

Electricity Regulatory Mechanism
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**Environmental Aspect of Power
Development**
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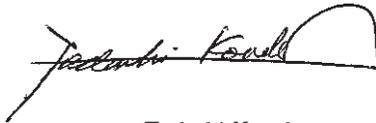
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Foreword

The India Resident Mission (INRM) Policy Brief Series is sponsored by the Asian Development Bank (ADB) and is designed as a forum to disseminate findings from policy research work undertaken on the Indian economy. The series is primarily based on papers prepared under the Technical Assistance (TA) 'Policy Research Networking to Strengthen Policy Reforms in India'. The main purpose of the TA was to provide assistance for developing policy research networking capacity, in order to build support for, and consolidate the reform process. The INRM Policy Briefs provide a nontechnical account of important policy issues confronting India.

A handwritten signature in black ink, appearing to read 'Tadashi Kondo', written over a horizontal line.

Tadashi Kondo
Country Director

Electricity Regulatory Mechanism

S. L. Rao

Introduction

Independent regulation of electricity in India started in Orissa. It spread nationwide after the formation of the Central Electricity Regulatory Commission (CERC) in 1998. It has had limited success, especially at the state level. While tariffs have been rebalanced between user groups and some states have striven to improve quality, the following problems persist.

- Divergence among state regulators in handling similar issues;
- No attempt to regulate the function of load dispatch and make it independent of the utility;
- No effort to introduce in interstate transmission the highly effective availability-based tariff (ABT) mechanism to better regulate the power system within states;
- Protectionism in many states of the state-owned sector and in some, use of regulatory instruments to continue its monopoly on the purchase and sale of third-party power;
- No effort to develop baseline data on efficiencies in transmission and distribution;
- Continuation of one-year tariff determination; and
- No continual attempt during the regulated period to monitor and follow up the implementation of commitments and orders issued to the distribution entities.

This relatively poor performance is due to:

- Lack of political and administrative support to the regulatory commissions;
- Selection processes that are skewed to selecting government servants retiring or retired; and
- Inadequate staff, and their relatively poor skills due to near-total dependence on staff deputed from the government.

The lack of an integrated national energy policy and the absence of linkages between different bodies whose decisions affect electricity tariffs and performance have squeezed the financial viability of electricity enterprises in distribution. Lack of political consensus and agitations to destabilize reformist governments have marred decision-making, prompting state regulators to worry about the unreasonable political fallout of their decisions.

Expected Regulatory Scenario by 2025

The electricity and energy contexts can be expected to change by 2025. This will change the regulatory context and practices in many ways.

Though the energy sector will continue to be dominated by government-owned enterprises, there will be significant private sector presence. For example, the private sector might account for 30% share in electricity, as against 5% today. The capacity for the transmission of electricity and pipelines for gas will be adequate (unlike today), though with low redundancy capacity. Therefore, shortages in meeting peak load demands will lessen. Distributed generation, with substantial central financial support for capital investments, will take over significantly in rural energy supply. Panchayats will become largely responsible for rural distribution and collection and will regulate groundwater usage. Tariffs will be determined by regulators for groundwater withdrawals based on assessments of groundwater availability in each water basin. A single tariff will not apply to the whole state. Renewable energy, and particularly wind power, will rise substantially in total supplies, and so will nuclear power. Gas-based power may not make the expected progress because of the high price of gas.

Subsidized energy supplies, electricity for small and marginal farmers and the rural and urban poor, and kerosene for the poor will remain but will be better targeted, with the subsidy capped per user. There will be a mechanism to regulate gas prices, so while there is satisfactory

return for all participants, linked to the end prices of electricity, the viability of the electricity sector will be improved, too. Efficiencies will have improved at all stages. Trading and markets will be well established in all energy supplies. Competition would have been introduced in spot sales of energy and transmission and pipeline capacities, as well as in bulk supplies to large users. However, long-term contracts and not spot sales will account for the major portion of sales.

There will be a single CERC for electricity, coal, and gas, regulating transmission and pipelines, bulk tariffs, licensing of transmission, and distribution entities, setting rules and enforcing them for trading, markets, and grid discipline. The state energy regulatory commissions (SERC) will also do the following:

- Enforce environmental rules set by environmental agencies;
- Enforce energy efficiency rules set by the Bureau of Energy Efficiency;
- Oversee the functioning of local agencies that would by then be in operation to enforce the rules for groundwater usage.

The energy regulator will have memorandums of understanding (MoUs) with other central regulators—for rail, shipping, telecom, etc., for mutual consultation and agreement on predefined common issues.

The multiplicity of regulatory agencies by sector and by state in the case of electricity (and perhaps water and other subjects that are concurrent or wholly with the state governments) strains the available limited talent for appointment to them. There might be an attempt to encourage groups of states to have common regulators, with benches in each state and the power accorded to the state government concerned to issue directives to the joint commission, in relation to that state's concerns.

Desirable Norms for Regulators

The search, selection, and appointment of all independent regulators for all states must be done by a Group of Eminent Persons. Government-influenced search committees must be kept out of this. Chairpersons and members of this group should be younger (45–55 years as against the current average of 60 years) and enjoy full five-year terms that last irrespective of age. They must have high status, attractive remuneration and perquisites, and at least health benefits for life if not other retirement

benefits, and very limited restrictions on postretirement employment. Not more than one member in a commission should have served as a permanent government servant or in a government enterprise. The group must oversee the training of regulators and their staff and must be the agency to which regulators will be accountable. While technical skills in the sector are not essential, there must be ample interdisciplinary expertise in the commissions in law, economics, finance, and management (not the same as administration) and an overall understanding of the principal technical parameters of the sector. Training should ensure that all regulators are enabled to contribute to all aspects of this interdisciplinary work.

There must be only one appellate tribunal for the whole energy sector, not different ones for electricity, coal, gas, etc. It must rule primarily on matters of law in hearing appeals against the orders of the regulatory commissions. It must submit reports to the Group of Eminent Persons about regulatory commissions that need to be disciplined because their orders have been frequently overruled on appeal.

At least four research, training, and education institutions must be created in electricity regulation with government funding support. Funding support must also be made available to consumer groups to develop expertise in the sector. They should be able to draw on the research output of these institutions. Every commission must have a consumer advocate to represent and coordinate among the consumer groups.

Transition Scenario (2005–2025)

Most of these expectations regarding regulatory commissions could be met within the next five years, but since this requires a major change in attitudes and mindsets among politicians and bureaucrats, a transition period of around five years may be necessary, from 2005 to 2010.

During this period, the ownership structure in gas, electricity, and coal will change rapidly as private investments increase in production, transportation, and distribution. Private investment in pipelines and electricity transmission lines will make the functions of transmission and load dispatch independent of operations. Electricity exchanges will be in place parallel to the load dispatch centers at the state and regional levels. Electricity trading will increase as the capacity for captive generation increases but will not be more than 10% of total generation, without

counting bulk deals between central generators and state-owned distribution entities. Rural electrification will progress with the replacement of low- with high-voltage lines, metering of distribution transformers, and building capacity in panchayats to distribute electricity and collect payments at tariffs determined by the regulator. The use of wind power along with biomass will increase substantially. Tariffs must be regulated to encourage generation, and not merely investment, as is done now; incentives must be redesigned to relate to generation performance and not capacity. Spot and forward contracts will become widespread. Competitive tariff bidding for new projects will remove the regulator from the present detailed examination of costs and expenditures.

During this transition period, regulators will also increasingly regulate trading and markets to ensure fairness and transparency. They will clear long-term contracts and license new projects based on committed forward tariffs, determined through competitive bids, and lay down the formulae to deal with fuel price variations.

Though there may be separate regulators for coal, gas, and electricity as well as for rail, shipping, environment, and energy efficiency, they along with the Telecom Regulatory Authority of India (TRAI) will have MoUs to ensure coordination on specified issues among themselves. Until electricity tariffs can be left entirely to market forces, the prices of principal fuels (coal and gas) must be regulated by separate regulators, or preferably by a single regulator for energy.

Electricity regulators could use their tariff determination and licensing powers to enforce the regulations relating to environment and energy efficiency. SERCs could be given powers to oversee groundwater and water basin regulation by local authorities like panchayats. The roles and jurisdictions of the competition commissions, the appellate authorities, and the respective sector's regulatory commissions will have to be clarified. Preferably, the Competition Commission might confine itself to mergers and acquisitions and consult the regulatory commission concerned before coming to decisions. Governments must make greater use of the expertise built up in the regulatory commissions and invite their advice in reform measures in each sector and in areas like taxation. No government must issue policy directives to regulatory commissions without prior consultation with them and without publishing the record of the discussions.

To ensure accountability, all regulators must be required to meet annually with the legislative committee concerned to explain their

approach and progress, but not to discuss specific orders issued by them. Regulators must have a formal arrangement to sort out issues of common concern. A formula to assure a relationship between end electricity prices and of coal and gas, that also recognizes the need for them to make adequate profits (for attracting investments) must be agreed upon. Regulatory bodies for gas, coal, and rail must be given responsibility for their tariffs, an element missing from the present Oil and Gas Regulatory Bill and in the 1997 discussions on amendments to the Coal Nationalization Act.

All independent regulators must be subject to a common framework of rules on appointment, terms, accountability, etc. As stated earlier, search, selection, appointment, and training of regulators must be the responsibility of a high-powered committee composed of eminent persons, and not, as at present, of a government-dominated/influenced committee. This group will also examine and rule on accountability issues. Government ministries and their responsibilities will be rationalized as some of their work is transferred to the independent regulators.

The government must establish on priority four institutes in each region to conduct training, education, and research on energy issues and their regulation.

Regulatory Behavior

Regulators must take special interest in forecasting supply and demand and find ways to improve distribution. Distribution companies must have the freedom (subject to regulatory orders) to sell energy supplies over which they have contractual rights to any customer. Vertically integrated operations (where one entity controls all operations, from fuel to final supply to consumers) will require special attention to ensure that the transfer pricing is fair to the consumers. Regulators must also deal *suo motu* with issues that push up the cost of projects (such as red tape, bureaucratic delays, padding of equipment costs, inefficiencies, etc.).

In the matter of subsidy, regulators must improve efficiencies in subsidy targeting and costs and reduce or eliminate subsidies to the nonpoor. This requires data on the poor and nonpoor and a system to keep the latter out of the subsidy mechanism. Cross-subsidies must be replaced with direct government funding. The government should be clear on whether cross-subsidies are to be eliminated, and if so, within

what period. If consumers are to be subsidized governments must be made to compensate the difference to the utility.

Given that the supply-demand balance for energy is unlikely to be in surplus even in 2025, regulators will continue with cost-plus tariffs, but the balance will change as competitive bidding prevails for new projects and transmission capacity expands. Cost-plus regulation by which the regulator looks at all costs, including investment, and allows or disallows costs for tariff purposes might increasingly become confined to long-term contracts.

Predictability is essential from regulators; one-year tariffs do not offer this. Tariffs must be determined for at least three years at a time and must ensure reimbursement of prudent expenditures. Regulators must have the requisite powers to formulate policy to carry out their tasks. They must demand the requisite information from all the parties concerned: utilities, users, input suppliers, and government. Data submitted for tariff determination must be accessible to anyone interested. Reasons for nondisclosure of any information must be given in writing.

Consumers' involvement must be ensured in the regulatory process. This should extend beyond well-informed and large consumers and must focus on the relatively ill-informed small groups. They must be supported with funding to help build their expertise. Each regulatory commission must have an office of a consumer advocate to look after consumer interests. This office can also help in selecting the consumer group to be encouraged.

A good way to fund the regulatory commissions might be to put down the regulatory costs as an item in all consumer bills. The consumer will then know at all times what she is paying the regulator for and evaluate the benefit in relation to the cost. Funding could also be by the creation of a corpus from which income is available to cover regulatory expenditures and subject to external audit. Using license fees and other fees levied on petitioners before the commission to fund the regulatory expenses would involve an obvious conflict of interest.

Independence must not be carried so far that regulators do not interact with different stakeholders, to at least understand different points of view. Regulators must visit different locations, meet a variety of interests, use conferences and consultation papers to elicit opinion, conduct formal public hearings, and in contentious matters issue draft orders for feedback before finalizing them.

Environmental Aspect of Power Development

P. V. Sridharan

Introduction

In India, as in many other developing countries, power systems are planned and operated without considering the environmental consequences, for a number of reasons, as follows:

1. Critical shortage of supply capacity, due to inadequate financial policies, makes it difficult to act against power stations that do not comply with environmental regulations.
2. Inadequate attention to demand-side management, hydroelectric power, other renewables, alternative fuels such as gas, clean-coal technologies, coal washing, and ash utilization, due to a distorted system of incentives, throws the burden of meeting the power needs heavily onto supply from conventional coal-fired power stations.
3. Absence of power-system planning at the level of states to incorporate the environmental effects of alternative policy options.
4. Inadequate awareness among stakeholders on the environmental impact of power generation.
5. Inadequate recognition by decision-makers of the tradeoffs being made in current policies and practices in the power sector.

Nearly all electricity generated in India is by using thermal, hydroelectric, or nuclear resources. Coal fuels 60% or more of the electricity production. Coal-based electricity generation affects air, land, and water

resources, human health, and the ecosystem. The accumulation of ash at power station sites despoils land and endangers both ground and surface water. Coal production itself also degrades land, depletes water resources, and causes water pollution.

Based on the power demand assessment (16th Power Survey by the Central Electricity Authority (CEA)) the Planning Commission, Government of India, has projected an addition of over 110,000 megawatt (MW) of installed capacity by 2011/12.

Environmental Requirements in Power Development

Developing a set of environmental requirements for the power sector involves decisions of two distinct kinds:

- First, there are the specific requirements of the power plant itself. These are the responsibility of the project developer in collaboration with relevant local or other environmental authorities. These include efficiency improvements through closure of old plants, repair and maintenance of existing plants, capacity building of personnel, upgradation of technologies or introduction of efficient technologies, etc.
- Second, there are requirements that relate to the operation of the power system as a whole. These strategic issues must be the concern of national or regional authorities with the responsibility for setting the overall policy framework for the development of the power sector. Examples of such requirements include measures to promote energy conservation via better demand-side management, encourage the use of renewable sources of energy rather than fossil fuels, promote hydropower development, and meet the overall targets for the reduction of emissions of sulfur dioxide, nitrogen oxides or greenhouse gases, and the economic utilization of waste products (fly ash).

National Environment Policy

The draft National Environment Policy (NEP) 2004 lists a number of objectives as follows to deal with current key environmental challenges:

1. Conservation of critical environmental resources;
2. Integration of environmental concerns in economic and social development;
3. Efficiency in environmental resource use;
4. Environmental governance; and
5. Clean technologies and innovation.

The draft NEP 2004 includes economic efficiency as one of its principles. Environmental resources will be assigned an economic value so that it makes the process of cost-benefit analysis of a development project more definitive by factoring in environmental costs in monetary terms. The proposed 'substantive reforms' include the concept of 'economic principles in environmental decision-making'. One proposed reform is strengthening the initiatives in 'natural resource accounting' and its inclusion in the 'system of national income accounts'. The policy directly blames the electricity pricing criteria for groundwater depletion and says that there should be 'explicit' accounting of the impact this has on the groundwater table. Cheap/free power supply discourages efficient use of water resources. The policy specifies the need for regulatory reforms, environmental standards, standardized management system, environmental certification and indicators, and a review of pollution emission norms. The draft policy proposes that the Cabinet Committee on Economic Affairs should review the implementation process of the policy annually and make public its findings. This will also help in building up public trust in the government's earnestness to conserve the environment.

While the draft NEP 2004 has a national perspective, the states are concerned with and responsible for major environmental measures like forest conservation, wildlife preservation, preventing unsustainable use and contamination of water resources, preventing air and soil pollution, etc. In the absence of state environment policies, the national policy may flounder. One 'substantive reform' should be to encourage states to formulate their own environment policy duly approved by their state assemblies. That would help in widening the ambit of the people's involvement in environmental conservation and development.

Policy Reforms and Strategies for Environmental Management

1. Greater thrust on hydropower development in the short, medium, and long terms. The emerging profile of the generation mix indicates the necessity of hydroelectric schemes. Hydropower would not only make available a reliable energy source but would also reduce carbon dioxide and other emissions. Under clean development mechanism untapped hydropower potential offers a unique opportunity to potential investors, both domestic and overseas.
2. For thermal power generation, the cleanest fuel economically available to be chosen. (Natural gas is preferable to coal subject to its availability and price.)
3. Preference given to high-heat-content low-ash, low-sulfur coal and beneficiation considered for high-ash coal.
4. Promotion of clean-coal technologies, especially coal beneficiation in the short term, to achieve immediate benefits and other clean technologies like supercritical boilers, integrated gasification combined cycle, etc., in the long term. The Ministry of Environment and Forests notification to use coal with 34% or less ash in thermal power stations in identified areas should be extended to the entire country.
5. Promotion of fly-ash management and utilization through suitable market-based instruments; the fly ash should be priced appropriately.
6. Public acceptance of fly-ash-based products to be improved through awareness and demonstration. Movement of ash through the rail network to be facilitated.
7. Promotion of exploitation of coal-bed methane as a clean alternative source of energy.
8. Greater thrust on renewables as a decentralized source of energy.

Importance of Economic Instruments

Economic instruments for environmental protection may be direct or indirect. Direct economic instruments are pollution taxes/charges, emission trading rights, deposit refund systems, performance bond, and

strict liability for pollution. The indirect economic instruments are taxes on outputs or inputs of polluting activities, fiscal incentives such as rebates on excise and customs duties, accelerated depreciation allowances, subsidies for the adoption of cleaner technologies and effluent treatment plants, eco-certification of products, and environmental audit. Economic instruments can, by altering the costs and benefits, provide signals to polluters to internalize the environmental costs in their decision-making and make them behave in a socially acceptable manner. They provide incentives to polluters to search for least-cost options of complying with the regulations.

Currently, national-level policies for controlling pollutant emissions from power plants rely on command-and-control instruments that mandate the use of specific technologies. However, such technology-push policies are not an optimal solution, since they do not take into account the differences in marginal abatement costs between different power plants. Therefore, it is necessary for policymakers to consider alternative policy tools, such as carbon tax and emissions trading, which can be more cost-effective and achieve greater leverage over effluents. When compared to a technology-push policy, an emissions trading regime is expected to generate cost savings for equivalent reductions. These savings could be invested in clean-coal technologies, strengthening institutions for effective policy implementation, and other air-quality management measures. Such an approach would align the economic considerations of power plants with environmental interests. However, it is necessary to precisely formulate this regime in terms of policies, implementing agencies, regulators, etc.

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