2

THE CHANGING GLOBAL CONTEXT FOR ELECTRICITY REFORM

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To a significant extent, national electricity sector reform initiatives were shaped in response to global trends in development ideology, financing, and technological change. In this chapter, we review these trends and examine their implications for electricity reforms. Based on this discussion we explore a debate over whether preserving and enhancing the public interest in the sector will occur automatically as a result of reforms, or whether it must be designed into reform processes.

ORGANIZATION OF THE ELECTRICITY SECTOR: FROM SOCIAL COMPACT TO ECONOMIC EFFICIENCY

Until the early 1990s, governments either owned the electricity sector or controlled the sector through regulation. Electricity was considered a textbook natural monopoly (Teplitz-Sembitzky, 1990; Hunt and Shuttleworth, 1996). Governments, it was thought, were best able to mobilize the large amounts of capital necessary to develop the sector and bear the long time horizons for recovery of costs. Particularly in developing countries, government leadership in the development and use of electricity was part of a broader "social compact" (World Bank, 1988).

In the early 1990s, however, this conventional wisdom came under siege. With astonishing rapidity, there was a revolution in thinking about the structure of the industry. In the industrialized world, the promise of the public, vertically integrated, centralized power system was largely realized—people had reliable, affordable power. The problems were those of a mature system and technologies. By the 1970s, however, industrialized countries no longer benefited from the smoothly rising demand curves of the past, undermining the predictable sources of income on which utilities had relied, and affecting the returns from new power projects (Rosenzweig and Voll, 1997). When small, cheap gas turbines became commercially viable, the trends in scale economies that had dominated the industry until this point were dramatically reversed (Hunt and Shuttleworth, 1996).[1] Costs and risk in the sector had increased due to a rising environmental consciousness, a corresponding increase in regulations, and burdensome investment in large power plants, particularly high-capital-cost nuclear units (Patterson, 1999). In short, a virtuous cycle of increasing consumption, growing interconnection, and lower costs driven by scale economies was replaced by a vicious cycle of increasing costs, diminishing productivity, and deteriorating economic performance (Oliviera, 1997).

Countries began to act on these changed realities. In the 1970s, the United States allowed independent power producers to sell electricity to utilities. This was a shift of considerable significance. It demonstrated that independent generators could be integrated into a grid system, and began the unraveling of the conventional wisdom that the utility was a natural monopoly (Hirsh, 1999). In the late 1980s,

Chile and the United Kingdom took reform a step further by re-making their sectors around the objective of promoting competition.[2] This was a radical idea.[3] Before these countries initiated reform, there was near unanimity that transaction costs in the sector and the technical requirements of electricity made competition nearly impossible.[4]

There was a rush to anoint a new conventional wisdom—competition in the power sector was not only possible, but inevitable.

The rapid growth and declining costs of communication and information technologies facilitated the development of new control techniques consistent with decentralization, which facilitated competition (Graham and Marvin, 1995; International Energy Agency, 1999). In a few short years, there was a rush to anoint a new conventional wisdom—competition in the power sector was not only possible, but inevitable. This new model represented a shift from a "social compact" to the pursuit of economic efficiency.

A COMPLEX NEW MODEL FOR THE ELECTRICITY SECTOR

The emerging model in the electricity sector is focused primarily on two dimensions: (1) changes in management practices, which may or may not involve changes in ownership from government to the private sector (*See Box 2.1.*); and (2) restructuring for competition, which is a process of separating or "unbundling" vertically integrated utilities to progressively introduce competition into the system (*See Box 2.2.*).[5] In positioning themselves with respect to these issues, countries have a wide range of choices. However, implementing reforms is by no means as simple as picking locations along these two axes. Putting into practice a competitive model for electricity requires developing rules for markets, contractual arrangements, tariff regulation, and a myriad of other details.

BOX 2.1 STAGES IN CHANGE OF OWNERSHIP AND MANAGEMENT

Commercialization: A government surrenders detailed control over a state-owned enterprise with the purpose of promoting operation in keeping with commercial principles. This is a change in practice rather than a change in organization form.

Corporatization: A government formally and legally relinquishes control and management of a state-owned enterprise to establish a corporation. It may still set overall objectives and subject the corporation to regulatory oversight.

Privatization: A government sells a corporation to private owners. The private corporation is able to tap the capital markets, and is subject to the discipline of those markets. The private company may be subject to regulatory oversight.

Source: Hunt, Sally and Graham Shuttleworth. 1996. *Competition and Choice in Electricity*. New York: John Wiley and Sons.

In addition to technical details, there are conceptual challenges to implementing this model. Privatization and restructuring, while theoretically distinct processes, are linked in practice. Privatization alone, in the absence of competitive market structure, will do little to promote competition (Oliviera and MacKerron, 1992). However, the introduction of truly competitive market structures will limit profits, at least in comparison to firms with market power. Ironically, the successful introduction of competition could mute private sector interest in the sector and actually undercut successful privatization (Bacon, 1995). Conversely, if privatization occurs before restructuring, private owners have a strong incentive to ensure that subsequent reform efforts do not undermine their ability to capture monopoly rents through, for example, effective regulation. This may open the door to corruption and other means of

BOX 2.2 APPROACHES TO RESTRUCTURING FOR MARKET COMPETITION

Monopoly: No competition at any level. A single entity handles generation and transmission to distribution companies, who have a monopoly relationship with the final consumer.

Single buyer: Competition in generation. Independent power producers (IPPs) may sell only to a single purchasing agency on the basis of a power purchase agreement (PPA). The purchasing agency transmits to distribution companies, who have a monopoly relationship with the final consumer.

Wholesale competition: Competing generators sell directly to distribution companies. All generators have open access to a transmission network for the purpose of delivery of power. Distribution companies continue to have a monopoly over final consumers.

Retail competition: Competing generators sell directly to distributors, retailers, and final consumers. Generators have access to both transmission and distribution wires on the basis of regulated prices. Final consumers may purchase power from a retailer or directly from a generator.

Source: Hunt, Sally and Graham Shuttleworth. 1996. *Competition and Choice in Electricity*. New York: John Wiley and Sons.

influencing the restructuring process. Privatization and competition, then, while apparently complementary, pose considerable challenges of sequencing and implementation (Newbery, 1995; Besant-Jones, 1996).

To further complicate the picture, competition need not be accompanied by privatization. For example, Norway has successfully introduced competition between different state-owned entities, some owned by the central government and others by municipalities (Wolak, no date; Magnus, 1997).

The benefits and viability of implementing a market model, either in whole or in part, continue to be hotly debated. Advocates of market-based reforms suggest that reforms provide incentives for cost savings and productivity enhancement (Joskow, 1998). These incentives operate by providing appropriate price signals to consumers to allocate resources appropriately, by unleashing the profit motive to provide an incentive for efficient use of inputs, and by encouraging cost reductions through competition (Bacon and Jones, 2001). They point to the experience of early movers among the industrialized countries, such as the United Kingdom, to suggest that these goals have been realized (Littlechild, 2000). However, the U.K. experience also shows that competition is at least as important as privatization in providing incentives for efficiency, and that the costs of system coordination are greater under the market system than in an integrated utility (Newbery and Green, 1996).

The benefits and viability of implementing a market model continue to be hotly debated.

Critics focus on the weaknesses of the market competition model (Watts, 2001). For example, the cost of capital for the sector is likely to be higher in an unregulated market (to reflect higher risks) than under either public ownership or regulation based on a stable rate of return. In a capital-intensive sector like electricity, the higher cost of capital can result in both higher average cost and greater price variability. In addition, it is difficult to defend against market power in this sector, both because electricity cannot be stored (giving generators opportunities to exploit market power), and because there is little elasticity of demand for electricity in the short run. Finally, planning for the transmission system becomes a challenge in a privatized sector where investment decisions may be a trade secret, and where choices

BOX 2.3

THE CALIFORNIA ELECTRICITY CRISIS

The Plan

In 1993, California was beginning to emerge from a prolonged recession. Electricity rates were 50 percent higher than the U.S. national average, owing—among a host of other factors—to the high costs of California's nuclear power plants and expensive long-term power contracts. Lawmakers feared that the high price of energy was driving industry out of the state. Deregulation was intended to reduce the price of electricity by introducing market competition.

In 1996, after two years of discussion and debate, the California Legislature unanimously adopted a plan for deregulation. To improve prospects for competition, the plan offered significant incentives to California's three largest utilities to separate their generation, transmission, and distribution functions into component parts.

The utilities quickly sold off their oil and natural gas power plants; their market share in electricity generation fell from 81 percent in 1996 to 46 percent in 1999. They also transferred control of electricity transmission to an independent system operator and established a power exchange facility to facilitate electricity sales between generators and utilities. The system was designed to allow residential customers to choose their electric service provider and thus inject retail competition into the energy sector.

Significantly, the plan allowed the utilities to recover their "stranded costs"—capital costs in plants that were potentially uneconomic in the new competitive generation market—by freezing consumer retail rates at 1996 levels for up to four years or until the costs were recovered, whichever came first. Since it was assumed that wholesale rates would remain well below retail rates, the plan would allow the utilities to lock in a sure profit. This was the carrot that made them willing to give up their near-monopoly on generation and transmission of electricity. The end result was a complex, delicately balanced system whose design represented a series of political compromises made between legislators, interest groups, and the utilities.

Crisis

In 2000, a combination of factors—some relating to supply, others to demand—combined to plunge California's power sector into crisis. On the supply side, a drought in the Pacific Northwest reduced the amount of hydroelectric power available for export to California in the spring months of 2000. Natural gas prices quadrupled in the same time period. Some have argued that the state's strict emissions standards limited the output of currently existing plants. Environmentalists counter that California's environmental regulations played no part in precipitating the crisis but that lack of supply was manufactured by generators exercising market power. All agree, however, that unbundling had failed to dilute market power.

The demand for electricity in California surged by 20 percent from 1997 to 2000, driven in part by a boom in the technology sector. Yet because retail prices were fixed by law, there was no way to signal to consumers that their higher demand was driving up the price of electricity. Moreover, in the mid-1990s the utilities reduced funding for what had been successful energy efficiency programs which would otherwise have lowered demand.

Exacerbating these problems was a lack of flexibility in the plan. Assumptions that supply reserves were adequate, that there would be robust competition, and that consumers would adjust use in response to market signals, all proved to be flawed. Although there were official public hearings, a significant amount of the drafting process took place in late-night, closed-door, horse-trading sessions between legislators, utilities, and environmental and other interest groups. The end result was a bill designed to satisfy each group. According to some insiders, by appeasing major interest groups, the consensus-building process may have deflected serious scrutiny of the bill. Finally, because the stakeholder consultation process led to the program being institutionalized in law—rather than in regulations, which are more flexible—policymakers had fewer options when dealing with a fast-changing and growing crisis in 2000 and 2001.

BOX 2.3 **(CONTINUED)**

In mid-May 2000, as excess capacity dwindled, wholesale energy prices began to rise. By June, the utilities were buying power at $120 per megawatt-hour and then selling to retail customers at the fixed price of $65 per megawatt-hour. Two utilities declared their stranded costs recovered and pleaded with the California Public Utilities Commission (CPUC) to lift the retail price restrictions. It refused, arguing that consumer rate hikes were politically impossible. The crisis was exacerbated by market manipulation; suppliers withheld energy at peak-hours in an attempt to drive up prices. The average number of megawatts off-line from November 2000 to May 2001 increased by 267 percent compared to the same period a year earlier. California's utilities began losing a great deal of money very quickly.

By mid-December 2000, the utilities were paying $400 per megawatt-hour for power on the wholesale market, reselling it for $65 per megawatt-hour, and losing roughly $50 million per day. By mid-January 2001, two utilities were insolvent, with one declaring bankruptcy in April. The power exchange shut down on January 31, but the governor instructed the California Department of Water Resources (CDWR) to buy power to meet the utilities' short positions. Through May 2001, CDWR had spent about $8 billion doing so.

Only in the spring of 2001 did a combination of conservation efforts, price caps, and the willingness of a previously reluctant government to sign long-term contracts with energy providers bring wholesale prices down to earth. The state of California cut its energy use by an astonishing 8 percent during the month of February 2001. A reduction in demand helped to nudge wholesale prices downward and to reduce the incentive for energy generators to take capacity off-line.

By July 1, 2001, electricity prices were back to the levels of early May 2000. The California government has effectively taken control of the electricity sector, and is now saddled with billions of dollars in long-term contracts that require it to buy power at prices significantly above current market rates. This will almost certainly ensure rate hikes and tax increases for California's citizens for the foreseeable future. This outcome is a far cry from the promises made in 1996.

The California story offers several possible lessons for reforming countries. The complexity of the reform challenge is daunting, suggesting the need for keeping reform simple. In particular, California's experience illustrates how pernicious the problem of market power can be; unbundling California's utilities only transferred the problem from one cartel to another. With regard to the process of reform, California did make a serious attempt at broad consultation, which allowed a broad range of interests to be represented. That the end result was unsuccessful suggests that while stakeholder engagement may be a necessary component of any reform plan, it is not in itself sufficient to ensure success. Finally, conservation and energy efficiency efforts were remarkably effective and a major factor in bringing the energy crisis to a close.

Sources:

The Economist. 2001. "A State of Gloom." (January 20).

Gamson, David. 2001. "The California Conundrum: Rates, Reliability and the Environment Under Electric Restructuring in California." Paper presented at "Energy Restructuring and the Environment" Workshop in Tokyo, Japan. (October 22).

Harvey, Hal, Bentham Paulos, and Eric Heitz. 2001. "California and the Energy Crisis: Diagnosis and Cure." San Francisco, CA: Energy Foundation.

Joskow, Paul L. 2001. "California's Energy Crisis." Working Paper 8442. Cambridge, Massachusetts: National Bureau of Economic Research. (August).

Nieves, Evelyn. 2001. "In California, Solar's Time to Shine: Alternate Power Systems and Conservation Draw New Converts." *The New York Times*. (May 3).

Reddy, Amulya K.N. 2001. "California Energy Crisis and its Lessons for Power Sector Reform in India." *Economic and Political Weekly*. (May 5-11).

World Bank Energy and Mining Sector Board. 2001. "The California Experience with Power Sector Reform: Lessons for Developing Countries." Washington, D.C.: World Bank. Online at: http://www.worldbank.org/html/fpd/energy/pdfs/e_calexp0400.pdf (May 29, 2002).

between transmission investments may considerably benefit one generator over another.

Others do not take issue with the model itself, but are cautious about the pragmatics of implementation in developing countries. In small developing countries, there is a trade-off between dividing up generators sufficiently to ensure competition, and ensuring economies of scale in generation (Bacon, 1995; Besant-Jones, 1996). Moreover, the starting conditions in the sector are an important factor in determining the viability of the private competition market. For developing countries, whether retail prices are above or below costs, or capacity generation is adequate to meet demand, the extent to which the population is fully served by electricity access and the existence of credible regulatory institutions to restrict the emergence of private monopolies will all determine decisions on how to proceed with reform of the sector (World Bank, 2001). Finally, while a market reform model provides incentives for efficient operation at the level of the firm, it does not by itself provide incentives for the balanced development of the sector, and would particularly neglect unprofitable customers or those unconnected to the grid (Reddy, 2001).

The debate has acquired renewed intensity in the wake of California's disastrous experience in the summer of 2000 following an extremely ambitious, though arguably flawed, reform program. *(See Box 2.3 on previous page.)* The collapse of the Enron Corporation in the United States—the company most closely and visibly associated with electricity markets—has also raised questions about the relative merits of deregulation and government control.[6]

It is beyond the scope of this study to conclusively consider these issues. However, based on the brief review conducted here, it seems true that the model described here may indeed generate gains, but there is considerable uncertainty about how best to define and implement reforms in particular cases. In particular, how reforms can best be tailored to the varying conditions in different countries along both privatization and restructuring dimensions, and whether and how the greater complexity of the sector can be adequately governed, remain open questions.

ADOPTION OF THE MODEL: THE STRUGGLE FOR FINANCIAL RESOURCES

Developing countries and economies in transition have faced some of the same issues as industrialized countries, notably the emergence of new generation and information technologies and, to some extent, rising costs due to increased regulation. But in other ways the problems have been quite different. These problems are outlined in Chapters 3-9 in greater detail.

As summarized in the *World Energy Assessment*, state-owned monopolies in many countries have allowed subsidies to proliferate, demonstrated a bias in favor of large and visible projects, been prey to bad management, and have placed a strain on government budgets (World Energy Assessment, 2000). For example, subsidized power was often used to propel forward key sectors of the economy. This approach, while effective, also created powerful constituencies for the continuation of such policies, as was the case with farmers in India. In other countries, nontransparent accounting undermined financial discipline in the energy sector, as for example in Bulgaria through the use of coal subsidies for electricity and electricity subsidies for district heating. The sector was often used for narrow political ends, resulting in a weakening of public institutions in the sector across many developing countries (Teplitz-Sembitzky, 1990). This observation was reinforced by a survey of 300 World Bank-funded projects from 1965 to 1983, which showed a progressive deterioration in the performance of developing country utilities over time (World Bank, 1988). In short, there is considerable evidence that the electricity sector faces significant problems in much of the developing world and in economies in transition.

The type and magnitude of problems are not similar all over the world. For example, in contrast to

many other developing countries, the sector in Argentina and South Africa is well-developed and functions relatively well. In Bulgaria, and in much of Central and Eastern Europe, the sector is well-developed but plagued by inefficiencies (Chandler, 2000). For example, energy intensity (the amount of energy required to produce a unit of GDP) in this region is approximately twice as high as in other industrialized countries (Tellam, 2000). In other countries, such as India and Ghana, the promise of the public utility model has failed to materialize. Most African countries provide electricity to less than 20 percent of their population (Bhagavan, 1999). Those who do have access to electricity are often inadequately served.

Despite these differences across countries, a market-based reform approach has fast taken root in many developing countries. While few have taken all the steps described in Boxes 2.1 and 2.2, several countries have undertaken some combination of steps toward a market in the electricity sector. *(See Table 2.1.)* For example, 44 percent of 115 countries surveyed in 1998 had converted their state utility into a corporation, and 40 percent had allowed the entry of private producers in generation (Independent Power Producers). A smaller number of countries had privatized either generation (21 percent) or distribution (18 percent). Nonetheless, taking into account the dramatic nature of institutional change required, these proportions represent a considerable shift over less than one decade.

What explains this relatively rapid adoption of the model in the developing world? To a significant extent, the answer lies in the search for finances for the energy sector in developing and transition economies. Traditionally, much of the developing world has relied heavily on public development finance, and particularly the World Bank, to finance their investments in the sector. By the 1990s, international public financial institutions were increasingly reluctant to continue funding public utilities that were trapped in a cycle of low revenues and declining quality. This led to a steep decline in World Bank funding for investment projects in the electricity sector. *(See Figure 2.1.)*

In addition, continuing a decade of "structural adjustment" in borrower countries, the World Bank and the International Monetary Fund sought to expand the role of the private sector in the development process. In 1993, a World Bank policy paper made reform in the electricity sector an explicit condition of continued lending for the sector (World Bank, 1993). The central thrust of the new policy was to encourage borrower nations to restructure their sectors and open them to greater private participation. Toward this end, the World Bank increased lending for policy reform. *(See Box 2.4.)* This shift was not limited to the World Bank, but is echoed in a 1994 energy sector policy paper produced by the Asian Development Bank (Asian Development Bank, 1994).

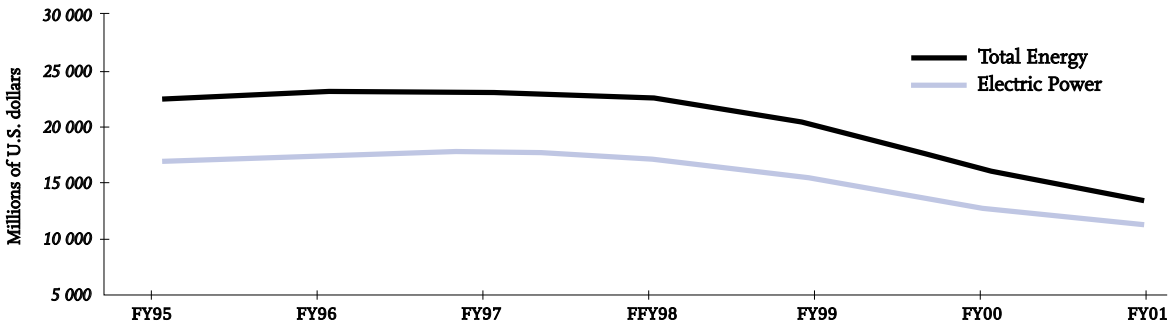
Obtaining private finance for the electricity sector was no easy task. The institutional framework for

TABLE 2.1 **COUNTRIES TAKING KEY REFORM STEPS IN THE POWER SUBSECTOR, 1998**
(sample of 115)

Corporatize	Law	Establish Regulator	Independent Power Producers	Restructure	Privatize Generation	Privatize Distribution
51	38	33	46	40	24	21
(44%)	(33%)	(29%)	(40%)	(35%)	(21%)	(18%)

Source: Bacon, Robert. 1999. *Global Energy Sector Reform in Developing Countries: A Scorecard.* Report 219/99. Washington, D.C.: ESMAP.

FIGURE 2.1 **WORLD BANK NET LENDING COMMITMENT TO THE ELECTRICITY SECTOR (1995–2001)**



Source: World Bank Annual Report (various years).

private investment in the sector did not exist. Like the experience in the United States, the United Kingdom, and Chile, developing countries and economies in transition had to pass new laws and establish new institutions to attract capital. In addition, under the public utility model, the sector was organized as an interconnected network. This structure did not lend itself to discrete investments with well-defined profiles of risk and return to private capital. Instead, dependence on private capital exerted a pressure to divide the sector into discrete components (Balu, 1997). Finally, the poor state of the sector in many potential recipient countries did not promise either reasonable expectation of profit or manageable low risk. Hence, borrowing countries were in a bind: to attract capital, the sector had to be in good health, and in order to ensure good health, they needed capital.

BOX 2.4 **SHIFTS IN WORLD BANK POLICY IN THE ELECTRICITY SECTOR**

From 1978 to 1993, World Bank lending in the electricity sector supported state-owned monopoly power utilities to:

- provide power service on the basis of least-cost development programs;
- strengthen the sector's institutions and improve their efficiency;
- increase local resource mobilization; and
- improve access to electricity by disadvantaged population groups.

In 1993, the World Bank made reform an explicit condition of continued lending for electricity. The strategy called on borrower countries to:

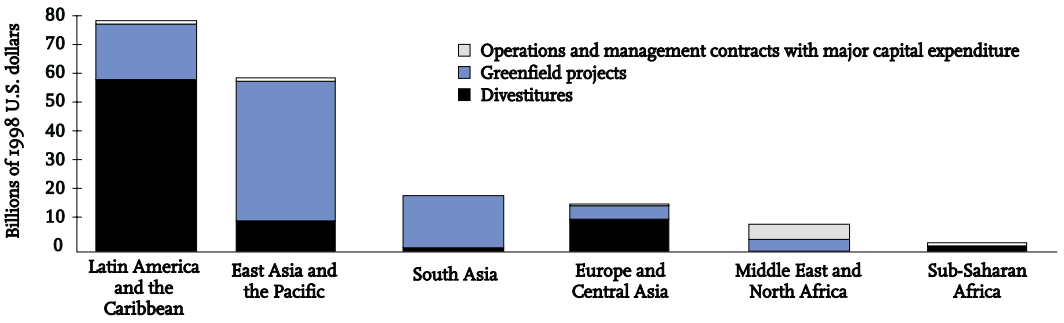
- establish transparent regulatory processes;
- commercialize and corporatize the power sector;
- allow for importation of power services in some cases; and
- encourage private investment in the sector.

Sources:

Covarrubias, Alvaro J. 1996. *Lending for Electric Power in Sub-Saharan Africa*. Washington, D.C.: World Bank.

World Bank. 1993. *The World Bank's Role in the Electric Power Sector*. Washington, D.C.: World Bank.

FIGURE 2.2 TOTAL INVESTMENTS IN ENERGY PROJECTS WITH PRIVATE PARTICIPATION, 1990–99



Source: Data from World Bank PPI database, reproduced with permission from Energy Sector Management Assistance Program (2000).

Institutional reforms across the developing world and transition economies were aimed at overcoming these hurdles, but took different forms in different parts of the world. *(See Figure 2.2.)* Private sector finance entered Latin America primarily through a wave of privatization. For countries burdened with debt-heavy utilities—the legacy of a wave of borrowing on international markets during the petro-dollar glut of the 1970s and 1980s—the outright sale of their public utilities was the most effective way to both shed debt and raise some capital (Oliviera, 1997).

In Asia, countries invited "independent power producers" (IPPs) to build and operate power plants and sell the electricity generated to the state utilities.[7] However, given the poor state of the sector in many countries, IPPs demanded and received highly favorable "power purchase agreements" (PPAs) providing concessions designed to minimize their risks and guarantee returns on their investment. These included high electricity prices; rigid "take-or-pay" contracts, which required the utility to make a set payment for power, whether it was used or not; and government guarantees against nonpayment for electricity. As a result, IPPs have been criticized as being built on the socialization of loss, but privatization of profit (Colley, 1997). Moreover, by attracting capital only to generation, IPPs have potentially negative environmental implications, since they skew incentives toward new generation and against meeting electricity needs through greater efficiency. In addition, the purchase contracts have forced use of high-cost power over lower-cost power already available. Not least, suspicion over corrupt practices in striking these deals has tarnished the already dismal record of governance in the sector (Albouy and Bousba, 1998; Izaguirre, 1998).

In Africa, countries have embarked on electricity sector reform as part of a larger program of structural adjustment with a focus on public sector reform (Turkson, 2000). In addition to IPPs, the private sector often entered through management and operation contracts in which operation of the entire utility was handed over to a private entity. This approach was based on the small size of the sector in many African countries and the lack of strong regulatory frameworks (Covarrubias, 1996).

In Central and Eastern Europe, divestitures, along with some IPPs and a small number of management contracts, were the order of the day, as Figure 2.2 suggests. Divestitures were undertaken as part of a larger process of restructuring along the lines of the U.K. model. One important goal of electricity reform

was to attract capital to replace and retool worn out systems. The reform process was further complicated by accession to the European Union and the consequent need to standardize systems and regulations, including environmental regulations (Chandler, 2000).

In sum, by the 1990s, development and transition economies sought to attract private capital to a sector shaped by decades of state ownership. In the past, state ownership was synonymous with running the sector to serve social policy—a "social compact." Indeed, many argue that good intentions led to an inefficient sector that has, in many countries, undermined the social purposes it sought to serve. With private capital as the taskmaster, however, the concern is a different one: How can a sector organized around private capital and markets sufficiently account for the public interest?

WHY PURSUE A PUBLIC BENEFITS AGENDA?

Will a reformed electricity sector organized around commercial principles automatically promote broader social and environmental interests? Or is there a case to be made for intentional scrutiny, oversight, and adjustment to ensure that these interests are adequately provided for? In this section we review this case on both social and environmental grounds. We conclude that, left entirely to its own devices, a market-oriented electricity sector provides inadequate long-run direction and runs the risk of providing insufficient public benefits.

Social Benefits: Access and Price

Electricity is a pervasive and central part of industrial society. Indeed, advocates for electricity sector reforms argue that the proposed changes will bring better quality power at lower average costs, with positive ripple effects through economies and societies. There may indeed be some benefits from efficiencies gained through application of the conventional reform model. However, when viewed through the lens of social equity, reforms should not only result in aggregate benefits, but also benefits to the least advantaged. From this perspective, access to electricity and the price at which electricity is available become important considerations. These issues are the central focus of this section.

Improved energy services provide a wide range of economic and social benefits, such as greater potential for education due to better lighting; savings in time and effort spent gathering traditional fuels; potential for improved access to information and digital connectivity; scope for greater productivity; scope for improved health services; and improved indoor air quality (Waddams Price, 2000; World Energy Assessment, 2000). In many developing countries, increasing access to electricity is an urgent need. In many African countries, for example, only 5 to 20 percent of the population has access to electricity with much of this access restricted to urban populations (Bhagavan, 1999).[8] In large measure, these dismal numbers reflect the failure of the centralized public power approach to guarantee access to electricity services.

There are several reasons for this failing. The rural poor, in particular, are often costly to serve because of remote locations and low population density, high transmission line losses, poor credit and minimal collateral, and a lack of purchasing and political power (Ehrhardt, 2000; World Energy Assessment, 2000). Yet, the proposed new model of market reform, designed to wring additional economic efficiency gains out of existing electricity networks through private sector competition, may be no better equipped to deal with these problems than the public utility model.[9] Indeed, in a reformed market where profitability is a central operating principle, interest in serving poor populations is likely to be further muted. A post-reform sector is likely to be dictated by principles of cost recovery in order to ensure adequate returns to the private sector. Hence, efforts at reform aimed at private participation will have to explicitly grapple with the tradeoffs between maintaining profitability and a social mandate to expand access to electricity, or risk being irrelevant to the problems of access.[10]

Without an explicit effort, market reforms will not support greater access to electricity.

The limited evidence available to date supports the view that without an explicit effort, market reforms will not support greater access to electricity. In Bolivia, for example, a World Bank study concludes, "...the necessary expansion of the grid to connect the poor will not take place as a consequence of privatization and restructuring" (ESMAP, 2000). Indeed, the experience in industrialized countries suggests that rural electrification requires a distinct and directed effort. In the United States, for example, beginning in 1935 the Rural Electricity Administration ran a concerted program built around low-interest public funding, a model of rural electricity cooperatives, standardized engineering to reduce costs, and a principle of universal coverage that was highly successful in electrifying rural areas (McClean, 2000).

Because grid extension is technically and economically challenging, decentralized (usually small) electricity systems are increasingly becoming a feasible option for rural electrification. Among the available sources are several renewable energy technologies, including small hydropower, wind power, solar, and biomass (World Energy Assessment, 2000). Since distributed power sources avoid the high costs of transmission and distribution, these technologies may be cost-competitive for rural electrification. Leasing arrangements for technology, subsidies for the initial costs of switching to new systems, and concessionaire approaches (where a private entity is given exclusive right to a market in return for an obligation to serve) are all means of encouraging the spread of distributed electricity.

Whether through the grid or off-grid, therefore, there are various ways of promoting access even in an electricity sector led by private actors (Estache, Gomez-Lobo, and Leipziger, 2000). For example, at the time of privatization, distribution companies could be mandated connection targets, regulators could promote innovative approaches including concessionaire arrangements, and subsidies for the costs of connection to electricity services could help support the transition to electricity access. To meet the challenge of effectively serving dispersed populations, experiments with "micro-privatization," where delivery of electricity or other services is handed over to small scale-private or community actors, demonstrate better results than either large-scale public or private service delivery (Harper, 2000). On a case-by-case basis, the choice of appropriate mechanism or policy will depend on, for example, the existence of sufficient fiscal capacity, administrative capacity, and the scope for entry of competitive actors in each country (Ehrhardt, 2000). The general point is that mechanisms do exist to promote enhanced access to electricity. The contrasting examples of Morocco and Chile detailed in Box 2.5 suggest that this holds true for both public and private ownership, and further underscore the need for explicit mechanisms if enhanced access to electricity is to become a reality.

A related, concern is the price at which electricity will be available in a post-reform world. In industrialized countries, reforms will likely lead to lower prices as efficiency gains are captured. In developing countries, however, prices are likely to rise as current price restrictions are removed and cross-subsidies eliminated.[11] There is an important tension to be managed here. High prices are necessary to recover costs and to offer scope for profit in and attract private investment to the electricity sector. Yet, higher prices will disproportionately affect the poor, who tend to spend a larger proportion of their income on energy services than higher income groups.[12] Thus, public subsidies will likely continue to be necessary to meet social policy goals (Barnes and Halpern, 2000).

Greater end-use efficiency would reduce the requirements for public subsidies to low-income consumers.

In this context, programs to encourage better end-use energy efficiency serve a valuable social purpose as well as an environmental one. Greater end-use

BOX 2.5 RURAL ELECTRIFICATION IN MOROCCO AND CHILE: CONTRASTING EXPERIENCES

Over the last decade, Morocco and Chile achieved impressive results in raising the share of their rural populations with access to electricity services. In Morocco, rural electrification rose from 19 percent of rural villages in 1995 to 39 percent in 1999. Equally impressive, Chile's electrification rates rose from 53 percent in 1992 to 76 percent in 1999. These two countries have radically different electricity sectors (an integrated state-owned utility in Morocco versus decentralized and privately operated generation and distribution in Chile), but their rural electrification efforts share a number of characteristics.

In both Morocco and Chile, national governments recognize that increasing access to electricity in rural areas requires closing the gap between the ability of rural customers to pay and the higher cost of providing electricity services in rural areas. Rural electrification efforts in both countries attempt to minimize subsidies. They permit flexibility and experimentation to identify the most cost-effective technology choices, financing schemes, and management arrangements.

Morocco's Program of General Rural Electrification (PERG) was established in 1996 as a cooperative program between the national electric utility, the Office of National Electrification (ONE), rural villages or municipalities, and individual beneficiaries. PERG combines grid extension with decentralized power generation, and requires municipalities and households to co-finance 45 percent of project costs. Using funds from a 2 percent levy for on-grid electricity sales, ONE contributes 55 percent of the financing.

In some cases, ONE assumes full responsibility for installing, maintaining, and collecting user fees as well as payments from local governments. In other cases, ONE contracts private sector retailers to install and maintain distributed power systems in return for a share of user fees. More recently, PERG began experimenting with a fee-for-service scheme. In these cases, ONE makes a one-time payment of U.S. $300 to a pre-approved private provider that in turn purchases, installs, and guarantees service and maintenance of a solar home system over a 7- to 10-year period in return for direct monthly payments

efficiency would decrease the burden of price increases borne by households, and reduce the requirements for public subsidies to low-income consumers (Clark, 2000).

The salient point is that there are routes to promoting equitable social policies within a privatized electricity world. In order to win support for reforms, a sensible approach to promoting such policies would identify beneficiaries from existing implicit and explicit subsidies; examine the extent of access to electricity; use the information to design a program of mitigation; and inform the public of the program (Estache, Gomez-Lobo, and Leipziger, 2000). Largely because of the political challenges, few countries follow this route.

There are two other related social concerns that are briefly treated here. First, the quality of electricity service in a post-reform sector is a significant component of a public benefits agenda. There is broad agreement that ensuring good service quality is central to the regulatory agenda in a post-reform sector, but there is no such consensus in the areas of access and price. Second, privatization is likely to be accompanied by substantial retrenchment of labor—an issue of great concern to public utilities unions (Colley, 1997; Bayliss and Hall, 2000). Moreover, since unions are typically well organized, labor

BOX 2.5 (CONTINUED)

from households. The PERG program has increased the number of rural villages electrified annually from 557 in 1996 to 1,650 in 1999.

Chile's rural electrification program, launched in 1994, was designed to attract commercial participation by introducing competition at various levels. The central government, through the National Electricity Commission (CNE), transfers subsidy funds to regional governments. The central government allocates funds among regions based on progress in rural electrification the previous year, and the share of populations still lacking access to electricity. The selection of projects and companies to receive subsidies, however, is delegated to regional governments.

Regional governments pool their own budget resources with the subsidies allocated by the CNE. Private distribution companies, usually in partnership with municipalities or rural communities, submit project proposals to regional governments to obtain the bundled subsidies. Using criteria and tools developed by CNE, the responsible state agency identifies projects that qualify for subsidies (only projects that generate a positive social return, but a negative private return are eligible), and submit these to the regional government council. Proposals are evaluated on the basis of cost-benefit analyses, share of the investment covered by the companies, and degree of social impact. From 1995 to 1999, the state contributed US$112 million in subsidies, but it also attracted US$60 million in private sector investments for rural electrification.

Sources:

Jadresic, Alejandro. 2000. "Auctioning Subsidies for Rural Electrification in Chile." Public Policy for the Private Sector. Note No. 214. Washington, D.C.: World Bank.

Jadresic, Alejandro. 2000. "A Case Study on Subsidizing Rural Electrification in Chile." In *Energy and Development Report 2000: Energy Services for the World's Poor*. Edited by Energy Sector Management Assistance Program. Washington, D.C.: World Bank.

Jamrani, Abderrahim. 1999. "The Moroccan General Electrification Programme (PERG)." Casablanca: Office National de l'Electricite (ONE).

Photovoltaic Market Transformation Initiative and the Global Environment Facility. 2000. *PVMTI News*. No. 2. September.

concerns offer a considerable stumbling block to the progress of reforms. Whether and how reforms address labor concerns is relevant both to the social dimensions of reform and to their political viability.

Environment: Balancing Efficiency and Sustainability

The electricity sector has a large environmental footprint. In much of the world, the sector is powered by fossil fuels, which after combustion emit local pollutants such as particulates and lead; regional pollutants such as sulfur dioxide; and global pollutants such as carbon dioxide. All of these pollutants have impacts on human and ecosystem health (World Energy Assessment, 2000). While it is difficult to quantify the contribution of the electricity sector as distinct from all combustion of fossil fuels, Table 2.2 presents an estimate for one global pollutant—carbon dioxide (CO_2). Unfortunately, data for local and regional pollutants are unavailable. The data suggest that the electricity sector is a significant contributor to carbon emissions in all regions of the world.

How can reforms in the sector influence this relationship between electricity and environmental harms? From one perspective, reforms will automatically result in environmental improvements through

TABLE 2.2 SHARE OF CARBON DIOXIDE EMISSIONS FROM ELECTRICITY AND HEAT PRODUCTION (1999)

Region	(%)
Middle East and North Africa	26
Sub-Saharan Africa	50
South Asia	50
Latin America and Caribbean	21
East Asia and Pacific	39
Europe and Central Asia	51
North America	42
High-Income Europe	30
Other High Income	40
World	**38**

Source: Computed by the WRI from International Energy Agency (IEA) data. *CO2 Emissions from Fossil Fuel Combustion*. Paris: OECD.
Note: Includes publicly or privately owned plants producing electricity or heat, for own use or for sale.

a number of pathways. The greater incentives for economic efficiency expected from a post-reform sector will translate into more efficient fuel use, with attendant environmental benefits. Incentives to shift to low-price fuels may stimulate a shift from coal-burning plants to relatively cleaner natural gas plants. And, since governments are typically more stringent about enforcing regulations with the private sector than the public sector, privatization will likely be accompanied by more rigorous enforcement of environmental regulation. These are all feasible outcomes, suggesting that reform may well result in a measure of environmental improvement.

However, there remain good reasons for close attention to the environmental implications of electricity market reforms. Market actors make decisions based on their business interests. While these may, on occasion, align with the interests of the sector as a whole, they are not guaranteed to do so. For example, private companies are likely to ignore the full life-cycle costs of their generation technologies, and make decisions based on integration with their other energy assets as part of a strategic business plan (Sherry, 2000). The resulting decisions may be very different from, for example, an "Integrated Resource Planning" (IRP) approach, which seeks the least costly mix of options to meet energy service needs (Regulatory Assistance Project, 1994).[13] While IRP was originally designed for integrated utilities and may be challenging to implement in a market framework, the underlying point—the need to develop a long-run vision for the sector and suitable mechanisms for coordination—still holds. Planning mechanisms should, at a minimum, provide for the tradeoff between present and future benefits, include environmental sustainability, and make provisions for incentives in line with that vision. As concerns over both local and global environmental harms grow ever larger, reform in the electricity sector offers an opportunity to systematically promote a more sustainable energy future.

Economic regulation should not discriminate against cleaner technologies.

Indeed, in electricity sector reforms, some analysts foresee an opportunity to spur a transition to a "micropower" future—a sector based on small-scale generation units, of about the same size as the loads they power, and located closer to the end-user (Patterson, 1999; Dunn, 2000; Vaitheeswaran, 2001). Such a vision promises greater local control, reliability, and environmental benefits. Visions of a micropower future appear remote when juxtaposed against present realities in developing countries of inefficient and dirty centralized generation equipment, economically unviable pricing structures, and poor forms of governance. Yet, since the occasion to radically redesign institutions and promote innovation comes but seldom, it is important to seize such opportunities to put in place incentives for a more sustainable energy future.

While it is by no means clear what route a path from centralized power to micropower will take, it is

likely that the process of electricity restructuring could put in place key preconditions for a micropower future based on renewable energy technologies. *(See Box 2.6.)* These include market access policies and price signals that reflect the true benefits of distributed power. Because innovative micropower systems will require new technological and institutional forms, the most promising opportunities to promote this approach may arise in currently underserved areas in the developing world, where the rigidities of the current system are not an obstacle (Patterson, 2001). In these areas, reforms in the electricity sector afford an opportunity to leapfrog to a new technological future.

Even if the goal is a somewhat more modest one of incremental improvements in environmental quality, an argument for separation of economic and environmental regulation, sometimes put forward by reform experts (Joskow, 1998), does not withstand scrutiny. Economic regulation can affect technology choice and can shape the transactions costs of different ways of supplying energy services. Economic regulators *de facto* make environmental decisions on a regular basis. Given this reality, is it not better that regulators are aware of and actively consider the environmental impact of their decisions?[14] At minimum, economic regulation should not discriminate against cleaner technologies.

BOX 2.6 | EXAMPLES OF POLICY OPTIONS TO DESIGN-IN ENVIRONMENTAL BENEFITS

- *Environmental Dispatch:* Use a pollution index to "dispatch" power, in order to prioritize electricity from clean plants over dirty sources.
- *Standard Contracts:* Develop standardized contracts for power purchase to lower the negotiation costs to small renewable project developers.
  - Example: Small hydropower in Sri Lanka.
- *Price–driven Renewable Energy Incentives:*
  - Example: Avoided cost (U.S.) — utilities were required to purchase all the renewable power offered to them at the price it would otherwise have cost them to generate that power—the "avoided cost."
  - Example: Non-Fossil Fuel Obligation (U.K.) — a tax collected from fossil fuel generation was used to support renewable electricity plants.
  - Example: Feed-in law (Germany and Denmark) — sets a guaranteed price for the purchase of renewable energy.
- *Renewable Portfolio Standard:* A quantity-based policy that requires a specific amount of renewable energy to be purchased by all retail energy service providers.
  - Example: Several European countries and U.S. states.
- *Net Metering:* Use of a bi-directional meter to register electricity flow in both directions, making possible sale of extra power generated on site by distributed energy sources.
- *Public Benefits Fund:* Establish a fund created through a charge on transmission, for example, to be spent on public benefits such as wider access, energy efficiency, or development of sustainable energy technologies.
  - Example: PROCEL (Brazil) — concessionaires are required to spend 1 percent of revenues on energy conservation, and 0.25 percent on end-use efficiency.

Sources:

Hamrin, Jan. Forthcoming 2002. "Policy Options for 'Building-in' Environmental Protection at Different Stages of the Restructuring Process: Practical Advice on Clean Energy Policy." In *Energy Market Restructuring and the Environment*, edited by Martha Harriss. Lanham, MD: University Press of America.

World Energy Assessment. 2000. *World Energy Assessment: Energy and the Challenge of Sustainability*. Edited by United Nations Development Programme, United Nations Department of Economic and Social Affairs, and World Energy Council. New York: United Nations Development Programme.

For example, economic rules that allow open access to the transmission system are critical to encouraging independent suppliers to develop renewable energy sources. In India, such open "wheeling" policies have played a role in catalyzing a wind industry (Gupta, 2000).[15] Moreover, whether or not renewable energy competes on a level playing field may be determined by the details of electricity supply contracts, which specify issues such as how power can be purchased from remote locations and from intermittent sources such as renewable energy sources (Kozloff, 1998).

In another example, pricing of distribution services can either promote or hinder distributed generation (Regulatory Assistance Project, 1999). Since distribution costs can vary widely across a service area, power generated on site can bring considerable savings. Pricing of distribution services based on the average cost fails to send consumers appropriate signals on opportunities for cost savings. If regulators were to set the rates at which they buy power back from consumers to reflect the full cost of distribution, customers would have a greater incentive to invest in distributed power sources. These measures are particularly necessary since renewable energy technologies, which typically face high capital costs, may be at a disadvantage in raising capital under the conditions of volatile wholesale markets (Kozloff, 1998).

Efforts at energy efficiency may be a casualty of market reforms.

Finally, efforts at energy efficiency may well be a casualty of market reforms. For example, "unbundling" of utilities into generation, transmission, and distribution functions introduces transactions and information costs in the chain from production to consumption relative to a vertically integrated structure. These costs can erect severe barriers to promotion of end-use energy efficiency. For example, generating companies in an unbundled structure have no means of meeting new supply needs through end-use efficiency or demand management. For their part, distribution companies are unable to capture the full savings in transmission and generation created by greater efficiency, since these benefits are shared by other distribution companies. The resultant "free rider" problem is a disincentive to undertake efficiency enhancing programs (USAID, 1998). Evidence from restructuring efforts in industrialized countries suggests that these perverse incentives have not been addressed in reform programs. To make matters worse, industrialized country reforms have been accompanied by a decline in funding for energy efficiency programs (USAID, 1998).

This section has summarized arguments for a long-term vision for electricity, and the intertwined nature of economic regulation and social and environmental outcomes. The intent is not to argue for reforms to be driven by either social or environmental outcomes to the exclusion of economic concerns. However, taken collectively, these arguments present a strong case for not treating either social or environmental concerns as a residual, and for actively incorporating a public benefits agenda into the mainstream of reform efforts.

CONCLUSION

Electricity sector reform is emblematic of rapidly accelerating global integration. The nature of the debate has been transformed with the emergent dominance of market ideology, with institutional restructuring, and with accelerating flows of private capital into the sector. As with other debates about globalization, the future of the public interest depends on whether globalization will automatically take into account public concerns, or whether social and environmental interests will be explicitly factored into reform processes. This chapter has argued the latter, that market-led changes cannot automatically ensure the public interest. Having established that social and environmental concerns should be managed, the next question is how, and whether they are, in practice, internalized in reform processes. The following six chapters consider this question by drawing on the experience in a range of countries in the developing world and countries in transition.

NOTES

1. Small gas turbines generate electricity that costs about 4 cents per kilowatt-hour compared to 12 cents per kilowatt-hour for power from the nuclear plants completed in the late 1980s (Flavin and Lenssen, 1997). By one estimate, the minimum efficient plant size decreased from 1,000 megawatts in the early 1980s to between 50 megawatts and 350 megawatts by the late 1990s (International Energy Agency, 1999).
2. Motivations in both countries were similar: macroeconomic restructuring based on an ideological predisposition to private ownership and competition; a desire to increase efficiency in the sector; and privatization to stem a drain on public finances (Bacon, 1995; Rosenzweig and Voll, 1997; Patterson, 1999).
3. These changes were preceded by a number of measures introduced in the United States in the 1970s to address the changed context, including competition in generation, to boost new technologies, and to promote energy efficiency services aimed at the customer (Flavin and Lenssen, 1997; Patterson, 1999).
4. Indeed, those who initiated reforms in the United Kingdom admitted that even as they promoted competition, they had no clear idea of how competitive structures should be established (Hunt and Shuttleworth, 1996).
5. The following description of institutional reforms relies heavily on Hunt and Shuttleworth (1996).
6. In the wake of the Enron Corporation's problems, some analysts noted that deregulation was increasingly associated with high risk, and that some states in the United States were more actively considering retaining or returning to a central role in the sector (Johnson, 2002). Others argued that Enron's troubles are not tied to deregulation, and that an appropriate response would be to press forward with a deregulation approach based on greater competition and transparency (Vaitheeswaran, 2001).
7. Turkey was the first developing country to adopt this approach, which was a substantial departure from the then prevalent approach of building a power plant and handing it over to the government for operation (Patterson, 1999).
8. Specifically, in Malawi, 4 percent of the population has access to electricity; in Tanzania, 6 percent; in Uganda, 12 percent; and in Zimbabwe, 14 percent (Bhagavan, 1999).
9. As Brook and Besant-Jones (2000) put it, "... it is arguable that the poorest of the poor, who make up the majority of the estimated 2 billion people who do not have access to modern energy, do not stand to benefit much from reforms aimed primarily at existing electricity and gas networks."
10. Privatization could also lead to a decrease in access to electricity unless potential problems are anticipated up front and mitigated. In Argentina, privatized distribution companies shut off supply to the poorest urban neighborhoods and emergency settlements in order to reduce losses (Bouille and Dubrovsky, 2000). Similar experience with disconnection of supply following privatization has been reported from Georgia, Moldova, and the Dominican Republic (Bayliss, 2001).
11. In the longer term, efficiency improvements may hold down costs and lower prices.
12. Moreover, as happened in Argentina, private sector firms will have an incentive to discourage consumption by their poor and less reliable consumers by increasing their prices, and decreasing those of the wealthy (Bouille and Dubrovsky, 2000).
13. According to one view, IRP is a necessary complement to competition because price only provides information on what a resource costs, not on its full worth to a utility (Reddy and Sumithra, 1997). By focusing on the "avoided cost" of supply, IRP provides a framework to compare the true worth of energy sources from both the demand and supply sides. For example, a source of power that has a higher price than another may also have a worth that justifies the price premium if it provides largely peak power, or if it saves on transmission and distribution costs.
14. As the Regulatory Assistance Project—a body of former U.S. government officials with considerable experience in regulatory theory and practice—compellingly argues, no utility regulator would urge their environmental counterpart to remain ignorant of the economic effects of environmental regulation (Regulatory Assistance Project, 1999).
15. Moreover, whether or not renewable energy competes on a level playing field may be determined by the details of electricity supply contracts, which specify issues such as how power can be purchased from remote locations and from intermittent sources such as renewable energy sources (Kozloff, 1998).

REFERENCES

Albouy, Yves, and Reda Bousba. 1998. "The Impact of IPPs in Developing Countries—Out of the Crisis and into the Future." Viewpoint Note No. 162 (December). Washington, D.C.: World Bank.

Asian Development Bank. 1994. "Bank Policy Initiatives for the Energy Sector." Manila, Philippines.

Bacon, R.W. 1995. "Privatization and Reform in the Global Electricity Supply Industry." *Annual Review of Energy and Environment*. 20:119-143.

Bacon, Robert. 1999. *Global Energy Sector Reform in Developing Countries: A Scorecard*. Report No. 219-99. Washington, D.C.: UNDP/World Bank.

Bacon, Robert, and John Besant-Jones. 2001. "Global Electric Power Reform: Privatization and Liberalization of the Electric Power Industry in Developing Countries." *Annual Review of Energy and Environment* 26:331-359.

Balu, V. 1997. "Issues and Challenges Concerning Privatisation and Regulation in the Power Sector." *Energy for Sustainable Development* III. (6):6-13.

Barnes, Douglas F., and Jonathan Halpern. 2000. "The Role of Energy Subsidies." In *Energy Services for the World's Poor*, edited by Energy Sector Management Assistance Program, Washington, D.C.: World Bank.

Bayliss, Kate. 2001. "Privatisation of Electricity Distribution: Some Economic, Social and Political Perspectives." London: Public Services International Research Unit. April. Online at: http://www.psiru.org/reports/2001-04-E-Distrib.doc. (May 20, 2002).

Bayliss, Kate and David Hall. 2000. "Privatisation of Water and Energy in Africa." London: Public Services International Research Unit. September. Online at: http://www.psiru.org/reports/2000-09-U-Afr.doc. (May 20, 2002).

Besant-Jones, John. 1996. "The England and Wales Electricity Model—Option or Warning for Developing Countries." Viewpoint Note. No. 84. Washington, D.C.: World Bank.

Bhagavan, M.R. 1999. "Introduction." In *Reforming the Power Sector in Africa*, edited by M. Bhagavan. London: Zed Books.

Bouille, Daniel and Hilda Dubrovsky. 2000. "Reform of the Electric Power Sector in Developing Countries: Case Study of Argentina." Unpublished manuscript. Buenos Aires: Institute of Energy Economics, Fundación Bariloche.

Brook, Penelope J. and John Besant-Jones. 2000. "Reaching the Poor in an Age of Energy Reform." In *Energy Services for the World's Poor*, edited by Energy Sector Management Assistance Program. Washington, D.C.: ESMAP.

Chandler, William. 2000. *Energy and Environment in the Transition Economies*. Boulder, CO: Westview Press.

Clark, Alix. 2000. "Making Provision for Energy Efficiency Investment in Changing Electricity Markets: International Perspectives." Paper read at IEI Workshop on Public Benefits and Power Sector Restructuring, Cape Town, South Africa, April 10.

Colley, Peter. 1997. *Reforming Energy: Sustainable Futures and Global Labour*. London: Pluto Press.

Covarrubias, Alvaro J. 1996. *Lending for Electric Power in Sub-Saharan Africa*. Washington, D.C.: World Bank.

Dunn, Seth. 2000. *Micropower: The Next Electrical Era*. Washington, D.C.: Worldwatch Institute.

Ehrhardt, David. 2000. "Impact of Market Structure on Service Options for the Poor." Paper read at conference, Infrastructure for Development: Private Solutions and the Poor, London, U.K., May 31 - June 2.

Energy Sector Management Assistance Program. 2000. *Introducing Competition into the Electricity Supply Industry in Developing Countries: Lessons from Bolivia*. Report 233/00. Washington, D.C.: ESMAP.

Estache, Antonio, Andrews Gomez-Lobo, and Danny Leipziger. 2000. "Utilities 'Privatization' and the Poor's Needs in Latin America: Have We Learned Enough to Get it Right?" Paper read at conference, Infrastructure for Development: Private Solutions and the Poor, London, U.K., May 31 - June 2.

Flavin, Christopher and Nicholas Lenssen. 1997. "Powering the Future: Blueprint for a Sustainable Electricity Industry." *Quarterly Bulletin*. 18 (3).

Graham, Stephen and Simon Marvin. 1995. "More than Ducts and Wires: Post-Fordism, Cities and Utility Networks." In *Managing Cities: The New Urban Context*, edited by P. Heal, S. Cameron, S. Davoudi, S. Graham and A. Madani-Pour. New York: John Wiley & Sons.

Gupta, Ajit K. 2000. "Policy Approaches: The Indian Experience." Paper read at conference, Accelerating Grid Based Renewable Energy Power Generation for a Clean Environment, Washington, D.C., March 7-8.

Harper, Malcolm. 2000. *Public Services through Private Enterprise*. London: Intermediate Technology Publications.

Hirsh, Richard. 1999. *Power Loss: The Origins of Deregulation and Restructuring in the American Electric Utilities System*. Cambridge, MA: MIT Press.

Hunt, Sally, and Graham Shuttleworth. 1996. *Competition and Choice in Electricity*. New York: John Wiley and Sons.

International Energy Agency. 1999. *Electricity Market Reform: An IEA Handbook*. Paris: OECD/IEA.

Izaguirre, Ada Karina. 1998. "Private Participation in the Electricity Sector—Recent Trends." Viewpoint Note No. 154. Washington, D.C.: World Bank.

Johnson, Kirk. 2002. "Turn out the Lights, the Party's Over: After Enron, Deregulation Looks More Risky than Sexy." *New York Times*. (February 10):29.

Joskow, Paul L. 1998. "Electricity Sectors in Transition." *Energy Journal*. 19 (2):25-52.

Kozloff, Keith. 1998. "Electricity Sector Reform In Developing Countries: Implications for Renewable Energy." REPP Research Report No. 2. Washington, D.C.: Renewable Energy Power Project.

Littlechild, Stephen. 2000. *Privatization, Competition and Regulation in the British Electricity Industry, with Implications for Developing Countries*. Report 226/00. Washington, D.C.: World Bank.

Magnus, Eivund. 1997. "Competition without Privatization—Norway's Reforms in the Power Sector." *Energy for Sustainable Development* III. (6):27-35.

McClean, Christopher. 2000. Paper read at conference, Village Power 2000, Washington, D.C., December 4-7.

Newbery, David. 1995. "A Template for Power Reform." Viewpoint Note 54. Washington, D.C.: World Bank.

Newbery, David M. and Richard Green. 1996. "Regulation, Private Ownership and Privatisation of the English Electricity Industry." In *International Comparisons of Electricity Regulation*, edited by R. Gilbert and E. P. Kahn. Cambridge: Cambridge University Press.

Oliviera, Adilson de. 1997. "Electricity System Reform: World Bank Approach and Latin American Reality." *Energy for Sustainable Development* III. (6):27-35.

Oliviera, Adilson de and Gordon MacKerron. 1992. "Is the World Bank Approach to Structural Reform Supported by Experience of Electricity Privatization in the UK?" *Energy Policy* (February):153-162.

Patterson, Walt. 1999. *Transforming Electricity*. London: Earthscan.

———. 2001. "Introduction." Paper read at conference, Keeping the Lights On: Electric Tradition or Innovation?, London, U.K., March 14-15.

Reddy, Amulya K N. 2001. "California Energy Crisis and its Lessons for Power Sector Reform in India." *Economic and Political Weekly* XXXVI (May 5-11).

Reddy, Amulya K.N. and Gladys Sumithra. 1997. "Integrated Resource Planning." *Energy for Sustainable Development* III (6):14-16.

Regulatory Assistance Project. 2001. *IRP and Competition*. Regulatory Assistance Project 1994. Online at: http://www.rapmaine.org/irp.html. (April 21, 2001).

———. 2001. *Electric Industry Restructuring and the Environment*. Regulatory Assistance Project 1999. Online at: http://www.rapmaine.org/environment.html. (April 21, 2001).

Rosenzweig, Michael B. and Sarah P. Voll. 1997. "Sequencing Power Sector Privatization." Unpublished manuscript. Washington, D.C.: National Economic Research Associates.

Sherry, Christopher John. 2000. "Economic Globalization, the Environment, and the Electric Power Industry: U.S. Foreign Direct Investment in the Greenhouse." Masters thesis, Center for Energy and Environmental Policy, University of Delaware, Newark, DE.

Tellam, Ian, ed. 2000. *Fuel for Change: The World Bank Energy Policy, Rhetoric vs. Reality*. London: Zed Books.

Teplitz-Sembitzky. 1990. *Regulation, Deregulation or Reregulation: What is Needed in the LDCs Power Sector Industry and Energy Departments?* Washington, D.C.: World Bank.

Turkson, John K., ed. 2000. *Power Sector Reform in Sub Saharan Africa*. London: MacMillan Press.

United States Agency for International Development. 1998. *Case Studies of the Effects of Power Sector Reform on Energy Efficiency*. Report No. 98-03. Washington, D.C.: USAID.

———. 1998. *Promoting Energy Efficiency in Reforming Electricity Markets*. Report No. 98-02. Washington, D.C.: USAID.

Vaitheeswaran, Vijay. 2001. "A Brighter Future?" *Economist*. February 10.

———. 2001. "Electricity Deregulation is Still Sound Policy." *New York Times*. December 15.

Waddams Price, Catherine. 2000. "Better Energy Services, Better Energy Sectors—and Links with the Poor." In *Energy Services for the World's Poor*, edited by Energy Sector Management Assistance Program, Washington, D.C.: World Bank.

Watts, Price C. "Heresy? The Case Against Deregulation of Electricity Generation." *The Electricity Journal*. 2001 (May):19-24.

Wolak, Frank A. No Date. *Market Design and Price Behavior in Restructured Electricity Markets: An International Comparison*. Department of Economics, Stanford University. On line at: http://www.stanford.edu/~wolak (March 22, 2002).

World Bank. 1988. "A Review of World Bank Lending for Electric Power." Energy Series No. 2. Washington, D.C.: World Bank.

———. 1993. *The World Bank's Role in the Electric Power Sector*. Washington, D.C.: World Bank.

———. 2001. "The California Experience with Power Sector Reform." Unpublished manuscript. Washington, D.C.: World Bank. Online at: http://www.worldbank.org/html/fpd/energy/pdfs/e_calexp0400.pdf (May 29, 2002).

World Energy Assessment. 2000. *World Energy Assessment: Energy and the Challenge of Sustainability*. Edited by United Nations Development Programme, United Nations Department of Economic and Social Affairs, and World Energy Council. New York: United Nations Development Programme.