


A
WORLD
BANK
POLICY
PAPER

THE
WORLD BANK'S
ROLE IN THE
ELECTRIC POWER
SECTOR

The World Bank's Role in the Electric Power Sector

Policies for Effective Institutional, Regulatory, and Financial Reform



*A
World
Bank
Policy
Paper*

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and Development/ THE WORLD BANK
1818 H Street, N.W.
Washington, D.C. 20433 U.S.A.

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Manufactured in the United States of America
First printing January 1993
Third printing September 1996

Cover design by Walton Rosenquist and Beni Chibber-Rao

Library of Congress Cataloging-in-Publication Data

The World Bank's role in the electric power sector : policies for
effective institutional, regulatory and financial reform.

p. cm.—(A World Bank policy paper, ISSN 1014-8124)

Includes bibliographical references.

ISBN 0-8213-2318-0

1. Electric utilities—Developing countries. 2. Electric
utilities—Developing countries—Finance. 3. World bank.

I. International Bank for Reconstruction and Development.

II. Series.

HD9685.D452W67 1993

333.79'323'091724—dc20

92-46609

CIP

ISBN 0-8213-2318-0

ISSN 1014-8124

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Foreword

This policy paper is based on the World Bank Industry and Energy Department's ongoing policy and research work, which (i) examines experiences of industrial countries and the Bank's borrowers in developing their power sectors, (ii) analyzes issues facing these sectors, and (iii) describes options for dealing with these issues in developing countries. The paper is supported by a large body of research, including the Bank's recent work on governance and public-sector management, the Latin America and Caribbean department's regional review of the power sector, the Operation Evaluation Department's review of power lending in Colombia, the Asia region's study of private investment in power and coal, the Africa region's analysis of Sub-Saharan power sector successes and failures, and the World Bank companion policy paper, *Energy Efficiency and Conservation in the Developing World: The World Bank's Role*. This paper has also benefited from extensive outside consultations with developing- and developed-country government officials, utility managers, academics, researchers, and nongovernmental organizations.

Acknowledgments

The principal author of this paper is Robert J. Saunders. John Besant-Jones, Anthony Churchill, and Peter Cordukes contributed to the development of the policy and analytical framework and to the paper's overall structure. Rangaswami Vedavalli, Enrique Crousillat, Sunita Gandhi, and Dennis Anderson contributed background material and critical review. The paper also benefited enormously from extensive consultations with Bank operations and policy staff and many others outside the Bank too numerous to list.

Glossary

BOO/BOOT schemes

Build-Own-Operate (BOO) and Build-Own-Operate-Transfer (BOOT) schemes are methods by which private sector participation in the power sector is encouraged. Under these approaches, a project company under private ownership, or a joint venture with a minority public participation, is set up to plan, finance under limited recourse, design, construct, and operate power generation facilities. In a BOOT arrangement, ownership of the facility is ultimately transferred to another entity after a specified period of operation.

Country commitment

Commitment must be judged on a country-by-country basis within the framework of a country-assistance strategy around the themes of significant progress toward needed reform and no more "business as usual."

Demand-side management

Identifying and implementing initiatives that improve the use of energy-supply capacity by altering the characteristics of the demand for energy. DSM involves a mix of pricing, other load management, and conservation strategies designed to increase the incentives for a more efficient use of energy.

Energy-efficiency improvements	Any measure that results in the delivery of any energy service with a reduction in energy consumption. Thus, carrier substitution or fuel-switching measures that lead to reductions in energy demand also become examples of energy-efficiency improvements.
Energy end use	Energy applications such as motive power, lighting, process heat, water heating, refrigeration, air cooling, cooking, and so on.
Integrated energy strategy	An interrelated set of measures that points the energy sector toward the most efficient, equitable, and environmentally-benign resource use. The strategy requires decisions on both the energy supply and demand side about sector structure, institutions, ownership, financing, fuel availability (coal, oil, gas), technology availability (import restrictions), structures of end-use markets, pricing policy, standards, service levels, and so on.
Integrated energy resource planning (IERP)	Primarily a U.S.-type planning process whereby utilities (and in the U.S., their regulatory commissions) evaluate available demand- and supply side-options to provide energy services (including purchased power) and determine an optimal energy service strategy, given economic and environmental factors. The essential concept of IERP is the equal treatment, or integration, of energy-based and conservation-based energy services. Planners attempt to rank by cost all the different energy supply and end-use technologies, processes, and programs that might be used to provide energy services and implement them beginning with the lowest-cost opportunities.
Load factor	A key measurement that compares a utility's average kilowatt-hour load to its peak, or maximum hour's usage, in a given year. A high load factor means greater plant utilization, since a company must build capacity to meet its peak demand, not its average demand.

- Load management** Any effort to control loads by economic incentives, direct interventions, or new technology. Shifting load from peaks to valleys, or simply shaving the peak, defers capacity additions and transfers load from high cost, inefficient peaking generation to more economically efficient base-load units.
- Marginal cost** The increase in the total costs of an enterprise caused by increasing its output by one extra unit. Marginal cost pricing is the setting of the price of an item equal to the cost of producing one extra unit of the item. Marginal cost represents the opportunity cost, or the total sacrifice to society, for producing an item. Long-run marginal cost is the cost of meeting an increase in consumption, sustained indefinitely into the future, when needed capacity adjustments are possible. In the long run, an increase in demand will result in a corresponding increase in the operating costs as well as in the capacity costs.
- Peak pricing** The setting of higher prices than average when supplying services during a period of peak demand. Enough electricity capacity must be installed to satisfy demand at peak times, because, in general, electricity cannot be stored. At off-peak times the cost of electricity is lower at the margin than at the peak, at which less-efficient power stations have to be switched in to meet the demand.
- Regulation** The supervision and control of the economic activities of private and arms-length public enterprises by government in the interest of economic efficiency, fairness, health, and safety. Regulation may be imposed simply by enacting laws and leaving their supervision to the normal processes of the law, by setting up special regulatory agencies, or by encouraging self-regulation by recognizing, and in some cases delegating powers to, voluntary bodies.

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Summary and Conclusions

The power sector in most developing countries consists of a single national electric utility operating as a public monopoly. This structure is partly based on the view that electricity is a strategic and publicly-provided good and that people have a right to power at low prices. Over the past thirty years this public monopoly approach has facilitated expansion of power supplies, captured technical economies of scale, and made effective use of scarce managerial and technical skills in the early years.

World Bank lending has largely supported the state-owned monopoly power utilities with the principal objective of helping provide the basic infrastructure required by the directly productive sectors (see World Bank Operational Manual Statement 3.72, published in 1978). The main components of the Bank's power lending strategy have been to (a) develop sector institutions; (b) mobilize local resources for expansion through appropriate power pricing and utility financial management; (c) improve sector planning by emphasizing least-cost investment; and (d) help governments organize foreign exchange cofinancing, albeit with repayments publicly guaranteed. During the 1980s the Bank's lending strategy aimed to improve economic efficiency and financial sustainability in the sector by encouraging least-cost planning, marginal-cost pricing, international accounting standards and practices, rates of return on revalued assets sufficient to provide a reasonable level of self-financing, and international competitive bidding. The Bank also tightened its policies on environmental and resettlement standards and implementation arrangements. These changes were reflected in the power sector support strategy paper in 1983 and the power sector Operations Directive of 1987.

The World Bank's lending for the power sector in developing countries through FY91 was about \$40 billion (about \$75 billion in 1990

prices)¹ or about 15 percent of total Bank lending. In spite of the impressive expansion of power systems in developing countries and despite the Bank's persistent dialogue with borrowers, the overall technical, institutional, and financial performance of power utilities in most developing countries has deteriorated. There are several examples of efficient power sectors and many successful individual projects; but a review of World Bank lending for electric power confirms a declining trend in the sector's pricing, financial, technical, and institutional performance, mainly due to governmental failure to address the sector's fundamental structural problems.

Over the period 1979–88, average real power tariffs in developing countries declined from 5.2 cents to 3.8 cents/kWh, quality of service deteriorated, technical and nontechnical losses and fuel consumption continued to be high, and poor maintenance of plants persisted. Inadequate metering, billing, and collection were the result of insufficiently commercial operations and lack of enforcement. While institution building (training of power utility staff, modernization) has continued to progress, conflicts between government's role as owner and its role as operator of utilities have affected sector performance. Opaque command and control management of the sector, poorly defined objectives, government interference in daily affairs, and a lack of financial autonomy have affected productive efficiency and institutional performance.

Financial performance, as measured by indicators such as the rate of return on revalued assets, self-financing ratios, and the level of overdue accounts, has also declined. On average, rates of return have fallen from levels averaging about 9 percent before the mid-1970s to less than 5 percent in 1991. Self-financing ratios on average were only 12 percent of investment requirements in 1991, against targets of between 20 to 60 percent; and the actual number of days receivable increased from seventy-seven days during 1966–73 to 108 days in the 1970s to 112 days in the 1980s. The overall average of accounts receivable by 1991 was ninety-six days compared with the general Bank target of sixty days. Developing countries' deteriorating macroeconomic situation and the debt overhang of the 1980s exacerbated these financial problems and worsened debt service coverage.

In the 1990s the continuing macroeconomic difficulties of many developing countries will severely reduce the availability of public resources to fund planned power sector investment programs. Furthermore, the changing global environment of the 1990s and the competition for access to financial resources underscore the need for the efficient utilization of power sector resources.

Under these circumstances, neither the developing countries nor the Bank can continue with a "business as usual" approach to managing the

power sector. In the absence of new approaches to restructure and evaluate sector management on the basis of commercial principles, with enterprises distanced from excessive government day-to-day management, and with clear strategies for generating confidence for new entrants, it is unlikely that the required power sector investment can be mobilized in the 1990s.

A number of developing countries are already changing the way they do business in the power sector. Examples include Korea, Malaysia, and Philippines in Asia; Argentina, Chile, and Mexico in Latin America; Turkey and Eastern European countries and Côte d'Ivoire, Guinea, Ghana, and Malawi in Africa. Given the large capital requirements and ingrained sector inefficiencies, there is an urgent need for the Bank to encourage and support these evolving business methods and commercial structures.

Many governments have also attempted to use the power sector and other publicly-provided infrastructure services to address issues of social equity. Experience has shown that such policies are costly and ineffective ways of dealing with these issues. Subsidized power has further softened budget constraints on power utilities, and the resulting large deficits have usually been financed from regressive general taxes. The power shortages that inevitably result from the inability to finance expansion to meet increased demand mean that some form of rationing is required and, just as inevitably, power supply to the poor is usually the first to be rationed. Clearly, there are much more effective means for addressing social equity issues overall than through power sector subsidies.

This paper focuses on the interrelated institutional, regulatory, and financial reform issues that are essential in improving power sector performance. The Bank's evolving role in addressing power sector needs in developing countries is a natural extension of the Bank's work on governance, public sector management, and ongoing structural adjustment reforms. This paper does not specifically address issues of technology and fuel choice. These issues and their environmental implications, and policy issues related to the rural fuels chain, will be addressed separately in subsequent papers. Issues related to the end-use efficiency of electric power are addressed more completely in a separate Bank paper, *Energy Efficiency and Conservation in the Developing World: The World Bank's Role* (1993).

Guiding principles for Bank support of power sector restructuring programs are summarized below. Given the range of regional and country situations, however, these principles will need to be translated into specific action programs at the individual country level and be part of the Bank's agreed country assistance strategy.

Transparent Regulation

A requirement for all power lending will be an explicit country movement toward the establishment of a legal framework and regulatory processes satisfactory to the Bank. To this end, in conjunction with other economy-wide initiatives, the Bank will require countries to set up transparent regulatory processes that are clearly independent of power suppliers and that avoid government interference in day-to-day power company operations (regardless of whether the company is privately or publicly owned). The regulatory framework should establish a sound basis for open discussion of power sector economic, financial, environmental, and service policies.

The dual role of the government as operator and owner of utilities has drawn governments into day-to-day interventions in power sector operations. There is therefore a need to set up some form of regulatory body as part of a broader governmental effort to redefine the respective roles of government, utility, and consumers. This implies a shift away from the monolithic type of governmental management and toward more decentralized and market-based systems. Government would retain responsibility for setting objectives and articulating overall policies and for planning and coordinating sector development. It would also establish the legislative and legal framework to protect the interests of the various stakeholders and the public. But regulatory approaches need to be established that appropriately balance protection of the public interest with the need for enterprise autonomy. This may require regulatory bodies independent of both government ministries and enterprises themselves.

With a more independent and transparent regulatory body, consumers, investors, and environmentalists could all be heard in determining policies related to investment programs, pricing, access to service, reliability of service, energy conservation, plant location, and environmental issues. Essential features for a sound regulatory framework include:

- transparency and openness;
- clear articulation of reform objectives, including tariff policies;
- a legal structure that clearly defines the rules and procedures for reducing the level of government involvement and increasing the autonomy and accountability of enterprise directors and managers; and
- defined entry and exit conditions for private power producers.

Such a regulatory framework should instill investor confidence and facilitate at least some competition among suppliers. Developing effective regulatory institutions will take time, and concerns about political interference and corruption hampering the effectiveness of the process

may persist, but these concerns should not delay necessary actions in implementing regulatory reform. The benefits of moving away from current inefficient practices far outweigh the costs.

In much of the developing world the present institutional structure has failed to produce responsible actions in response to environmental concerns. Government enterprises, in particular, have found it difficult to add environmental concerns to their already overburdened social agenda. Enforcement actions must be seen as one element in a dialogue between regulators and enterprises, the objective of which is to improve the environmental performance of the plants under scrutiny. Such a dialogue is particularly difficult when both parties are government agencies. The situation in Eastern Europe is an extreme example of the problems that exist in many developing countries. The direction of regulatory and institutional change proposed in this paper should go a long way toward developing institutions that would deal with environmental issues in a more responsible manner. A clearer recognition of the role of the government as policymaker, rather than producer, will avoid the confusion of roles that is behind much of the poor performance in this area. The development of regulatory bodies will provide a natural focus for articulating environmental concerns and provide the forum for a more open process of input into decisionmaking by all interested parties.

Because electric power generation accounts for 30 percent of all fossil fuel consumption and 50 percent of all coal consumption worldwide, the gains from reducing emissions of particulates and gases are substantial. Shifting to natural gas and using clean-coal technologies can reduce emissions of particulates and carbon monoxide by 99.9 percent and emissions of sulfur dioxide and nitrogen oxides by more than 90 percent. Curbing emissions of particulates should be the first point of attack. It is cheap—1 to 2 percent of the total capital costs of electric power supply, on average—and it is important for human health. All new power plants should have equipment for control of particulate matter, and it should be well maintained to ensure continuous functioning. The costs of reducing sulfur dioxide and nitrogen oxides are higher (unless natural gas is available), at 10 to 20 percent of capital costs. The effects on health of reducing these emissions are usually much less than for particulates, and the impacts on forests, agriculture, freshwaters, and buildings vary greatly by area. The specific standards on nonparticulate emissions, therefore, will depend on circumstances.

With regard to CO₂, there is currently no feasible solution for mitigating CO₂ emissions apart from switching fuels (coal to oil to gas to hydro or biomass) and increasing energy efficiency.

Importation of services

In some of the least developed countries, the Bank will assist in financing importation of power services to improve efficiency.

In some lower income countries with weak public and private sectors, undeveloped capital markets, and a relative lack of market forces, a way to help bring about power sector reform and increase sector management efficiency would be to bring local or international industrial or developing-country services into the sector under utility management contracts or on a twinning basis. The Bank will consider the partial financing of these arrangements. Potential services for contracting out could include plant maintenance, billing, revenue collection, vehicle maintenance, line stringing, and pole and tower fabrication. Other issues that could be addressed with outside involvement include reducing supply-side power losses and increasing generating-plant availability. The financial costs of these initiatives would generally be low relative to the benefits.

Commercialization and corporatization

The Bank will aggressively pursue the commercialization and corporatization of, and private sector participation in, developing-country power sectors.

The Bank will assist in developing power sector strategies to bring about commercialization. For power enterprises to operate on commercial principles, they must be treated like commercial enterprises. They should pay interest and taxes; earn commercially competitive rates of return on equity capital; and have the autonomy to manage their own budgets, borrowing, procurement, salaries, and conditions pertaining to staff.

The Bank may be able to facilitate the commercialization and corporatization of the power sector by linking support for financial sector reform to power sector financing. This could be done by channeling some portion of Bank lending to sector enterprises through financial intermediaries in accordance with existing Bank guidelines. Given the potential importance of the power sector for capital market development and the comparative price and income stability that will come through more transparent regulation and commercialization, the power sector could be in a better position to play a leading role in channelling domestic savings in banks and pension funds to investments in long-term bonds and equity issues of power companies.

Commercialization and corporatization of state-owned power utilities are necessary first steps in the process of restructuring and attracting