competition in wholesale power pools. Restructuring of the wholesale energy market allows generators to submit price and quantity bids into a power pool, which the pool operator uses to build a system wide supply curve for energy.* This curve is used to determine the order of dispatch of generating plants, replacing the merit-order system based on operating costs used by earlier reform countries.

Transmission fees, as well as the charge for local distribution services provided to large customers, were set by either the regulator or the power market operator. The minimum demand threshold for eligibility by large customers to buy power from the wholesale market was reduced. Governance of the power market was strengthened by allowing distributors, some eligible customers and the transmission company to join generators as members of the wholesale market operator. Moreover, instead of regulating the price at which distributors purchased electricity, some countries obliged distributors to tender their energy requirements among all generators. Some countries employed yardstick competition (see section 6.5) to regulate their unbundled distribution segment.

Regulations became more flexible, bestowing more discretion on regulators. Regulations also began to incorporate quality issues and increase fines for bad service. The process of setting regulated prices became more transparent. In Chile regulators were not allowed to publish the information used in rate-setting, except to the regulated firms, which prevents the demand side of the market from counteracting the lobbying pressure of regulated distributors. In Argentina, in contrast, public hearings became an important tool of the regulatory process. These changes made the power market in Argentina considerably more competitive than the one in Chile.

* The supply curve is based on prices at nodal points in the power system. These prices reflect the anticipated weighted average values of marginal costs across the system load duration curve of meeting the projected demand on the power system over the next 48 months under an operating program for the generation capacity on the power system that minimizes these costs. The values of marginal costs take account of technical losses in the power network. The prices are adjusted monthly by indexation formulae.

Source: Fischer and Serra 2000.

Indonesia, Malaysia, Nepal, Pakistan, the Philippines, Thailand, and Vietnam. Most countries proceeded without structural reform, although some plan to move to some market restructuring (China in some provinces, India in some states, the Philippines). This model also

increased sector investment, but it did not improve overall sector performance. It also concentrated the impact of macroeconomic shocks from the 1997 Asian financial crisis on the single buyer (see section 5.3).

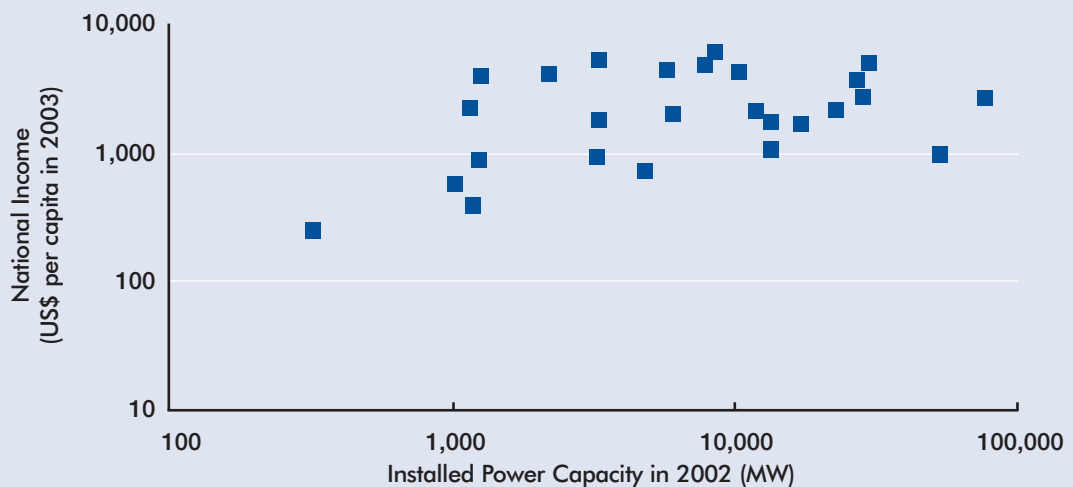
BOX 7. Reforms Undertaken in Eastern Europe and Central Asia

Countries in Eastern Europe and Central Asia have followed a variety of reform paths for their power markets:

- Kazakhstan privatized quickly most of its generation and some of its distribution at “throwaway” prices, and now it operates a bilateral contract driven wholesale market. Some of the investors have disinvested and walked out.
- Tajikistan and the Kyrgyz Republic have either unbundled or are considering unbundling their sector and have not undertaken any privatization yet. The concession for Pamir Power Company to operate as a vertically integrated utility in Tajikistan is the first case of private investment.
- Turkey and Lithuania have substantially commercialized and unbundled the sector and are poised to introduce competitive wholesale markets.
- Poland and Hungary have unbundled the sector, introduced a single buyer model wholesale market and have substantially privatized generation and distribution. Poland and Hungary have completed privatization substantially.
- Ukraine has unbundled and adopted a sophisticated competitive pool (which could not work as envisaged because of extensive nonpayment problem) and has privatized more than 50 percent of its distribution. It is still searching for a workable model.
- Georgia has unbundled and privatized distribution in its capital region and some generation. It has given management contracts to manage nonprivatized generation, transmission, and the Wholesale Market Operation and operates a single buyer model pool.
- Moldova, the smallest among the countries reviewed, has unbundled its sector, has privatized three of its five distribution companies, and operates a wholesale market based on bilateral contracts between distributors and domestic and foreign generators.
- Hungary, Poland and Turkey started with BOT-BOO-TOOR type of private sector involvement and are devising methods to accommodate them in a competitive structure and to manage the resulting stranded costs and contracts.
- Romania and Bulgaria have unbundled their sectors and have privatized some distribution entities.

Source: Krishnaswamy and Stuggins 2003; World Bank 1999.

FIGURE 1. System Size and National Income of Unbundled Power Systems



Sources: Based on income data from World Bank 2005 and on capacity data from Energy Information Administration 2002.

3.2 Classification of Developing Countries by Power Market Reform

Most developing countries can be broadly classified into two groups in assessing their experience with power market reform. One of these groups (“the large middle-income group”) is formed by a combination of system size larger than 1,000 MW and national per capita income above US\$900, and the other group (“the small low-income group”) is formed by a combination of size and income below these threshold values. This approach is indicated by figure 1 for the developing countries that have unbundled their power supply arrangements to date.¹⁹ It accommodates the huge range of country and sector characteristics found among developing countries. The existence of empirical threshold values between these groups shows the influence of scale economies on market reform.

These two variables have relatively stronger influences on different components of power market reform. Country income level has a relatively stronger influence on the roles of the public and private sectors and on access and affordability to electricity services. It can also have a stronger influence on the regulation of power markets on the basis that institutional capacity increases with income level. Power system size has a relatively stronger influence on market structure.

The threshold values of 1,000 MW and US\$900 are indicative because the two groups defined by them do not hold all developing countries. Some countries have lower power capacities but higher income levels than the threshold values. Other countries have higher power capacities but lower income levels than the threshold values. Table 3A shows that about one third of all developing countries fall below both threshold values

BOX 8. Classification of Developing Countries by Income and Size Group

Developing countries fall into the following groups according to their per capita income and size of power system:

Countries with per capita income of less than US\$900 and a power system smaller than 1,000 MW (44):

Angola, Benin, Bhutan, Burkina Faso, Burundi, Cambodia, Cameroon, Central African Republic, Chad, Comoros, the Democratic Republic of Congo, Côte d’Ivoire, Equatorial Guinea, Eritrea, Ethiopia, the Gambia, Guinea, Guinea-Bissau, Haiti, Kiribati, Lao PDR, Lesotho, Liberia, Madagascar, Malawi, Mali, Mauritania, Mongolia, Nepal, Nicaragua, Niger, Papua New Guinea, Rwanda, São Tomé and Príncipe, Senegal, Sierra Leone, Solomon Islands, Somalia, Sudan, Tanzania, Timor-Leste, Togo, Uganda, the Republic of Yemen

Countries with per capita income of more than US\$900 and a power system smaller than 1,000 MW (27):

Antigua and Barbuda, Barbados, Belize, Botswana, Cape Verde, Djibouti, Dominica, Fiji, Gabon, Grenada, Guyana, Honduras, Maldives, Marshall Islands, Mauritius, Micronesia, Fed. Sts., Namibia, Samoa, Seychelles, St. Kitts and Nevis, St. Lucia, St. Vincent and the Grenadines, Suriname, Swaziland, Tonga, Vanuatu, West Bank and Gaza

Countries with per capita income of less than US\$900 and a power system larger than 1,000 MW (20):

Azerbaijan, Bangladesh, the Republic of Congo, Georgia, Ghana, India, Indonesia, Kenya, Democratic People’s Republic of Korea, the Kyrgyz Republic, Moldova, Mozambique, Myanmar, Nigeria, Pakistan, Tajikistan, Uzbekistan, Vietnam, Zambia, Zimbabwe

Countries with per capita income of more than US\$900 and a power system larger than 1,000 MW (59):

Albania, Algeria, Argentina, Armenia, Belarus, Bolivia, Bosnia and Herzegovina, Brazil, Bulgaria, Chile, China, Colombia, Costa Rica, Croatia, Cuba, the Czech Republic, the Dominican Republic, Ecuador, Egypt Arab Rep., El Salvador, Estonia, Guatemala, Hungary, Islamic Republic of Iran, Iraq, Jamaica, Jordan, Kazakhstan, Latvia, Lebanon, Libya, Lithuania, FYR Macedonia, Malaysia, Mexico, Morocco, Oman, Panama, Paraguay, Peru, the Philippines, Poland, Romania, Russian Federation, Saudi Arabia, Serbia and Montenegro, Slovak Republic, South Africa, Sri Lanka, Syrian Arab Republic, Thailand, Trinidad and Tobago, Tunisia, Turkey, Turkmenistan, Ukraine, Uruguay, Venezuela

¹⁹ Uganda is an exception among the countries in this group to this finding, since it has an installed capacity of much less than 1,000 MW and a per capita income of well below US\$900.

TABLE 3. Differences in Power System Characteristics by Threshold Group**TABLE 3A. Developing Countries Classified According to Threshold Values for System Size and National Income**

INSTALLED POWER CAPACITY IN 2002			
NATIONAL PER CAPITA INCOME IN 2003	BELOW 1,000 MW	ABOVE 1,000 MW	TOTAL
Below US\$900	44	20	64
Above US\$900	27	59	86
Total	72	79	150

TABLE 3B. Average Proportion of Population without Access to Electricity by Threshold Group of Countries, 2002

INSTALLED POWER CAPACITY IN 2002			
NATIONAL PER CAPITA INCOME IN 2003	BELOW 1,000 MW	ABOVE 1,000 MW	AVERAGE
Below US\$900	83%	53%	73%
Above US\$900	49%	9%	14%
Average	77%	20%	41%

TABLE 3C. Average Values of TI Corruption Perceptions Index by Threshold Group of Countries, 2004

INSTALLED POWER CAPACITY IN 2002			
NATIONAL PER CAPITA INCOME IN 2003	BELOW 1,000 MW	ABOVE 1,000 MW	AVERAGE
Below US\$900	2.5	2.3	2.4
Above US\$900	4.2	3.6	3.7
Average	3.0	3.3	3.2

Note to tables 3B and 3C: The data needed for these tables were available for virtually all the countries with installed power capacity above 1,000 MW, whereas the data were not available for many countries with installed power capacity below 1,000 MW. Conversely, data availability did not differ significantly between the lower-income group and the higher-income group of countries, with similar proportions of countries lacking this data.

Note to table 3C: The Transparency International (TI) Corruption Perceptions Index rates countries in relation to the degree to which corruption is perceived by business people and analysts to exist among public officials and politicians. It defines corruption as the abuse of public office for private gain. The index values are relative to a clean rating of 10. A rating below 5 indicates considerable corruption, and a rating below 3 indicates rampant corruption.

Sources: World Bank 2005 for country income levels and for proportion of country population without access to electricity; Energy Information Administration 2002 for country installed power capacities; Transparency International 2004.

into the lower income group, another third fall above both threshold values into the middle-income group, but the remaining third fall outside these groups.²⁰ Box 8 lists the countries that fall into each group. The threshold values may change over time for future groups of reforming countries—either upwards or downwards.

The basis for this classification is strengthened by the observed divergence in social and institutional characteristics that corroborate the divergence in physical and economic characteristics of these groups, for example:

- *The proportion of the population without access to electricity* indicates a social dimension of the power sector that is particularly relevant to the priorities for power market reform. Table 3B shows that this proportion is extremely high—averaging 83 percent—for countries that fall below both threshold values, whereas it is very low—averaging 9 percent—for countries that fall above threshold values. The average proportions for the other two groups lie between these values at around 50 percent. These are highly significant differences for specifying the conditions for reforming a country’s power sector.
- *A country’s rating for corruption*—as measured by Transparency International Corruption Perceptions Index—shows an institutional dimension that is relevant to attracting investment and improving governance of the power sector. Table 3C shows that national per capita income is the critical factor for distinguishing country groups by this rating, since countries in the lower income groups have markedly lower (worse) ratings than countries in higher income groups. The difference in rating based on size of power system is not significant.

This analysis provides insights into power market reform in developing countries. For example, in nine countries with competitive power trading arrangements, three have nonaccess rates of 20 percent or more and eight have corruption ratings of below five. Such conditions indicate difficulties for sustaining these arrangements.

3.3 The Rise and Fall of Private Investment

A direct result of the global movement to reform power was the rapid growth from the early 1990s in private investment in the power sectors of developing countries. The rate of this investment peaked at US\$43 billion in 1997, but it dropped sharply after the Asian financial crisis of 1997 to around a quarter of that level from 2001 onwards, as shown in figure 2 (Izaguirre 2004; World Bank 2003a).²¹ Public investment declined, including donor financing for such investments, in the expectation that private investment would be an adequate replacement. For example, annual financing for power sector investments from multilateral organizations fell from around US\$8 billion during 1980s to around US\$3 billion from 1998 and thereafter (World Bank 2004a).

Most private investment went to a relatively few countries (figure 3). Two regions—East Asia and Latin America and the Caribbean—received 75 percent of this investment, while about 50 percent went to only five countries—Argentina, Brazil, China, India, and the Philippines. About 70 percent went to the power generation segment, and the rest was mainly in the distribution segment; little went into transmission (figure 4).

Foreign private investment in the power markets of developing countries has been vulnerable to economic conditions in these countries. This is shown by the decline in private investment in developing countries after the East Asian and Russian financial crises in 1997 and 1998, respectively. These crises dealt a double blow to the prospects for attracting private investment to developing countries in general, and to countries in Eastern Europe and the FSU in particular just as they were embarking on reforms to their power markets (Besant-Jones 1999). This decline is mainly attributable to three factors: investors’ bad experiences in some countries, the unattractive investment climates of many countries, and the difficulty for many countries in sustaining the reforms to power market and corporate governance needed to place the power market on a commercial footing.

²¹ This surge in foreign investment was stimulated by low interest rates and high supplies of private funds in international capital markets, allied to growing global interest in market oriented reforms to infrastructure sectors. See also Izaguirre 2000 for information about private participation in energy.

²⁰ A classification based on these two factors allocates many more countries into the two target groups (one higher than both threshold values, the other lower than both threshold values) than a classification based on one or other factors alone, as shown in Table 3A. A single factor classification allocates countries in nearly equal numbers above and below each threshold value (73 and 78 below and above 1,000 MW, respectively; and 66 and 85 below and above US\$900 per capita income, respectively), which shows little discrimination.

FIGURE 2. Private Investments in Electricity in Developing Countries, 1990-2002
(billions of U.S. dollars)

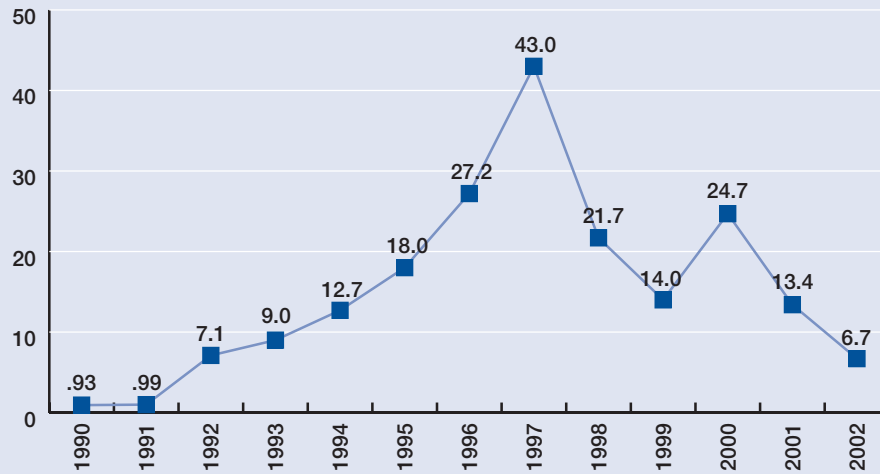


FIGURE 3. Geographic Imbalance in Private Investment in Electricity, 1990-2002

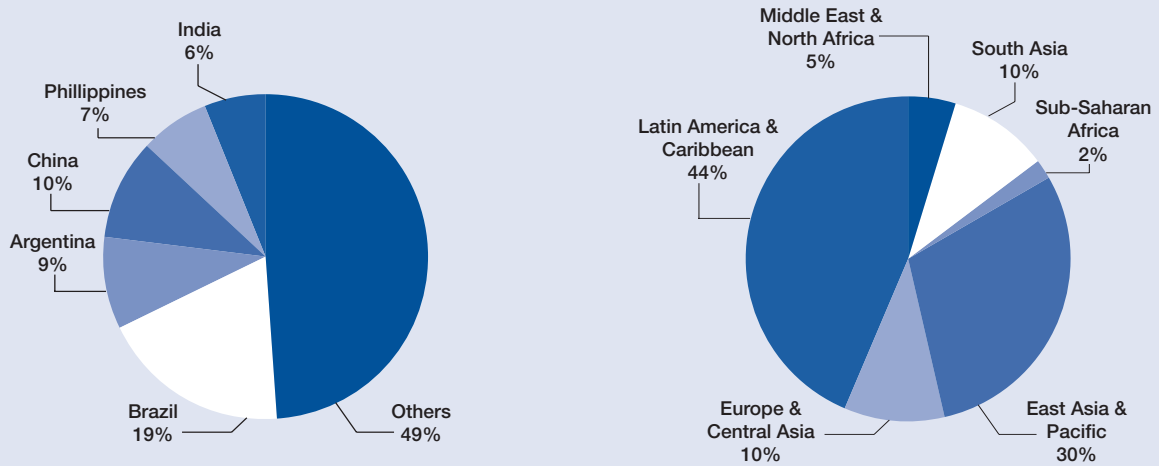
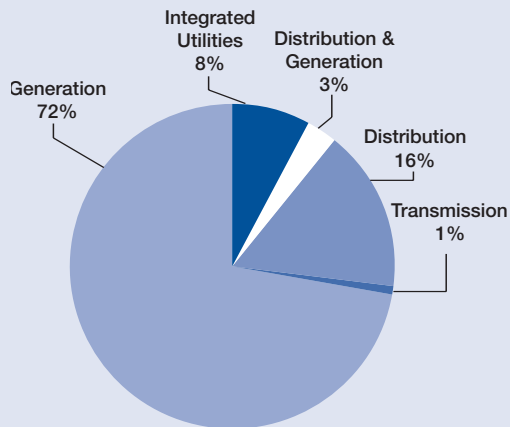


FIGURE 4. Distribution of Private Investment by Power Market Segment, 1990-2002



Source for figures 2, 3, and 4: World Bank 2003a. The World Bank PPI database, which is the source for this data, tracks total financial flows to projects in emerging markets that have a private component, including both investment in power generation capacity that supplies the public power system, and investments in capacity by industrial and commercial users to provide electricity for their own needs.

- *Investors' bad experiences in some developing country power markets, which outweigh some good experiences.* This situation arises from a general reduction in interest of international power investors in developing countries. For example, about a dozen foreign power producers have withdrawn from Indian power projects over pricing issues. Many foreign investors are carrying losses from their investments in Argentina and Brazil because of large currency devaluations, and some have sold their holdings at substantial losses.
- *The unattractive investment climates of many countries.* Investors are being deterred by a combination of continued regulatory uncertainty and general concerns about risk and reward tradeoffs in countries where it is politically difficult to raise power tariffs, competition and financial difficulties in home markets for leading firms in the power business, turmoil in some markets, such as in Argentina, and lack of access to debt financing for investment in developing countries.
- *The difficulty for many developing countries in sustaining reforms to power market and corporate governance needed to place the power sector on a commercial footing.* Several developing countries are pulling back from private sector participation in power supply. For example, the economic crisis in Latin America led to the postponement of privatizations of power entities in Peru, Ecuador and Brazil. This pullback stemmed from many sources, including unmet expectations and popular criticism of poorly designed concessions, greater sensitivity about increases in power prices, and concerns over contingent public liabilities under private provision of electricity services.
- *A recovery in the interest of foreign investors in developing country electric power sectors is uncertain both in timing and extent.* Yet more than 40 developing countries have announced their intention to privatize some or most of their electric power assets, which indicates a high demand for private investment in these markets.

As a result of these developments, overall investment in developing country electric power sectors has generally not kept pace with the estimated needs during the 1990s. The current level is a fraction of total investment requirements of over US\$100 billion annually in developing country electric power sectors (IEA 2003). Many developing countries face a huge backlog of maintenance and capacity expansion in their electric power sectors, and have experienced a marked deterioration in

service quality and an increase in unserved power demand. Industrial and commercial enterprises in many countries have resorted to installing their own generator sets to serve their power needs, but at substantial cost that is undermining their businesses in competitive markets.

3.4 Outcomes of Power Market Reform

Power market reform in developing countries should be assessed against three outcomes that reflect their drivers for reform. These outcomes are better service quality for electricity consumers, improvement in government's fiscal position, and more affordable access to electricity for the poor. Outcomes are distinguished from outputs or elements of reform and are—or at least should be—closely related to the drivers of reform. The main elements of reform—restructuring power supply chains and markets, regulation, competition and the roles of public and private participants—are considered as the means for achieving these outcomes. Empirical analysis to date about reform outcomes has been carried out largely for OECD countries, Latin America and Eastern Europe where outcomes have been systematically monitored.

Overall, implementation of reforms has been constrained by lack of country commitment, macroeconomic and political crises, and lack of experience among reform practitioners, particularly with political economy factors (World Bank 2003b). These reforms have not been in place for sufficient time to take full effect. Power market reforms that restructured and privatized power entities and liberalized power markets beyond just bringing in IPPs started only in the mid-1990s, and most countries that embarked on this course are still at the early stages of reform. The empirical evidence for reform is thus limited and not in a form suitable for econometric analysis. Country case studies are therefore the most important means for examining reform outcomes.

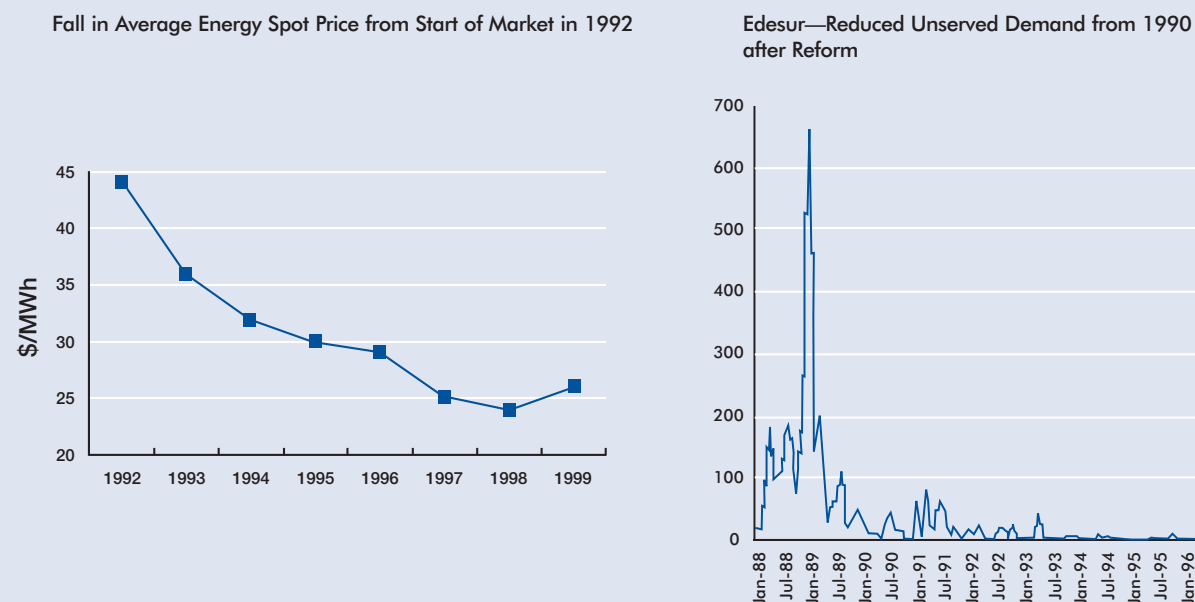
The sustainability of reform is threatened in some cases by various political, economic and technical factors. Political manipulation of tariffs is a major threat. Problems arising from market design or regulation create technical and economic problems. Some Latin American countries, such as Colombia, have yet to resolve the particular problems of managing a wholesale competitive power market in a system dominated by hydropower under variable hydrology (Ayala and Millán 2002; Larsen and others 2004). The public image of power market reform has been damaged by some notorious cases in OECD countries, such as in California (Besant-Jones and Tenenbaum

BOX 9. Successful Outcomes of Power Sector Privatization in Chile and Argentina

In Chile, power suppliers increased their capacity substantially by more than doubling annual generation from 1990 to 1998. Privatization also increased the productivity of utilities by cutting energy losses by more than half to 8.3 percent in 1997, by doubling labor productivity in distribution, and by tripling energy generation by worker in the largest generating company. Although privatized companies became substantially more efficient, however, these gains were only transferred to customers in areas under competition. In the main market, the regulated wholesale price of electrical energy fell by 37 percent, and technological change rendered uneconomical a large fraction of existing thermoelectric plants. In contrast, the final price to customers did not fall to reflect the huge productivity gains that were achieved after privatization, since between 1987 and 1998 the regulated price to consumers fell by only 17 percent. This situation led to spectacular increases in the profit rates of distribution companies: the rate of return of the largest distributor rose from 10.4 percent to 35 percent in this period, which is striking considering the low market risks carried by distribution monopolies (Fischer and Serra 2000).

In the case of Argentina, wholesale power prices and unserved demand dropped substantially following market reform, as shown in the figure below. (This figure shows only the years immediately following privatization to illustrate the gains that were actually realized then. Recent events in the country have undermined the sustainability of this reform.) The average energy spot price dropped steadily from around US\$45 per MWh in 1992—the first year of operation—to US\$25 per MWh by 1998 under intense competition among the privatized generators. Retail power prices did not decline as much, however, because of contracts between distributors and generators concluded before the parties were privatized. Electricity prices for industrial users declined more than prices for residential users. Similar price trends occurred in other South American countries (Bolivia, Colombia, Peru) that followed the same reform model as Argentina, with wholesale prices dropping by more than retail prices.

Benefits from the New Wholesale Electricity Market in Argentina



Source: Adapted from Deloitte Touche Tohmatsu 2004; World Bank 2003c.

2001; Wolak 2003), as well as highly publicized controversies with IPPs in some Asian countries and politically inspired public opposition to the removal of general subsidies in power tariffs.²²

The main policy conclusions from one econometric assessment (Zhang, Parker, and Kirkpatrick 2002) are that (a) neither privatization on its own nor regulation on its own leads to obvious gains in economic

²² Even serious power shortages in recent years caused by abnormally low rainfall in countries dependent on hydropower (Brazil, Colombia, Ghana, New Zealand, Norway, and Tanzania) have been spuriously linked to actual or nascent power sector reform in these countries.

performance, since the effect of privatization and having an autonomous regulator separately is statistically insignificant; (b) the coexistence of privatization and an autonomous regulator reforms together is correlated with greater electricity availability, more generation capacity, and higher labor productivity; (c) hence, an effective regulatory framework should be emphasized when privatizing electricity supply under monopolistic conditions; and (d) introducing competition is effective in improving performance, irrespective of changes in ownership or regulation, since competition appears to bring about favorable results for service penetration, capacity expansion, labor efficiency, and prices to industrial users.²³

Better Service Quality for Electricity Consumers

Better supply quality at reduced cost should be the main outcome of investments in supply capacity.

Among developing countries, these outcomes have been achieved successfully so far in a few South American countries, such as Chile (Pollitt 2004a) and Argentina (Bastos and Abdala 1996; Pollitt 2004b) where privatized power entities increased their efficiency and coverage substantially (box 9). Additions to generation capacity through IPPs from the mid-1990s onwards helped many developing countries that were experiencing severe supply shortages in the midst of global financial crises, although temporary surpluses occurred under constrained demand (section 5.3).

Efficiency gains have not been shared equitably between power suppliers and consumers, or among consumers. Generators initially kept a high proportion of their productivity gains, and were obliged to pass some of these gains to purchasers of their output only in competitive wholesale power markets. Distributors were obliged to pass some of these gains to consumers only under regulatory price reviews, for example in the case of Brazil (Mota 2003). Likewise, real prices have generally decreased for industrial and commercial consumers, but not for residential consumers.²⁴ The main policy lesson from this experience with privatized electricity sectors is that countries should aim to establish conditions that lead to the broadest possible scope for competition

Improvement in Government's Fiscal Position

Government's fiscal position can improve in three ways from reforms to the power sector. First, by removing or reducing support for power suppliers' debts. Second, by removing or reducing direct subsidies for specific groups of power consumers. Third, by receipts of proceeds from divestiture of some or all of the state's shareholdings in power suppliers. The first two benefits recur continually over time, whereas the third constitutes a single boost to the public exchequer. Investments by IPPs under long-term contracts with state-owned off-takers, however, do not relieve the fiscal burden entirely because they substitute government backing for borrowing by government backing for off-take commitments by state-owned entities, especially if the latter involves payment guarantees that rank as contingent liabilities.

Latin American experience shows that privatization of power sector assets can yield substantial fiscal benefits under stable macroeconomic conditions. The high costs of restructuring the sector reduced the immediate benefits for government budgets. Divestitures of public power assets yielded around US\$60 billion between 1990 and 2002 for the most successful nine countries in the region during a period when such infusions of funds were needed for economic stability and social programs in Chile in the 1980s, Argentina and Bolivia under the Brady Plan, and then Brazil, Colombia, and Peru in the mid-1990s.²⁵ In comparison, divestitures of public power assets yielded around US\$10 billion between 1990 and 2002 for the most successful eight countries in Asia. Substantial additional fiscal benefits flowed from payment of income and other taxes and dividends to governments for their remaining shareholdings in divested entities, as well as reductions in subsidies to the power sector, as shown by the following cases from Latin America (World Bank 2003b).

²³ This assessment of the effects of privatization, competition and regulation on the performance of the electricity generating industry uses panel data for 51 developing countries. It identifies the impact of these reforms on generating capacity, electricity generated, labor productivity in the generating sector, capacity utilization, and industrial and residential user prices. The conclusions are subject to tradeoffs between methodology and data availability (Jamansb and others 2004).

²⁴ A comparison of electricity prices in the power market after reform with those before reform should be interpreted cautiously, however, because this type of comparison can be distorted by specific regulatory actions over prices, as when electricity prices for residential users start well below cost at the start of reform. The comparison becomes more reliable when post-reform prices are largely determined under market forces, as in the case of some Latin American countries.

²⁵ Table 15 in chapter 7 provides a breakdown of this amount by country.

- *Bolivia*: Fiscal revenues from the power sector (sales and profit taxes) increased by 247 percent in three years (from US\$17 million in 1994 to approximately US\$42 million in 1997). In addition, debt service of approximately US\$61 million for the main power entity preprivatization, which was guaranteed by the government, was transferred to the private companies.
- *El Salvador*: The sale of 75 percent shareholdings in the distribution companies totaling US\$575 million had a substantial financial impact equivalent to 5.5 percent of the 1996 national GDP.
- *Panama*: In FY 2000, the privatized power sector companies contributed US\$70.8 million to the treasury, of which US\$34.5 million was in income taxes and US\$36.3 million in dividends for the shares still in government hands.
- *Peru*: The sector shifted from draining the public treasury of US\$300 million in 1990 to being a source of fiscal income from US\$300 million in profits in 1998.

Private power operators saved governments from providing heavy operating subsidies. Where private operators took over retail supply, they also drastically reduced payment delays, theft, and unpaid bills (from 30 percent to 12 percent in Buenos Aires, and about the same in Côte d'Ivoire, where assets were not sold but just leased). A lot of the gains that eliminated or reduced the need for subsidies stemmed from better asset management. Typically in the reformed Latin American power sectors, over a five-year period plant availability increased by 10 percent to 40 percent, the number of customers per employee also increased by 50 percent, and power outage indicators decreased by more than half.

TABLE 4. Improvement of Privatized South American Distribution Companies

ITEM	PERU LUZ DEL SUR	ARGENTINA EDESUR	ARGENTINA EDENOR	CHILE CHILECTRA
Year privatized	1994	1992	1992	1987
Change in energy sales (%)	+19	+79	+82	+26
Change in energy losses (%)	-50	-68	-63	-70
Change in number of employees (%)	-43	-60	-63	-9
Change in customers per employee (%)	+135	+180	+215	+37
Change in net receivables (days)	-27	-38	—	-68
Change in provisions for bad debts (percent of sales)	-65	-35	—	-88

— Not available.

Note: Performance improvement is measured from the date of privatization until 1998 in relation to performance relative to the year of privatization.

Source: Bacon and Besant-Jones 2002.

Latin American distribution companies substantially improved their performance following privatization through long-term concessions. These improvements show the benefit of focusing private management on commercial performance, which has been a major weakness of state-owned utilities. The improvement in efficiency after privatization of four South American distribution companies is summarized in table 4. These improvements are measured in the change in performance between the date of privatization and 1998.

Affordable Access to Electricity for the Poor

The poor have obtained a low share of the benefits of power market reform in developing countries, and some have even suffered welfare losses. Although reforms to power markets have delivered substantial benefits to society overall through efficiency gains, most of these benefits have been shared between power suppliers, nonpoor power consumers and governments (through fiscal gains). Most of the poorest people, especially those in rural areas, lie outside the ambit of power market reform. In many developing countries, improving electricity access for the poor was overshadowed in the 1990s by the pressing need to add generation capacity. Lagging reforms in transmission and distribution constrained power delivery and expansion of access for the poor.

Some of the poor have gained from power market reform, and some of the poor have lost from power market reform. The poor who gained received otherwise unavailable connections to electricity supply. The poor who lost were obtaining some electricity service before reform—albeit illegally and of poor quality—but have been disconnected or now have to pay for their consumption. Other groups of the poor continued to receive legal service but at higher tariffs as subsidies and cross-subsidies were removed under the commercial pressure on service providers introduced by reform. Some of the poor may have benefited indirectly through economic growth and job creation. The poor are often the last to benefit from increased access because of reform (Chisari, Estache, and Waddams Price 2001).

Reforms have led to improved access to electricity supply by low-income households in some countries, with substantial benefits for these households. Even where electricity tariffs were raised under reforms toward cost-recovery levels, the energy services met by household electrification still cost the households less than beforehand. For example, new connections and the percentage of households having electricity access grew in Chile from 64 percent to 95 percent in 1990–94, in Bolivia from 56 percent before the

reform to 70 percent in 1997, and in Peru from 53 percent in 1993 to 70 percent in 1998. South Africa substantially extended access to electricity during the last 10 or so years, however, using innovative measures, such as prepaid metering to control customer service costs (Tewari and Shah 2003).

Where reforms involved adjusting tariffs to cover costs, poor households supplied from the public power system were adversely affected, at least in the short term. In Poland, energy subsidies have tended to help the rich more than the poor (Freund and Wallich 1995). In Hungary, energy price reforms did not have a regressive impact, suggesting that subsidies prior to reforms were not effectively targeted at the poor (Newbery 1995). In Guatemala, the social tariff introduced following privatization of the power distribution companies largely fails to reach poor households, and access to modern utility services remains highly inequitable (the richest 20 percent are twice as likely to have electricity connections as the poorest 20 percent). Electricity coverage is close to universal in urban areas, but reaches little more than half of rural households (Foster and Araujo 2004).

Existing customers, including low-income consumers and industries that provide employment to the poor, clearly benefited from the relatively quick elimination or reduction of supply shortages. Based on research findings that growth is good for the poor (Dollar and Kraay 2001), reducing generation supply constraints should have benefited the poor through growth in GDP. While this may be demonstrable in a macroeconomic context of trade liberalization and transition into market economies, the argument is less tenable in the sectoral context of private capital flows into developing country electric power sectors suffering from transmission and distribution constraints on reaching the poor.

Reforms to urban power markets can spur support for improving access and affordability to the poorest urban areas. This is shown by experience in Tbilisi in Georgia and in Buenos Aires in Argentina after electricity distribution was privatized through long term concessions. Under the inefficient state-run power systems, theft of electricity was widespread as consumers tapped into electricity networks without facing pressure to pay or be disconnected. The solution in Georgia for the general population was a combination of activities aimed at increasing revenue collections (box 10).

The solution adopted in Buenos Aires was the Acuerdo Marco, which was a four-year framework agreement between public authorities and new distribution

BOX 10. Impact of Power Market Reform on Georgia's Urban Households

At the end of 1998, Government of Georgia sold the electricity distribution company serving Tbilisi to AES Telasi, a subsidiary of AES Corporation. AES Telasi greatly improved revenues and cash flow from the beginning of 2000, accompanied by substantial improvements in the quality of power supply and customer service. Revenue from the residential sector increased 91 percent from 2000 to 2001 and another 41 percent from 2001 to 2002. While tariff increases of 8 percent in 2000 accounted for some of the increase, better collections from customers—as well as increases in the amount of targeted and nontargeted subsidies—was the main source. AES Telasi was particularly successful at reducing household payment arrears. They steadily improved collection rates, rising from 44 percent in 2000 to 86 percent in 2002.

The consequence of this reform on the welfare of Tbilisi's households was found to be mixed. A major concern was how reform to access and prices for energy services would lead to changes in energy consumption and expenditure patterns. Government provided energy subsidies for households through various schemes, such as subsidizing the extension of natural gas supply for heating and cooking, which helped households with affordability for other goods and services including electricity.

A major finding was that an aggressive approach to reducing nonpayment did not have a disproportionate adverse impact on low-income households—particularly when suitable subsidy and transfer mechanisms were in place. Under the increased price for electricity and policy of reducing nonpayments, households in Tbilisi paid a larger share of their electricity bills. The mean household consumption of electricity remained constant at around 125 kWh per month, which is sufficient for lighting and some small appliances but not for heating or air conditioning. Demand for electricity in Tbilisi remained constant despite the increase in electricity prices. This finding indicates that demand at this level of consumption was quite inelastic, and that the increase in price for serving this demand therefore caused welfare losses for these households. These losses appeared to more than offset, however, by welfare gains from access to natural gas supply.

Analysis of changes to household electricity consumption patterns indicates that enforcement explains much of the improvement in collections. Metering and subsidies had a much larger impact on collection rates and revenue increases than service quality and retail prices. Collection rates were systematically higher for remetered households. The threat of disconnection seemed almost as effective in reducing nonpayment as an actual cutoff. Remetering was found to be as important a determinant of utility receipts as prices, followed by service quality and subsidies. Remetering in conjunction with tariff increases should therefore be given high priority, particularly at the early stages of reform. Improving collections did not have a disproportionate impact on low-income households, since collection rates increased uniformly across the top and bottom quintiles of household incomes. This challenges the conventional wisdom that nonpayment is closely related to affordability, since collections would be lower for the bottom quintile if affordability were important.

Source: Lampietti and others 2004.

concessionaires to subsidize the cost of network extension and regularize electricity services to the inhabitants of the city's shantytowns. The national government waived taxes to cover unpaid bills from users in these areas, and local authorities waived taxes to contribute funding to capital works on the power system in these areas. The local authorities also provided support to the distributors in many other essential ways. The agreement has yielded substantial benefits for these local communities (Chisari and Estache 1999; Haselip, Dyer, and Cherni 2005).

The impact of power market reform on the poor forms part of the broader consequences of this reform for public benefits—both social and environmental. Public benefits have tended to be overshadowed in many country reform programs, however, by the pressing need for new

investment in supply capacity. Yet new investment by itself has been insufficient to sustain reform in many countries, especially when it has resulted in negative social outcomes, such as large increases in power tariffs and pressure on government budgets (chapter 5). Experience shows that social and environmental policies are seldom incorporated into reform processes for power markets. Experience also shows that public benefits are seldom given due consideration once the urgent financial problems are fixed, partly because the technical and institutional solutions adopted for the financial situation constrain the options available for addressing public benefits. Consequently, a political commitment to promote public benefits is needed as part of the reform process (World Resources Institute 2002).

4. ENTERPRISE RESTRUCTURING AND CORPORATE GOVERNANCE

OGN's Guidance on Enterprise Restructuring and Corporate Governance

In the current environment, even very ambitious restructuring programs are likely to include a continuing ownership and operational role for the state. As part of a comprehensive reform strategy, institutional strengthening of companies left in the public sector will usually be required to improve management and corporate governance.

Actions to attract private investors in the power sector have to take into account the overall investment climate in a country. These actions must also be realistic given the global and regional context, especially with regard to the current and future levels of investor interest.

Difficulties in sustaining reforms to place the power sector on a commercial footing in some countries, a wider reduction in investment flows to emerging markets, and the withdrawal of investors have produced a more difficult climate for attracting private investment in developing country power sectors.

Practical solutions for these countries may be public-private partnerships that lie between these options that do not require private investment capital, such as management contracts and leases. The public sector can have a financing and/or a risk bearing role in all of these arrangements.

The possibilities for different levels of private participation depend on political economy factors (including public acceptance, and pricing), the country and sector investment climate, and the legal framework that may in particular limit choices on the mode of private participation.

Responsibilities, risks and rewards need to be carefully allocated in public-private partnerships, including actual and contingent government liabilities, so that the real costs and benefits of different private participation options are clear to the government and its development partners.

Even where revenues are close to or cover costs and the overall investment and regulatory climate is adequate, additional measures to attract private investment may be required under which governments share certain risks with the private operators until certain pre-conditions for viability are met, and also provide well-designed subsidies.

This chapter covers enterprise restructuring and the roles of public and private electricity service providers in improving corporate governance.²⁶ The requirements for corporate governance and commercialization of service providers apply equally to all countries—whatever their size and income status. A wide range of public and private sector roles are available for these service providers. For countries in the large middle-income group, private service providers can find conditions suited to all roles up to and including at-risk investments. For countries in the small low-income group, where governance and institutional capacity

tends to be weak at all levels, private roles are usually confined to those with modest risk exposure under carefully designed contractual conditions. The conditions that apply to private participation in power distribution are covered in this chapter and in power generation in the next chapter. Conversely, the role for the public sector in financing investments in the power sector is unavoidably substantial—and even predominant—in small low-income countries, whereas it should be targeted to specific areas according to policy grounds in large middle-income countries.

²⁶ Although these subjects are covered in separate sections in the OGN, they are covered together in this chapter because of their close links.

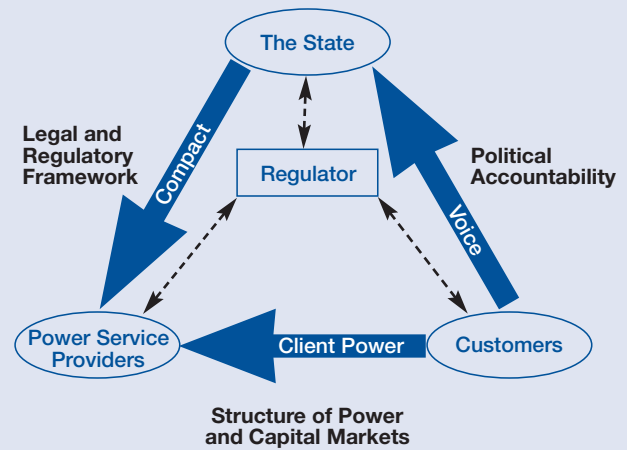
4.1 Corporate Governance and Commercialization

Corporate governance encompasses institutions and processes that influence the relationship between power companies and their owners.²⁷ Corporate governance forms part of the framework for the governance of the power market and its participants that includes regulation, competition and privatization.²⁸ This view is based on the presumption that power markets should be organized to deliver modern energy services efficiently to produce desired outcomes, such as those covered in section 3.4. Initiatives to improve governance must therefore address both corporate governance and market governance.

The main governance relationships in the power market are fundamental to understanding the nature of power market reform. The analytical framework for these relationships is depicted in figure 5.²⁹ It shows the two chains of accountability from customers to service providers—the one a direct route via the market under competition for market share and for capital whereby customers exercise choice of provider, and the other a longer route via government whereby its regulator intercedes between customers and providers in the interests of both parties as well as the public interest. The ability of customers (apart from some vested interests), however, to influence governance is generally weak or nonexistent in developing countries, because of weak political voice and lack of choice of power service provider. The regulatory route is thus critical to the governance framework. The roles of the three parties in these relationships are examined in this chapter and in chapters 5 and 6.

The typical institutional environment has not provided the correct incentives and governance for providers of power services to meet consumer demands efficiently. Most state-owned power utilities in developing countries have operated under highly distorted economic incentives and governance for utility managers, employees, and customers, which have undermined service provision and revenue control. Governments have controlled their utilities closely through key appointments, tariff setting, investment approvals and financing, employment conditions and bureaucratic

FIGURE 5. Power Market Governance Framework



Source: Adapted from Deloitte Touche Tohmatsu 2004; World Bank 2003c.

processes. Some governments have even caused their utilities to involuntarily support their fiscal budgets when their departments and agencies do not pay their electricity bills. This has usually led to operational inefficiency, limited access to electricity, financial loss and the need for public subsidy by these utilities, often in an environment of widespread corruption. High levels of nontechnical power losses (such as theft) from state-owned power utilities in many developing countries also reflect a failure of governance.

Poor consumers in particular are vulnerable to poor incentives and governance of state-owned power utilities. This situation tends to be most acute when access to electricity supply and payment for electricity consumption is controlled by a monopolistic utility and its employees (Lovei and McKechnie 2000). A survey of corruption carried out in South Asian countries found that power consumers faced endemic petty corruption (Transparency International 2002). The survey found that more than 60 percent of the electricity users surveyed reported irregular connection processes, and that direct payment to office staff was the dominant irregular practice. Bribes paid to get a proper supply and overbilling were the most common forms of corruption, with meter readers and linesmen identified as the key facilitators by means of direct extortion. Users considered the power suppliers

²⁷ The World Bank identifies four components to corporate governance: efficient management, accountability, a supportive legal framework, and transparent information flows (World Bank 1995). See also World Bank 1994a.

²⁸ Constitutional governance is a higher level of governance that applies checks and balances on governments through supreme courts, government auditing bodies, separation of powers and independent media. A lack of this governance makes governments vulnerable to interest groups and patronage.

²⁹ This figure is an adaptation of the conceptual presentation of the key relationships of power discussed in World Bank 2003c, which was applied to the electric power sector in Deloitte Touche Tohmatsu 2004.

lack of accountability and monopoly of service provision to be the major contributors this corruption. These users lacked the recourse of having a choice of service provider.

The lack of labor reforms has restricted reform of power markets. In most countries labor forces in the power supply industry are highly regulated based on old legislation for protecting workers' interests. An example of a restriction is the requirement that all but the smallest companies must obtain government permission prior to laying off employees or closing plants. Over decades the state-owned power utilities built up extremely large work forces who view their jobs as permanent government entitlements. Labor productivity is several times below international norms, and it is hardly offset by low wages. The underemployed, underpaid, and undermotivated employees of the power utilities themselves participate in providing illegal connections to the power supply network and facilitating nonpayment of bills by electricity consumers. In addition to theft, the rampant culture of dishonesty and side-dealing often leads to collusion in bidding for contracts and parts.

In many countries, organized labor has responded to reforms with strikes and severe opposition. Invariably, labor's discontent has forced compromises in which newly corporatized (or even privatized) entities are required to guarantee job security for a certain period. In some countries the government has undertaken the politically sensitive task of laying off workers before privatization in order to extract higher prices from private bidders. Where governments have avoided this task, this legacy has imposed costs on new managers and has hampered the ability of the new firms to innovate with new technology and work culture (Tongia 2003).

Change from the traditional form of governance to commercially oriented corporate governance is fundamental to achieving sustainable reform of power markets. This change includes irreversibly removing the management and development of power supply from political and bureaucratic control. Efforts to improve incentives and governance for power service providers are not sustainable under political pressures and noncommercial business processes. Power service providers can only function commercially on the basis of respect for property rights and a legal framework that enables them to collect their revenues and that penalizes theft and nonpayment.

The premise of commercialization of power supply is that power utilities ought to achieve commercial standards in management practices, financial performance and in the pricing of their products and services. Obliging electricity enterprises to operate according to these commercial principles requires that enterprises pay taxes and market-based interest rates, earn competitive risk-adjusted returns on their investments at prices for their services that are affordable for consumers, and have the autonomy to manage their own budgets, borrowing, procurement, and labor employment. This requirement should extend to state-owned entities that undertake one or more of the basic functions in the supply of electricity.³⁰

Commercialization of electricity service providers is a benchmark of good governance at the corporate level.

Full commercialization also requires that power suppliers raise financing for expansion of their supply capacity from capital markets without recourse to government fiscal resources. Capital markets can impose financial accountability provided that power suppliers do not receive the protection of government guarantees. Heavy borrowings with government backing on the international capital markets were used to finance large investment programs in power plants in some developing countries that turned out to be economically burdensome. Such periods occurred in the late 1970s and the early 1980s when power utilities in Latin America embarked on major hydropower construction programs, and during the 1990s when some power utilities in East Asia entered into long term power purchase agreements (PPAs) with independent power producers.

The appointment of an independent and competent Board of Directors is critical for combating political and bureaucratic interference in the management of a power utility. The board should consist of outside professionals of high standing and other knowledgeable eminent persons, rather than the typical practice of limiting board membership to a few civil servants and utility executives. Experience in Lithuania shows the healthy impact this policy has on the corporate governance of the utility. If improving performance with the existing set of managers or the Board proves to be difficult, the alternatives of using management contracts or cooperation with or franchising from western utility groups could be considered as an interim measure.

³⁰ The supply services function encompasses the sale of electricity procured on the wholesale electricity market to electricity users and the associated customer services of billing, collection and maintenance.

Corporate governance also involves the question of human capital in top management. Power supply entities that run on commercial principles need commercially oriented management. Governments of many state-owned power utilities, however, appoint civil servants who are trained as generalists to senior management positions, instead of appointing career power professionals. The result is resentment in the ranks of utility employees since good performance on the job is not a prerequisite for advancement to the highest positions within these enterprises. Moreover, top civil servants tend to operate within their own rules and cultures that might impede the development of a business culture in the power enterprises. Where the state retains a large shareholding in partly privatized enterprises—as has happened in the distribution entities of many countries—the presence of government appointees among top management obstructs commercialization by keeping these enterprises exposed to government directives and politicians' whims.

State-owned utilities can operate at high standards of efficiency and management performance when they are governed by effective commercial principles. Examples are the power utilities in the Republic of Korea, Singapore, and Taiwan (China). A commercialized state-owned power enterprise meets the following general standards for corporate governance of state-owned enterprises:³¹

- a. It does not operate as a government department.
- b. It adopts best commercial practices for management and operations.
- c. It retains a corporate status.
- d. It develops a corporate style of management with corporate objectives and goals.
- e. It has autonomy for its board and management.
- f. It adopts accrual accounting and international accounting standards.
- g. It competes with the private sector on equal terms without receiving anti-competitive subsidies.
- h. It adopts commercial salaries and employment conditions.
- i. It takes full responsibility for staffing and procurement.

Private sector participation changes the governance arrangements for a power utility. This is because the profit maximizing interests of private owners differ from the vote winning and rent seeking interests of politicians and bureaucrats. Since a privatized utility is legally and functionally independent of the government, its owners can be expected to resist government pressure to pursue noncommercial goals in nontransparent ways, as well as to push for commercial arrangements, such as tariffs that fully cover costs.

Commercialization of power suppliers cannot be achieved even under private ownership when politicians continue to interfere in their business. Such interference includes exerting patronage over jobs and failure to support measures, such as prosecution of theft of power and power utility property. Private owners can only achieve commercialization by being able to control the board of directors and the labor force. The Indian state of Orissa's experience with private participation in power distribution shows that changing sector governance involves more than a change of corporate ownership (Government of Orissa 2001). Box 11 summarizes the main governance requirements for power distributors—whether publicly or privately owned and managed.

Legislative action alone is not enough to reform governance, even when supported by institutional and market restructuring under market reform. Improvement in governance is an outcome that is often mistakenly assessed in relation to reform outputs, such as enactment of laws, appointment of boards, the incorporation of companies, and so on. While these actions are objectively verifiable, they often give little indication of outcomes in the quality of governance when political interference continues via informal mechanisms.

Where privatization is not feasible because of daunting risks for investors or local opposition, governments have options for improving the governance arrangements for their state-owned power utilities (Irwin and Yamamoto 2004, PA Consulting Group 2005). One way is by negotiating performance contracts with their managers, but this approach has generally not worked because well-designed and enforced contracts can be politically costly (Shirley 1998). These options still require political commitment to achievement of commercial goals by the utilities, without which the performance of power utilities and their public services would continually decline. Hence the sustainability of this approach is a major concern, especially under the possibility of a change

³¹ See also OECD 2005 for general guidelines on corporate governance of state-owned enterprises.

BOX 11. Governance Requirements for Power Distributors

The main financial governance requirements are (a) revenues from electricity sales, including subsidy receipts from the government, fully cover the costs of supply and distribution and generate a competitive return on capital employed; (b) large cross-subsidies among consumption categories are eliminated under a series of regulatory orders; (c) tariffs are set by a reasonably autonomous electricity regulatory commission on a multiyear basis—preferably under a legally credible statute supported by a legally and technically knowledgeable appellate tribunal for dealing with disputes between the licensee and the regulator; (d) consumers receive good quality power supply that moderates their resistance to tariff increases; (e) utilities face the financial discipline of a hard budget constraint; (f) government subsidies are efficiently targeted and transparently delivered; (g) most consumption is metered accurately by distribution companies; and (h) system technical and commercial losses are reliably estimated by distribution companies.

The main legislative governance requirements legislative are (a) the legislative framework should specify that the supply of electricity is a commercial service available only to those who pay the bills for electricity supplied to them; (b) utilities have the right in accordance with regulatory procedures to deny service to any consumer who fails to pay for service provided; (c) procedures for the recovery of payment arrears are simple, fast and cost effective; (d) theft of electricity is made a cognizable criminal offence that can be prosecuted quickly and punished accordingly; and (e) politicians and their officials cannot interfere in these procedures and in court cases.

The main corporate governance requirements are (a) utilities are able to combat fraud perpetrated by consumers and utility employees under the perception, sometimes fostered by politicians, that the utilities have weak property rights under common public ownership; (b) politicians refrain from using power utilities as a source of patronage for employment which undermines management's control over the labor force; and (c) utility managements exert full authority over their employees notwithstanding public service employment rules and the activities of politically influential unions.

The main operating governance requirements are (a) utilities are not subject to political pressure to delay or modify tariff filings and sometimes also on investment and procurement decisions; (b) utility managements possess the full range of critical skills (finance, economics, human resources management as well as engineering); and (c) utilities have reliable information about their operating data from efficient management information systems.

BOX 12. Improving State-Owned Power Suppliers in Andhra Pradesh

In 1999, the state government of Andhra Pradesh unbundled the generation, transmission and distribution functions of the state electricity utility with the transmission company acting as a holding company for the distribution companies. Each entity thus formed was given responsibility for managing its operations as a corporate entity. The government also established a state electricity regulatory commission that established transparent procedures for its activities, such as periodic tariff reviews. The transmission company acted a single buyer by purchasing bulk power from all sources—both in-state and out-of-state generators—for sale to distribution companies and large users of power under regulated bulk supply agreements.

The state government also launched a campaign in January 2000 to control theft of electricity from the state-owned power companies and to improve their revenue collection. The campaign focused on four measures: enacting a new law to address electricity theft, strengthening enforcement mechanisms, reorganizing the anticorruption function in the utilities, and reengineering businesses processes to improve management control and customer service. The distribution companies installed modern bulk metering and data logging equipment and millions of digital meters at consumers, and they automated meter reading and reduced billing cycles. They also consulted extensively with their customers and communicated with the general public about their reforms—a major change from previous practice. Under this campaign, the distribution companies regularized large numbers of consumers and prosecuted extreme cases of theft of electricity with the support of the legal system. As a result, they reduced losses from 38 percent in 1999 to 26 percent in 2003, and increased the collection rate to 98 percent.

Source: Bhatia and Gulati 2004

from a committed government to a populist one that attracted votes by promises of subsidized electricity and reduced anti-theft efforts. The scope for a committed government to substantially improve governance arrangements and operating performance under state ownership is shown by the achievements of the Indian state of Andhra Pradesh (box 12).

4.2 Conditions for Justifiable Public Investment

Public financing for some investments and for covering restructuring costs is vital for power market reforms in most developing countries, yet it carries risks. The main types of investments and restructuring costs are summarized in this section. One risk is a weakening of pressure to improve sector finances for countries able to mobilize substantial financing from external sources for public investments. Another risk is that of increasing the drain on fiscal resources to the power market before the onset of improvements from reform for those countries under fiscal stress. The fiscal risk arises in the many countries where the need to reduce fiscal stress is an important driver of power market reform, and hence the demand for public financing threatens to aggravate, rather than ameliorate, fiscal stress in the short to medium term. Governments should therefore check the impact on the public sector deficit of any investments in the power sector to be financed with fiscal support.

*The public sector will remain the main source of investment for segments of the power market kept under state ownership as a matter of policy.*³² Even ambitious restructuring programs include a continuing ownership role for the state. Reform strategies commonly retain public ownership of transmission assets and public operation of the power system, even if private investors build and maintain new transmission lines. Hydroelectric and nuclear power plants may also remain state-owned on public policy grounds.

The public sector will also remain an important source, and often for the medium term the main source, of investment for a power sector where country and sector risks deter private investors. In many countries, for example, some public investment will be needed to improve the performance of nonviable generation and distribution businesses as a prerequisite for attracting private investment in them. Where many customers

cannot afford to pay cost recovery tariffs needed to ensure commercial viability, well-designed transparent subsidy arrangements will be critical to building private sector interest in these businesses (chapter 7).

Public investment may also be needed for immediately required new supply capacity in segments of the power market that are suited to competitive pressures, but where conditions are currently unattractive to private risk capital. This situation may apply in developing countries that are faced with imminent shortages of generation capacity relative to growing demand for electricity, but lack a credible reform program for the power sector and where the sector generates insufficient revenues to cover costs and pay for incremental generation capacity. Before committing public financing to a thermal power generation plant, for example, government should undertake a market test to assess whether private investment in this plant will be forthcoming and, if not, the reasons for this state of affairs.³³

Public investment in generation capacity is not justified on the grounds that it reduces financial costs to the sector. This reduction simply reflects the subsidies present in public financing. In these situations, other types of government interventions may be preferable than supporting public financing of new generation capacity. One example is to reduce losses and revenue leakages by supporting public-private partnerships in distribution. Another example is to address affordability and equity concerns or environmental externalities by directly targeted subsidies for toward specific access or environmental goals, instead of using public financing for new generation capacity.³⁴

Public financial resources should be limited to preprivatization investments and organizational development for entities that governments have programmed for privatization in the short to medium term. Efforts should be focused on immediate performance improvements and on facilitating privatization. In the case of distribution entities, a typical priority is to improve their cash collections by measures, such as ensuring strict adherence to payment discipline and ensuring that subsidy mechanisms are explicit and transparent, for which interim management contracts should be considered. For entities that remain in the public sector, the government should place a high priority

³² Nevertheless, the private financial sector in countries with high domestic savings rates is likely to provide substantial debt funding for public sector investments in the power sector.

³³ This market test should incorporate available multilateral instruments in the bidding documents.

³⁴ For example subsidies in competitive procurement for environmentally friendly generation, or targeted subsidies for electricity distribution services, such as new connections to low-income households.

on establishing satisfactory corporate oversight, for example, by putting an independent and qualified board in place with a clear mandate.

Public funding often has to be available for rehabilitating power distribution networks during the early years of concessions for distribution businesses. This funding is needed to maintain and improve supply quality when private concessionaires are not willing to commit a sufficient amount of capital to maintain and improve service quality in the anticipation of future tariff increases.³⁵ Improvements to supply quality also help make tariff increases needed to cover the costs of this work more palatable to power consumers.³⁶ Hence a reform strategy should set out in advance the tariff path needed to repay loans for these investments and the regulatory arrangements needed to adhere to this path.

Actual and contingent government liabilities should be assessed where government financial support is an integral part of private participation transactions in the power sector. This support can be provided as subsidies for low-income or disadvantaged consumers, contributions to investments under the terms of a concession, or guarantees that support power utilities to access capital markets and to enter into PPAs with IPPs. The assessment should also cover the rationale, costs and delivery means of any subsidy as well as the risks involved to the government's overall budget situation, so that the real costs and benefits of different private participation options are clear to the government and its development partners (Irwin 2003).

*Public financing will also be required to restructure power sector debt arrears before privatizing distributors.*³⁷ The alternative of leaving a single buyer of wholesale power to carry the sector's accumulated debt servicing obligations, as happened in Orissa, is seldom sustainable. Some governments face huge accrued liabilities for guarantees for utility bonds and contingent liabilities under their guarantees to IPPs. The treatment of restructuring costs by the regulator should also be clarified to take account of the tradeoff between the government's wish to limit its exposure to these costs and power consumers' reluctance to pay higher tariffs for covering these costs.

Power market reforms should be financed in ways that do not impede the reforms. The priorities for using the proceeds from selling utility assets may be the dues to employees of the utility (pension fund, labor retrenchment) and payment of the utility's debts or other liabilities. Preprivatization expenditures for the distribution function could be financed from the sale of generating assets before reforming the distributors, but the proceeds would probably fall far short of the underlying value of the businesses because of the poor creditworthiness of the distributors in their current condition. Selling shareholdings in generation companies after privatizing distributors could greatly increase the sale proceeds. This means that government should look for other sources of finance for preprivatization expenditures in distribution.

4.3 Private Sector Participation

The case for bringing the private sector into power supply functions should rest on economic grounds. These grounds require that this would yield net welfare benefits to power consumers in particular and society in general, while private service providers would be able to earn a competitive financial return for their investment risks. In fact, many of the benefits that are attributed to private sector participation have arisen from the wider set of reforms and the interactions of many policies that foster private sector participation and the associated regulatory reform (Estache, Gómez-Lobo, and Leipziger 2001). This finding reflects the requirement that private sector participation needs to be supported with significant legal, regulatory and institutional changes in most developing countries, and that ownership change alone is insufficient for achieving the benefits sought from power market reform.

Private service providers are expected to earn competitive returns by improving sector performance in ways that benefit consumers. This condition requires that a system for power sector regulation can be designed and implemented which provides good business incentives for delivery of services of the right quality while reassuring investors of the profitability of economically justified investments. In practice, the amount of private investment in the electricity supply industry has been shown to be

³⁵ This situation has occurred in low-income countries, such as Uganda.

³⁶ Measures that increase quality of service without, however, simultaneously addressing metering deficiencies or unauthorized connections only increase demand without increasing revenue.

³⁷ Options include conversion of existing loans to equity, debt write-offs, sale or transfer of specific state-owned assets with their associated liabilities, sale of shares in power entities formed from the unbundling of utilities, securitization of utility dues, and other market-based financial instruments. A combination of these options will often be required to deal with this task.

positively correlated with institutional factors that support the business environment, such as the protection of property rights, judicial and regulatory autonomy, and country political risk (Bergara, Henisz, and Spiller 1997; Zelner and Henisz 2000; Newbery 2004).

Most developing countries need to attract resources from the private sector for meeting their electric power needs. These countries are not able to provide from their own resources the huge amounts of necessary financial, institutional and technical capacity.³⁸ Few of them, however, are willing to pass all their power sector assets into private ownership for the foreseeable future because of their concerns that a combination of private profit motives and regulated retail prices would not bring about sufficient investment to achieve socially desirable levels of services.³⁹ In addition, groups that gain from patronage and rents under the current arrangements in the power sector are likely to oppose the privatization of sector assets.

Private Sector Roles

The roles of private participants in the power sector should match their capacity to take on investment risks under specific country conditions. Their roles range from virtually no at-risk investment under management contracts through some investment risk under long term concessions to accepting all investment risks under divestiture of ownership to the private sector. The more that risk and responsibility are passed to the private sector, the more powerful are the incentives for the contractor to improve services, and hence the greater the potential benefits.

- **Management contract.** Under this arrangement, the local utility delegates part or all of its operations to an outside party. The contractor's staff fills key management positions and ensures the quality of customer service. The electric utility still owns the power facilities, controls investment decisions, and remains accountable for financial results. The contract stipulates the improvement objectives to be achieved. The compensation of the outside management contractor is tied to the performance obtained.

- **Lease and concession.** Under this arrangement, the state retains ownership of the power utility's assets and concedes to an outside party the use of these assets.⁴⁰ The lessee or concessionaire is responsible for providing electricity service, operating and maintaining the utility's plant and equipment, and financing the required investments under the terms of a contract signed with the authority that oversees the utility. The contract stipulates minimum levels of service and sets standards for the quality of power produced and delivered. The lessee or concessionaire reimburses the state for use of the assets, and often the state provides some form of guarantee for the concessionaire's investments. Again, compensation is tied to results.⁴¹
- **Divestiture.** Government transfers both ownership of the electric utility assets and operating rights to a private party or a new semipublic organization or a joint venture of both types. The new owners take over plant operations and become responsible for financing all future investments at their risk. Performance is controlled through competition or general regulation, rather than wholly or partially through contract terms (as under concessions).

The limitations of relying on private investment for meeting the power sector needs of developing countries needs to be recognized. Furthermore, the view that public and private infrastructure provision is a dichotomy—a case of either-or, one or the other—should be replaced by an appreciation of the extent to which the performance of each is dependent on the competence of the other. In other words, for the private sector to perform well, public sector capacity must be enhanced (Nellis 2005). This realization has advanced the development of public-private partnerships through management contracts, leases, and concessions for countries with distressed power markets and poor investment climates. As described above, under public-private partnerships the public sector can play a financing or a risk-bearing role by means of investment financing and provision of subsidies.⁴² Table 5 summarizes the main features and prerequisites for these forms, distinguished by how they allocate responsibility for such functions as asset

³⁸ IEA estimated that developing countries face combined investment requirements in their power sectors of US\$1.2 billion for 2001–2010, US\$1.7 billion for 2011–2020, and US\$2.2 billion for 2021–2030, where these requirements are expressed in real dollars using year 2000 prices and market exchange rates (International Energy Agency 2003).

³⁹ Exceptions to this situation include very small power systems, including those on some island states, such as Barbados.

⁴⁰ The French model of affermage concessions lies between management contracts and concessions in the risk-reward spectrum for private contractors. This arrangement transfers limited risks and responsibilities to the private sector, including that for working capital.

⁴¹ See World Bank 1998 for a full description of the issues and options related to the design, award, implementation, monitoring, and modification of concessions, drawing on the experience of both industrial and developing countries. See World Bank 2006 for a companion toolkit for design and award of concessions.

⁴² Private contractors appear to be keener than private investors on such public-private partnerships. A recent survey of 52 international private investors in developing country power sectors found that 50 of these investors did not rate public-private partnerships as being important for them, and they ranked this arrangement lowest among the factors that lead to successful outcomes for their investments (Lamech and Saeed 2003).

TABLE 5. Main Features of Public-Private Partnerships

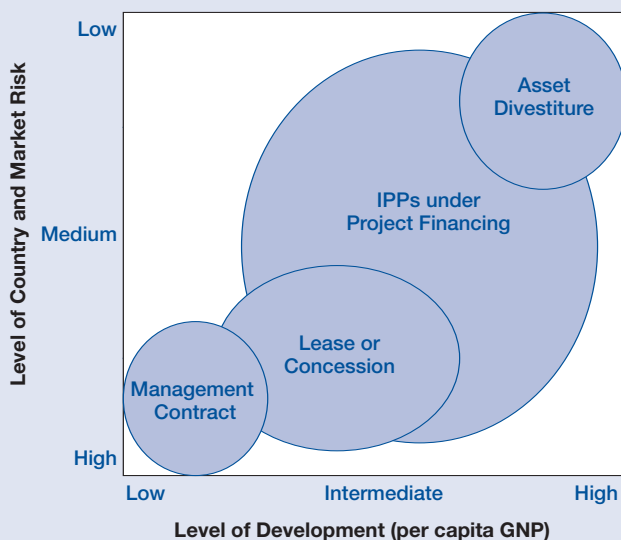
	FORM OF PARTNERSHIP			
	MANAGEMENT CONTRACT	LEASE	CONCESSION	DIVESTITURE
ALLOCATION OF RESPONSIBILITIES				
Asset ownership	Public	Public	Public	Private
Operation and maintenance	Private	Private	Private	Private
Capital investment	Public	Public and private	Private	Private
Commercial risk	Public	Private	Private	Private
Duration	3–5 years	8–15 years	25–30 years	Indefinite
PREREQUISITES FOR SUCCESSFUL IMPLEMENTATION				
Political support	Low to moderate	Moderate	High level	High level
Cost-covering tariffs	Preferable but not necessary	Necessary	Necessary	Necessary
Good system information	Sufficient to set incentives	Required	Required	Required
Well-developed regulatory framework	Moderate monitoring capacity	Good monitoring capacity	Good monitoring capacity	Strong capacity for regulation and monitoring
Good country risk rating	Not necessary	Good rating to attract investors	High rating to attract investors	High rating to attract investors

ownership and capital investment between the public and private sectors. Figure 6 shows how these forms fit the range of country and power market development and risk levels found among developing countries.

Management contracts transfer only limited risk and responsibility to the private sector. The anticipated benefit is to turn round a poorly performing utility in conditions that are unlikely to attract private investors because of their perceptions of high country and sector

risk. They offer commensurately small possible gains (as in the case of Orissa in India during the mid-1990s before distribution was privatized under divestiture). They are often recommended as a transitional arrangement to bring in private sector managerial expertise in cases where the private sector views investment risks as unacceptably high. In other words, they can be viewed as interim arrangements in preparation for deeper reforms.

FIGURE 6. Private Participation Roles in Power Markets of Developing Countries



Source: Deloitte Touche Tohmatsu 2004.

The major difficulty with management contracts has been demarcation of responsibilities between owner and manager, and the need for the full support of owners and employees for the arrangement (World Bank 2003b). Experience during the 1990s in the power sectors of developing countries with management contracts and affermage concessions was generally disappointing. Much of this experience was obtained in Sub-Saharan Africa (in Benin, the Democratic Republic of Congo, Ghana, Mali, Rwanda, Senegal, Sierra Leone and Zimbabwe). The contracted service providers invested little risk capital because they faced little incentive to do so under the small performance-related components in their contracts. Similar experience was obtained elsewhere (Bolivia, Lao PDR). Côte d'Ivoire was a notable success with a 15-year operating concession starting in 1990 that resulted in substantially improved technical and financial performance and service quality which attracted the first IPPs to the region. These improvements could not be sustained, however, once the political and economic conditions in Côte d'Ivoire deteriorated substantially after 2000.

More recent experience indicates that well-structured management contracts can soon lead to improvements in operating and financial performance (Tanzania, Botswana and Togo). This experience shows that operators must be able to manage the utility autonomously and governments

must be committed to the success of the management contract. However, designing these contracts to provide the appropriate balance between risks and rewards for the contractor remains difficult, and evidence also suggests that the effectiveness of these contracts diminishes over time after the initial gains. While some management contractors have been able to improve performance to the point where the utility's cash flow is sufficient to attract some local commercial debt, in most cases access to commercial debt remains out of reach.

The economics of long-term (25- to 30-year) concessions differ little from those of divestitures with licenses. For example, issues about remuneration of investment in new assets become similar. However, government has the right to determine disposal of assets under concessions, whereas the private owners have this right under divestitures. In addition, the degree of perceived protection offered to investors differs, since contract-based private sector participation may be seen as less risky for investors than license-based participation because of the legal context of each type of approach.⁴³

One option under joint ventures is the capitalization-type approach used in some parts of Latin America, such as Bolivia.⁴⁴ This approach allows the revenues from a sale of assets to be used for modernizing the enterprise, instead of being transferred to the national exchequer. It also allows the concession to be granted to the investor willing to invest most in the enterprise.⁴⁵ The value of the business is based on this market-determined value, rather than on a net book value. Additional benefits from this approach are the short-term financing for both new investment and working capital provided from incoming cash, and the support to balance sheet restructuring of the enterprise (Ewing and Goldmark 1994; Moen 2000). This approach works only when private investors are willing to pay a substantial amount for the concession, that is, the business is viable and private sector participation is politically sustainable.

Conditions for Sustainable Private Investment

Many developing countries do not offer the necessary conditions for attracting substantial amounts of private investment to their power markets.⁴⁶ This is because they have had reversals in reforms or have been unable to generate sufficient momentum to embark on the reform

⁴³ Long-term concessions are discussed in the subsection on regulation by contract in section 6.4.

⁴⁴ Romania is using a mix of transfers to Government and capitalization for privatization of its power sector assets.

⁴⁵ The investor may own up to 50 percent of the stock of the enterprise through its investment, thereby taking control of management. The remaining shares are managed by pension funds on behalf of the Bolivian populace.

⁴⁶ See Asian Development Bank 2000 for an overview of promoting private sector investment in the power sector.

path, including difficulties in moving to and sustaining cost-covering tariffs, and so are in a situation of incomplete reform. These countries therefore have to seek private sector resources as complements to the resources of the public sectors in their power markets.

Developing countries should avoid giving perceptions of excessive risk in their power markets to foreign investors in the global competition for finance. Most of these countries will have to compete for international capital since their domestic capital markets are too undeveloped to replace foreign finance. Actions to attract private investors in the power market should be realistic in the global and regional context (World Bank 2004b). For example, offers of extremely high rates of return on equity (25 percent and higher) under long-term PPAs to compensate for poor investment environments create the risk of contract breakdown because these rates require unaffordable payments by the purchasers under these contracts, and they generate resentment among power consumers and other parties in the host country.

The importance of a stable macroeconomic environment for attracting private investment extends far beyond the power market. Low inflation, sound taxation policies, access to foreign exchange and fiscal prudence form the overall justification for the range of current reform and development efforts. They should be viewed as complements to current reforms of power markets, such as legal protection of property rights of investors, arm's length regulation of the power market by government with no serious distortions to market prices, prevention of anti-competitive practices by dominant power suppliers, legislated rights to entry and exit from the power market by private suppliers, and freedom to import goods, fuel, and services.

Private investment in power markets depends on the prospective risks and returns of investments. These risks and returns depend not only on the investors' perspective of the specific terms attached to each investment proposal, but also on the specific political, macroeconomic and regulatory environment of the country. Overarching political considerations include public acceptance of private ownership and service provision under commercially set prices, and how this attitude is reflected in the legal framework by limiting the mode of private participation (for example, by precluding full asset sales).

Private investors seek predictability and control of risks to avoid threats to their investment returns. A poor country risk profile is a major deterrent to investors.

The macroeconomic and business environments alone, however, cannot be a sure predictor of the amount or viability of investment in the power market. The countries that best attract investment offer a set of appropriate, clear, transparent, and enforced rules governing general and specific investment activities:

- Power generators look for no serious distortions in the market prices of wholesale electricity, viable purchasers of the output, and the ability to manage uncertainty in market prices for their outputs.
- Power distributors look for predictably regulated electricity tariffs, pass through to retail tariffs of purchased power costs beyond the distributor's control, freedom to disconnect nonpayers, and regulated open access to the transmission network.

Investment rules require clear definitions, credibility, predictability, enforceability and clearly delineated decision-making roles. Whether rules should be formally codified by law or contract, and the role of regulatory frameworks with their respective enforcing agencies, depends on country circumstances. The following considerations are important for investors (Lamech and Saeed 2003).

- *The rules that best answer the main concerns of foreign investors may not require a complex regulatory framework in the host country.* If the principal requirements of investors are clarity of rules and predictability of results with government commitment and assured payback, they may be satisfied with the establishment of clear contracts, rather than complex regulations.
- *Local market characteristics, in particular rapid pace of market growth, may attract investors without the need for much regulation.* China attracted huge amounts of foreign investment in power generation without a developed regulatory framework, largely because investors felt protected by the country's need for their investment. Such examples are exceptional, however. In slower growing markets, a clear regulatory framework is likely to help attract the investment capital for which developing country power sectors compete.
- *An unduly heavy regulatory framework may actually deter new investment, even though it clarifies the rules and the system for enforcing them.* Working within such a system may generate excessive costs of responding to regulatory requirements—both direct costs and indirect costs—for investors.

- *The regulator should make proper allowance for factors beyond the reasonable control of power entities.* These entities have difficulty obtaining insurance, for example, against natural disasters, such as floods and cyclones (as in the case of Orissa in 1999 and 2001), and they lack the funds needed to restore supply, particularly to rural areas.

Private investors should be apportioned those risk components that they can reasonably manage. They should carry obligations to meet commercial and technical performance criteria, such as construction deadlines and plant operating efficiency and availability levels. In turn, they must be able to exert full corporate control, and their managers must be able to change the business practices of their company. The private shareholders in Orissa's distribution companies were unable to make linemen cut off delinquent payers, and senior managers were prevented from moving linemen and other staff from long-held positions by interference by politicians.

The government should support the new owners' efforts to change business practices. Orissa's experience shows that governments should instruct local police to support the distributors' efforts to prosecute customers who steal power and distribution employees who defraud the companies and their customers. Government support is needed for dealing with political interference in the field that frustrates the operator's efforts to improve billing and collection. An intense joint communication campaign by the operator and the government is needed to persuade local politicians and administrators that financially viable distributors are in the public interest.

Specific support from the government is needed where a lack of credibility about the regulatory system threatens the viability of reforms that rely on finance and substantial risk-bearing from the private sector. This situation applies particularly in countries that have seen reversals in reforms or have been unable to generate sufficient momentum to embark on the reform path. The issue may be uncertainty about an unproven legal and regulatory environment, or a lack of confidence that the government will maintain an agreed regulatory framework because of a poor reputation. The additional measures needed to attract private investment may include sharing of certain risks by government with the private operators until the preconditions for viability are met, as well as strong commitments by government to agreed contractual and regulatory frameworks (Crow 2001).

Privatization of generating plant calls for a clear enunciation of the structure and rules of the market. Privatization of generation plant has been feasible in countries with a single buyer model with government guaranteed contracts similar to those concluded with IPPs. Privatization could be feasible in countries where the generation entities enter directly into supply contracts with the distribution utilities and large consumers and where system dispatch supports such bilateral contracts. In countries that plan to move to competitive power pools, clear market rules and enforceable payment discipline are paramount to enable investors raise finance, because the generating units will be taking the demand risk, dispatch risk and price risk. The absence of clear market rules and payment discipline undermined private investments in generating assets in Georgia and Kazakhstan (Krishnaswamy and Stuggins 2003).

Investors in generation plant prefer to use fuels of their choice, especially in competitive power markets.⁴⁷ Experience in Poland, Hungary, and Ukraine indicates that investor interest is reduced by saddling the generation units with the ownership of associated coal or lignite mines or saddling them with the obligation to use allocated fuel supplies (bowing to the pressures of the coal mining lobby).

4.4 Improving the Feasibility of Privatizing Distribution

Following the post-1997 downturn in private investment, reforming countries have experienced particular difficulty in attracting and retaining private investors to their distribution businesses. Investors are wary of taking on the substantial level of regulatory and commercial risks that investors assumed in the first wave of privatization in Latin America. In addition to the causes cited in chapter 3 for the general downturn in investor interest, investors faced the prospect of low or negative investment returns in these businesses because governments failed to support the measures needed to improve sector performance and because regulators added to the uncertainty about future revenues, in some cases leading to the withdrawal of investors (for example, in the Dominican Republic, Georgia, and Orissa—India). In particular, many countries have had difficulties in moving to and sustaining cost-covering tariffs. This experience indicates that unsustainable compromises that led to poor outcomes may have been made under the pressure to complete the initial transactions.

⁴⁷ The need to liberalize fuel markets for competition in the wholesale power market is covered in chapter 5.

Investor interest appeared to have recovered a little in the past few years. A partial recovery is shown by the successful closing of long-term concessions for distribution businesses in India (New Delhi) and Uganda, and the sale of majority ownership of distribution entities in Romania. These ventures offer lessons about how the private sector can be persuaded to enter power markets in countries considered to offer high risks for private investment.⁴⁸ The main lessons from the New Delhi privatizations to two local groups are that the transaction should be structured to appeal to a range of investors, investors need certainty, and political will is important (Agarwal, Alexander, and Tenenbaum 2003). The means for achieving such successes are the focus of this section.

This experience shows that governments need to devise strategies for attracting and retaining private investors to power distribution in developing countries. Such strategies should cover the following considerations:

- What is being privatized—in terms of viable and unviable distribution businesses.
- Who is expected to be the private participants and what form of participation will be adopted.
- When the sale takes place within the broader reform program for the power market, which would be linked to when the necessary preconditions for attracting private participants are met.
- How the privatization is conducted—namely the transaction design—particularly what stakes in the businesses are offered and the sequencing of sales in shares of joint ventures.
- What terms are offered to manage the risks that investors are expected to bear, whether these terms change during and after a transition period, and the means of mitigating these risks, such as guarantees.

These considerations are examined in turn in this section.

What Is Being Privatized

What to privatize in the case of power distribution concerns primarily the configuration of the businesses to be offered to private participants. In particular, this issue concerns the size of the businesses and the number of them—which are really the same issue—and the customer mix of each business. The minimum size of business

needed to attract private investors is debatable and needs to be assessed as part of the work on designing a privatization strategy for the distribution sector.

The way that urban and rural markets are combined or separated is important for configuring the distribution entities formed by unbundling a power utility. This is because these markets have substantially different economic profiles, with urban areas having much more industry and commerce, as well as higher-income residences. Because the geographical areas served by a distribution entity should consist of contiguous components of the power network, a distribution entity that is classified as urban will also generally contain periurban and rural customers.⁴⁹ A rural distribution entity may have a few medium-sized and small urban areas, but by definition no large urban areas.

The choice of configuration for the distribution entities often lies between the following two options:

- Divide the distribution of power throughout the country or state into a few contiguous mixed urban-rural entities to be privatized in their entirety.
- Separate the commercially stronger main urban centers (with some surrounding rural areas) from most of the weaker rural areas and privatize them first, leaving the remainder under state ownership until other ways are developed through public-private partnerships.

The first option is preferable, if feasible, because it avoids letting investors serve only viable urban areas, leaving the less profitable and unviable rural areas in state hands. Investors picked only the urban segments in Georgia, Kazakhstan, and Moldova, and similar preferences are evident in India (Dossani 2004) and Pakistan. It may substantially delay privatization while trying to meet preconditions (section 4.3), which risks derailment of the reform program. In this situation, the latter option would lead to quicker privatization—albeit only for the better-performing businesses. Both reform strategies also face the need to foster the entry of new service providers, such as small-scale private providers and cooperatives to expand power supply to unserved rural areas and urban communities not connected to the main power supply network.

Distribution systems should not be fragmented into small and unviable entities in the hope of enabling competition, because such entities do not attract serious investors.

⁴⁸ The benefits of providing a third party risk guarantee is illustrated in the Romanian and Ugandan cases in chapter 6.

⁴⁹ A distribution entity that covers only a significant urban conurbation and its immediate surroundings is a special case of this category.

Some countries in Eastern Europe and Central Asia fragmented their distribution systems into tiny entities, presumably to make the franchise areas coincident with the boundaries of local administrations. Albania, Georgia, and Lithuania had to regroup their entities into much fewer larger entities subsequently, but they still failed to create entities sufficiently large to attract private investors. This experience shows that investors in this region tended to be interested in distributors with at least 1 million consumer connections and 2,000 GWh of annual sales (Krishnaswamy and Stuggins 2003).

Policy makers should anticipate that investors are interested in acquiring stakes in more than one distributor in a country as a means of spreading their overhead costs, as happened in India, Moldova, and Ukraine. In the first major privatization of distribution in India, namely in the state of Orissa in the mid-1990s, an Indian investor took three of the four distribution entities into which the state had been divided. In Moldova, a private investor acquired three contiguous entities out of five distribution entities, and the other two have not attracted investors. A similar pattern emerged from the first round of distribution privatization in Ukraine.

The Prospective Private Participants

Few major international power companies (“strategic investors”) are presently interested in power distribution in emerging markets, and fewer have business strategies that cover low-income countries. Work on strategies for privatizing distribution in these countries, however, has tended to focus on attracting these companies by offering large distribution businesses and by adopting prequalification criteria for bidders that match the characteristics of the international investors in power assets. This approach reflects the interest of major international investors in businesses that are large enough to carry the costs of expatriate managers and generate sufficient profits to make material contributions to their corporate performance.⁵⁰

Strategies for privatizing distribution should aim to diversify the pool of investors and develop new ways to manage their financial risks. A variety of private partners are available, both domestically and internationally, to help meet the needs of developing country power sectors. These strategies should focus on local and regional entrepreneurs (and financial investors from

other parts of the world) with proven resources, as well as on technical collaboration and joint venture agreements with international investors. This is already happening in some markets in East Asia, Eastern Europe, and Latin America (Izaguirre 2005).

Foreign investors are needed because the power sector requires intensive use of capital and skills. The concept of strategic investors (mostly from Western Europe or North America) being selected on the basis of competitive bidding worked well initially. However, bids issued for privatization have not elicited good, or even in some cases any, responses recently (such as in Armenia, the Czech Republic, Georgia, and several other countries). In many countries, the narrowness of the local private sector prevents domestic entrepreneurs from taking the lead in power sector projects. The domestic financial sector is important for the long-term development of a power system, however, to avoid excessive risk exposure on the international currency markets that could result from over-reliance on foreign investment.

Domestic and regional investors are becoming active as they grow and replace foreign investors. Some of these investors are large industrial conglomerates (in China, India, and Russia, for example), while others are large regional power utilities (from the Czech Republic, Malaysia, South Africa, and Thailand, for example). The domestic capital markets and banking sectors are also participating—especially in Latin America, but also in some Asian countries. Regional investment funds are sources of capital for privately led investments. Creditworthy power entities can also access substantial amounts of capital through bond issues on regional capital markets (such as Singapore Power and the Electricity Generating Authority of Thailand (EGAT) of Thailand). Numerous power generation projects that are too small and risky to attract the attention of international investors have been developed by local IPPs with local financing in Asian and Latin American countries.⁵¹

Additional interested investors could be attracted by offering medium-sized distribution businesses suitable for consortia of foreign power utilities and domestic or regional investors, for example, the following:

- *Medium-sized foreign power utilities* may be interested in a modest financial exposure, but be willing to contribute substantial management and technical expertise.

⁵⁰ This discussion also applies generally to the generation and transmission segments.

⁵¹ See Deloitte Touche Tohmatsu 2004 for experience with domestic financing of power sector investments, and Izaguirre 2005 about the emergence of new investors across infrastructure sectors.

- *Local investors, such as large business houses, may be well placed to take financial risk exposure investments in power distributors, but lack the required managerial and financial skills to run these businesses.*
- *Foreign investors may help mobilize local investors who require the presence of a large neutral investor to act as leader and arbitrator among a group of local partners who are rivals in their home market.*
- *A local ownership base could be developed from many small units that could eventually be consolidated into larger units that attract foreign investors.*

The sale of minority shareholdings to nonstrategic investors by governments can produce short-term gains, but pose long-term problems. Many countries (such as Egypt, Russia, Ukraine, and Vietnam) have sold minority shareholdings to local investors and granted or sold on preferential terms shares to power company employees and through local stock exchange. These sales can raise funds for government budgets—although usually not large sums—as well as raise employee morale and help nascent the stock markets. When combined with minority share privatization, however, they might give control of the company in unintended ways (employees often quickly sell their shares to investors seeking controlling interests in power companies). They tend to be unattractive to serious investors, since groups with minority blocking rights can always hinder whatever the strategic investor wants to carry out (as happened in Ukraine).

When Privatization Should Take Place

Improving the performance of distribution businesses is the priority in poorly performing power sectors. This is because inevitably one of the main problems is the inadequacy and poor management of the cash flow from billings and collections. Reform must therefore focus from the start on the customer end of the power supply business, and not focus exclusively on the relatively easier steps of contracting new generating capacity from IPPs. The difficulty in attracting private involvement in poorly performing power distribution businesses highlights the need to fulfill a number of preconditions that should be met before attempting to reform these businesses, whatever form of private participation is envisaged.

Governments face a number of preconditions for attracting and sustaining private sector involvement in distribution:

- *A clear statement of reform policy about market structure, regulation, corporate governance, protection of consumers—particularly low-income households—subsidies, captive power units, third-party access, bulk supply tariff, allowable returns to investors, and reform transition arrangements, backed up by enabling legislation.*
- *A clear demonstration of commitment to improved governance in the sector and introduce commercial business practices, notably through support for law and order, antitheft and bill collection measures, as well as restraint from interference in regulatory processes.⁵²*
- *Restructuring of the sector completed with independent boards and financial management and control over operations and labor forces for the successor entities, access to networks on fair terms assured for market traders, and a clear indication of the evolution of trading arrangements for bulk power.*
- *A sustainable financial recovery plan for the sector under which past liabilities, such as unrecoverable debt that is sufficiently large to undermine the viability of the sector, should not be added to the balance sheets of sector entities (as happened to the state grid company in Orissa). Asset and customer bases should not be artificially inflated to project the higher tariffs needed to show the viability of the entities under cost-of-service regulation.*
- *Creation of a credible regulatory regime that is conducive to private management and ownership in the sector, an agency with clear functional autonomy, regulatory rules that deliver a degree of certainty in relation to tariff adjustments, and processes perceived as fair and transparent.*
- *Distributors have at least positive cash flows (after subsidy payments from governments). A subsidized bulk supply tariff from state-owned generators may be needed until retail tariffs and operational performance improve, provided that these generators cover their cash operating costs.*

⁵² Measures that support this commitment include aerial bundled conductors to reduce illegal connections, small single or three phase transformers more uniformly distributed throughout service areas to improve supply quality, and tamper-proof meters located in secure, sealed boxes or sockets located outside residences with properly protected service conductors to reduce billing and metering losses.

- *The establishment of a credible transition path to commercial performance* that encompasses the privatization process, power trading arrangements, regulatory processes, and subsidies and financing of initial investments to improve service quality and access. In the case of poorly performing distributors, for example, transition issues for regulation include restatement of losses, working capital, service standards, and targets for efficiency improvements as reliable information is obtained about technical and commercial performance.

When the preconditions for privatization are largely fulfilled, the participation of the private sector will be more sustainable.

How Privatization Should Be Conducted

Careful attention to the strategy for transacting the privatization process is critical to how the privatization is conducted. The critical elements of a strategy are which

parts of the distribution system to put forward for private participation, what form of private participation to pursue, and how to expand the range of targeted investors. Where the time that is needed to meet these preconditions in full exceeds the available timescale for reform, governments must resort to risk-mitigation measures at least during a transition period in order to attract the private participants at a suitable time. Numerous valuable lessons can be drawn from the experience with privatization of power sector entities in Eastern European countries (box 13) and privatization of the distribution sector in the Indian State of Orissa (box 14).

Risk Mitigation Options

Even when a government has made serious efforts to put the preconditions described in the previous section in place, the possibility remains that adverse market sentiment may dampen investors' interest in the businesses being privatized. To enhance the likelihood of investor interest, governments can use mechanisms to

BOX 13. Privatization Lessons from Eastern Europe

The following lessons for transaction strategy emerge from privatization in the power sectors of Eastern Europe:

- **Privatization through transparent international competitive bidding among prequalified investors results in the most sustainable privatization deals.** Negotiated privatization does not even save time (for example, Estonia) and often leads to unsatisfactory terms to the sellers.
- **Offer majority shares to attract strategic investors in a manner that enables them to implement prudent investment and operating decisions.** In any case, the strategic investor must have management control.
- **Retaining only a golden share (or some similar device, such as a special shareholder agreement) for a specified period may be prudent** when selling all the shares to the strategic investor. It will also help the government to prevent acquisitions and mergers that erode competition.
- **The privatization agreement may also contain a prohibition for the resale of assets to anyone with qualifications inferior to those of the original investor.** Otherwise the elaborate prequalification exercise would become meaningless.
- **Sort out labor agreements** (in regard to employment levels, severance compensation, and funds for assisting separated labor).
- **Sort out fuel supply arrangements** in order to promote a genuine market in fuels used for power generation. This involves, for example, discontinuation of fuel "allocation" practices and liberalization of fuel imports before privatization.
- **Sort out issues relating to the "right of way" for facilities located in state or municipal lands while privatizing distribution utilities.** Issues relating to the removal of any legal rights the municipalities may have in relation to distribution business and related power facilities should be sorted out in the preprivatization phase, if necessary, through special legislation.
- **Be wary of dishonest and collusive equity for debt swaps and asset stripping** as was practiced in Ukraine.

Source: Krishnaswamy and Stuggins 2003.

BOX 14. Post-Privatization Lessons from Orissa

Privatization in the power sectors of Orissa has yielded the following lessons:

- **A sustainable financial recovery plan for the sector is essential.** Past liabilities, such as unrecoverable debts that are sufficiently large to undermine the viability of the sector, should not be added to the balance sheets of sector entities. Asset and customer bases should not be artificially inflated to project the higher tariffs needed to show the viability of the entities under cost-of-service regulation.
- **Good appraisal of current assets is important,** to avoid heavy discounting of their true value by potential purchasers. Without a meaningful asset quality appraisal, a large provision has to be made for bad and doubtful receivables for the distribution companies.
- **Bidding documentation should be realistic about the quality of information and forecasts.** Privatization documentation should not seriously understate the level of system losses and overstate forecasts of sales to profitable customer groups.
- **Business, political, and regulatory risks should be allocated among distributors, customers, and government with regard to capacity to carry risk exposure.** This applies particularly to the period following privatization until losses have been substantially reduced and tariffs increased to cover costs. Distributors' risks are set by the method for determining allowable costs for setting tariffs.
- **Private shareholders must be able to exert full corporate control, and their managers must be able to change the business practices of their company.** For example, the new private owners must be able to make linemen cut off delinquent payers, and senior managers must not be prevented from moving linemen and other staff through interference from politicians who benefited from this patronage.
- **Government should support the new owners' efforts to change business practices.** The local police should support the distributors' efforts to prosecute customers who steal power and distribution employees who defraud the companies and their customers. Government must prevent political interference in the field that would frustrate the operator's efforts to improve billing and collection.
- **Government should provide financial support for subsidies it requires.** Government should provide subventions to cover the subsidies to favored groups of power consumers to avoid creating pressure to increase cross-subsidies from other consumers.
- **The regulator must be impartial in its actions, as well as independent of stakeholders in the power sector.** It should avoid perceptions of following a populist policy. It should allow full cost pass-through in tariff orders, rather than only the costs needed to substantiate a tariff increase acceptable to government.
- **The regulator should make proper allowance for factors beyond the reasonable control of power entities.** Orissa is prone to natural disasters, and utilities would have difficulty in obtaining insurance against them. Distribution networks were badly hit by cyclone and floods, and the distributors lacked funds needed to restore supply—particularly to politically sensitive rural areas.
- **The single buyer model for transacting bulk power aggravates problems when sectoral revenues do not cover costs fully.** In Orissa, the single buyer—the transmission company—was in deep financial difficulty partly because it lacked revenues to service payments on debt created to cover preprivatization liabilities.

Sources: Government of Orissa 2001, Rajan 2000, and other reviews.

TABLE 6. Power Market Risk Matrix and Coverage

RISK CATEGORY	BEST PARTY TO COVER RISK	COMMON SOURCE OF COVERAGE
POLITICAL RISKS		
Expropriation/nationalization, convertibility/transferability, war and civil disobedience, terrorism	Government, MDB/ECA	MDB/ECA insurance
LEGAL, REGULATORY, AND CONTRACTUAL RISKS		
Changes in law, breach of contract, regulatory noncompliance, obstruction of arbitration, nonpayment of a termination amount	Government, MDB/ECA	MDB/ECA guarantees and insurance
ECONOMIC RISKS		
Inflation risk, foreign exchange risk	Government	Only covered as credit risk
CREDIT RISKS		
Political risk, commercial risk	MDB/ECA	MDB/ECA limited to public sector
COMMERCIAL RISKS		
Construction risk, operation risk, technology risk	Private investor	Private sector
<p>Note: MDB—Multilateral Development Bank; ECA—Export Credit Agency. Source: Adapted from Deloitte Touche Tohmatsu 2004.</p>		

mitigate perceived policy risk—including measures to increase the predictability of regulatory regimes, and political risk guarantees. On the principle that risks should be allocated to the parties best able to manage them, political risks should be allocated to government, while commercial risks should be borne by private investors. Legal, regulatory, and contractual risks related to factors that are under the control of government should also be allocated to government, but third party guarantees for government performance from multilateral and bilateral agencies are usually needed to support private investment in the power sectors of developing countries (Deloitte Touche Tohmatsu 2004). Table 6 summarizes this allocation of risks.

These mechanisms do not substitute for meeting the essential preconditions for privatization, notably for tariffs and subsidies, and for sector and corporate governance. Rather, they supplement the policies needed to meet the

preconditions when generally difficult market conditions deter investor interest in the businesses to be privatized. The difference they make to the success of a privatization strategy depends on the extent to which the preconditions are met and on the general state of investor interest in such markets.

The following options are available for temporarily reducing the risks investors face during a transition period:

- *Limiting (“ring-fencing”) of regulatory discretion over tariff setting through a multiyear tariff-setting arrangement, possibly further reinforced by being established in the transaction outside the remit of the regulator. Under a multiyear tariff setting, tariffs are determined on a multiyear basis instead of a year-to-year basis. Tariff predictability for investors is one of the main requirements for the privatization of*

distribution (unless this risk is passed to another party), especially during the years following privatization. This approach has been used widely in both OECD and developing countries.

- *Protecting (“ring-fencing” again) a portion of the distributor’s revenues to cover the distributor’s “wires” costs—with supply risks carried by other parties—under such approaches as the distribution margin approach. This approach is also relatively new with only limited international experience.*
- *Vesting contracts for the short to medium term between distribution companies and generators to reduce uncertainty about the availability and cost of bulk power supply for the new distribution companies. This approach has been used widely in Latin America and Eastern Europe.*
- *Political risk guarantees to give investors the assurance that governments will avoid changing the policy framework unilaterally. Such guarantees specifically cover changes in laws and judicial decisions, commitments about regulatory performance, prompt payment of subsidies or other transfers, and payments for power consumption by government entities. Political risk guarantees can be used in the medium term to allow governments the time needed to build a credible track record. In the medium to long term, governments can best mitigate investors’ perceptions about political risk by developing a good track record of implementing sound policies.*

The feasibility of these approaches has to be confirmed in the specific country context.

Ring-fencing does not remove the need to resolve the underlying problems of tariffs and governance. Ring-fencing part of the business risk or regulatory risk can be viewed as a temporary—albeit multiyear—arrangement to be removed once the power supply has been commercialized.

The multiyear tariff-setting approach is one way to counter unpredictability about the regulatory process under inexperienced or politically influenced regulators, especially in arriving at their tariff orders. It allows an initial period in which the regulatory institution can develop the capacity and processes needed when private operators are involved. Multiyear tariff setting is the regulatory norm in virtually every country that has successfully privatized power distribution over the last 15

years, where the mandatory multiyear tariff-setting regime is almost always written into either the law or a concession agreement between the government and the new private investor.

Latin American experience shows that concession agreements are often renegotiated within a few years because of disputes between the regulator and distributors that occur over the application of tariff-setting formulas embedded in the concession agreement. Although multiyear tariff setting is an important and necessary reform, it does not replace the need for revenues to cover costs, because it requires commitment from governments to raise tariffs and eliminate serious arrears of payments by state-owned power utilities.

The distribution margin approach is used for allocating risks between investors and the government until the sector can be “conventionally” regulated. The distribution margin approach resembles a short-term concession that transfers payment risks upstream from the investors in the distribution company and protects them from uncertainty about regulatory performance (box 15). This is achieved by allowing the distributor to retain sufficient funds from collected revenues to cover its costs and equity returns before passing the balance to the transmission and generation companies. The distribution margin approach gives rise to concerns about the heavy financial risks to which the government would be exposed under this approach. This concern could be addressed by allocating a proportion of each risk to the distributor, with this proportion increasing on a sliding scale over time.

Vesting contracts between distribution companies and generators remove trading price uncertainty for investment in the early years of reform. Removing this uncertainty provides a significant advantage for financing the renovation of dilapidated and undersupplied power distribution systems, as well as for dilapidated generation plant, and therefore helps sell these businesses provided that the contracts are in place at the time of sale. Vesting contracts fix the price of power traded between the generators and distributors for a set period (up to five years in some cases) before an open bulk power market goes into operation. Hence, these contracts are a transition mechanism that should eventually be replaced by trading arrangements that give stronger incentives for distributors to be efficient buyers of power.

BOX 15. The Distribution Margin Approach

The distribution margin approach protects the revenues needed by an operator's "wires" part of the distributor's business, in which the transitional risks for the supply part of the business are passed to other parties until these risks are removed. It is conceived as an arrangement with two important characteristics:

- The revenue of a distribution business (the "permitted revenue") in a period is defined by either a fixed prespecified amount or cost-plus and incentive margin linked to improvement in specific performance variables. This permitted revenue is the distribution margin. This methodology does not depend on total revenue collected from consumers, nor on the level of other costs (generation and transmission) in the system.
- The distribution business has a first claim on the amount of revenue collected, which it applies first to meet its permitted revenue—with the balance of revenue collected being remitted to the rest of the industry. The distributor becomes, in effect, a temporary collection agent for other parties involved in supplying power.

This approach is designed to cover the distribution company's costs and equity returns. It incorporates incentives and penalties into the margin to achieve service and operational targets set on a multiyear basis. Government makes up the deficit between revenues and total system costs. This approach is sustainable if government can, and does, keep up its payments. It won't work if government is faced with payments beyond the capacity of its budget. The formulation of the distribution margin should provide incentives and penalties for the distributor to improve collections and thus reduce the level of subsidies payable by government over time. This approach is workable when the proportion of total revenues retained by the distributor is relatively low.

The distribution margin approach allocates many of the risks normally carried by distribution companies to other parties and, in particular, government based on the contention that such risks are beyond the control of the investors during the period of greatest uncertainty immediately following privatization. For a poorly performing sector, these risks would probably cover retail tariffs, demand level, bill collections, commercial losses from theft, pass-through of generation and transmission costs to consumers, adequacy of bulk supply to meet demand, and guarantees to third party financiers of capital expenditure. The distribution companies would take the risks from commercial losses caused by inaccurate metering, distribution operating costs, and cost overruns on capital expenditures. Government would have to support the distributors in such ways as prosecution of thieves and control of employees to allow the distributors to improve their commercial and financial performance.

The distribution companies would be switched to "normal" regulation once certain conditions are clearly met, under which the investors will accept the various normal utility risks that are not allocated to them under the distribution margin model. The main conditions are likely to include tariffs that cover costs (possibly with continuation of some subsidies), high collection levels, definition of key regulatory rules and procedures, and the availability of sufficient information for cost-based or incentive-based regulation (in section 6.5). In essence, the period required to meet the conditions for switching to "normal" regulation can be considered a transition period that requires a different approach to allocating risks from that under "normal" regulation. The incentives and penalties under the distribution margin should create realistic prospects of achieving sector viability and thus an end to the transition period.

Successful reduction of risk requires that vesting contracts must be combined with a credible commitment by the regulator to pass through purchased power costs in the vesting contracts. They allow regulators to focus on factors under the control of the new distribution companies, especially distribution costs and supply quality. They have been used to cover 80–90 percent of total power trade in most countries that have set up short-term power markets.

Political risk guarantees allow investors to raise funds needed for efficiency improvements from the capital market. Such improvements may not be available without political risk mitigation. In this way investors control the funds and are fully responsible for the commercial risks, including the collection risk, with the government agencies assuming responsibility only for their own performance and the regulator's performance

undertakings under the privatization agreement or license. This approach relieves the government from having to find the funds from its own resources, and also achieves a more beneficial risk-sharing framework from the government's perspective. From the private investors' viewpoint, this approach would also be more beneficial, because they would benefit from the political risk mitigation through the guarantee against government noncompliance and interference (one of their main concerns).

A third-party political risk guarantee may be required, for example, from a multilateral institution to mitigate investor's risks by backstopping a government's

commitments on risk-sharing and regulation. This is because political risk guarantees offered by many governments would not substantially assuage investors' concerns, because these governments have poor records in honoring their contractual undertakings or supporting private investors in the power sector. Such a guarantee (see section 6.2) should only be provided for a government that demonstrates its commitment to establishing a track record for sound policies (Gupta and others 2002).⁵³

⁵³ Two recent examples of a third party risk guarantee for private investment in power distribution entities are the World Bank's Partial Risk Guarantees for a long-term lease in Uganda and for asset divestiture in Romania (box 21 in section 6.2). See World Bank 2002 for a description of its guarantees and application to power projects.

5. MARKET STRUCTURE AND GOVERNANCE

OGN's Guidance on Power Market Structure

The extent of restructuring power markets should be assessed on a case by case basis. Full unbundling is generally preferred in medium to large power markets to facilitate the introduction of competition at least in the market for wholesale trade in power.

For small markets with little or no opportunity for cross-border trading, regulation of a vertically integrated monopoly may be the most cost-effective choice until the power market has grown substantially. However, both market growth and regional power markets can be facilitated by the unbundling of even relatively small systems. Unbundling of accounts, staff and management should be the first step in this to increase the transparency of price setting and facilitate benchmarking of costs and service standards, but full unbundling will be required to make these changes effective.

The potential benefits of moving to more competitive trading arrangements are well known and, in addition to governance and regulatory motivations, usually underpin the extensive vertical and horizontal unbundling of monopolistic service providers. The difficulties in implementing competition in power markets are also by now well known.

Full competition should be approached cautiously in developing countries because many existing markets are too small, there are significant risks of market power abuse, distributors may not be sufficiently creditworthy for trading on commercial terms, and policy makers have limited tolerance for the substantial price volatility that occurs with competition in the market.

Governments should consider for the near- to medium-term, gradual market opening and limited competition for the market. This can be facilitated by allowing open access to networks by third parties besides the main generators and distributors, and trading on a bilateral basis between generators and distributors and other suppliers.

This chapter shows how market structure and the form of trading within the power market are linked to market size and income level. This relationship is clearly evident in the extent to which a power supply chain should be unbundled into separate entities. Unbundling of generation from distribution can be worthwhile even in small power systems, but forming numerous generation entities or distribution entities is only suited to introducing competition in large power markets that are at least in the middle-income level. Competition for the right to supply an incumbent supplier under long-term agreements by independent power producers, by contrast, can work in power markets of any size and at any income level, whatever unbundling is undertaken. These producers, however, are expected to carry more investment risk in the large middle-income countries than in the small low-income countries.

5.1 Importance of the Market Structure for Market Governance

The importance of market governance has emerged in a situation of large needs for investment in the power sectors of developing countries, yet low private sector

willingness to invest in them. The experience of private investors has been particularly bad in countries where market governance was especially weak, for example, in some of the transition economies of Eastern Europe. The structure of the power market strongly influences the governance of the power market, regardless of whether electricity service providers are publicly or privately owned.

Governments can create the environment for attracting investors and operators only by reforming market governance. In this environment, investors face reasonable commercial risks without fear of expropriation and corruption, while consumers, regulators, and other stakeholders honor the contractual rights of utilities to recover their revenues. Robust reform strategies, regardless of the roles of the public and private sectors, must confront serious issues about market governance, often in a situation where prices are well below full-cost recovery (World Bank 1994b). Reform strategies are unlikely to succeed in improving sector performance and contributing to economic growth and poverty reduction without credible steps to improve suppliers' commercial and operational performance, and to align revenues with costs (World Bank 2004b).

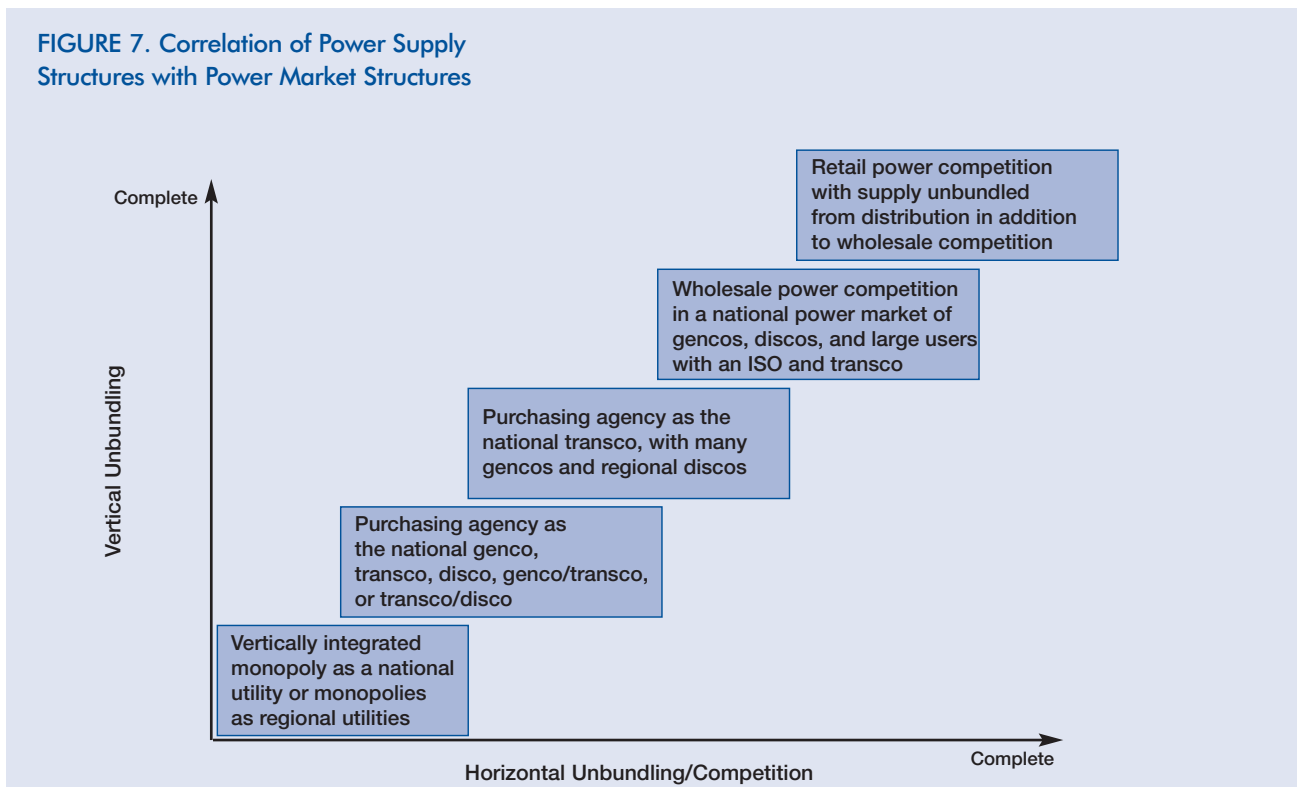
5.2 Restructuring Power Supply

Integrated power suppliers are restructured to obtain benefits from competitive trading arrangements, as well as to strengthen governance and regulation of the markets in which they operate. The main issue concerns the extent of vertical and horizontal unbundling of the generation, transmission, and distribution-supply segments of the market, taking into account the size of the power system.⁵⁴

The variety of market structures emerging from reforms to power sectors can be categorized according to increasing degree of competition, as follows (Hunt and Shuttleworth 1996).

- **Monopoly**—involves no restructuring and no competition at all, since it consists of a vertically integrated monopoly at all levels of the supply chain within a country (typically) or a region in parallel to other vertically integrated regional monopolies (as in Japan and in parts of Canada and the United States).
- **Purchasing agency, also known as a single buyer**—manages competition for long-term market share among generators and IPPs. It generally has a
- **monopoly for supplying distribution companies** that serve customers under regulated terms and also, in some cases, large power users under regulated terms. The functions of this agency are carried out by many types of entities in different countries, including a national vertically integrated utility, a national generation entity, a national transmission entity, a national distribution entity, a combined national generation and transmission entity, and a combined national transmission and distribution entity.
- **Competition in the wholesale power market (“wholesale competition”)**—allows distributors and large users of electricity to purchase electricity directly from generators they choose either in a power exchange or bilaterally (see section 5.4), and to transmit this electricity under open access arrangements over the power networks to the points of electricity consumption. Independent power suppliers (firms that specialize in energy trading, but do not own or operate distribution networks) are allowed to compete with distributors for the custom of large users.⁵⁵
- **Competition for retail customers (“retail competition”)**—allows end users of electricity to choose their power supplier, with open access for suppliers to the

FIGURE 7. Correlation of Power Supply Structures with Power Market Structures



⁵⁴ The significance of power system size for restructuring to date is illustrated in chapter 3.

⁵⁵ This could be delayed in those countries where distribution and supply systems are so dilapidated that they need a period of assured revenues to remedy the worst deficiencies before having to compete for the business of their largest customers.

transmission and distribution systems to procure their supplies competitively at the wholesale level from generators and suppliers.

The correlation between power supply structures analyzed in chapter 3 with these market structures is shown in figure 7.

Within these market structures, competition for a long-term right to a share of the power market supplied by a purchasing agency or single buyer is clearly less radical than competition in the power market for a share of that market. Competition for a share of the market is a single event that relies on the effectiveness of the procurement arrangements for its benefits. Competition in the market is much more dynamic and therefore potentially beneficial, since it involves repeated rounds of bidding in a market. It does, however, require much greater institutional capacity and market development to work properly, otherwise the results could be costly. As discussed later in this chapter, competition for the market can be viewed as an interim arrangement in a long-term reform process, and competition in the market should be considered only when the main necessary conditions are in place.

Reform programs can progress through these structures. This progression starts from a vertically integrated monopoly or monopolies and progresses to a purchasing agency or wholesale competition, and possibly proceeds eventually to retail competition. It reflects the basic sequence of a reform program, whereby restructuring the supply industry and power market, as well as setting up the legal and regulatory framework, precedes the transfer of ownership of power generation and distribution from the state to the private sector.⁵⁶ A vertically integrated monopoly is almost universally under state ownership in developing countries (for reasons given in chapter 3).

The economic case for unbundling a vertically integrated power utility rests on whether the gains from unbundling exceed the costs of arm's length transactions among the separated segments. This matter depends on such factors as power system size and country institutional capacity to manage complex trading mechanisms. In the weakest countries with little prospect of cross-border power trading, a key issue is whether arm's length transactions among sector participants can be sustained. The case for unbundling is strongest in large power systems in countries well endowed institutionally.

The case for unbundling gets weaker the smaller the system, the more undeveloped the institutional capacity, and/or the weaker the general country conditions.

The vertical unbundling of a state-owned power utility is seldom straightforward. This is because many of these utilities supply a wide array of social services that blend goals like employment of idle workers, protection of the environment, and provision of energy services to poor areas into their daily production decisions. The deep links between one of these utilities and the state hinder the unbundling of a large state-dominated power utility and reassembling it in a different, more market-based form. Recasting the utility's methods of financing or labor-hiring decisions, for example, is difficult without broader reforms in capital and labor markets. The basic organization of a power utility can be durable and resistant to change, even once the utility has been unbundled in name. In the contest for control, the losers from unbundling—mainly the beneficiaries of the social services provided by the utility—are already organized within the utility and the state and have direct access to decision makers (Heller and Victor 2004).

In a wholesale power market where power is traded under competitive arrangements, the transmission and system control functions should be kept under separate ownership from distribution and generation. Restrictions are necessary on ownership or on control (through governance arrangements) of the licensees for these functions by generators and distributors, in order to prevent the acquisition of anticompetitive amounts of market power by any generators or distributors. This separation of ownership and control also ensures that private operators and developers are not deterred from trading in this market by concerns about discriminatory control of these monopoly services by their competitors.

Private sector participation in the transmission system should be handled carefully to avoid subsequent abuse of market power by the new owners. The primary concern for the transmission operator is that payment will be made by the users of the system, namely, the generation and distribution entities. As a result, effective private sector participation in the main transmission system will depend on clear improvements in the financial viability of these entities. If transmission capacity bottlenecks impede private sector participation in generation, early private sector participation may be in order. These bottlenecks may be best addressed by alternative

⁵⁶ Sequencing of reform stages is discussed in chapter 8.

BOX 16. Cash Flow Problems in Ukraine's Wholesale Electricity Market

In Ukraine during the late 1990s, the collapse of funds administration in the wholesale electricity market was the main indicator of distress in the market. These funds were supposed to be allocated to generators and service providers in proportion to their revenues due from the selling price and volume of units of electricity sold. In practice, these providers were not paid in full—and in fact they often received a very low proportion of their due amounts, because the revenues collected from users fell far short of their bills.

An algorithm was therefore developed for allocating the available cash in proportion to relative sales by providers. In practice, however, the Ministry of Fuel and Energy (Minenergo) intervened by directing scarce funds to particular providers according to short-term expediency in substantially different ways than the algorithm. It claimed a number of technical reasons for its actions, such as emergencies and the need to pay coal miners, which led to numerous changes to the algorithm. The operating companies could rely on receiving funds predictably under this transit account system.

According to the market rules, distributors that have not fully paid for the electricity purchased from the wholesale market should have been cut off from future electricity deliveries. But Minenergo insisted that delinquent distributors continue to receive wholesale power, and it tried to address the problem by reaching agreements with central and local governments on customers that could be disconnected without political repercussions. Consequently, some of the distributors took advantage of the nonenforcement of payment obligations and withheld from the market the cash collected from their customers.

The proliferation of barter and other noncash payment modes (mutual cancellation of payment obligations, promissory notes, and tax write-offs) further compromised the application of the market rules. Noncash transactions offered significant tax advantages because cash received in an enterprise's bank account was often confiscated by the tax service. Because noncash payments had limited fungibility, the market operator could only allocate cash payments.

Total collections soon fell to below 80 percent, of which the share of noncash transactions in the power industry surpassed 80 percent (the economywide average was about 40 percent) and cash payments dropped to below 10 percent (nonpayments accounted for the balance). In essence, only the general population paid cash for electricity. Generators and their fuel suppliers received little cash, and even the cash allocated to the distributors under the algorithm and Minenergo's interventions did not cover the costs of their distribution networks and customer services.

forms of private sector participation to divestiture of shares in the transmission entity, such as transmission lines constructed and operated under build-operate-transfer (BOT) arrangements.⁵⁷

Sector unbundling should be undertaken under conditions that preserve the integrity of power system operation and power market trading. It should be deferred, however, if it would worsen an ongoing crisis of serious and prolonged nonpayment that reduces the cash flow up the supply chain to generation and transmission entities. This happens when the unbundled distribution entities act in their own interests by holding on to most of the cash collected from customers. Under such severe financial indiscipline, competitive pools or even other modified forms of the wholesale market for electricity could not work as intended, as happened in Georgia, Kazakhstan, and Ukraine (box 16).

The key decision for many developing countries is whether to choose a purchasing agency—single buyer or competition in the wholesale power market for bringing private investment to the power sector. This choice depends largely on whether the power system meets the necessary conditions for one of the forms of competition in the wholesale power market. If not, a purchasing agency—single buyer can be adopted because this option does not require unbundling of the existing integrated supply structure. These two structures are thus examined further in this chapter.

Purchasing Agency—Single Buyer

The pure single buyer model is one among many forms of centralized purchasing arrangements. There are several ways to implement what is broadly referred to as a single buyer model. All ways have a central entity

⁵⁷ BOT arrangements work for a natural monopoly, such as transmission services, because competitive supply of these services is not economically efficient.

aggregating the load, playing some role in the procuring of energy to serve that load, and allocating this energy among different consumers or distribution companies. Given those characteristics, the expression “centralized purchasing arrangement” more properly captures the multitude of commercial arrangements that can be in place (Arizu, Gencer, and Maurer 2006).

Although a purchasing agency–single buyer structure is easier to implement than other market structures, it carries substantial risks for reform outcomes. Government can still impose noncommercial practices on the market by manipulating the single buyer’s terms of trade. It can use a single buyer to commission excess generating capacity to actual demand and to choose costly generation technologies. Its commitment to full reform may weaken to avoid the politically controversial consequences of introducing more private sector participation and competition (Lovei 2000). This structure is open to

excessive risk exposure under long-term power purchase commitments with IPPs (section 5.3). It is also vulnerable to a government’s reluctance to support increases of retail tariffs needed for the financial viability of the single buyer when generators receive guaranteed contract prices and distributors receive guaranteed margins. Hungary represents a prominent example of this situation (box 17).⁵⁸

A purchasing agency–single buyer can be used as an interim stage for moving toward a competitive market model for wholesale power trade. Under this strategy, this model is designed to provide the time required for the generation and distribution sectors to develop sufficiently for the operation of a competitive wholesale electricity market. It requires that stranded costs are manageable when the market moves to a competitive model from the rigidities associated with long-term PPAs with guaranteed “take or pay” provisions. These costs pose a substantial challenge to regulators (Arizu, Maurer,

BOX 17. The Roles of the Single Buyer Model in Eastern European Power Markets

A market structure based on a single buyer model had been adopted in Hungary, Poland, and other countries as an interim measure before moving to a fully competitive pool. Under this model, the state-owned transmission and dispatch company buys power from generating companies on the basis of PPAs negotiated with each producer, and sells electricity at a single pooled average wholesale price to all distribution utilities and the large consumers eligible to buy directly from the wholesale market. The retail price for end consumers is regulated by adding a distribution charge to the wholesale price. Long term PPAs (generally 10 years or more) and short term PPAs (one year or less) are covered by “take or pay” provisions guaranteed by the state. The market risk is thus fully transferred from the generators to the single buyer, who is obliged to pay generators for the power not purchased if the demand declines, as well as for increased fuel prices, exchange rate variations, and so forth, for which the prices in PPAs are usually indexed. The single buyer carries the risk of not being compensated for the resulting increase in the average wholesale price per kilowatt-hour when government does not allow the necessary increase in retail tariffs. The Hungarian government, for example, did not allow retail prices to rise to the full extent, but instead compelled the single buyer to reduce wholesale prices and compensated the single buyer through direct budget subsidies.

Russia and Ukraine have operated their wholesale electricity markets on a modified single buyer basis. Under this basis, no direct contractual link exists between the generators and distributors. Generators sell electricity at regulated prices, and the wholesale market entity supplies distribution utilities at the pooled average wholesale market prices. This kind of arrangement lends itself to abuses. When supply is less than demand in the market, the wholesale market entity can be pressured by government to allocate power to favored large users and distributors, instead of following the agreed algorithm. Likewise, when the demand is below available supply, the wholesale market entity can be pressured to allocate demand to favored generators, such as the coal-fired plants (to appease the strong mining lobby). It can also be pressured to allocate demand among all generators to ensure that every plant is kept working and employment in the plants is sustained, so that uncompetitive plants are not faced with bankruptcy. These practices distort least-cost dispatch by partial loading of the thermal plants that reduces efficiency and increases fuel consumption. Further, in an environment of extensive nonpayment, where the wholesale market is unable to collect dues from the distribution utilities and settle the dues of the generating companies, it has linked distributors to generators arbitrarily for purposes of payment. Such arbitrariness can lead to corrupt practices. Instead, direct bilateral contracting and settlement should be allowed between the distribution utilities and the generators.

Source: Krishnaswamy and Stuggins 2003.

⁵⁸ See Bakos 2001 for an account of power sector reform in Hungary.

and Tenenbaum 2004), and they are unpalatable to consumers when they are recovered from them as a surcharge to the regular tariff.

A purchasing agency—single buyer should not be given a legal monopoly on trade in wholesale power. This is to avoid obstacles to introducing different trading arrangements—bilateral or a central power exchange—when government decides to introduce stronger competitive pressures in the power market. The main obstacle is usually the difficulty in rescinding the legislation that grants this monopoly. A purchasing agency does not need to have a legislated monopoly to transact a large proportion of energy in a power system when generation and distribution companies find this arrangement the least risky under the poor business conditions found in many developing countries. The proportion of energy transacted by this agency should be allowed to decline if some of the generators and distributors in the market prefer to start trading bilaterally, which would signal that these market participants are ready to move away from the single buyer arrangement.

Restructuring Small Power Systems

Small countries face similar problems to larger countries in reforming their power markets, but with greater intensity. For example, all wholesale electricity markets must grapple with issues of market power, although such problems are likely to be more severe in the markets of small countries because collusion is easier among few suppliers. These countries therefore need stronger regulatory capacity to monitor and control their power markets and thus sustain competition in these markets. Although regulatory capture and incompetence can afflict a power market of any size, small countries will more likely have ineffective regulation because of their smaller human resources and generally lower income levels.

Small countries are also sensitive to the impact of large—mostly foreign—investors and developers in power generation and distribution. These investors can easily stifle competition and overwhelm regulators in small countries, because they have access to much greater resources—financial, technical, and legal—than the public sectors of these countries. Their proposed investments may represent a large proportion of total investment in the country and total power system capacity. Foreign developers bring expertise from their projects in other countries. They can

mobilize the support of their embassy, and they can play small countries off against other countries. In contrast, many small countries seek private funds in situations of looming or actual electricity shortages. They have few experienced negotiators and experts in these types of transactions, and they have high country risks that deter foreign investors because of weak economies and unstable policies.⁵⁹ Altogether these factors can give foreign developers a strong bargaining position. As a result, many PPAs with these developers have entailed high prices and shifted many project-related risks to the power purchaser. This creates a perception of unfairness in the host country that politically undermines the sustainability of the PPAs and more general reforms over the long term (Rufin 2002).

The numerous countries whose power systems are too small for a competitive power market have intermediate reform options (Bacon 1994).⁶⁰ Horizontal unbundling into tiny entities would generally not make sense, because this would cause losses in economies of scale and scope without gaining the benefits of competition. However, both market growth and regional power markets can be facilitated by some unbundling of even relatively small systems under one of the following options:

- Privatizing the vertically integrated utility as a whole and regulating it until the market has grown substantially. This course, of action, runs the risk of having a private monopoly with weak regulation.
- Splitting the vertically integrated utility into two or three vertically integrated regional utilities, privatizing, and subjecting them to regulation.
- Unbundling the existing utility into one generating entity, one distribution entity, and one transmission and dispatch entity; privatizing generation and distribution; and retaining transmission and dispatch in the public sector, as in Uganda. All three entities would be subject to regulation.

The smallest countries that presently have sophisticated competitive trading arrangements in their wholesale power markets are El Salvador, Guatemala (box 18), and Panama. All three countries, however, have a per capita income level and power system size above the threshold levels that define small power systems in this context (US\$900 per capita and 1,000 MW—chapter 3).

⁵⁹ Not all small countries are weak, for example Costa Rica and Singapore.

⁶⁰ About 100 countries have power markets of under 1,000 MW (see chapter 3 for details).

In small power systems, some degree of vertical unbundling is likely to improve services and lower costs. This is because vertical unbundling helps the regulation of power service providers and even the introduction of competitive pressures in the generation and supply markets (table 7). Unbundling of accounts, staff, and management among the main functions in the supply chain should be

the first step in this case, because it would provide better information about costs, increase the transparency of price setting, and help benchmark costs and service standards.

Forming power trade areas with neighboring countries and unbundling to the extent that makes sense in the larger regional power market is an option for small

BOX 18. Example of a Small Competitive Wholesale Power Market in Guatemala

The Guatemalan wholesale electricity market is formed by a spot market and a contract market in which energy and capacity are traded as distinct products in both markets. In the spot market, hourly energy prices are determined by the least-cost ranking of available resources, as established from incremental cost information submitted by thermal plant operators, from the value of water bids submitted by hydro plant operators, and from demand-side schedules allowing disconnection of load at certain spot market prices. Spot capacity prices are likewise determined by matching supply-side offers and demand requirements.

There are more than 100 participants in the wholesale market, which has exhibited considerable dynamism since its inception. Total installed generating capacity in the market totaled 1,875 MW in 2002. Although the market is concentrated in absolute terms, barriers to entry of new operators do not appear to be high with the possible—and important—exception of hydro producers.

All distribution companies must supply their regulated customers through long-term contracts with generators. Rates are regulated under a price cap system, whereby the noncompetitive cost elements, such as the use of wires and transmission equipment, are set every five years in accordance with efficiency standards and adjusted periodically for inflation and other factors. Energy and capacity prices are passed through to the final consumers and adjusted every three months in accordance with the terms of the contracts. Unregulated large consumers are not required to have a capacity contract, and can contract directly from generators or marketers or buy from the spot market.

The contract market offers a variety of standard contract types that accommodate bundling of energy and capacity, price certainty, and other characteristics. Four types of supply contracts are offered: (a) differences in load curve contracts, (b) capacity contracts without associated energy, (c) capacity contracts with associated energy, and (d) demand shortfall difference contracts. Capacity reserve contracts between generators are also possible. Take-or-pay contracts are not permitted.

In the spot market, each buyer can buy from the pool of sellers with surpluses of their term contracts or from merchant plants. The spot price is fixed every hour and is the maximum variable cost of the generating units that generate at that corresponding hour, taking into account the power system loss factor. For each spot price there is a price for each node in the transmission grid. Each generator sells its energy to the market operator at the node in which it is connected to the grid and at the price corresponding to that node. Consumers pay the spot price for all the energy they consume in excess of their term contracts, including related losses.

The difference between the spot market price for energy and the actual variable operating cost for each generating unit provides a premium for all units that are dispatched except for the marginal units. This premium contributes to meeting the fixed costs of these units, and is higher for units with relatively low variable costs. This payment system thus provides an incentive for investment in technologies with low variable costs and correspondingly high fixed costs, which favors units designed for base load operation.

A capacity adjustment market supports the other markets by enabling buyers and sellers to trade surpluses and shortfalls in their contractual commitments in a pool. Prices for ancillary services are also determined by market rules.

Source: Fundación Solar 2002.

TABLE 7. Types of Vertical Unbundling

TYPE OF SEPARATION	DESCRIPTION	EFFECT ON INCENTIVES TO DISCRIMINATE	EFFECT ON ABILITY TO DISCRIMINATE
Accounting	The preparation of separate accounts on a defined basis for specific functions or services.	None	Very little without effective regulatory oversight
Functional	Separation of different services into different divisions of the same firm, possibly with different management and information systems, and with prohibitions on the flow of business-sensitive information between them.	None	Very little without effective regulatory oversight
Corporate	The separation of different services into different corporations, although owned by the same company.	None	Very little without effective regulatory oversight
Joint ownership	Each competitive firm owns a share in the noncompetitive agency.	None for newcomers; eliminates for incumbents	Some, but requires regulatory oversight
Operational	Putting the operation—but not the ownership—of the noncompetitive component under the control of an independent entity.	None	Some, but requires regulatory oversight
Ownership	Separate owners of the competitive and noncompetitive components.	Eliminates	Some

Source: Van Sicklen 2000.

power systems. This trend is noticeable around the world with the Southern Africa Power Pool (O’Leary, Charpentier, and Minogue 1998) and in Central America (Tomiak and Millán 2002), and the nascent regional power markets being developed in southeastern Europe (Kennedy and Besant-Jones 2004), East Africa, West Africa, and the Mekong region (Yu 2003). Similar groupings are emerging among Indian states and Chinese provinces (Berrah, Lamech, and Zhao 2001). Regional trade can only develop successfully under liberalized arrangements when the domestic power sectors of the trading partners are subject to sound governance.

5.3 Experience with Independent Power Producers

Independent power producers (IPPs) can help launch the reform process by showing the benefits of private investment and management. They are often the first private investors in a power market dominated by state-owned power utilities, and they can enter the wholesale power market under any of the market structures discussed above. In many developing countries IPPs have generally sold their output to the state-owned utility acting as a purchasing agency—single buyer on the basis of a long-term PPA with a state-backed guarantee for the off-taking utility’s performance. IPPs have spread across the developing world

(World Bank 2003a) and are operating in more than 60 countries (chapter 3). Reviews of experience with IPPs have been published for many of these countries.⁶¹ These reviews complement general reviews of experience with IPPs in developing countries (International Finance Corporation 1999; Lefevre and Todoc 2000; Woodhouse 2005a).

Impact of Independent Power Producers

IPPs have provided timely and cost-effective solutions to chronic supply shortages in some countries under appropriately structured contracts. They have mobilized financing and added supply capacity where governments had little alternative. Where IPPs signed long-term PPAs, they generally accepted construction and operating risks. In many cases, they shared fuel availability risk with fuel suppliers, either by signing an agreement with a fuel supplier who acts as a third party to the project, or by transferring equity in the project company to the fuel supplier. IPPs are generally insulated under the terms of their PPAs against demand risk through take-or-pay provisions, dispatch risk, price risk, and exchange rate risk (Roseman and Malhotra 1996).

The cost of power produced by IPPs can be competitive with the cost of power from new plants constructed and operated by state-owned power utilities. This finding applies to IPPs that have freedom over plant specification, procurement, construction, and operation under competitive bidding. The comparison allows for differences in generating technologies used by IPPs and incumbent power utilities.⁶² It also allows for differences in cost of capital, with IPPs at a disadvantage to state-owned utilities backed by their governments in this respect.

IPPs expect to offset their higher cost of capital by better control of construction and operating costs. Their cost of capital is heavily influenced by country and technical risks faced by their investments under the project financing arrangements used by IPPs to develop their projects. International rating agencies have developed comprehensive methodologies for assessing these risks as guidance to the financiers of the high proportion of debt capital that is usually used in these projects (Rigby 1999).

Prices for power from the first IPPs in countries have tended to be higher than from subsequent IPPs. High prices from the first IPPs reflected the high risk associated with pioneering investments in sectors new to private capital where the business climate and regulatory environments were highly uncertain. Subsequently, prices fell as developers and equipment suppliers competed for business following the initial success of the early entrants.

Successful investments for IPPs cannot ensure, and may even impede, attempts to produce good sector-level outcomes. In some countries (Pakistan and the Philippines, for example) the success of IPPs in reducing power shortages also relieved pressure on leadership and policy makers for needed reforms. Some countries that opened their power sector to IPPs in response to capacity shortages were slow or weak in reforming the transmission and distribution subsectors, resulting in downstream bottlenecks to fully utilizing the new generation capacity. In Pakistan, the failure to address downstream reform and capacity provision, coupled with weak system planning, resulted in under-utilization of the IPP capacity even as demand remained unmet (World Bank 2003b).

High PPA prices (in local currency terms) under IPP contracts with “take or pay” provisions impede moves toward competitive power markets. Many of the early PPAs in developing countries were structured as full “take-or-pay” agreements under which the purchaser is obliged to pay for a contracted minimum output even if the amount that is actually used is less than this minimum level. The prices that emerge from a liberalized wholesale power market are likely to undercut these PPA prices, and the difference between these prices become stranded costs that are have to be absorbed under the restructuring of a power utility (Woolf and Halpern 2001). One way to avoid stranded costs would be to renegotiate more flexible off-take terms to PPAs, such as providing in the PPA for the possibility of revising the power purchase terms once the project debt is paid off. If stranded costs are unavoidable, a state-backed special purpose financial entity could take over the off-take commitments with IPPs and then recover at least a part of the stranded costs through a retail tariff surcharge.

⁶¹ Reviews of experience with IPPs have been published for the following countries: Argentina (Núñez-Luna and Woodhouse 2005), China (Woo 2005a), Egypt (Eberhard and Gratwick 2005a), India (Lamb 2005), Kenya (Eberhard and Gratwick 2005b), Malaysia (Rector 2005), Mexico (Núñez-Luna 2005), Pakistan (Fraser 2005), the Philippines (Woodhouse 2005b), Poland (House 2004), Thailand (Woo 2005b), and Turkey (Cakarel and House 2004).

⁶² IPPs have generally built gas-fired combined cycle gas turbines under commercial incentives to manage their investment risks, whereas power utilities have adhered to older but familiar generation technologies, such as coal-fired steam turbines or hydropower. Combined cycle plants have lower capital costs, shorter construction periods and generally higher fuel costs than the older generation technologies.

Policy makers and regulators should anticipate this eventuality by insisting that PPAs contain provisions for assignment of obligations.

The cumulative obligations to purchase power from IPPs exposed power utilities in many countries to serious financial risks. These obligations strained the already precarious financial condition of some Asian power utilities as a result of the 1997 Asian financial crisis, as happened in Indonesia, Pakistan, and Philippines. The utilities were obliged to continue payments to IPPs under the PPAs for energy that they did not need when retail sales fell below forecast levels, and their governments prevented them from raising their retail power tariffs to cover increases in power purchase costs in local currency terms under PPAs following currency devaluations (Gray and Schuster 1998). When some Asian and Latin American countries experienced substantial currency devaluations, the cost of power from IPPs in local currency terms rose to unaffordable levels under PPA prices

denominated largely in U.S. dollar terms, as occurred in Argentina and Brazil (Gray and Irwin 2003).

The risk exposure of utilities that are off-takers for many contracts with IPPs depends on how these risks are structured. In some cases, the utilities have taken on substantial risks, whereas in other cases, the utilities are much less exposed to risks beyond their control. This difference is illustrated in table 8 for four Asian countries (Indonesia, Malaysia, the Philippines, and Thailand) that have followed the IPP route to reform. The results show a wide difference in risk exposure just among these four countries. The Philippines has the greatest overall exposure, with a high rating for all five exposure indicators, which is creating enormous problems. Indonesia also has a high overall exposure, with a high rating for four indicators, whereas Thailand has a moderately low overall exposure, with a high rating for two indicators, and Malaysia has a low overall exposure, with a high rating for only one indicator.

TABLE 8. Risk Exposure to the Impact of IPP Costs in Four Southeast Asian Countries

SOURCE OF RISK EXPOSURE	INDONESIA	MALAYSIA	PHILIPPINES	THAILAND
IPP capacity in operation in mid-2000 (MW) (high if the fuel is imported)	2,329	7,121	3,676	2,419
Exchange rate exposure through origin of fuel supply (high if the currency is denominated in U.S. dollars or another hard currency)	Low	Low	High	High
Exposure to exchange rate through currency of wholesale tariff (high if the currency is denominated in U.S. dollars or other hard currency)	High	Low	High	Low
Exposure to exchange rate through foreign debt for project financing (high if the foreign debt made up more than 50% of project financing)	High	Low	High	Low
Exposure to market risk through proportion of domestic power needs supplied by IPPs (high if this proportion is over 50%)	High	High	High	Low
Exposure to off-taker payment problems through margin of retail tariffs over wholesale prices (high if this margin is less than US\$0.03 per kWh for covering the costs of transmission, distribution, customer services, and system losses)	High	Low	High	Low

Source: Bacon and Besant-Jones 2002, adapted from Gray and Schuster 1998.

BOX 19. The Importance of Political Institutions: The Southeast Asian Experience

The importance of political and regulatory institutions in shaping privatization outcomes is shown from empirical analysis of the experience of with private power provision during the 1990s in four countries in Southeast Asia.

These countries—Indonesia, Malaysia, the Philippines, and Thailand—provide a natural experiment for this assessment, since all four countries undertook electricity privatization at roughly the same time and for roughly the same reason. Additionally, although the details of individual country reform programs differed, all shared the common feature of using long-term PPAs with guaranteed off-take provisions to induce entry by private investors. Subsequently, the four countries experienced the same macroeconomic shock in the form of the 1997 East Asian financial crisis.

Foreign investors in the Philippines and Thailand chose to rely on contractual safeguards whose efficacy depended more heavily on credible ex post enforcement of private property rights by the government. Since 1996, Thailand has operated under a new constitution that separates the branches of government and supports relatively rigorous democratic debate among multiple parties. At the time of the financial crisis, the dispersion of party affiliations in the lower house of the legislature meant that any new policy proposal or change in the status quo policy required the approval of multiple parties with their own competing interests. Further, Thailand had begun to develop an independent judiciary over the past decade, providing an additional institutional safeguard against abrogation or unilateral renegotiation of the contracts. In the Philippines, the government faced a razor-thin majority that relied upon the support of independents and other allies in both legislative chambers. The judiciary had also begun to play a more independent role.

Investors in Malaysia and Indonesia chose to rely more heavily on noncontractual safeguards whose efficacy was less dependent on the institutional environment. This was because the level of institutional support for private property rights provided lower levels of credibility and safeguards for investors were considerably weaker in Indonesia and Malaysia than in the Philippines and Thailand. In Malaysia, despite the multiplicity of parties in parliament and the *de jure* independence of the courts, the ruling party controlled both the legislature and the judiciary. In Indonesia, the president controlled the legislature, and the judiciary was unable to exert any checks on the executive and legislative branches of government. Investors in these countries thus relied more heavily on local partnering and external enforcement by international financiers and multilateral agencies.

Source: Henisz and Zelner 2001.

Institutions are important for supporting the credibility of government commitments to investment in power generation and infrastructure. Differences in the level of policy credibility affect investors' choices of strategic safeguards. The level of policy credibility affects the efficacy of safeguards in the presence of a shock that strengthens political officials' incentives to behave opportunistically. This perspective complements the perspectives of power utilities and governments concerning the risk exposure that is faced by IPPs. The importance of political and regulatory institutions in shaping privatization outcomes is shown from empirical analysis of the experience with private power provision during the 1990s in Indonesia, Malaysia, the Philippines, and Thailand. These countries provide the conditions for this assessment, since all four countries followed the IPP route at roughly the same time and for roughly the same reason (box 19).

Sophisticated political and regulatory risk mitigation strategies are important for investors. Investors should choose the types of strategies that they think would be most effective in aligning governance with the

institutional environment, given the extent to which the relevant institutions support credible commitments to private property rights. Regardless of the strategies chosen, investors in the two countries—the Philippines and Thailand—with the stronger institutions of these countries, received considerably better treatment following the crisis than did investors in Malaysia and Indonesia, despite the fact that the governments of all four countries faced strong incentives to engage in opportunistic behavior toward investors (Henisz and Zelner 2001).

Sustainable Conditions for Independent Power Producers

The process for selecting IPPs is critical to obtaining benefits from them. In many countries, the initial contracts with IPPs were concluded under nontransparent processes that attracted allegations of corruption and exposed these contracts to pressure for renegotiation that substantially reduced the investment returns for IPPs. A loss-sharing solution of lowering PPA rates in exchange for an extension of the PPA term has

been the most common approach and successfully used in Guatemala, Pakistan, and Thailand. In a few cases, PPAs were cancelled or remained in dispute for years (India, Indonesia, and Tanzania), particularly where the off-take prices were extremely high by international standards for generation costs in U.S. dollar terms.

Much of this risk of renegotiation can be avoided by obliging IPPs to earn the right to enter into PPAs under a competitive bidding process. The use of internationally acceptable bidding documents provides transparency to the process and thus sustainability to the agreement (K & M Engineering and Consulting Corporation 1994). Countries that engaged in transparent and competitive bidding processes for contracting with IPPs on the whole have got lower prices, especially in countries able to provide low-cost natural gas to IPPs (Bangladesh and Egypt), and more sustainable contracts than countries that adopted noncompetitive processes.

The failure of off-takers to honor their payments commitments to IPPs is an endemic risk in countries with generally poor governance and contract protection under the law. This usually arises when off-takers do not have sufficient revenues to meet these commitments because their retail tariffs are kept below supply costs by political pressure and a large proportion of their bills are not paid by consumers (the Dominican Republic), or because of a macroeconomic shock that resulted in a major devaluation of the local currency.

The incorporation of IPPs into a power market introduces some specific issues for system planning and operation. These issues include (a) how to ensure that power utilities and private producers have the incentive to trade power economically; (b) how to price a utility's bulk power purchases from private producers efficiently and in a way that gives these producers an incentive to develop capacity that can supply power at a lower resource cost than the utility's own cost of meeting the demand on its system; and (c) how to manage an orderly process for developing system capacity (APEC Secretariat 1997; Roxas 2001).

Long-term PPAs should be structured in a manner that is bankable by the IPPs, yet allows efficient use of plant output by the power system operator. This is a key issue for ensuring economic power trade with IPPs and enabling IPPs to finance the investment with large

proportions of debt financing. A two-part price structure meets these criteria, under which one part is a periodic availability charge that covers all the costs covered by the PPA, except for fuel and variable O&M costs, which provides bankability. The second part covers fuel and variable O&M costs based on a rate that is applied to the actual amount of energy that is provided under the PPA, which provides the system operator with the correct price signals for dispatching IPP plants efficiently.⁶³

Access to the transmission network on transparent and equitable terms is a prerequisite for the sustainability of investments by IPPs and the efficient use of their generation capacity. This can be achieved credibly by forming an independent transmission entity that is regulated in accordance with these terms and is legally barred from cross-ownership with generators. Chile did this over concerns about abuse of market power after initially keeping transmission bundled with generation.

Power utilities should not risk overextending their financial capacity through long-term commitments under PPAs. To avoid creating stranded costs for these utilities if the power market is subsequently opened to competition, these utilities should sign only a few PPAs before they are restructured. Hungary and Poland faced stranded cost issues with their single-buyer approach to contracting with IPPs, and so do such countries as India, Pakistan, and the Philippines. In Poland, the transmission company took on long-term PPAs with all the generating companies formed from restructuring the sector, but at prices that were later undercut by prices realized in the new competitive wholesale power market. In the other countries, the problem stemmed from arrears in payments by the state-owned utility to the IPPs caused by low retail tariffs and low collection of payments from power users.

A short- to medium-term PPA with an IPP to supply power from barge-mounted or skid-mounted generating units is an option to avert a costly shortage of power supply capacity. This capacity can be installed in fewer than six months from financial closure, and it requires far less investment than needed for a plant installed under long-term PPAs (Bacon 1995). The price of power under this alternative tends to be higher, however, than under a long-term PPA, because the generating units consume more fuel and the capital expenditures on these units have to be recovered over the short terms of their PPAs. The benefit of quick additions to supply, however, can

⁶³ The economically efficient amount of output taken from an IPP's plant is that which enables the demand on the power system to be met at least cost from all the power plants on the power system. A take-or-pay structure distorts this incentive by effectively imposing zero short-term marginal cost on the system for the amount of power covered by the take-or-pay provision, even if the variable cost of this power is higher than that of other plants on the system.

be an advantageous tradeoff for the host country. This approach has been taken in Bangladesh, the Dominican Republic, Guatemala, Jamaica, Nigeria, and the Philippines.

5.4 The Role of Competition in Power Markets

Competition is introduced to power markets to achieve price reductions and improvements in electricity services. Competitive power markets provide the dynamic pressure on service providers and power suppliers that is essential to achieving these benefits for power consumers and the country's economy. This dynamism is founded on the ease of entry to the power market by sufficient generators and independent power suppliers to control abuse of market power and to discourage collusion by incumbents. Experience indicates that competitive arrangements can work in the mature power markets of OECD countries (the appendix). Competition in the power market and the reforms needed to introduce it, such as unbundling an integrated supply chain, private ownership, and mechanisms for power exchange, are not ends in themselves, but rather ways to achieve the broad reform goals.

The lessons of experience from countries that have successfully introduced competition to their power markets can be relevant to some developing countries in two respects (Besant-Jones 1996; Millán 1999; Wolfram 1999). First, competition offers a vision of a successful ultimate outcome, even when the conditions for attaining this state cannot be met from immediate reform efforts. Second, these lessons serve as warnings against attempting overly ambitious reforms in the unsuitable conditions for them found in most developing countries. Both viewpoints are examined in this section.

Characteristics of Competition in the Power Market

The concept of managed, or regulated, competition applies to the power market, rather than the economic ideal of atomistic competition without regulation. Competition can be developed in the power generation and supply service segments, but generally it is not feasible in the network segments (transmission, distribution, and system control) that are natural monopolies. Competition is more difficult to introduce in network industries than in other industries, and more difficult in electricity than in other networks.

As competition develops, the focus of regulation evolves from controlling prices and ensuring efficient provision of services to monitoring for abuse of market power and ensuring free and fair access to the transmission system. Achieving this type of access regime requires regulatory intervention, as well as market structure interventions that maintain a strict separation between transmission, generation, and distribution activities. The quality of services provided by retail power suppliers (such as prices, service standards, and access) are regulated to help consumers benefit from competition among suppliers.

Power supply to large electricity users is an intrinsically competitive segment because the cost of competing for their business is small compared with the potential profits. Power supply to all but large electricity users is less likely to attract competition because the profits per customer are too small, unless the market has become highly contestable and suppliers have to defend market shares.⁶⁴ This element of supply service has generally been carried out by the entity that distributes electricity to these users because both these functions serve the same market segments. Separate licenses are issued for the distribution (“wires”) business—which has natural monopoly features—and power supply to facilitate regulation of the former and competition in the latter.⁶⁵ Hence the term supplier usually applies to a distributor that has a supply license, unless it applies to an independent power supplier.

The contestable form of competition is seldom sufficiently strong to force dominant wholesale power suppliers to pass on their efficiency gains by reducing their prices to consumers. Under weak competitive pressure, regulators are responsible for pressuring suppliers to do so (Newbery 2004). Contestability in this type of market is limited by the substantial sunk costs in generating plant involved in entering the market, and by the absence of second-hand markets for generating plant for exiting the market. The incumbent must be broken up to enable real competition in the market.

The social costs of private ownership could exceed the benefits under weak competitive conditions. This situation could happen, for example, if competition were too weak to force producers to pass on cost reductions to consumers, as could happen under rapidly rising demand for power. This could also happen if

⁶⁴ Consumers should be able to switch between suppliers at low cost, otherwise their original suppliers retain market power, even when these suppliers have only modest market shares.

⁶⁵ The threshold level of customer demand at which the supply to meet it becomes competitive has been coming down, however, and full competition in the retail market has been introduced in England and Wales, the Nordic countries, and some parts of the United States (Texas, Pennsylvania/New Jersey/Maryland).

BOX 20. China's Experiment with Competition in the Wholesale Power Market

Beginning with the economic reform which started in 1978, market and competition were slowly introduced into the national economy. The transition from a centrally planned economy to a market economy was a long process because China adopted a gradual approach to reforming. Competition in the electricity industry was particularly late because it was deemed a vital sector that needed to be controlled by the state. It was also because of prevalent capacity shortage to meet surging demand.

Competition in the electricity industry first started in 1999 on a limited experimental basis. The direct cause was a sudden turnaround of the power market from chronic shortage to widespread surplus. Six Chinese provinces were chosen for this experiment. The experimental competitive market followed the old England and Wales power pool model. Each province selected its 12 largest independent power producers to compete for a part of the provincial demand. The bulk of the power demand continued to be met by allocated dispatch according to central plans. These producers were free to decide each day whether to compete or not. Simulation of the competition began in July 2000, with no actual financial settlement.

The experiment was short-lived in all six provinces for two main reasons. The first reason was the absorption of surplus-generating supply when power demand picked up in 2001 because of unanticipated economic growth. The second reason was the central government's influence on who could compete in favor of incumbent integrated power utilities.

Source: Zhang 2003.

consumer inertia blunts competitive forces by allowing producers and suppliers to earn excessively high profit margins that are paid in dividends, or dissipate efficiency gains in higher marketing costs, wages, and directors' remuneration (Newbery 2004).

State-owned enterprises will weaken competition in a power market by forcing out more efficient private competitors where both are present. This is because state-owned enterprises can borrow at the much lower rates than private investors can—and even as low as risk-free government bond rates.⁶⁶ Protection from the threat of takeover or bankruptcy bestowed by state ownership, however, reduces their incentives for efficiency and so may dissipate their lower apparent capital costs. In this situation, competition among state-owned service providers becomes weak or nonexistent (Newbery 2004). China's experiment with competition in the wholesale power market illustrates this tendency (box 20).

Private ownership works best when subject to competitive pressures (Zhang, Parker, and Kirkpatrick 2002). Private ownership provides the diversity of ownership needed for real competition—including investment in new capacity—because private owners respond better than public sector managers to the commercial incentives that drive competitive behavior. Privatization and competition are therefore related elements of power market reform. One of these elements is usually given priority over

the other for the reform strategy because there is a tradeoff between ease of privatization and of introducing competition.

If competition is the priority, privatization can become more difficult. Constant post-privatization vigilance is needed to prevent the privatized entities from anti-competitive behavior through acquisition of holdings and mergers. Cross-ownership between generating and distributing companies (especially when the wires business and supply business are bundled together) must be severely limited from the beginning and guarded against after privatization, so that these generators cannot prevent other generators from accessing power users through the distribution networks. When distribution is unbundled into supply and wires business, some cross-ownership between generation and the supply business may be tolerable. In a competitive model of this kind, the generating plants have to take full market risk, and distributing utilities have to face uncertainty over the terms of power supply. Under such conditions, the investors have more difficulty accessing long-term debt at reasonable costs, which causes privatization to become somewhat more difficult.

Since ease of privatization is the priority in many developing countries, restructuring of the power supply should focus on managing investment risks for private investors. Competition in the power market is not

⁶⁶ This position also reflects the philosophy underpinning centrally planned economies that the interests of state-owned enterprises are identical to the public interest, and so competition among them is wasteful.

feasible under country and power sector conditions in these countries. The single buyer model with little or no restructuring has been widely used to attract private investment into power generation, since it removes most market risk for the investors. Experience shows, however, that its substantial regulatory and political risks have also deterred investors (the subsection on Purchasing Agency–Single Buyer in this chapter). A country that wants to attract private investment under limited competition in the power market can unbundle its power supply structure, but allow limited cross-ownership between generators and suppliers to help investors manage risks. Lack of clarity for this kind of choice resulted in difficulties in Georgia and Kazakhstan where, despite announced interest in competition, some investors have been allowed to acquire generation and distribution facilities in the same areas.

Once most of the power supply industry has passed into private ownership and is exposed to competitive forces, oversight of the market becomes critical to the sustainability of the reform. However, when conditions that make competition possible cease to exist, or prove to be inadequate, market interventions are clearly legitimate within the spirit of the new regulatory framework. This has been the rule, rather than the exception, in competitive power markets worldwide (Ayala and Millán 2002).

- Private participation will not automatically induce competitive behavior in a network industry, such as electricity supply that requires substantial coordination of producers, which inclines participants toward cooperation and collusion. Good regulation and antitrust enforcement are therefore required to support this form of competition.
- The private owners may carry out further restructuring to reduce market risks with moves to recombine some generation capacity with some distribution capacity, as in some OECD countries, or they may sell their stakes to other private parties under realignment of their investment strategies, as in Brazil. These tendencies require careful antimonopoly regulation to maintain competitive pressures on power producers and suppliers.
- When unexpectedly large profits by the new private producers and suppliers arouse public hostility to the reforms, they may provoke the regulator into making unscheduled price reviews or the government into considering a windfall tax on these profits (as happened in England and Wales).
- Strong pressure to increase retail tariffs caused by unanticipated large currency devaluations can lead to demands from the utility for reductions in the off-take prices under PPAs with IPPs, as in the case of some Asian countries following their financial crisis in 1998, and also in Argentina and Brazil.

Wholesale Power Trade

Bilateral trading and organized power exchanges are the main market designs that have emerged for competitive trade in wholesale power. In a gross power pool, generators have to sell all their electrical energy into an organized exchange.⁶⁷ In a net power pool most—typically over 90 percent—of the trade is conducted under bilateral arrangements, under which generators sell power to power retailers (including distribution companies) that sell power to end users, power marketers (traders that deal with other traders and retailers), and large end users of electricity. A net power pool also has an organized power exchange to eliminate imbalances between supply and demand at the margin on the system. In a simpler form the system operator appoints a generator to increase or reduce its power production, as necessary, to keep supply in balance with demand on the system.⁶⁸

Bilateral trading is the most common successor to a single buyer once the basic requirements for competition in the market are met. Electricity distributors, independent power suppliers, and large consumers buy from generators based on a set of market rules according to production costs, subject to the approval of contract terms by the market regulator.⁶⁹ It should start once merit-order dispatch of generators is established, metering to measure the energy traded under these contracts is in place, and settlement arrangements are in force, as well as any stranded cost issues associated with PPAs are resolved.

⁶⁷ Some national power markets (Belgium, France, Ireland) include trade in power capacity as well as energy, while regional trade in power is conducted via auctions for interconnector capacity between power markets where demand for this capacity exceeds the available amount (increasingly in Europe, such as the undersea connector between England and France).

⁶⁸ Such a balancing arrangement is needed because a group of bilateral contracts will not match total supply precisely with the constantly changing total demand for electricity in the market, especially in the presence of transmission constraints on power flows from power generation plants to load centers.

⁶⁹ A form of this model is used in the current England and Wales power market, which uses a sophisticated arrangement for balancing supply with demand by which producers, suppliers and buyers trade at spot prices to balance their needs (the appendix).

Traders are exposed to different risks under bilateral trading in net power pools from trading in gross power pools. Under bilateral trading, settlement for the contracted power is also carried out bilaterally, and each distributor is financially responsible for its own contracts. Only the value of the power sold for the balancing pool passes through wholesale market settlement procedures. This means that under bilateral contracts, generators are individually exposed to the risk of nonpayment by distributors, and so generators are concerned about the creditworthiness of the distributors that purchase their output. Gross power pools, on the other hand, relieve generators of this specific exposure by centralizing this risk, although this increases the incentive for payment delinquency by distributors (“free riding”).

A power pool based on price bidding with risk-hedging mechanisms in short- and long-term forward markets is the nearest design to pure competition in a power market. Most pools use an auction system to form prices based on bids from buyers and sellers in the market, and they work with the system operator to ensure the reliability of physical delivery of power. Power pools that offer a wider range of services, such as clearing services to provide financial security for transactions and ancillary services required to manage the power system, allow progressively more competition in the market (Barker, Tenenbaum, and Woolf 1997). Power pools based on price bidding are found in Australia, Scandinavia, Spain, and some states in the United States. The California experience with a price-bidding power pool offers many useful lessons for countries considering this type of power market (the appendix). The cost-based bidding approach used by South American countries allows competition for market share based on auditable costs of generators that give incentives to producers to reduce their costs (chapter 3).

A major concern about power pools is whether some form of regulatory intervention is needed in order to avoid serious shortages of power generation capacity. Underinvestment in generation capacity can arise under uncertainty about the future level of demand in a power pool, as well as investment risks arising from deficiencies in a country’s investment climate (Finona, Johansen, and Midttun 2004). Capacity contracts can be used (as in Guatemala—see box 18), but this type of market should be designed carefully to be effective (von der

Fehr 2002). Regulatory interventions include capacity payments and can be supported by structural measures that reduce investment risks, such as bilateral trading and forward hedging, as well as limited cross-ownership between the generation and distribution segments of the power market that can be monitored for abuse of market power. Regulators have to contend with the difficulty of setting a level for capacity payments that leads to economically efficient investment in generating capacity (Oren 2003; Turvey 2003).⁷⁰

The power supply industry is highly susceptible to the exercise of unilateral market power because it possesses product characteristics that enhance the ability of suppliers to exercise this power.⁷¹ The main characteristic is the difficulty of balancing supply with demand for electricity at every instant in time and at every location of the network because of many factors. One of these factors is the inability to store electricity. Another is the technical constraints on generation capacity for temporarily increasing production. An additional technical constraint is imposed by congestion in the transmission network. A further factor is the inelasticity of power demand to wholesale electricity prices because of the way that power consumption is metered and charged. Moreover, power suppliers often possess local market power regardless of the congestion management protocols used in the power market as a whole when they are shielded by transmission constraints from sufficient competition to discipline their bidding behavior into the market. These constraints are common in newly established competitive power markets because transmission networks were configured for a different pattern of power flows under the former vertically integrated industry structure.

Competition or antitrust policy as it is applied to other industries may be insufficient to protect electricity consumers. The past two decades of international experience with wholesale electricity markets has shown the significant harm to power consumers that can result from firms simply engaging in unilateral profit-maximizing behavior given the actions of their competitors. Unlike other product markets, coordinated actions among suppliers or the concentration of production capacity in the hands of small number of firms is unnecessary for electricity suppliers to raise prices substantially above competitive levels.⁷² Consequently, the relevant competition authorities have not been able to find conclusive evidence

⁷⁰ Energy rationing is the ultimate recourse in the case of a long-term shortage of capacity or energy (for more than one year, as can happen in hydropower systems through droughts). The Brazilian experience with energy rationing is interesting (Maurer, Pereira and Rosenblatt 2005).

⁷¹ This paragraph and the following paragraphs on problems with market power and regulatory oversight of competitive markets draw on Wolak 2005.

⁷² Some wholesale electricity markets have had severe market power problems even though they had Herfindahl-Hirschman Index values that would not raise concerns about market power in other industries.

of coordinated actions among suppliers to raise prices in violation of the competition or antitrust law during these market power episodes.

In a competitive power market, a combination of regulatory oversight and competition law is needed to provide consumers with the protection from market power that conventional competition law provides in markets for other products. In the case of electricity, an industry-specific regulator endowed with a prespecified set of responsibilities is necessary to react to unanticipated events because unilateral market power problems can be extremely difficult to predict. Even small market design flaws that cause little harm during most system conditions can lead to substantial consumer harm when the load on the power system approaches the limit of the system's supply capacity. Clearly specified regulatory safeguards tailored to the electricity supply industry are needed to prevent the harmful exercise of unilateral market power before it can occur, and to rapidly implement remedies if it does occur.

Restructuring the generation sector for a competitive wholesale market should focus on control of market power while allowing investors to manage their risks efficiently, such as by forward hedging of contracts in the market. The selected structure created considerable market power even in some large industrial countries

(such as Spain) where several approximately equal-sized private generators could have been created. Experience in the early years of the England and Wales competitive power market indicates that no entity should operate or control more than 20–25 percent of total generation capacity in this type of market. Thus the size of the power system should be able to accommodate at least four or five generation companies, as well as have the appropriate economic characteristics.⁷³ These characteristics are (a) the technological mix used in generation (competitive generation is more practicable without a large proportion of nuclear power or hydropower), and (b) the extent of power system interconnection, with competitive reform being more practicable where load centers are interconnected (including interconnection with power networks of neighboring countries).

Some Latin American countries have adopted measures to control market power in competitive power markets (table 9). Argentina deliberately designed the reform so that no firm could have more than 15 percent of the market, and Brazil and Colombia also kept down concentration of ownership. Chile (where one firm has 60 percent of its market) has a very high ownership concentration. Bolivia and Peru are small countries with relatively few generating plants that managed to avoid creating high levels of market power (Bacon and Besant-Jones 2002).

TABLE 9. Market Concentration in Selected Latin American Power Markets, 1998

	NUMBER OF GENERATORS	LARGEST MARKET SHARE (%)	HERFINDAHL-HIRSCHMAN INDEX ^a	EQUIVALENT NO. EQUAL-SIZED FIRMS
Argentina	38	14	0.06	16.7
Bolivia	6	26	0.19	5.2
Brazil	14	25	0.15	6.7
Chile (main system)	4	60	0.43	2.3
Colombia	26	24	0.14	7.1
Peru (main system)	8	35	0.23	4.3

a. The Herfindahl-Hirschman Index is defined as $\sum(S_i)^2$, where S_i is the share in the market of the capacity of the i th firm. The index varies from unity for a monopoly toward zero for perfect competition (a very large number of equal-sized firms).

Source: Bacon and Besant-Jones 2002, based on data from Berrah, Lamech, and Zhao 2001.

⁷³ In a good competitive market, four or five companies should compete not only for base load power, but also for peaking power and intermediate power (that is, all along the load curve).

The primary goal of the regulatory process in competitive power markets should be to prevent market participant behavior that significantly degrades system reliability and market efficiency. The regulatory process should ensure that the conditions necessary for vigorous competition exist and to limit the economic harm associated with the exercise of unilateral market power when they do not exist. Regulators cannot prevent firms from exercising unilateral market power.⁷⁴ Regulatory mechanisms that attempt to prevent all exercise of unilateral market power can introduce market inefficiencies that cause more economic harm than the market power they are attempting to prevent.

The regulator should have access to all information needed to analyze the behavior of market participants. The regulator should be able to replicate market-clearing prices and quantities, given the bids submitted by market participants, total demand, and other information about system conditions. This is necessary for the regulator to verify that the market is operated in a manner consistent with the market rules. In addition, all data submitted to the real-time market and produced by the system operator should be immediately released to the public to help system reliability. In a bilateral trading system (net power pool), the real-time market should handle little energy trade because it is operated primarily for reliability reasons, and all market participants have a common interest in the reliability of the transmission network. The regulator's access to data submitted to the system operator by market participants or produced by the system operator should not be limited. The regulator should also have the ability to request information from market participants on a confidential basis to perform further analyses.

The institutional arrangements for market operation are important for developing a competitive wholesale power market. Appropriate regulatory tools—including grid codes, access rules, and commercial tools for the operation of the transmission system—should be established before competitive power trading arrangements are introduced (Arizu, Dunn, and Tenenbaum 2002). Responsibility for control of power system dispatch and administration of power trading arrangements should be placed in an entity beyond the control of competing sellers and purchasers of electricity. This responsibility could be

given to the transmission company, especially when it is state-owned and so not under the control of private traders in the market. This arrangement provides a practical solution in the weak institutional and financial environments found in many developing countries. Separate licenses should be issued for transmission system operation and market operation to allow market operation to be spun off into a separate entity if, for example, government later decides to allow private shareholding in the transmission entity or the regulator becomes concerned about the manner in which the transmission system operator is managing market operation.⁷⁵

The governance of a separate power system operator should be kept independent of the market participants. This lesson is reinforced by the Californian experience (Besant-Jones and Tenenbaum 2001). This independence can be achieved by prohibiting market participants from having any ownership in the system operator and requiring that the system operator's governing board is composed of nonmarket participants. If governance boards are composed of market participants, however, they should not be too large or dominated by one or more classes of market participants. The system operator should monitor markets carefully and continuously for signs of trouble—such as unusual price movements that may indicate abuse of market power—and have the authority to penalize those who violate market rules.

Competition in the Power Markets of Developing Countries

Competitive power markets have been developed successfully in some Latin American countries (see chapter 3), but tried unsuccessfully in other countries. Some countries in the latter category have been reluctant to provide nondiscriminatory or even regulated third party access to their wires services, even to large consumers. In Poland such access is not available for the import of power from abroad. In Hungary such access is available only if the buyer buys at least 50 percent of annual needs from domestic generators. In Ukraine a competitive pool never functioned as intended because it was introduced prematurely in an environment of extensive nonpayment and reluctance by government to let retail prices move up or down with wholesale market prices.

⁷⁴ In fact, markets function most efficiently when suppliers have high-powered incentives to exercise all available unilateral market power provided that there are few barriers to entry to the market.

⁷⁵ A separate entity for market operation is found in some OECD countries. In the United States, many transmission networks are owned by investor owned utilities that also buy and sell power in the wholesale power market. In England and Wales the transmission entity is a separate privately owned corporation.

A shortage of real competitors is a major obstacle to developing competition in the power markets of most developing countries. This is because of the small sizes of these markets with limited scope for international trade. It is also because of the difficulty in attracting new entrants to an industry characterized by high sunk costs in investments with virtually no alternative economic uses and in countries with inefficient financial sectors, lack of credibility of institutions, and weak enforcement of laws. A key issue for competition policy is the rate of return that will attract the optimal level of investment. In most developing countries, however, this issue can be resolved more easily through concession contracts with regulated prices than with competition in power markets (Beato and Laffont 2002).⁷⁶

Liberalization of fuel markets is an essential requirement for the development of competition among power generators. This requirement is often overlooked, even though fuel costs are a critical area for competition among generators, since these costs amount to at least 60 percent of the total costs of thermal power generation. Fuel costs and availability of fuel types (coal, natural gas, and liquid fuels) and specifications for each type (in regard to energy content and contaminants) not only affect operating costs directly, but also affect choices of plant types by investors. The greater the options for fuel choice, the greater the potential for competition among investors in the power generation market. In many developing countries, fuel markets are tightly controlled under state-owned monopolies that usually produce a limited range of fuel products under rigidly controlled prices, and they struggle to meet even existing levels of domestic demand. They are likely to favor their contracts to supply state-owned power generators in this situation.⁷⁷ Governments have to choose between protecting these monopolists and allowing competition to flourish in their wholesale power markets.⁷⁸

In summary, only limited competition can work in the power markets of most developing countries for the following reasons:

- *Insufficient power generating capacity to cover fast-growing power demand*—including demand for access to electricity supply from currently unconnected households, because the development of competition requires adequate supply capacity to meet all segments (base, peak, and shoulder) of the load on the power system.⁷⁹
- *Many existing markets are too small* to support the number of viable sellers and purchasers needed for full competition in the market.
- *Lack of diversity in fuel supply markets* needed for competition among power generators.
- *Inadequate development of the power transmission system and power system control system* necessary for managing the complex pattern of power flows in a competitive market.
- *The insolvency of most power utilities* that prevents them from paying their suppliers in full and which deters IPPs from developing large power projects.
- *Domestic capital markets are too undeveloped* to provide financing on the scale and terms needed for investment in supply capacity.
- *Difficulty in controlling abuse of market power* if generators and suppliers are allowed to charge market-based prices. Market power in a mixed hydropower and thermal power system is generally more difficult to control than in an all-thermal power system.⁸⁰
- *Policy makers have limited tolerance for the substantial price volatility* that occurs with competition in the market.
- *Lack of respect for property rights and obligations under contracts*, notably keeping to merit order of dispatch of generating capacity and to agreements on tariff revisions.
- *Also lacking is the availability of the legal infrastructure for dispute resolution* in a rapid, fair, and competent manner, and mechanisms to enforce court decisions and property rights through courts and arbitration.

The general absence of the necessary conditions for open competition in power markets in developing countries indicates that competition should be introduced

⁷⁶ Such concessions are in fact widely used in both power generation—with IPPs and distribution—as in Latin America.

⁷⁷ IPPs often gain specific import rights for their fuel requirements in these circumstances.

⁷⁸ This was the case in Panama at the time of privatization of power generation and distribution assets, when the government allowed private generators to bypass the monopoly seller of oil products in the country to obtain fuels on a competitive basis (Rufin 2002).

⁷⁹ This concern applies even to effective demand after allowing for the impact of below-cost tariffs and nonpayment of electricity bills by users.

⁸⁰ See García and Arbeláez 2002 for Colombia's example of this problem. Panama and Chile have retained centralized models of their power systems to determine the optimal dispatch of their hydroelectric capacity (Walker and Benavides 2002).

gradually to the wholesale power trade in these countries. This could be done by the following means: (a) generation capacity is distributed among many owners; (b) open access to transmission and distribution networks is provided to third parties; allowing multibuyer trading on a bilateral basis between generators and distributors and other parties, instead of trading through a single buyer of wholesale power; (c) the system operator represents the interests of all wholesale market participants without being under undue influence of any group of participants when dispatching system supply capacity; and (d) distributors pay generators fully and promptly and, in turn, generators pay their fuel suppliers fully and promptly, preferably on liberalized fuel markets that enable generators to reduce their fuel costs.

Under weak regulatory capacity for monitoring and preventing abuse of market power, simple regulatory instruments are more prudent than theoretically more efficient, but complex rules. For example, simple limits on vertical integration or horizontal concentration avoid the need for collecting and processing the extensive amounts information necessary to identify behavioral changes in the market. They also help regulators avoid disputes in court when they oppose mergers and takeovers proposed by market participants. Complex rules tend to yield erratic results in courts that either do not share the regulatory philosophy or lack the capacity to grasp the highly technical issues involved in such cases (Benavides 2003).

Third-party access would allow entry by new types of suppliers, including industries that own power generators to meet their own power needs and that can sell excess power from these plants, developers of small power plants (“distributed generators”) fueled by both conventional and unconventional renewable energy forms, IPPs able to conclude sales agreements directly with industrial and other large power consumers, and small service providers in rural areas that sell to local grid-connected power markets. Regulatory support in the form of reasonable wheeling and backup charges is essential to the success of open access for third parties to the power grid.

In summary, the following lessons from experience should guide developing countries in deciding how to introduce competition into their power markets.

- *Price-based spot markets are generally too risky for small to medium-sized power systems, because these systems lack sufficient bidders to maintain effective competition.*
- *Cost-based spot markets, such as those developed in Latin America, offer a simpler and less risky alternative that can yield competitive benefits for medium-sized power systems.*
- *Most developing countries should start with limited forms of competition that can evolve to wholesale competition once the sector can manage competition without uncontrollable market power. The creation of bid-based spot markets should generally not be their top priority.*
- *Bilateral trading among multiple buyers and multiple sellers should be considered instead of gross power pools, but only when distributors are creditworthy purchasers.*
- *A temporary single-buyer arrangement can be considered—that is, one without a legal monopoly—in situations where bilateral trading or spot markets need substantial time to develop viable power purchasers and sellers.*
- *Full retail competition should be implemented last. Countries that have not achieved substantial household electrification should focus on encouraging competition to serve those who do not have access to electricity (see chapter 7), instead of on retail competition for those who already have access.*

6. REGULATION OF POWER MARKETS

OGN's Guidance on Regulation of Power Markets

The development of capabilities and institutions to regulate power markets is an important part of sector reform. It is unrealistic, however, to expect that a new regulatory system will be fully functioning and credible soon after it is formally created.

Experience shows that developing robust regulatory frameworks and strong institutions to manage them can be hampered by underfunding and a reluctance on the part of governments to transfer real independence in decision making to regulatory authorities even when required to do so by law.

Private sector investors contend that a credible regulatory system requires more than a formally independent regulatory entity, especially in the critical early years right after it is created.

Since many regulators begin performing their functions with the disadvantage of limited independence and capacity, other transitional arrangements may need to be established to provide stability and predictability for a new regulatory regime. This could include limiting the amount of discretion that regulatory bodies have in setting prices and key parameters, particularly during the initial years of public private partnerships where the private sector is investing significant amounts of capital.

This can be achieved by setting out details on key terms, such as initial price controls in the key regulatory instruments (licenses or contracts), or by having clear tariff-setting principles in the country's legislation.

This chapter covers regulation of power markets for all types of market structure. These structures range from a single integrated power supplier responsible for all publicly supplied electricity to a decentralized competitive wholesale power market with many participants. The structure of the regulatory system is linked to the market structure, since regulation is an important component of power market governance. In particular, the need for a separate, autonomous regulatory agency operating under transparent processes is much stronger with private sector participants in a power market than when all public power supply is under state ownership. Even in large middle-income countries, various forms of contractual arrangements and third party guarantees against regulatory risk are needed for attracting large amounts of private investment in the power systems with a new regulatory agency that has not had time to develop a track record for credibility. In small low-income countries, contracting out of regulatory functions is an option under their weak institutional capacity.

6.1 The Need for Public Regulation of Power Markets

Regulation of electricity service providers and consumers is the means of applying governance to the power market, complemented by competition where feasible. Economic regulation of the power market is the formal

arm of governance that balances the interests of market participants—power generators, suppliers, network and market service providers, and users. It should also consider the interests of those who aspire to participate in the market—new entrants that are either power suppliers that want to sell their product or power users that want access to the public power system. It is used to control prices and ensure efficient provision of services. Regulation is applied both as a public good to protect the public interest through a public entity, or as a private good for market members through a private organization—as in a power market exchange.

Public regulation is the dominant form of arm's length regulation for power utilities. It forms part of a broader regulatory framework that encompasses public safety, employment conditions, and environmental safeguards, and more broadly the legal framework in which the power market operates. The following characteristics of the electricity supply industry make public regulation both necessary and difficult (Stern and Holder 1999).

- The assets are capital intensive and become sunk costs once invested, since they cannot be profitably redeployed, so investors need protection from expropriation.

- The electricity supply industry has considerable economies of scale and scope, especially in the network segments, which limits the number of firms that can support the power market viably. This means that governments cannot rely on the development of competition in the market to protect consumers from the abuse of market power by these firms.
- The price of electricity services is highly political because these services are important for the welfare of households.
- The quality of electricity services matters for economic growth because these services are important intermediate inputs for the industrial and service sectors.

Public regulation works better under a clear formal regulatory process, rather than by informal oversight and noncommercial objectives typically imposed on state-owned utilities. Once a government decides to attract substantial private investment to the power sector, it is faced with the need to put regulation at arm's length from its executive agencies. The main governance elements of power market regulation consist of the following interrelated features: clear roles and objectives, regulatory independence and accountability, stakeholder participation, and transparency and predictability. These features promote legitimacy for market reform and the regulatory process, and enhance the credibility and reputation of the regulatory institution (Rodríguez and Jiménez 2005). If a government is unable or unwilling to create these arrangements, state ownership and financing of the electricity supply industry becomes the fall-back solution (Levy and Spiller 1993).

Price-setting arrangements under state ownership of power supply usually result in severe distortions to electricity prices, especially low prices for households and influential consumer groups (such as irrigation farmers in India—Monari 2002). Under state ownership, regulation of the power market has traditionally been carried out implicitly by governments in combination with numerous other roles. Setting prices tends to be a process of negotiation between government ministries, the power utility, and influential consumers in which political considerations are as influential as financial requirements. The regulatory function is usually carried out by the line ministry responsible for the power sector under a command-and-control approach. This tendency can be observed in many countries in Asia and Africa.

Environmental regulations are an important component of power market regulation. Regulatory processes for environmental standards should guide, rather than hinder, the operation and development of power markets. They should address important aspects that include permissible levels of emissions—especially during times when the power system, as well as local environments, are particularly under stress—as occurred in California (Besant-Jones and Tenenbaum 2001). They should provide the means for handling environmental concerns by community groups and nongovernmental organizations (NGOs) about the siting of power plants, the selection of fuels, and the development of hydropower resources for power generation (World Commission on Dams 2000). They should not be open to capture by vested interests to get round environmental regulations or at the other extreme to block the siting and operation of new power facilities.

6.2 Institutional Approaches to Power Market Regulation

The development of capabilities and institutions to regulate power markets is an important part of power market reform. This development covers both regulatory governance (who does what under which laws, rules, and procedures) and regulatory substance (how tariff levels and structures are established and approved, and mechanisms for coordination of tariffs and subsidies and the establishment of quality of service standards). Developing economies need to find appropriate ways to balance the costs and benefits of regulation in their circumstances. The design of new regulatory structures should take account of the political, legal, and constitutional arrangements under which they have to function. It should be consistent with country endowments (including constitutional checks and balances), technical expertise, auditing competence, and fiscal resources, as well as the economic characteristics of the power market (Kessides 2004).

The regulatory systems of developing economies tend to operate within legal frameworks modeled on one of the three frameworks used in OECD countries (Stern and Holder 1999):

- The U.S. model of regulation, which operates under a strong and well-established constitution, an administrative law code and a tradition of using the legal system to resolve issues.

- The U.K. model of regulation, which relies on achieving compromises between parties, rather than resorting to the courts, in the absence of a written constitution and a formal code of administrative law.
- In many European countries, whose regulatory systems operate within Napoleonic law codes with traditions of public service obligations.

Thus, Latin America generally follows the European framework, Asia follows either the U.S. or U.K. framework, and Africa follows either the U.K. or European framework.⁶¹ Although many developing countries follow the U.S. structure of independent regulatory commissions, they lack the legislative background and substantial resources needed to replicate the regulatory processes of U.S. style cost-of-service regulation developed for investor-owned vertically integrated utilities.

The core issue for designing a new regulatory structure is how to manage the tradeoff between flexibility and discretion. The need for flexibility in applying regulations under changing market conditions must be balanced rules and procedures by limiting the regulator's discretion in applying them. Achieving a balance depends on which course risks more economic inefficiency under the prevailing institutional framework. Flexibility is more important under rapid technological change, such as with telecommunications, whereas commitment is more important under great social needs, such as with water supply. The power sector lies somewhere between. Flexibility and commitment can be in conflict.⁶² How a country resolves this conflict depends on the specific institutional environment of the country.

Countries can choose from two distinct institutional approaches to achieving regulatory flexibility and commitment. The approach chosen should fit the particular country setting in the most credible and plausible way as a workable system. Some countries have the institutional background to get substantial efficiency and flexibility, while having the commitment that is needed for the system to be workable and for private investment to be forthcoming. Other countries may have to accept some

compromise with the efficiency goal in order to establish the kind of commitment that induces the private sector to participate (Levy and Spiller 1993).

The approach that emphasizes regulatory flexibility focuses on creating autonomy in the regulatory agency in an environment that allows discretion, but restrains arbitrary, unexpected, and undesired actions by the agency. Such actions include domination or excessive influence over the regulatory system by investors in their own interests, and expropriation of investors' assets by the government responsible for the regulatory system.⁶³ This approach is generally suited to the conditions found in OECD countries. Many developing countries constrain regulatory discretion in various ways, both formally through incorporation of regulatory procedures and rules in concession contracts, and informally through covert pressure on regulators and regulated entities.

The approach that emphasizes regulatory commitment under limited discretion embeds highly specific substantive rules in licenses provided to operators or in legislation ("regulation by contract"). This contractual approach (section 6.4), however, entails considerable loss of flexibility. The Chilean system provides a good example of this approach, since it consists of very precise benchmark regulations and leaves little room for discretionary action on the part of the regulator. Such a system relies on a set of institutions that can resolve conflicts, of which a judiciary is the most important, and an administrative apparatus. This regulatory model requires a strong institutional framework, since the parties involved must understand the basic logic of capital asset pricing models (for example, rate of return and marginal cost pricing), the need for technological change, and what efficient regulation looks like.

A well-designed regulatory system reduces the cost of private capital for the power sector. Such a system ensures that regulatory responsibilities for financially important decisions for the investors—such as license awarding and tariff setting—are based on technical, rather than political, factors. Otherwise, private capital would be attracted only on costly terms to the country.

⁶¹ In Latin America power supply entities were privatized under the "Washington consensus" that the quality of institutions have an important impact on economic growth. Attention was given to modernizing the regulatory frameworks of power markets for the newly privatized entities as part of the so-called second generation of reforms (Basañes and Willig 2002; Basañes, Saavedra, and Soto 1999).

⁶² These approaches draw on agency theory that stresses the asymmetry of information between regulator and the firm (Lafont and Tirole 1993), under which the regulator proposes a contract in order to make the firm reveal its private information. Price cap regulation and cost plus regulation are forms of this contract.

⁶³ This approach draws on transaction economics that emphasizes the need to minimize transaction costs over the long term. It views concessions as incomplete contracts, where the utility is guaranteed a fair rate of return and the regulator retains the residual rights of control.

This would be apparent by either high rates of return sought by investors, or mitigation of risk exposure at more competitive returns by earning high returns to equity during the early years of operation, take-or-pay contracts as used in PPAs by IPPs for their first projects in many countries, and by sovereign guarantees or third party guarantees.

International guarantees against regulatory risk can support these approaches for those countries where the domestic institutions do not provide a basis for credible commitments to any set of rules. This situation can exist if these institutions were created too recently to develop a good track record. Without adequate assurances of an effective regulatory framework (such as an effective

BOX 21. Partial Risk Guarantees for Privatizing Distribution in Romania and Uganda

Romania: A Partial Risk Guarantee (PRG) from the World Bank for 60 million was used to support the privatization through majority asset sale of the Banat and Dobrogea distribution companies in April 2005. The investor—Enel SpA of Italy—acquired a 51 percent shareholding through equity injection, and the balance of the shareholding was retained by the state through its distribution holding company. The licensing framework consisted of a distribution license for 25 years and a supply license for 8 years (renewable) subject to European Union policy. Revenues are regulated by the National Energy Regulatory Authority (ANRE) on the basis of a price cap or price basket methodology introduced prior to the privatization.

The PRG backstops a Letter of Guarantee issued by Citibank Romania for a term of five years, which provides for payment to the distribution companies for loss of revenues resulting from a change or repeal by the government or ANRE or noncompliance by ANRE with the provisions of the preagreed regulatory framework comprising (a) the distribution formula; (b) the full pass-through of electricity costs; and (c) pass-through of PRG-related costs.

The PRG Guaranteed Events and the claims mechanism are outlined in a Government Support Agreement (GSA) concluded between the Government of Romania and the distribution companies. In the event of a claim under the Letter of Guarantee, the Government of Romania, through the Ministry of Public Finance, has the primary obligation to reimburse Citibank Romania, with the World Bank guaranteeing repayment to Citibank Romania under the PRG if the Government of Romania fails to meet its obligation.

In this way, the PRG-facilitated closing of the first electricity privatizations in Romania in the context of a new regulatory framework for the country and ANRE's limited track record. PRG's mitigation of regulatory risk during the transitional period resulted in an agreement by Enel to reduce its return of investment by two percentage points per year. The resulting reduction in the revenue requirements of the distribution companies will yield substantial savings for the country over the life of the distribution companies, even though the PRG is available only for five years. Moreover, the PRG has established a lower investment return benchmark for subsequent privatizations of Romanian distribution companies, thereby generating further significant savings for the country.

Uganda: An IDA PRG of US\$5.5 million was issued in March 2005 in support of a 20-year concession of the Uganda Electricity Distribution Company for the benefit of UMEME Ltd. (a private consortium of Globeleq Ltd. of the United Kingdom and Eskom Enterprises of South Africa). Under the PRG structure, UMEME will have recourse to a Liquidity Facility in the form of a Standby Letter of Credit Facility issued by Citibank Uganda and backed by the PRG. The PRG is for a term of seven years and specifically provides protection for the following risks:

- Regulatory framework: Noncompliance by Uganda's Electricity Regulatory Authority (set up in 2000) with the preagreed framework relating to the distribution tariff; full pass-through of the bulk electricity supply from the domestic power transmission company acting as a single buyer; timely adjustments of tariffs.
- Government payment arrears: Nonpayment of electricity bills by government and its agencies.
- Termination payments: Buyout amount for underdepreciated investments resulting from early termination of the concession caused by breach of concession agreements by the government or any of its relevant entities.

The PRG helped to implement the first power distribution concession in Sub-Saharan Africa by catalyzing US\$65 million of investment commitment from UMEME for the rehabilitation and expansion of the distribution network. This transaction is likely to have an important demonstration effect for similar privatizations in the region.

Source: World Bank staff.

regulatory agency) and rules (for example, predictability about pricing and quality standards), private investors would be reluctant to commit their capital to the country's power sector. Export credit agencies provide guarantees against political risks for repatriation of profits and debt servicing (OECD 2003). Guarantees, such as the World Bank's Partial Risk Guarantee (PRG—World Bank 2002), have been specifically adapted to backstop a government's commitment to a predefined regulatory framework and a process of dispute resolution, thereby helping mitigate regulatory risk for private investors and facilitating a smooth transition to a credible regulatory framework. The PRG has recently been used successfully for this purpose in Romania and Uganda (box 21). A PRG cannot, however, substitute for a basically poor regulatory framework (Gupta and others 2002).

6.3 Regulatory Credibility for Private Investment

The regulatory credibility necessary for attracting long-term private investment in electricity services covers autonomy, transparency, and accountability.⁸⁴ The pressing need for this investment gives governments the incentive to improve the credibility of power market regulation.

The principal means for developing credibility is by establishing a designated regulatory agency that discharges its duties in a neutral and depoliticized manner. This agency is an institutional solution to keeping entities responsible for formulating policy apart from entities responsible for providing services. From the early 1980s to the present, 134 countries around the world—both OECD and developing—have set up separate regulatory agencies for their infrastructure markets as a prelude to or in tandem with sector unbundling and private participation (Environmental Resources Management 2004).⁸⁵ In the developing world, Latin America has advanced furthest, Central and Eastern Europe have advanced far, Asia is advancing, and Africa is starting to make progress.⁸⁶

A regulatory agency offers a number of institutional advantages. It can attract and develop the highly specialized technical skills needed for a complex sector to relieve overstretched and under-resourced government departments of this burden. It can also use its powers of arbitration to relieve the judicial system of a heavy caseload arising from disputes and clarifications of electricity regulations, and thus provide a faster and more flexible service than available under the formal, lengthy, and costly procedures of the typically overburdened law courts in developing countries. Such an agency also avoids the problems associated with industry self-regulation combined with anti-monopoly laws in the case of the power system, even when these laws are well developed and enforced. Experience with this approach in New Zealand showed up problems, such as the difficulty in finding a firm guilty of abuse of market power because of the technology-intensive nature of the industry (Patterson and Cornwall 2000).

In practice, regulatory agencies in many developing countries have not been allowed to discharge their functions properly. Even in some countries where legislation explicitly provides the appropriate framework, government ministries and their power utilities have restricted the activities of the agencies. Regulators have been excluded, for example, from overseeing new private investment in the sector, such as by approving PPAs with IPPs. They have not been able to review tariffs without being subjected to political pressure—or they have been excluded from tariff decisions. They have lacked the powers to pressure managements to improve the performance of their utilities. And they have not been able to help expanding access to affordable electricity services. Examples of these cases can be found among Indian states (Prayas 2003), as well as in Africa (Eberhard 2005). These problems have stimulated interest in modifications to this regulatory model, particularly contracting out of regulatory functions (covered later in this subsection) and regulation by contract (covered in section 6.4).

⁸⁴ The term “autonomy” is used in this context in preference to “independence” because a regulatory agency is an arm of government. Autonomy does not carry as much political controversy as independence when applied to sector regulators (for example, Rao 2004 discusses so-called independent regulation in India).

⁸⁵ This large number of countries relative to the lower number of countries that have undertaken some restructuring of their power systems (chapter 3), indicates that establishment of many of these regulatory agencies was a first stage that has yet to be followed by structural reforms.

⁸⁶ See Kirkpatrick and Parker 2004 for a review of experience with infrastructure regulation in low- and middle-income countries.

A regulatory agency should have the autonomy to carry out its duties. Autonomy applies to both the agency's organization, procedures, processes, and finances from arbitrary political and bureaucratic interference, and to undue influence from regulated companies and consumer interests. This autonomy is needed for providing the stability and enforceability of laws and contracts that are important to private investors (Lamech and Saeed 2003).⁸⁷ Regulatory agencies need to show autonomy to establish a track record that builds up their credibility.

Autonomy for regulatory agencies from governments can never be total. This is because ultimately governments are responsible for providing regulation, and therefore regulatory agencies must be accountable for their performance in conformity with government policies. Most laws that establish a regulatory framework allow governments to give policy directives to the regulatory agencies under their jurisdiction. A tariff policy directive from government, for example, should not reduce the regulatory commission to the status of a mere calculating machine. It should not take away discretion from regulators on rates of return, risk evaluation, rates of depreciation, incentives, and such elements of tariff regulation. It could, however, direct that subsidies to a particular class of consumers would continue for a given period at specified levels, propose a development charge for new investments, encourage hydro investments through preferential treatment, and ask for multiyear tariffs (Rao 2002).

A regulatory agency needs the legal status for autonomy from political and market influences, as well as for the authority to set parameters and monitor implementation of contracts. This can be achieved with the following key measures:

- Making the regulator accountable to the legislators that provided its legal status, instead of to an executive ministry.
- Funding the agency independently of government budget allocations, such as through a small surcharge on consumer's bills or a levy on the utility's revenues in a process not open to diversion by the government (Kelley and Tenenbaum 2004).
- Appointing commissioners on fixed, staggered terms with limitations on government's powers to dismiss them.
- Limiting government's ability to delay or overrule commission decisions, by making these decisions subject only to appeal to the judiciary or some other impartial source (Tenenbaum 1996).

Many developing countries provide for operational autonomy in the enacting legislation, which is followed in practice to varying degrees among these countries, but few of them meet the requirements for financial autonomy.

The autonomy of regulatory agencies should be protected by appointing its staff on the basis of technical competence. This principle has not been followed to date in many countries, including China and India. In India, the selection of regulatory commissioners has been biased toward retiring government servants, often from the sector they are to regulate. This policy perpetuates civil service mindsets and attitudes, and the resulting regulatory actions are unlikely to promote the commercial practices needed in the reformed power market (Rao 2002). Likewise in China, the national regulatory commission was set up with a small staff composed of engineers lacking economic training, which seriously affected the commission's ability to fulfill its mandate of regulating complex markets, preventing market power manipulation, and arbitrating industry disputes (Yeh and Lewis 2004). In both countries, the regulatory staff faced the difficulty of keeping at arm's length from the regulated entities because often these entities were managed by their former colleagues.

Transparency in a regulator's procedures and processes is critical for public credibility, especially for tariff setting, as well for attracting investors. A transparent tariff revision process at least helps unearth data that was shielded from public scrutiny. It also helps develop public understanding of the issues involved, including their serious nature and the symptoms and sources of problems (Prayas 2003). Transparency supports the public interest in controlling the environmental and social impacts of power system development. It gives confidence in the fairness and predictability of the application of regulations to investors, as well as allowing them to see their regulatory risks clearly and make provisions to manage them. Transparency can be ensured through (a) regulations that prohibit off-the-record communications between the parties involved in

⁸⁷ This finding is supported by an analysis of private investment in Latin American infrastructure (Pargal 2003). The analysis concluded that legislation that creates the legal basis for reform, rather than specific aspects of the institutional framework, is the most significant determinant of private investment volumes.

regulatory processes, (b) the obligation for the regulator to publish its reasoned decisions, and (c) the availability of all documentation presented and used in the processes to all participants and the public (except for commercially sensitive data).

The powers of the regulator should depend on how much autonomy it is likely to have. Regulation of the power sector applied by a regulatory agency with substantial autonomy is appropriate for countries that intend to attract private investment, and whose political and judicial systems have the capacity to limit the risks of regulatory failure. Countries with weak political and judicial commitments to transparent and fair regulation, but which still intend to open their power sectors to private investment, should focus on contractual approaches to improving sector performance. In Africa and Asia, the new regulatory agencies have fewer decision-making powers and autonomy from government than those in Latin America and Central and Eastern Europe.⁸⁸

Where the regulator is likely to act autonomously, it can be given substantial decision-making powers without undue risk of regulatory capture by one of the regulated parties. The reverse risk, that of a lack of checks and balances on the use of regulatory power, became an issue in Argentina and—according to some commentators—in the Indian state of Orissa. This risk can be managed within the broader legal framework. Where this risk is perceived to be serious, the regulator could be given a semi-autonomous status with mainly advisory roles, and other agencies would be vested with rulemaking and enforcement powers. This tradeoff is an option for countries with little separation of legal and executive powers (Brown and others 2006).

A new regulatory agency should not be allowed to become a roadblock in the view of investors, utilities, and customers. In the Philippines, for example, an Energy Regulatory Board was created during the initial reform stage to make regulation of the power sector more efficient and transparent. However, utilities used the right to judicial review of the board’s verdicts extensively, and the regulatory process became gridlocked. Instead of streamlining regulation, the new system made matters worse.

Contracting out of specific tasks can help regulators improve their competence, autonomy, and legitimacy and, hence, their credibility in the following ways:

- *Competence can be increased* by providing access to specialized skills and building core in-house skills through training.
- *Autonomy can be strengthened* by enabling the regulatory body to benefit from the reputation of an external agent, and giving the regulator a higher degree of control over who does the work, particularly in countries where there are constraining civil service rules.
- *Legitimacy can be established* in countries with weak or fledgling institutional capacity where external studies may be perceived to be more credible and can increase the transparency of the regulatory process.

Contracting out is particularly helpful for newly established regulators that need external support for their initial start-up phase. Suitable tasks for contracting out include gathering and analyzing information, monitoring compliance with existing rules, determining new rules, and enforcing rules.

Contracting out of regulatory tasks is particularly widespread by water and telecommunications regulators in Africa and Latin America, but it is less prevalent among electricity and energy regulators in developing countries (Bertolini 2004; Environmental Resources Management 2004). The functions most contracted out include monitoring compliance with physical and quality targets, monitoring compliance with quality parameters, and legal opinions. Most regulators contract out functions that are advisory or nonbinding in nature, and few agencies use contracting out to produce binding inputs into the decision-making process because the agencies are accountable by law for their decisions.

An independent nongovernmental expert panel would be a novel way to conduct periodic price reviews to shield regulatory decisions from political influence. This approach is an extension of the concept of contracting out regulatory functions to private entities. It has been used for a few long-term concession agreements in the water and sanitation sector, but not so far in the power sector. It could be organized in one of three ways:

⁸⁸ See Stern and Cubin 2003 for a review of regulatory governance arrangements.

- The panel replaces the regulator for the periodic review of prices, and it is empowered to take binding decisions—subject, perhaps, to limited-scope appeal.
- The panel gives a recommendation, without binding force, before the case goes to the regulator.
- The panel serves as an appeals body for a decision made by the regulator.

The concession agreement or the enabling law and regulations should specify in detail the method of appointing the expert panel to ensure true independence and high competence, the requirements for information and reporting from the company, and the principles and rules governing the periodic review. The amount of discretion given to the expert panel should be limited to ensuring that tariffs are set at a level sufficient to enable the service provider to meet specified service standards. Setting these service standards, tariff structures, and the like should be the responsibility of the relevant public authority, not the expert panel (Shugart and Ballance 2005).

6.4 Regulation by Contract to Support a New Regulatory Regime

Specific contractual arrangements may be needed to sustain private investment under a new regulatory regime. Private sector investors contend that a credible regulatory system requires more than a formally autonomous regulatory entity soon after it is created (Bakovic, Tenenbaum, and Woolf 2003). This is because many regulatory agencies begin performing their functions with the disadvantage of limited autonomy and capacity. The development of robust regulatory frameworks and strong regulatory institutions can be hampered by a variety of constraints, in particular underfunding and reluctance by governments to transfer real autonomy in decision making to regulatory agencies, even when required to do so by law.⁸⁹

The incorporation of regulatory procedures and rules in concession agreements can provide stability and credibility during the transition to regulatory autonomy. This is achieved by setting out details on important terms, such as initial price controls, in the main regulatory instruments (licenses or contracts) or by having clear tariff-setting principles in the country's legislation.

This form of “regulation by contract” limits the amount of discretion that regulatory bodies have in setting prices and targets for key performance parameters in this situation. It is particularly suitable for the initial years—such as for the initial tariff-setting period of about five years—of public-private partnerships where the private sector is investing substantial capital. Since this form is expected to transit into “normal regulation,” the contract should also specify the tariff principles that will be applied by the regulatory agency after the contract to reassure investors initially at the time of negotiating the agreement. Governments may have a role in setting the initial terms and conditions of key regulatory instruments, since they are best established as an outcome of the transaction process with private investors (Bakovic, Tenenbaum, and Woolf 2003).

Under regulation by contract, the discretion of the regulator is limited in areas that are known to deter investment, while the autonomy of the regulator is used to avoid uncertainties for investors. Such uncertainties arise from political micromanagement and changes of government or governmental policy. The objective is to define the tradeoffs between the regulatory objectives of protecting the interests of both consumers and investors. Hence, regulation by contract specifies in one or more formal or explicit agreements the formulas and procedures that determine the prices that a distribution company will be allowed to charge for the electricity that it sells. These formulas can be based on either cost-of-service regulation or incentive regulation, or sometimes a combination of both. The key component of the contract is a performance-based, multiyear, tariff-setting system.

The credibility of regulation by contract requires that the underlying principles and initial parameters of the contracts should be clearly specified in the country's primary or secondary electricity legislation (as in Argentina, Bolivia, Chile, and Peru). Regulation by contract is less likely to survive if the concession agreement is poorly specified or exists only within a stand-alone concession or license agreement with little clear support in national laws (as in Brazil). Hence, the performance of regulation by contract has been variable in the power markets of developing countries. Regulation by contract has been combined with autonomous or partially autonomous regulatory commissions in many Latin American countries,

⁸⁹ For example, it would be unreasonable to expect a new regulatory commission to close the gap between revenues and costs and rebalance tariffs across classes as merely technical adjustments when its government had previously failed to tackle these issues because of political opposition.

and this combination has generally been successful in inducing and sustaining private sector investment in more than 60 privatizations of electricity distribution systems.⁹⁰

Concessions for power distribution under regulation by contract resemble PPAs with IPPs for investments in power generation. This familiarity appeals to private investors. These concessions, however, are more difficult to negotiate and less able to be subjected to competitive bidding than PPAs, because of the large number of customers, the high visibility of retail power prices, and the need for ongoing investments, as well as their basic monopolistic features.⁹¹ The experience in Argentina with regulation by contract was similar to the pressure on IPPs from governments to lower the sale price of power under their long-term PPAs in East Asian countries following the 1997 financial crisis. Unlike concession agreements under regulation by contract, however, PPAs and concession agreements do not require an autonomous regulator when these agreements specify the investments to be undertaken.

Risk allocation is a major design issue for regulation by contract, just as for PPAs and concessions. This concerns which parties bear risks, especially risks from pass-through of power purchase costs, technical and nontechnical loss-reduction targets, foreign exchange fluctuations, and obligation to supply. Under regulation by contract, the parties to the concession act as agents for their principals, so it is the principals that bear these risks. The regulator acts for the electricity users served under the contract, the government acts for the citizenry, and the management acts for the investors and shareholders in the company that wins the contract. In addition, the government sustains the credibility of the regulator's position (Stern and Holder 1999).

Regulation by contract is sustainable only if the underlying economics to the concessions are viable. The concession agreement will not work if revenues are much less than costs. The gap must be closed by lowering costs or increasing revenues, or both. Investors must be protected, and the agreement might need to be combined with transition subsidies. Even in those countries where effective autonomous regulatory decision making has been achieved, regulators are not likely to follow policies that balance consumer and private investor interests where the financial, institutional, and technical performance are poor at the outset, and the transition to commercial standards takes longer than expected.

Concessions under regulation by contract cannot absorb major economic shocks to the regulatory system. Long-term PPAs with IPPs and long-term contracts for distribution concessions in Latin America have been highly vulnerable to exchange rate shocks—but neither could any other regulatory system absorb such shocks. Following the time that Argentina abandoned its Convertibility Law in December 2001, for example, which led to a major devaluation, government overruled the regulatory commitment under concession agreements to allow pass-through of increased supply costs to retail electricity tariffs. It was motivated by its desire to protect the economic welfare of power consumers, but at considerable cost to private investors in power distribution.

Robust and workable mechanisms for resolving disputes should be incorporated into concession agreements. The possibility of contract reopening poses a major risk for investors in the highly politicized conditions found in most developing countries. These countries don't have a tradition of separation of legal and executive powers, nor do they have well-developed parliamentary and legal systems. This limitation applies particularly when such contracts involve many parties, investment in sunk assets, and politically accountable governments that cannot or are unwilling to legally bind their successors. Contract features that appeared to increase the incidence of renegotiation of infrastructure concessions in Latin America are awards based on the lowest tariff bid, investment requirements specified in the contract, price cap regulation (see the next section, 6.5), absence of a regulatory body, and the regulatory framework embedded in the contract (Guash 2004). Alternative dispute resolution mechanisms to going through local courts are often preferable, including international arbitration.

The presence of a regulatory agency allows for simpler contracts that are easier to monitor, enforce, and revise. In particular, the presence of a regulator operating under a defined regulatory process helps deal with substantial renegotiations (Stern and Holder 1999). From this perspective, regulation and contracts are complements for network industries, rather than substitutes (Stern 2003). Renegotiation occurs because it is not possible to write enforceable long-term contracts that can cover all necessary contingencies in a power market. Often events during the term of concessions lead to pressure to reopen them. Concession agreements may also set out the terms and conditions incompletely,

⁹⁰ See Guash 2004 for an extensive bibliography on experience with infrastructure concessions in Latin America.

⁹¹ See Littlechild 2002 for a review of issues and some experience with competitive bidding for long term distribution contracts.

which can lead to problems between the regulator and the investors early in the life of the concession, as has occurred in the case of the electricity distribution concessions in New Delhi (Agarwal, Alexander, and Tenenbaum 2003). Moreover, governments often delegate their monitoring responsibilities to their regulator in the case of distribution concessions (as in the Latin American cases) because of the heavy monitoring workload when they have concluded many concession agreements. Ideally, of course, avoidance of renegotiation should be the aim of contract design and the behavior of the parties to the contract (Bell 2003).

6.5 Incentive Regulation to Promote Efficiency

*Incentive regulation is designed to give suppliers incentives to behave as if they were subject to competition.*⁹² It promotes innovation, cost containment, and service tailored to the needs of power users, and it allows regulators to reward suppliers for good performance and penalize them for poor performance. Power suppliers are given explicit financial and other incentives to achieve certain performance goals, as well as significant discretion on how to achieve the goals. Performance goals are typically to improve investment and operating efficiency or connect a target number of new consumers (Alexander and Harris 2001). This discretion is the main distinction in principle between incentive regulation and old-style cost-of-service regulation.⁹³ Another important distinction is that the link between suppliers' authorized prices and their realized operating costs are weaker and less explicit under incentive regulation than under cost-of-service regulation.

Incentive regulation is designed to offer the following advantages over cost-of-service regulation:

- *A stronger incentive to reduce costs, because the supplier keeps more of its gains under the weaker link between rates and costs.*
- *Lower costs of administering regulation plans, because these plans avoid the micromanagement of the regulated entities and intensive data collection*

and authentication required under cost-of-service regulation.

- *Helps power suppliers to adapt to competition, if and when some or all of their markets are liberalized, because it offers incentives similar to those that face firms in competitive markets.*

Incentive regulation that induces cost-minimizing behavior by power suppliers yields large gains to the most efficient suppliers, while cost-of-service regulation controls those gains, but creates weak incentives for minimizing costs. Incentive regulation is also appropriate for developing countries because of their generally weak capacity to audit the costs of power suppliers—which is critical to the effectiveness of cost-of-service regulation. These suppliers can exploit their advantage over regulators in information about their costs by padding their allowable rates.

Cost-of-service regulation (or rate-of-return regulation) can be considered for countries where rules can be enforced but complex regulatory arrangements cannot be managed. Jamaica's environment suited this approach by using highly precise binding contracts as the basis for substantial private investment. However, the contract could not be written in the way that Chilean contracts are written (see below), because enforcing that type of contract would not be feasible in Jamaica's institutional environment. In this particular setting, cost-of-service regulation was the best that could be done for providing commitment, even though it is second best for efficiency when applied in a manner that increases risks to the profitability of investments.⁹⁴

*Price cap regulation has emerged as the most popular form of incentive regulation.*⁹⁵ Incentive-based regulation typically puts limits on prices by one of the following means:⁹⁶ indexation of tariffs to specific input costs (for example, fuel); price index less x on regulated services; price capping for markets that could become competitive in time; and yardstick competition for monopolistic functions—typically power distribution. An incentive regulatory scheme typically specifies a

⁹² Incentive regulation was first proposed during the 1980s for infrastructure sectors in the United Kingdom. In the United States, incentive regulation is often called performance based regulation—see NARUC 2000 for a full description of performance-based regulation for distribution utilities.

⁹³ Cost-of-service regulation is sometimes called rate-of-return regulation.

⁹⁴ In India, for example, electricity regulatory statutes for many states require annual reviews of tariffs, which poses the risk that regulators will continually pass through to tariffs the benefits of investments that cut costs, and thus reduce the returns to these investments for the owners of distribution companies.

⁹⁵ Even in the United States, where cost-of-service regulation for electricity suppliers has prevailed since the early twentieth century, 28 electric utilities (about 10 percent of the total number) were identified in a survey as being subject to incentive regulation (Sappington, Pfeifenberger, Hanser and Besheda 2001).

⁹⁶ A workable form of economically rigorous price regulation based on marginal costs has yet to be developed.

commitment period (such as five years) during which the regulated company can adjust its rate as long as, on average, its rates rise no faster than inflation less a productivity offset (the x in the price formula), which allows consumers to share in the productivity gains. A variant on this approach is to cap revenues, but this has the disadvantage for many developing countries of discouraging connections to new consumers because more profits can be earned by increasing sales to existing consumers under the allowable growth in sales revenue.⁹⁷

In practice, the application of price cap regulation has tended to incorporate aspects of cost-of-service regulation, and vice versa. This reflects differences in outcomes between price cap forms of incentive regulation and the cost-of-service form of regulation, because price cap regulation focuses more on short-term operational efficiency, whereas cost-of-service regulation focuses more on long-term investment efficiency. Power distributors in Latin America have performed at a better level under price cap regulation than under cost-of-service regulation. The performance of distributors under regulation that combines elements of price cap regulation with elements of cost-of-service regulation lies between these levels. Under cost-of-service regulation, however, privately owned distributors are at most as efficient as publicly owned distributors (Estache and Rossi 2004).

The policy and regulatory framework based on incentives should cover not only the entities targeted for privatization, but also the entities that are likely to remain under state ownership in the medium term, especially the natural monopoly segments. This principle applies even though incentive regulation is based on the fundamental assumption that the regulated entity responds to economic incentives, such as those that increase profits if efficiency targets are exceeded, yet publicly owned service providers generally do not respond strongly to economic incentives.

*Regulation by contract and regulation by benchmarking are designed to overcome difficulties in applying incentive regulation.*⁹⁸ They can help address the following three types of problems that have been encountered under severely inadequate information about service costs (found in many developing countries):

- If the regulator sets the productivity offset too low, the regulated firms can make super profits as they cut costs, but at the risk of arousing public ire and demands for price reductions, as occurred in England and Wales during the years following privatization of the electricity supply industry in the early 1990s.
- The rate freeze form of incentive regulation, under which a company cannot change its rates during the commitment period, is dangerous in the absence of provisions for pass-through of significant costs outside the control of the regulated firms, especially in the presence of other factors unrelated to the implementation of incentive regulation that provoke a crisis in the power market, as shown dramatically in California in 2001 (Besant-Jones and Tenenbaum 2001).
- In some cases of price cap regulation, regulators have reacted to politically controversial high returns to investment earned by suppliers under price caps, by such means as periodically reviewing the level of the cap.⁹⁹ This has the disadvantage of creating unpredictability about returns on investment, thus indirectly raising the cost of capital for investment.

Benchmarking involves comparison of a measure of actual performance against a reference benchmark performance. The yardstick form of this approach can be used to promote indirect competition among regulated firms operating in geographically separate markets, under which the performance of a regulated firm is compared against that of a group of comparable firms. The National Energy Commission in Chile was the first to apply this approach to its electricity distribution firms. Benchmarking has been applied to many OECD countries for electricity distribution, and to Argentina, Brazil, Chile, Colombia, El Salvador, Guatemala, Panama, and Peru in Latin America, as well as to the Indian State of Orissa among developing countries.

Regulators have adopted a variety of benchmarking methods and techniques in incentive regulation. These approaches can be classified by whether the benchmarks represent the best (“frontier”) practice or some measure of representative (“average”) performance

⁹⁷ There are other variants to incentive regulation which are much less common than price cap regulation (see Jamasb and Pollitt 2001).

⁹⁸ Benchmarking of power distribution and transmission utilities is reviewed in Council of European Energy Regulators 2005, Edvardsen and Forsund 2003, Jamasb and Pollitt 2001, and Shuttleworth 1999.

⁹⁹ In the case of England and Wales, the incoming government in 1997 imposed windfall profits tax suppliers on the grounds that price caps had not fully reflected the scope for cost reduction.

(Jamansb and Pollitt 2001). The former focuses more strongly on performance variations between firms, and is suitable for the initial stages of regulatory reform when a priority calls for improving performance. Average benchmarking may be used to mimic competition among firms with relatively similar costs or when lack of sufficient, reliable data and comparators prevents application of frontier methods.

Benchmarking is particularly useful for regulating small off-grid power systems, particularly in its average form, because it costs relatively little to administer under the wide variety of production technologies and local market characteristics found in these systems. Benchmarked cost levels will seldom be optimal, but this disadvantage is often outweighed by ease of application. The essence of off-grid regulation should be light-handed with a focus on lower but affordable service standards and fewer regulatory requirements than applied to the main power

grid supply. Otherwise regulation becomes unworkable, such as when using individual cost-of-service calculations for the 119 electricity cooperatives in the Philippines (Reich, Tenenbaum, and Torres 2006).

The Government of India has adopted a variant of benchmarking to provide incentives for improving the performance of State Electricity Boards. Performance is measured and ranked on a series of indicators related to improvements in transmission and distribution, installation of meters, and institutional reform, with less emphasis on financial results. Simple and transparent measures are intended to make it easier to allocate resources according to true performance—rather than to states that are politically better connected to the central government—thus creating competition between states and, it is hoped, incentives for innovation. Two ratings firms produced the first such ranking in 2003 (Tongia 2003).¹⁰⁰

¹⁰⁰ <http://powermin.nic.in/report/Rating%20of%20State%20Power%20Sector-January%202003.pdf>.

7. ACCESS AND AFFORDABILITY TO ELECTRICITY SERVICES

OGN's Guidance on Access and Affordability to Electricity Services

Improvements in access to electricity services do not automatically follow comprehensive reforms that generate increased resources for investment in system expansion.

The cause—lack of access to credit, high connection costs, and affordability constraints—should first be diagnosed, and the findings should guide policies to address access and equity issues in the sector.

Various regulatory and policy approaches have been tried to expand access and affordability. They include the use of connection or coverage targets in concession and license agreements, the obligation to offer service, liberalizing entry by other suppliers to unserved or underserved areas, allowing different levels of service for consumers, and the provision of subsidies for system expansion and consumption.

Governments should also recognize that electricity may be appropriately provided by cooperatives or other community organizations operating minigrids or reselling power purchased from the grid or by private entrepreneurs offering solar home or battery recharging systems.

In general, targeting subsidies at connections would be preferable to subsidizing consumption. Governments should assess the extent to which proposed subsidy schemes would benefit the poor and whether there is sufficient fiscal space for these subsidies. Schemes that ensure competition for subsidies on the part of the service provider should reduce the fiscal burden. Cross-subsidies from other consumers can also be employed, but this approach should not unduly distort electricity prices or burden those consumers.

Governments may seek to introduce new, local service providers into the rural electrification business to meet demand in areas currently not served by the incumbent(s). They should consider how best to deliver this support, and in particular whether it should be provided through such existing facilities as small and medium enterprise (SME) development windows and NGO-supported microfinance and business development entities. They should factor in the state of private sector and financial sector development when assessing the possibilities for SMEs or community-driven models in the power sector.

Where subsidies are needed, they must be well targeted and based on a clear policy rationale, and include output-based aid (OBA) approaches, as well as more traditional input-based approaches.

Power market reform entails a number of important social dimensions for the poor. These dimensions include the prices of electricity services, access to electricity services, and quality of electricity services. Without access to services, other social aspects of power supply are irrelevant. The higher power prices that have followed power market reform in many developing countries raise concerns about affordability for low-income households and the role of subsidies in the new power markets. Quality of electricity service is closely linked to investment in supply capacity needed to meet growing demand for power by all types of power users, including low-income users located on the margins of power grids and in areas not connected to these grids.¹⁰¹

7.1 Context and Background

Developing countries face major challenges to improve access and affordability to electricity services for households on low incomes. These countries have responded to the challenges according to their income levels in the following two main ways:

- Some developing countries—generally in the middle-income group—have met these challenges with some success since the 1990s, partly by attracting private investment. These countries have an extensive energy infrastructure and basic coverage service of electricity services. This observation applies irrespective of the size of the power system.

¹⁰¹ See World Bank and ESMAP 2000 for a review of issues and options for providing energy services for the poor. Surveys of the social impact of power market reform in Brazil, Guatemala, Georgia, and India are reported in PA Government Services Inc. 2002.

- Small low-income countries, such as those in Sub-Saharan Africa, face low and stagnant growth in access to electricity. Their share of households with access has sometimes even declined as their population has grown faster than their power supply. Their challenges are particularly daunting because typically less than 10 percent of the population is electrified, mostly in urban areas.

*Extending access to affordable modern energy services—including electricity services—for poor households is one of the most practicable ways of supporting their welfare.*¹⁰² This is because expanding access—and therefore consumption—of these services from the low levels found in numerous developing countries helps to increase income and meet basic needs, such as improved health and primary education, as well as support social empowerment and environmental sustainability, and hence achieve the Millennium Development Goals (U.N.-Energy 2005).¹⁰³ The cost of these services to users is often considerably lower than the corresponding traditional energy alternatives used by poor households without access to these services.¹⁰⁴

Households that are not connected to electricity supply are generally poor. The main reason is that the access charges levied by power utilities amount to the equivalent of many months of the low incomes of these households, especially for residential premises situated far from the electricity grid. In addition, the premises occupied by many poor households are precluded from connection to public electricity supply because they are too poorly constructed to be safe for electrical wiring. Households may also experience long waits to obtain new connections to electricity service from poorly performing utilities and face demands for informal payments from utility employees to get connections. Their multifamily dwellings create uncertainty about liability for payments that deters traditional utilities from serving them. Finally, householders without formal title to the land they occupy face legal obstacles to obtaining electricity service from utilities.

Low-income households that are connected to electricity supply also suffer from low-quality technical and customer service. Low quality of power supply hits these households

hardest, since they cannot afford to repair damage to their electrical appliances caused by high voltage fluctuations and power surges, nor purchase protection equipment. They experience long waits for utilities to restore service after local network failures and to rectify inaccuracies in billing. Consumers on unauthorized connections to the network are exploited by dishonest utility employees for informal payments.

Households that can only afford to meet their basic needs sometimes prefer to receive electricity service from informal vendors rather than from utilities. In many cases, this happens because these consumers expend less on purchasing the small amounts of services that they can afford from vendors than they would by paying the relatively high fixed charges levied by utilities to cover the high up-front costs of their networks. Vendors also deliver services—such as recharging 12-volt batteries for lighting and radios—directly to households where the formal network does not extend to their communities.

Many governments actively discourage informal electricity distributors that serve many off-grid communities around the world. These distributors may be illegal where the incumbent utility has an exclusive franchise. They lack access to subsidies and to the capital markets. They may be disadvantaged by regulatory provisions suited to formal network providers because they create public hazards, high unit costs, low service quality, and harmful fumes from generators. Small operators may also form cartels and charge exorbitant prices to consumers. Nevertheless, in many countries informal providers are needed because services from the network operators are too expensive for poor areas, or the operators take too long to expand service.

Most of the poor in developing countries—especially the rural poor—tend to be avoided by private operators and have benefited little from private capital flows into developing country electric power sectors. One reason is because the poor do not have access to public electricity supply, and lack of access is far more prevalent in rural areas than in urban areas.¹⁰⁵ Another reason is that private operators are reluctant to serve low-income clients

¹⁰² Access for a household to electricity services from a public supplier encompasses a connection from a local distribution network to the place of residence and a legally valid agreement between the supplier and the householder for the supply of electricity services.

¹⁰³ Low access rates are examined in chapter 3.

¹⁰⁴ Households in Guatemala without electricity, for example, pay implicit prices of more than US\$11 per kWh (more than 80 times the price of electricity) for lighting with candles and wick lamps and to power appliances with dry cell batteries (Foster and Araujo 2004).

¹⁰⁵ Four out of five people without access to electricity live in rural areas of the developing world, mainly in South Asia and Sub-Saharan Africa. Globally about 1.6 billion people lack electric power (IEA 2002b). In Sub-Saharan Africa only 8 percent of the rural population has access to electricity, compared with 51 percent of the urban population. In South Asia only 30 percent of the rural population has access, compared with 68 percent of the urban population.

because these markets are not financially viable on a freestanding basis.¹⁰⁶ Investment and operating costs of rural energy projects are high relative to revenue potential, making returns unattractive to private investors. Meanwhile, few private rural energy and renewable energy investments have been commercially viable or competitive with investment opportunities in the generation subsector (World Bank 2003b).

Unless efforts are targeted at urban areas, as well as rural areas, much of the urban poor will not gain in access to electricity (Saghir 2005). Poor areas—especially slums and shantytowns—in many large cities have been virtually abandoned by the traditional electricity service providers because their staff are reluctant to enter these areas, particularly those areas that are known for their violent crime. Moreover, a large proportion of the growth in low-income households requiring access is expected to be in urban markets, since much of the population increase in developing countries will occur in urban areas, partly caused by migration from rural areas.¹⁰⁷ Fast population growth, rapid urbanization, and rising demand for electricity are overloading supply capacity and creating strong demand for new investment.

Extending electricity service to the urban low-income households requires improvement to the existing power system. Since power service providers in most urban areas are already serving better-off populations, they face modest demands for new capital investment—such as extending the grid to new periurban areas—relative to the cost of extending supply to rural areas. Even with lower connection costs and higher incomes relative to rural areas, though, many urban low-income households cannot afford the connection charges or monthly rates for electricity.

Policies for reforming urban power markets should consider the impacts on access and affordability in rural electricity markets. Despite differences in economic characteristics, these two markets are usually linked—in some cases physically, as well as technically, institutionally, and economically. Many rural areas are supplied from the national power grid and are subsidized from urban power markets. In these cases, scalable models for improving rural service provision can work only by improving the overall governance and management of the national power sector.

7.2 Reform Policies for Improving Access and Affordability

The impact of reform to power markets on the affordability of electricity for the poor has been a recurring issue. This is because of concerns that reform will unwind subsidies in power tariffs for poor households under policies that enable electricity service providers to recover their costs through user fees or subsidies. This issue has been studied for many countries.¹⁰⁸ Power market reforms designed and implemented by technical groups working at the national level, for example, allow users little say in the design and delivery of electricity services and can end up hurting—rather than benefiting—the poor.

Power market reform in developing countries is generally perceived as providing limited support to poverty alleviation (Estache, Gómez-Lobo, and Leipziger 2001; Wamukonya 2003). The main factors behind this perception are outlined in chapter 3. The focus on commercial performance by power suppliers that comes with reform is also viewed as detrimental to the interests of the poor because this focus reduces the scope for addressing social objectives through cross-subsidies from better-off consumers to poor consumers. This view would not be valid, however, in a well-conceived reform program, because reform offers the opportunity to introduce new ways for expanding access to electricity supply by the poor, and it also helps target subsidies efficiently on the poor in place of current approaches that largely favor the better-off consumers. Indirectly, reform should also help the poor by allowing governments to redirect fiscal resources from supporting power utilities to expanding social programs that benefit the poor.

Reforms can produce services that are better matched to the needs and ability to pay of low-income households. These services can emerge from making a power utility adopt commercial objectives or by allowing alternative suppliers to create new delivery mechanisms. The challenge is to discover an appropriate price-quality combination by offering service options to these consumers that lie between a high-quality service offered by a utility that is too expensive for low-income households or not available to them at all, and a low-cost service offered by informal suppliers but whose low quality imposes other costs or

¹⁰⁶ In Bolivia, for example, coverage of access to power supply did not change much in rural areas but grew in urban areas during the decade following power sector reform (Bojanic and Krakowski 2003).

¹⁰⁷ World Urbanization Prospects: The 2001 Revision, United Nations Department of Economic and Social Affairs—Population Division.

¹⁰⁸ For example, see Dodonov, Opitz, and Pfaffenberger 2004, Fankhauser and Tepic 2005, Freund and Wallich 1995, and IPA Energy Consulting 2003 for countries in Eastern Europe; McKenzie and Mukherjee 2003 for Latin America; and Monari 2002 for India.

limits the benefits to these consumers. One option, for example, involves trading off fewer hours of electricity supply at a steady frequency for a lower price.

Power market reform provides an opportunity to rectify the policy and regulatory constraints on electricity access and service for low-income households by overcoming entrenched attitudes to providing electricity services and developing different kinds of service. Opening up the main power market to new entrants can stimulate incentives specifically designed to attract new entrants into markets serving poor areas. The establishment of a new regulatory system for the main power market provides an opportunity to introduce regulations that specifically help the poor. Reforms that place the power sector on a sound commercial footing, however, will not automatically improve access and affordability of electricity services to low-income households. They may make little difference to this situation, or even worsen it. It is important to ensure that reforms do not adversely impact access and affordability. The ways in which market reforms can impact access and affordability to electricity services are shown in table 10.

7.3 Removing Regulatory and Institutional Constraints on Electricity Services

The causes of poor electricity access and service for low-income households originate in regulatory and institutional constraints:

- Institutional arrangements may impede the flow of private finance to the power sector and discourage innovation in service delivery methods. In many countries, for example, it is illegal for local private or cooperative generation and distribution enterprises to enter the power market.
- Regulatory frameworks often raise the biggest barriers to decentralized options for electricity supply, including barriers to alternative power technologies for locations not served by electricity and fuel distribution networks.

Setting up efficient regulatory and institutional structures is an essential part of supporting electricity services for low-income households.

TABLE 10. Impacts on Access and Affordability of Different Types of Utility Reform

	PUBLIC MARKET REFORM	PRIVATE SECTOR PARTICIPATION	REGULATORY REFORM	MARKET RESTRUCTURING
Price of service	Prices <i>may</i> adjust toward efficient cost reflective levels.	Prices <i>should</i> adjust toward efficient cost reflective levels.	Prices <i>should</i> adjust toward efficient cost reflective levels.	Prices <i>should</i> fall because of competitive pressures.
Quality of service	Quality <i>may</i> improve because of better management.	Quality <i>may</i> improve because of better management.	Quality <i>should</i> improve because of increased oversight and accountability.	Quality <i>should</i> improve as a result of competition.
Access to service	Access <i>may</i> improve because of improved finances.	Access <i>may</i> improve because of improved finances.	Access <i>should</i> improve because of increased oversight and accountability.	Access <i>should</i> improve as new providers widen consumer choice.
Fiscal flows	Subsidies to the sector <i>may</i> be reduced.	Subsidies to the sector <i>should</i> be reduced, and tax revenues from the sector <i>may</i> increase.	Subsidies to the sector <i>should</i> be reduced as tariffs converge to cost reflective levels.	Entry fees <i>may</i> generate revenues, and tax revenues <i>should</i> increase.

Note: **May** indicates possible impact; **should** indicates probable impact.

Source: Adapted from Foster, Tiongson, and Laderchi 2005.

Regulation of Electricity Markets Serving Low-Income Users

Electricity regulators have an important role in protecting the interests of poor consumers. They perform this role by promulgating service standards, guidelines, and codes of practice for electricity service. Many regulators of power markets have not issued these standards and codes, with such exceptions as the state energy regulator for Andhra Pradesh in India.¹⁰⁹ They need to find the right balance between protecting the commercial interests of the electricity service providers and the social interests of consumers. In the case of protecting poor consumers, this may not be achievable without funding arranged by government. The license conditions for distributors in some South American countries also spell out these standards and codes in some detail.

The regulatory system for rural electrification should not simply mimic the regulatory system for existing urban distribution systems. This is because of large differences in market characteristics, especially lower load densities and higher supply costs in rural areas. The following regulatory measures help create a business environment conducive to private sector participation and investment in rural electrification:

- Ensure that rural service providers face sensible incentives for supply under tariff reforms. Such incentives may include deregulation of retail prices to facilitate entry by suppliers to rural service areas in the absence of public funding.
 - Focus regulation on the price at which bulk service or network access is provided to competing providers.
 - Add an antitrust or competition law element to regulation, or issue nonexclusive licenses to prevent providers that have a dominant position in a market from using that position to prevent competition in that or related markets.
 - Simplify legal mechanisms for extending electricity service to unserved or poorly served customers to reduce the legal barriers to entry to a rural electricity market.
- Set affordable service standards for rural customers—covering distribution codes and standards for service quality, customer metering, and enforcement of disconnections.
 - Allow rival technologies to be selected on the basis of their economic merits without discrimination through barriers for entry to markets.
 - Apply wheeling charges and fair terms for providing backup support from the grid that facilitate the creation of multivillage power systems as an alternative to power supply from the main grid operator.
 - Encourage participatory approaches to rural electrification to improve interaction between the electricity service providers and rural consumers.
 - Lighten the information and reporting requirements imposed on service providers.

Regulation of off-grid electrification providers should be treated specifically for three reasons. First, off-grid electrification will become more important because many of the communities and households that have yet to be electrified are in relatively isolated locations for which off-grid electrification is the economically rational choice. Second, the regulatory issues associated with off-grid electrification have received little attention in the general literature of power sector regulation. Third, a poorly designed or implemented regulatory system can destroy an electrification initiative, often by imposing too much regulation, even for a commercially viable business model.

The traditional strategy of one national electricity regulator “doing it all” is often not sensible for enterprises that provide off-grid electrical services. Successful electrification requires that the traditional regulatory functions and tasks are often best performed by entities other than the national electricity regulator. Nontraditional regulatory techniques need to be developed and implemented for different forms of electrification. Four basic regulatory principles are presented in box 22 for designing and implementing regulatory systems that promote electrification in ways that maximize benefits and minimize costs (Reiche, Tenenbaum, and Torres 2006).

¹⁰⁹ The Andhra Pradesh Energy Regulatory Commission’s order Regulation No. 6 Standards of Performance in Connection with Electricity Supply to Consumers, issued in the AP Gazette of September 4, 2000, covers: restoration of supply in the event of power outage, quality of power supply, period of scheduled outage, complaints about meters, applications for new connections or additional load, paying off accumulated dues by customers, disconnecting seriously delinquent payers, and complaints about consumer’s bills.

BOX 22. Regulatory Principles for Promoting Off-Grid Electrification

The following four basic regulatory principles provide guidance for designing and implementing regulatory systems that promote electrification in ways that maximize benefits and minimize costs.

Principle 1: Adopt light-handed and simplified regulation—especially for off-grid electrification. This principle embodies the concept that a well functioning regulatory system is one that minimizes the costs of regulation for service providers and hence avoids undermining their commercial viability.

Principle 2: The national or regional regulator should be allowed (or required) to temporarily or permanently “contract out” or delegate regulatory tasks to other governmental and nongovernmental organizations. Although it may be legally necessary for the national or regional regulatory to have final formal responsibility over all entities within a country that provide electrical services to consumers, it does not logically follow that the regulator should be required to perform all regulatory functions and tasks. It is often more efficient for the regulator to “delegate” or “contract out” traditional regulatory functions for entities that are providing off-grid electrical service. These functions can be delegated to a functioning rural electrification agency or rural electrification fund.

Principle 3: The regulator should be allowed to vary the nature of its regulation depending on the entity that is being regulated. A regulator should be allowed to vary its methods of regulation depending on the type of entity that is being regulated, rather than adopt a “one-size-fits-all” view of grid versus off-grid electrification that risks unnecessary disputes about what the regulator can or cannot do under the existing statute. The electricity or regulatory law should be written (or amended) to give the regulator explicit authority to vary its regulatory rules and procedures (concessions vs. licenses vs. permits) depending on the nature of the entity that is being regulated (small vs. large, grid vs. off-grid, private vs. community based).

Principle 4: Quality of service standards must be realistic, affordable, monitorable, and enforceable. Quality of service standards need not be uniform across all customer categories or geographic areas. Instead, standards should be based on customers’ preferences and their willingness to pay for the costs of providing the specified level of quality. In the absence of subsidies, quality-of-service standards should not be imposed on an operator unless its customers are willing and able to pay for the costs associated with meeting the standards. This is of special import in remote off-grid markets, where users requirements can vary greatly and many households will be happy to get a lower service level (for example, more frequent short power outages) for less money, as long as that service level is clearly defined ex ante—ideally chosen from a menu of options.

Source: Reiche, Tenenbaum, and Torres 2006.

Institutional Reforms for Supporting Access and Affordability

Extending access to electricity for rural households often involves creating the entire energy infrastructure network and developing viable new electricity service providers. Rural areas often lack any infrastructure for providing energy services—whether electricity or other modern forms of energy. The remote locations and low density of demand raise the costs of electrification to unaffordable levels for many rural users. This lack of affordability challenges business models for rural electricity supply that are economically sustainable and financially replicable. Policies are needed for reducing the capital and operating costs of supplying electricity services to affordable levels for rural households.

Where this is not feasible, as is the case in many places, the policy choice is whether to subsidize capital costs for extending national power grids to rural areas or for developing off-grid solutions.

The interests of low-income consumers should be specifically represented on policy bodies for the power sector. Otherwise these consumers tend to be outweighed by pressure from politically well-organized and influential consumer groups who benefit from preferential services and low tariffs. NGOs that specialize in consumer protection have sprung up in various countries, such as India, and consumer watchdog organizations exist in many countries to monitor issues that affect consumer interests generally. Nevertheless, consumer

representation is usually limited to the likes of regulatory advisory councils, where they exert little influence over major policy issues.

Meeting the major specific challenges of expanding electricity services—as part of wider energy services—to rural areas usually requires dedicated institutional arrangements. A common problem for meeting this challenge is dispersion of responsibilities for rural electrification among numerous ministries and agencies, in which rural electrification needs receive little attention among the demands of mainstream energy sectors. Hence, an interministerial or interdisciplinary mechanism supported by a dedicated agency is required that can tackle the essentially local nature of many challenges for delivering electricity services in rural areas. This institutional arrangement is important for formulating policies for rural electrification, such as for the roles of public and private sectors, incentives and subsidies, appropriate quality standards, and prioritizing the areas covered by these policies (Barnes 2005).¹¹⁰

New entrants can bring many advantages to serving the electricity needs of low-income households:

- They can increase the available range of service options.
- They may be able to provide a “basic needs” level of service more cheaply than formal network operators.
- They may offer cost-quality combinations better suited to poor people’s willingness to pay.
- They may offer innovative tariff and payment systems that enable low-income households to access service.
- They are only likely to flourish if they provide a better service than the incumbent’s service to electricity consumers, or if they serve areas that do not receive service from the incumbent utility.
- They are more likely to encourage more of the population to connect to their systems, involve local leaders in the collection of bills to lower costs, provide flat rates for minimum service, and develop lower-cost systems to provide service to consumers who have low demand for electricity.

In the Republic of Yemen, for example, electricity use in rural areas is high compared to other middle-income countries because small-scale electricity providers supply rural towns and villages not served by the public utility. These providers range from individual households that generate for their own use and to supply a few neighbors, to larger operators supplying up to 200 households using diesel generators (Ehrhardt 2000).

Decentralized generation can be incorporated into the rural energy service company model. It can augment power supply, provide voltage support, and reduce energy losses in the transmission network. Decentralized generation by the private sector has expanded significantly in many countries, largely with financial assistance provided through local institutions. It has grown in the power deficit situations that many developing countries face, where expanding grid connections is of little value because the available bulk power supply cannot fully meet the demand on the power grid. The smaller niche market-based and community-based systems are applicable for remote areas where small village-level, minigrid systems are powered by microhydro or diesel generation, or both, as in Nepal. Private companies and suppliers would be best suited to provide individual solar photovoltaic (PV) systems, possibly with sales and maintenance support provided through a local NGO.

Opening the electricity markets to new service providers involves the development of private, community, or cooperative distribution companies that are responsive to consumers. Some approaches to attracting new entrants have had some success, including the dealer model, the concession model, and the retailer model (box 23). Under these approaches, suppliers can provide a range of services besides power supply, including metering and billing, rehabilitation and maintenance, system improvement, quality improvement, and demand-side management. Approaches should be selected according to their potential for widespread adoption in the specific circumstances of a country, given the prevailing constraints from financing for subsidies, technical assistance inputs, and the pace of overall market reform.

¹¹⁰ This referenced document—Barnes, Douglas F. (ed). 2005. Meeting the Challenge of Rural Electrification in Developing Nations: The Experience of Successful Programs—has case studies of rural electrification programs in the following developing countries: Bangladesh, Chile, China, Costa Rica, Mexico, the Philippines, Thailand, and Tunisia.

BOX 23. Three Models for Attracting New Electricity Service Providers

The dealer model centers on developing dealers that can sell equipment (such as solar PV systems) to people living far from the grid. Many countries already have retailers that serve rural areas, but they are typically weak and undercapitalized, and they serve limited territories. Kenya has a robust solar PV market (EAA, RAEL, and ERG 1999). Programs based on this model have tried various ways to strengthen dealer networks, with mixed results. In Indonesia such a program failed in part because it was implemented just before the financial crisis, although it had become evident that participating retailers preferred to sell PV systems for cash rather than providing them on a lend-lease basis. In Sri Lanka a project started out successfully, but multinational companies soon took over the local retailers.

The concession model is aimed at minimizing subsidies and encouraging private sector participation. The model depends on regulation by contract of large-scale competitive licensees or sublicensees more than by market forces, but it helps to ensure that projects achieve scale economies. In Argentina and Chile, for example, competitive bidding is used to award franchise rights for rural service territories to concessionaires providing service for the lowest subsidy. Concessionaires can choose from a range of off-grid technologies, although PV systems are expected to be the most cost-effective choice in many cases. Users pay a connection fee and monthly service tariff (set by the government), and the government pays the concessionaires a declining subsidy determined by their contract (Jadresic 2000).

The retailer model involves a decentralized approach to providing electricity to households without access to grid service. Variations include rural electric cooperatives and competitive licensees (rural energy service companies), models based on various small market service providers, and various community-based models. A community, organization, or entrepreneur develops a business plan for meeting local demand for electricity, and then submits the plan to a project committee. If the committee approves the plan, it grants a loan or subsidy for developing the business. The retailer uses a fee-for-service arrangement to recover costs, repay the loan, and earn a profit. This approach ensures significant local involvement and consumer choice.

Source: Saghir 2005.

7.3 Financial Viability and Affordability

The financial viability of electricity service providers is essential for the sustainability of affordable services to low-income households. Market segments serving low-income consumers raise important issues for viability that need to be considered under reforms to the power market as a whole. These issues cover delivery costs, service prices, and subsidies.

Unless electricity can be produced and delivered more cheaply than presently, it can be unaffordable without subsidies for many low-income households. The costs that matter are not only the unit energy costs, but also the costs of extending the network into an urban slum, for example, or to a rural town. The low demand for services would raise tariffs—including access charges—to recover the costs of extending a power network to unaffordable levels for low-income households and small or isolated communities. As a result, these users benefit from power market reform that brings down the average cost of extending power networks in urban and periurban areas and spurs alternative solutions—including minigrad services—for rural areas (Powell and Starks 2000).

Reducing Service Costs

Low-cost services should be emphasized in policies for providing electricity services to low-income households. These policies should support technologies for low-cost electricity generation and distribution. They should allow some flexibility in regulated service standards, since the levels of electricity service applied to the main power markets are generally unaffordable for low-income households. Special programs for service delivery can be developed to cater to their needs by adopting lower construction and supply reliability standards, so as to reduce the costs of extending access and delivering services without compromising safety and environmental standards.

Connection costs can be reduced by exploiting cost-effective technical designs and the scope for reducing the construction costs of rural networks. In many cases, as in South Africa, careful attention to system design reduces construction costs by up to 30 percent, contributing significantly to the pace and scope of rural electrification. Adopting urban system design standards for the electrification of rural areas has led to the poor service, high losses, and low collection efficiency facing the power sector. For example, low-hanging bare

conductors on low-tension lines facilitate energy theft by unauthorized connections to the lines, old meters are easily tampered with, and low voltage levels over long lines create large line losses of energy.

The following policy instruments are available for promoting access to electricity services by low-income households:

- *Instruments that require service providers to extend access—universal service obligation and connection or coverage targets in concession and license agreements—in order to overcome a reluctance to serve customers whose business is not commercially attractive to service providers.*
- *Instruments that increase supply options under restrictions on alternative ways to provide services under privatization when connection to the public network is mandatory—broader service obligations, licensed entry to unserved or underserved areas of alternative service providers, and promotion of partnerships between utilities and alternative service providers.*
- *Instruments that reduce connection costs using the private cost of capital for financing network expansion—lower-cost technologies, labor contributions in kind, credit lines, connection subsidies, and connection cross-subsidies.*

These instruments have the advantages and disadvantages summarized in table 11.

Designing Appropriate Tariffs

Well-designed tariffs can lower customers' bills while increasing the service provider's profits. Such tariffs cover pricing for specific service quality standards and the payment arrangements for electricity. Where necessary, they also incorporate subsidies provided through service providers. Well-designed tariffs allow consumers to choose tariff options that best meet their specific demands. For example, a customer could choose to pay a lower monthly fee, but a higher per-unit charge, or to pay a higher monthly fixed fee and a lower per-unit charge. Monopoly providers seldom offer such services because they do not face market risk. This practice is common, however, in competitive markets for other goods and services, such as telecommunications.

New entrants may also offer innovative tariff and payment mechanisms more suited to the services demanded by low-income households. These entrants are more likely than power utilities to charge flat rates for their services without imposing periodic fixed charges. This enables low-income households to match the amounts of electricity purchased according to changes in their actual cash incomes and other expenditures. Informal providers are also more likely to design payment mechanisms that can accommodate noncash transactions for the poor who operate outside the traditional cash economy and engage in bartering activities to meet their needs.

Even incumbent power utilities can be pushed under regulatory pressure to implement flexible payment mechanisms suited to the poor. These utilities are often unwilling to provide service to predominantly poor areas because of the risk of nonpayment. Their periodic bills for accumulated consumption tend to strain the cash resources of low-income households. Prepayment mechanisms increase payment security to the service provider and ease budgeting by low-income households. Prepayment meters and cards have been widely adopted, for example, in South Africa (Tewari and Shah 2003). Another example is the recharging for a fee at privately operated charging facilities of 12-volt batteries used for electricity supply in many African households. For customers with low and variable cash incomes, these advantages offset the disadvantages of higher unit costs and lower payment convenience relative to grid-based electricity supply.

Appropriate services to low-income households can be provided through nonstandard service delivery mechanisms, service types, and tariff and payment mechanisms. This requirement arises from geographical features, economic capabilities, social patterns, and land tenure arrangements. Traditional power utilities, however, tend to have a one-size-fits-all approach to service standards and charging. Few utility managers have much contact with poor areas or a real understanding of the needs of potential customers there. Private sector participation in utility management can help, but it may not overcome the tendency to ignore poor and marginal areas.

The following policy instruments are available for jointly promoting the financial viability of service providers and the affordability of electricity by low-income households:

TABLE 11. Policy Instruments for Promoting Access to Electricity Services

INSTRUMENT	ADVANTAGES	DISADVANTAGES
INSTRUMENTS THAT REQUIRE OPERATORS TO PROVIDE ACCESS		
Universal service obligation	Provides a legal obligation to serve all customers, including those that may not be commercially attractive.	The obligation is rather vague and may not be meaningful if poor customers cannot afford connection charges or if others live far from existing networks.
Connection targets	Forces a concrete definition of realistic coverage targets, ensuring that unprofitable customers are served. Can be monitored and enforced by use of financial penalties.	Requires users to accept an obligation to connect. Affordability of connection charges can be an issue.
INSTRUMENTS THAT INCREASE SUPPLY OPTIONS		
Broader service obligations	Ensures that an alternative is available for households that are not able to connect to the network.	Poor households prefer private connections. Communal supply points tend to be unprofitable.
Licensed entry of alternative providers	Provides choice to consumers. Increases competitive pressures on the dominant utility.	May make investment unattractive to utility. Difficult to regulate small suppliers for adequate quality of service.
Promotion of partnerships	Improves supply quality to communities lacking utility connections. Reduces utility commercial risk from serving marginal communities.	May be difficult to achieve collaboration between the formal and informal sectors.
INSTRUMENTS THAT REDUCE CONNECTION COSTS		
Labor contributions	Allows households to contribute their time rather than money. Reduces external financing requirement.	There may be significant costs in training and supervising community volunteer labor.
Credit lines	Addresses what is sometimes the real underlying problem—credit constraints—rather than absolute affordability of access.	Provided by private operator could lead to increased risk exposure. Requires collaboration of microcredit institutions.
Source: Derived from Estache, Foster, and Wodon 2003.		

- Instruments that facilitate payment of bills by low-income households arising from requirements to improve revenue collections—billing frequency and prepayment devices.
- Instruments that protect low-income households from increases in costs of service arising from more demanding quality-of-service standards—different levels of service for consumers and consumption limiting devices.

The advantages and disadvantages of these instruments are summarized in table 12.

Subsidizing Electricity Services to Low-Income Households

Governments have traditionally subsidized electricity rates as a means of income support for the poor.¹¹¹ They have usually chosen below-cost tariffs to make

electricity usage more affordable, but they have often applied this policy indiscriminately by failing to ascertain whether electricity rates are really unaffordable to low-income households.¹¹² They have also applied this policy regressively when the richest users received a large share of this subsidy because they consume the most electricity. Under some tariff structures, the average payment per kilowatt-hour of electricity by rich users is actually lower than the payment by poor users. Moreover, subsidies are generally ineffective in many developing countries where chronic power shortages reduce consumption by subsidized users to well below their needs. In these countries, power rationing tends to reflect the greater political influence of better-off consumers by favoring the areas that serve them at the expense of low-income areas. Generally, therefore, the substantial empirical evidence questions the effectiveness of many subsidy schemes as a means of helping low-income electricity consumers (Komives and others 2005).

TABLE 12. Policy Instruments for Promoting Affordability of Electricity Services

INSTRUMENT	ADVANTAGES	DISADVANTAGES
INSTRUMENTS THAT FACILITATE PAYMENT OF BILLS BY LOW-INCOME HOUSEHOLDS		
Billing frequency	Facilitates budgeting for low-income households.	Increases administrative costs of revenue collection, but may improve revenue collection rates.
Prepayment devices	Facilitates budgeting for low-income households.	May lead to “self-disconnection.” May be costly and subject to fraud. Requires the creation of a network for selling “smart cards” if electronic technology is used.
INSTRUMENTS THAT PROTECT LOW-INCOME HOUSEHOLDS FROM INCREASES IN THE COSTS OF SERVICE		
Different levels of service	Allows consumers to choose their preferred balance between the cost and quality of service.	May not always be technologically possible to differentiate quality of service provided through a common network.
Consumption limiting devices	Prevents low-income households from consuming beyond their means.	May lead to hardship if basic needs exceed imposed consumption ceiling. Required metering technology may be too expensive. Runs against the private operator’s commercial incentives.
Source: Derived from Estache, Foster, and Wodon 2003.		

¹¹¹ The countries of the former Soviet Union subsidized electricity tariffs as rewards for acts of bravery, patriotism or other achievements. These subsidies were also given to victims of disasters (such as at Chernobyl nuclear power station), war veterans, old age pensioners and others. In some countries, such privileged tariffs applied to more than 50 percent of the population (Krishnaswamy and Stuggins 2003).
¹¹² Ascertaining the affordability of electricity rates for low-income households should usually be carried out at the local level, since the necessary understanding of the consumption characteristics of these households is seldom found in national institutions.

Governments have also subsidized connection charges to help low-income households gain access to electricity services. This is a better policy than subsidizing the operating costs of service providers, because the latter are poorly targeted at the intended beneficiaries. The initial connection charges demanded by power utilities are often a greater barrier to obtaining electricity service for households than monthly electricity bills. These charges can be reduced through subsidies, such as a preset payment per connection to a private investor, to meet annual targets of new connections to the power system under rural distribution concessions, as in Guatemala (Economic Consulting Associates and Mercados Energéticos 2002a; Foster and Araujo 2004).¹¹³ These charges can also be spread over several years without subsidies as a surcharge on the recurrent costs of electricity, where the need is to correct for a weakness in financial markets rather than to overcome constraints on affordability. These practices allow larger numbers of low-income rural households to pay for the low levels of electricity consumption that they value highly.

Well-designed subsidies can be used to attract private sector participation through concessions and asset sales. A “good” subsidy scheme is one that enhances access for low-income households while sustaining incentives for efficient delivery and consumption, as well as being practicable within the financial and administrative capacities of the subsidy provider—usually the government (Barnes and Halpern 2000). They meet the three criteria of efficiency, equity, and effectiveness. They are efficient because they maximize the social (or economic) benefits relative to the opportunity costs of the subsidies. They are equitable because they reach the poor people that do not have electricity service, rather than better-off people that can afford to pay the full cost of services. And they are effective because they deliver sustainable support to the intended population (Barnes 2005).

Electricity services for the poor generally meet the economic criteria of suitability for subsidies. Subsidies for extending access meet these criteria better than subsidies for consumption. Even under successful reform, low-income households need help with financing the costs of connecting their premises to the network and installing meters at the points of consumption. Lifeline rates serve a social purpose by enabling these

households to afford a limited amount of electricity consumption when electricity tariffs are increased toward cost-recovery levels under reform. Subsidizing the cost of bulk power to privately managed distributors in situations where revenues fall below the full cost of supply—including financing costs—can ameliorate tariff increases for low-income households, but only regressively since most of this subsidy goes to other electricity consumers. Governments should provide financial support for subsidies that it requires, as shown by experiences in two Indian states.¹¹⁴

The following instruments are available for implementing these subsidy policies. Their advantages and disadvantages are summarized in table 13.

- Instruments that help low-income households gain access to electricity services.
- Instruments that protect low-income households from general increases in tariffs arising from cost recovery requirements and removal of major cross-subsidies—lifeline tariffs, targeted tariff discounts, vouchers, and tariff rebalancing.

The design of subsidies to help low-income users may be enhanced by a number of considerations when implementing power market reform:

- Subsidies should not be incompatible with commercialization of power supply. They should therefore be transparent to show their full cost to the parties that benefit from them and to those that finance them.
- Subsidies should be well targeted so that users who really need them receive subsidies while improving the affordability of the total subsidy. There are practical issues for designing targeting mechanisms where affordability is a binding constraint on providing electricity services to low-income households (Komives and others 2005). For example, a “lifeline rate” should be available only to users of small amounts of electricity (since this class of users is a fairly reliable proxy for low-income households). General subsidies for electricity use could impose unsustainable burdens on financial resources.

¹¹³ See Economic Consulting Associates and Mercados Energéticos S.A. (2002b) for lessons from the private provision of rural electrification in Southeast Asia—Cambodia, Laos, and Vietnam.

¹¹⁴ The government of Andhra Pradesh provides a good example of implementing this policy, but the government of Orissa did not provide subventions to cover subsidies and also blocked tariff increases needed to cover deficits, thus undermining the willingness of the private owners to undertake critical investments for improving services (chapter 4).

TABLE 13. Subsidy Instruments for Helping Low-Income Electricity Consumers

INSTRUMENT	ADVANTAGES	DISADVANTAGES
INSTRUMENTS THAT HELP LOW-INCOME HOUSEHOLDS GAIN ACCESS TO ELECTRICITY SERVICES		
Connection subsidies	Targets subsidy funds to low-income individuals with low administrative costs. Costs of community-level subsidies can be kept down by competitive bidding.	Requires government finance and is relatively costly per household connected. User cofinancing should be required to ensure commitment.
Connection cross-subsidies	Does not require external source of funding and spreads cost over a large connected population (often with greater ability to pay than the unconnected population).	Requires the unconnected population to be small relative to the connected population. The connected population may be unwilling to shoulder the subsidy.
INSTRUMENTS THAT PROTECT LOW-INCOME HOUSEHOLDS FROM GENERAL TARIFF INCREASES		
Lifeline tariffs	Entails minimal administrative costs.	Based on the questionable assumption that poor customers are small consumers, because of large families, shared dwellings, and reliance on secondary retailing (sales between neighbors).
Targeted tariff discounts	May provide a more reliable way of identifying low-income households.	It is difficult to find good targeting variables, and administrative costs may be significant. May be difficult to raise subsidy or cross-subsidy funds.
Vouchers	May provide a reliable way of identifying low-income households. Adds flexibility for user to select service provider. Low-income customers can be commercially attractive.	May be administratively complex and open to abuse. Remains difficult to identify good targeting variables and raise fiscal funds.
Tariff rebalancing	Reduces burden of fixed costs on small consumers.	The overall impact on affordability may not be large. Utilities may need to cover fixed costs of billing.
Source: Derived from Estache, Foster, and Wodon 2003.		

- Subsidies and taxes should avoid undermining electricity service markets by favoring one fuel over another, giving consumers distorted price signals, or creating disincentives for entrepreneurial solutions to electricity supply.
- Subsidies should be targeted to make access more affordable in ways that bring down the one-off fixed costs associated with electricity consumption, rather than the recurring costs of electricity consumption.

BOX 24. Output-Based Aid

Output-based aid (OBA) is a form of output-based mechanism for supporting the delivery of basic services that warrant some degree of subsidy to address affordability or to obtain social benefits when these services have the characteristics of a merit good. Traditional responses have focused on financing assets or other inputs used by public sector service providers, often with disappointing results. In contrast, OBA involves delegating service delivery to a third-party (typically private firms, but also NGOs) under contracts that tie payment of the subsidy to the particular outputs or results delivered. The public payments may complement or substitute for user fees, and may be funded from Bank loans, other sources of development assistance, or from a government's own resources. OBA approaches can also help to mobilize private financing in support of development outcomes.

OBA schemes take a variety of forms. Examples include the contracting out of services under performance-based contracts, the award of concessions or franchises for the delivery of services on the basis of least subsidy required, and voucher-type schemes, which give consumers a choice of supplier. The choice of approach, the specification of performance requirements and payment structures, and the design of detailed implementation arrangements need to take account of a variety of sector- and country-specific features. Although some of the design and implementation issues can be challenging, much can be learned from experience dealing with similar issues in private infrastructure arrangements, and many of the lessons can be transferred not only across countries, but also across sectors.

Source: Brook and Smith 2001.

- Some degree of cross-subsidy will always be possible, even with open access to the power market, because of the economies of scale in network services. The scope for large cross-subsidies could become unsustainable, though, if new entrants are able to take the most profitable consumers away from the customer base used for cross-subsidizing low-income households.

Approaches have been developed for delivering subsidies to extend access to electricity services by low-income households. They include OBA approaches (Brook and Smith 2001—box 24) and other competitive approaches (Wellenius, Foster, and Malmberg-Calvo 2004), as well as more traditional input-based approaches (World Bank 2004b). For example, a competitive auction for subsidies for rural electrification was developed in Chile in association with the reform of the power sector, with successful results (Jadresic 2000; Gómez-Lobo 2001). Competitive auctions for payments to cover the capital costs of new connections to rural households by private contractors and operators were successfully implemented in Gabon (Environmental Resources Management 2002), Guatemala (Harris 2002), and Mozambique (Sakairi 2000).

Competitive approaches offer the advantage of allowing private innovation for finding solutions to extending electricity services. They allow governments and donor agencies to structure projects and provide a mechanism for donor contributions. They allow all types of projects (grid, off-grid, and solar) to be considered. They leverage private sector investment while keeping down

public contributions to the cost of extending access. Finally, they help develop market testing of alternative approaches to see which ones work best in the specific circumstances of a country or region (Townsend 2002).¹¹⁵

The design of subsidy delivery mechanisms should be compatible with the design of a new power market structure. This would improve the efficiency of subsidies and reduce the need for cross-subsidies (Ehrhardt 2000). The delivery mechanism should be selected according to the following sequence of decisions:

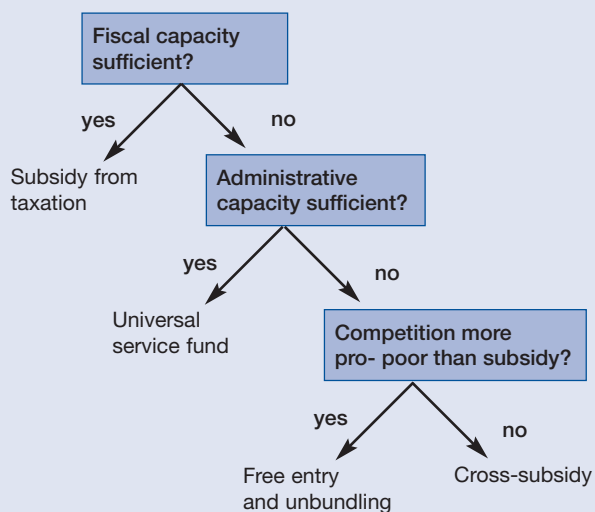
- If government can afford to allocate fiscal resources to subsidizing low-income users, providing subsidies for electricity access and consumption from direct taxation is economically the most efficient way.
- If the government is fiscally constrained, a Universal Service Fund should be considered that is designed to provide cross-subsidies without distorting competitive forces in the power market. All service providers must pay a levy into a fund, and providers supplying poor customers at below cost receive subsidies from the fund. This fund may be difficult to administer, however, particularly if it involves numerous small-scale providers.
- If a subsidy is required, but administrative capacity is too limited for a Universal Service Fund administered through several service providers, government needs to decide whether competition or cross-subsidies is more helpful to the poor. A cross-subsidy would

¹¹⁵ See Econ One Research, Inc. (2002) to see how a private distribution operator was able to improve service quickly in Namibia.

require restrictions on free entry and unbundling. Alternatively, free entry and unbundling should be considered if entrants can serve the poor without a subsidy. This choice should be assessed on a case-by-case basis.

This process can be represented by the decision tree shown in figure 8.

FIGURE 8. Decision Tree for Source of Subsidy Funding



Source: Ehrhardt 2000.

8. IMPLEMENTING POWER MARKET REFORM

OGN's Guidance on Implementing Market Reform

The extensive range of economic and institutional endowments found across developing countries rules out “cookbook” solutions for reforming power sectors. This lesson applies regardless of the choices made for roles of public and private sectors for power supply.

Power sector reform strategies should be designed to fit an overall framework for delivery of modern energy services to promote poverty alleviation and economic growth. Meeting these two objectives requires the provision of reliable electric power services in sufficient quantity to meet affordable demand at the lowest cost reflecting the resources and impacts involved in their production and transportation.

Competition, unbundling, private participation, and other reform elements are not ends in themselves, but rather intended to contribute to the achievement of broad goals for poverty reduction, economic growth and environmental sustainability. In particular, these reforms should improve the economic efficiency of the sector and the commercial and operational performance of service providers.

Given the differing points at which they find themselves, countries must fashion power sector reform strategies that reflect the strategic priorities for the sector, and the immediate country conditions that influence the suitability of particular approaches.

Governments face critical decisions in reforming their power sectors.

The following valuable policy lessons have been learned from experience with implementing reforms to power sectors in developing countries (chapter 3):

- The role of the private sector in the power market should be suited to the prevailing country and sector conditions (chapter 4).
- Competition in the power market is open to serious abuse of market power and is best started by limited forms under the conditions generally found in developing countries (chapter 5).
- The form of the regulatory framework should be chosen to produce credibility and predictability for private investors and operators (chapter 6).
- Power market reform should take account of the needs of the poor on the grounds of equity and political sustainability (chapter 7).

Additional policy lessons are provided in this chapter about the implementation of power market reform, including the need for careful consideration in the sequencing and pacing of power market reforms to manage risks for investors, consumers, and governments during the transition period to the reformed structure.

8.1 Challenges for Implementing Power Market Reform

Reform strategies must address a generic set of interrelated challenges. The main challenges are the following: ensuring that consumers pay fairly and promptly for their electricity consumption; changing the manner in which new investments are financed; increasing the efficiency and development effectiveness of those investments; and increasing operational efficiency, while addressing equity concerns as the power market expands. However, the process of comprehensively reforming power markets through industry and market restructuring, private sector participation, arm's length regulation, and competition is technically complex, time-consuming, resource-intensive, and politically risky. It requires phasing and good sequencing to create the conditions for market transformation (World Bank 2003b).

Reform of power markets should cover the whole power market—not just discrete parts. For example, rural power markets should be included in reforms carried out in urban markets because these markets are linked physically by grid interconnections and financially by cross-subsidies and joint costs. Regulatory reform should also apply to all suppliers—both state-owned and privately owned—to ensure economically efficient operation and development

of the power market. Furthermore, reforms should be extended to energy markets rather than be concentrated on the power market, where reforms to these markets have many spillover effects. For example, fuel supply markets usually need to be liberalized to support restructuring of the power market.

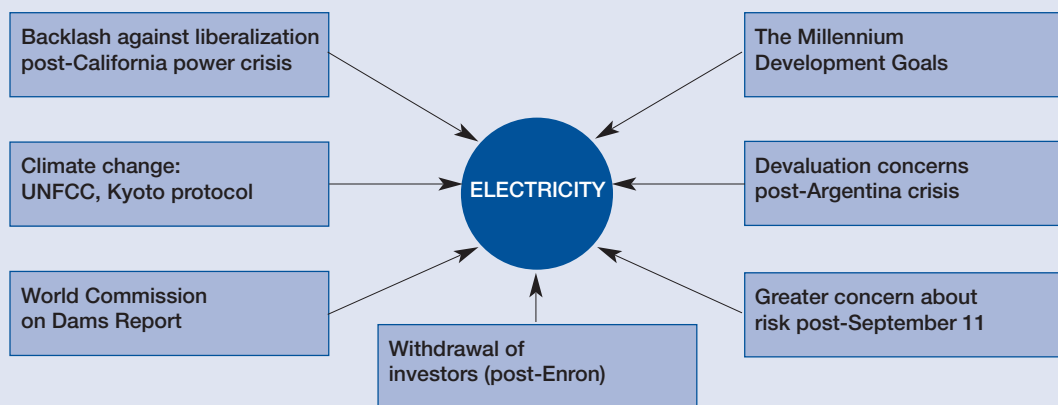
Developing countries face many formidable priorities for reviving power investor interest in their power markets in a challenging global environment (figure 9). The priorities concern the following areas:

- Legal framework for private investors.
- Consumer payment discipline and enforcement.
- Regulatory predictability.
- Administrative efficiency for approvals and licenses.
- Credible arbitration available for investors.
- Investment grade (country) credit rating for foreign exchange debt.
- Positive view of private investment by civil society.
- Commitment to new sector structure by key stakeholders.
- Good country reputation for preventing corruption.

Arranging the large amounts of financing for covering the costs of power market reform can be a major challenge. Some of the main cost items are discussed in chapter 4 in the context of justifiable public investment. Major reform programs usually incur substantial costs for the following items:

- The cost of new metering for a competitive wholesale market, which can be enormous if a low threshold allows a large number of participants.
- Substantial investments that are usually needed to upgrade the power system control and communications system needed for a decentralized trading system.
- The substantial cost of establishing a new regulatory agency.
- Extensive consulting services to help draft legal and regulatory documentation and system technical documents, such as grid codes; plan and implement the restructuring of the incumbent power utility into new corporate entities; and draft the legal agreements and design the market bidding, dispatch, and settlement systems for establishing new trading arrangements.
- Hiring transaction advisers for carrying out due diligence and preparing and marketing entities for privatization.

FIGURE 9. The Challenging Global Environment for Developing Countries



These costs can amount in total to hundreds of millions of U.S. dollars, even excluding the cost of restructuring sector debts.¹¹⁵

Reforming power sectors is a long-term process that carries many political risks for governments (chapter 2). This situation applies especially to countries starting with weak governance structures for power suppliers and poor investment climates. Risks arise from the following features of reform:

- Unavoidable substantial costs in the short term.
- Uncertainty about when reforms will yield benefits in the long term because unanticipated events can derail reform programs.
- Opposition from politically influential interest groups that lose under reform (subsidized consumers, employees of the former state-owned enterprise who will be made redundant, bureaucrats and politicians who lose powers of patronage).
- Opposition by society at large to privatizing an essential public service, especially to foreign parties.
- Difficulty in improving service quality needed to gain public acceptance for tariff increases needed for reform, and vice versa. Opponents of reform have blamed private investors for tariff increases needed for financial viability, and have generated a backlash against private power supply in some countries that raises the prospect of renationalization.
- Mobilizing the financing for the heavy costs of reform (debt restructuring, investments essential for restructuring) under strained public budgets, as well as for expanding supply capacity to keep up with growing demand until the reformed sector can attract substantial risk capital.

8.2 Government Roles and Responsibilities

Governments have important roles and responsibilities in reforming their power markets. They must decide on the relative roles of public and private sectors in providing power services, the governance and reform of public enterprises operating in the market, the new structure of power supply arrangements to introduce

competition where feasible, including unbundling and the development of power markets; and reform of the governance and regulatory arrangements to improve oversight of the power market and introduce incentives for service providers to be efficient and responsive to consumer needs. They should also incorporate priorities for access, equity, and environment in the policy framework.

Governments should address the challenges for reforming power markets in ways that credibly show commitment to the reform strategy. This emphasis on policies and commitment recognizes that policy constraints and lack of political commitment cannot be overcome and sustained by contracts and regulation alone. Governments create credibility by establishing a track record of keeping to its commitments under its laws and contracts (Bakovic, Tenenbaum, and Woolf 2003). Maintaining momentum for reform involves political costs and thus requires political commitment through successive phases of the reform process over one or more electoral cycles. Governments must be confident that the legislative changes required for reforms are politically feasible. Here, the strength of a government's parliamentary majority, the nearness of the next election, and the mandate of the previous election all impact on the willingness and ability of the government to institute the required changes.

A good indicator of a government's political commitment is its day-to-day support to distribution companies and regulators. Government's support is needed for reducing theft of electricity and materials and nonpayment of bills by electricity users, providing subsidies for a transition period, and ensuring that its departments and agencies pay their electricity bills regularly. Payment arrears can often be settled through financial restructuring, but private operators are often helpless in enforcing policies for disconnecting power supply to consumers in payment arrears in the public sector, in particular for essential services, such as water supply, hospitals, army, and police. In some countries, government and its agencies account for more than 50 percent of a power utility's sales, so failure to pay their electricity bills becomes a real obstacle to reform. A government can publicly demonstrate its commitment by the passage and enforcement of antitheft legislation that allows for disconnection and prosecution of those who steal electricity, and by successfully prosecuting politically well-connected thieves.¹¹⁶

¹¹⁵ The cumulative costs of advisers and consulting services needed for implementing a major power reform program alone can amount to tens of millions of U.S. dollars, based on the experience of reforms in Ukraine and Orissa (India), for example.

¹¹⁶ The case of Andhra Pradesh shows how this can be done (chapter 4).

Government's implementation strategy should include the following elements:

- Ways to compensate or reassure losers in reforms to the power sector, with appropriate social safety nets.
- A build-up in trust between private entrepreneurs and the other parties, which can be achieved by seeking modest levels of private participation initially to overcome mutual suspicions.
- Mobilization of public support for the reform process by involving the main interest groups in the planning stage.
- Initial steps to establish government's commitment to reform to manage the political risks involved in restructuring the supply structure, establishing the new regulatory framework and introducing private participation.
- A transition process that takes into account the political realities facing reform.

Governments have to radically change their roles to support reform strategies based on private sector participation.

Their current roles are multiple, because they encompass policy maker; legislator; power producer and supplier as owner, system operator, and majority or only investor in the power sector; user of power services through its numerous agencies; and employer when power workers are subject to civil service employment conditions. The scope for conflict among these roles is usually too great to manage through tradeoffs. In a reformed power market, governments should adopt more selective roles, focusing mainly on being policy maker, legislator, creator of an enabling environment and risk mitigator for private investors, and financier of subsidies for low-income consumers.¹¹⁷ Even governments' role as consumers would diminish under programs to privatize state-owned businesses.

One of government's key roles is to facilitate the development of power markets. This role carries the following responsibilities:

- Ensure that regulation of the power market achieves a fair balance between protecting the interests of electricity consumers and attracting the investment needed to meet demand for electricity.

- Mobilize financing of access costs to modern energy services for the poor where usage is socially worthwhile.
- Provide or arrange guarantees to mitigate political risks that are exceptional and deter private suppliers of electricity services.
- Provide limited performance undertakings on behalf of state-controlled enterprises to help privately financed investments and concessions in difficult business environments.
- Reduce barriers to market penetration for energy service providers and for promising new technologies (including some renewables).
- Build a good track record for paying subsidies to support its social development policies so as to help reduce risk for the viability of investments that depend on these payments.

Decisions about the level of government financial support should be consistent with decisions about power market development and electricity prices. This requirement reflects the reality that electricity must be paid for either by consumers or by taxpayers.¹¹⁸ Revenue shortfalls are costly since they lead to deterioration in the quality of supply and assets, as well as an inability to meet demand, as seen in many countries. Robust reform strategies, regardless of the choices made for the different roles of the public and private sectors, must confront these issues, often in a situation where prices are well below full-cost recovery (World Bank 1994b). Without credible steps to improve suppliers' commercial and operational performance and to align revenues with costs, reform strategies are unlikely to succeed in improving sector performance and contributing to economic growth and poverty reduction.

Government's responsibilities do not cease at privatization. Instead, its oversight role often becomes more complex, partly because its support is needed to sustain private investment (as outlined in chapter 4). Government has to maintain stable sector policies and keep to the letter and spirit of privatization agreements by avoiding actions that go against these agreements. It has to work jointly with investors to solve local problems as they arise and maintain fair and transparent mechanisms for dispute resolution. It

¹¹⁷ Governments would, of course, retain their responsibility for representing national interests in energy—related international affairs, such as transboundary emissions, international rivers, energy producer associations, climate change initiatives and international energy trade.

¹¹⁸ A major drawback with payment by taxpayers is the high economic cost to developing countries of public funds raised through general taxation.

has to quickly adapt to the concept of the autonomous functioning of the regulatory body. The types of post-privatization actions to be avoided include the action of Hungarian government in allowing retail tariffs to rise at a lower rate than wholesale tariffs, the actions of Ukrainian government in preventing and later staggering retail tariff adjustments called for in the tariff compacts of the privatization agreements, and government of Orissa's inability to resolve the heavy financial problems in the power sector after privatization.

8.3 Sequencing of Power Market Reform

Sequencing of power market reform raises both strategic and tactical issues. Strategic issues concern the design of the new structure of the power market and wholesale power trading arrangements with the attendant reforms to market regulation and the roles of public and private participants. The logical sequences for addressing strategic issues are as follows:

- The legal and regulatory framework for creating the new market structure and trading arrangements is put in place before restructuring the power supply arrangements, privatizing power suppliers, and setting up new market trading arrangements, as discussed in chapter 6.
- Restructuring of power markets progresses from an integrated structure—under which the power utility may not even be corporatized—to partially unbundled

structures of corporate entities, and eventually for some countries to a fully unbundled structure, as discussed in chapter 4.

- Restructuring of wholesale power trading arrangements progresses from internal transactions within an integrated power utility to the entry of IPPs selling their output to a single buyer, then to opening access to power networks by large users of power, and eventually to bilateral trading between generators and distributors or to a central power pool under competitive trading, as discussed in chapter 5.
- Major organizational and financial restructuring precedes the creation of private ownership rights to avoid problems with stranded costs, as discussed in chapter 5.

Power market reforms in most of the developing countries that have progressed substantially have broadly followed the logical sequence. The sequences followed by 20 of these countries are summarized in table 14. All of these countries passed primary legislation for power market reform, established sector regulation, transacted with IPPs, and privatized some of the power supply industry. Fourteen these countries implemented corporatization or passage of primary legislation for reform as their first step. Conversely, none of them started with restructuring, privatization, or the introduction of wholesale competition to the power market. IPPs entered the power supply chain at various steps in the reform sequence, which shows the

TABLE 14. Sequence of Power Market Reform Measures in 20 Developing Countries

REFORM MEASURE	NUMBER OF COUNTRIES AT EACH REFORM STEP					
	FIRST STEP	SECOND STEP	THIRD STEP	FOURTH STEP	SUBSEQUENT STEPS	TOTAL COUNTRIES
Corporatization	7	2	5	2	1	17
Electricity law	7	6	3	2	2	20
Establish regulation	3	5	5	5	2	20
First IPPs	3	—	3	3	11	20
Restructuring	—	3	3	5	4	15
First privatization	—	3	1	3	13	20
Wholesale competition	—	—	—	—	9	9

Note: These countries are Argentina, Bolivia, Brazil, Chile, China, Colombia, Czech Republic, El Salvador, Hungary, India—Orissa, Indonesia, Jamaica, Malaysia, Morocco, Pakistan, Panama, Peru, the Philippines, Poland, and Thailand.

Source: Derived from Jamasb 2006.

adaptability of this form of transaction. The nine countries that introduced wholesale competition undertook the necessary main reform steps beforehand.

Tactical issues for sequencing concern the implementation of a reform program. These issues include the number of stages to a reform program, how much improvement to entities slated for private ownership or concessions should be attempted before handing the entities over to the private sector, the timing of tariff increases relative to service improvements, and the order of privatizing distribution and generation entities. Although generic sequences can be put forward for strategic sequencing issues, such an approach would not be useful in the case of tactical sequencing issues, given the wide variety in starting conditions for power market reform found among developing countries. Tactics should be specifically designed for each set of local conditions.

Government should incorporate its strategic and tactical decisions in an explicit policy for reforming its power sector. This step should be undertaken at the start of the reform process to ensure that all parties to the reform have a clear and common understanding of the planned reform, to carry out the consultations needed to develop consensus for supporting the reform, and to develop the roadmap for implementing the reform. The reform policy should be developed under the guidance of a senior member of the cabinet to ensure cooperation among the numerous ministries and government agencies involved in the reform. The policy should be documented and presented to the legislature for discussion and to obtain political support. Once this is obtained, the policy should be officially published. Nigeria is a good example of this process.¹¹⁹ This document can then be used as the blueprint for drafting the legislation needed for introducing some of the radical reforms, such as the abolition of a legislated monopoly for the state-owned power utility, the establishment of new regulatory arrangements, and the introduction of private service providers.

Some countries in Eastern Europe and the FSU were able to attract considerable investor interest by following sound sequencing of reforms. In Hungary, Poland, and to some extent Moldova, privatization followed substantial improvement in the sector's commercial performance on the basis of an appropriate market structure and transparent competitive procedures, and resulted in

substantial privatization receipts. Hungary, Poland, and Turkey (as well as Lithuania and Moldova to some extent) focused on (a) improving their laws on electricity supply and theft, (b) establishing professional and competent regulatory bodies to improve the levels and structure of tariffs to cover costs of supply, and (c) comprehensively commercializing the operation of their utilities. With these reforms, they met with reasonable success in restructuring their sector, attracting private investors and moving toward competitive markets.

Other countries in Eastern Europe and the FSU were not able to attract significant investor interest because of poor sequencing of reforms. In Georgia, Kazakhstan, and Ukraine, privatization of poor commercial performers was conducted by direct negotiation on the basis of an impractical market structure, and resulted in poor privatization receipts, chaotic market conditions, no palpable improvement in sector performance, and eventually in disinvestments by disenchanted investors. These countries did not focus adequately on creating the right conditions before embarking on privatization. Consequently, they have been facing investor disenchantment and disinvestments, and stalled privatization programs (Krishnaswamy and Stuggins 2003).

The sequencing of tariff increases with investments to improve the quality of service is often problematical. Probably the most contentious reform issue is raising the overall level of tariffs to cover supply costs—even efficiently incurred costs—and removing most of the heavy cross-subsidy to households and other subsidized consumer groups (such as farmers in India) from industrial and commercial consumers.¹²⁰ From the consumers' viewpoint, matching tariff increases to actual service improvements has economic merit, but it causes investors to face the difficulty of raising the large amounts of funding required for investments to upgrade service quality while tariffs remain below cost.

The sequencing of private investment in the power sector depends on conditions in the power market. In the conditions of many developing countries, investment in new generation capacity alone is insufficient in the absence of the institutional capacity needed to manage retail operations, and efficiency improvement in customer service usually requires substantial investment in upgrading supply

¹¹⁹ The power reform policy document, "Federal Republic of Nigeria: National Electric Power Policy Adopted by the Electric Power Sector Reform Implementation Committee and Approved by the National Council on Privatisation," can be found on the Nigerian Bureau of Public Enterprises Web site (<http://www.bpeng.org>) under Publications/Power/Sector Policy/Electric Power Policy.

¹²⁰ Subsidies do not run universally to households from industries. In Brazil, for example, the cross-subsidy runs to large industries from other consumer groups.

capacity. These relative needs, however, indicate the following basis for sequencing the introduction of private participation:

- Private participation is steered first to investments in power generation if more physical capacity is the priority, usually to meet rapidly growing demand for electricity, as in East Asia, since this segment of the power supply chain accounts for 60–70 percent of the total investment in the power sector.
- Private participation is steered first to the distribution sector of the power supply chain if increased efficiency is the priority, because of huge losses—both technical and nontechnical—as in Latin America.

This divergence in priority for private participation is shown in the differences between East Asia and Latin America in composition of private investment that took place between 1990 and 2002 (table 15). This table shows that these Asian countries attracted much more private investment in power greenfield projects (around US\$68 billion) than the Latin American countries (around US\$29 billion) over the same period. In total private investment in power, however, the Latin American countries attracted about US\$10 billion more than the Asian countries because of high receipts from privatization of state-owned assets and businesses in the power sector.

The privatization sequence for poorly performing power sectors should start with distribution entities. A prerequisite for implementing reforms in these sectors is to stem the accumulation of operating losses and enable sector revenues to exceed sector operating expenditures (PA Consulting Group 2005). Investors will pay more for generation assets when they see good prospects for selling their output to solvent purchasers, which usually occurs when the distribution entities are passed into private management. Latin American countries that privatized generation entities after they privatized distribution entities obtained greater privatization receipts than Latin American countries that privatized in the reverse order.¹²¹ In Brazil, for example, privatization began with distribution entities to realize the quickest available productivity gains where the power system had been most abused politically, and to create creditworthy buyers of energy for generators in preparation for their privatization (Brown 2002).

For a power sector with loss-making utilities or distribution entities, the choice of sequence involves whether to improve the commercial performance of

TABLE 15. Private Power Investments in Latin America and Asia 1990–2002 (US\$ million)

COUNTRY	DIVESTITURES CONCESSIONS	GREENFIELD PROJECTS	TOTAL PPI INVESTMENT
LATIN AMERICA			
Brazil	34,644	9,913	44,557
Argentina	11,046	5,070	16,116
Chile	4,163	4,330	8,493
Colombia	4,348	2,210	6,557
Peru	3,166	1,137	4,303
Mexico	n.a.	3,897	3,897
Dominican Republic	1,208	1,101	2,309
Guatemala	651	782	1,433
Panama	937	128	1,065
Total	60,163	28,568	88,730
ASIA			
China	4,084	15,599	19,684
Philippines	2,683	10,730	13,412
India	378	11,960	12,338
Indonesia	n.a.	9,960	9,960
Thailand	1,545	6,471	8,016
Malaysia	1,395	6,296	7,691
Pakistan	291	5,646	5,937
Bangladesh	n.a.	1,040	1,040
Total	10,376	67,702	78,078
n.a. Not applicable.			
Source: World Bank PPI Database.			

these entities before bringing in private participation. If it is difficult to improve the commercial performance of distribution entities under current managements, the preferred alternative is for private participation through the use of leasing or concession arrangements. However, if attracting private participation in any form is not feasible for some time, a reform strategy should address how to improve the performance of these entities before attempting to attract private participation, as happened in the case of the Indian State of Andhra Pradesh (chapter 4).

¹²¹ This finding is based on unpublished research conducted within the World Bank and IFC.

Even in a situation of bulk power shortages, investments in new generating capacity should follow investments in distribution when the distributors are insolvent, for the following reasons:

- Distributors do not generate sufficient cash revenue to pay fully for the costs of power from new generation capacity in their current operating condition.
- Commitments to significant additions to new generation capacity should be deferred until the level of economically effective demand can be assessed reliably.¹²² Technical improvements to reduce technical and commercial losses are usually the least-cost means of closing the shortfall of supply relative to demand.
- The incumbent utility should not sign many long-term power off-take agreements with IPPs to avoid overcomplicating the restructuring of its PPAs when it is restructured.
- IPPs are more likely to seek credit support on terms that impede market reform, such as escrow of revenues from the best-paying customers of distributors, when they sell power to insolvent distributors.

The economically rational priority is to deal with tariff distortions, theft, metering, and local capacity bottlenecks through relatively low-cost investments to improve the performance of distributors, while creating a sound regulatory framework to govern future tariff changes. The need for additional generating capacity should be assessed once the response of demand to these measures becomes evident.

Governments have to make tradeoffs in choosing their reform sequence for distribution businesses that cover urban and rural service areas. Their options depend primarily on their ability to bear the political and financial costs for creating the conditions for attracting private participation, the risks that they should accept during the transition period, and the prevailing investor interest in such assets. The scale of the challenge in meeting these conditions is illustrated by the slow progress to date of

many countries in reforming their distribution businesses, even with options for dealing with investors concerns about risk (chapter 4). In this situation, a government can choose from the following options for phasing the reform of distribution entities:

- *Concurrent privatization of all distribution companies with mixed urban-rural areas as soon as practicable.* This is the most direct approach for meeting reform objectives, but it runs the risk of failing to sell the weaker distribution companies. Substantial amounts of commercial and regulatory risks would probably have to be ring-fenced from the investors during the transition period.
- *Sequential privatization of distribution companies with mixed urban-rural areas over time.* This approach might be suitable for achieving some privatization soon if not all distribution entities were performing sufficiently well to be privatized without the government assuming too much risk during a transition period.
- *Sequential privatization of distribution companies in separate urban and rural areas.* This approach might come into contention if the other options are infeasible. A possible transition path would be (a) management contracts, (b) concessions (perhaps investment management contracts), and finally (c) divestiture of assets. Smaller rural areas may be concessioned off to rural entrepreneurs or community organizations. Although performance-based returns should be built into these contracts, innovative measures to bring in the capital needed also have to be developed.
- *Full privatization could be tried later.* This approach provides time for meeting the conditions for attracting private participation and only if government wanted to privatize all the distribution entities at the same time. It requires government to credibly maintain a strong political commitment to reform. This approach works if the distribution entities would be able to access the debt markets on the strength of their balance sheets once they have been substantially commercialized and the tariff regimes (including social protection measures) are appropriate.

¹²² System load can be pushed above effective demand by a combination of tariffs that are well below supply cost for some consumer categories, and uneconomical consumption that is encouraged by unmetered supply and high losses that arise from theft and poorly designed distribution networks. However, system load can be depressed below effective demand by tariffs that are well above supply cost for other consumer categories, but below the cost of own-generation, and by supply interruptions caused by lack of maintenance and by inadequate feeder and substation capacity in the distribution network.

8.4 The Transition Stage for Power Market Reform

The transition stage from the old power market to the new power market is a vulnerable period when derailment of the reform process is possible. Under the starting conditions for the power market found among most developing countries, the transition stage usually covers intermediate reform stages. For the market structure, transition concerns the less than full unbundling of the industry structure and the adoption of a single buyer trader for wholesale power (chapter 4). For private sector participation, transition focuses on private sector roles that fall short of full risk taking, such as management contracts and other forms of private participation, with temporary risk mitigation mechanisms, such as ring-fencing, vesting contracts, and political risk guarantees (chapter 4). Transition arrangements to provide credibility for a new regulatory regime revolve around regulation by contract (chapter 5).

The Importance of Starting Conditions

Starting conditions in the power market are important for designing power reform strategies. They critically influence the main parameters of a reform, such as the roles of public and private sectors, the new market and industry structures, and the design of the regulatory framework. Given the wide range of starting conditions among developing countries, power market reforms are also likely to vary, as shown by the experience to date with reform (chapter 3). These conditions include the size of the country and its power system and market, the country's location relative to other power markets, its income level and macroeconomic condition, its political situation, and the capacity of its domestic financial markets and institutions.

The extensive range of economic and institutional endowments found across developing countries rules out “cookbook” solutions for reforming their power sectors. This lesson applies regardless of the choices made for the roles of the public and private sectors in power supply arrangements. Reforms based on substantial market restructuring that may be adapted to large middle-income countries would be infeasible for small low-income countries. Conversely, modest reforms designed for the weak economic and institutional capacities of small low-income countries would have unacceptably low reform outcomes in large middle-income countries.

Countries in the lower-income group with small power systems typically have the weakest starting conditions for reforming their power markets. Electricity prices are well below costs in many of these countries, but they are near to cost-recovery levels in others, which gives rise to politically sensitive concerns about affordability of electricity for low-income households. Access rates to electricity by the population are low. Poor quality and shortage of public power supply cause numerous consumers to install private power generators. Poor governance of state-owned power utilities leads to poor technical and financial performance, the need for substantial credit support, very low operating efficiency that drives up unit supply costs under lack of maintenance, theft of electricity and utility property including cash, inefficiency in collecting revenues owed to utilities, and lack of investment caused by the inability of utilities (and governments) to mobilize financing. These countries have very low ratings for corruption and country creditworthiness.

Countries in the middle-income group with larger power systems tend to have better starting conditions for reforming their power markets. Access rates to electricity by the population are higher than among the low-income small system group. Power systems are sufficiently large for breaking up their power generation and distribution sectors, as well as vertically unbundling their supply arrangements. Rapidly rising power demand requires large investments in expanding power supply capacity. Households and other favored or influential consumer groups benefit from substantial subsidies and cross-subsidies through the structure of power prices. Many of these countries have low ratings for corruption and governance. Some countries have local institutional investors, but generally investors face substantial political risk.

The composition of power market reform should therefore be adapted to starting conditions in countries. This policy is illustrated in table 16 for the two groups of developing countries—large middle-income countries and small low-income countries—described above.

Quick versus Gradual Approaches to Reforming Power Markets

Strong regional patterns influence the time taken to accomplish the transition stage. In Latin America, where reform has generally been the most comprehensive among the regions, the time taken to cover the transition

stage has been the shortest. In contrast, countries in Asia have been tentatively reforming their power markets for long periods without advancing far. Countries in Eastern Europe fall between the two other groups in the rate of their reform progress. This pattern is evident among the sample of 20 countries whose reform sequences are summarized in table 14 (Jamásb 2006).

- Eight Latin American countries in the sample took between one and four years from the passage of an electricity law to restructuring the supply chain, establish the regulatory framework, privatize a

substantial proportion of the power supply business, and set up competitive wholesale trading arrangements for power.

- Among the three Eastern European countries in this sample, Hungary's performance corresponds to that of the Latin American countries with a transition stage of four years, while the other two countries (the Czech Republic and Poland) have carried out most of the reforms since the early 1990s, but have yet to complete the transition stage. Bulgaria and Romania are now proceeding along the same reform path relatively quickly.

TABLE 16. Types of Power Market Reforms with Different Starting Conditions

DEVELOPING COUNTRY GROUP		
	SMALL LOW-INCOME COUNTRIES	LARGE MIDDLE-INCOME COUNTRIES
COUNTRY STARTING CONDITIONS		
Power system size	Very small	Small to large
Access to electricity	Low	High
Investment climate	Too poor to rate	Low to medium
Institutional capacity	Very weak	Low to good
Governance rating	Poor	Poor to good
INITIAL REFORM CHARACTERISTICS		
Market structure	Limited vertical unbundling. Single buyer with some simple bilateral trading for wholesale power.	Substantial vertical and horizontal unbundling. Bilateral trading or a central exchange for wholesale power.
Regulation	Semi-autonomous regulatory agency mainly responsible for oversight of concessions.	Autonomous regulatory agency with power to issue licenses and approve retail tariffs and trading arrangements.
Role of private sector	Mainly IPPs in generation; concessions in distribution under public-private partnerships.	Privatized generators and IPPs. Privately owned and financed distributors under long-term licenses.
Role of public sector	Continued ownership of most power supply facilities. Primary responsibility for financing sector development.	State ownership in sensitive generation sectors (hydro, nuclear), transmission, and nonviable distribution service areas.
Role of competition	Limited to bidding for PPAs by IPPs and by private operators for distribution concessions.	Competitive bidding for wholesale power contracts under bilateral trading or bidding into a power exchange.

- Finally, the seven Asian countries in the sample (counting India as a whole instead of just Orissa) have progressed least among these countries, despite also starting their reforms in the early 1990s, partly because of weak commitment to the reform vision adopted by Latin American countries.

The design of the transition stage should never lose sight of the fiscal reasons for reform, because an overly cautious approach runs the risk of delaying real reform benefits and losing political momentum for reform.

Consumers expect much more from private companies than from state-owned enterprises. Consumers understandably lose patience if tariffs go up immediately, but service improvements lag behind. When this happens, the regulators are blamed. Therefore, it is not surprising that most regulators, when faced with this situation, will try to find a way not to raise tariffs, especially if their legal mandate consists of nothing more than principles, goals, and objectives (Bakovic, Tenenbaum, and Woolf 2003). The preservation of protective features, such as “lifeline” rates, may be necessary, even though they would likely mean the continuation of subsidies within income classes, as well as from industry to residential consumers.

Pressures for rapid results, however, should not obscure the point that power market reform is designed for the long haul and requires patience. Kazakhstan shows the risks of not following a well-planned and sustainably paced reform sequence. It unbundled its electricity supply functions, tried to establish a wholesale power market, and privatized much of its generation and distribution assets at rock bottom prices. It did so at the height of an economic crisis with low retail tariffs and cash collections in the power market and before establishing a credible regulatory framework for investors. As a result of this, power trade became chaotic, and investors pulled out (Kennedy 2002).

The gradual approach of incremental reform may succeed by helping reformers develop the necessary support, at least according to one theory. This approach helps reformers create an initial constituency of early “winners” who sense real benefit in further reform, while lulling “losers” into believing they have achieved a good compromise. These initial winners develop into an interest group with a stake in reform, and provide the politician with confidence to push further. The “losers” begin to cede ground, and over time lose members to

the “winners’ side.” The advantages claimed in theory for this process are that it allows government to plan and sequence its reforms coherently, ensure democratic buy-in, prevent policy reversals, and make all major political parties associate themselves with the reform agenda through the election cycle.

The advantages claimed for the gradual approach may be less elegant in practice and do not conform to sanitized theories of transparent, consultative, democratic functioning, or good governance.

These advantages enable reformist politicians to use skills and networks to keep their own incentives in the process alive by enabling them to devise rules and stratagems that will augment their own resources and reward their supporters or collaborators. Furthermore, they gain time for politicians to divide, lull, or inveigle opponents of the reform; to resolve, avoid, defer, or shift conflict through compromise, obfuscation, deal-making, blame-shifting, or stalling; and to identify and harness incipient supporters of the reform who will help push subsequent reform. This explanation recognizes that much of reform is politically unmarketable either because it runs up against powerful interests, does not coincide with the politician’s time cycles, or fails to address legitimate concerns. Implementing reform thus depends on stealth, ambiguity, and following the path of least resistance.¹²³

The relative merits of the quick approach versus the gradual approach to reforming power markets have yet to be settled. This is because the outcomes of these approaches are still evolving in developing countries. In the reformed power sectors of Latin America, the quick approach worked effectively for reforming the power market structure, but most of these countries have had to revisit several aspects later in an effort to address concerns about processes for market regulation and social issues under weak or nascent institutions (Benavides 2003). The gradual approach followed in Asia allows time to develop institutional capacity and public consultation about the proposed reforms and their social impacts, as well as to integrate environmental concerns into policies for the new power market (World Resources Institute 2002). This approach, however, could prolong the reform process and perpetuate the culture of poor governance, leading eventually to its collapse from political intrigue and public skepticism, as shown by India’s early reform experience (box 25).

¹²³ The views given in this paragraph and the preceding one are taken from an unpublished paper by Sumir Lal entitled “Political Factors Affecting Power Sector Reform in India.”

BOX 25. India's Experience with a Gradual Approach to Power Market Reform

India has generally followed a gradual approach to reforming its power market. Trained on broad reform goals, the detailed steps required to unravel the old system were worked out along the way through trial and error. Much of the gradual structural reform focused on the State Electricity Boards (SEBs)—the vertically integrated dominant power suppliers at the state level—because they were particularly inefficient and created huge losses for which the state governments were ultimately liable.

From the mid-1980s, under an economywide approach for state-owned enterprises in general, the central government had attempted to improve the efficiency of SEBs by giving them greater managerial autonomy and increasing their access to capital, with the hope that they would become more entrepreneurial.

The central government adopted a new approach in 1991 because of India's financial crisis, under which it sought immediate remedies. Since many years would be needed to rectify the SEB's inefficiencies, the new approach focused on the immediate problem of meeting the shortfall in generating capacity that had been perpetuated by the SEB's poor finances. The government hoped that private investors would provide large amounts of efficient and inexpensive power capacity, even though there was little track record in developing countries to provide credibility for this approach. A focus on private investors was also consistent with the reformist agenda of attracting foreign direct investment. There was a broad consensus supporting this approach to reform because of the lack of viable alternatives.

The central government created the legal conditions needed to attract private investors in electricity generation, and it set tariff rules that would be particularly attractive to investors, with a guaranteed 16 percent return on equity (after tax) and full repatriation of profits in dollars. To jump-start the process, the government awarded "fast track" status to eight projects (many with foreign participation), promising rapid clearances and central government repayment guarantees to assuage investors' concerns about selling their output to insolvent SEBs. Most of these projects included a cost-plus PPA between the operator and an SEB. Only three of the fast track projects, however, have produced power more than a decade after the fast track initiative.

Despite promises of rapid regulatory approval, many of the fast-track projects became mired in controversy. The projects were touchstones for anti-globalization lobbies that used protests and public interest litigations on environmental grounds to slow approvals until investors withdrew. Although hundreds of Letters of Intent or even Memorandums of Understanding were signed in the early to mid-1990s for projects without fast-track status, most of them did not result in serious investment. In addition to the obvious failure to attract much new capacity, this first wave of reforms yielded electricity from private plants that was much more expensive than power from the SEB's existing plants and even from new plants built by state-owned enterprises. Take-or-pay clauses in the PPAs, high rates of return, and a contracting structure that gave upside earnings potential to investors and saddled the SEBs with fuel and currency risks, were all the product of a power at any cost mentality.

After this experience, India reverted to a gradual approach to power sector reform.

Source: Tongia 2003.

The comparison between quick versus gradual approaches to reform reflects views about the leadership of the reform process and the need for a public consensus. The quick approach reflects a view that economic reforms must be carried out by a strong executive, unhampered by the need to consult or seek consensus, in order to stop vested interests from obstructing a reform agenda. From this perspective, although reforms may be rational for society as a whole, myopia on the part of the general public and a collective irrationality nonetheless can obstruct reform. However, this autocratic

approach, even if tied to good economics, can make for undesirable politics by undermining democratic institutions. The gradual approach reflects the opposing view about the central importance of forging a social consensus around reform. This consensus requires consultation to improve policy and, by addressing the concerns of the general population, to increase the probability of continued public support for the reform program and support for democratic institutions. The distinction between these two approaches is blurred somewhat by noting that while the initiation of reforms

may require a firm and autonomous executive with a relatively free hand, consolidation of reforms may rest in building consensus (World Resources Institute 2002).

Reform Road Map

A road map is a vital component of the reform process. It shows how the key strategic and tactical reform issues will be handled under a coherent reform strategy. This includes showing how a commercially oriented business environment will be developed and how other reform objectives will be achieved. The road map sets out the sequence of reform and shows the process for changing governance by restructuring the institutional, regulatory, industry, and market arrangements for power supply. It covers what, when, and how the reform will be done; who will do what; and how the substantial costs of reform will be financed (box 26). A road map is, of

course, specific to a particular reform for a power market. It can take many forms depending on the institutional arrangements for reform.¹²⁴

The road map should be adapted during reform implementation in response to unexpected developments. The following examples of such developments have been encountered:

- Unexpectedly strong and persistent opposition of the power utility's labor force to new employment conditions that make them accountable for performance.
- Failure of the regulatory process to perform consistently with expectations because of political interference in tariff filing, regulatory bodies being subject to political interference, or governments nullifying regulators decisions by offering additional subsidies in lieu of tariff

BOX 26. Road Map for Power Market Reform

A road map for power market reform answers the following questions:

What business-enabling environment will be created through legal, regulatory and competitive frameworks?
What markets are being created, and how will property rights be protected?

What roles will be taken by the private and public service providers, respectively?

How will the new businesses be managed and financed from tariff revenues and funding for capital expenditure, and how will the subsidies that are needed to meet social objectives be provided in ways that do not undermine the commercial incentives and orientation of sector governance?

What transition path will be taken from the starting conditions to reach the desired end conditions with regard to, for example, corporate and market restructuring or change in governance arrangements for financing?

Who will mitigate the risks and soften the tradeoffs associated with the transition?

How will any required financial restructuring of the state-owned power utility be undertaken?

What options will be considered for dealing with unexpected developments during the transition period that delay progress?

How will the reform process be organized in relation to allocating responsibilities for implementing reform stages, such as corporate and financial restructuring, transacting sales to private investors and operators, mobilizing resources needed to carry out reform, and retaining technical experts?

When and how will consultation take place with interested and affected stakeholders?

What points in the reform process will trigger key actions and milestones?

What is the basis for checking that proposed reform steps conform to the overall reform strategy?

¹²⁴ For example, a road map can be developed in a series of resolutions recorded in the minutes of a reform management committee that are supported by working papers prepared by technical task forces and technical reports prepared by consultants.

increases (which in effect postpones the hard decisions needed for private sector participation and commercialization).

- Absence of budgetary discipline at the level of the power utility that undermines incentives to commercialize.
- Difficulties in recovering the costs of operational inefficiency (typically large technical and commercial losses) under tariff orders, both for losses incurred in the year covered by the order and for unrecovered losses in previous years.
- Unexpectedly severe disruptions to power supply, such as a drought in a predominantly hydropower system (as in Cameroon three years after privatization of the power utility) or typhoons that wreck networks (as in the case of Orissa shortly after privatization of the distribution companies).
- A change of government that threatens to hold up key stages of the reform or even require substantial changes to significant elements.

APPENDIX: REFORM OF POWER MARKETS IN OECD COUNTRIES

This appendix briefly compares and contrasts the conditions for power market reform in OECD countries and developing countries.

Power market reform for OECD countries has conventionally been interpreted for radical market restructuring with the introduction of competition where feasible in both the wholesale and the retail markets for electricity. Economic regulation of the wholesale and retail power markets is used to promote competition and protect consumer interests. Regulation of electricity prices is essential since experience shows that competition is not sufficient to control pricing in the presence of the transmission and distribution natural monopolies. This movement has been led by Australia, England and Wales, the Scandinavian countries, and some regional groups in the United States. Chile was also a leader with these OECD countries. The extensive reach of this reform movement is shown by the existence of regionwide monitoring reports for the United States (Center for the Advancement of Energy Markets 2003; Public Utility Commission of Texas 2005) and the European Community (Commission of the European Communities 2004).

The initial restructuring of the England and Wales power market showed that radical restructuring of an integrated power supply chain of functions is feasible, contrary to forebodings about disrupting technical coordination of a vertically integrated power supply. The generation, transmission, and distribution functions can be separated from one another and traded at arm's length in a wholesale power market. It was made possible by rapid changes in technology that occurred in both the generation of electricity and in the computing systems used to meter and dispatch power. There is now sufficient track record to provide assurance about the technical feasibility of coordinating these power supply functions and maintaining security of supply to power users. This experience countered widespread concern about the technical feasibility of decentralizing corporate control (but not control over power system operation) in power markets.

The experience of England and Wales also showed that the production and supply of electricity could be subject to competitive pressure, provided that transmission and

distribution are regulated to support competition in production and supply. The new guiding principle was to introduce competition by restructuring the electricity supply industry where possible, and to simulate as far as possible the effect of competition on the natural monopoly network through price cap regulation. The passage of the 1989 Electricity Act and the restructuring of the Central Electricity Generating Board of England and Wales combined for the first time privatization with restructuring to introduce competition. The benefits of competition showed initially in rapid substantial reductions in wholesale electricity costs, followed later by a sharp decline in wholesale electricity prices under regulatory pressure and bargaining by the government or competition authority with the electricity supply industry to introduce further competition (Newbery 2004). The current competitive power trading arrangements in England and Wales are described in box 27.

The drivers for reform have differed between OECD countries and developing countries, partly reflecting the differences in their starting conditions. Power market restructuring evolved in OECD countries to achieve further efficiency gains, even though the electricity supply industry in most of these countries worked well technically under vertically integrated, largely state-owned structures. OECD countries offered favorable conditions for restructuring because of their well developed power sectors, excess power supply capacity and moderate power demand growth that allowed time for introducing radical changes, and the availability of natural gas that allowed the entry of gas-fired generating plants into the power market at modest scale and relatively low cost. Within OECD countries, reform drivers have reflected particular pressures within countries and can generally be classified as follows:

- *In the United States, the passage of the Energy Policy Act of 1992 aimed at fostering competition to enhance efficiency, encourage technological innovation, and lower prices. Criticisms of the inefficiency of rate-of-return regulation for encouraging gold-plating and cost inefficiency (Averch and Johnson 1962) became decisive in the restructuring movement in the United States.¹²⁵*

¹²⁵ Utilities were given incentives to invest as much as they could and only penalized for underinvestment. This led to waste in how they used resources. The attitude often was "better safe than sorry" and "we can pass it on to consumers." Significant amounts would be spent on efforts to woo the key politicians and regulators since they had more direct control over profits than did consumers.

BOX 27. New Electricity Trading Arrangements for England and Wales

The system for trading electricity under the England and Wales power pool was changed on March 27, 2000, to the New Electricity Trading Arrangements (NETA). (NETA became BETTA—British Electricity Trading and Transmission Arrangements—in 2005 when the fully competitive wholesale power market was extended to Scotland.) Under NETA, market participants wishing to buy and sell electricity, including nonphysical traders, as well as generators and suppliers, are able to enter into any freely negotiated contracts to do so. There now exists a three-tier contract driven market:

- Forward and futures markets, including short-term power exchanges, which allow contracts for electricity over a time scale ranging from several years to day-ahead markets.
- A balancing mechanism in which the system operator accepts offers of, and bids for, electricity to balance generation and demand and resolve any constraints on the transmission system.
- A settlement process for charging participants whose contracted positions do not match their metered volumes of electricity, for the settlement of accepted balancing mechanism offers and bids, and for recovering the system operator's costs of balancing the system.

The system operator is responsible for ensuring balance one hour ahead of the beginning of the trading period. All trading except through the balancing mechanism, ceases at that time ("gate closure").

Bilateral contract markets for firm delivery of electricity operate from a year or more ahead of real time (the actual point at which electricity is generated or consumed), typically up to 24 hours ahead (the day-ahead market), and occasionally up to gate closure. These markets allow a buyer and seller to contract for delivery on specified date of a given quantity of electricity at an agreed price.

Currently three power exchanges operate over similar timescales, although trading tends to be concentrated in the last 24 hours. Offers and bids can be posted, modified, or withdrawn at any point until they are accepted in these exchanges. Once accepted, they represent firm financial commitments and are settled at prices specified in the offer or bid. For settlement purposes, generators and suppliers must notify the system operator about their overall contract volume of production and demand for the trading period by gate closure; thereafter, further trading for these periods is prohibited. Price discovery in these markets is provided through on-screen display of the last accepted trade, live offers, and bids, and by price reporting services.

The balancing mechanism operates from gate closure to the completion of each trading period. The system operator administers the balancing mechanism to balance generation and demand, taking into account and resolving any constraints on the transmission network. Every half hour generators, suppliers, and large customers are required to notify their intended physical positions for the periods ahead. Trades in the balancing mechanism are visible to all participants who can see competitors' bid or offer acceptances and choose to adjust their bids or offers accordingly.

Although participation in bilateral markets, power exchanges, and the balancing mechanism is optional for generators and suppliers, participation in the settlement process is mandatory. All generators and suppliers must comply with the Balancing and Settlement Code, which provides a framework within which participants comply with the balancing mechanism and settlement process. The code is administered by a nonprofit entity called Elexon.

After the trading period, Balancing and Settlement Code participants' metered output and off-take are compared with their contractual volumes (as notified at gate closure) and adjusted for balancing mechanism accepted offers and bids to determine the magnitude of imbalance. All generators and suppliers that are out of balance are subject to an energy imbalance charge. Energy imbalance (sometime called cash-out) prices are calculated for each half hour as the net volume-weighted average of all trades accepted by the system operator in the balancing market.

- *In Europe*, the desire to bring about a single market in electricity—as well as other industries—has been a key driver of change. The countries of Eastern Europe have been motivated by the requirements of the European Union’s Electricity Directive of 1996 for accession to European Union.
- *In Britain*, privatization was driven by more political motives, to “roll back the frontiers of the State” and because “the business of government is not the government of business.” Economists argued that competitive pressures were more likely to deliver cost improvements and hence politically attractive price reductions.

In contrast:

- *In much of the developing world*, the driving forces have been fiscal pressure—in particular, disenchantment with the poor performance of publicly owned utilities, and the need for new investments and modernization to meet rapid growth in demand. Often these forces arose in the context of a major economic crisis for the country which made restructuring and privatization politically feasible. This was particularly the case in Latin America during the 1990s, where restructuring of power markets reflected the replacement of the import substitution model led by public investment by a market-oriented model of economic development.

The restructuring of the electricity supply industry in England and Wales produced a number of key lessons (Newbery 2004):

- *Competitive pressure on generators is needed to reduce costs, which requires separating generation from transmission and distribution.* All generating companies dramatically increased productivity and drove down costs immediately following restructuring. The original approach that was adopted to regulating the privatized utilities can be viewed as “competition where possible, regulation where not.” Regulation was seen as a last resort, appropriate only where competition was unlikely to be applicable (Littlechild 2005).
 - *Whether these benefits will be passed on to consumers through lower prices depends upon the intensity of competition—particularly the number of competitors and the existence of an open access wholesale market.* These benefits were initially almost entirely captured as higher profits by generation companies, since wholesale prices did not fall in line with the fall in costs.
- Eventually wholesale prices fell under increased competition in the market following regulatory intervention that forced the companies to extensively divest substantial amounts of their generating capacity (Newbery and Pollitt 1997).
- *Regulators have to work hard to translate efficiency gains into lower consumer prices.* Securing efficiency improvements in transmission and distribution requires tough regulatory price controls. Britain sought to provide a new kind of regulation to improve the incentives to efficiency in the monopoly sectors and encourage innovation (Littlechild 2005). The performance of the British distribution companies has improved after privatization relative to the counterfactual of continuing under public ownership. Improvements in the first five years under the initial price controls were modest, with most of the price cuts, efficiency gains, and transfers to consumers confined to the second and subsequent regulatory reviews (Domah and Pollitt 2001).
 - *Well regulated network companies can deliver adequate infrastructure investment.* Britain has invested £16 billion in transmission and distribution since privatization in 1990.
- The economic lessons of restructuring are reinforced by evidence from the Nordic power market:*
- *Effective competition in generation under private ownership reduces costs and passes those cost reductions through to consumers in price reductions.*
 - *Effective competition in generation requires regulated third party access to separately owned networks to lower the barriers to the power market.*
 - *This in turn requires ex ante regulation by specialized utility regulators, since competition law alone is inadequate, given the special properties of electricity.*
 - *Cost reductions will be passed through to price reductions under many competing generating companies and a well-designed market for the various ancillary and balancing services, as well as adequate supply capacity to meet demand reliably.* The number of actively competing generators may be increased by improving transmission links, as among the countries of the Nordic market. Otherwise, enforcing or encouraging divestiture of plant by the incumbent may be necessary, as in England and Wales.

The major concerns arising from restructuring of OECD power markets are that reforms have frequently failed to address issues of market power, and conversely that competition in the market may not be sustainable.

Since generating companies benefit from a shortage of supply through higher prices for their output, they may delay investment and increase scarcity.¹²⁶ The complex reforms involved in market restructuring also run risks of

incurring substantial economic costs if they are imperfectly designed, as shown by the California electricity crisis of 2001.

The California power crisis of 2001 gave reform an unjustified bad image. It showed that competition could lead to high prices and price volatility in the presence of serious faults in the design of a competitive market

BOX 28. Lessons from California with Competition in the Power Market

The California power crisis produced the following useful lessons:

- A mandated, deregulated, wholesale bid-based spot market was shown to be highly complex to operate and difficult to monitor for abuse of market power. It should be pursued only if certain conditions are likely to be satisfied. Some of these prerequisites are also required for other, more limited forms of competition, but the consequences of not satisfying these conditions are most dramatic and harmful in a mandated and deregulated spot market.
- It is simpler and less risky to impose obligations on generators and distributors to provide ancillary grid support services as a condition for being connected to the grid, rather than trying to synchronize separate markets for ancillary services with an untested spot energy market.
- Vesting contracts should be allowed as a form of insurance for distributors purchasing from a new spot market. A vesting contract that fixes the sale price for trade between existing or new generators and distributors for five or more years should be established before the market goes into operation. They also provide at least initial protection against market power.
- Close attention is needed to the starting points for reform, the particular problems that need to be solved, and the appropriateness of the reform path selected for solving these problems.
- A poorly designed power market will not operate properly, and inadequate attempts or delays in correcting market distortions will spill over into a serious financial crisis.
- There is no way out of a crisis in a poorly designed power market that is quick, painless, or cheap. “Quick-fix” solutions to basic design flaws usually fail and may aggravate the problems. Any real solutions will impose heavy costs on stakeholders, such as suppliers, consumers, shareholders, and legislators.
- Retail tariffs should be aligned with the costs of wholesale power. Regulators should avoid rate freezes that expose distributors to the possibility of an unsustainable squeeze on their cash flow occurring when rising wholesale power costs approach or even exceed fixed retail rates.
- Regulators should encourage and even require suppliers to allow large users to adjust their demand for power in real time, through smart metering and other means, since competition works properly only when prices are seen by both the demand and supply sides of the market.
- Power suppliers should be given regulatory scope to absorb through risk management techniques the high price volatility that can occur in spot markets for power.
- One or more commercially viable entities must have a legal obligation to provide adequate supplies for small retail power users who prefer to deal with a default supplier rather than shop around in the market for a supplier and face volatile spot market prices.

Source: Besant-Jones and Tenenbaum 2001.

¹²⁶ Easy entry and a profitable market can also lead to excess entry. Competition in the English electricity wholesale market drove prices to cover only just variable costs, which are well below total costs.

(box 28). In the light of the experience in California, many governments are afraid of immediate and full restructuring of the market and total reliance on full market restructuring. Hence, a phased approach to market restructuring is advocated for developing countries, provided their governments don't use this approach to indefinitely postpone necessary reform steps (Besant-Jones and Tenenbaum 2001).

The different outcomes of power market reform in developing countries and OECD countries show the need for caution in applying OECD reform experience to developing countries:

- Efficiency improvements in OECD countries usually apply to power suppliers whose technical and financial performance satisfies prevailing commercial standards. Competition and regulatory incentives are required to raise these standards and thus apply pressure to improve performance. In most developing countries, however, the priority is to find ways to raise technical and financial performance standards up to commercial levels from much lower levels under much weaker regulatory capacity and less scope for introducing competition. Hence, positive reform outcomes can differ, as in the case of retail electricity prices. In OECD countries, reform is expected to lower prices by lowering costs, but in many developing countries reform requires substantial price increases to cover costs fully—at least for some consumer groups, such as households.
- The main fiscal impact of power market reform in OECD countries occurs through the receipt of privatization proceeds. Although this was also important for some South American countries (Argentina, Brazil, Chile, and Colombia), such proceeds are seldom substantial elsewhere because of the poor investment climate, and sometimes these proceeds are used to recapitalize the sector, as in Bolivia (Moen 2000). The main fiscal impact in developing countries is through reduction in subsidies for below-cost tariffs to certain consumer groups and state guarantees to long-term debt financing and power purchase commitments by state-owned power entities.

- The outcome of helping the poor has much greater relevance to developing countries than to OECD countries. The low affordability in relation to per capita incomes and the substantial proportions of households without access to electricity are serious concerns in developing countries, whereas affordability concerns are extremely limited, and the access rate is virtually 100 percent in OECD countries.

Confidence in the findings of the empirical analysis to date about the outcomes of power market reform is constrained by concerns about methodological rigor and inadequacy of the data (both cross-country and longitudinally over time) available for analysis (Jamansb and others 2004).

Econometric studies can pick up the effects of reforms and restructuring on prices, investment, and productivity, although the length of time under most reforms is still rather short for the long-term effects to be clearly identified. Cost-benefit case studies can identify the net social gains from restructuring, but they are few and far between, and are also restricted to a relatively short period (Newbery 2004). However, it is certainly early enough to say that poor market design and poor regulation can make matters considerably worse, as the case of California demonstrates.

Different analyses can result in differing conclusions about similar issues. For example, two studies (Steiner 2001; Hattori and Tsutsui 2004) examine the impact of regulatory reform on power supply using panel data for 19 OECD countries. They reach different conclusions about the effect of creating a wholesale market on the industrial price of electricity, probably caused by slightly different definitions of regulatory reform indicators. However, both of them find that third party and retail access tend to lower industrial electricity prices and the ratio of industrial to domestic prices, which in many countries represents an improvement in allocative efficiency. One of them (Steiner 2001) finds that privatization improves operating efficiency and capacity utilization.

GLOSSARY

Access: Access for a household to electricity services from a public supplier encompasses a connection from a local distribution network to the place of residence and a legally valid agreement between the supplier and the household for the supply of electricity services.

Affermage: An extension of the management contract approach, of French origin, which involves the award of a concession (by competitive bid or by negotiation) to a private enterprise to run a state-owned power (or other) system usually for a long term (up to 20 years). It differs from the management contract insofar as the concessionaire receives all the revenue and costs of the operation, and it usually allows a greater degree of freedom for the managers to determine the commercial strategy.

Affordability: With regard to access for a household to electricity, affordability refers to the ability of the household to finance the charge levied for a connection to public electricity supply, taking account of available subsidies and credit support. With regard to the consumption of electricity by a household, affordability refers to the ability of the household to pay for a desired amount of electricity under prevailing tariff rates—including subsidies. It is usually expressed as a share of total household expenditure, which is assessed against an empirical upper limit to this share.

Ancillary services: Services provided by power producers in addition to energy and capacity for the operation and stability of the power system. These services cover the regulation of frequency, black start capability, cold reserve, fast reserve for emergencies and contingencies, and the production or absorption of reactive power.

Average cost: The revenue requirement of a utility divided by the utility's sales. Average cost typically includes the costs of existing power plants, transmission, and distribution lines, and other facilities used by a utility to serve its customers. It also included operating and maintenance, tax, and fuel expenses.

Barriers to entry (or exit): These barriers are how incumbent firms keep out competitors. The main sorts of barriers include (a) a big firm with **economies of scale** that may have a significant competitive advantage because it can produce a large output at lower costs than can a smaller potential rival, and (b) an incumbent firm that may make it hard for a would-be entrant by incurring

huge **sunk costs**, which any rival must match to compete effectively, but which have no value if the attempt to compete should fail.

Base load: The minimum average electric load on a given system over a given period.

Bilateral contracts: A contractual system between a buyer and a seller to obtain generation or ancillary services, or both, of a given type, duration, timing, and reliability to preestablished specifications over a contractual term.

Brownfield project: A project in which productive facilities—including power generation plants—are constructed on sites once occupied by industrial or commercial installations. In many cases, these sites require substantial cleanup because they were developed and in operation before current environmental regulations came into effect. See **greenfield projects**.

Build-own-operate-transfer (BOOT): A contract whereby an investor undertakes to finance, construct, operate, and maintain a project for producing or providing an infrastructure service for a specific period. The investor may be permitted to charge user fees during the period of operation of the project as specified in the contract. The investor is required to transfer the project to an agency in accordance with the contract after the expiry of the period of operation. This contractual concept has a number of variations, including build-operate-transfer (BOT), Build-Own-Operate (BOO), Build and Transfer (BL), Build-Lease-Transfer (BLT), Build-Transfer-Operate (BTO), Rehabilitate-Operate-Transfer (ROT), Rehabilitate-Operate-Maintain (ROM), and Supply-Operate-Transfer (SOT).

Bulk power supply: The aggregate output of electric generating plants, transmission lines, and related equipment. This term is used interchangeably with **wholesale power supply**.

Capacity: The maximum power that a machine, such as an electrical generator or a system, such as a transmission line, can safely produce or handle.

Capacity factor: The measure of the energy production of a generating plant during a period compared to the total energy production if the plant had operated continuously at full output during the period. This factor is usually expressed as a percentage.

Capital intensive: A production process that involves comparatively large amounts of capital to other factors of production, such as labor. Electricity generation is a good example of this type of process.

Captive customer: A customer who does not have realistic alternatives to buying power from the local utility, even if that customer had the legal right to buy from competitors.

Central dispatch: The process of scheduling by the market operator and issuing direct instructions to electric power industry participants by the system operator to achieve the economic operation of the transmission system while maintaining its quality, stability, reliability, and security.

Cogeneration: The simultaneous generation of electricity and usable heat for industrial processes, or the use of “waste” heat from electricity generation in an industrial process.

Combined cycle: A two-stage electrical generation process. In the first stage, electricity is generated by a gas turbine. The waste heat is then used to generate more power by steam turbine.

Combined heat and power: See **cogeneration**.

Commercialization: The application of commercial principles to a state-owned enterprise, as far as possible.

Competitive bidding: The process of acquiring supply-side or demand-side energy resources from private or public sector companies or organizations.

Competition for the market: One way of bringing competitive forces to bear on natural monopoly segments of an industry is to delineate a monopoly franchise and auction it off to the bidder offering the lowest price to consumers (or the best bid in relation to another output variable, such as a number of new connections). Monopoly franchises, however, especially long-term ones, still involve regulation—indeed, some commentators argue that this form of competition is simply a way of facilitating regulation. Prices and related terms of the franchise (often known as a concession) have to be adjusted in response to events.

Competition in the market: Competition to provide electricity services among two or more rival providers in the same service area. In the power market, it typically

applies to competition in a wholesale power market, whereby distributors and large users of electricity purchase electricity directly from generators they choose either in a power exchange or bilaterally, and transmit this electricity under open access arrangements over the power networks to the points of electricity consumption. Independent power suppliers are allowed to compete with distributors for the custom of large users.

Concession: An arrangement in which a firm obtains from the government the long-term right to provide a particular service under conditions of significant market power. Unlike a **management contract**, a concession involves considerable private capital expenditure. It is a legal arrangement suitable for creating **competition for the market**.

Contestable market: A market in which an inefficient firm, or one earning excess profits, is likely to be driven out by a more efficient or less profitable rival. A market can be contestable even if it is dominated by a single firm, which appears to enjoy a monopoly with market power, and the new entrant exists only as potential competition.

Contract for differences: A financial instrument negotiated between the buyer and seller of electricity for an agreed quantity of electricity at a specified price (the contract price or strike price). In the energy pool, the generator of electricity always receives the clearing price, and the purchaser always pays the clearing price. With a financial instrument, if the market clearing price is below the contract’s strike price, the purchaser pays the difference to the generator. If the clearing price is above the strike price, the generator pays the difference to the purchaser. This mechanism creates an agreed profile of prices for the contracted quantity of electricity for the duration of the contract.

Corporate governance: The relationship of a company to its shareholders or, more broadly, to society, especially in terms of how to secure and motivate efficient management of corporations by the use of incentive mechanisms, such as contracts, organizational designs, regulation, and legislation.

Corporatization: Subjecting a state-owned enterprise to the principles of corporate law. This is often accompanied by a range of other initiatives, including providing greater management autonomy and clear commercial objectives, performance monitoring, and competitive neutrality.

Corruption: The abuse of public office for private gain, either illegally or unethically.

Cost of capital: The amount a firm must pay the owners of capital for the privilege of using it. This includes interest payments on corporate debt, as well as the dividends generated for shareholders. It is used as the rate of return that an investor would otherwise be able to earn at the same risk level as the rate of return on the selected investment.

Demand: The amount of a good or service that people are both willing and able to buy.

Demand-side management (DSM): The measures taken by a utility to encourage conservation of electric usage or to reschedule electric usage for more uniform usage throughout the day or year so as to reduce the cost of generation.

Deregulation: The process of removing legal or quasi-legal restrictions on the amount of competition, the sorts of business done, or the prices charged within a particular industry.

Developing country: A country with a relatively low standard of living, undeveloped industrial base, and moderate to low development of health and education standards. These countries are classified by the World Bank on their per capita income, namely low-income countries (US\$765 or less), lower-middle-income countries (between US\$766 and US\$3,035), and upper-middle-income countries (between US\$3,036 and US\$9,385).

Distribution company (disco): The regulated entity that constructs and maintains the distribution wires connecting the transmission grid to the final customer. The disco can also perform other services, such as aggregating customers, purchasing power supply and transmission services for customers, billing customers and reimbursing suppliers, and offering other regulated or nonregulated energy services to retail customers. The “wires” and “customer service” functions provided by a distribution utility could be split so that two totally separate entities are used to supply these two types of distribution services.

Distributed generation: Small amounts of generation located on a utility’s distribution system for the purpose of meeting local (substation level) peak loads or displacing the need to build additional (or upgrade) local distribution lines, or both.

Distribution margin approach: A method of providing a predictable, performance-based payment to equity investors for providing electricity distribution services during a transition period for privatizing a distribution entity. It gives for first charge of distribution entity’s revenues to the equity investors, typically consisting of a base revenue component and incentive charge component.

Divestiture: A private entity buys an equity stake in a state-owned enterprise through an asset sale, public offering, or mass privatization program.

Econometrics: Mathematics and sophisticated computing applied to economic data in search of economic relationships that have statistical significance.

Economic rent: The difference between what a factor of production is paid and how much it would need to be paid to remain in its current use, which is a measure of **market power**.

Economies of scale: Reduction in the average cost of a product in the long term, resulting from an expanded level of output. One reason is that overheads and other fixed costs can be spread over more units of output.

Economies of scope: The situation that arises when the cost of performing multiple business functions simultaneously is more efficient than performing each business function independently.

Energy services: The benefits produced by using energy supplies. They include lighting, heating, cooking, motive power, mechanical power, transport, and telecommunications. They can be generated from a variety of primary energy sources—oil, gas, coal, and renewables. They can be delivered using different energy carriers and systems for the transformation and transportation of energy, ending with the delivery of energy services within the operation and regulation of energy markets.

Externality: Costs or benefits arising from an economic activity that affect somebody other than the people engaged in the economic activity and that are not reflected fully in prices.

Fiscal policy: One of the two instruments of macroeconomic policy, the other being monetary policy. It comprises public spending, taxation, and any other government income or assistance to the private sector (such as tax breaks) and consumers (such as subsidies).

Fixed costs: Production costs that do not change when the quantity of output produced changes, for instance, the cost of production overheads and debt servicing. Contrast with **variable costs**.

Force majeure: An unexpected and disruptive event that may relieve parties to a contract from some or all of their obligations under the contract.

Forward contract: A contract that commits the user to buying or selling an asset at a specific price on a specific date in the future.

Future: A forward contract that is traded on an exchange.

Generation company (genco): A regulated or nonregulated entity (depending upon the industry structure) that operates and maintains power generating plants. The genco may own the generation plants or interact with the short-term market on behalf of plant owners.

Governance: The traditions and institutions by which authority in a country is exercised for the common good. This includes the process by which those in authority are selected, monitored, and replaced (the political dimension); the government's capacity to effectively manage its resources and implement sound policies (the economic dimension); and the respect of citizens and the state for the country's institutions (the institutional respect dimension).

Greenfield project: A project in which a private entity or a public-private joint venture builds and operates a new facility for the period specified in the project contract. The facility may return to the public sector at the end of the concession period.

Grid code: The set of rules, requirements, procedures, and standards that users of the transmission system must follow to ensure the safe, reliable, secured, and efficient operation, maintenance, and development of the high-voltage backbone transmission systems and its related facilities.

Gross power pool: A power pool in which all energy generated and consumed is included in the system operator's settlement process. In a gross pool, all contracts for commodity energy must take the form of contracts for differences.

Horizontally integrated: A situation in which all or most of the capacity within a segment of production—such as generation—is owned by a single entity.

Horizontal unbundling: The breakup of the capacity of a dominant seller in a segment of electricity supply, such as generation or distribution, into multiple entities.

Incentive regulation: See **performance-based regulation**.

Independent power producer (IPP): An entity that owns facilities to generate electric power for sale to utilities and end users and that has no affiliation to a transmission or distribution company.

Independent system operator (ISO): A system operator that is independent from control by any single market participant or group of participants, and therefore has no financial interest in generating facilities.

Independent power supplier: An entity that specializes in energy trading, but does not own or operate distribution networks.

Lease: A form of **concession** of shorter duration that can involve both public and private financing of investments, where applied to infrastructure services.

Liberalization: Relaxation of government restrictions, usually in areas of social or economic policy. In the context of electricity supply, removal of a legal or de facto monopoly by opening electricity market to entry by rival service providers under arm's length regulation and competition, with unbundling of the monopolist's functions.

Lifeline rate: A lower rate than the general rate charged to households for electricity consumption that helps low-income households afford a level of consumption considered nondiscretionary for their social and economic needs (such as a minimum requirement for lighting of 30–50 kWh per month). Higher charges are levied on electricity consumption above that level.

Management contract: An arrangement under which operational control of an enterprise is vested by contract in a separate enterprise that performs the necessary managerial functions in return for a fee. It can involve a wide range of functions, such as technical operation of a production facility, management of personnel, accounting, marketing services, and training.

Market failure: When a market left to itself does not allocate resources efficiently. Its presence is the main justification for **regulation**. Four main sorts or causes of market failure are identified: the abuse of **market power**, the presence of **externalities**, the existence of **public goods**, and existence of incomplete or asymmetric information or uncertainty.

Market power: When one buyer or seller in a market has the ability to exert significant influence over the quantity of goods and services traded or the price at which they are sold.

Merit good: A good that is underconsumed if provided by the market mechanism because individuals typically consider how the good benefits them as individuals rather than the benefits that consumption generates for others in society. In economic terms, this is because the positive externalities of the good are not internalized by consumers. To increase efficiency, the state may choose to encourage greater production or consumption of a merit good through regulation or subsidies, or may choose to produce the good itself.

Merit order dispatch: The process of meeting the demand on a power system at least cost by dispatching electricity from generating units connected to the system under a merit order. This order ranks units according to their variable operating costs with the lowest cost units ranked first for dispatch, and other units ranked in ascending order of variable operating cost so that the highest cost units are dispatched last.

Monopoly: The only seller in a market that controls sales in that market.

Monopsony: A market dominated by a **single buyer**. See single buyer.

Natural monopoly: A market in which demand can be satisfied at lower cost by a single firm rather than by multiple firms. Natural monopolies occur in industries that exhibit decreasing average long-term costs because of size (**economies of scale**).

Net power pool: A design of the power pool under which power buyers and sellers can choose to trade under bilateral contracts outside the pool.

Obligation to serve: The concept governing the retail or end-use provision of electric service in which a utility is required to serve all customers who request service

and are willing to pay nondiscriminatory prices for that service. This obligation is rendered in return for the granting of exclusive rights to serve a geographic area at the retail level.

Opportunity cost: The true cost of producing or acquiring a good or service. This cost includes not only the money spent in this process, but also the economic benefits that are foregone from the use of the resources consumed (including time) in this process.

Performance-based regulation: A process by which a utility's rates are set by linking rewards (generally profits) to desired results or targets, as opposed to setting rates based on cost plus an allowed return on investment. These rates, or components of rates, can be based on external indices, rather than on a utility's cost-of-service. Also known as **incentive regulation**.

Power pool: A wholesale electricity market in which electricity produced by generators and the electricity required by distributors and other suppliers is "pooled" in a power exchange. The pool establishes short-term market-clearing prices based on bids by suppliers and purchasers. It provides price bids to the system operator, who may then use the sets of price bids provided by the power exchange to establish congestion prices, match actual demand to available supply, and facilitate the efficient short-term operation of the integrated generation and transmission system. A separate pool for ancillary generation services may be established in parallel.

Power purchase agreement (PPA): A legally binding contractual agreement by which an entity, such as a single buyer or a distribution company, undertakes to purchase the power generated by an independent or affiliated power producer under specified terms for a multiyear period.

Power utility: A regulated entity that exhibits the characteristics of a natural monopoly. For the purposes of electric industry restructuring, "utility" refers to the regulated, vertically integrated electric company. "Distribution utility" refers to the regulated owner or operator of the distribution system that serves retail customers.

Price cap regulation: Price cap regulation of power utilities—whether they are vertically integrated utilities, transmission entities, or distribution entities under long-term concessions—fixes the prices (or the price paths over time) for their electricity services. The entities thus

bear the risks associated with varying exogenous input prices and shifting demand. At the same time, the entities have full incentives to reduce their costs, as their prices are not adjusted downwards when they succeed. This contrasts with rate-of-return regulation or cost-of-service regulation, where prices track observed costs closely.

Private sector participation: Private sector participation in power supply is generally classified in four categories: **management contracts, concessions, greenfield projects, and divestitures.**

Privatization: The transfer—usually by sale—of assets or service delivery from the public sector to the private sector.

Project financing: An arrangement in which a lender provides the needed capital to build a facility, and the security for the loan is the value of the project itself, rather than the security being the full faith and credit of the owner of the project.

Public good: A good that can be consumed by everybody in a society, or by nobody at all. It has three characteristics: one person consuming it does not stop another person from consuming it; if one person can consume it, it is impossible to stop another person from consuming it; and people cannot choose not to consume it even if they want to. It can be beneficial—as in the cases of clean air and the judiciary—and harmful—as in the case of an epidemic of a disease.

Public interest: In the specific case of power market reform, it refers to the interest of power consumers in particular and to all members of society in general that are affected by the production, transportation, trade, and use of electricity. In the course of these activities, acting in the public interest covers such aspects as protecting public health and safety, detecting or exposing crime or serious impropriety, exposing misuse of public funds or other forms of corruption by public bodies, and correcting misleading public actions or statements.

Public-private partnership: Use of a private firm to provide a public service under contract with a public agency. The public sector can have a financing or a risk-bearing role, or both, by means of investment financing and provision of subsidies. The main forms of this type of partnership are **management contract, lease, concession, and divestiture.**

Public utility: A **utility** providing essential services to the public, such as water and electricity, usually involving elements of **natural monopoly.**

Purchasing agency: See **single buyer.**

Rate-of-return regulation or cost-of-service regulation: This form of regulation caps a power utility's realized rate of return on capital employed in the business by making the utility's prices track its observed costs closely. The utility faces lower risks than under a price cap regulation, but it is unlikely to earn excess profits for long. The downside is that the utility has little incentive to pursue efficiency gains because the profitability of such activity is reduced by the expectation that its prices will be cut by the regulator in response.

Regulation: Rules governing the activities of enterprises, particularly private sector enterprises. Regulation is often imposed by government, either directly or through an appointed regulator. However, some industries and professions impose rules on their members through self-regulation. Regulation is often introduced to tackle **market failure.**

Regulatory capture: The theory that regulation is a process by which interest groups seek to promote their private interest by obtaining over time some influence—or even dominance—over the agencies that regulate them.

Regulatory failure: A situation in which regulation generates more economic costs than benefits.

Regulatory risk: A risk faced by private sector firms that regulatory changes will hurt their business. In competitive markets, regulatory risk is usually small, but in natural monopoly industries, such as electricity distribution, it may be huge.

Rent: The commonplace definition is the income from hiring out land or other durable goods. See also **economic rent.**

Rent-seeking: Trying to make more money without adding any value, such as producing more for customers. Examples of legal rent-seeking include lobbying the government for tax, spending, or regulatory policies that benefit the lobbyists at the expense of taxpayers or consumers or some other rivals, and a labor union demanding higher wages without offering any increase in productivity. Illegal rent-seeking activities are usually classified as **corruption.**

Retail competition: A system under which more than one electric service provider can sell to retail customers, and retail customers are allowed to buy from more than one provider.

Ring-fencing: The internal separation of business functions within an enterprise for management and accounting purposes. In the context of power market reform, this type of separation can be used to limit a contractor's exposure to financial or regulatory risk.

Risk: The possibility of outcomes not turning out as expected.

Risk premium: The extra return required by investors to hold a risky asset instead of a risk-free one, or the difference between the expected returns from a risky investment and the risk-free rate.

Single buyer—also known as a **purchasing agency**: An entity that is granted—sometimes by law—an exclusive right to purchase and sell power in a wholesale electricity market. It generally has a monopoly for supplying distribution companies and large power users. It can manage competition for long-term market share among generators and IPPs. The functions of this agency are carried out by many types of entities in different countries, including a national vertically integrated utility, a national generation entity, a national transmission entity, a national distribution entity, a combined national generation and transmission entity, and a combined national transmission and distribution entity.

Spot price: The price quoted for a transaction made in a spot market that is to be made on the spot—that is, paid for now for delivery now. Contrast spot prices with **forward contracts** and **futures**, where payment or delivery, or both, will be made at some future date. Also contrast with a long-term contract, such as a **concession** to provide a public service, in which a price is agreed for repeated transactions, such as the sale of electricity under a **tariff** over an extended period.

Stakeholders: All the parties that have an interest, financial or otherwise, in a company or a market, including shareholders, creditors, bondholders, employees, customers, management, the community, and government.

Stranded costs: Liabilities incurred before the reform of the electricity industry and which cannot be recovered in a new market environment. Examples are undepreciated

generating facilities and preestablished long-term contractual obligations.

Strategic investor: In the context of power markets, a major corporation—which can also include a state-owned entity—that invests in the power sectors of many countries according to a defined strategy of business development. Such a strategy can seek opportunities for business growth outside the corporation's home market, or be a defense against the aggressive business strategies of rival corporations in its home market. It often seeks to leverage the corporation's strengths, such as in project development, financing, construction, and management.

Subsidy: Money paid, usually by government, to keep prices below what they would be in a free market, or to enable businesses to remain viable in providing unprofitable, but socially desirable services, or to make a service affordable to a particular group of consumers, or generally to make activities happen that otherwise would not take place, such as the development of new forms of service delivery.

Supplier: Any person or entity licensed to sell, broker, market, or aggregate electricity to end users, that is registered with the market operator as a customer.

System operator: The party identified as the system operator pursuant to the grid code that is the party responsible for generation dispatch, the provision of ancillary services, and operation and control to ensure safety, power quality, stability, reliability, and security of the grid.

Sunk costs: Costs that have been incurred and cannot be reversed or reclaimed by resale. Investments in most immovable infrastructure assets that have no alternative use to a particular infrastructure output or service fall into this category of costs.

Supply: The amount of a good or service that is available at any particular price.

Take-or-pay: The terms of an agreement between a buyer and seller in which the buyer pays an agreed amount even if it does not accept the product or service. In the power market, this arrangement used to prevail in power purchase agreements with IPPs, under which an off-taker—typically a power utility or a single buyer—agreed to pay for a prescribed level of electricity produced by the IPP in a defined period—usually a year—even if the off-taker actually took less electricity.

Tariff: A document, approved by the responsible regulatory agency, listing the terms and conditions, including a schedule of prices, under which utility services will be provided.

Third party access (TPA): Open access for parties other than a vertically integrated power utility to use its transmission system, which enables independent power producers to sell power directly to suppliers and consumers and end users, and allows suppliers and end-users to purchase electricity directly from the wholesale market rather than through a local distribution utility.

Transition economies: The formerly centrally planned economies of the former Soviet Union and Central and Eastern Europe that are becoming market economies.

Transmission company (transco): The corporation organized pursuant to an electricity law to acquire, operate, and maintain transmission assets.

Transmission system: The system used to deliver electric power at higher voltages in bulk quantity from generating facilities to local distribution facilities (and a few large industrial customers), for final retail use.

Transaction cost: A cost incurred in making an economic exchange, such as for buying and selling electricity, in addition to the price at which the exchange is made. It can cover the costs of search and information, negotiation, monitoring, and enforcement.

Two-part price: A price structure under which one part is a periodic availability charge that covers **fixed costs**, and the other part is applied to the actual amount of service that is provided and covers **variable costs**.

Unbundling: The act of disaggregating the total electric service provided by a power utility into its basic components and offering to sell each service separately with separate rates for each component. Thus, generation, transmission, and distribution services could be functionally unbundled into separate entities and offered as discrete services. (See **vertical unbundling** and **horizontal unbundling**.)

Unserviced energy: The expected amount of energy curtailment caused by power demand that exceeds available capacity.

Utility: A regulated entity which exhibits the characteristics of a natural monopoly. For the purposes of electric industry restructuring, “utility” refers to the regulated, vertically integrated electric company. “Distribution utility” refers to the regulated owner or operator of the distribution system that serves retail customers.

Variable costs: Part of a firm’s production costs that change according to how much output it produces. Contrast with **fixed costs**. Examples include purchases of fuel in the case of electricity generation. In the long term, most costs can be varied.

Vertical integration: An arrangement whereby the same company owns all the different aspects of making, selling, and delivering a product or service. In the electric industry, it refers to the historically common arrangement whereby a power utility owns its own generating plants, transmission system, and distribution lines to provide all aspects of electric service.

Vertical unbundling: The functional separation of the vertically integrated utility into smaller, individually owned business units (that is, generation, dispatch or control, transmission, and distribution).

Vesting contract: A contract that fixes the price of power traded between generators and distributors for a set period (up to five years in some cases) before an open bulk power market goes into operation. It removes trading price uncertainty for investment in the early years of power market reform, thereby providing a significant advantage for financing the renovation of dilapidated and undersupplied power distribution systems, as well as for dilapidated generation plant, which helps sell these businesses, provided that the contracts are in place at the time of sale. These contracts are a transition mechanism that should eventually be replaced by trading arrangements that give stronger incentives for distributors to be efficient buyers of power.

Wholesale competition: A system whereby a distributor of power would have the option to buy its power from a variety of power producers, and the power producers would be able to compete to sell their power to a variety of distribution companies.

Wholesale power supply: See **bulk power supply**.

Yardstick competition: See **yardstick regulation**.

Yardstick regulation: A form of incentive regulation that involves comparison of a measure of the actual performance of a power utility or utilities against a reference benchmark performance. It can be used to promote indirect competition among regulated entities operating in geographically separate markets, under which the performance of a regulated entity is contrasted to that of a group of comparable entities.

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Chapter 6

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