

“ENERGY REGULATORY MECHANISM AND COORDINATION ACROSS SECTORS”

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PREFACE

This paper was written as part of a larger project on economic reform for the Asian Development Bank. It focuses on energy regulation and uses the experience of the regulation of electricity, the only sector so far to have independent regulatory authorities. It tries to evaluate effectiveness of regulatory agencies, weaknesses in their functioning that Regulatory Commissions must attend to, the shortcomings in government functioning at central and state levels in performing their duties and in relation to Regulatory Agencies, deficiencies that need to be corrected in the law and institutional changes and corrections that are required. It does this in three stages: the present situation, the transition as the Electricity Act 2003 and other reforms begin to take effect and the situation in 2025 as it might develop.

It has drawn on the experiences of the author and on numerous studies, publications and conferences on the issues covered in the paper. The paper has benefited from the comments of a distinguished steering committee appointed by ADB and by other colleagues writing on related topics.

SUMMARY

By 2025 we foresee continuing domination of the energy sector by government owned enterprises but with a more significant private sector presence, for example in electricity the private sector might account for 30%. Transmission and pipeline capacity will be adequate with redundancy in some areas. Distributed generation will have taken over to a significant extent in rural energy supply and panchayats will have become largely responsible for rural distribution and collection. Renewable energy and particularly wind power will have risen substantially in total supplies. Subsidized energy supplies, electricity for small and marginal farmers and the rural and urban poor, subsidized kerosene for the poor, will remain but better targeted and the expense capped per user. As a result gas prices will also be regulated to provide satisfactory returns to all participants but related to prices of electricity so that viability of the electricity sector is improved from present levels. 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 pipelines capacities, though long-term contracts will account for a major portion of sales.

There will be a single Central Energy Regulatory Commission for electricity, coal and gas, regulating transmission and pipelines, bulk tariffs, licensing of transmission and distribution entities, setting rules and enforcing them for trading and markets and grid discipline. The State Energy Commissions will also enforce environmental rules set by environmental agencies, energy efficiency rules set by the Bureau of Energy Efficiency and oversee the functioning of local agencies that enforce rules for ground water usage. The Energy Regulator will have MOU's with other central Regulators-for rail, shipping, telecom, etc, for mutual consultation and agreement on 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. We must encourage as many States as possible to have common Regulators, with Benches in each State and the power to the

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concerned State government to issue directives to the Joint Commission in relation to its concerns.

There will be a group of Eminent Persons that will nationally be responsible for the search, selection and appointment of all Independent Regulators. We must appoint Chairmen and Members who are younger (45 to 55), for full five year terms that last irrespective of age, with high status, maximum remuneration and perquisites, at least health benefits for life if not other retirement benefits after they have completed their terms, very limited restrictions on post-retirement employment and not more than one Member in a Commission who has moved from employment as a permanent government servant or in a government enterprise. The Eminent Persons Group will oversee training of Regulators and their staff and be the agency to which Regulators will be accountable. Appellate Tribunals for different sectors will apart from ruling on appeals against Orders of Regulatory Commissions also identify to the Group of Eminent Persons the commissions that need to be disciplined because their Orders are frequently upset on appeal. There will be at least four research, training and education institutions on electricity regulation that will be given government funding support. Funding support will be available for consumer groups who can also draw on the research output of these institutions.

To get from the present situation to the envisaged one in 2025 will require a *transition period* of around five years, from 2005 to 2010. In this transition period there will be fairly rapid changes in the ownership structure in gas, electricity and coal as private investments increase in production, transportation and distribution. Private investment in pipelines and electricity transmission lines will soon result in the load despatch functions becoming independent of operations. Electricity exchanges will be in place parallel to the load despatch centres at State and regional levels. 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. Wind Power along with bio mass will be the main renewable sources of energy and also be connected to the Grid. Incentives will be related to generation performance and not capacity.

The Regulators will increasingly be regulating trading and markets to ensure that there is fairness and transparency. The Regulator will clear long-term contracts. New projects will be licensed on the basis of committed forward tariffs with the Regulator laying down formulae for dealing with fuel price variations. There will be separate Regulators for Coal, Gas and Electricity as well as for Rail, Shipping, Environment and Energy Efficiency. These Regulators along with TRAI will have MOU's that ensure coordination on specified issues between the Regulators and Electricity Regulators could use their tariff determination and licensing powers to enforce the regulations relating to environment and energy efficiency. State Electricity Regulatory Commissions could be given powers to oversee ground water regulation. The respective roles of the Competition Commission, the Appellate Authorities and the respective sector Regulatory Commissions need clarification and preferably the Competition Commission might confine itself to mergers and acquisitions and take advice from the concerned Regulatory Commission 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 other areas like taxation.

Search, selection, appointment and training of regulators will be soon made the responsibility of a high-powered committee composed of Eminent Persons who will also examine and rule on accountability issues.

Regulators must have a formal arrangement whereby issues of common concern can be sorted out between them. A formula to assure a relationship between end electricity prices and of coal and gas that also recognizes the requirement of profits for attracting investment into the fuels must be agreed. New Regulators for Gas, Coal, 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.

Regulators must take special interest in supply and demand forecasting. Distribution companies will have 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 from Regulators to ensure that transfer pricing is fair to consumers. Regulators must also deal *suo moto* with issues that push up cost of projects (such as red tape, bureaucratic delays, padding of equipment costs, efficiencies, etc).

The electricity regulators have to find ways to improve the distribution, improve efficiencies in subsidy targeting and costs, reduce or eliminate subsidies to the non-poor and make the subsidy reach the really needy. This requires data on the poor and non-poor and a system to ensure that the non-poor are kept out of the subsidy mechanism. Cross-subsidies must be replaced by direct government funding.

Regulators will continue with cost-plus tariffs even in 2025. However this might be primarily for long-term contracts. There will be interdisciplinary research, training and educational institutes established with government support for Energy. Government Ministries and their responsibilities will be rationalized as some of their work is transferred to independent Regulators.

1. BACKGROUND

The governance of the country has a built-in coordination mechanism between the Centre and the States through the National Development Council, the Finance Commission, the negotiations of State governments with the Planning Commission on the size of their plans and central support to them, among others. Coordination between ministries in a government is through Cabinet meetings and by the Chief or Prime Ministers. Frequent meetings between Ministry departments take place to achieve coordination. However the coordination has been weak and in key areas it has been time-consuming and ineffective. A good example is that of Energy and within that, electricity (or power). The Central Electricity Authority (CEA) has since its creation ensured coordination between the Centre and the States in electricity on technical issues such as planning of generation and transmission facilities at the centre and the states and monitoring of project implementation. However on economic, commercial and managerial issues coordination has for long been erratic and inadequate until the introduction of the Accelerated Power Reforms and Development Programme (APRDP). By introducing a programme with substantial rewards and penalties in relation to an agreed memorandum with milestones for achievement, it has enabled substantial progress in some states though there are many who have yet to respond.

There are separate Ministries for many different types of power-atomic, non-conventional sources, thermal and hydroelectric, apart from oil and gas and for coal. Power is at present the only part of the energy sector in India to have independent regulatory mechanisms and separately for the Centre and the States (Power is a concurrent subject in the Indian Constitution). There is a Central Electricity Regulatory Commission-CERC, and there are individual State Commissions (SERCs), though smaller states and union territories are permitted to have joint Commissions. The CERC regulates the Central government owned sector and inter state issues; the SERC is responsible for matters within a state.

The Electricity Regulatory Commissions Act of 1998 did not provide for any coordination between the Central and State Commissions, a glaring omission, since the imperatives of a national interconnected grid demand it. However, the Electricity Act 2003 (Section 66) attempts to provide for some coordination between the Central and State Commissions through two institutional mechanisms. One is a coordination forum consisting of the Chairperson and Members of CERC, Chairman CEA, and representatives of generating companies and transmission licensees engaged in interstate transmission of electricity and the second, a Forum of regulators consisting of the chairpersons of the CERC and the SERCs. (This is in addition to the voluntary "Forum of Indian Regulators" formed in 1998 that consists of all present and former Regulators. This Forum presently includes only electricity regulators).

Another method that provides coordination and consistency in approach is that the Act gives the Central Commission the responsibility of laying down regulations and rules on specified matters. These are (Section 178): Grid Code; rates, charges and terms and conditions in respect of intervening transmission facilities; payment of transmission charges and a surcharge for providing non-discriminatory open access; reduction and elimination of surcharge and cross-subsidies; proportion of revenues from other business to be utilized for reducing transmission and wheeling charges; duties of electricity traders; standards of performance of licensee or class of licensees; details to be furnished by licensee or generating company for determining tariff in respect of generation, transmission and distribution. The Central Commission {61(a)} has also the power to specify principles and methodologies for the determination of the tariff applicable to generating companies and transmission licensees.

On the other hand, there is no statutory provision for coordination beyond electricity even with regard to the principal costs on fuels used in generating thermal power in India, viz., coal and gas. Usage for power generation is at present their single most important usage. However, these fuels are under other central Ministries. Power prices are regulated, with end prices to consumers being capped by the SERCs. Increases in fuel prices will not necessarily or immediately affect end consumer prices of power. The coal and gas companies concerned, (with final decision by their controlling Ministries), determine the prices of coal and gas. Coal is entirely government-owned and government largely owns gas. Price coordination between the Power Ministry and the others is poor and largely ineffective. For example it the power sector was to face (October 2004) 12-26% rise in gas prices with an additional rise in tariffs for transportation but could only appeal to the Cabinet. There is a developing shortage of coal that will adversely hit power generation that could have been avoided with better coordination. Similarly coal prices have risen without considering their impact on power generation costs. The Power Regulators have no opportunity to examine the coal shortage or the validity of coal or gas price increases.

Environmental clearances add substantially to power project costs for generation and transmission. Delays in clearances lead to time and cost overruns. There is little or no coordination between the different sectors. Nor is the Power Regulator required to enforce orders of environmental Regulators in government departments on matters such as pollution standards or fly ash utilization.

Similarly railway freight is an important cost element in coal prices and has been rising, thus affecting power costs. However the Power Regulator has no say on such freight increases. On the other hand, railways pay the highest costs for power as compared to other consumers. Railways have had the recourse of setting up their own captive power generation. The Power Regulator cannot also scrutinize the price of gas though it is an important element in power costs and tariffs.

There is a similar issue in hydropower when the project is linked to using water for irrigation. A share of the capital and running costs must rightly be charged to water and be reflected in the tariffs of its users. However this happens to a very limited extent and substantial unpaid amounts remain in the books of the irrigation department. If the full costs were not charged to power, hydro projects would not recover costs.

The present structure in the energy sector is of substantial government ownership, control and management. This is beginning to change and by 2025 a large private sector can be expected in each of the different energy types. Trading in energy has begun and markets will become important in coming years. Rural electrification is an important political issue and holds opportunities for investment and challenges for coordination and regulation.

However we need to be cautious in the sub-continent that is India, with a federal structure, of advocating or even approaching the concept of a Super Regulator for many different areas as is common the in the States in the USA. There are complex issues to be resolved in these early days of independent regulation without mixing

sectors that have little in common with each other. Perhaps when the system is set and the sectors are functioning efficiently and the Regulator's task is mainly to oversee the operation of markets we could consider integrating disparate regulatory bodies. This Paper advocates coordination and integration only between closely related sectors.

It is the judiciary that on the whole appears to have welcomed the creation of the electricity regulatory and other commissions. The hitch over the Competition commission appears to be more due to its replacing the MRTPC that was always headed by a retired Supreme Court Judge and with creation of the competition commission was to be headed by a civil servant. It is the judiciary that has through pronouncements on appeals against Orders of the electricity regulatory commissions actually developed a set of principles that could be the beginning of regulatory law in electricity. Some SERC's have been contrary and have been inconsistent in their Orders, especially between each other, delaying the use of the findings of one SERC as precedent in a hearing before another. As of today the regulatory process through independent commissions has integrated well with the judiciary. Problems might arise when the appellate authority for electricity begins to function. It has been the experience that SEBI has seen many Orders overturned by the appellate authority while the telecom appellate authority has yet to come to grips with its work.

2. GOVERNANCE IN ENERGY SECTOR

Government decision-making on energy at the Central level is distributed between the Ministry of Petroleum and Natural Gas, the Ministry of Coal, the Ministry of Non-Conventional Energy Sources, the Ministry of Environment and Forests, the Ministry of Atomic Energy, and the Ministry of Power. Within the Ministry of Power, the Central Electricity Authority (CEA, the technical wing) works closely with individual state electricity boards (SEBs) and utilities in power generation, transmission, and distribution of electricity. At the state level, there exist various departments, agencies and authorities working on various sub-sectors of energy. The Ministry of Panchayati Raj dealing with rural authorities, does not have any role in rural electrification. The responsibility for comprehensive rural electrification (including quality of power and collection) is scattered between different Ministries in an uncoordinated fashion.

2.a Weakness in present coordination for energy sector

The close protection of their turf by each Ministry makes for ineffective coordination. In addition it is now reported that the Planning Commission will perform a coordinating role for infrastructure.

2.b Present status of regulation in coal sector

The Coal Ministry regulates coal. Nearly 70% of electricity capacity in India is based on coal and nearly 75% of coal consumed is for power generation. Supply, price and quality are decisions of the government owned companies with the final approval by the concerned Ministry. No action has been taken for appointing a Coal Regulator for regulating tariffs, quality, licensing captive mines and allocating supplies.

The Coal Mines (Nationalisation) Amendment Bill 2000 (not discussed by Parliament even up to October 2004) explains that in view of the anticipated "huge gap between demand and supply of coal by the end of the 10th Plan which cannot be bridged by the nationalized coal companies and the captive mining companies"....it is necessary to allow the private sector to participate for non-captive purposes. In the discussions on the Bill it has been suggested that there is a definite need to review the pricing mechanism for coal and for this purpose an independent body must regulate the price. The principal user, the electricity thermal generating sector, has no forum to participate in the decisions on prices, quality and even supply.

The coal industry claims that coal at the pithead is the cheapest fuel option but that it becomes very costly by the time it reaches the user at a distance because of high rail freight, royalty payments and taxes. However there is no transparency in setting rail

freights. The Railways Ministry refuses to consider setting up an independent Railway Tariffs Regulatory Authority.

2.c Present status of regulation in oil and gas sector

A second draft of the Bill to create an Oil & Gas Regulator is ready (September 2004). The Bill provides that the appointment of the Regulator will be entirely left to the government. At the same time the Regulator is barred from government or commercial employment for two years after he ceases to be a Regulator. This provision will deter qualified candidates from applying since they cannot use their expertise for two years after completing the regulatory assignment.

The Bill concentrates on transportation and marketing but does not give tariff-setting powers to the oil and gas Regulator. It gives the Regulator the powers to license the marketing of notified petroleum and gas products, establishing & operating LNG terminals, to lay, build, operate and expand as common carrier, declare designated pipelines as common carrier, regulate access & transportation rates to the common carrier. Funding is to be independent and not part of the government budget, a useful provision that will help assure independence of the Regulator from government.

For notified products the Regulator is to ensure adequate availability, ensure price information at retail level, prevent profiteering, secure equitable distribution and maintain an information data bank. Government can give directives to the Regulator and is required to consult the Regulator before doing so, but only 'where possible'.

The Regulatory Board can use the CBI for conducting investigations, a useful provision not in the legislation for other independent regulatory bodies. Its powers to impose civil penalties are substantial. The Chairman of the Regulatory Board is to be selected by a Search Committee composed only of Secretaries to government and government is to decide on termination of the Regulators, a sure way from past experience in electricity to pack the Board with retiring government servants.

2.d Regulation and coordination amongst energy transporting Ministries

The energy sector is heavily dependent on railways (for transportation of coal), sea freight (for oil and gas) and the Finance Ministries of central and state governments for more uniform and reasonable rates of taxation. The Railways Ministry is opposed to independent Regulators determining rail tariffs. Sea freight (affecting costs of imported coal, oil and gas) is determined by market forces and fluctuates widely due to rising demand from China and India. In recent years the central government has been more amenable to accept the pleas of the energy Ministries in fixing tax rates on these products. This is not so with state governments.

2.e Coordination required in determining taxation in energy sector

There is no accurate estimation of the impact of taxation at different stages on the various elements in the energy sectors. Some uniformity in taxation and assessment of their impacts to minimize differentials between various states and attempting harmonization rates of sales tax between the states is required. Naphtha and gas if declared as "Declared Goods" would be subject to only the CST rate of maximum 4% rather than 22%. Electricity must be treated as zero-rated goods so that all taxes paid up to that point could be claimed back. There are many issues and anomalies in energy sector taxation. While no appointed but not elected independent energy regulators can be given taxation powers, government should ask for their advice on these issues.

2.f Concurrent powers on electricity under the Constitution

Being a concurrent subject under the Constitution the States share powers with the Centre only on power, not on other energy sources. However they do share powers on environmental regulation. This distribution of powers makes for difficult coordination between the different energy sources over the country and their environmental impact between States.

The Centre can legislate on electricity and the central legislation shall prevail over that of the State. The Electricity Act 2003 has legislated (but in tangential ways) on matters within state jurisdiction. For example,

- By the flexible definition of 'captive generation' that in effect bypasses the veto power of state governments on third party sales and purchases of electricity;
- Rules would be laid down at the central level that would be followed by state regulatory commissions,
- The creation of a national forum of Chairmen of Regulatory Commissions of which the Chairman would be the Chairman of CERC,
- Determination of surcharge for open access on principles laid down by CERC.

Central laws on a concurrent subject over ride a State law. In coalition governments state level political parties have significant influence and it is unlikely that any central government will override the state legislation. Since the Electricity Act 2003 gives some coordinating powers over Power to the CERC, CERC must exercise these powers comprehensively to avoid conflicts and inconsistencies over the country.

3. PRESENT STATUS AND FUTURE PROJECTIONS IN ENERGY SECTOR

The following Table tries to envisage the situation in the power and related sectors by 2025 as against the position today. It expects a fair amount of reorganization by the government. What are presently scattered between different Ministries of government- coal, oil, gas, power- are likely to be brought together in such a way that policy coordination actually takes place.

Table 1 Stages in energy development

	Present	2025
Fuels ³	Thermal-77% Coal- 61% Nuclear-2% Oil and Gas-12% Renewable other than biomass- 0.7% Biomass- 0.5% Hydro-23%	Thermal-84% Coal-55% Nuclear-5% Oil & Gas-18% Renewable other than biomass- 3% Biomass- 3% Hydro- 16%
Capacity generation	Peak Shortages	Reduced Peak shortages
Transmission	Large gaps	Very few gaps
Distribution	Proportion of Low to High voltage lines in 2002-03=2.05:1 and including 33kv=1.8:1 (Source: CEA)	Target for Low to High voltage lines =1:1
Metering	Agriculture un-metered	Agriculture metering fully at 11 kv level and of the better-off.
	Urban: low	Urban: fully metered
	Non functioning	Fully functioning
	Poor Quality	Electronic, tamper proof, reliable and long lasting.
Universal Service Obligation	About 44% of rural households are connected Rural supply for an average of 6 hrs a day	Almost 100% of rural households are connected Rural power supply quality better
Quality	Frequency variation Voltage: considerable variation Inadequate capacitors	Frequency fully stabilized Rare voltage variations Full VAR load
Power company culture	No enterprise orientation No commercial attitudes	Enterprise oriented Commercial attitudes inculcated through training and private participation.
Subsidies	Heavy subsidies. Amount not controlled. Cross Subsidies exist. No caps on subsidies. Erratic reimbursement to service provider who has paid for subsidy.	Subsidies capped and budgeted. Cross-subsidies are eliminated. Cess imposed to cover subsidy costs. Reimbursement in advance by State.
Tariffs	Good customers (large, timely payers of bills) pay higher tariffs. Also bulk users. Those who cost highest to serve pay lower tariffs.	Bulk user discounts. Subsidy related to cost to serve.
Competition, trading, markets	Limited to competition for Unscheduled Interchange (UI) power under ABT.	• Long-term contracts do not exceed 10 years.

³ IEEJ (2001)

	Present	2025
	All else under long term contracts/allocations.	<ul style="list-style-type: none"> • Long term Contracts decided on competitive bids, • And subject to Regulatory approval. • Spot tariffs decided between buyers and sellers with no regulatory oversight except of market processes. • No allocation of power by governments. • Buyer owns the contracted power and is free to sell it. • Consumer tariffs are market determined. • Exchanges to act as neutral clearing houses also.

The following Table assesses the energy situation in 2100 somewhat differently. (From a Draft paper by Nair (2003))

Table 2: Scenario of Indian power sector in 2100 vis a vis in 1995

	1995	2100
Power generation capacity (India)	96 GW	912 GW
Share of coal in total generation	60%	50% (Remains mainstay of power generation)
Share of oil and gas in total generation	12%	25%
Gas based capacity		235 GW
Hydro power capacity		63 GW
Share of hydro in total generation	22%	7%
Renewable energy technologies (small hydropower, wind, cogeneration and biomass technologies, solar and geothermal) other than biomass's share	0.7%	6%
Biomass share		4%
Nuclear share	2%	7%
Power availability	Inadequate/unmet demand of power presently	Will be much better
Rural electrification	Not adequate/more at the planning stage	Will be much better if Panchayats are helped to build capacity to take responsibility for distribution of distributed generation, many times also connected to the national Grid.
Transmission of power	Constrained	Constraints would have gone
Power distribution		Improved with some gaps in metering and collection in urban India
Trading and markets for spot power		Would have expanded
Terms of contracts	25-30 years	More likely for 8-10 years with more market-determined tariffs and the Regulator's role will be to manage the markets, trading and ensure adequate capacities at all levels.

(Notes: There will be substantial increase in the gas-based capacity to about 235GW in 2100 due to relatively low investment costs of gas technologies as compared to coal, high operating efficiencies and suitability for meeting peak load).

Both scenarios are hopeful of significant improvement but the second expects much higher shares for oil an gas, nuclear and renewables in the total generation.

4. ENERGY INDUSTRY STRUCTURE IN INDIA

India must adopt measures that improve the efficient utilization of energy resources. Such efficient management of resources must go hand in hand with better coordination between various Government Ministries and Departments at the Central and State levels to enhance the security of energy supplies, but also to mitigate environmental impacts and reduce their cost of delivery.

4.a Coal

Coal is entirely controlled by the central government owned companies. Compared to international experience productivity is poor, with excessive staffing and costs, poor safety standards, unreliable quality and security in terms of guaranteed delivery of ordered and paid-for quantities.

Imports of Coal are uneconomic except for generation plants located near the coast and distant from the coalmines. The domestic coal industry is not making serious efforts to reduce the demand-supply gap through increased supply. Mine development plan of the CIL is not in line with the expansion plans of various stakeholders like power and steel plants. Coal prices are not determined in relation to electricity (its largest user) whose prices are strictly regulated. There is no attempt to expand production through fresh entry by private investors.

4.b Oil and Gas

Prior to September 1997 the Government of India notified annual price rises of about 4%. Since then the price has been linked to a basket of fuel oils with a floor price of Rs.2150/ per 1000 SCM and a ceiling price of Rs.2850/ per 1000 SCM. The gas prices of the private sector are not yet subject to the same limits as the public sector. GAIL charges for transportation are opaquely determined. There is need to bring a level playing field to gas prices.

Government and perhaps the Regulator who is given the brief must decide whether

- Gas prices should be left to 'market' forces,
- Linked to fuel oil prices,
- Or even to domestic coal prices,
- Whether they could they be determined on cost plus basis with an adequate guaranteed return,
- Be on the same basis for private and public producers and suppliers,

- Whether LNG must be treated differently for tariffs because of relatively high costs.

The industry structure is changing rapidly. Will the developing vertically integrated structure benefit or harm the consumer? Can a regulatory framework be created that can ensure that benefits to consumers are maximized and there is no abuse of market power? .

Questions that have been resolved or are under examination for electricity are also relevant for gas.

- Should generation, transmission and distribution be under the same control,
- Whether any of these entities should engage in trading,
- Should there be mandatory open access to transmission and distribution lines,
- How should transmission tariffs as well as other tariffs be determined.
- Who will decide on these issues and how transparent and consultative will be the process.

These are questions that must be resolved also in the case of gas. These questions make a strong case for independent regulation of oil and gas for power and ideally, to be under a common energy regulator.

4.c Electricity

Agriculture has shown the fastest growth in consumption. The 2001 Census reports that only 44% of rural households have electricity. The Electricity Act 2003 tries to stimulate captive generation capacity further and allow it to be sold for use by a wider network of users than merely the generating companies. The regulator has to make fuller use of this captive generation capacity. The regulator can also improve availability by encouraging renovation and modernization, improved efficiency through better plant load factors and demand side management. Energy conservation could also add to

available electricity. The ERC's will have to work closely with the newly created regulator for energy conservation, the Bureau for Energy Efficiency.

Unbundling of the state electricity sectors has been accomplished in many States but in effect, the sector continues to operate as before, as a department of government. States that have divided distribution into regional companies like Karnataka has done have in practice run them as before. In Karnataka for example, there is a common Managing Director for all the distribution companies. Privatization of distribution has been done so far only in Orissa and Delhi. Performance in Orissa shows little improvement while there is significant improvement of supply and quality in Delhi.

Power Grid owns the interstate transmission system today and operates it. In the States, the SEB State load despatch centres continue to be with the state undertaking or the government owned Transmission Company, or TRANSCO own the transmission and distribution system and operate it. The SEB also owns generation plants and where there are other generating companies besides, there is a clear conflict of interest. Private investment in transmission has been allowed since 1998 but none has taken place except a joint venture to bring power from Bhutan to India between Power Grid and TATA Power.

Load Despatch Centres are responsible for the integrated operation of the power system within their designated areas for optimum scheduling and despatch of electricity. The central and state transmission utilities are within their areas responsible for smooth flow of electricity from generating stations to load centres and provide non-discriminatory open access to its transmission system. SEB/TRANSCO (for SLDC's) and Power Grid (for RLDC's) today are the state and central transmission utilities respectively and also control load despatch at State, Regional and national levels. Thus load despatch centres continue to be with state undertakings or the government owned Transmission Companies. In the States, SEB's also have generating plants and in States where there are private generators as well, there is a conflict of interest when the SEB controls load despatch. Further, the Electricity Act 2003 allows the establishment of more than one distribution line within the same area. When there are other generating, transmitting and/or distributing entities, it is felt that load despatch should be a separate function. Many countries have however left it with the transmission operator, but as in the United Kingdom, he is the sole transmission licensee. At the minimum the load despatch and transmission system operation functions should not be with a generator.

The CERC had questioned the lack of transparency by Power Grid in 1999 and has done so again in 2004. The operation of the transmission system must be the responsibility of an independent and preferably not-for-profit cooperative of all stakeholders.

ERCs must make load despatch in the States independent from the transmission operator so that it becomes a truly a neutral function. This could also be an issue in the case of gas.

GAIL has so far had a monopoly in the erection and running of pipelines. It is likely that government will allow private investment and operation in pipelines. There are regulatory issues in relation to licensing, open access, tariffs, etc. Separation of ownership at the different stages also has to be considered to enable more transparent disclosure and regulation.

5. ENERGY INDUSTRY STRUCTURE IN OTHER COUNTRIES

Ownership structures in the energy sector in various countries¹ in electricity and gas, both among the highly developed ones and among others, show a large element of state ownership in electricity and gas. Ownership of electricity is in many countries with the State. This is also the case but to a lesser extent, in Gas. But private (or State) ownership is not the essential precondition for efficient and consumer friendly electricity systems. Good management is. The Regulators in India might usefully look to improving management of the state owned electricity and other fuel systems while optimizing the interests of consumers.

Relevance of Role of OFGEM in U.K.

The U.K. has the longest experience in a large developed economy of combining the regulation of electricity with gas after many years when they were regulated separately. OFGEM operates under the direction and governance of the Gas and Electricity Markets Authority, which makes all major decisions and sets policy priorities for OFGEM. The role of OFGEM is to monitor the companies to ensure that they meet their license conditions. In the case of the Distribution Network Operators ('DNOs'), OFGEM has instituted a system of penalizing them if they do not achieve specific standards of reliability. Thus OFGEM attempts to mitigate the risks that affect security of supply. These could be short or long term risks.

In mitigating risks OFGEM's role includes:

- Maintaining policy framework
- Enabling Competitive markets
- Relying on market mechanisms
- Reducing regulatory uncertainty
- Continuity of policy and governance
- Transparency and due process
- Keeping the commitment of OFGEM and Government to non-intervention
- Active market monitoring and information provision
- Promote liberalization of European markets

For our Regulators, OFGEM experience and that of its predecessors suggests that

- Competitive markets by themselves may not be the best way to deliver security of supply.
- The independent regulator has to be well informed, watchful and have comprehensive rules in place that are carefully monitored for compliance so that the markets function in a fair manner.
- The new trading rules in the U.K. enabled markets to deliver the desired results in the short term.
- The nature of markets is that they function on a "just-in-time" basis. This can at times create sudden rises and falls in prices. The Regulator has to watch capacities, efficiencies, supplies, contracts and trades to ensure that they follow the rules. However OFGEM (and the government) is committed strongly to non-intervention except when matters are getting out of hand.

6. FUTURE VIABILITY OF ELECTRICITY IN INDIA

An estimated 44% of the population in India is actually connected today and able to use electricity. The availability of electricity to rural areas is believed to be for around

¹ Philip Grey in "Comparative Electricity Regulation", World Bank, 1996 and Carlos Ocana in "Trends in the management of regulation: a comparison of energy regulators in member countries of the OECD", International Journal of Regulation & Governance, TERI, Delhi, 2003

six hours a day (though there are very wide geographical, seasonal and temporal variations). There is considerable waste because of the inefficiency of poorly designed and fabricated farm equipment. The ratio of high to low voltage lines is much lower than it should be, causing high voltage fluctuations and transformer burnouts. The farmer is very dependent on ground water in dry land areas. Electricity is the important source of power for pumping water. There is little regulation of ground water. It is necessary to have a uniform policy within the same water basins so that the ground water is pumped in relation to the availability of water. Today the small and marginal farmer with shallow wells suffers from the excessive pumping by deeper bore wells by the better off farmers.

Regulation of ground water is a major issue. Perhaps the SERC could lay down the rules and there might be an enforcing authority.

Significant portions of domestic urban and rural consumers who are connected are unable to pay full costs to serve. As the numbers that are connected rise with economic growth and the commercialization of presently non-commercial energy in the future, there will remain substantial numbers who are unable to pay. They will demand and receive state support. There is also the question of equitable costs for water in irrigated areas versus ground water. The tariff for electricity in dry land areas may need to be estimated on an equivalent basis to the cost of water in irrigated areas. This might be the basis for subsidy calculations.

The ratio of low to high voltage lines can be improved, as can metering and the quality of equipment, but subsidies will not disappear. Regulators must focus on improving this infrastructure of connectivity, metering and equipment quality. They must also make serious effort to identify those who should be supported and do so in a limited way.

Given the condition of state government finances it is questionable whether state governments will be able to bear costs of subsidies from their budgets. Figures of subsidies and cross-subsidies on power are available for some states. They are given below:

Andhra Pradesh

Year	Subsidy approved by the Govt. (Rs. Million)
2000-01	16260
2001-02	15610
2002-03	15090
2003-04	15130

Cross Subsidy (Rs./unit): Andhra Pradesh

Year	Cross subsidy/subsidizing unit (Rs./unit)
2001-2002	2.09
2002-2003	2.07
2003-2004	1.80

The subsidies approved for payment by Andhra government have remained about the same over four years but there has been a decline in the cross-subsidies. The burden on the sector of selling below cost to some sections has come down.

Karnataka

The amount of subsidy granted by the government over the last few years is tabulated as below:

Government approved subsidy: Karnataka

Year	Subsidy released by the Govt. (in Rs. Million)
1999-00	7689.1
2000-01	12464.2
2001-02	18720.0
2002-03	15340*

*As per communication by the Government to the Commission. In addition to this amount, the balance of subsidy due from the Government to KPTCL as on 31-3-2002 is Rs.16328.6 Million.

As far as reduction in cross subsidy is concerned, except for BJ/KJ and IP sets, all the categories are paying at least the average cost of supply (that is the total cost divided by total supply and not differentiating between lower costs to large customers and higher costs to small or distant ones). Of these categories, there are however, some categories, mainly commercial and industrial, which are paying higher than the average cost of supply and therefore continue to subsidize other categories.

Haryana

Cross Subsidy: Haryana (in Rs.Million)

Year	Cross subsidy	
	Domestic	Agriculture
2001-02	1425.7	1520.2
2002-03	1546.4	2092.5

Haryana shows a growth in cross-subsidies.

The challenge for the State Regulators is to identify the base level of subsidies and cross-subsidies, accurately estimate the cost of providing them to those who are targeted for them, insist on the State meeting its obligations to reimburse the subsidy paid out by the operator, find ways to limit the subsidy to the desired beneficiaries, and determine the surcharge on open access that must be applied towards the cross subsidy cost (as allowed under the Act). The regulator must decide what proportion of the cross-subsidy the surcharge should meet.

In case of LPG and Kerosene, studies need to be carried out on increasing the consumption of LPG and kerosene by poor households in urban and rural areas to enable them derive environmental and health benefits associated with using these commercial energy forms. The purpose should be to:

- Assess alternative subsidy schemes for LPG and kerosene according to pre-defined criteria
- Provide a strong analytical basis for policy decisions to harmonize the fiscal and social objectives of petroleum sector pricing policies.

The same issues as for electricity apply for these products as well.

In power sector, TERI conducted a study on the cost of un-served electricity energy in 2001 for the World Bank. The study highlighted a range of estimates for two states (Karnataka and Haryana) in the two major sectors of agriculture and industry. These studies developed methods that help in assessing the willingness to pay for electricity by these two consumer categories. Similar studies might be undertaken by the concerned ERC's in their states so that they know what the market can bear.

Another study by V. Santa Kumar of CDS Trivandrum shows that electricity subsidies to the poor and agriculture constitute around 5 to 8% of the revenue of SEBs. However,

he concludes that they are not the major reason for the losses of SEBs. The main findings of Dr Santa Kumar are:

- i) The non-poor receive a disproportionately higher amount of electricity subsidy in different Indian states. It is more acute in states that are ahead in economic and social development. Thus, he estimates that about 95% of the subsidy goes to the non-poor in Kerala, Punjab and Delhi.
- ii) Some states have reduced subsidy to each class and also made the distribution of the subsidy more progressive, that is, improved the share of the poor. These states are Rajasthan, urban areas of Gujarat, Andhra, Orissa and Punjab.
- iii) But the distribution of subsidy in rural areas in these States (except Rajasthan) is not improving in progressiveness.
- iv) The average subsidy has neither increased nor reduced in U.P., Bihar and West Bengal.
- v) The subsidy has not been rationalized, though reduced in Kerala, Karnataka and Tamil Nadu.
- vi) The average size of landholding increases consistently as we move up the expenditure classes, from lowest to highest. The distribution of power at highly subsidized rates or free of charge to agriculture means that a greater part of the subsidy goes to the non-poor.

The electricity regulators have to find ways to improve the distribution, reduce the cost of subsidy, reduce or eliminate subsidy to the non-poor and make the subsidy reach the really needy. This requires data on the poor and non-poor and a system (meters or local observers) to ensure that the non-poor are kept out of the subsidy mechanism. The Electricity Act does not impose restrictions on the powers of the ERCs to rationalize subsidies in this way. But Regulators have yet to enter this area for decisions.

However, it might be possible to have a multiple price mechanism so that long-term prices are kept in check while spot (or opportunistic seasonal or time-of-day) purchases are kept relatively free. Regulators have to develop information systems and methods to achieve this.

It is possible to visualize that the sector could become economically viable. Institutions, organization structures, systems, technology, mindsets, information and data availability, efficiencies, fiscal responsibility at all levels of government and the community, are some areas which must change if the viability of the sector is to improve. Some changes have begun. Others like changes in mindsets or attitudes to fiscal responsibility in state governments and the community have yet to develop. Ownership would not be a problem if governments that own electricity enterprises were able to give autonomy to managements and support for metering and collection of bills. Since that is yet to happen in any State, moving out of state ownership with incentives to private owners who improve the system seems to be the direction that distribution reforms will take in the coming years. The model will be that of Delhi.

The other issue is the supply of power to the rural communities. The Electricity Act 2003 provides new opportunities for rural generators. Distributed power is also a possibility. The State will have to provide from its funds for subsidies on power tariffs and for this purpose must use local authorities to take charge of the distribution and to ensure that cheap power reaches those for whom it is meant. Some thinking in this direction has begun and hopefully, policies will get developed and implemented during the life of the current government (2005).

It is conceivable that within the next three years, many state governments would have taken irreversible steps towards privatization, rural supplies, holistic policies in agriculture that relate power costs to cropping patterns and water use, structural changes in electricity organizations and the quality of the staff and improved efficiencies.

By 2015 we must expect that transmission constraints would have substantially reduced, trading would account for a substantial part of electricity sales as compared to the present, and urban distribution would have become much more remunerative. The sector would have become viable in most states.

7. DATA AVAILABILITY AND DEMAND FORECASTS

Forecasting of electricity demand has been notoriously faulty for many years. CEA's estimates of captive generation capacity in different sectors (industry and commercial establishments) are not based on universal reporting and do not also include the generation capacity of the thousands of small generators in shops, homes and offices.

There is no estimate of the immense damage to equipment with rotating parts due to the wide frequency variations (now brought down with the introduction of the ABT-availability based tariff-by the CERC). Nor do we have any reasonably accurate estimate of the damage due to equipment due to voltage fluctuations. We have no regular monitoring and reporting of blackouts and load shedding and the value of production lost as a result. We do not have a good idea of the extent of electricity consumed by farmers, households and others. We do not know what it costs to serve each group of customers. We have no precise data on the extent of transmission and distribution losses due to technical reasons and non-technical (meaning mostly theft) reasons. We are unable to break down these losses by causes. Data considered essential for good management in any other sphere of industrial or other activity in which investments are made, is almost entirely absent in the electricity sector. Management accounting has yet to enter most state government owned electricity undertakings. SERC's must get involved in improving information for control and management.

SEB accounts are notoriously out of date and faulty. Most electricity undertakings do not know what assets they have, when they were bought, at what price and what is their current state and value. In almost all state owned electricity undertakings there is no funding of provident fund dues, a liability estimated to be in excess of Rs.400000 million. SERC's must push for improving this information.

Demand forecasting techniques in use today are not dynamic but are static. They do not develop alternate demand scenarios for different prices to the different consumer segments or supply changes due to improvements in efficiency of use. Without good demand forecasts investment decisions could go wrong.

The Central Electricity Authority (CEA) estimates the generation and transmission requirements for future years. The central (or State) transmission utilities convert the estimates into projects that are approved by the CEA. These projects could include plans of the private investor. Power Grid Corporation is the national operator of interstate transmission (and State government owned transmission companies, for the States).

With the change in law in 2003 ERC's there will have to be a decision on whether a single corporate entity at the Centre and one in each State (the transmission utility) will decide for inter state and intra state transmission investments. The national transmission plan is inadequate since it is constraint driven and does not plan for adequate surplus transmission capacity, presumably the reason why parallel capacities are now allowed under the Electricity Act 2003. While the broad determination of future transmission requirements is necessary as done by the CEA, and in consultation with all operators, the role of a single transmission utility at the centre and in each State might be reexamined.

In summary the shortcomings of power forecasts are:

- A survey is carried out once in five years and is not verified more often within the period.

- Equipment efficiency improvements are not taken into account.
- The estimates from the survey should be for alternate scenarios developed by the forecaster.
- Elasticities of demand should be considered (as tariffs go up and thefts are controlled what will happen to the demand that was there at lower prices or given free). These are not presently taken into account.

Electricity regulatory commissions must play a key role in data collection and forecasting. SERCs must initiate work to estimate demand and supply, plan transmission requirements, regularly estimate T & D losses and their reasons, estimated elasticities of demand, establish the costs to serve different consumer segments, impose standard financial and management accounting practices on the sector as well as demand reliable and timely data. They have not done so till now, indicating the lack of a commercial mindset and an enterprise culture in the state owned undertakings as well as in the regulatory commissions.

ERCs must lay down the other information requirements for ABT. The responsibility for data submission must be laid down on designated individuals in the different organizations. Failure to submit timely and reasonably accurate data must be penalized. The operators who fail to submit data when called upon to do so and when the data are faulty must also suffer consequences for the failure.

The position in the coal and gas sectors is also unfortunate, though not always for lack of data as much as because it is not made available. Thus coal demand forecasts have been notoriously faulty and have become a reason for the rising tariffs and shortages of coal.

Adequate, timely, reasonably accurate data are essential if these issues are to be decided and regulated satisfactorily. Regulation would be more effective if the data is processed and decisions taken for all these related sectors by one Regulator. State regulators and even CERC have been unable to improve the quality and availability of information especially from government owned utilities. Regulators must be more proactive in this area.

8. COMPETITION MODELS AND MARKETS

Energy Regulators are enjoined to promote competition, specifically in the 1998 Act and by implication in the 2003 Act.

8.a Possible competition scenario

The following is a description of a possible scenario for electricity as we move to competitive markets:

- 1) What is the market model? This will require answers to a number of questions. The first is whether there will be and if so what will be the duration of contracts. Will they be based on competitive bidding or on formal power purchase agreements? Second, will there be power pools, will they be state wide, regional or national, what will be the nature of transactions in the pool (spot, firm/infirm, etc), and what will be the role of power exchanges in relation to the pools? Third is the nature of incentives for new generation capacity; will there be capacity payments, what will be the determinants of market price and the nature and extent of regulatory intervention in these matters. Fourth, who will do transmission (congestion) planning and despatch, state or market, regulator or the central transmission utility and others operating the Grid? Finally, what is to be the extent of regulatory intervention? The ideal way would be for the Regulator to determine answers to all these questions in transparent consultation. There will have to be a developing scenario as the context changes from all power sold on long-term contracts to one where there is trading and more reliance on and spot markets.

- 2) The global experience with mandatory and optional pools and the relatively tight supply situation for the foreseeable future in India suggest that optional pools will be more suitable. In the former, all generators are required to sell to and all suppliers of electricity are required to buy from the same market. The optional pool allows bilateral agreements between generators and suppliers and enables new capacity creation to have the certainty from bilateral contracts. However, Regulators might have to insist that all buyers and sellers participate in the pool at least to a minimum extent in order to make the pool effective. Regulators must also ask for all contracts to be initially cleared with them. After some experience they could be merely filed, with them.

8.b Power exchange

A power exchange becomes necessary when there is a day ahead spot market for every hour slot for the next day since it enables a financials market to develop which can allow hedging through trading in futures and options. This may well be necessary after ten years or so when the supply and transmission situation has improved.

8.c Role of the regulator

In a power trading and Power Exchange scenario the role of the regulator would be primarily to ensure fair competition. Thus the SERC will ensure that in the absence of competitive bidding, proper norms are followed. The SERC must also be involved in the planning stage to ensure that adequate generation capacity has been bid for. In the case of purchases through a Pool or Exchange, the Regulator must ensure there is no rigging of the power exchange and that competition is fair and free so that small players are not at any disadvantage.

8.d Competition in generation

Competition gives consumers the opportunity to choose between suppliers, compels competitors to improve efficiency and may bring down prices. Price is the signal that helps to balance demand and supply and stimulate new capacity creation. If price is not freely determined in response to supply and demand, distortions are likely in the structures of production, consumption and markets. Competition requires multiple suppliers and many consumers. If only one supplier provides a product or service, whether because of government sanctioned monopoly or for reasons of 'natural monopoly', there can be no competition. Similarly, if there were to be only one buyer, he would be able to dominate the suppliers for supply and on price. What the experience of independent regulation suggests is that transparent and consultative regulation could to some extent simulate the effects of competition and prevents or minimizes the ill effects of monopoly.

Carriage in infrastructure services is usually a natural monopoly-whether railway lines, roads, ports, airports, telephone lines or electricity transmission and distribution lines. The Electricity Act 2003 provides for parallel electricity wires. While investors would be careful in laying them they would do so if their business model showed a profit opportunity. The opportunity for competition in electricity is greater between generators and between suppliers; and not as much for transmission and distribution wires.

Enabling competition or regulating monopoly to simulate the effects of competition requires appropriate legislation and the creation of the necessary institutional framework and procedures. This includes the imposition of obligations and duties on generating, transmission, distribution and supply companies, establishing national and regional coordination of the operation of the wires, establishing independent load despatch centres, mechanisms for licensing various monopolistic or quasi monopolistic activities and truly independent regulatory bodies staffed with qualified people.

Clearly, an essential requirement for competition is that goods and services can move freely from any supplier to any customer. In a service like electricity this requires open access to the transmission and distribution networks and no restrictions on who to sell to or buy from. While the Act provides for open access there is no time limit and there

is a surcharge for the facility that may limit its use. The immediate opportunity might be open access for 'bulk' users. .

What are the pre-requisites for competition and consumer choice in generation of electricity? Apart from open access, separation of carriage from content, independent system operator, regulated wheeling charges, trading arrangements, settlement mechanism, efficient transmission arrangements, time of day metering, regulatory capacity, the following must be added:

There must be adequate transmission and distribution capacity with some redundant capacity. There must be adequate generation capacity and additional reserve capacity to meet sudden peak demands, though implementing open access to bulk users does not require this as a pre-condition. Open access for bulk users can be introduced even in conditions of shortage. There must be good market information with generators and customers about demand, supply, prices, etc. There must be no restrictions except contractual ones on suppliers and customers to move their business to others. Prices must be determined by markets and not imposed by governments.

Distribution privatization will take long in India because of accumulated losses and substantial unfunded provident fund dues, 'free' or subsidized power, thefts and other inefficiencies, over staffing that is difficult to reduce, and ideological objections. Privatization will not resolve these issues speedily. If mindsets in distribution companies can be changed from administrative to enterprise orientation, we might be able to bring about improvements in the existing setup. Governments are not conscious of the need to bring about this change by distancing government from enterprises. Improvement demands this since privatization of distribution is unlikely to occur to any significant extent.

Competition or competitive results could apply to all types of contracts. Long-term contracts will obviously constitute the dominant part of all electricity that is generated and sold. Base load demand is certain and must be provided for in advance. But it can be contracted for in competition. Once contracted for, the buyer has to pay for it. He, therefore, owns it and must be free to use it or sell it wherever he can for the best price he can get. The profits or losses on such transactions must belong to the seller who has contracted earlier for the power and need not be shared with the original supplier.

The price at which the unused surplus is sold will in any case be subject to the prices permitted by the Regulator in the State into which the electricity is sold. If a central generator has surplus power he must also be free to sell it but since the prices at which he can sell are already determined by the CERC that is the price at which he can sell such surplus as well.

The present central government allocation of 15% of the power generated by central undertakings must be returned to the central undertaking for trading purposes. Competition will most influence spot sales. ABT sales and purchases are examples of spot transactions taking advantage of an imminent opportunity. In the case of ABT transactions the price is pre-fixed. In other cases, the price will be limited by what the Regulator in the State of purchase will allow. There needs to be no other limit placed on spot prices. Perhaps the prospective buyers could take advance permission from their Regulators for such opportunity purchases and the Regulator can place limits on the quantity so purchased.

Regulators must use a well-defined mechanism to estimate the surcharge for open access. Estimating the extent of cross-subsidy, laying down a time-frame for their gradual elimination with targets for each year, deciding how much of the cross-subsidy should be recovered by the surcharge (the rest going into tariffs), with perhaps a cap being placed on the maximum percentage surcharge that might be charged are some steps for Regulators to take.

Matching of the term of PPA's with the term of the financing arrangement will help limit the PPA to less than the present 25 to 30 years. There is also merit in requiring that all capacity must not be committed under PPA's. A proportion must be sold in the open market and a quantity out of that to bulk suppliers. The idea of 'merchant plants' in case of PPA's of five years or less is to be commended though their freedom to sell must be ensured.

CERC needs to set out its views with a time frame for the development of electricity markets and a power exchange. The proliferation of such exchanges in recent months (2004) also merits pruning by CERC. Clearly competition in generation is likely to come about in stages. These stages must be identified (one example relates to open access for which a suggestion is made earlier in this paper) in relation to the parameters discussed earlier and when the necessary events, policies or institutions will be in place.

8.e Vertically integrated companies are developing in electricity as well as in oil and gas

These companies get the fuel (coal or gas or oil) from their own mines or fields, transport them, generate power and transmit, distribute and supply it to their consumers or sell it through their retail outlets in the case of oil. This is an optimizing business model providing each segment is run efficiently and the benefits of efficiency are available to the consumer in improved quality, service and price. This is very likely to happen in the electricity regime that will emerge as the Electricity Act 2003 and other reforms begin to develop a new framework.

For example in Delhi and Mumbai we already have Reliance Energy and Tata and in Mumbai, Tata, Reliance Energy and BEST as operators of distribution circles. But it is open to each to take customers from the other areas. They can procure power from any source. They can set up their own wires for transmission and distribution. They can ask for open access on wires that might belong to competitors (in Delhi it is the state owned TRANSCO).

Vertical integration might in theory be antithetical to competition but if each segment is independently regulated and information is made freely available, the system might increase the benefits to the consumer.

Balakrishnan (1986) has sought to analyze the vertical integration strategy for a company from a technological and competitive perspective. The two main results of his analysis are:

- i) Especially if the degree of competition is high, integration is affected negatively by the frequency of technological change, ie, more the technological change the less the integration.
- ii) The optimal level of integration depends negatively on the degree of competition in the industry; greater the competition the lower the integration.

Competition and technological change are the route to reducing the extent of vertical integration. Vertical integration benefits the producer when it results in barriers to entry and /or mobility. Barriers to competition result in higher revenues to the integrated firm. The producer also benefits from integration when there are production economies of scope or there are transactional economies.

What this conceptual analysis does not bring into the discussion is the effect of an external regulator acting independently in ensuring benefits to the consumer. The Regulator will have to develop information and monitoring systems in such a scenario of vertical integration to ensure that the benefits to the consumer are optimized. This situation of vertical integration will be reality within four years and the Regulator must be ready to cope with it.

8.f Actions for competitive market structure:

To achieve competitive market structures in electricity, the government, Regulators and distribution entities must achieve the following:

- SEB's (and other distribution utilities) must be made to buy power through competitive bidding.
- There must be a payment security mechanism in place especially for sales to SEBs, both for IPPs and other suppliers.
- PPAs may require some changes and these must be accomplished through discussions perhaps under the auspices of the SERC.
- The allocation mechanism of the central government must be dismantled and the power must enter the market in competitive transactions.
- The state transmission utilities must be separated from generation and distribution.
- Similarly the state load despatch centres must become independent and neutral and not tied to the state transmission utility, presently the SEB.
- The national power pool as well as state/regional/zonal pools must be established.
- Wholesale power procurement even through PPA's must be based on competitive bids.

Many of these conditions are well on their way to being met. We can expect a greater degree of competition within the next three years.

8.g Barriers to entry

Studies by Chambers of Commerce and consulting firms have established that there are severe barriers to entry in the power sector due to bureaucratic red tape for the many clearances that are required. Similar is the case in other areas of the energy sector. These barriers to entry make it difficult for an essential condition for competition, namely ease of entry, from being met. The Regulator presently plays a marginal role in most of these clearances. We need to consider how the adverse effects of these barriers can be minimized and how the independent regulator could be given a coordinating role with the other regulatory agencies and not only put time limits for each clearance but listen to objections in open hearings.

8.h International experience with wholesale markets

Taking account of the experience of the U.K., Argentine, Victoria (Australia), California and Brazil we find that:

- Claims for stranded assets as a result of creating wholesale markets (as might happen in India by the winding up of or major changes to long term power purchase agreements that have 'take or pay' clauses with mandatory payment of fixed charges). Such contracts were honoured in Victoria (Australia), California and Brazil but not in the UK and Argentine.
- Argentine discontinued existing power purchase agreements at the time of deregulation while Brazil continued them. The issue did not arise in the other countries. The transition period to competitive markets varied from around one year in the UK, to nine years in Argentine. In the case of the others even after 11 years in Victoria, 6 in California and 9 in Brazil, the process is not yet complete. Pool participation was mandatory in Victoria, California and Brazil, initially mandatory but later optional in the UK, while in Argentine it was optional but bilateral contracts were also permitted at the same time.
- Distinct capacity payments were not provided in pool transactions in UK, Victoria and Brazil but were so provided in the others. Despatches were based on price in all except Argentine. It is despatched on the basis of cost.
- These experiences show that market practices have to be designed to suit the context. India must develop the model that suits us best and Regulators must take the specific local context into account. Ownership does not necessarily have to be with the private sector. In many countries state owned electricity systems function

effectively and profitably. The problem is that our electricity system under state government ownership lacks a commercial and enterprise mindset. There is government interference and control on almost all decision-making. There is no multi-disciplinary expertise functioning together in an interactive manner. Accounting and financial management are primitive and give no management information for control purposes.

- Long-term contracts especially for base load demand must continue. Merit order despatch might make some existing power purchase agreements unviable. A formula to compensate such units in some way must be designed. The Dhabhol settlement when it is reached might be a good precedent. The Pool will account only for a small portion of power sales. By 2015 we can expect to see vibrant and competitive markets for electricity, though only for a portion of it. The Regulator might ask to vet long-term contracts and look at spot and pool sales ex post to ensure that no anti-competitive practices are in play.

8.i Competition Commission

The Competition Act that replaces the Monopolies and Restrictive Trade Practices Act and the MRTP Commission with the Competition Commission.

The Competition Act provides:

“The Commission shall, while determining whether an agreement has an appreciable effect on competition have due regard to all or any of the following factors, namely: creation of barriers to new entrants in the market; driving existing competitors out of the market; foreclosure of competition by hindering entry into the market; accrual of benefits to consumers; improvements in production or distribution of goods or provision of services; promotion of technical, scientific and economic development by means of production or distribution of goods or provision of services”.

The Electricity Regulatory Commissions Act 1998 had required the electricity regulatory commissions to promote competition (Sections 13 and 22). However, neither was competition defined nor adequate powers were given to the Commissions to achieve it. The Electricity Act 2003 does not require the ERC's to specifically promote competition along with efficiency and economy as the earlier Act did. However the ERC's do have some responsibilities for promoting competition in the Electricity Act 2003 as seen in the following clauses:

If the Appropriate Commission is of the opinion that it is necessary or expedient so to do for maintaining the efficient supply, securing the equitable distribution of electricity and promoting competition, it may, by order, provide for regulating supply, distribution, consumption or use thereof.

- Section 60- Market Domination: The Appropriate Commission may issue such directions as it considers appropriate to a licensee or a generating company if such licensee or generating company enters into any agreement or abuses its dominant position or enters into a combination that is likely to cause or causes an adverse effect on competition in electricity industry.
- Section 62-Determination of Tariff: Provided that in case of distribution of electricity in the same area by two or more distribution licensees, the Appropriate Commission may, for promoting competition among distribution licensees, fix only maximum ceiling of tariff for retail sale of electricity.

The Electricity Act 2003 does not mention achieving competition as one of the objects of the electricity regulatory commissions. This might mean that the Competition Commission will be the arbiter of whether a particular situation must be held to contravene the requirements of competition, issues like mergers and amalgamations in the sector, vertical and horizontal integration, returns on investment, tariff determination, etc. These matters could shift for decision from the ERC to the

Competition Commission. Alternatively it might be the court of appeal for such matters and they will not go to the Electricity Appellate Tribunal (being constituted). There is opacity and consequent scope for conflict in jurisdiction between the different regulatory bodies, namely the SERC's, the Electricity Appellate Tribunal and the Competition Commission.

The situation has to be simplified. Ideally the Competition Commission should have no jurisdiction over infrastructure areas that have their own independent regulatory bodies as well as appellate bodies. In addition there are the superior Courts that will sit in appeal on their Orders. If the Competition Commission must have jurisdiction (for unclear reasons) they must confine themselves to mergers and acquisitions and not licensing or tariff issues.

8.j Regulating state owned enterprises

Experience has shown in other countries and in India that regulating state-owned enterprises by independent regulatory commissions is not as straightforward or effective as regulating privately owned enterprises. This has been the experience in India in electricity both at central and state levels. The enterprise response has typically been of challenge, non-compliance and defiance. Thus in its early years all orders of the CERC were challenged by the centrally owned undertakings concerned, in many cases up to the Supreme Court. (The courts upheld all of them). In many states, the undertakings did not implement tariff orders and were backed by the state governments. (In Karnataka for example the state-owned distribution company said that their directors were spending time at the cost of the business in appearing before the KERC and would not do so in future). There is a close relationship between a state-owned enterprise and the ministerial officials who in effect control them as representatives of the state- the owner. The state is concerned about the profitability of the enterprises that it owns and of the impact of the ERC (Electricity Regulatory Commission) orders on voters. For both reasons, it tends to support or even to ask its companies to defy the regulator. State support makes this easy. The ERCs also have been reluctant to penalize the non-complying utilities (Rao 2004).

The Regulator in Energy in India must recognize that state domination in the energy sector will remain for many years. (Even by 2025 the state will remain the dominant owner of the power system. Other energy items like coal, oil and gas, will also have a significant state ownership). There is too much ideologically oriented resistance to diluting state ownership in this sector. The benefits of private versus public ownership have yet to be established in India. Further, energy tariffs will be regulated for long because of the large numbers of the rural and urban poor and poor and marginal farmers that have to be protected and enabled to use commercial energy.

Thus the Regulator will be regulating an energy sector with dominant state presence but with a growing presence of private operators, even if in limited numbers. The Regulator must have the independence to treat them alike. As the private presence in the sector increases there might be less government pressure on the Regulator to favour state enterprises. The Regulator will have to perforce significantly increase his proactive measures to understand management issues in state enterprises so that implementation in them takes place with commercial mindsets and enterprise cultures. This will require involvement of the Regulator in pressing enterprises on issues such as information systems, training programmes, organizational structures, human resource management, etc. The Regulator will need to ask for implementation programmes and get enterprises to commit dates for achieving important milestones. The Regulator might even have to penalize those who fail badly and repeatedly in achieving implementation objectives.

There are some who will regard all this as micro management by the Regulator. But there is a vacuum that the governments as owners have for so long been unable to fill. Only the Regulator can do so. Neither governments nor state enterprises have been able to introduce these commercial attitudes.

9. CAPTIVE POWER AND THIRD PARTY SALE

The MERC in an Order issued in Case No 57 of 2003 (Bhushan Steel versus Maharashtra State Electricity Board) has held that a company that sets up a generation plant for use in its other operations, sets up parallel transmission lines and supplies the power to third parties and particularly those situated in rural areas, does not require any permission to do so from the State Electricity Board nor can be required to pay a surcharge for open access. This opens a new opportunity for power trading and sales to bulk consumers especially if located in rural areas, who are looking for definite supplies, quality supplies and reasonable tariffs. Even in the absence of SEB permissions it is now possible for captive generation plants or even merchant plants set up in association with various users, to use their own transmission lines to supply the power within this association.

The bogey of wasted resources because of parallel transmission must be laid. There are constraints in the system and there is no redundancy in transmission capacity. Private investors make their own calculations and take the risks. They will in any case require approval by various authorities before proceeding to lay new lines. The Regulator really has no role in tariff setting in a captive network either for generation or for parallel transmission network use.

10. DISTRIBUTED GENERATION

With deregulation, implementation of the Electricity Act 2003, captive generation and rural electrification using distributed generation, along with growth both in parallel transmission and distribution lines and open access as part of the Grid, the task of the ERC will become quite complex. At the same time vertical integration *a la* the “well-head to wall-socket” concept enunciated by Reliance Industries in which the generation, much of the transmission, distribution and supply are integrated will increase. This is also a version of distributed generation and with rural electrification might well form 20% of total generation by 2010. The two sources of generation namely stand-alone generation utilities and the “distributed generators” should to the extent possible be integrated with the grid in order to augment and improve reliability of the overall grid system.

The operational issues related to this expanded definition of distributed generation are challenging. There must be Schedule Coordinators like the Load Despatch Centres in the grid that will coordinate the different units in the system. A mechanism for grid connection must be available. The Schedule Coordinator has to work in a way that the generator can maximize his profits within network constraints so that contractual obligations are met. For transactions between DG and the grid the Schedule Coordinator must submit offers in optimal ways (Kulkarni).

The Regulator must be prepared to ensure that such generators also meet the requirements and obligations imposed by the Regulator. Since such distributed generation might be established both for urban and rural supply and might also involve interstate movement of electricity it will pose new challenges for regulatory coordination.

As the power system in India changes, with a mix of private and state owned generating companies, multiple transmission operators, independent load despatch at central and state levels, privatized distribution along with state owned distribution, vertically integrated monopolies in private and public sectors, the operation of a national grid will become much more complex. The Regulator must make advance preparation to develop the rules for its operation. These rules must allow maximum flexibility to market forces while closely monitoring and intervening when necessary.

11 REGULATING RURAL ELECTRICITY

Rural electrification is a priority area for all state governments and the central government is giving substantial support to achieving it. Studies by the World Bank have shown that the agricultural sector uses 30-40% of the electricity produced but provides only 8-10% of the revenue. Power supply to agriculture is under a flat rate where the user is charged a fixed annual rate based on the horse power of the pump set in most of India except where it is supplied free as now in Andhra, Tamil Nadu and soon in Maharashtra.

These flat rates have remained relatively constant and do not keep pace with rising costs and inflation. Consumption in agriculture remains unmeasured. Distribution entities use this lack of precise data to misattribute a significant amount of T & D losses to agricultural consumption.

In the 1980's and 1990's groundwater irrigation has risen significantly. It is estimated that one-third of power consumed in the electricity sector is used to energize roughly 50% of irrigation needs from groundwater sources. Along with poor collections this has raised the gross subsidy to agriculture substantially.

These conditions have led to a strong advocacy of pro rata tariff regime by metering power supply to agriculture. The proposition is that this will regularize power supply, ensure improved management of distribution and retailing of power, control T & D losses, improve maintenance of physical infrastructure, enable better quality of supply to farmers for longer hours, improve the farmer's earnings and the farmer's marginal willingness to pay for each unit of power consumed. It is expected that this process will progressively reduce the subsidy without loss to society.

However, we have doubts about the achievement of this objective. Metered power supply was universal till early 1980's without resolving high pilferage, poor collection and corrupt meter readers. It seems unlikely that metering will solve the problem of high subsidies. Further, with unit rates to agriculture for metered supply being pegged at 0.50 p per unit in most states, subsidies will continue at high levels.

The World Bank estimated that in Haryana alone the metering of all agricultural connections would cost USD 30 million as capital investment and annual operating costs of USD 2.1 million, apart from the costs of monitoring the system and controlling pilferage. A study in U.P. and Maharashtra puts metering costs (not counting capital costs of installing meters, controlling and monitoring pilferage) at 26 % and 16% of total revenue realized per connection.

An alternative is to lease out the collections of charges (meter reading, billing and collection) to local entities. We do not commend this solution since billing and collection are an important means for substantially improving revenues from electricity consumed and so should remain under the direct control of the enterprise.

A related alternative is the micro privatization of power retailing. Orissa has village electricity committees that attempt this. A technical backing to this suggestion is to combine flat rate electricity supply with metering at 11 KV transformer level. This will enable better recording of actual energy consumption in agriculture and identify malpractice areas. There is also the possibility of differential pricing since agriculture is mostly supplied at off peak hours when costs are lower.

Thus, the Regulator has an agenda of work before him in regulating agriculture tariffs and consumption:

- i) Estimate the real amount of subsidy to agriculture.
- ii) Estimate how much electricity supplied to agriculture contributed to GDP so that some idea can be had of the social benefit of such supplies.
- iii) Introduce innovations in metering-11 KV metering, prepaid meters.

- iv) Estimate costs of supply to agriculture in off peak hours.
- v) Estimate power and water use efficiency under different tariff regimes-flat rate, metered per unit.
- vi) Define precisely what constitutes 'Rural'.
- vii) Rural electrification has mostly aimed to connect villages to the grid by extending already overburdened low voltage lines. Instead grid power must be a supplement and distributed power available 24 hours a day must be the norm.
- viii) The principal issue in rural electrification is to get villages to pay for power. The Panchayat is the rural institutional authority but the Panchayat Ministry has in past governments had little to do with coordinating rural electrification. However capacity building and financial authorities have to precede such responsibility.
- ix) The many experiences in rural electricity of TERI, IISc, ONGC and others have to be coordinated for national extension.
- x) Distributed power will need capital subsidies, cheap long period loans and revenue subsidies, a network for repairs, maintenance and fuel supplies, training to Panchayat officials to efficiently run their local electricity distribution, Grid connections where possible for backup and more importantly to sell unused or surplus capacity, advance disbursement by State governments of grants to meet subsidy costs, clear rules on subsidy entitlements and tariffs for different users.
- xi) Coordination between different ministries, governments, public enterprises and research institutions must be institutionalized.
- xii) There is work for independent regulators in estimating real levels and costs of subsidies, enforcing metering to 11 KV, developing principles for off-peak pricing for agriculture, developing methods for and limiting subsidies to one pump set, etc. (IWMI and ORG)

12 ENVIRONMENT, ECOLOGY, GREEN POWER

The Electricity Regulatory Commissions Act 1998 Chapter III Section 13 and Chapter V Section 22 (2) (o) (CERC) had a provision that required the ERC to take an interest in the environment and to promote green energy. As per the ERC Act 1998, the Central Commission shall discharge all or any of the following functions including "associating with the environmental regulatory agencies to develop appropriate policies and procedures for environmental regulation of the power sector". The Electricity Act 2003 has no role for the CERC in these matters.

12.a Green/Renewable Power

Section 86 (e) of the Electricity Act 2003 states a function of the SERC to "promote cogeneration and generation of electricity from renewable sources of energy by providing suitable measures for connectivity with the grid and sale of electricity to any person, and also specify, for purchase of electricity from such sources, a percentage of the total consumption of electricity in the area of a distribution licensee". Thus the Act specifically requires the SERC to promote cogeneration and the use of "green" power. The SERC can specify connectivity requirements to be arranged and for its sale. It also requires the Regulator to ensure that a given percentage of the power purchased by a distributor is from renewable that is, generated from windmills, biomass or such other sources. This must also be seen in the context of India's informal commitment to achieve a substantial increase in green power use by 2012.

13 TASKS FOR SERC ON ENVIRONMENT AND GREEN POWER

- i) The cost of generation of green power or from non-conventional sources tends to be higher than from bulk generation of thermal, hydro and other such sources. The Regulator has to determine the proportion that he will stipulate. That will depend on the cost of other power, the cost of these "green" sources and the ability of the consumer to pay extra because of their use.

- ii) The experience with renewables (mainly wind power) is that suppliers pad capital and generation costs. Regulators would be well advised to use experts to determine the reasonable costs for these technologies. At the same time the Regulator must also attempt to reduce these costs.
- iii) The Regulator has also to ensure connectivity for these sources and he could waive the open access surcharge for such power.
- iv) There is also the problem of regularity of supply. Cogeneration based on bagasse is seasonal unless the stocks of bagasse can last outside the sugarcane-crushing season. Wind power is even more erratic and is subject to climatic and seasonal variation. The Regulator must ensure that backup power capacity is available when there is a shortfall. This will add to costs and they must also be estimated.

14 ENVIRONMENT AND ECOLOGY

14.a Structuring

Environmental clearance is required for all types of power projects including nuclear, hydel and thermal under Environmental Protection Act 1986 (EIA notification in 1994) from MoEF, GoI. Site clearance is required for pithead thermal power stations and hydropower projects. Public hearing is required for all power projects. There is a prescribed application form and procedure to be followed for obtaining clearance. If forestlands are involved in any of the power projects clearance has to be obtained from MoEF under Forest Conservation Act. In 1997 through a notification MoEF has delegated some powers for environmental clearance of power projects up to certain capacity to the State Governments. (Details of these clearances are also available in the book titled "Pollution Control Acts, Rules and Notifications issued there under" published by CPCB in September 2001). The whole set up is such that we see multiple agencies playing roles at various levels to approve a project that causes not only delays but also substantial additional costs. One possibility is to give state level environmental clearances for new projects to the SERC taking the expert advice of the local Pollution Control Boards. Since they hold public hearings on other matters they could do it for this clearance as well.

14.b Regulator's tasks

The Energy Regulator can in any event at least help in the enforcement of directives of the Environment Protection Agencies by using his tariff determination authority to insist that the environmental regulations of the concerned authorities do deliver the desired norms.

- i) Environmental regulations are formulated by other agencies including the local pollution control boards. They lay down requirements which many times require additional capital expenditures and running costs. The SERC has to take these into account in determining tariffs.
- ii) It could at the same time also relate the cost to the result, in other words, are the desired pollution levels specified achieved and if not, he could disallow all or part of the capital and running costs. As of now the SERC's do not perform this function.
- iii) There are also the waste products like fly ash and their utilization. Environmental agencies determine this but SERC's could use their tariff determination powers to enforce the requirements. This is also not presently undertaken.
- iv) Since CERC regulates generation plants that are central government owned and supply interstate, it would be desirable to give CERC also the powers to enforce such requirements on these plants.
- v) Transmission and distribution also have environmental safeguards that have to be imposed by the environmental regulator. These could also be enforced by the ERC, thus avoiding another body to which the project developer has to go for approval.

- vi) Hydroelectric power (and to a lesser extent other parts of the power sector) has ecological and human dimensions as for example, when there is submergence and many people have to be rehabilitated. The ERC could follow up to ensure that the requirements are met.
- vii) However technical issues like submergence and rehabilitation in case of hydro plants or forest protection in the case of transmission lines will need to be monitored by the environmental agency itself.

14.c Emissions trading

With the European Union, Japan and Russia having introduced emission norms in their countries and the ratification of the Kyoto Protocol (even without the USA), there is a market for emission credits. India is well placed to enter this market since India has lower levels of emissions than it is entitled to. In addition, there are many producers who produce non-polluting energy and are therefore entitled to emission credits. These have to be inspected and certified by accredited agencies.

India has entered this trade in a modest way but the potential is considerable. It is important for Regulators to decide who owns the profits from such trading- the company that earns the credits or the consumer of the power that is supplied by the company. The emissions credit could be used to mitigate the high costs and tariffs of green and renewable power by either sharing them with the users or allowing the generator to keep them entirely.

15. TRADING AND REGULATION

15.a Power

i) Preconditions for power trading

- Easy access to adequate transmission
- Information regarding supply, demand, capacities, transmission availability, tariffs, etc must be easily available to all players.
- Every system has surpluses at times and trading helps to locate those surpluses and find the potential customers. This is what is required from the licensed power traders.
- The Regulator has to satisfy himself that adequate transmission capacity has been licensed and established, before licensing trading. The system operator or perhaps the load despatch centre must before accepting a trading transaction, satisfy itself that there is adequate transmission capacity.
- Transmission access must be freely available at reasonable and not penal rates to all who want to access it. This is yet another task for the Regulator.
- Trading must be subject to grid security and discipline and this has to be ensured by the Regulator.
- Independent Load despatch is a critical necessity for trading to take place in power.
- The single buyer model under which the SEB alone could be the buyer of any power sold within the State is antagonistic to trading. The Electricity Act 2003 makes it possible in certain circumstances to over ride this SEB monopoly.

ii) Open Access

Open access is the access to any supplier, of the transmission and distribution wires that connect different points on the network. It is an important requirement if trading is to take place. This is in addition to the existence of transmission capacity. No supplier should be discriminated against. For this rules have to be set out. The CERC has done so and they take care of the requirements of long-term contracts, short-term contracts and firm and infirm power. They must also ensure that the surcharge that the law allows the regulator to fix on wheeling charges for open access is not set so high that the access becomes too expensive (as has happened in Andhra). Open access also relates to gas pipelines. The essential principle is that wires are a wholly or partially

natural monopoly and access to them must be allowed on the basis of principles to be set out by the Regulator.

Though the CERC had issued guidelines as required by the Act in January 2004 for implementing open access to transmission lines, the new government that took office at the Centre in May 2004 allowed extension of time and only three states have implemented open access. Further, 13 states have been allowed four to twelve months for reorganizing their electricity boards and as a consequence the separation of trading from the state transmission utilities is also delayed. These will delay the full flowering of trading in electricity.

iii) Availability based tariff

- The CERC's Order on availability based tariff has because of the extra money to be made by judiciously taking advantage of the surcharge for unscheduled interchange brought about a certain degree of judicious trading by SEB's who buy or sell power when there is an opportunity to get it cheap or sell at a high profit. When frequency varies, greater supply or more load can restore frequency if the generator or distributor is ready to come to rescue of Grid. Some SEBs are even willing to resort to load shedding to take advantage of the penal high prices that become available when the frequency drops.
- As and when the SERC's are able to introduce the ABT at the intrastate level, trading in smaller quantities within the state will become possible. It could be limited to bulk deals and thereby start much before full metering of all customers.
- However ABT can have only a limited life till transmission constraints are removed and supply catches up with peak demands.

iv) Stimulus to trading

The Regulator can stimulate trading by his tariff decisions. If he varies tariffs by the season of the year, time of day, even daily weather variations or when there are unusual events like cricket matches resulting in sudden peaks in demand, he would encourage suppliers and customers to buy or sell depending on their need for the power and the opportunity to make extra profit on the power.

v) Load despatch centres

Load despatch centres are the key element for successful electricity trading. They are responsible for both system and market operations. They centrally despatch on the Load schedule in real time. Presently they are under central or state transmission utilities, which are today the central government company, Power Grid Corporation of India and the SEB's or their successors respectively.

- This must change and the load despatch function must be totally neutral and not be under any of the commercial entities in the system. They will despatch on merit order for which information must be supplied to the LDC's by the members of the system. If data is not supplied correctly and in time severe penalties must be imposed on defaulters.
- The Regulator must clearly and precisely define how he will execute despatch on merit order and the information he will use for the purpose.
- The Electricity Act 2003 creates a National Load Despatch Centre to replace the central transmission utility CTU over RLDC's. The duties of the Regulator in relation to the NLDC however have not been specified. This must be done.
- The central government keeps around 15% of the capacity of central generating units. This was intended for allocation to priority uses like exports. This quantity should be released to the generating companies and offered for trading.

- The Electricity Act 2003 gives the transmission utility only recommendatory role and its recommendations about who should get a license are not binding on the Commission. This is a significant change and enables easier entry for private investment. The concerned ERC's and governments must ensure that the transmission utilities do not have a veto power on private investors.
- It is important that government not interfere in the market rules set out by the ERCs, nor in the operation of the market.

vi) C.E.R.C. In Trading

vii) The Act gives the following powers to CERC in electricity trading.

- Formulate & implement Grid Code
- Determine rates, charges and terms and conditions in respect of intervening transmission facilities
- Payment of transmission charges and a surcharge for providing non-discriminatory open access
- Reduction and elimination of surcharge and cross-subsidies
- Proportion of revenues from other business to be utilized for reducing transmission and wheeling charges
- Duties of electricity traders
- Standards of performance of licensee or class of licensees
- Details to be furnished by licensee or generating company for determining tariff in respect of generation, transmission and distribution
- Specifies principles and methodologies for the determination of the tariff applicable to generating companies and transmission licensee.

These are in addition to other powers of CERC to issue licenses for electricity trading (for which it has set out the terms and conditions), set out trading Rules, decide trading Margins, set out the rules for open access, rules for determining the surcharge for open Access, determine the basis for transmission tariffs and regulate regional load despatch centres. The SERC determines intra state transmission tariffs, and licenses parallel transmission & distribution. A greater role for the ERC in regulating markets and trading is necessary and government must take the necessary actions as discussed in earlier sections on competition.

15.b Coal, Oil & Gas

Trading in coal is almost entirely between the coal companies and the big users, with wholesale and retail trade confined to small users. However there is considerable diversion of allocations that finds its way into the open market. As far as oil and gas are concerned the gas suppliers, so far mainly ONGC in the public sector, enter directly into contracts for supply, though they have many times been unable to honour their contracts to supply. Since the customers till now were public sector thermal generation plants any legal remedies for breach of contract could not be applied because the common owner, government, would not give permission. As a result NTPC's gas plants worked for many years at well below capacities. Private gas producers are not at present subject to government controls on tariffs. Government must have similar rules for all players.

Trading requires a Regulator to ensure contracts are honoured. Similarly there has been no trading in pipeline capacity since there has been inadequate capacity, owned by a government monopoly, GAIL, and catering almost entirely to usage by government owned suppliers and users. A trading situation requires that there are other suppliers, many customers and availability of pipeline capacity to all and monitored by the Regulator.

16. EVALUATING AND BUILDING CAPACITY IN REGULATORY COMMISSIONS

There is an ongoing project undertaken by Dr Navroze Dubash and Prayas. It strongly recommends that there should be a periodical review of all regulatory commissions using the set of indicators developed by the Dubash-Prayas-NIPFP project. (Details can be gathered from: "Electricity Governance Indicator Toolkit" Draft June 2004, prepared by World Resources Institute, Prayas-Pune, and National Institute of Public Finance and Policy; available at <http://electricitygovernance.wri.org>). The following comments are in relation to the indicators in the toolkit. They are based on data gathered in earlier Prayas and TERI surveys referred to in "Governing Power". S L Rao, TERI Press, 2004.

16 .a Prayas Survey (2003)

The PEG (Prayas Energy Group) carried out a survey-based study of various ERCs in India in order to

- i) Identify and assess resource limitations, if any, faced by the ERCs.
- ii) Assess and analyze the status of transparency and public participation in the regulatory process in various states; and
- iii) Draw lessons for enhancing transparency and participation in future

The survey portrays an uncertain picture of the ERCs. Many functions mentioned in the establishing legislation have not been transferred to the SERCs by the concerned state governments, In most of them, including the CERC there have been serious delays in relation to the timetable for filling vacancies laid down by the law. At all levels, there is dominance of bureaucrats from government administrations, the CEA (Central Electricity Authority), and SEBs (state electricity boards). Most chairpersons are former officers of the IAS (Indian Administrative Service). Officers from the central services and other branches of governments, especially the public electricity sectors, occupy Member positions in the ERCs. Most of the workforce – even where specialist skills such as management and chartered accountancy are required – comes on deputation from government departments.

While funds have not been a problem for most, the CERC in particular was for its starting years subject to the ministry for disbursals. Staff appointments have been much delayed. Consultancy appointments could be made only on a limited basis out of the budgets sanctioned to the ERCs, but bilateral grants, from the UK and Canada in particular, were available for consultants' appointments, usually from the same countries and at substantial expense. Loans sanctioned by multilateral institutions (such as the World Bank and Asian Development Bank) often included conditions regarding appointment of consultants approved by the lenders. This was ostensibly intended to ensure that qualified expert helps was available but it was not always the case.

State governments freely issued policy directives, in some instances to override the timetable of the ERCs. Most orders were brought for review and appealed to superior courts, especially in the case of the CERC. Use of the legally mandated advisory committees was perfunctory for all ERCs. Many did not ensure transparency in making documents easily available or publicizing hearings. Most ERCs did not prepare and table their reports in the legislatures as required by law.

Observations by TERI experts add some more comments to the PEG findings. Independent regulation of electricity is not a standalone device that can transform the sector. It requires many other reform measures to be in place concurrently. This has not happened and incumbent state-owned monopolies are still in place almost everywhere except in Delhi and Orissa. The regulators have no role at present in the reform and restructuring of the electricity sector. In Orissa, the regulators were consulted during the bidding process. In Delhi, on the other hand, the government

decided on issues relating to the restructuring process and the manner of privatization of the distribution companies with little or no consultation with the DERC (Delhi Electricity Regulatory Commission).

There is also some lack of clarity on whether governments have the right even to unilaterally announce policy in areas handed over to the ERCs by legislation. In fairness, it must be noted that many regulators have been stiff-necked about their 'independence' and are not available for informal discussions, very necessary in taking decisions on a sector with such complex problems. Other regulators, in their orders, did not do enough to prepare the ground that would give investors the predictability and certainty that they require in making long-term investment decisions.

In the states, regulators have devoted most attention to annual tariff determination. They have rationalized tariff design and structure considerably. Thus, in HP (Himachal Pradesh), the number of domestic slabs has been reduced to three, in Delhi to five, while in Maharashtra the number of low-tension categories have been reduced by three and in UP (Uttar Pradesh) by two.

Time-of-use tariffs have been introduced as peak and off-peak tariffs. HP has introduced a winter surcharge.

In dealing with cross-subsidies, the regulators have increased the subsidy burden on governments. Regulators have adhered to the requirement in law that tariffs should progressively reflect the costs of supply of electricity. However, except in WB (West Bengal), no other regulator has set a time frame for eliminating cross-subsidies altogether.

While all regulators have put out tariff philosophy papers, annual determination of tariffs instead of multi year tariffs continues, leading to regulatory uncertainty. The problem is claimed to be the lack of and the unreliability of the data from the utilities. Regulators have done little to improve the quality of the data while governments and utilities appear to have ignored this need altogether. However, there was nothing to stop regulators from announcing the principles for tariff determination that they would follow for a few years without changing them or to announce automatic pass-throughs of power purchase as well as fuel costs even during the year. In fact, some ERCs have done so.

Regulators have focused on improving efficiencies but with mixed results. They have set high efficiency targets with little basis and no guidelines on how they could be achieved. Only Gujarat has ordered and received results from a study on T & D (transmission and distribution) losses and demand forecasts. Some regulators have ordered staff rationalization, maintenance of asset registers, and studies to bring transparency across the system. Little data is available on how far these measures have been implemented but SEB performance does not show any impact. Regulators have no control over the major inputs – coal and gas – that are primarily owned and controlled by the government.

As far as quality standards are concerned, there has been some attempt to set out 'consumer charters' improve the quality of wiring, set up grievance redressal procedures and so on, but the effect has not been uniformly and adequately monitored. UP alone has initiated an independent survey to assess whether such standards have been achieved. The monitoring of these aspects on a regular basis and automatic payment of penalties for failures need to be in place.

All ERCs have mimicked judicial proceedings with arguments, cross-examinations, evidential hearings, and formal orders. Some electricity regulators have combined this quasi-judicial approach with consultative one, as in UP. (This is the method adopted by TRAI). Draft orders are another way in which there could be a second chance for participants to review before final orders are issued. The courts appear to have

recognized the expertise of these IRCs (independent regulatory commissions) and, on the whole, have not interfered except when there are serious errors.

16.b Policy process in governments

The electricity departments in the Ministry and Executive are not necessarily expert or experienced in the sector. They move from one area to another. Yet as studied and reported by Joel Ruet, the Ministry and the Executive control the electricity enterprises under the central and state governments, and the enterprises look for all direction, policy and procedures from them. The enterprises (especially in the States) function in an administrative fashion and not in that of a commercial enterprise. The Ministries do submit annual reports on performance to the legislature but they are little debated in the legislatures. Advisory committees to the departments are more window dressing than true consultative mechanisms. There are distinct planning and technical agencies in the central government. Some states have also created their own. But they are subordinate to the administration and their advice can and sometimes is ignored. Recommendations made to government by consultants are not often made public or subjected to public scrutiny.

16.c Data availability

Even after the advent of independent regulation in electricity asset registers with present and historical valuations of assets are not available in most States. While the Orissa privatization can be faulted the Delhi experience was far more transparent and consultative. Subsidy calculations are getting better though individual subsidies are neither capped nor monitored. Suggestions have been made in Section 7.

16.d Regulatory Commissions: appointments, powers and functions

The Regulatory Commissions have powers to seek information but they have not been adequately used by some of the electricity commissions and in some cases not been complied with. The Commissions have enforcement and penalizing powers but these are not sufficiently deterrent and have been rarely used. The functions of the regulators are reasonably comprehensive but need to be expanded as detailed in earlier pages and to include consultation by and recommendation to government on reforms, distancing from the administration, etc.

Search, selection and appointment of regulators have so far been left largely to government servants and have resulted in filling most appointments with former government servants. The relative lack of commercial and enterprise expertise is unfortunate since there is no understanding about what state electricity enterprises must do to develop such cultures. Members invariably are appointed at an age when they are nearing retirement or have retired. Private sector candidates are rarely appointed.

Conflicts of interest among Members of the regulatory bodies are not known nor are their assets declared. Tenures are fixed but subject to age limits so that in many cases regulators do not serve full terms. Removal procedures are simpler in the new Act but are now entirely with government and hence could become a means of demanding regulatory collaboration with directives from governments. Resources are adequate on the whole but some States have squeezed funding to bring ERCs to heel. There is nobody to whom the public can complain about regulator behavior, conflicts or poor functioning.

16.e Selection, Appointment, Accountability-suggestions for changes

- Selection: A standing group of eminent citizens chaired perhaps by a former Chief Justice of the Supreme Court could be created to select all independent Regulators.
- Training: Ideally, candidates must go through an intensive training programme to familiarize them with relevant topics. With classroom exercises to reinforce their

learning, it should be possible to weed out those who do not take to the training. The rest could then be appointed. If this is too restrictive, all appointees must be required to undergo an intensive interdisciplinary programme.

- Complaints: The standing group could also be responsible to consider complaints against regulators, have them examined and have powers to take the necessary actions. The Courts should also pull up Agencies whose Orders are frequently overruled on appeal. These measures could counter the criticism that Regulators are not accountable, and so so without diminishing their authority or independence.
- Mandamus: It is open to any citizen to go to court demanding that government and the commissions perform their duties as required by law. Governments have delayed selection and appointments within the time frame laid down by law or ignored the provisions regarding qualifications required of regulators. Regulatory Commissions have not submitted to the legislature the reports required of them. These violations must not be condoned and severe action must be taken to enforce them. However no consumer group has so far challenge governments on these issues.
- Cadre: The demand for independent regulators is growing as more such Agencies are created. It has been suggested there should be a Cadre for regulatory commissions open to qualified managers, economists, engineers, lawyers, administrators, accountants and financial experts with practical working experience of at least 15 years and not eligible unless they have at least ten years left before statutory retirement. However there are others who argue that such a Cadre will make rigid an institution that must have considerable flexibility in the thinking of members.
- Compensation and Status: It is selection that is the real issue and it is essential that the search, selection, training and appointment process is well integrated and pursued independently. This will also require that Regulators are given adequate compensation and status as well as post-retirement health and pension benefits so that they do not need to seek government employment or in the private sector, other than as Board Members and possibly as consultants.
- Regulatory Law: Studies by S L Rao (Governing Power, 2004) and TERI suggest that in the early years the SERC's were inconsistent with each other in their Orders on similar issues. More recently there seems to be more consistency though it is a moot question whether it has been enough to develop a body of regulatory law that can be cited as precedents. Further, some SERC's have been often overruled by the superior Courts on appeal. Superior Court Orders however have been consistent and lead to a good understanding of the Court views on the role of regulators. The present structure does not provide oversight of Regulatory Commissions for action to be taken when they are frequently overruled by superior Courts.

16.f Transparency

Transparency exists in the courtroom process. However all ERCs require the filing of petitions and affidavits. This makes it difficult for ordinary public participation. It might be useful to allow written representations that might not be in legal format, to be filed. All ERC's have rules that allow easy disclosure of most documents at reasonable cost. By giving reasons for Orders most regulators ensure that the participatory process is complete.

Commissions must not be rigid in their procedure. The TRAI procedure of widespread consultation (outside a courtroom process) could be combined with Draft Orders on which public hearings can take place before a final Order is issued.

Some Commissions have created a Public Advocacy position that looks after the interests of smaller consumers. Karnataka ERC has also funded a new apex consumer

group. However much more needs to be done to enable weaker sections to participate in the regulatory process. All ERCs have websites on which all their Orders are posted. However there is urgent need for a Regulatory Law Journal that not only publishes important Orders but also analyses them for consistency between different Commissions and also their past Orders.

Licensees are required by the ERCs to file periodic performance reports as well as tariff filings. Consequences for non-filing are not stated or if they are the penalties are modest. The law must provide for such consequences.

16.g Commission Philosophy

Each ERC has tried to publish consultation papers on its tariff philosophy and then received public reactions before finalizing them. CERC has held public hearings on such documents. These are usually simply written. However there is considerable dependence on external consultants for this work by many ERCs. In some instances it appears as if the ERC itself has added little to the consultants' papers. Orders or final policy documents that are mere papers by Consultants do not fulfill the quasi-judicial role given to regulatory commissions.

On licensing, the authority of the ERCs is clear in the law as is the process laid down by the ERCs. It was disputed under the old Act when CERC tried to implement the provisions for private transmission investments since the Act provided that the central (and State) transmission utility was to 'approve' while the CERC (or SERC as the case might be) was to 'issue' the license. The new law removes this confusion. The CERC has published draft rules that the transmission utility need not have anything to do with licensing.

On social and environmental issues the mandate of the Executive appears clear in the law. However, that is not so in the case of the ERCs. Except for encouraging 'green' power the new Act gives them no role. It has been argued earlier (Section 12) that the ERC could use tariffs to enforce environmental regulations and ensure achievement of desired norms.

16.h Social obligation

As far as societal requirements are concerned the legislature has been unclear and unspecific as to who should be looked after and to what extent. This is so regarding use of electricity for pump sets, extent of ground water use or electricity for domestic lighting.

ERC's have explored affordability of tariffs by different groups mainly through the submissions and responses in public hearings. All consultation reports on assessments conducted to support tariff revisions are made public. However affordability as such has rarely been studied. ERCs could do a lot more to educate potentially affected populations of the impacts or implications of tariff changes. The almost complete reliance on courtroom consultation process for the purpose might be unduly limiting.

Climate change and the need to report on electricity sector emissions have yet to enter ERC regulation. (In one case MERC has ruled that profits on emissions trading must be shared with consumers).

16.i Suggestions for Capacity building in Regulatory Commissions

When creating Regulatory Commissions, particularly for electricity where there had to be one in each State apart from the Centre, it had not been realized that suitable people to be Members and support staff were difficult to find. There was no training available in India nor were there universities and other institutions in which interdisciplinary work on electricity was undertaken. There were engineers, a few economists, few accountants since the state owned system did not need business accountants, lawyers specializing in projects and many foreign affiliated consulting firms. With financial support from foreign agencies these foreign consultants dominated

the regulatory scene. They brought largely British and American and in some cases Argentinean experiences to India. In some regulatory commissions they wrote the Orders for the Commissions. The result has been a poor judgment of the context and variable quality of regulatory effort in many state commissions.

There is now a growing number of educational and training programmes that prospective regulators and regulatory staff can benefit from. SAFIR runs core programmes annually for regulators. TERI, FOIR, ASCI, IIMA, are some institutions that run short programmes on different aspects that add to regulatory knowledge and skills. The TERI School of Advanced Studies has designed Master's programmes in regulatory studies that for the first time will bring qualified people to man regulatory commissions.

The effort for building capacity in research, training and education in regulatory studies in different aspects of infrastructure, with interdisciplinary training and building of expertise, needs to be extended to enable larger numbers to be trained. Ideally we must have four core institutions that are part of a network of local institutions in law, economics, accounting, finance, management, engineering, and that will draw on the expertise of each, with a few core faculty to plan and guide the training, education and research programmes.

16.j Criteria for Membership

There are not many people that can be considered immediately qualified to run these regulatory agencies. A Member of an independent regulatory agency must be very open minded and willing to be persuaded by reasoning, with a modicum of understanding of corporate financial statements, essentials of cost accounting, of the law that created them and related legislation, of basic management concepts, and knowledge of the essential features of the system to be regulated. Members must carry no ideological baggage for or against the private or the public sector. They must not be cut off from the sociopolitical context of India and the sector they have to regulate. This is the chief reason why proliferation of regulatory agencies must be discouraged. However, the idea of making decisions transparent, consultative and reasoned is a good one and will restore confidence in our governance. It is for this reason that the suggestion has been made in this paper that younger Members who can enjoy full tenures are appointed after inter disciplinary training. We must find ways whereby we get the benefits of independent regulation without the excessive proliferation of agencies staffed by aged and unqualified Members and staff.

16.k Break Ministerial Boundaries

We can do this by creating such agencies without reference to the closely held turf boundaries of Ministries and departments of governments. In this way we can also deal with another fault in our governance that decisions are taken without coordinating with other aspects that might fall in the purview of other ministries or departments.

16.l Holistic Regulation

To avoid regulatory proliferation and ensure holistic decision-making we could have a central energy regulator instead of separate ones for electricity, upstream oil, downstream oil, gas and coal. This regulator would be responsible for tariffs and licensing of production, transmission, distribution, and supply of coal, gas and electricity. This will ensure that the interests of all can be coordinated, especially since electricity, a major user of the others, has its prices capped. Oil and oil products could be regulated separately since issues of national security and highly technical issues in oil exploration have to be considered. (Retail distribution of oil and oil products has very different issues for consideration).

At the state level the state electricity commissions could also be made responsible for a closely related area, namely enforcing the rules for ground water (for drinking and irrigation). This might include permission for ground water exploitation, pricing, etc. through sub-benches created in each district for the purpose. Since subsidized or free

electricity is responsible for the massive over exploitation of ground water, this could help to relate the one to the other. Since sanitation is closely related to drinking water quality, the two regulators will need to meet from time to time on related issues.

The essence is to promote transparency, public participation and open decision-making wherever the public interest is involved. If government could be so in its normal functioning, such new agencies might be redundant. But governments in India have invariably been secretive, tend to engage in superficial and limited consultation and rarely give reasons for their decisions. They are unlikely to change soon.

If we do not look for such holistic responsibility for regulatory agencies we would be creating a multitude of regulatory agencies in addition to government departments, without any improvement in the quality and cost of the services they have to regulate. A regulatory morass is the inevitable consequence of regulatory proliferation. It does not have to be so.

16.m Coordination

The Electricity Act 2003 is a bridge between the present and 2025.

It also gives the central commission the responsibility of laying down regulations and rules on specified matters and also to specify principles and methodologies for the determination of the tariffs applicable to generating companies and transmission licensees. There is no legal provision for coordination beyond electricity even in relation to the major fuels used in generating thermal power in India, viz, coal and gas. Amendments are necessary to the existing Bill to create regulatory authorities for oil and gas and to amend the Coal Mines (Nationalization) Act. Similarly, in shipping freight rates the Regulator could play a useful role in advising government.

A mechanism will have to be legislated under which Regulators for related areas meet regularly on boundary issues. This must apply to Energy, Water, Rail, Road and Sea transportation, environmental Regulation and Telecommunications (since Power transmission wires are used to hang the telecom wires). If coal and gas are not with a single Energy Regulator, they must also be in this List

16.n Taxation

There are many variations between States and central taxation is also an important component in energy tariffs. Here again some coordination perhaps as advise to government from the regulator might be useful.

16.o Subsidies and role of regulator

The Electricity Regulator must play a more proactive role than he has done in handling subsidies. He must have reliable data and take steps to get them. Thus he must estimate-

- The real amount of subsidy to agriculture.
- How much electricity supplied to agriculture contributes to GDP so that some idea can be had of the social benefit of such supplies.
- Introduce innovations in metering-11 KV metering, prepaid meters.
- Costs of supply to agriculture in off peak hours.
- Power and water use efficiency under different tariff regimes-flat rate, metered per unit.

Clearly the regulation of agriculture tariffs will require coordination with energy efficiency and many studies and experiments.

16.p Role of Regulator in future viability of electricity sector

1. Regulators must focus on improving the infrastructure of connectivity, metering and equipment quality.

2. They must also make serious effort to identify the population to be subsidized and develop methods to do so within the available subsidy (plus cross-subsidy when it exists).
3. Energy Regulators are enjoined to promote competition. The Regulator must clearly define what is meant by competition, the extent to which it is possible or can be simulated and the stages through which the sector will pass before competition is largely established.
4. The need for coal to be regulated independently must be questioned and it requires to be regulated together with electricity.
5. Either by legislation or regulation production/generation, transmission/ pipelines, and distribution might be separated so that the different operations might be confined to separate corporate entities. This is important when the same entity is in more than one operation.
6. The ERC's will have to work closely with the newly created regulator for energy conservation, the Bureau for Energy Efficiency.
7. With more private generation capacity set to enter the Grid and privatizing of distribution, the ERCs must impose independence from the transmission operator and make load despatch into a neutral function.
8. It might be better if operators do their own forecasts and the Regulator works to a broad plan of transmission requirements than to a national estimate that is made by the CEA. Data and forecasting are areas in which electricity regulatory commissions must play a key role.
9. The routing and placement of gas pipelines and terminals for LNG need more scrutiny. We need a balance between the centralized planning in electricity and the relative laissez-faire in the case of oil and gas.
10. Open access must be ensured in electricity and gas and the requirement in the Electricity Act to use surcharges for meeting the cost of cross-subsidies should not be allowed to restrict open access and eliminated as soon as possible.

17. CHANGES REQUIRED IN PRESENT INDEPENDENT REGULATION OF ENERGY

17.a Effectiveness of ERCs and Tasks before Energy Regulators

In the present environment in the power sector the task of the independent regulator is to improve efficiencies and quality. Independent regulation exists only in power and its achievements are that it has on the whole been able to (a limited extent) rationalize distortions between user groups in tariffs; at the central level and in some States especially in cities the Regulator has been able to improve quality. There is some modest reduction in T & D losses and significant improvement in plant load factors in generation. Metering has expanded though it is still only for a portion of users.

However there are many shortcomings. There is little increase in using environmentally benign energy, targeting subsidies and keeping them in check, in moving towards cost of service for user charges, competition at least in serving bulk users, removing major transmission constraints, significantly reducing voltage fluctuations, improving safety, cutting technical losses in T & D, improving collections, imbibing professional management, commercial and entrepreneurial attitudes and mindsets. The oil and gas sectors are also beset by problems caused by subsidies and cross-subsidies and the lack of adequate pipeline capacity. Coal remains a government monopoly and tariffs and quality pose major costs for users. The task before Regulators in the coming years is to correct these conditions.

A major challenge before regulators is the regulation of rural electricity to ensure energy access, satisfactory distribution and collection. Section 12 has listed the Regulator's tasks in this connection. The Regulator must develop an information system for monitoring availability and access in rural areas and ensure that power is available in rural areas. He must set tariffs for distributed power in a way that takes full advantage of concessional equipment funding by government and tariff subsidies, so

that they can be built into tariffs for different classes of consumers. The panchayats should be made responsible for distribution and collection. For this purpose they will need adequate budgets and revenue enhancing powers, personnel, adequate training and penal authority for enforcement.

17.b Transition directions (2005-2010)

It will take at least a decade before the electricity sector in India has a large (around 30%) private sector that can push for regulatory reform as it is doing in the telecom sector. What should be the regulatory approach during the period of transition when the state owned sector is dominating?

- i) A serious lacuna in the present electricity regulatory framework is the absence of many strong, well informed and research based consumer groups who can argue before the ERC's on equal terms with the large operators in the sector. Commissions like KERC have attempted to encourage the formation of consumer groups but the funding support is meager. It is important that there are multi-disciplinary research-cum-training-cum educational Centres in the four or five regions that will provide strong research and information support to consumer groups. Such consumer groups must also get funding support for travel, etc, from government.
- ii) It is apparent from the experience of the ERCs, particularly the SERCs that a loose federal approach has worked only to a limited extent and only in some States. Electricity follows the law of physics and not of political boundaries. The power system requires up to the minute accounting, full metering, adequate T&D capacity, good equipment maintenance, failsafe systems to island load centres and cut load or generation as required by the system, strong grid discipline, close monitoring, efficient operations, and highly professional management. It needs cohesiveness and consistency in policies. All this demands strong centralized control and direction.

The ERCs function in a power system that is primarily state owned. With enterprises so close to the bureaucracy and the bureaucracy's tacit support for most of the challenge and defiance that they display against orders of ERCs, independent regulators face difficulty. State ownership and dominance is unlikely to reduce in the near future.

One possibility is for the system to be modified while retaining transparency and consultation while making the regulators part of the government. Such government servants who become regulators might be given fixed tenures during which they cannot be moved. Their independence from government can also be written into the law so that their confidential annual reports, etc., are dealt with in such a way that there is no possibility that they could be used to make the regulators more amenable. Staff could be taken from outside government as well, with less restrictive compensation policies than apply to normal government servants. The model of Chief Election Officers in the states is a possible direction for development of this institution at least till such time that state ownership is dominant. The objection to this is that these regulators who are 'protected' government servants, will later go back into service and that eventuality might constrain their freedom of action as regulators.

- iii) It is apparent that the number of SERCs is excessive in relation to available qualified Members and staff. Sometimes Orders of different SERCs have contradictory principles on the same issues. Ideally, we should have a central regulator with benches in each state.

Alternatively we should have regional regulators with the opportunity for each state to issue policy directives to them for their state on specified matters. This may require changes in the Constitution of India. Alternatively the precedent of the ERC Act 1998 which was amended to permit joint commissions for small

states (also incorporated in the Electricity Act 2003) might be extended with the consent of the States to achieve this object of reducing the number of ERC's. This will also save considerable expense. More important, such bodies can build supporting staff expertise from the limited numbers of experts who are available.

- iv) The nature of regulation in electricity as an example will change from involvement in detail to more structural and systemic regulation. Over time the current emphasis of ERCs on tariffs and efficiencies (plant load factors, T & D losses, etc) will shift to issues of competition, markets, quality, load despatch fairness, etc. This will require the capability of the regulatory commissions to be enhanced in areas such as economics, law and engineering versus the present emphasis on finance and engineering. It is contradictory to talk about regulation being 'light' or 'heavy' handed. By its nature regulation has certain responsibilities and objectives and carrying them out requires the Regulator to set out the rules, monitor and enforce them. The issue of the Regulator being 'intrusive' arises in certain contexts as in the case of the electricity boards that have neither commercial or entrepreneurial attitudes nor managerial approaches.
- v) A stronger role for the CERC in relation to the SERCs is highly desirable since the CERC has been better able to build and use expertise. The new Act gives the CERC a definite role in relation to the SERCs unlike the ERC Act, 1998, which gave it no role or relationship at all with the SERCs. The CERC must use its powers more vigorously while also using other mechanisms like the statutory forums and the informal one of FOIR to achieve consensus with SERC's.
- vi) There must also be a closer consultation between the ERCs and the concerned governments so that the ERCs march in step with the political and administrative commitments. This is also provided for in the new Act. However there must be no compromise on the Commissions' independence and transparency of functioning. Perhaps this could be achieved by having open meetings between governments and commissions or at the least, ensuring that the minutes of the meetings of this new proposed forum are publicized immediately after the meetings take place.
- vii) Another possibility is the drafting of more detailed legislation so that the SERC functions within rigid limits set out by government. This was done in Delhi with extensive use of the State's power to issue policy directives and is proposed as part of the Karnataka reforms. In this way the SERCs would function within the policies of government. This suggestion will if implemented make for a rigid and authoritarian government and legislation.
- viii) There will necessarily be close coordination and consultation between different regulatory agencies on the margin where the areas are common. An argument has been made in an earlier section for introducing an agreement between regulators on consultation between different agencies on specified issues as has been done through MOU's in Sri Lanka.
- ix) Appeals against Orders of Regulatory Commissions are heard by the High Courts. Much greater clarity is necessary about the relationships between the regulatory commissions, appellate authorities and the judiciary. For example one of these superior bodies might be given the authority to keep track of Orders of commissions that are appealed and overturned so that the superior body can counsel and if necessary discipline Commissions that have had their Orders overruled frequently. Should regulatory commissions become party to appeals before superior Courts as some have done so? Should superior courts *suo moto* review Orders for legal infirmities?
- x) The idea of independent regulatory commissions like the ERCs is a good step forward in our system of governance. They make government more transparent, bring the citizenry closer to the decision making process and are in line with the

process of decentralization and freedom of information to enable reducing the alienation of people from government. We should not abandon them but make them effective.

18. REGULATION IN 2025

18.a Context

By 2025 the context should have changed. The key is the nature of reform and regulation that will develop and its objectives and methods. With more private investment and a diminution of government domination, more experience of state owned enterprises with independent regulation, support from the Courts, introduction of commercial approaches and professional management, entrepreneurial styles of working, better technologies in place, reform in targeting and paying for subsidies, more transmission and pipeline capacities, introduction of comprehensive educational and training programmes for Regulators and their staff, we can expect a significant change in the manner of regulatory functioning.

More of energy transaction\ will be market based and the regulator will be ensuring that the markets function transparently. Transmission and distribution capacity will be adequate, with even some redundancy. Renewable energy will be a higher proportion of the total. Open access to pipelines and transmission lines will make for freer movements of energy. Market tariffs will be determined by demand and supply with the Regulator having little role except in regulating markets. However the Regulator will continue to regulate long-term contracts and monitor the delivery of subsidies. Subsidies will remain and the Regulator must play a more proactive role with government in reimbursing utilities and ensuring that the subsidy reaches only those it is meant for and the quantities specified. The Regulator will actively encourage the development of competition in all areas of energy from production to the consumer. Competition will progress on the lines discussed in Sections 8. By 2025 governments would have become accustomed to independent regulation and the relationships would have become more mature. The presence of a large private sector will mitigate today's ill effects of close government –enterprise relationships.

18.b Electricity in 2025

By 2025 we can hope that generation capacity and particularly privately owned capacity, will increase to meet demand and there may even be adequate spinning reserves to meet sudden peak demands. Merit order despatch will rule and load despatch will be an independent and neutral non-profit function. Transmission capacity will have expanded to enable a truly national grid and there will even be redundancy in transmission capacity. Thefts of electricity will be a memory and efficiencies and quality will have improved. The Regulator will no longer be trying to improve management, information and commercial cultures in electricity enterprises but will be promoting trading and developing markets. There might be a South Asian Energy Grid. Hydro and nuclear power will have increased as will private participation in them.

Distributed power will be common, using gas in small package generators as well as biomass gasifiers and solar technologies serving closed or isolated communities both in urban and rural India. State ownership might be high but will function independently. As renewables grow in the total energy mix, their costs will fall and lead to their greater use, encouraged by Regulators.

18.c Oil & Gas

The Oil and Gas Regulator as well as independent regulators for coal, railways, and civil aviation might have been created by 2025. This proliferation of new 'independent' regulatory bodies could add another layer of clutter to our governance structure without improving it. We must build safeguards to keep them effective. Two actions are required.

One is to reorganize ministries and departments so that there is more coordinated decision-making.

The other is to combine responsibilities so that there are not numerous regulators dealing with related subjects. There must be mandatory consultations between regulatory agencies on specific issues that impinge on common jurisdictions. The Sri Lankan experience in providing for such regulatory consultation might be usefully studied and emulated.

18.d Beyond India:

We can expect by 2025 that the electricity and gas Grids in South Asia will be interconnected. This will raise further issues in regulatory coordination. It will be necessary to

- Develop some common regulatory philosophies so that there can be coordination between regulators of different countries, essential to ensure Grid stability;
- Together explore potential sources of energy likely by 2025- coal bed methane, Gas hydrates, etc;
- As trading and markets develop, coordination in tariffs might become possible and will lead to common governmental actions on energy security;
- The use of storage of gas for the region and its strategic release might be another issue for regulators.

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Abbreviations

CEA	Central Electricity Authority
CERC	Central Electricity Regulatory Commission
GDP	Gross Domestic Product
Gol	Government of India
IPP	Independent Power Producers
MNES	Ministry of Non-conventional Energy Sources
MoAE	Ministry of Atomic Energy
MoCoal	Ministry of Coal
MoEF	Ministry of Environment & Forest
MoP	Ministry of Planning
MoP&NG	Ministry of Petroleum & Natural Gas
MoR	Ministry of Railways
MORT&H	Ministry of Road Transport & Highways
OFGEM	The Office of Gas and Electricity Markets
PC	Planning Commission
PPA	Power Purchase Agreement
SERC	State Electricity Regulatory Commission