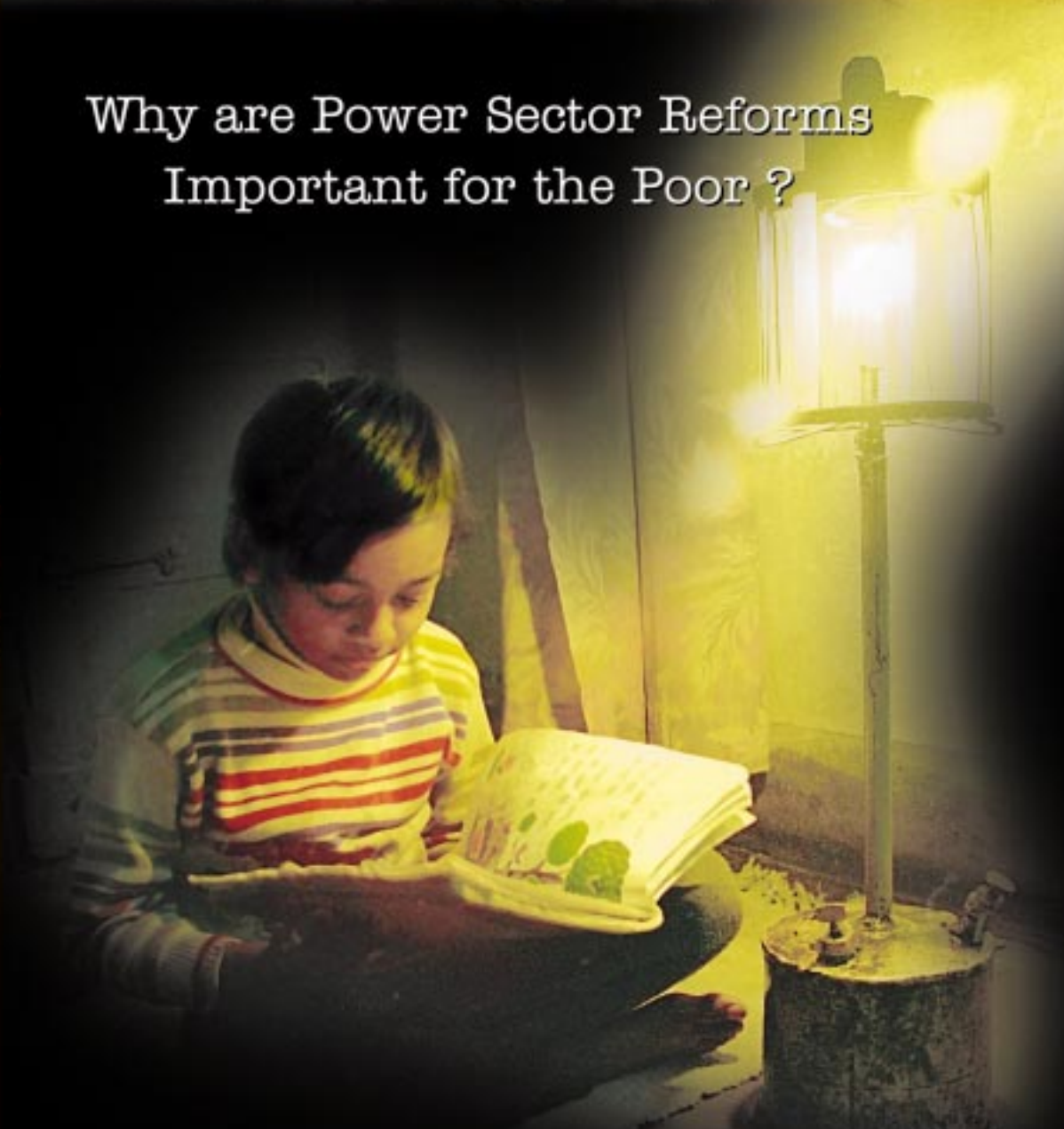




Why are Power Sector Reforms Important for the Poor ?



THE WORLD BANK

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Why Are Power Sector Reforms Important for the Poor?

1. The benefits of electricity are large...

There is a wide body of evidence from India and around the world that provision of electricity improves living standards, supports development and job opportunities, and fosters social activities.

These benefits are widely recognized by both urban and isolated rural households, which attach significant value to electricity access. Studies in India and elsewhere have consistently shown that most people are willing to pay a significant portion of their income for reliable electricity service. In India, this group includes small and marginal farmers,¹ who spend a greater share of their income than larger farmers for electricity to power irrigation pumps, but whose crops yields are severely affected by the unreliability and poor quality of supply.² In addition to more productive farming, international experience has shown that electrification benefits households in many other ways. For example:

- ◆ Electricity used for water pumping improves the provision of safe drinking water and hygiene, which in turn helps to improve health. Recent analyses from of the Demographic and Health Surveys (DHS) in India and cross-country data point to a statistically significant correlation between electricity connection and lower child mortality. In Bangladesh, rural electrification has contributed to reduced fertility rates. In Peru, bundling electrification with other essential services such as water, sanitation, and education has had a dramatic impact on the welfare of rural populations.
- ◆ For poor households, electric lighting reduces costs, decreases indoor pollution, and makes it possible for children to study, for women to engage in income-generating activities (such as sewing) in the evening, and for the elderly to move around the house more safely. In India, the value obtained from the lower cost of lighting can be as high as Rs. 400

¹ In this booklet, marginal farmers are defined as having up to 1 ha; small farmers between 1 and 2 ha; medium farmers between 2 and 5ha; and large farmers more than 5ha.

² For a discussion of why farmers in India are willing to pay more for improved supply, see the first booklet in this series, *Improving the Lives of India's Farmers: How Power Sector Reforms Will Help*, Energy Sector Unit, South Asia Region (World Bank 2002). For a more detailed discussion, see *India Power Supply to Agriculture* (World Bank 2001).

per month, or 50 percent of a household's net cash income. In the Philippines, monthly time saved on household chores is equivalent to an estimated US\$24 per household, or about US\$25 million for the country as a whole.

- ◆ Electrification fosters business development and increases employment opportunities. It facilitates entrepreneurial activities, both in and out of the home; and enables traditional artisans in villages-potters, carpenters, blacksmiths-who are facing competition from new materials (e.g., plastics) and technologies, to increase production by using mechanical devices. Electrification is also crucial for the development of larger businesses. In Costa Rica, for example, a rural electricity cooperative reported that the number of major businesses jumped from 15 to 86 in one year after villages in its area were electrified.
- ◆ Public lighting in urban and peri-urban areas facilitates social activities and social cohesion, and reduces crime and the vulnerability of women. In Kerala, for example, the provision of street lighting was found to be of major importance for security, especially for women, as well as for preventing snake and dog bites and reducing theft.

2. ... but these benefits are not reaching the poor in India

The Government of India considers universal access to electricity to be an important social objective. Yet the achievement of this objective is constrained by three sets of problems in the sector: (a) most of the electric power utilities³ are vertically integrated monopolies with large losses and other operational shortcomings associated with government's interference in the sector, which makes it difficult to enforce collection and prevent theft, and increases the cost of supplying electricity to very high levels; (b) low tariffs, particularly for households and farmers, leave utilities without sufficient resources to address problems of poor quality (voltage fluctuations), availability (shortages), and reliability (inconsistent supply), so customers are unwilling to pay the higher tariffs needed to remedy these problems; and (c) the resulting overall subsidies to the sector are so large⁴ that they crowd out other public expenditures for rural development, health, and education, as well as expansion of the electricity grid, which could better address the needs of the poor. In addition, industrial consumers in India are made less competitive because of the large cross-subsidies and poor conditions of power supply, i.e., frequent power outages and unreliable availability.

These difficulties mean that India's power sector, as currently structured, is a significant barrier to economic growth, poverty reduction, and rural electrification.

Structural difficulties facing the sector

Electricity prices, quality of power supply, and access issues are closely interlinked. Poor quality of supply negates the benefits of electricity for those who cannot afford alternative sources (e.g., back-up diesel generators), or the repair of damaged appliances. Failure to extend access to the rural population and to provide reliable and good quality service prevent the benefits of electrification from reaching the poor, including benefits derived from indirect linkages such as employment opportunities created from economic growth.

³ The Electricity (Supply) Act, 1948, created the State Electricity Boards (SEBs) and entrusted them with the primary responsibility for power supply as well as for related state-level regulation. Today there are 19 SEBs (of which 6 are successor companies) and, for 8 smaller states, Electricity Departments. By law, the SEBs are supposed to earn a 3 percent rate of return on assets. In reality, over the last several years, all SEBs have had a negative return.

⁴ Power sector subsidies in India reached Rs. 280 billion, or 1.3 percent of GDP, in FY 2000, with the utilities incurring losses of Rs. 202 billion. By comparison, India spends Rs. 150 billion on health, Rs. 580 billion on all levels of education, and about Rs. 100 billion on water supply and sanitation.

According to official statistics,⁵ 15 percent of Indian villages still are not connected to electricity.

The operational inefficiency and poor governance of the utilities, along with a distorted and below-cost tariff structure, are the root causes of problems now affecting the sector. These structural problems impose a high cost for both industry and agriculture, and have significantly slowed the pace of rural electrification (Box 1). They have also resulted in the financial insolvency of the power utilities, which are starving for investment to extend services and to maintain and rehabilitate the network.

The effects of power sector problems on the poor

Under present conditions, the rural poor do not receive the benefits of electricity, because only a very few poor rural households and farmers have access to a connection. For connected households, the subsidies designed to help the needy in lowering their monthly electricity bills are poorly targeted and therefore ineffective. Subsidies to farmers benefit mainly medium and large farmers, while most small and marginal farmers do not have electric pumpsets. In addition, mounting power subsidies take away public resources which could be used for social and anti-poverty programs, thus bearing a high opportunity cost for the poor (see Box 2).

Even for those who are connected, the structural problems described above, as well as the mistargeting of subsidies and rent-seeking behavior of utility employees (who may demand informal payments in addition to the cost of an official connection), significantly reduce the benefits of electrification. Further, once a household is connected, the unreliable power supply conditions have adverse impacts on household work, children's education and health. Power disruptions also negatively affect the livelihoods of artisans, small shopkeepers, and those who run a business from their homes. As a result of all these factors, the poor are deprived of the better living standards, employment, and other economic opportunities that would be generated by affordable and reliable electricity supply.

The Government views price subsidies to households as a way to make electricity more affordable for the poor. However, only a small percentage of poor households, especially in rural areas, have gained access through this approach,

⁵ *Annual Report on the Working of State Electricity Boards and Electricity Departments*, Planning Commission (2001).

Box 1. Structure of the Power Sector as a Barrier to Growth

The problems in India's power sector are manifested in various ways:

The cost of unserved power. The deteriorating financial performance of the power utilities has led to inadequate investment and maintenance, affecting the reliability and quality of power supply.

- ◆ Power shortages have a major impact on output and profitability in industry and agriculture. Industrial losses per unit of outage range from an average of Rs. 5 per kWh in Haryana to Rs. 22 per kWh in Karnataka. Farmers in the two states lose an estimated 3 and 13 percent of productivity (Rs. 2 and 4 for every unit of power not supplied). Moreover, fluctuations in voltage damage irrigation pumps and other electrical equipment. While wealthier farmers can mitigate these effects with back-up power sources such as diesel pumps, poor farmers cannot.
- ◆ Unreliable supply has an adverse impact on the quality of life, especially for women and children. In a survey in Andhra Pradesh, women reported that power outages made household activities more difficult and that children had less time to study. Comparable studies in other countries estimate the cost of unserved energy for residential consumers to be as high as for the industrial sector.

The adverse impact of cross-subsidies. Industry is penalized twice by India's power sector policies. It receives low-quality power, but is forced to pay above-cost tariffs to cross-subsidize residential and agricultural consumers, who also receive low-quality power. Industrial tariffs in some states are Rs. 4 to 5 per kWh, among the highest in the world, and affect the competitiveness of industry. Typical rates in Western Europe and the United States are about Rs. 3 equivalent. Industrial tariffs are also lower in other developing countries: Rs. 3.8 in Argentina, Rs. 3.3 in Bolivia, and Rs. 2.9 in Brazil and Thailand.

Financial problems in the sector have slowed the pace of rural electrification. Only 600 villages were electrified last year (the Government defines a village as electrified if it has a single connection). If the current trend continues, it will take 100 years to electrify all 80,000 unelectrified villages in India—despite the fact that many studies have shown the significant economic and social benefits of rural electrification. Economically, the benefits of lighting to an average rural household in India are in the range of Rs. 15 to 20 per kWh, while the cost of supply is Rs. 3 to 4 per kWh. Added value in agricultural productivity is Rs. 20 to 35 per kWh. In terms of social benefits, women can have home-based businesses, children can study at night, public lighting provides more safety, clinics and community centers can operate in the evening, and more jobs are created.

Source: India: *Power Sector Reforms and the Poor* (World Bank 2002).

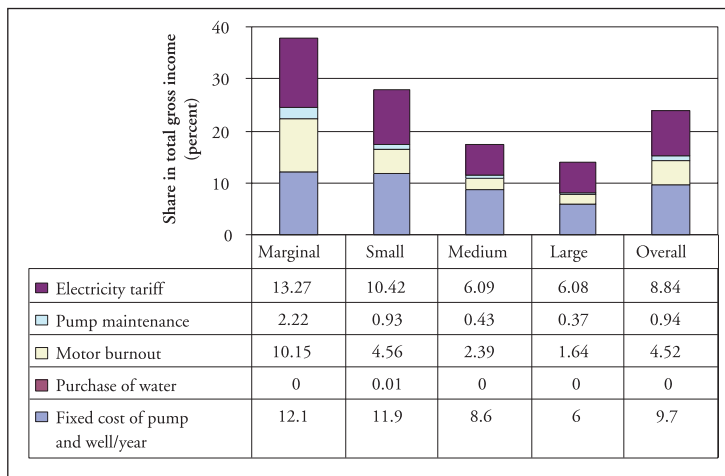
Box 2. The Fallout of Power Subsidies

To compound the problem of mistargeting, the subsidy to residential consumers and farmers is financed, to a large extent, through cross-subsidies from industrial and commercial users. The burden of this arrangement, along with poor-quality service, has forced many of those users to abandon the grid in favor captive generation, which has grown from 10,000 MW to an estimated 30,000 MW over the last decade. Their switch away from the grid has worsened the financial position of the power utilities and has exacerbated the problem of power shortages and lost productivity in the agriculture and industrial sectors. At the same time, flight from the grid has increased the cross-subsidy burden on those industrial customers who cannot afford alternative sources of power supply. Electricity tariffs for industrial consumers in several Indian states are now among the highest in the world, yet they are not enough to compensate for losses. At the beginning of 2001, cumulative arrears of the State Electricity Boards amounted to almost US\$10 billion, and every year, the SEBs lose an additional US\$6 billion.

The need for government to support failing utilities imposes a major burden on state resources, and crowds out other public sector investments, including in rural electrification and education. If the financial losses of the power sector were reduced by only one third, the savings for a single year would be sufficient to fill every teacher vacancy in the country and provide every school with running water and toilet facilities.

Source: India Power Sector Reform and the Poor (World Bank 2002).

Figure 1. Irrigation Cost as a Percentage of Gross Farm Income, Haryana (electricity pumps only)



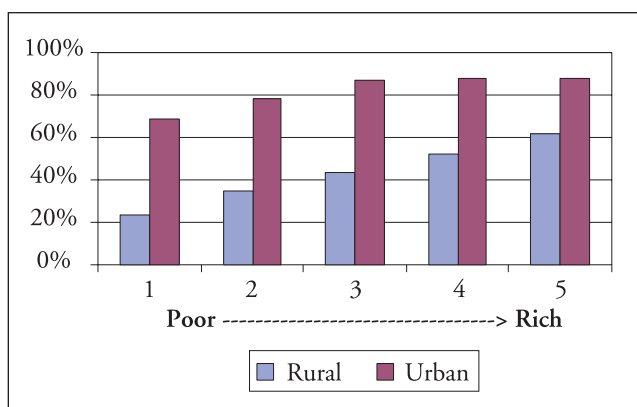
Source: India Power Supply to Agriculture (World Bank 2001).

and that about 90 percent of the total power sector subsidy goes to households that are not considered poor. With regard to farmers, the subsidized tariff benefits mainly medium and large farmers, rather than those that are small and marginal (see Figure 1).

Poor households have a low level of access

A small proportion of the poor, particularly in the rural areas, have access to an electricity connection (see Figure 2). Even fewer have a legal connection-due to high connection cost, delays, and informal payments often demanded by utility employees for an official connection. Illegal connections are particularly common in peri-urban areas. Nearly half the population of Delhi-about 4.7 million people-live in unauthorized colonies and resettlement colonies with no electricity access. But in those few colonies that have public lighting, theft is rampant, with residents typically hooking into the nearest street lighting connection to light their homes, and local electricians maintaining the wires for as little as Rs. 5 to 10 per month. The desire for electricity in these areas is universal, and many households are willing to pay more for a legal and regular supply.⁶ In rural areas, connection rates are half what they are in urban areas (43 versus 82 percent), and connection rates for the rural poor are less than one third of those for the urban poor (19 versus 65 percent). The poorest of the poor-landless laborers-have the lowest level of access of any group.

Figure 2. Households Electricity Connections Rate (legal and illegal) by Expenditure Category (quintile)



Source: *India Power Sector Reform and the Poor* (World Bank 2002).

⁶ *Energy Provisions for the Urban Poor: India Study*, Environmental Resource Management India (1999).

Subsidies to poor households are ineffective and regressive

Power sector subsidies are not effectively targeted, and are not helping to close the gap between urban-rural and rich-poor connection rates (see Table 1). Moreover, across all households - connected and unconnected - the subsidies are regressive, due mainly to the low level of connections among the poor; and they are more regressive for rural than for urban households, due to the lower level of connections of rural households. In particular:

- ◆ *Seventy-three percent poor households are not connected*, and thus do not benefit from subsidies. The rural poor (77 percent of whom are not connected) are at a particular disadvantage compared to urban poor (31 percent)
- ◆ *Across all households-connected and unconnected-a larger share of the subsidy goes to richer households*. The subsidy is even more regressive in rural India, where a very large portion of households has no connection. In urban areas, despite a higher connection rate for poor households connected, the subsidy is still regressive (see Figure 3).
- ◆ *Subsidies are not targeted to connected poor households*. All connected households, regardless of wealth, spend a similar share of their income on electricity. On average, the poor spend about 3 percent of their budget on electricity, about the same share as the non-poor (see Figure 4).
- ◆ *Block tariffs (with higher tariffs for higher consumption levels) intended to benefit poor households have been ineffective, particularly in rural areas*, due to the fact that consumption is relatively flat across levels. The poorest ten percent consume about 25kWh per month, and the richest ten percent

Figure 3. Electricity Tariff Subsidies as a Share of Monthly Per Capita Expenditures (quintile)

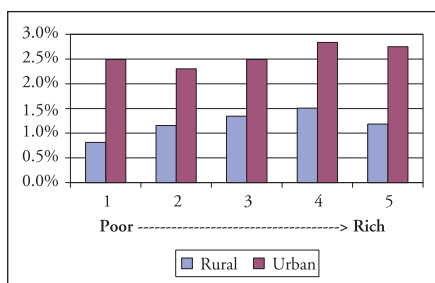
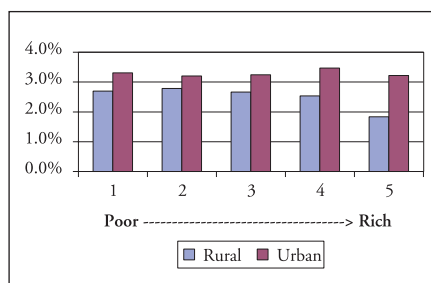


Figure 4. Electricity Expenditures by Connected Households as a Share of Monthly Per Capita Expenditures (quintile)



Source: India Power Sector Reform and the Poor (World Bank 2002).

consume about 60kWh while a heavily subsidized first block tariff is often set at 100 kWh. Thus, rich as well as poor households are covered by the subsidy scheme.

- ◆ *Tariff subsidies to non-poor households*-an estimated Rs. 6 million per month-are more than three times the amount needed to subsidize (at present consumption and tariff levels) all poor households, both connected and not yet connected.

Under current targeting methods, an increase of the tariff to cost-recovery levels would result in a doubling of the electricity bill as a percentage of the total budget for connected households. The poorest consumers, especially in the rural areas, could be affected more severely, with their electricity bill increasing to more than 8 percent of their household budget.

Table 1. Electricity Connections in the Poor Category, Lowest Expenditure Quintile

Type of Household	Electricity Connections (percent)		
	Rural	Urban	Combined
<i>Proportion of households connected that are poor</i> (HH poor, connected / HH connected)	11	17	11
<i>Proportion of poor households that are connected</i> (HH poor, connected / HH poor)	23	69	27
<i>Proportion of poor households belonging to SC/ST that are connected</i> (HH poor, connected SC/ST / HH poor)	10	14	10
<i>Proportion of poor households that are not connected</i> (<i>Error of exclusion</i>) (HH poor, not connected / HH poor)	77	31	73

Note: HH = household; SC/ST = Scheduled caste or scheduled tribe.

Source: Analysis of data from the National Sample Survey 54th Round (Planning Commission 2000).

Subsidies to farmers benefit richer farmers more than poorer farmers

Electricity subsidies for agriculture - equivalent to three quarters of total electricity subsidies in India - allow farmers to pay less than 10 percent of the cost of supply. These subsidies, provided in a form of a uniform flat rate based on the horsepower level of the pump, benefit mainly medium and large farmers, who comprise only a third of the farmer population but own 60 percent of the pumps, and so consume more electricity at the uniform subsidized rate. In Haryana, for example, the subsidy to medium and large farmers per kilowatt

hour, in the absence of metering, is twice the subsidy to small and marginal farmers.⁷

Moreover, electricity subsidies do not even reach the majority of small and marginal farmers, who do not have access to electricity and rely mostly on rainfall to irrigate their fields. In Haryana, electric pump owners have net incomes one third above the average for the state's farmers, and four times that of farmers who rely exclusively on rainfed cultivation.

Subsidized tariffs have a negative impact on the willingness of large farmers to pay for improving quality and reliability of supply, because these farmers can afford expensive backup arrangements (e.g., diesel) that make their incomes less vulnerable to supply fluctuations. Small and marginal farmers, on the other hand, cannot afford backup arrangements, so they bear significant direct and indirect costs from unreliable and poor quality supply. In Haryana, small and marginal farmers already pay up to 13 percent of their constricted gross farm income for electricity. Nevertheless, they are willing to pay about *four times* the present level of tariffs (up to half their income under present circumstances) *for one additional hour per day* of supply. By contrast, medium and large farmers, who pay only about 6 percent of their income, have a zero valuation for power availability at the margin, since greater availability is not likely to have any short-run effects on their income. This has major implications for both the efficiency of resource use and the equity of tariffs, and indicates the importance of metering as a way to transparently target power subsidies to those farmers who most need them.

⁷ This section is based on *India: Power Supply to Agriculture* (World Bank 2001).

3. Reforming the Power Sector to Help the Poor

International experience has shown that successful reform depends on two core elements: (a) utilities must operate on commercial principles, which means that tariffs cannot longer be discounted to provide large subsidies, but must be at cost-recovery levels; and (b) the poor must be protected by more effective subsidy schemes from the impacts of higher tariffs. In addition, successful reform must have the cooperation of all levels of government; and all stakeholders, including the poor, must be consulted, particularly in planning for rural electrification.

Based on these principles, assistance to the poor to make their access to basic services more affordable is in various countries increasingly taking the form of income-tested cash transfers to eligible beneficiaries. Well-designed cash transfers have several advantages over tariff subsidies, including better targeting, more transparent and accountable delivery mechanisms, a smaller financial burden on the government budget, and improved efficiency and performance of the utilities.

In designing a subsidy scheme, the following questions must be considered:

Whom to subsidize? If subsidies are meant to improve the welfare of the poor, they must be directed to the people who cannot afford access to high-quality energy services. These are typically the very poor, living in rural areas.

What to subsidize? Providing a partial subsidy for the cost of connection is more effective than a subsidy for ongoing energy charges. Capital subsidies for access costs not only reduce the cost of service to the poor, but also encourage businesses to increase connections in rural areas.

How to subsidize? Subsidy mechanisms are generally categorized as demand side and supply side. Demand-side subsidies, especially if they involve partial funding of connections, generally can be better targeted and provide greater incentives for expanding coverage and sustaining services. Supply-side subsidies, although easier to implement, have the disadvantages of being difficult to target, undermining efficient service delivery, and raising costs above what they would otherwise be. While the proper design of the subsidy scheme is important, its success also depends on effective institutional structures; regulations that allow businesses to charge remunerative prices for energy services; mechanisms to offset the tendency of politicians to divert subsidies to political interest groups; and the active involvement of community groups in the scheme's design.

Delivery mechanisms for subsidies differ substantially across countries (see Box 3). Their design is influenced by the specific objectives of a subsidy scheme, the performance of social safety net programs, and other country-specific issues, including the role of cooperatives (Bangladesh and Costa Rica) and privatization (Argentina and Eastern Europe).

India's experience with pro-poor programs

In 1988, the Government established a scheme, the Kutir Jyoti Program (KJP), to provide single-point light connections to poor rural households, with special quotas for scheduled castes and tribes; in particular, Harijan and Adivasi families. Under this scheme, the state-owned Rural Electrification Corporation provides grants to State Electricity Boards to connect unelectrified households in electrified villages. Beneficiaries are not charged a connection fee or the one-time cost of internal wiring, and monthly bills are nominal. KJP is intended to help consumers make the transition to a regular domestic connection once their income improves, and evidence shows that the program has been effective. A recent study, based on a survey of 1,000 targeted households, found that: (a) more than 60 percent of households with a KJP connection belong to the poorest of the poor; (b) many of these households now have small businesses; (c) women are engaged in productive activities in the evening, and (d) children can study in the evening. As further confirmation of the program's effectiveness, the NSS survey found that half the connected rural households are from the scheduled castes and tribes targeted by the KJP.

However, misuse of the program is widespread. A review of the program has suggested that it would be more effective and efficient in providing the poor with grid access if there were better identification of the targeted population and beneficiaries served.⁸

The main challenges in power sector reform

To achieve the Government's objectives of improving the quality and reliability of supply, improving governance, increasing rural access, and better targeting subsidies to poor households and farmers, it will be necessary for the states, the utilities, and the Government to address a number of important challenges:

⁸ *Study on Socio-Economic Impact of Kutir Jyoti Programme in Rural Areas* (Center for Social Research 2000).

Box 3. Pro-Poor Electricity Provision: Five Cases from Asia, Latin America, and Eastern Europe

Rural electricity cooperatives in Bangladesh and Costa Rica

Bangladesh provides electricity service to its very poor rural population through rural electric cooperatives (PBSs), which purchase electricity from a national grid. All new cooperatives must satisfy revenue requirement standards prior to approval. Some communities may not be included in the PBS electrification plan until the population and the associated potential for productive use loads grow to the point that they qualify. The revenue standards allow for financial losses during the first several years of PBS operation. During that time, the PBSs are provided with cash flow support; long-term, low-interest construction loans, and a cross-subsidy in the form of lower power purchase costs from the public utility. Financial and operational viability is an explicit goal in the development of the cooperatives, with the subsidies intended as incentives for them to develop a business to serve rural populations. The cooperatives then are responsible for ensuring that rural people have access to energy services.

Costa Rica also has rural electric cooperatives that connect the rural population to the grid. The first four cooperatives were established in the 1970s, with assistance from USAID. All four have prospered and now provide electricity supplies to about 20 percent of the country's rural population. Most remaining rural areas are covered by the national utility, and more than 90 percent of the rural population is now connected to the national electricity supply system. The success of the RE program can be attributed to its adherence to the principles of cost recovery, operational autonomy, and an effective regulatory framework. In addition:

- ◆ rural families had a high willingness to pay for electrification;
- ◆ with urban electrification virtually complete, there was a strong institutional base to support RE;
- ◆ the original cooperatives concentrated only on distribution, not on generation;
- ◆ the financial viability of the cooperatives enabled them to recruit and keep high-quality staff;
- ◆ there was strong Government support for rural development, and effective collaboration between rural development efforts and the various power agencies.

Privatization in Argentina - The Acuerdo Marcos

Privatization of Argentina's power utilities in the early 1990s included a requirement for universal service. To that end, the utilities formed a partnership with municipal authorities and the provincial government to extend or regularize services to 650,000 inhabitants of shantytowns and poor neighborhoods, while

at the same time diminishing non-technical losses. To cover the cost of infrastructure works, the national Government contributed an amount equal to 18 percent of the net billing for users benefiting from the agreement; the municipalities waived the 6 percent municipal tax on bills collected in the covered areas; and the province waived the 95 percent tax for distributors that invested in infrastructure in those areas. The distributors, for their part, installed 10,000 meters per month in the shantytowns, and laid pre-assembled cables to prevent illegal and unsafe connections. The cables enabled the municipalities to install public lighting, which increased public safety, especially for women. The regularization process paved the way for participating inhabitants to obtain title to their property, thus ensuring that the program had public support.

Non-utility subsidies in Eastern Europe

In **Armenia**, during the utility crisis of early 1990s, most of the population received only 2 to 4 hours per day of electricity; central heating and natural gas were virtually terminated; and the supply of drinking water decreased in areas that required pumping. As a result, consumer payments for both electricity and drinking water services fell to only 10 percent of billing, further threatening the sustainability of these services. The Government responded by targeting investments to improve supply quality followed by raising the tariff to near the cost of supply, to help the utilities become financially viable, while at the same time introducing a newly designed family benefit (with broader objectives) targeting 28 percent of households below the poverty line. The Government also, as a temporary, one-year, measure, targeted monthly cash payments to an additional 9 percent of households not eligible for the family benefit, but expected to have difficulty paying their electricity bills. The net result has been a dramatic and sustained improvement in the supply of electricity. Most households now receive service 24 hours a day, and outages are shorter and less frequent. Transparency of financial flows has increased, and accumulation of quasi-fiscal debt has diminished.

In **Hungary**, authorities pursued both tariff and non-tariff instruments for re-targeting subsidies to the most vulnerable groups during the transition. The process involved rapidly phasing out cross-subsidies and instituting cost-recovery tariffs, while putting in place means-tested earmarked cash supplements to mitigate the impact on vulnerable customers. This scheme was consistent with the overall structure of the country's social safety net, which channeled dwelling maintenance support to the poor through the municipalities. In addition, a public-private mechanism, the Hera Fund, was designed in consultation with stakeholders, to minimize the fiscal burden on the state. The Fund collected contributions from electricity consumers, utilities, and private sponsors, and delivered this money to municipalities to match their resources.

Source: India Power Sector Reform and the Poor (World Bank 2002)

Increasing access of the rural poor. Increasing access of the rural poor is one of the major challenges for power sector reform. Utilities will initially need to focus their investments on improving the quality of supply, so that customers will be willing to pay the higher tariffs necessary for utilities to extend the grid. During this transition period, special programs such as a more targeted Kutir Jyoti could provide grants to connect targeted households. For villages reached by the grid but with a low rate of connection, a review of connection charges should be conducted to determine whether they are a barrier for the poor. Where there is no electricity or lack of good-quality supply, off-grid applications, including solar photovoltaics and distributed generation, should be considered.

Improving operational efficiency and the quality of service. Technical losses must be reduced and the operating efficiency of the industry increased to achieve more reliable supply, especially for the poor, who cannot afford expensive coping strategies. When combined with targeted investments to overcome bottlenecks in transmission and distribution, loss reduction and efficiency measures would improve the quality of service, for which many customers would be willing to pay a higher tariff. International experience has shown that privatization is often the most effective way to sustain improved performance, mobilize the necessary capital investment and managerial expertise, and extend coverage to low-income areas, through special programs undertaken in partnership with government or other sponsors. In India, measures to improve efficiency and quality of service have been important elements of state reform programs. Additional research is needed to collect more empirical evidence of the specific impacts of these measures on low-income groups, identify factors that enhance positive impacts for these groups, and effectively communicate the observed benefits.

Retargeting household subsidies and providing a social safety net. International experience has shown that non-tariff instruments are typically more transparent and better targeted than subsidized tariffs, and that they impose a smaller financial burden on the state while not interfering with the commercial operations of the utility. Such schemes vary considerably across countries (see Box 4), and models for India could be tailored to the particular circumstances of each state.

Redesigning the subsidy mechanism for poor farmers. Electricity subsidies to farmers could be better targeted to vulnerable groups by introducing a different tariff structure based on energy consumption (thus requiring meter installation), and perhaps including lifeline rates. Other types of subsidies also need to be

assessed, including direct reimbursement of farmers for a portion of their electricity bills. As a first step toward raising farmers' awareness of the real cost of electricity, utilities could indicate the amount of the subsidy on their electricity bills, as recently initiated in Maharashtra. The redesign of subsidies needs to be integrated with efforts to explore alternative business models for rural electrification.

Facilitating participation of the poor in the design of subsidies and financial incentives. International experience has shown that a consultative process is important for developing a subsidy program that is broadly accepted and works well in specific circumstances. Almost all Indian states have notified their regulatory commissions of the need to set electricity tariffs through a consultative process. However, more efforts are needed to ensure that poor households, whether or not connected to the grid, are given the opportunity to participate in the process. The poor should also be involved in defining the financial incentives established to promote electricity access.

Improving governance. Reducing theft, legalizing connections, combating corruption and improving quality of electricity services would benefit the poor, because now they are penalized by the informal payments to utility staff.⁹ Thus, The participation of the poor in designing a reform program and in the regulatory process could be a first step toward improving sector governance, combating corruption, and legalizing connections. Some states, including Andhra Pradesh and Karnataka, have undertaken massive statewide campaign to regularize illegal electricity consumers. These campaigns not only helped the utilities to raise revenues, but also helped those consumers who could not afford to make informal payments or could not obtain a legal connection. Another improvement would be the monitoring of customer services standards by the regulatory commissions.

The World Bank recognizes the importance and the positive impacts that well-designed power sector reforms can have on the quality of life of the poor, and will continue to work with the Government of India toward achieving that goal.

⁹ See results of the socio-economic assessments for Orissa (XIM 1997), Haryana (TARU 1999), Andhra Pradesh (TARU 2001), and Kerala (Snc Lavalin 2000)

This booklet is based on the recent study, *India: Power Sector Reforms and the Poor* (World Bank 2002), which aimed to determine the effects of power sector problems on the poor. The study included an analysis of household-level data from two sources: (a) the National Sample Survey (NSS), 54th Round, which provided data on electricity consumption and income (Planning Commission 2000); and (b) the *Annual Report on the Working of State Electricity Boards and Electricity Departments* (Planning Commission 2001), which provided data on the cost of electricity supply. Taken together, these data provided a statistical compendium from which average net household expenditures on power, and the level of power subsidies, could be calculated for each of 5 income categories.

- ◆ *National Sample Survey.* NSS data were used to compute household electricity consumption, expenditure, and connection rates for each of 5 expenditure categories, in order to determine: (a) what proportion of poor (and poorest) households benefit from an electricity connection? and (b) what proportion of beneficiaries (households having electricity service) are poor households?

Under the 54th round, during the period January-June 1998, survey data were collected at the household level, and disaggregated into rural and urban for a stratified sample of households selected from all the Indian states and union territories. The sample comprised 13,483 households-9,986 rural and 3,497 urban. The electricity consumption and expenditures reported in the survey were based on a household member's perception of the amount of previous bills over the previous 30 days. Although the data did not indicate whether electricity connections were legal or illegal, an official Government source indicated that all types of connections were included.

The NSS also collected household expenditure data on a wide range of other items, and on total monthly per capita expenditure (MPCE). This variable was then used as a proxy for income/poverty level, with each quintile representing 20 percent of households in the sample. The *poor* were defined as households in the *lowest or first quintile*, with per capita monthly aggregate expenditures of less than Rs. 250. The *non-poor* were defined as the richer *80 percent*, with incomes of more than Rs. 250.

- ◆ *Annual Report on the State Electricity Boards and Electricity Departments.* To deepen the analysis, the NSS data on consumption and expenditures were combined with data from the *Annual Report* on the statewide average cost of electricity supply to estimate, in a simplified manner, the incidence and level of electricity tariff subsidies to households. If the difference between the unit cost and the report unit cost from the NSS survey was positive, it represented a subsidy to the household; if the difference was negative, it represented an extra charge above the cost of supply.

