PN-157 2006ER25

USAID | INDIA
FROM THE AMERICAN PEOPLE

Ministry of POWER
GOVERNMENT OF INDIA

Regulation of Distribution Business

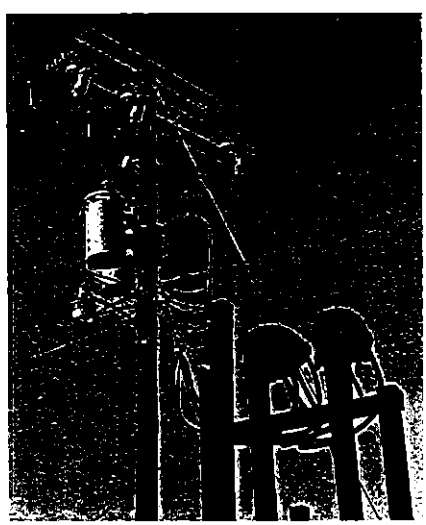
Reference Book

15 -19th May 2006

DRUM Training Program

DISTRIBUTION REFORM, UPGRADES AND MANAGEMENT

A USAID Funded Program



teri

Power Finance Corporation Ltd.
(A Govt. of India Undertaking)

TABLE OF CONTENTS

VII. RELEVANT BACKGROUND MATERIALS

1. "Why and when do state government's reform: the case experience in electricity in Delhi" by Jagdish Sagar, India Infrastructure Report 2004 (Module II&III)
2. "Improving the performance of the distribution sector: An evaluation of two approaches" by Daljit Singh & Sidharth Sinha, India Infrastructure Report 2004 (module II and III)
3. "Benchmarking and regulation of electricity transmission and distribution utilities: lessons from international experience" by Tooray Jamasb and Michael Pollitt, University of Cambridge
4. "Regulation and policy" Chapter 2, Governing Power by S.L Rao
5. "History of electricity in India", Chapter 4, Governing Power by S.L Rao
6. "Regulatory law: principles, processes, and procedures, Chapter 9, Governing Power by S.L Rao
7. "Quality of service of distribution utilities: need for end to end commitment", Lead authors Sreekumar N & Shantanu Dixit, Prayas Energy Group
8. "Terms and Conditions of open access to intra-state transmission and distribution networks", Regulation No 2 of 2005 by Andhra Pradesh Electricity Regulatory Commission
9. Minutes of the meeting held on 17, 18 December 2004 of the Forum of Indian Regulators on "issue of surcharge (cross-subsidy) and additional surcharge".
10. "Matter of determination of wheeling charges and surcharge", petition no RER6/40/2004, by Rajasthan Electricity Regulatory Commission
11. "Matter of determination of transmission charge, wheeling charge and cross subsidy surcharge under open access", dated 9 june, 2005 by Karnataka electricity regulatory Commission
12. National Tariff Policy, 2006

I. DRUM TRAINING PROGRAM BACKGROUND AND OBJECTIVES

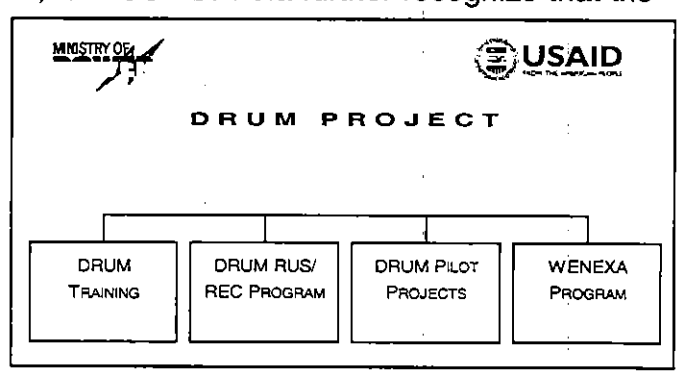
DRUM: Distribution Reform, Upgrades & Management

Power Distribution Reform in India

Power distribution reform is widely viewed today as fundamental to improving commercial performance and financial viability of the power sector in India. Initiatives, such as the enactment of the Electricity Act 2003 provide for a framework for more competitive, transparent and commercially driven power sector, and the Accelerated Power Development Reform Program (APDRP) aimed at the financing of the modernization of sub-transmission and distribution networks demonstrate the recognition and commitment by the Ministry of Power to urgently address the issue of distribution reform

DRUM Project

The Ministry of Power, Government of India, and USAID/India further recognize that the major inefficiencies in the electricity distribution sector inhibit a more rapid and comprehensive reform of the energy sector throughout the country. As a result, the Ministry of Power and USAID/India jointly designed the Distribution Reform, Upgrades and Management (DRUM) project with the purpose of demonstrating "the best commercial and technological practices that improve the quality and reliability of 'last mile' power distribution in selected urban and rural distribution circles in the country". The project is in synch with the Indian Government's policy on power sector reforms, the Electricity Act 2003 and the APDRP scheme. As a comprehensive five-year, $30 million dollar bilateral project, DRUM's four components are based upon a detailed analysis report entitled "Study Report: India Electricity Distribution Reform Review and Assessment".



Component 1: National Strategy and Alternative Financing

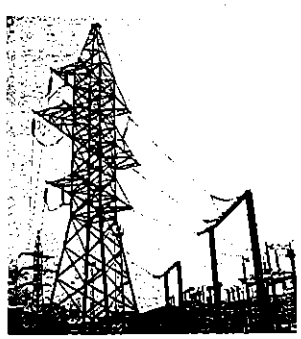
The focus of this component is to design alternative financing mechanisms with special attention on furthering the rural electrification program of the Government of India. It is also designed to provide support to the APDRP program initiated by the Ministry of Power.

Component 2: State Planning and Design

Activities under this component are designed to support state energy departments, distribution companies and other stakeholders. Capacity enhancement in the preparation and execution of distribution strategies aimed at improved commercial viability of the sector, reduced need for power subsidies and decreased state fiscal deficits are some of the aims and activities covered under this component.

Component 3: Distribution Reform Pilot Projects

The distribution pilot projects in rural and urban areas are designed to demonstrate the best technological, institutional, and commercial practices for wider replication. The distribution circles will serve as models of excellence and permit the showcasing of high quality and reliability of power delivery, and customer service by the application of efficient technologies, systems, business values and practices. A special feature of the project will be its focus on enhancing customer relations and the role of village level communities, co-operatives, and private entrepreneurs in managing the business of rural power distribution.



Component 4: Water-Energy Nexus Activity (WENEXA)

This component is designed to address problems whose roots lie at the intersection of the country's water and energy sectors, as India is facing a crisis of quality and quantity of both resources. While the situation for water and energy is serious when each resource is viewed independently, vicious cycles exist between the two that greatly exacerbate inefficient behaviors. Patterns of waste and inefficiency at the nexus of water and energy resource use exist in all sectors, but are especially prevalent in agriculture, which is the largest single consumer of water and uses 30% of the electrical power in the country.

Objectives

The overall programmatic goal of the DRUM Project is to demonstrate commercially viable electricity distribution systems that provide reliable power of sufficient quality to consumers and to establish a commercial framework and a replicable methodology adopted by Indian Financial Institutions for providing non-recourse financing for DRUM activities and programs. Specific anticipated results include:

- Improved power distribution
- Better availability and quality of electricity
- Enhanced commercial orientation and drive
- Improved consensus on the distribution reform process
- Enhanced viability of the sector
- Strengthened Distribution Reform initiatives of the MoP
- Enhanced efficient utilization of APDRP funds
- Innovative financing mechanisms
- Improved groundwater management

DRUM — Training Program

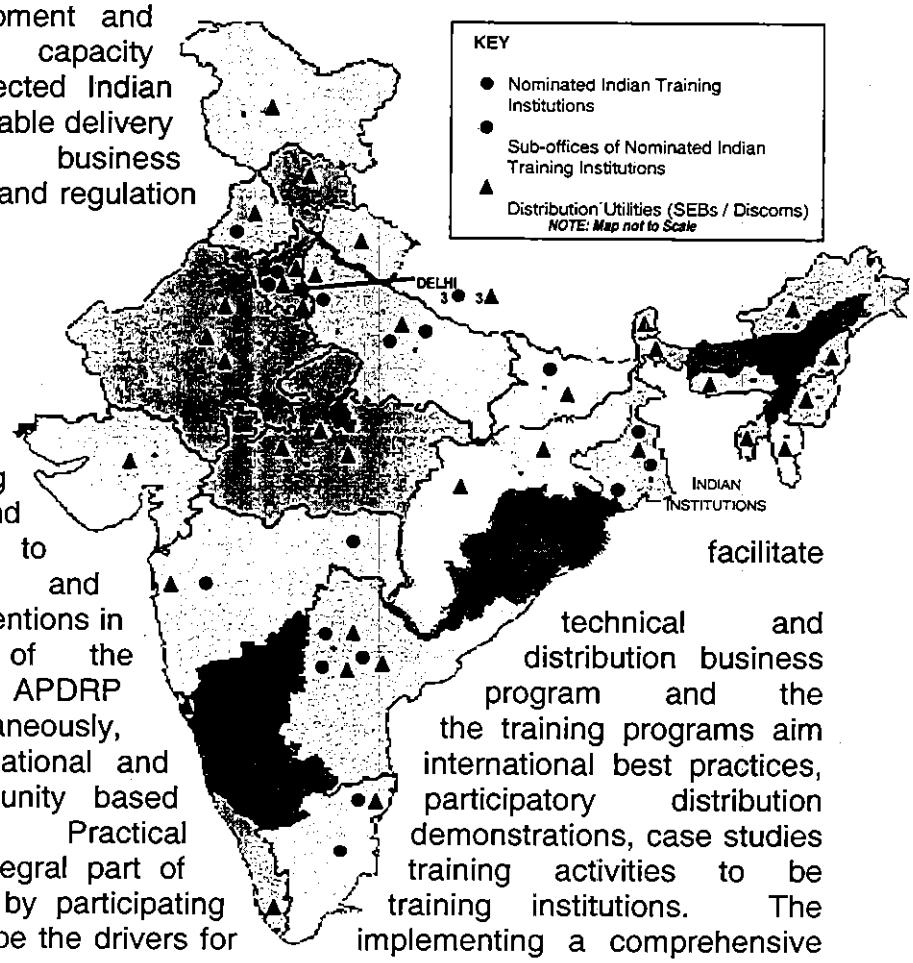
DRUM — Training in a Nutshell

As part of Component 1: National Strategy and Alternative financing, the DRUM Training Program has been designed to provide training to some 25,000 utility engineers, managers, as well as regulatory commission and staff personnel of various states. With guidance from the Ministry of Power, training activities will be regionally targeted to deliver high impact education through 15-20 regionally dispersed Indian institutions engaged in power sector and distribution reform activities.

Objectives

The two major objectives of the DRUM Training Program are to:

- Enhance the knowledge and experience of a significant number (20,000 – 25,000) of distribution engineers, managers and technicians through the facilitation of technical and managerial training delivered by professional Indian training institutions; and
- Support the development and institutional capacity enhancement of selected Indian institutions for sustainable delivery of distribution business management, reform and regulation training.



Role of the Participating Indian Training Institutions

The participating training institutions will design and deliver training programs to facilitate awareness, understanding and technical and implementation of key interventions in distribution business commercial operations of the program and the consistent with both the APDRP the training programs aim Electricity Act 2003. Simultaneously, international best practices, to share experience on national and participatory distribution and innovations in community based demonstrations, case studies business models. Practical training activities to be and field visits form an integral part of training institutions. The developed and undertaken by participating implementing a comprehensive participating institutions will be the drivers for nation-wide training program.

The focus of DRUM Training is to reach the grass-root level staff of the distribution utilities, represented by linemen, foremen, engineers, technicians, electricians, meter readers, bill collectors, and other customer interface personnel. However, for maximum results, training will also be provided to the utility supervisors and managers, as well as State Regulatory Commissions' staff. Wherever necessary, training will also be delivered in local languages.

The initial launch of various training courses during the initials years under the various technical, managerial/business and support themes will graduate to a multiplication of course deliveries over the coming years. The experience during the initial years will offer the opportunity for refinement and fine-tuning of both the course materials and training methods.

About TERI

A dynamic and flexible organization with a global vision and a local focus, TERI was established in 1974. While initially the focus was mainly on documentation and information dissemination activities; research activities in the fields of energy, environment, and sustainable development were initiated towards the end of 1982. A unique developing country institution, TERI is best described as an independent, non-profit research organization focusing on energy, environment and Sustainable development. Its mission is 'to develop and promote technologies, policies, and institutions for efficient and sustainable use of natural resources'.

Over the years TERI has developed and strongly advocates an integrated energy strategy for the country. The institute's core competence is its research capability, amply complemented by information & communication, and training & outreach. The various divisions of TERI are: (1) Regulatory Studies & Governance. (2) Policy Analysis (3) Energy – Environment Technology (4) Environment and Industrial Biotechnology, (5) Biotech and Management of Bioresources, (6) Resources and Global Security, (7) Action programmes, (8) Information Technology and Services and (9) Sustainable Development Outreach.

While TERI's vision is global, its roots are firmly entrenched in Indian soil. All activities in TERI move from formulating local and national level strategies to suggesting global solutions to critical energy and environment related issues. It is with this purpose that TERI has established regional centres in Banglore, Goa, Kolkata and Guwahati, and has also set up affiliate institutes in Tokyo, Moscow, Malaysia, London, and Washington, DC.

TERI has successfully carried out and completed Training and other Power related Programs/ projects funded by World Bank, ADB, DIFID, CIDA, USAID, and JBIC etc.

About PFC

Finance Corporation Limited (PFC) was set up in July 1986 as a Development Financial Institution dedicated to the Power Sector. PFC is committed to the integrated development of power and its associated sectors by channeling resources and providing financial, technological and managerial services for ensuring development of economic, reliable and efficient systems and institutions. Since inception PFC has cumulatively sanctioned Rs. 742.68 billion and disbursed Rs 501.14 billion to the power sector till March 2005. Additionally, PFC also actively associated with the Ministry of Power, Government of India for implementation of various policies relating to development of the power.

Training Programme Description

Training Programme Facilitators: The Energy and Resources Institute
Training Programme Venue: TERI, New Delhi
Training Programme Duration: 5 Days
Target Audience : Senior and Middle Management level officials from utilities and regulatory agencies

The institution of independent regulatory bodies is relatively young and is facing several resource challenges in discharging their functions. Power sector utilities also need to gear themselves to meet the challenges of a reforming distribution sector. This programme on "Regulation of Distribution Business" has been specially developed to meet the 'capacity building' needs of regulators and utilities in the power sector.

The broad objective of the training programme is to share relevant regional and international experience in the management of distribution business. The programme will cover all the important aspects of the distribution business ranging from regulatory matters such as approaches to tariff setting, open access and reforms to issues of concern to utilities such as quality of service, information management, and energy efficiency.

Training Program modules

Day-1

Module 1: Regulation in the context of economic reforms

Module 2: Distribution reform – Challenges, issues, and opportunities

- Imperatives for reforms
- Key problems in power distribution
- Implementation issue
- Role of state governments in distribution reforms
- Role of regulators and different stakeholders during and after the reforms
- Implication of Electricity Act 2003
- Experience of states in restructuring/ unbundling SEBs
- Choice and suitability of distribution reform model adopted/proposed

Module 3: Distribution reform – Challenges, issues, and opportunities (Contd.)

Module 4: Regulatory approaches to price regulation: Regional and international experience

- Normative and positive theories of regulation
- Cost plus or Cost of service regulation
    - Average cost
    - Marginal cost
- Performance based regulation
    - Designing incentive structure
    - Multi-year framework
- Merits and demerits of RoR and PBR regulation
- Regional and international experience

Day-2

Module 5: Institutional issues between regulator and regulated entities

Module 6: Open Access: Key issues and requirements

- Approaches towards fixing of relevant charges (transmission charges, wheeling charges, cross-subsidy surcharge, additional surcharge and manner of reduction and elimination of surcharge, reactive energy charges for OA consumers etc.).
- Treatment of cross-subsidies and allocation mechanism between consumer classes.
- Implementation requirements in terms of infrastructure (metering, operating rules for scheduling and settlement, and operational requirements etc).
- Institutional issues in managing competition introduced through open access (capacity and loss allocation, planning and funding of new investments, coordination with CTU, grid constituents, grid codes and operating parameters etc.)
- Experiences of states in implementation of OA so far
- Open Access experience in other countries.

Module 7: Regulatory approaches to price regulation: Regional and international experience (Contd.)

Module 8: Parallel Distribution and Micro Privatization – A Case-study

Day-3

Module 9: Governance issues in regulation of power distribution

- What is governance?
- Framework for governance
- Issues in governance
- Players and their roles in governance

Module 10: Governance issues in regulation of power distribution

Module 11: Regulatory responsibilities for consumer protection

- Consumer protection against poor quality of supply
- Rule making for customer service requirement
- Redressal system
- Process of involving and seeking consumers' views before and during public hearing
- Creating consumer awareness

Module 12: Regulatory approaches to quality of service

- Traits of Quality of Service
- Rationale of Regulation of QoS
- Regulatory Tasks and Challenges
- Role of Utilities in QoS
- Experience of south-asian countries

Day-4

Module 13: Open Access-Addressing issues of Cross-subsidy

Module 14: Distribution Codes and Quality of Service

- Contents and process of developing distribution code
- Outcomes and implementation issues/challenges

Lunch

Module 15: Annual Revenue Requirement-Key issues in preparing and filing of ARR

- Efforts to improve the efficiency and reliability of distribution networks

Module 16: New metering devices and Revenue Management:

- CEA regulation on installation and operation of meters
- New metering products – TOU/TOD meters, Prepaid meters
- New metering technologies (Automated Meter Reading)
- Case studies

Day-5

Module 17: Discom led DSM programs and the need for regulatory push

Module 18: Understanding the National Tariff Policy

- Key features including the provisions aimed at promoting competition in the industry
- Discussion on new provisions introduced in the tariff setting process
- Experience so far

Feedback

Course Round and certificate distribute

Agenda

Regulation of Distribution Business

TERI, New Delhi
15-19 May, 2006

Monday, May 15, 2006

9:30 a.m.	Registration
10:00 am	Welcome remarks & introduction to TERI Dr Leena Srivastava, Executive Director, TERI
10:15 a.m.	Module I: Regulation in the context of economic reforms Dr S.K Sarkar, Director, Regulatory Studies and Governance Division, TERI
11:20 a.m.	Tea/Coffee Break
11:40 a.m.	Module II: Distribution reform- challenges, issues and opportunities Mr Jagdish Sagar, Former Chairman, Delhi Vidyut Board and Former CMD, Delhi Transco
1:00 p.m.	Lunch Break
2:00 p.m.	Module III: Distribution reforms - challenges, issues and opportunities (contd..) Mr Jagdish Sagar, Former Chairman, Delhi Vidyut Board and Former CMD, Delhi Transco
3:20 p.m.	Tea/Coffee Break
3:40 p.m.	Module IV: Approaches to price regulation: Regional and international experience Dr Puneet Chitkara, Associate Professor & Head of Dept of Policy Studies, TERI School of Advanced Studies
5:00 p.m.	Adjournment

Tuesday, May 16, 2006

10:00 a.m.	Module V: Institutional issues between regulator and regulated entities in distribution

	Pro S L Rao, Distinguished Fellow TERI and Chairman, Institute for Social and Economic Change, Bangalore
11:20 a.m.	Tea/Coffee Break
11:40 a.m.	Module VI: Open Access: key issues and requirements Mr Ravindra, Chief (Engineering), Central Electricity Regulatory Commission
1:00 p.m.	Lunch Break
2:00 p.m.	Module VII Approaches to price regulation: regional and international experience (contd..) Dr Puneet Chitkara, Associate Professor & Head of Dept of Policy Studies, TERI School of Advanced Studies
3:20 p.m.	Tea/Coffee Break
3:40 a.m.	Module VIII: Parallel distribution and micro-privatization – a case study Mr S K F Kujur, Chairman, Jharkhand Electricity Regulatory Commission
5:00 p.m.	Adjournment

Wednesday, May 17, 2006

10:00 a.m.	Module IX: Governance issues in regulation of power distribution Dr Navroz K Dubash, Senior Fellow, National Institute of Public Finance and Policy
11:20 a.m.	Tea/Coffee Break
11:40 a.m.	Module X: Governance issues in regulation of power distribution (Contd..) Dr Navroz K Dubash, Senior Fellow, National Institute of Public Finance and Policy
1:00 p.m.	Lunch Break
2:00 p.m.	Module XI: Regulatory responsibilities for consumer protection Mr Girish Sant, Member, Energy Group, Prayas
3:20 p.m.	Tea/Coffee Break

3:40 p.m.	Module XII: Regulatory approaches to quality of service Mr K Ramanathan, Distinguished Fellow, TERI
5:00 p.m.	Adjournment

Thursday, May 18, 2006

10:00 a.m.	Module XIII: Open Access – addressing issues of cross-subsidy Sunil Kumar, Principle Consultant, PWC
11:20 a.m.	Tea/Coffee Break
11:40 a.m.	Module XIV: Distribution code and quality of service Mr Vivek Mishra, Director (Tariffs), Madhya Pradesh Electricity Regulatory Commission
1:00 p.m.	Lunch Break
2:00 p.m.	Module XV: Annual Revenue Requirement – key issues in preparing and filing of ARR Mr Vivek Mishra, Director (Tariffs), Madhya Pradesh Electricity Regulatory Commission
3:20 pm	Module XVI: New metering devices and revenue management Mr V.D Apte, Chief (Projects), North Delhi Power Limited
5:00 p.m.	Adjournment

Friday, May 19, 2006

10:00 a.m.	Module XVII: Discom led DSM programs and the need for regulatory push Dr Ajay Mathur, President, SenergyGlobal
11:20 a.m.	Tea/Coffee Break

11:40 a.m.	Module XVIII: Understanding the National Tariff Policy Mr J. L Bajaj, Distinguished Fellow, TERI and Former Chairman Uttar Pradesh Electricity Regulatory Commission
1:00 p.m.	Lunch Break
2:00 p.m.	Feedback
2:30 p.m.	Course round up and certificate distribution Dr S. K Sarkar, Director, Regulatory Studies and Governance Division, TERI
3:20 p.m.	Tea/Coffee & Course Adjournment

VI. TRAINING PROGRAM MATERIALS

Regulation in the context of economic reforms

By
S K Sarkar, Ph.D
The Energy and Resources Institute

New Delhi
May 15, 2006

Reforms of infrastructure sectors: goals

- Increases sector efficiency
- Put sector on a commercial basis
- Enhance ability to attract capital on favourable terms
- Enhances service quality
- Conform to international pressure for liberalisation

Reforms of infrastructure sectors: goals (Contd...)

- Reallocation of resources of the state
- Privatisation of risks
- Technological innovation
- Changes in economics of scale and scope
- Minimise political interference
- Reduce opportunities for corruption
- Reduce government debt and fiscal deficit

Attainment of goals dependent on....

- Compatibility of imported models with local circumstances
- Getting sequence of reforms correct
- Development of new skills for new role in state sector
- Nature of legal system
- Viability of independent regulation
- Political environment
- Performance of new entrants
- Market power and anti-trust mechanism

Regulation: types

- Economic regulation
- Social regulation
- Administrative regulation
- Regulatory reforms: such changes which improve regulatory quality
  - Deregulation
  - Reregulation

Source. OECD 1997

Regulation: why

- Regulation prevents monopoly excesses
- Benefits of regulation are:
  - attracting private investment
  - fair return to utility
  - consumer protection and consumer trust
  - improved communication
  - better delivery of services

Fundamental policy choices in regulation

- Economic efficiency vs social consideration
- Rule based vs contract (concession) based
- Rate of return (cost based) vs price cap (incentive based) regulation of monopoly services
- Anti-trust vs proactively competitive approaches to market formation
- Deliberative vs administrative decision
- Centralisation vs decentralisation

Regulatory institutions: features

- Created through independent legislation
- Neither administrative department nor judicial bodies
- Executive powers
- Legislative power
- Adjudicative powers
- Autonomous, but accountable

Regulatory constituencies

- Regulated companies
- Small consumers
- Large consumers
- Environmentalists
- Financiers
- Low income customers
- Macro economic policy makers
- Specialised and/or parochial groups

Regulatory process: principles

- Open records
- Open evidence
- Public meetings and hearings
- Public access and opportunity for public participation
- Opportunity for discovery of information from regulated companies
- Meaningful advance public notice of all proceedings and intentions

Sound regulation: scope

Regulator has:

- Core functions (e.g. tariff regulation)
- Recommendatory functions (e.g. licensing where issuing authority is different from the regulator)
- Advisory functions (e.g. counseling ministry on issues of importance, such as sector restructuring, sectoral policy)

Regulatory reforms: driving forces in India

- Donor's pressure (electricity sector in Orissa)
- Demand from private players (port sector)
- Government's compulsion

Regulatory reforms in India

- Telecom sector (TRAI 1997, amendment 2000)
- Electricity sector (OERC 1996, and ERCs in more than 25 states, CERC, EA 2003)
- Port sector (TAMP 1996)
- Oil & Gas sector (in the offing)
- Water sector (Maharashtra, and in the advanced stage in Gujarat)

Regulatory institutions: who are the members/staff?

- Generally multi-member body: members vary from 3-5
- Mainly retired bureaucrats/judges heading the regulatory bodies. Few have sector experiences
- Institution staffed by deputationists from regulated/government entities - mindset problem, divided loyalties
- Little interest from professionals; legislative barriers

Regulatory bodies: what they have done so far?

- Addressed house keeping problems
- Initiated transparent regulatory process
  - Consultative
  - Quasi-judicial
- Tariff regulation - major
- Quality of service - minimal

Independent regulation: trends in India

- Non-uniform approach across different sectors
- At initial stages, reliance on judicial intervention by regulated entities, rather than on regulatory institutions
- Non availability of qualified staff,
- Lack of regulatory legitimacy
- Less respect to regulatory institutions

Regulatory reforms in electricity sector in India

- Enactment of Electricity Act 2003 (repealing IE Act 1910, the Electricity (Supply) Act 1948, and ERC Act 1998)
- EA 2003 seeks to promote competition, protect consumer interests, rationalise electricity tariff, ensure transparent policies regarding subsidies, provide regulatory environment

Electricity sector: structure

- Monopoly of government sector, in generation, transmission, distribution, trading
- Steps to promote competition include delicensed generation, freedom for captive generation, trading as independent activity, open access in transmission at the outset, and in distribution in phases, multiple distribution licensee in a supply area, unbundling of SEBs, by stipulated dates

Issues affecting effective regulation in electricity sector

- Financial viability of SEBs,
- Level playing field, regulatory oversight
- Irrational end user tariff,
- Availability of transmission capacity
- Resistance to unbundling
- Institutional capacity for handling competition,
- Framework for Market design

Thank you

Distribution Reform

Challenges, issues & opportunities

Jagdish Sagar May 06 1

Topics

- The nature of the problem.
- Distribution reform so far.
- Some Quality of Service issues.
- Public-private partnerships: alternative models.
- Distribution privatisation experience.
- Government, regulator, civil society and accountability.

2

Part 1

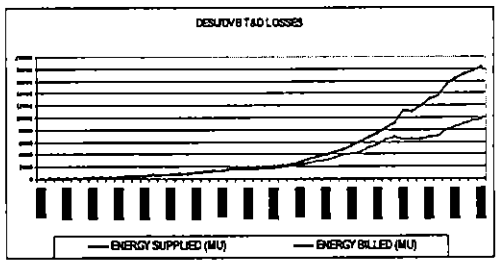
The Nature of the Problem

(Imperatives for reform,

The key problems)

3

Background-the decline of SEBs. DVB a transparent example. (No fudging through unmetered billing)



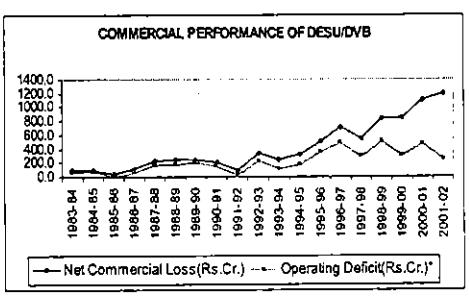
4

Non-commercial orientation:
Govt and management worried only about cash flows.

Financial Year	Date on which DVB Financial Statements were signed
1991-92	19.6.95
1992-93	7.7.98
1993-94	20.1.99
1994-95	17.6.99
1995-96	6.4.2000
1996-97	30.6.2000
1997-98	19.9.2000
1998-99	12.2.2001
1999-00	3.7.2001
2000-01	31.11.2001
2001-02	7.8.2002

5

Commercial loss and operating deficit:

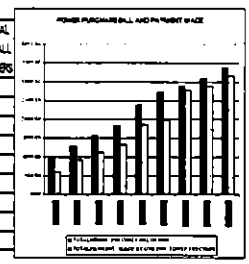


6

Non-payment as a (temporary) survival strategy:

Of DESU/DVB's accumulated dues of Rs 23137 cr by 2001, Rs 12,809 cr were to Central utilities for power purchase. (DVB's payment record comparatively good, but more dependent on Central utilities.)

YEAR	TOTAL POWER PURCHASE BILL OF DVB	TOTAL PAYMENT MADE BY DVB FOR POWER PURCHASE	%AGE OF TOTAL PAYMENT TO ALL POWER SUPPLIERS
1993-1994	1017.48	591.84	58.17
1994-1995	1290.13	911.65	70.66
1995-1996	1551.20	1110.96	71.62
1996-1997	1838.54	1321.53	71.88
1997-1998	2380.08	1853.97	77.90
1998-1999	2714.04	1972.62	72.68
1999-2000	2893.44	2770.11	95.74
2000-2001	3065.03	2871.56	93.68
2001-2002	3369.12	3160.28	93.80



7

Difficult to re-engineer a Government body:

- Management autonomy not respected:
  - Head of DESU/DVB changed 8 times between 1993 & 1999!.
  - Pervasive political interference at local level.
- External accountability oriented to procedures + extraneous considerations rather than outcomes.
- Internal accountability & reward systems skewed:
  - Quasi-judicial disciplinary procedures:
    - At DVB unbundling, 791 pending 'vigilance' cases, 135 in Court, 58 pre-1990.
  - 'Justice' orientation:
    - Litigation on 'seniority';
    - Promotions mostly retrospective.
  - Decision-making perceived as the main risk.

8

...continued:

- Background of unprofessional HR policies (e.g. DVB):

	1980-81	2001-02
Maximum Demand Met (MW)	563.8	2879
No. of Employees (Nos.)	26159	22869
No. of consumers (in lakhs)	10.11	26.45

- Inappropriate past recruitment:
  - Only 750 Engineers, 1250 Junior Engineers.
  - No professionally qualified finance/HR executives.
- No change in structure or procedures:
  - Routine multiplication of 'districts'
  - Minimal use of IT
    - Only for bill generation.

9

...continued:

- Difficult to recruit/redeploy:
  - Political support for employees;
  - Obstructive Secretariat.
  - Possibility of litigation.
- Process re-engineering constrained:
  - Delegation of powers;
  - 'Turf' concerns.
- In-house efforts to reorganise obstructed in Govt Secretariat:
  - 1995 DESU rehabilitation plan.
  - 2000 Business Centres proposal.
- Mindset.

10

Who was stealing electricity? Some examples

- ✓ Grandson of a famous national figure.
- ✓ A 'social worker' who can get a dozen MPs and the like to write on her behalf.
- ✓ Prominent NGO personality.
- ✓ A personal friend of the Chairman.
- ✓ Prestigious public school.
- ✓ Industries, Nursing Homes, Guest Houses.
- ✓ Professionals: doctor, architect, chartered accountant, lawyer.
- ✓ DVB employees.

11

Universality of the problem:
Quotes from Arthur Hailey's novel 'Overload', set in California in the 1970s.

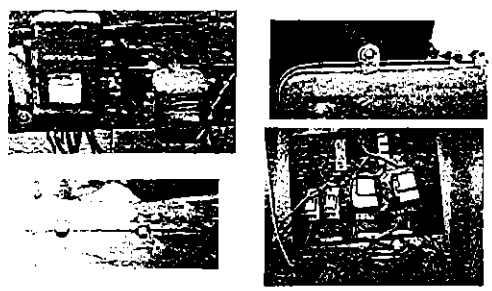
'...Don't let appearances fool you. Plenty of people with big incomes and flashy houses are deep in debt, struggling to stay afloat...now bills are big and getting bigger, so some who wouldn't cheat before...have changed their minds...'

'...And most public utilities are so impersonal, people don't equate theft of power with other kinds of stealing...'

'...The way I see it, most people have decided the system stinks because our politicians are corrupt, in one way or another, so why should ordinary Joes punish themselves by always being honest?...'

12

Metering was a mess, but...



13

People were willing to queue up for meters
(Meter-issuing camps in regularised unauthorised colonies (2000)

14

Estimated 14% of energy consumption:
'Unelectrified'unauthorised colonies'
+ Jhuggies (squatters' huts)

15

Related to urban management:

The consumer base did not keep pace with consumption:

	1988-89	1999-00	Increase
Transformation Capacity (MVA)	*5520*	*12418*	125%
Peak Load (MW)	*1129*	*2580*	129%
Consumption (MU)	*6856*	*16806*	145%
Registered Consumers (lakhs)	*15.4*	*22.9**	49%

*excluding temporary disconnections

16

Energy Audit for 2YK (11KV level):

effect of unauthorised colonies.

Circle	Energy Released (Dec 99-Nov2K)	Energy Billed (Jan-Dec 2K)	Distribution Loss
Central	*1383.75 MU*	*784.28 MU*	43.32%
East	*2848.07 MU*	*1049.59 MU*	63.15%
North	*2459.69 MU*	*1501.81 MU*	38.94%
North-West	*1761.85 MU*	*971.63 MU*	44.85%
South	*3772.86 MU*	*2290.50 MU*	38.29%
West	*2725.38 MU*	*1121.53 MU*	58.37%

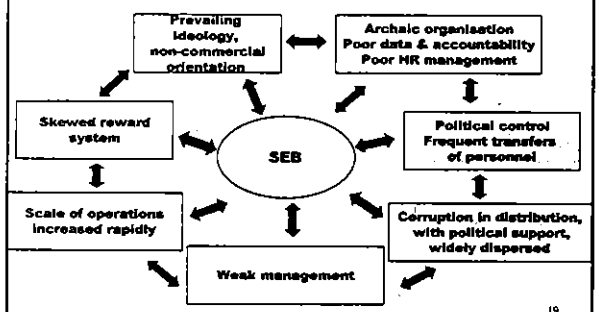
17

Energy Audit 2K - districts with highest and lowest distribution losses:

	Energy released (Dec 99-Nov 2K)	Energy billed (Jan-Dec 2K	Distribution loss
Yamuna Vihar (East Circle)	*901.00 MU*	*239.61 MU*	73.41%
Nehru Place (South Circle)	*446.10 MU*	*349.31 MU*	21.70%

18

Summing up on SEB deterioration:



19

Part 2

Distribution Reform So Far

Policy and Implementation

20

Power Sector Reform in India:

- First phase from 1991:
  - Guaranteed PPAs to encourage IPPs; poor results.
  - Captive Power Policy: moderately successful.
- Second phase:
  - Distribution reform: Orissa started 1993.
  - Common Minimum National Action Plan, 1996:
    - Independent Regulation;
    - Private Participation in distribution & transmission;
    - Compulsory metering;
    - Encourage captive and cogeneration.

21

WB assisted reform in Orissa, Haryana, Andhra Pradesh, Uttar Pradesh, Karnataka:

- Minimalist Reform legislation:
  - Retained annual revenue filing system, no thought of multi-year package despite Latin America experience;
  - All regulatory eggs in SERC basket:
    - Removal of the political risk associated with Government regulation was thought sufficient.
  - Privatisation was a stated goal, but not built into the package.

22

WB assisted reform in Orissa, Haryana, Andhra Pradesh, Uttar Pradesh, Karnataka:

- Slow process:
  - Two stage unbundling:
    i. Unbundle SEB into Genco & Transco-with- distribution, then
    ii. Unbundle Transmission & Distribution;
  - Discom privatisation a third (optional) stage;
  - Dilatory & expensive consultancies;
  - If financial assistance is the motivator, will it lead to "window dressing" plus "just-enough" steps?

23

WB assisted reform in Orissa, Haryana, Andhra Pradesh, Uttar Pradesh, Karnataka:

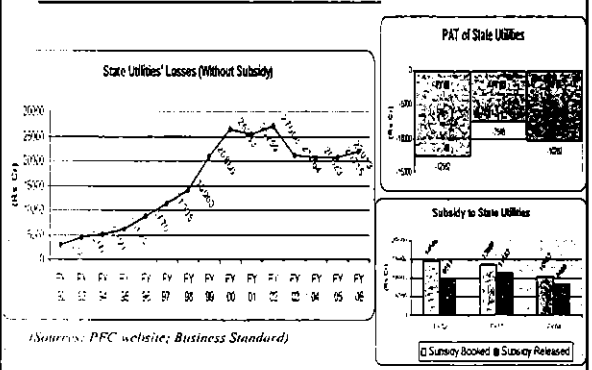
- After Orissa, no progress from unbundling to privatisation:
  - Political leadership in no hurry to disinvest Discoms once created.
- Deteriorating commercial performance of unbundled discoms:
  - Further accumulation of liabilities;
  - No decisive improvement in commercial efficiency (except in Andhra Pradesh).

24

Delhi	Earlier Reforming States (typically)
Government reformed because it expected an electoral reward for doing so.	External assistance supported by external pressure (from external agencies were essential factors.
No external intervention or financial assistance for the reforms.	
Privatising distribution the clear objective: no intermediate stage of public sector corporate functioning of unbundled distribution utilities.	Privatising distribution at best a long-term objective; unbundling in stages, attempt to run unbundled utilities without privatising them.
No financial benefit to Government within its then current term of office (as reforms involved cash outflow initially, payoff thereafter.)	Current financial benefit to Government in the form of assistance from external agencies.

25

What assurance of financial health?



(Sources: PFC website; Business Standard)

Has too much hope been raised by claimed reforms?

- Late and inadequate availability of reliable information regarding efficiency improvements:
  - Utility financial statements not easily available.
  - Regulatory orders the best source: usually delayed.
  - Regulatory scrutiny uneven.
- Difficult to see through the "hype":
  - Anecdotal claims of success, not scrutinised.
  - Why so many 'pilot projects'?
  - Irrelevant criteria, like "cash loss reduction".

27

...continued

- Euphoria over policy statements, announcement of targets.
- Electricity Act, 2003 a major step, but
  - Unbundling, regulation were already spreading to more States;
  - Open Access and parallel distribution licenses are not yet a reality: could this not have been foreseen?
  - Generation capacity creation through private investment will be the real proof of distribution reform:
    - Success has yet to be achieved by this criterion.

28

More about Open Access and Parallel Licenses:

- Why Open Access in distribution is desirable but won't happen on any large scale:
  - Cheaper generation not on offer: competitiveness of open access supplier depends on cherry-picking in the context of cross-subsidy-
    - Cross-subsidy necessitated by inefficiency, high losses.
  - Rapid cross-subsidy elimination not politically feasible, pending efficiency improvement;
  - Efficiency improvement, facilitating cross-subsidy elimination, would deprive open access suppliers of their competitive advantage.

29

...continued...

- More problems with Open Access:
  - Line losses, including theft, borne by main licensee:
    - not a problem where utilities are efficient.
  - No consumer-supplier interface on QoS:
    - this could be problematic in our environment.

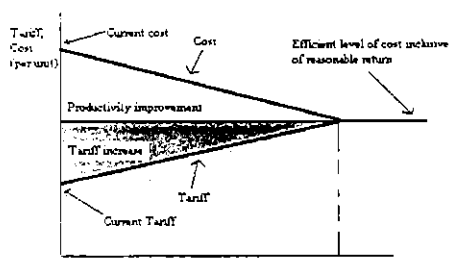
30

...continued.

- Why Parallel Licenses won't be granted:
  - Viable only on a territorial cherry-picking basis
    - And assumes inefficiency of incumbent utility;
  - In urban areas, limitation of space for surfaces, resistance to further urban disruption;
  - Probably not attractive in rural areas;
  - Government functionaries at all levels will support incumbent Government-owned utilities in the face of competitive threat.
- Conclusion: no "bypass" around the challenge of making distribution utilities function effectively.

31

The basic issue in distribution reform: passing the marshmallow test



32

A four-year-old child is left in a room with a marshmallow, with the choice of either eating it or of leaving it and getting two marshmallows when the researcher returns:

'Some children grab for the treat the minute he's out the door. Some last a few minutes before they give in. But others are determined to wait. They cover their eyes; they put their heads down; they sing to themselves; they try to play games or even fall asleep.' *(Nancy Gibbs, Time Magazine, October 2, 1995)*

***Follow up research** (15+ years later):*
The kids who hold out not only get a second marshmallow, they do better all their lives.

33

Part 3

Quality of Service Issues

34

Quality of Service:

The consumer does not distinguish between shortages and breakdowns. But we should when considering distribution performance:

'Differences in Corridors of Power' Hindustan Times, Delhi 14.5.06

THE STATE and Union Power Ministers seems *(sic)* to be divided on whether Delhi's power situation has improved after privatisation. Union power minister, Sushilkumar Shinde informed Parliament on Friday that Delhi is facing its worst ever power crisis. The total energy shortfall reached 4.2 per cent and peak demand deficit hit 4.4 per cent in April. This is already higher than the peak power shortage for previous years.. ..

However Haroon Yusuf, Delhi's power minister, says, "Since privatization the power situation in the Capital has improved". This year, he says, "there has not been a single report of transformer burning. Power breakdown has reduced to 60 percent compared to last year... There are fewer complaints from consumers. Voltage fluctuation has reduced. But there is scope for further improvement," he says.

35

Supply Parameters & Delhi Status

SAIDI (System Average Interruption Duration Index)	Average Duration of an Outage	Stated by Discoms in presentations, showing substantial improvement. • Not on websites. • No external verification. • Not scrutinised by DERC.
SAIFI (System Average Interruption Frequency Index)	Average Number Outages per year	
CAIDI (Consumer Average Interruption Duration Index)	Average Duration of an Outage for those consumers who had an outage.	
MAIFI (Momentary Average Interruption Frequency Index)	Relevant if interruptions lasting less than *n* minutes excluded from SAIDI/SAIFI/CAIDI	N. A.
Service Availability Index	Possible to estimate with reference to major outages/shedding.	Breakup of reasons shows Discom improvement
Distribution Transformer Burnout	Very rough indicator where situation is really bad.	Huge improvement shown since privatisation.

36

Other parameters

- Billing & Metering norms, errors, grievance redressal:
  - DERC, other ERCs, have laid down standards with penalties for individual lapses.
  - Overall performance should be monitored externally.
- Call Centre performance:
  - No independent monitoring.
- Response time:
  - DERC, other ERCs, have laid down standards.
  - Performance not available.
- Consumer satisfaction surveys:
  - Commissioned by DVB/DPCL up to 2003.
  - Commissioned earlier by UPERC.

37

Comparisons across SEBs/Discoms

- MoP entrusted performance monitoring to CEA
  - Dependent on SEB/Discoms' own reporting.
- State-wise ratings commissioned by MoP
  - Useful but some inconsistencies, anomalous results, two agencies reviewing different States.
- ERC orders the most reliable guide, but
  - Focus on tariff issues;
  - No common format. Chapter on utility performance in earlier UPERC tariff orders, not paralleled by other ERCs.

38

Part 4

Public-Private Partnerships

Alternative Possible Models

39

Challenges, Activities & Opportunities in Distribution:

- ❑Unbundling
- ❑Regulation
- ❑Transparency
- ❑Competitive threats
- ❑Accountability to consumers
- ❑Restructuring
- ❑Commercial reorientation
- ❑Efficiency improvement
- ❑Focus on consumers
- ❑Financial advice
- ❑Change management
- ❑Training
- ❑MIS
- ❑IT & automation
- ❑Supply standards
- ❑Energy Audit
- ❑Billing & Grievance redressal
- ❑Call Centres
- ❑DSM

The Case for PPP

- *Problem of in-house capability*
- *Organisational rigidities*
- *Staff motivation*
- *Urgency*
- *Cost*

40

Modes of PPP (in descending order of transfer)	*Problems (inversely with degree of transfer)*
•Distribution Utility privatisation	•Transition management
•Management Contract	•Risk apportionment
•Franchise	•Political risk & State support
•Outsourcing	•Regulatory risk
	•Consumer confidence
	•Flexibility for unforeseen situations
	•Culture of 'partnership' compatibility with Government accountability culture?
	•"Civil Society" culture of allegations.

41

Management Contract	*Has been successful elsewhere, but in India has been tried only once, in Orissa, unsuccessfully.* *• Requires continuous State support.* *• Risk apportionment simplified in principle, problematic in practice without a strong PPP culture.* *• Organisational improvement difficult without effective control over staff, flexibility in HR management—the key operational difference between management contract and utility privatisation.*
Franchise	*7th Proviso to section 14, Electricity Act 2003: '...in a case where a distribution licensee proposes to undertake distribution of electricity for a specified area within his area of supply through another person, that person shall not be required to obtain any separate licence from the concerned State Commission and such distribution licensee shall be responsible for distribution of electricity in his area of supply...'*

42

Franchise Issues	
Possible objectives	Discharge Universal Service obligation. Extend metering and billing to reduce theft, consumption. Improve collection.
Franchise area	Urban: squatter settlement, unauthorised colony. Rural: village. Technocratic: Substation.
Licensee's liability	Licensee remains liable to regulator and consumer.
Franchisee's responsibility	'...undertake distribution...' = licensee obligations. Franchisee's specific tasks, nature of supervisory responsibility, terms of franchisee liability to licensee, all left to contractual agreement: no sharp line between outsourcing and franchising. Industry practices will have to evolve. 43

DVB Single Point Scheme (pre-privatisation, pre-EA 2003)	
Objective	Reduce theft, transformer burnout. Target areas squatter settlements and unauthorised colonies. About 600 contracts executed.
Terms	Contractor was DVB's consumer. Extended own network to residents, on payment. Option of metering or fixed rate (based on appliances). 20% commission.
Problems	Legality in issue: but legal challenge failed—no right to steal. Contractor acceptability: often a political issue. Contractor capacity: some suffered losses. Contractor misconduct: theft from DVB; misappropriation of consumer deposits; alleged overcharging.
Outcome	Did bring about 150,000 households into the billing net. Wound up after privatisation: regulatory disapproval; problem of licensees' responsibility under EA 2003. 44

Cooperative Societies: In various countries, tested solution for rural areas	
Indian Experience to date	• Main pre-reforms PPP model; little impact. • 41 set up *circa* 1970, financed by REC. • Most (27) reported taken over by SEB or liquidated.
Problems reported, reflecting lack of State support	• General problems of cooperative movement in India. • Cost of power charged by SEB. • Tariff restriction without subsidy. • Poor consumer mix, SEB unwillingness to transfer semi-urban or HT loads. • Poor supply, inadequate sub-transmission back-up.
Situation post EA 2003	• Exemption from license possible under section 13. • Problem of sourcing will remain, except in case of distributed generation. • Greater freedom regarding tariff and consumer mix. • Cooperative movement problems remain. 45

BSES Orissa Participative Model for Rural Areas: also introduced in Karnataka and Noida.	
Build-up to full franchise through stages of outsourcing	• Intervention stage: Village Committee, Village Contact Person, Grievance redressal, Survey by Utility. • Collection-agent: Stage can be omitted. • Input-based: Payment feeder-wise on basis of collections as percentage of input energy. Requires local energy audit. • Franchisee partner: Franchisee buys at contracted rate, raises bills at approved tariff, retains collections in excess of contracted rate.
Impressive experiment. Some questions.	• Little agricultural consumption in Orissa. • Facilitation of rural energy audit may have been best result. • Reported successes need to be considered in context of limited overall efficiency improvements: AT&C loss targets for FY 08 are 34-38%. • Fourth stage not widely operational.

46

Assam Single Point Power Supply Scheme for rural areas	
Some potential weaknesses	• Wide local discretion in choice of Agents, no eligibility criteria. • Two-year agreement. • Flat 10% distribution loss + 15% commission. • Consumer mix as reported by Agent. • ASEB arrears separated. • Dual interface with consumers: maintenance, billing, new connections by ASEB, meter reading and collection by Agent.
Benefits reported	• Showed greatly improved collections over up to three months compared to average of previous six months. • No other parameter. Data incomplete for many franchises. • Impossible to judge real benefits, or their sustainability, on the basis of information available.

47

Gujarat Distribution Franchise Proposals	
Commercial rather than 'Participative'	• Companies eligible (& Coop Societies). • Competitive Bidding. • Loss reduction trajectory the main bid variable. • 'Essentially...to operate the distribution business as Sole Agent'. • Assets on 'right to use basis'.
Questions	• Incorporating other bid variables with efficiency improvement. • No clarity on capex. • No clarity on employees. • Term of 3 to 5 years appears short. • Relationship with licensee: details of contract. • Last date for EOI was Jan 12th, 2004. No news of further progress.

48

Andhra Pradesh 'Substation Franchising'	
Commercial	• O&M and revenue cycle management of 33 KV substation. • Substation and feeders without employees. • Bidders to quote commission on collection target & excess collection. • Penalty 2% of commission for every 1% of shortfall.
Still an experiment	• 16 Substations offered. • Three contracts awarded.

49

Outsourcing	
Very large scope	• Easier to implement than other forms of PPP, risk apportionment less problematic. • APDRP alone envisages Rs 20,000 crore project investment, favours turnkey implementation. • Utility services market not less than Rs 2000 crore a year. • Open to small as well as large firms. • Fruitful DVB experience with meter-reading & bill delivery.
Potential problems	• Possibility of wastage, reinventing the wheel, sub-optimality, in midst of plethora of new ideas. • Example: expensive GIS with overprovided features where Consumer Indexing the cost-effective first priority. • Anecdotal nature of much success reporting: not convincing until reflected in utility performance.

50

Some conclusions:

- No decisive change can be attributed to non-privatisation forms of PPP so far.
- No established success models.
- PPP success requires mindset change-
  - Willingness to design models that are viable for private investors, through interaction with them: has to be a 'win' for both sides;
  - Willingness to make mid-course changes where necessary;
  - Enabling accountability environment.

51

Part 5

Distribution Privatisation Experience

52

Orissa	*Delhi*	*Lessons of Experience*
Wrong baseline data. Investor's risk.	Better data. Comfort of ERC approval.	Delhi's AT&C loss concept may be less useful in other States.
Steep initial tariff increases, though insufficient to cover costs. Tariff now stable.	Transitional assistance. Moderate increases projected, not binding on ERC. Projections not followed, uncertainty continues.	Feasibility of annual tariff revision unpredictable, depends on consumer satisfaction perception + political situation.
Investors accepted total regulatory risk. From 2004, ERC has approved business plans to FY 08.	Loss reduction targets fixed through bidding. Other aspects of regulatory risk remain unmitigated.	Comprehensive multi-year tariff package necessary for fair and predictable risk apportionment.

53

Orissa	*Delhi*	*Lessons of Experience*
Overvaluation of assets raised tariffs. Govt recognised error; surrendered Govt utilities' return.	Business valuation of assets.	Business valuation since provided for in Electricity Act, 2003.
Investors accepted investment risk. Finance a problem, but APDRP assistance available. ERC has asked them to increase equity.	Investors accepted investment risk. Finance available, but APDRP assistance discontinued. Over-investment proposals of two Discoms rejected by ERC.	Capex projections should be incorporated in multi-year package.

54

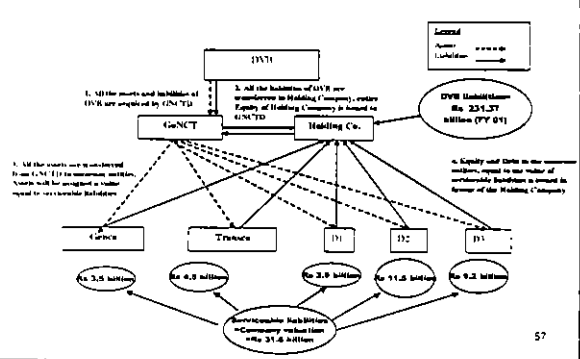
Orissa	*Delhi*	*Lessons of Experience*
Currently viable. Problem of liabilities from early post-reform years to be resolved.	Regulatory Assets. Companies not yet earning committed return. Loss reduction success.	Initial efficiency improvement slow. Turnaround delay unless tariff + transitional assistance cover the gap.
State support was always an issue.	State support an issue after consumer dissatisfaction in 2 discoms. Special Courts delayed, police support an issue.	Without goodwill of consumers, private Discoms cannot count on State support.
Pre-EA 2003.	Pre-EA 2003.	EA bypass options affect investor interest.

55

Risks that should be transferred	*Risks investors should not face*
• Management risk, including - Commercial risk (loss reduction) - Penalties for not meeting service standards.	• Unforeseeable regulatory risk: - Importance of a comprehensive multi-year package.
• Investment risk: - Subject to regulatory scrutiny. - Safeguard for Government control in case of equity increase.	• Government payment risk. • Government support risk: - Experience with APDRP - Route clearance, etc. - Law & Order support. - Decision-making mindset.

56

Financial Restructuring in Delhi



57

Complex contractual structure:

Shareholders' Agreement	Between Holdco & Investors	For each Discom
Loan Agreements	Between Holdco & DVB Successor Companies	With each company
PPA	Between Transco & Genco, Transco & Pragati Power	Subject to DERC approval
Bulk Supply Agreement	Between Transco & each Discom	Subject to DERC approval
Escrow Agreement	Between Transco & each Discom	
Shared Facilities Agreement	Between Transco and each Discom	Covers various transitional issues
Tripartite Agreements	Between GNCTD, DVB & 2 staff organisations	Protected staff interests, provided for Pension Trust
License	Issued by DERC to Transco & Discoms	DVB deemed license for interim

58

An empirical, iterative process:

- Model 1: Strategy Paper, Feb 1999.
- Model 2 (Up to Jan 01):
  - Business Valuation
  - Restructuring
  - Assistance to Discos direct
  - Bidding on equity
  - Operationalise transfer scheme *before* privatising.
  - Five-year tariff setting principles (=formulae) proposed to Commission

59

...continued

- Final model:
  - Solution devised after rejection of tariff setting principles: to legitimise loss reduction targets by making them the bidding criterion.
  - Backdrop of Kanpur failure, developing Orissa experience, very little investor interest.
  - Operationalise transfer scheme only with privatisation:
    - Resist temptation to run Government companies
    - Plus other considerations already referred to.

60

Three inputs for sector turnaround: status at beginning of FY 06

A T&C Loss Reduction Targets overachieved:

	2002	Bid level 04-05	Bonus level	Actual	Over	Consumer Gain*	Discom Bonus
NDPL	48.1%	40.85%	37.10%	33.79%	7.06%	Rs 121.8 cr	Rs 37.3 cr
BRPL	48.1%	42.70%	37.35%	40.64%	2.06%	Rs 71.0 cr	0
BYPL	57.2%	50.70%	45.70%	50.12%	0.59%	Rs 12.3 cr	0

*Consumer gain shown is for overachievement, in addition to target achievement.

Transitional assistance disbursed as committed:

2002-03	2003-04	2004-05	2005-06	2006-07
Rs 1364 cr	Rs 1260 cr	Rs 690 cr	Rs 138 cr	Nil

But initial tariff increases less than projected (not binding):

	2002-03	2003-04	2004-05	2005-06	2006-07
Projected	10%	10%	10%	5%	3%
Actual	0	5%*	10%	6.6%	???

*Counterbalanced by removal of minimum charges & misuse charges.

61

Tariff increases projected vs actual increases allowed by DERC:

	2002-03		2003-04		2004-05		2005-06		Cumulative 2002-03 to 2005-06	
Category	As per SBI	As per DERC	As per SBI	As per DERC	As per SBI	As per DERC	As per SBI	As per DERC	As per SBI	As per DERC
Domestic	15	0	15	5	15	10	7	10	63	27
Non-Domestic	7	0	7	4	7	9	5	4.2	29	18
Agriculture	15	0	15	47	15	14	15	19.8	75	99
SIP	7	0	7	6	7	10	5	4.45	29	22
LIP	7	0	7		7		5			
Railways	7	0	7	6	7	0	5	0	29	6
Water	7	0	7	0	7	0	5		29	
Public Lighting	7	0	7	5	7	7	5	12.2	29	12
Average	10	0	10	5	10	10	5	6.6	40	23

62

Tariff (billing rate) cumulative increases before & after DERC creation in 1999

	1990 status	1999 (last tariff 1997)	% increase	2005 (before rollback)	% increase
Domestic 0-100 units	0.27	1.00	270%	2.40	140%
101-200	0.32	1.75	447%	2.40	37%
201-400	0.75	2.50	233%	3.90	56%
400+	0.75	3.00	300%	4.60	53%
Non-Domestic 1	0.89	3.00	237%	5.35	78%
Non-Domestic 2	0.89	4.00	349%	4.87	22%
LIP energy	0.85	3.00	253%	4.30	43%
LIP demand	0.40	1.50	275%	1.50	Nil

63

Regulatory Assets in DERC's Tariff Orders:
(Rs Cr)

	BRPL	*BYPL*	*NDPL*	*Transco*	*Total*
2004-05	267	138	192	100	696
Revised 2005-06	221	120	207	0	548
Amortisation 2005-06	71	12	122	0	205
Remaining	150	108	85	0	343

64

Regulatory assets under National Tariff Policy (8.2.2)

- Limited to 'natural causes or force majeure conditions'.
- Carrying cost to be allowed.
- Recovery within 3 years/control period.
- Not repetitive.
- Return on equity should not become unreasonably low.

If DERC had applied these principles, the retail tariff for 2004-05 might have increased by about 30% over the previous year—to compensate for the stable tariff of the previous two years. But in the following year minimal increases might have sufficed.

65

Questions of Discom credibility & regulatory oversight:
Independent data & software audit advisable: role of ERC.

Capital Investment in Distribution System (Rs Cr)				
	2004-05		*2005-06*	
	Petition	DERC	Petition	DERC
NDPL	303.26	328.42	361.11	361.11
BRPL	800.00,	525.82*	1400.01	477.00*
BYPL	681.61	405.25*	1165.00	426.00*

**Provisional subject to verification and scheme-wise approval. DERC observations on high inventory, little capitalisation.*

Sale of Energy (Units)				
	DVB (2002)	NDPL	BRPL	BYPL
Domestic	40.80%	42.08%	54.77%	53.53%
Non-Domestic	12.53%	18.73%	30.07%	31.35%
Industrial	30.04%	32.40%	11.17%	13.23%

66

Problems with Delhi reforms, summed up:

- Failure to create a perception of consumer satisfaction:
  - A Discom failure. Initially 2 of 3 Discoms had serious billing/consumer relations problems, which affected their image.
  - This tends to make tariff revision unacceptable to consumers and Government.
  - DERC needs establish & monitor standards, win consumer confidence.
- Regulatory Assets and other regulatory issues yet to be resolved:
  - Successor companies' loan repayment to Holdco;
  - Treatment of transitional assistance;
  - Future retail tariff problematic.
- Public-private partnership under strain:
- Uncertainties on future sourcing of power:
  - Distribution privatisation not followed up with generation PPP.

67

But still a success:
Efficiency improvements ensure future turnaround for the sector.

	BRPL		BYPL		NDPL	
Opening Level as per DERC	48.10		57.20		48.10	
Year	Target Level	Achieved	Target Level	Achieved	Target Level	Achieved
2002-03	47.55	47.40	56.45	61.89	47.60	47.60
2003-04	46.00	45.06	54.70	54.29	45.35	44.86
2004-05	42.70	40.64	50.70	50.12	40.85	33.79
2005-06	36.70	35.17*	45.05	43.64*	35.35	28.50*
2006-07	31.10		39.95		31.10	

*As stated by Discoms; yet to be assessed by DERC.

68

Annual Plan expenditure on sector.
(Non-plan assistance has ceased.)

Plan Expenditure on the Power Sector (Rs Cr)						
	2000-01	*2001-02*	*2002-03*	*2003-04*	*2004-05*	*2005-06**
Capital Expenditure**	721.10	806.31	209.16	126.67	130.38	320.00
Power Sector Reforms***		860.00	1385.58	1471.75	697.25	141.50
Total	721.10	1666.31	1594.74	1598.42	827.63	461.50

*Figures for 2005-06 are Approved Outlay; other annual figures are actuals.
**These are loan; they were never repaid before unbundling but are being repaid since then.
***Includes Contribution to Pension Trust, Transitional Assistance, and expenditure on DERC.

69

Further savings to the public

- Savings to consumers @ Rs 90 cr for each % of AT&C loss reduction (overall for Delhi).
- Annual deduction of Central Plan Assistance for non-payment to CPSUs: Rs 300 cr *per annum* & increasing.
- Annual non-plan loan (to cover non-repayment of earlier loans): Rs 400 cr in 01-02, increasing annually.
- Occasional special loans—average Rs 80 cr in last 2 years of DVB.
- Increasing liabilities because of DVB's annual loss- Rs 1200 cr in 01-02.

70

Possible mismatch between regulatory 'returns' and returns as per company financial statements: possible issues of accounting standards, depreciation rate etc. that ought to be addressed by Tariff Policy.

Discom Returns in Delhi according to Financial Statements (Rs Cr)

	NDPL			BRPL			BYPL		
	FY 03	*FY04*	*FY 05*	*FY 03*	*FY 04*	*FY 05*	*FY 03*	*FY 04*	*FY 05*
Equity	368.00	368.00	368.00	460.00	460.00	460.00	116.00	116.00	116.00
Reserves	22.21	51.50	108.26	7.67	33.98	41.14	1.80	19.85	20.86
Total	*390.21*	*419.50*	*476.26*	*467.67*	*493.98*	*501.14*	*117.80*	*135.85*	*136.86*
PAT	22.1	29.29	56.76	-56.95	-31.81	60.44	-100.95	-55.29	6.52
Return	*5.79%*	*6.98%*	*11.92%*	*-12.18%*	*-6.44%*	*12.06%*	*-85.70%*	*-40.70%*	*4.76%*

71

Part 6

Government, Regulator, Civil Society & Accountability:

Are we making reform impossible?

72

State Government & Regulator

- Regulation may involve protecting the utility from its owner:
  - State-owned utilities often show little respect for regulatory orders.
- Regulation has created transparency:
  - Automatically improves accountability;
  - Perhaps the main benefit so far.
- State Government's policy role requires to be respected:
  - Issues of adherence to Policy Directions, transfer scheme in Delhi.

73

"Civil Society" and the Culture of Allegations

- 8 Writ Petitions filed against privatisation, issues include:
  - Alleged monopoly.
  - Legality of Policy Directions.
  - Business valuation vs book valuation.
  - Not allowing Bharatiya Mazdoor Sangh to bid.
  - Negotiation process.
  - Privatisation *per se*.
  - Alleged corruption.
- Quality of the petitions must be seen to be believed!
- Political vagaries: PAC etc.
- Political risk + culture of allegations, as means of self-promotion by self-appointed "civil society" groups: a constraint on decision-making.

74

Problems that will have to be managed:

- The obstacles to reform are basically political, social, mindset issues.
- Privatisation, with the higher expectations it brings, may make it more, rather than less, difficult to impose any kind of transitional burden on the consumer/voter.
  - The marshmallow test again.
- Privatisation the best option, not magic: there are also questions of private sector capability, motivation, and sensitivity to consumer perceptions.
- Gap between perception & reality (unbridgeable?)
  - Orissa still described as a 'failure';
  - Little perception of the importance of Delhi success in loss reduction.
  - People still say the new meters are fast!

75

Times of India *editorial, March 16, 2005:*
The quality of thinking we are up against!

Electricity users deserve competition, not rate hikes

Three Delhi utilities...want the regulator to hike tariffs by as much as 60 per cent. This is shocking and violates logic. How can entities that ought to make handsome margins by buying and selling power run into losses? Back-of-the-envelope numbers show that the two distribution companies buy electricity at Rs 1.50-1.60 per unit. Retail prices vary between Rs 2.20 and Rs 5.45 per unit, an average of about Rs 4.30 per unit. Some electricity is stolen and therefore not paid for. How much? When Delhi power distribution was privatised in the summer of 2002, losses were about 50 per cent of total supply. The companies had committed to cutting losses by 0.55 per cent, 1.53 per cent and 3.3 per cent in the first three years. Therefore, we assume that about 45.6 per cent of electricity is stolen and companies get paid for 54.4 per cent of what they sell, realising an effective tariff of Rs 2.33 per unit. That should leave a profit of between 73 and 83 paise per unit, totalling to a little less than Rs 100 crore, from buying and selling power. .. the power companies ... have bungled ... Open access must be introduced immediately for all classes of consumers and the practice of cost-plus pricing must be dismantled in favour of competitive rates ...Competition is the only way out, not hikes in administered tariffs that are pegged to costs.

76

In the end, the basic issues are moral, not technical:

- Intellectual honesty:
  - The perennial problem of fact vs. perception—also applies to QoS.
  - Let's not con ourselves: is 'bypass' really an alternative to making utilities work?
- Willingness to see a process through:
  - The marshmallow test.
  - Tariff fixation, QoS and civil society: transparent regulation having been established, why not work through it? Little rigorous thought, too much discussion at the level of slogans.
- The Blame Game:
  - Reform has to be an iterative process, nothing will ever work out exactly as projected.
  - Accountability is necessary but let's not make reform, decision-making impossible.

77

Thank you for your attention

78

Regulation of Electric Utilities

Puneet Chitkara
Associate Professor
Department of Policy Studies
TERI – School of Advanced Studies

What is Regulation?

- State imposed limitation on the discretion that may be exercised by individuals or organizations
- Supported by the threat of sanction

What is Economic Regulation?

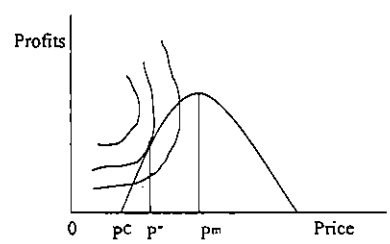
- State imposed restrictions on
  - Prices charged by the firms
  - Entry and Exit
- Example: Minimum wage restrictions

Why is there Regulation?

Various theories

- Regulation occurs in industries plagued by market failures –
  - Natural Monopoly
    - Conflict between productive and allocative efficiency
  - Externalities
- Capture theory

Stigler- Peltzman Model



Regulatory Constraints

- Informational Constraints
  - Moral Hazard
  - Adverse Selection
- Transactional Constraints
  - Identification of all contingencies
  - Legal Fees
  - Enforcement and monitoring costs
- Administrative and Political Constraints
  - Scope of Regulation: Coal / Gas / Electricity etc.
  - Choice of instrument
  - Long term commitments

Regulatory Constraints

Three types of Regulatory Constraints.

- Informational.
- Transactional.
- Administrative and Political.

These prevent the regulator from implementing it's preferred policy.

Informational Constraints

- Regulator cannot rely on regulatory contracts contingent on information held only by the firm
- We distinguish between two types of informational constraints
  - Moral Hazard
  - Adverse Selection

Moral Hazard

- Refers to endogenous variables not observed by the regulator
- A firm takes discretionary actions that affects its cost and quality of service
- Generic label for such actions is "*effort*"
  - Intensity of work done by the managers

Adverse Selection (1)

- Arises when the firm has more information than the regulator about some exogenous variables
  - Making Available carefully selected facts
  - With holding information – compel lawsuit – when delay is advantageous
  - Flooding the regulator with more information than it can absorb
  - Provide information – deny reliability – commence study to get more reliable data
  - Provide information unofficially to *sympathetic officers*
  - Respond to damaging info – supply technical counter evidence – necessitate hearing – hence delay

Adverse Selection (2)

- Adverse selection allows the firm to extract a rent from the government (regulator) even if its bargaining power is poor
  - Consider a cost reducing activity
  - Firm's intrinsic costs can be high or low
  - Firm knows
  - If Regulator wishes to ensures that the firm participates, it allows high costs to pass through
  - That is a *firm may enjoy non-negative rents even if it is intrinsically inefficient*

- Loss of information for the regulator
  - Creates a demand for information gathering
  - Periodical monitoring by Public Audits
  - Most dimensions of moral hazard and adverse selection do not show up in accounting statements
    - Recommendations of auditors are not binding and staff of auditing bodies have imperfect knowledge about the technology

Transactional Constraints

- Contracts – costly to write and likely to be incomplete
- Imposes transaction costs
  - Require long and costly studies
  - Legal Charges – All contingencies should be unambiguously defined
  - Agreements must be monitored and enforced by a court

Governance Structure and Transaction Costs

- Contingencies left out of a contract must be filled in
- The authority relationship induced by the ownership of assets impacts the Renegotiation about what is to be done when the unforeseen contingency occurs

Administrative and Political Constraints

- Scope of Regulation is limited
- Regulators cannot use any instrument they wish
- Regulatory contracts extending beyond some specified time horizon may be illegal
- There are administrative procedures governing the way the Regulator can collect information, conduct hearings, accept filings, solicit comments
- Regulators are constrained to formulate standards and follow their own rules
- Political Constraints: Legislation, Shift in authority, humiliation in public hearings etc.

Regulatory Instruments and Incentive Schemes

- Regulators use accounting data and demand data
- Many incentive Schemes are based on cost data
- A typical procurement contract
  - t = a – b C
  - A is fixed fees, b is a fraction of total expenditures C
  - Cost plus fixed fee contract (b = 0): A low powered incentive scheme
  - Fixed Price Contract (b =1): Extremely high powered incentive scheme
  - Linear contracts with slope b strictly between 0 and 1 are called "incentive contracts"

Role of Cost Data in Profit Sharing

- Sliding Scale Mechanisms
- Partial Overall Cost Adjustment Mechanisms
- Cost-of-service regulation
- Average Cost pricing regulation

Allocation of Costs

- Allocating aggregate cost among projects / product lines is generally difficult
  - Common costs may be allocated to firms advantage
  - Best engineers may not be used where cost reducing potential is maximum
- Fully distributed cost schemes too are defective – moved from MC principle – produce perverse incentives

Incentive Contracts

- Real World contracts are often linear
- Some have non-linear features such as limits on transfers from the government, or a guarantee that the firm will not lose money (they are however piece-wise linear)
- Demand data on which contracts are based are: Price and Quantity, *but may also include quality parameters*

Information Constraints at play

- Allocating costs of common activities
- Managers can assign their best resources for products with lowest "b"

Regulatory Instruments and Incentive Schemes

- Accounting Data
- Demand Data
  - Prices
  - Quantities
  - Quality of Supply

Cost of Service Regulation

- Rates are determined in two stages
  - Calculation of Revenue Requirement
    - Regulator looks at Historical costs (operating)
    - Determines the level of Capital Stock
    - Chooses a "fair" rate of return
    - Revenue requirement = cost plus the rate of return
  - Choosing a price level to equate revenue and revenue requirement
    - Quasi-Judicial regulatory hearing of interested parties

The Controversies surrounding COS regulation

- Stage-I
  - What costs to allow?
  - Measurement of stock of capital and cost of capital
  - Distortion in "optimal" choice of inputs by the firm
  - Lack of incentives for efficiency improvement
- Stage-II
  - Issues of Price discrimination and cost allocation among product lines

Incentive Regulation

- Incentives are linked to parameters such as oil consumption, heat rate, availability
- Prices are adjusted downwards when the firm's rate of return exceeds the target
- To avoid cost plus features only a part of the cost changes relative to predetermined targets are allowed to be passed on

Price Cap Regulation

- Regulator fixes a ceiling for all products or a basket of products
- Indexation adjusts the price over the review period
- Example: RPI-X regulation

PC v/s COS

- Prices are rigid under COS and upwardly rigid under PC
- Downward flexibility under PC is relevant more for the structure of the relative prices
- Under PC, individual prices reflect variable costs and demand elasticities
- Regulatory lag is supposed to be exogenous under PC
- Prospective rather than retrospective

Optimality Without Regulation

- Auctioning of Monopoly Franchise
- Contestability as it applies to Natural Monopolies
- Theory of Contestability and Auctions in a world that changes over time
- To what extent should the regulator rely on market forces such as entry to achieve optimality, versus direct regulation

Auctioning the Monopoly Franchise (1)

- Though one firm produces the good, many firms are capable of producing it
- The bid from each firm will consist of price that it will charge from the customers
- The franchise is awarded to a firm that offers the lowest price

(2)

- Assume that the firms do not collude while bidding
- The firms will bid down: Results: Zero Profits with least cost production
- The above process could occur all at once also
- Profits would be zero and production efficient without any direct intervention by the regulator

Type of Optimality (3)

- First best optimality is not achieved
- In a one good situation: all aspects of second best optimality are achieved: price = average cost, profits are zero, least cost production methods are employed
- In a multi good situation, auctions as described need not result in Ramsey Prices
  - Auctions assure that profits are zero, but does not determine which of the various price combinations that result in zero profits will be offered

Limitations (4)

- Costs and Demand Changes over time
- Once auctioned, the price does not adjust to changes in costs and demand automatically
  - Result: Either windfall profits or bankruptcy
- In the face of this, the regulator might
  - Specify how the price will change if certain events occur
  - Establish a procedure by which prices are revised periodically

Limitations (5)

- The first approach would however be incomplete at best
  - Moreover because of asymmetric information the firms may not truthfully reveal all events
  - This will lead to direct regulation
- Thus, a contract with contingency clauses that relate price to certain events ends up being essentially the same as direct regulation

Limitations (5)

- The second contracting approach tries to list all events and devise mechanisms by which prices will be reviewed periodically
- This requires review of events that have transpired – essentially same as direct regulation
- In a changing world, the distinction between direct regulation and reliance on market forces fades, when the market forces are harnessed through an auction with long term contract

Limitations (6)

- Repeated Auctions
- Incumbent may have advantage in repeated auctions
- Conditions under which repeated auctions can be used to attain the lowest possible price are the same as those required for a contestable market

Contestability (1)

- A contestable market
  - Free Entry – Entrant is not at a cost disadvantage wrt an incumbent
  - Exit is "Costless" – Firm can recoup all costs it incurred when entering
- Threat of entry would force the monopolist to produce efficiently and price so as to earn zero profit

Contestability (2)

- In contestable markets positive profits or inefficient operation would induce entry even for a short period
- First best optimality is not achieved
- Second best optimality is achieved in a one-good situation
- In a multi-good situation, prices need not be Ramsey

Limitations (3)

- The theory assumes that the entrant can enter the market before the incumbent can reduce its price – however the converse is generally true
- Two ways to confront this:
  - Entrant can sign long term contracts with employees before entering the market
  - Regulator can mandate the incumbent not to lower its price in view of entry: If this is known a priori the Incumbent will always choose a price that prevents entry

Sustainable Prices in a Contestable Market (1)

- Theory of Contestability and the notion of repeated auctions suggest that regulator should allow entry even in natural monopoly situation
- Allowing entry can cause problems in many situations even if the conditions of contestability are fully met
- Entry can, depending on cost structure, prevent equilibrium at optimal prices
- Introduce the notion of sustainable prices

Sustainability (2)

- Sustainable Prices
  - under conditions of contestability, incumbent earns zero profit and no new firms chooses to enter
  - Potential entrants are not able to make profits

definition of sustainability: Result 1 (3)

A firm's prices are sustainable only if its profits are exactly zero and it produces at least cost

- Zero profits and least cost are necessary but not sufficient for sustainability
  - Suppose there are economies of scope in production to two goods
  - These are produced by the monopolist at least cost and the prices are such that profits are zero
  - An entrant can potentially enter the market for one of the goods, undercut the monopolist and earn a positive profit

Result (1)

Are there always prices that a natural monopoly can charge that will prevent entry?

If not, then allowing entry will prevent attainment of an optimal equilibrium.

This constitutes the next result.

prices exist for a natural monopolist – Result (2)

- In a one-output situation, if economies of scale do not exist, pricing at average cost will not be sustainable
- Similar Situation exists for a multi-product firm
- This result implies that the Regulator without knowing the cost and demand function cannot be assured that the desire for entry by another firm means that the incumbent is pricing too high

Ramsey Prices may not be sustainable, even if sustainable prices exist for a MP NM – Result (3)

- Result (2) states that in some situations sustainable prices do not exist
- But will allowing entry when sustainable prices exist induce optimality?
- Ramsey prices may not be sustainable

Sustainability of Ramsey Prices

- Consider two goods A and B
- Demand of A = 1000, Demand for B is price sensitive and given by Q = 1280 – 10P
- Costs of A by a single Firm
  - Fixed Cost is $20,000, Marginal Cost $2 per unit
- Cost of B by a Single Firm
  - Fixed Cost is $30,000, MC = $3 per unit
- Costs of Joint Production
  - Fixed Cost is $40,000, MC (A) = $2, MC (B) = $3 per unit
  - P(A) = $17, P(B) = $28 are sustainable but are not Ramsey Prices

Summary

- Regulator could prevent entry by inducing the firm to charge Ramsey Prices, where Ramsey Prices are sustainable
- The incentive may be weak because the firms could charge other sustainable prices
- In case Ramsey Prices are not sustainable, the regulator by allowing entry could be preventing attainment of Ramsey Prices

Market Forces V/s Regulation

- Direct Regulation and Reliance on Market Forces are not very different in practice
- Regulator would find it advantageous to use a mix of both these approaches
- What is the appropriate combination in practice?
  - Judgment is essential
  - When market power is most effective and when limitations come into play – this judgment can always be improved

Regulatory **Challenges** for Distribution Reforms

TERI CONFERENCE

S L RAO

AGENDA

- Objectives of Reform
- Multi-year framework to reduce Risks
- Constraints and Issues
- Demand and Supply
- Trading and ABT
- Renewable resources of energy

OBJECTIVES

INVESTORS:

Reasonable chance of return to risk

REGULATORS

- Incentives for efficiency
- Reasonable division of efficiency gains between shareholders and consumers

GOVERNMENT

- Realize value for assets
- Ensure Social Policies

Consumer

- Improved quality
- Better availability
- Quality of service

Reform Experience in India:

- First phase from 1991:
  - Guaranteed PPAs to encourage IPPs; poor results.
  - Captive Power Policy: moderately successful.
- Second phase:
  - Distribution reform: Orissa started 1993.
  - Third Phase:

  Common Minimum National Action Plan, 1996:
    - Independent Regulation;
    - Private Participation in distribution & transmission;
    - Compulsory metering;
    - Encourage captive and cogeneration.

State Level Experience(1):

- Minimal Reform legislation:
  - Annual revenue filling system
  - No multi-year package
  - All regulatory eggs in SERC basket;
  - Legislation merely *enabled* privatisation.

State Level Experience(2):

- Slow process of two stage unbundling:
  i. SEB into Genco & Transco-with- distribution, followed by
  ii. Unbundling Transmission & Distribution;
  - Discom privatisation a third & optional stage;
  - Delayed consultation process
  - Financial assistance from WB was motivator; seems to result in "window dressing" plus "just-enough" steps?

Privatization (3):

- After Orissa many years before Delhi was privatized
- Political leadership in no hurry to disinvest Discoms in other states
- Especially after lack of support even by Congress to Delhi administration when it was unfairly attacked.
- Deteriorating commercial performance of unbundled discoms:
- Further accumulation of liabilities;
- Further deterioration of commercial efficiency (except in Andhra Pradesh).

Electricity Act, 2003: SERC's have not followed its spirit

- Supercedes earlier laws.
- Mandates open access, subject to:
  - Time frame to be fixed by SERC; (took two years or more)
  - Surcharges to compensate distribution licensee for
    - Cross-subsidy & losses;
    - Supply obligation.
    - Fixed at uneconomic levels for availing open access

Electricity Act, 2003 (Continued)

- Captive generation liberalised:
  - No restrictive definition;
  - Open access without surcharge.
  - Some capacity has come up
- Multiple distribution licences:
  - For *any* area, large or small;
  - Cannot be refused to protect interests of existing licensee.
- Mandates multi-year tariffs
  - Not given effect to

ABT and Trading

- CERC Order on ABT introduced a penal commercial mechanism to bring regional frequency to desired levels
- This has led to substantial trading using the unscheduled interchange surcharge as benchmark tariff
- ABT and Grid Code required balancing of load and despatch, based on load and generation forecasts
- Provided this is not seen as Gaming
- Manipulating forecasts for 'gaming' is subject to penalties
- Starving home markets to earn premium from UI is also 'gaming'
- In intra-state ABT gaming would be by large users of grid and SERC has to regulate

Good management and ABT Require Forecasts

- Forecasts of long term & short term demand in intra-state ABT, of large users of grid
- WHY LONG TERM AND HOW LONG?
- Investment and Funds Planning
- At least to extend of Long Gestation
- Alternatives to meet supply-demand gaps
  - Procurement
  - Planned and Unplanned power cuts
  - Decisions on types of power uses to allow

Forecasting-short term

- Why Short Term
- To balance Load with Despatch
- Excess Loads lead to Islanding or Frequency Declines or blackouts
- Excess supply leads to Grid Overload and Collapse
- Need to balance minute to minute
- Hence need for Load and Generation forecasts in small intervals

Wrong Forecasts lead to

- Shortages and power cuts
- Thefts
- Adverse economic growth
- Higher tariffs to those who can pay
- Search for outside procurement
- Third party purchase
- Decline in frequency
- Pressure for captive generation
- Now penalties under ABT

State Load Despatch Centre

- STU responsible for Real time operation of power system
- Must provide daily/monthly demand estimates for operational planning
- STU has to submit rolling demand forecasts every year for ten years forward and plan for supply
- Ensure integrated Grid operation
- For operations IEGC requires from it demand forecasts on daily/weekly/monthly basis
- Regulator must control SLDC

S L D C

- Both system and market operator
- Centrally despatch on Load schedule
- Determine a least cost schedule
- Cannot overdraw or over despatch or under despatch
- STU has to match supply to demand but forecasts and procurement are by DISCOMS

Merit Order Despatch used by Regulator

Present Practice

- **To despatch generators of varying age and efficiencies in the most economic order**
- **List of generating plants is arranged on variable cost of increasing output (Rs/MWh) according to specified factors to be included in cost.**

Best Practice

- **Station marginal cost pricing: cost of generating an additional MW**
- **Requires up to date cost data and assumes competitive fuel market**

RLDC

- **Apex body for integrated operation of regional power system**
- **System operation &control- inter regional power transfer**
- **Responsible for balancing generation and load schedules**
- **Determines UI charges**
- **Adjusts schedules three time blocks in advance for system security**
- **Part of interstate transmission regulation by CERC**

Role of Regulator in Trading
(applies within & between states)

- Set out rules for trading
- Ensure Load Despatcher free of commercial interest
- And represents all participants
- Recognize merchant producers, traders, brokers, agents
- Encourage expansion of transmission capacity where needed
- Third Party sale
- Open Access at reasonable charge
- Free captive generation
- Improve forecasting

MULTI YEAR TARIFFS & Regulator

- Constraints-Information on Future Operating & Investment Costs
- Regulators can use incentive based approaches
- For Information-Use incentives, benchmarking; Surveys

MYT & Regulator

- To prevent excess profit or loss, Allow:

1. Cost pass throughs for uncontrollables;
2. Provide possible add-ons;
3. Reward companies only for what is in their control;
4. Assess financial impact of incentives

MYT

- Cost Base: Investments; Losses
- Annual or halfyearly adjustment (CPI-X)
- Applied to Cap on Revenue or Unit Price
- Excess Profits or Loss controlled by Profit sharing; Rebasing Returns; Shorten life of control
- Create incentive for new investment
- NEED FOR CLEAR CRITERIA, RELATIVE IMPLICATIONS OF OPTIONS, COST IMPACT OF EACH.
- BUT MUST BE SIMPLE AND REALISTIC

T&D Losses

- Need for good base line data
- Targets to be set that are challenging but achievable
- Need for Action Plan and indenfication of responsible personnel
- SERC must monitor achievement in relation to target
- None of this is happening
- Result: T&D targets not achieved; under recovery in revenues; ARR a useless piece of paper. Losses mount further

Filing ARR's

- Need for timely filing well before year commences
- Changes not to be made after filing
- Correctness of submissions
- In practice, SEB's and DISCOMs have been slow, inaccurate, and keep changing ARR

Renewable Use

- What percentage?
- Can state buy renewable performance from other states?
- Should we not look at total cost benefit of each renewable;for example, land displacement by wind power
- What about cleaning coal pollution and setting off pollution saving against equivalent renewables?
- Devising incentives and penalties

Open Access in Transmission and Distribution

By Ravinder, Chief (Engg.)
Central Electricity Regulatory Commission
New Delhi, May, 2006

Open Access by.....

By the distribution licensee for consumers under Section 42.

By the transmission licensees for licensee, generating company and distribution open access consumer (Section 38, 39, 40) and captive generating plant (Section 9).

CERC's Open Access Regulations for Inter-State Transmission

Two Types of Transmission Service to meet the need for energy market development

Long Term Service

Short Term Service

A *long term customer* will be allowed access based on transmission planning criteria stipulated in the Indian Electricity Grid Code.

Access to *short term customer* shall be allowed subject to availability of transmission capacity.

Nodal Agency

- Nodal Agency for arranging long term access:
  Central Transmission Utility (POWERGRID), if its system is used. Otherwise the nodal agency shall be the transmission service provider in whose system the drawal point is located.
- The nodal agency for short term access:
  Regional Load Dispatch Centre (RLDC) of the Region where the drawal point of electricity is situated.

cerc 4

Features of Long Term Service

- Firm point to point Transmission Right
- Non Transferable
- Exit Option
- Long terms BPTA to facilitate investment
- Higher priority in allotment
- Last to be curtailed
- Assured recovery for Transmission Service Charges

cerc 5

Types of Short Term Service

Four Types of Services:

- Advance Reservation upto 3 months.
- Current Reservation upto 1 month
- Composite Service for next day.
- Composite Service for the same day.

cerc 6

Salient features of Short -Term Service

Point to Point Service

Exit Option

Revenue recovery reduces the payment obligation of long term customers and provides additional revenue to the Transmission Licensee.

Part day charges.

Non-transferable.

Reduced charges when there is no congestion.

Subject to "Use-it-or-loose-it" clause.

Rs./MW/Day rates for each stamp are known in advance and total charges are very simple to calculate.

Trading through *exclusive* open access

- Open Access Regulations have facilitated power trading in an orderly manner.
- Energy agreements and transmission clearance have to be arranged separately.
- Revised open access regulations facilitate advance reservation for transmission as well as day ahead reservation for trading.
- Open Access charges are reasonable and simple to apply.

Trading through *exclusive* open access... *(contd.)*

- Suppliers call for bids from buyers/traders.
- Traders compete to win the supply bids.
- Buyers have no option but to buy from the trader having the supply contract.
- Due to deficit scenario, suppliers dominate.
- Prices of trades electricity have been shooting up.

Issues in Exercising Consumer Choice through Open Access under Section 42

- Energy Charge
- Wheeling (T&D) charge
- ATC losses
- Cross Subsidy (+) or (-)

Charges Payable by Open Access Consumer to DISCOM/SEB

- Wheeling (T&D) charge for relevant voltage class
- Wheeling (T&D) losses in kind or cash
- Surcharge
- Additional Surcharge, if any

Issue No.1:After getting freedom of choice under section 42(2), whether the consumer has to ;

- separately apply for Open Access path clearance?
- sign agreements with network owners etc., and
- pay (separate) Open Access Charges in addition to wheeling charge?

Issue No.2: Billing of Open Access Consumer

- Meter ownership & type (Either he or DISCOM/SEB)
- DISCOM should read the meter
- His supplier need not read the meter
- Supplier to bill based on scheduled injection
- DISCOM to bill for T&D charges based on his meter (energy) reading, subject to a minimum amount per MW
- DISCOM to raise second bill for UI settlement?
- DISCOM to raise bill for Reactive Energy supplied

Issue No.3: Charges to be paid by the *Supplier* of Open Access consumer to the *DISCOM/SEB*

DISCOM to raise UI bills on the supplier if he is situated within the state, based on his scheduled injection *vis-à-vis* actual injection.

Issue No.4 :Whether the Open Access consumer is required to give his day ahead drawal schedule?

Not necessary, the supplier can coordinate with his consumer and give the schedule of his injection for each consumer. This minus T&D loss (at relevant voltage level) would be the drawal schedule of Open Access consumer.

DISCOM to calculate UI charge of Open Access consumer accordingly.

Issue No.5 :Wheeling Charges Payable by Open Access Consumer

- No wheeling charge payable to Discom for Transmission System outside the state (Either he or his supplier takes care of that).
- Wheeling charge should be applied differentially depending on voltage at which he is connected e.g. only STU charges should be applied in case he is connected at 66 KV above.

Issue No.5 :Wheeling Charges Payable by Open Access Consumer

contd...

- Wheeling Charges should not include losses payable by Open Access Consumer
- Amount of Wheeling Charges ? Based on marginal cost or full cost ?
- Should the wheeling charge applied on postage stamp basis ?

Issue No.6 :Right of Open Access Consumer as Network user of Discom

He enjoys all rights & privileges at par with embedded consumer for the use of network in the same manner as embedded consumer.

Network services to him are provided on equal priority.

He is not discriminated in fault clearance, load shedding, system upkeep.

He or his supplier does not have to sign any long term or short term agreement for wheeling within the State.

Issue No.7: Treatment of T&D losses for Open Access Consumers

Average postage stamp losses should be applied.

Open Access consumer should bear losses at his supply price and not at Discom supply price.

Percentage losses should be declared for every year based on ARR approval for each voltage class.

Losses should be applied in kind by reducing drawal schedule work to his injection schedule at the state periphery.

Issue No.8 Section 42: Obligation of Discom to resume supply to Open Access consumer who chooses to come back

A reasonable charge may be levied for a period of six months from the grant of Open Access.

If he comes back within six months, he is taken back on the tariff applicable to embedded consumers of his category.

If he comes back after six months, he pays 5% higher tariff for a period of one year.

Issue No.9: Reactive Energy Charges for Open Access Consumers

Discom to install KVARH meter.

Discom to bill for Reactive Energy at par with embedded consumers.

Treatment of Over-drawal and Under-drawal

- Could be priced at a special rate or a frequency linked UI rate?
- Differential rates for over and under drawal?
- Penalty for excessive over- drawal?
- Separate treatment for cases of under-drawal as a result of failure of DISCOM?
- Is SEM necessary for every open access consumer?

Thanks

MICRO PRIVATISATION
OF
DISTRIBUTION
OF
ELECTRICITY
&
2nd DISTRIBUTION LICENSEE

S.K.F.Kujur Chairman
JSERC

Company A was granted Distribution license under Electricity Supply Act 1948

For distribution of electricity in a township in 1923.

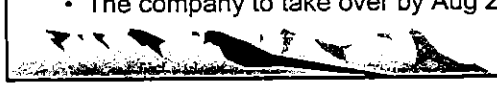
Within the licensed area there were number of areas which remained unoccupied.

Later these areas were occupied unauthorisedly.

- The Company did not supply electricity in those areas which were occupied unauthorisedly.
- SEB took over the supply of electricity in those areas in 1976.
- Thus there were five pockets in the company's area which was supplied electricity by SEB.
- SEB purchased power from the said Company for the supply in the area.

- **SEB was incurring loss in the area and consumers were also very unhappy with the supply.**
- **The complaints:**
- **Erratic supply**
- **Low voltage**
- **SEB's complaints:**
- **Revenue loss : 23% collection.**
- **Rampant theft**
- **System loss 62.5%**

- SEB and the Government decided in 2002:
- The pockets be handed over to the company.
- Valuation of the assets of SEB
- The outstanding bills on a/c of power purchase be settled.
- The company will conduct a survey in the area to know the consumers
- The company to take over by Aug 2002



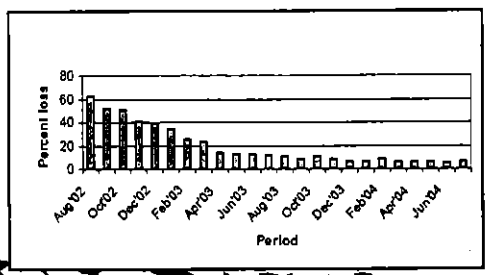
- The company took over the area after carrying out the survey and meeting the consumers of the area.
- The domestic tariff of the area:
- SEB tariff Rs.1.23/ kwh
- Company's domestic tariff: Rs. 2.50/kwh

- **Action taken by the company:**
- **Work outsourced (MASCOT).**
- Disconnection of illegal connections and payment defaulters after giving due notice
- Regularising connections (where the faults have been corrected) and providing new connections
- Change of all mechanical meters into electronic ones (starting with the faulty ones) and proper sealing

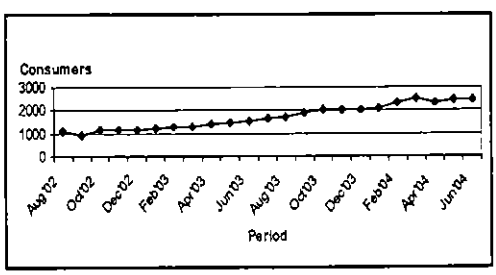
- **Action taken by the company:**
- **Regular raids to check unauthorised tapings and pilferage**
- **Replacement of damaged ACSR conductors and unsafe catenary's wires and improvements in the earthing system**
- **Regular monitoring of loading of transformers**
- **Provision of 5 new substation of 6.6kV/415 V with 1000 kVA transformers and drawing of new feeders**

- **Action taken by the company:**
-
- Underground cabling in a few sections
- Daily performance reports to track area-wise power break downs, shut downs, raids and bill collection
- Adoption of a monthly billing cycle including timely delivery and collection
- Under ground cabling (8 km of 6.6 KV and 30km of 415 V)
- Laying of insulated conductor for 15-20 km

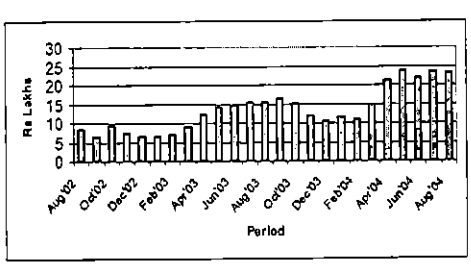
RESULTS OF ACTION TAKEN: SYSTEM LOSS



RESULTS OF ACTION TAKEN CONSUMER BASE



RESULTS OF ACTION TAKEN
Revenue collection:



Conclusion:

Micro-privatization or outsourcing of part of the distribution functions through a management contract (what the company did through MASCOT) merits consideration in other parts of the state. In fact varying models of micro-privatization have been successfully tried out in a number of states with both public and private owned distribution systems. A well-structured contract and its effective enforcement are no doubt crucial for the success of such efforts.

Electricity Regulation and Good Governance: Making the Connection

Training Program on Regulation of Distribution Business
DRUM Project
May 17, TERI, New D

Navroz K. Dubash, NIPFP, New Delhi
Shantanu Dixit, Prayas Energy Group, Pune
based on Electricity Governance Indicator Toolkit Project

1

Goal of the Session

- Make the link between regulation and new thinking in governance
- Explore the political realities of regulatory practice
- Locate the discussion in the current context of Indian electricity regulators
- Introduce practical tools to assist regulators move toward better governance in the regulatory process.

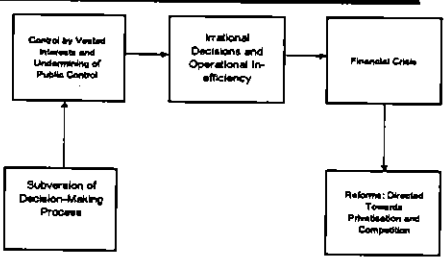
2

Outline

I. Electricity in India through a Governance Lens
II. Theory and Practice of Regulatory Governance
III. Regulatory Governance in the Indian context
IV. A Tool-Kit for Regulatory Practice

3

A Governance Diagnosis of Power Sector Crisis



4

Reforms Have Tried Quick-Fixes

- Introduction of IPPs (1991)
- World Bank led privatization of SEBs (1995 onwards)
- Introduction of Competition? (2003)

=> Underlying problems with decision-making process not addressed

5

Genesis of Regulation

- "Orissa model" of reforms
  - World Bank 1993 policy makes independent regulation one of several explicit conditions
  - International consultant driven approach
  - No clear understanding of opportunities and challenges in Indian context
  - Focus on sending signal of credibility to investors
- ERC Act 1998: Electricity regulation extended as national law
- Electricity Act 2003: Continues and extends electricity regulation

6

Mixed Record so Far

- "A Good Beginning but Challenges Galore" Prayas (2003)
  - Increased transparency and scrutiny of data
  - Weak operationalization of transparency and participation
  - Limited authority over SEBs

=> Future of regulation may lie in better regulatory governance

7

II. Theory and Practice of Regulatory Governance

8

Context for Independent Regulation Global Political-Economic

- Retreat of the state and rise of the market
  - Growing role of the private sector
  - Changing role of the state: from provider to facilitator
- Electricity Restructuring
  - New "standard model" based on competition and choice
  - Decrease in public funding and emphasis on attracting investors
- Track record of poor service provision
  - Increased political pressure from consumers

=> Independent regulators as a mediating agency between private sector, state, and citizens

9

Context for Independent Regulation
New Ideas on Governance

A. Governance as good government
   - rule of law, efficient administration, accountable bureaucracy, transparency

B. Governance as "New Public Management"
   - Separate policy and implementation ("steering" vs. "rowing"), promote competition, measure outcomes not inputs

C. New Governance: Governance without Government
   - Governance as process, involvement of stakeholder networks, based on negotiation not authority, government as enabler not controller

10

Theories of Regulation I
Public Interest

- Public interest: a response to public demands for the correction of inefficient and inequitable practice
- Roots: Railroad dispute (Munn vs. Illinois 1876)
  - "...property does become clothed with a public interest when used in a manner to make it of public consequence and affect the community at large...when one devotes his property to a use in which the public has an interest ... he must submit to be controlled by the public for the common good..."
- Assumptions
  - (Some) economic markets are fragile if left alone
  - Regulation can be achieve at a relatively low cost
- Critiques
  - Socially undesirable outcomes of regulation
  - Evidence that regulation systematically benefits only some

11

Theories of Regulation II
Regulatory Capture

- Capture theory:
  - regulators operate in a political market
  - interest groups struggle to maximize member interests
  - Life cycle theory: initial regulatory independence followed by capture as public attention is diverted
- Assumption
  - Bilateral relationship between regulator and regulated
  - Participation is unhelpful as it can lead to capture
- Critiques
  - There is often no single dominant interest
  - Government is an interested actor; government capture

12

Theories of Regulation III
Stakeholder Theory

- Stakeholder theory
  - a network of relations, including dominant firm, competitors, consumers, employees, suppliers, etc.
  - Regulators pay explicit attention to interests and ensure that outcomes reflect a balance between stakeholders
- Assumptions
  - Legitimate social interests are at stake in regulation
  - Discretionary judgments required to balance trade-offs
- Critiques
  - Which interests are to count, and how much?
  - Risks the proliferation of conflicting objectives and regulatory paralysis

13

Implications of Stakeholder Theory of Regulation

- Attention to *how* decisions are made, not just *what* decisions are made
- Importance of clear, predictable procedures
- Legitimacy and credibility of regulators rests of perception of how they balance interests

=> Importance of regulatory governance

14

Elements of Good Regulatory Governance

- Transparency: Formal, predictable, and low cost means of access to information
- Participation: Formal mechanisms for participation backed by outreach
- Accountability: Reasoning of orders
- Capacity: Regulatory and stakeholder capacity to engage in good governance process

15

Regulation in Practice
How can Regulatory Governance Help?

- Regulatory decisions create winners and losers
=>Clear reasoning provides basis for challenge or legitimacy
- Information is incomplete
=> Assumptions and path to better information made transparent
- Existence of trade-offs: e.g. Predictability vs. flexibility; Long-run vs. short-run goals
=> Rationale for choice made clear
- Regulators have inadequate financial resources and staff capacity
=> Access to external advice and scrutiny

16

International Participation in Electricity Regulation

Country/ Region	Indirect Representation	Public Hearings	Formal Representation	Corporatist Representation	Tort-based	Research, Public Survey	Direct Input
E.U.	▮	▮	—	▮	—	▮	—
Germany	▮	▮	—	▮	—	—	—
France	▮	—	—	▮	—	—	—
Netherlands	▮	▮	—	▮	—	▮	▮
Denmark	▮	▮	—	▮	—	▮	▮
U.S.	▮	▮	▮	—	▮	▮	—
Canada	▮	▮	—	▮	—	—	—
Argentina	▮	▮	—	—	—	—	—
Brazil	▮	▮	—	—	—	▮	—
Chile	▮	—	—	—	—	—	—
Colombia	▮	▮	—	—	—	—	—
Uruguay	▮	—	—	—	—	▮	—

17

Obstacles to Good Regulatory Governance

- Public lacks technical knowledge with which to engage regulatory process
- Higher transactions costs
- Danger of political deadlock

18

Promise of Good Regulatory Governance

- Better decisions: broaden information base beyond "experts" alone
- More sustainable decisions: create "buy-in" and legitimacy for politically difficult decisions
- More legitimate decisions: Participation and transparency provide means of accountability of regulators to public

19

Challenge to Regulation in India

- Large information gap
  - Basic information on losses unavailable
- Strong threat of "political capture"
  - Regulation to de-politicise the sector
- Low regulatory capacity
  - Small staff and budgets
- Weak stakeholder capacity
  - Few organizations, little technical knowledge

20

III. How is Regulatory Governance Relevant in the Indian context?

21

How Can Regulatory Governance Help?

- Stakeholder participation can boost information base
  - Independent analysis, scrutiny, including by corporate consumers and competitors
  - Supplement weak regulatory capacity
- Hearings, petitions process provides political space for debate *before* decision becomes a political crisis
- Public demand for accountable regulatory process acts as check on political capture

22

Delhi: A Thought Experiment

- Open deliberation prior to tariff setting, including of privatization agreement => better public understanding of short term costs, long term gains
- Detailed stakeholder scrutiny of ARRs => debate and revision of tariff request
- Hearings process => airing of utility and consumer demands and establishing political "feasibility set"
- Consumer groups demand political non-interference with regulatory process
- Tariff determination without government intervention

23

Outcomes of Regulatory Governance

- Consumers: long-term interest in sound regulatory process, not in populist appeal to government
- Utilities: pressure for accurate and pragmatic filings
- Investors: more confidence due to signal of regulatory credibility
- Government: faces decreased electoral stress

24

IV. A Tool-Kit for Regulatory Practice

25

Salient findings from Prayas survey 'A Good Beginning but Challenges Galore'

- Detailed survey of 13 ERCs in India (Feb 2003) – focus on transparency, resources and public participation
- Key areas for improvement
  - Procedural compliance
    - Timely Annual reports
    - Regular Advisory Committee meetings
  - Proactive measures to further transparency and public participation
    - Documentation systems and disclosure procedures
    - Greater use of local language

26

About the Electricity Governance Initiative (EGI) ..1

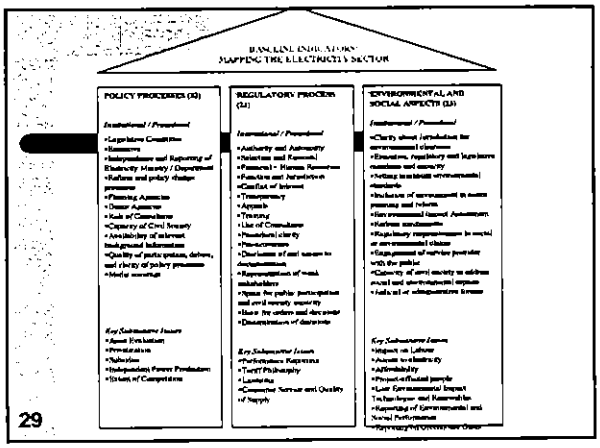
- A collaborative effort of WRI, NIPFP, Prayas
- Objectives
  - To develop common language to facilitate communication amongst stakeholders on governance issues
  - To develop operational framework to measure progress
  - To serve as capacity building and advocacy tool for CSI
  - To establish benchmarks
- Currently, pilot tested in four countries (India, Indonesia, Thailand and the Philippines)

27

About the Electricity Governance Initiative (EGI) ..2

- The toolkit Approach
  - A framework of critical research questions about institutional actors and decision-making processes in the electricity sector
  - Answers to research questions generate qualitative indicators of governance
  - Legislative, executive, regulatory levels, as well as some key operational issues
  - Emphasises environmental and social concerns
  - Addresses both law and practice

28



29

Furthering Transparency and Public Participation..1

- Salient legal provisions (Electricity Act 2003)
  - Mandatory public notice and hearing before tariff order and issue of license (S. 15 & 64)
  - ERCs to function in a transparent manner (S. 79 & 86)
  - Creation of advisory committees (S 80/81 and 87/88)
  - Recognized consumer representatives to represent interests of consumers (S. 94)

30

Furthering Transparency and Public Participation..2

- National Electricity Policy
  - 5.13.4 *"The Central Government, the State Governments and Electricity Regulatory Commissions should facilitate capacity building of consumer groups and their effective representation before the Regulatory Commissions. This will enhance the efficacy of regulatory process".*

→ Letter and spirit of E. Act and policies mandate significant transparency and public participation in the regulatory process

→ Need operationalisation of these principles and legal provisions

31

Examples of 'Further Steps"
Operationalising Transparency ...1

- **Document Indexing and Disclosure System**

Important Characteristics

- Well structured database and proper indexing
- Simple processes for accessing documents
- Structure & accessing procedure known to all

Types of Documents (examples)

- Case-wise filings
- Periodic reports submitted by utilities
- Agenda and minutes of the RC meeting

32

Examples of 'Further Steps"
Operationalising Transparency ...2

- **Information Dissemination Systems**

To ensure Easy and Timely availability of ALL documents

- Internet Based
  - Website
  - Email Newsgroup
- Newsletter (fee based?)
- Reading Room and Library with proper index

33

Examples of 'Further Steps"
Operationalising Transparency ...3

- Information available to public regarding use of consultants
  - Details of arrangements
    - Terms of reference
    - Budget
    - Selection procedure
  - Report / inputs / advice provided by consultants
  - Timely and easy availability of above information for ALL consulting arrangements

34

Examples of "Further Steps"
Facilitating effective public participation ..1

- **"Information Packs" for CSOs (in local language)**

  For example:
  - How to file a petition / affidavit ?
  - "Road-map" of regulatory process
  - Using document indexing and disclosure system

35

Examples of "Further Steps"
Facilitating effective public participation ..2

- Provision of financial and analytical support to weaker sections / consumer groups
  - Workshops, training courses, studies
  - Attending hearings, appeals in the ATE
- Email / web notice of all hearings and meetings

36

Examples of "Further Steps"
Facilitating effective public participation ..3

- Supporting diverse institutional mechanisms
  - Consumer representatives under S. 94 – e.g.MERC
  - Consumer Advocate – Karnataka
  - Staff presentations - AP

37

Examples of "Further Steps"
Enhancing Accountability..1

- Accountability of Regulatory Commissions
  - Annual reports – Timeliness and adequate information
  - Timely documentation and meetings and of advisory committee
  - Well reasoned orders with adequate response / feedback on public comments
  - Worksheets / computations on the website
  - Monitoring of 'order compliance' and timely actions

38

Examples of "Further Steps"
Enhancing Accountability..2

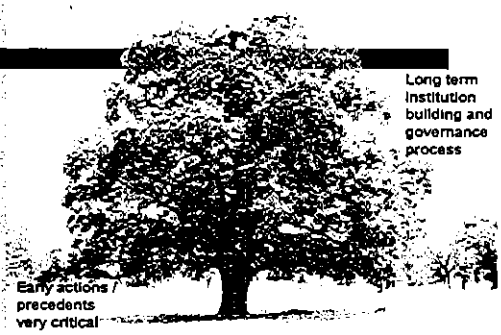
- Accountability of licensees and utilities
  - Periodic performance reports
  - Consumer service and quality of supply
    - Well defined standards of performance
    - Adequate monitoring and and periodic performance reviews

39

Where to Begin? A Few Suggestions

- Streamline internal documentation system
- Ask Website Contractor to Implement New Structure and Provide them Required Data
- Create "Reading Room" and Put up Index with Instructions about Whom to Contact etc.
- Identify Topics for "Information Packs" and Appoint Consultant for Preparing the Same
- Based on a "Concept Paper" initiate discussion for funding of CSOs

40



41

Regulatory Responsibilities for Consumer Protection

Girish Sant,
Prayas Energy Group

DRUM Training
17th May 2006
Delhi

Utility entering a new phase

- Separation of roles
  - Government was owner, policy maker, regulator of utility
  - Now Policy, regulation, utility ownership and management roles are slowly getting separated
- Regulator is supposed to protect public interest (while ensuring reasonable revenue to the utility)

Consumer (citizen?) protection...

Against what?

- Excessive inefficiency of service provider
- Negligence of service provider
- Excessive tariff shocks
- Malpractice / abuse by monopoly
- Limit the ill-effects of competition failure
- ...

Consumer concerns

- Access
- Cost
  - Tariff
  - Tariff categories / slabs
- Quality
  - Supply quality
  - Service quality

Access

- Also covered by – National / state policies
- But SERCs have rarely given a push for increasing access (e.g. specific investments, new categories etc.)
- Under E-Act & Rajiv Gandhi scheme (RGGVY), RC's role in promoting access is likely to get redefined

Tariff

- Improvements from the past
  - Much more data available (better transparency),
  - Reasoned order by RC
  - Consumer can make their points, go in appeal (if they have resources & capability)
- Continuing limitations
  - Utility still not following several RC directives
  - Regulatory scrutiny superficial on several counts
  - RCs have not developed sufficient capacity to monitor such large business…

Provisions related to tariff

- Hearing consumer voice
  - Limited time and data given to consumers (Consumer Representatives take part in technical validation in MERC)
  - SERCs rarely link consumer objections with their decision (dilutes RC's accountability)
- Tariff setting direction
  - Safety net for BPL consumers (< 30 U/month) tariff can be 50% average cost! Most SERCs need to remove fixed charges (reduce tariff) for poor
  - Agri tariff – by water depth. Most SERCs yet to implement such tariff

Provisions related to tariff

Tariff setting for poor

- About half population yet to be a consumer! Majority of these are Below Poverty Line! Their paying capacity may not be even Rs 50 / month ! →
- Solution being attempted:
  - Differentiated service quality (for rural & urban areas)
  - Reduce cost of service without killing service: e.g.
  1. Load-limitors for very small consumers (low cost connections for say 2 bulbs) not yet implemented by any SERC
  2. Improve efficiency of use – at consumer end (to reduce need for subsidy) = DSM Only on field test level

Tariff for Poor (<1 U/day)

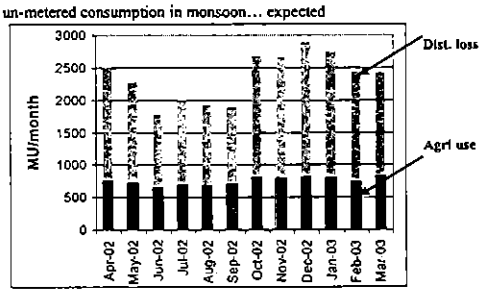
State and sub-category		Consumption 30 U / month			No of unelectrified household [illegible]
		Fixed Charges (Rs/month)	Energy Charges (Rs/unit)	Rs/unit for 30 units/month	
Orissa	Kutir Jyoti	[redacted]			
UP	Rural Metered				
	Rural Unmetered				
Chhattisgarh	Metered BPL				
	Unmetered BPL				
Rajasthan					
Andhra Pradesh					
Madhya Pradesh					
Maharashtra					
Tamilnadu					
Karnataka					
Gujarat	Rural				
	Urban				
Punjab					
Delhi	Juggi - Jhopadi				
	Left out villages				

Provisions related to tariff

- Tariff reasonability
  - CapEx
    - Quantum (Benchmarking)
    - Quality (appropriateness of schemes, impact evaluation)
  - Power Purchase
    - Base / Peak planning
    - Timing of addition, risk sharing
  - Revenue / sales verification
    - Estimation of T&D losses (Maharashtra →)
    - Cross-checking category wise sales
    - Verifying ABR (billing rate reported by utility)

Agri use & T&D loss: Maharashtra

Fall in un-metered consumption in monsoon… expected



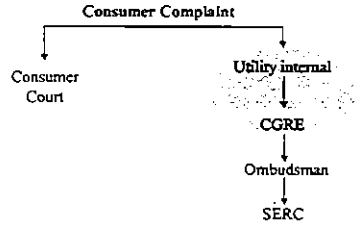
Quality of service

- Improvements
  - Earlier there was no concept of Quality of Service (QoS) standards – now QoS notified by most RCs.
  - Some RCs also have provision of penalty in case of utility failures → Table
  - Redressal mechanisms augmented → Fig.

QoS comparison of SERCs

State	Constitution of ERC	GRF/Ombudsman Regulation	SoP Regulation-1	SoP Regulation-2
Andhra Pradesh	Mar-99	Feb-04	Sep-00	Jun-04
Assam	Aug-01	Dec-03	NA	Feb-05
Chattisgarh	Jul-04	2004	NA	NA
Delhi	Mar-99	Mar-04	Aug-02	Draft
Goa	Apr-02	NA	NA	NA
Gujarat	Apr-99	Aug-04	NA	Mar-05
Haryana	Aug-98	Apr-04	NA	Jul-04
Himachal Pradesh	Dec-00	Oct-03	NA	NA
Jammu & Kashmir	Jul-04	NA	NA	NA
Jharkhand	Apr-03	Apr-05	NA	Draft
Karnataka	Aug-99	May-04	2001	May-04
Kerala	Nov-02	Nov-04	NA	NA
Madhya Pradesh	Jan-99	Apr-04	NA	Jul-04
Maharashtra	Oct-99	Dec-03	NA	Jan-05
Orissa	Aug-99	Apr-04	Sep-96	May-04
Punjab	Apr-01	Draft	NA	Draft
Rajasthan	Dec-99	Nov-03	NA	Mar-03/Mar-04 (short amendment)
Tamil Nadu	Jun-02	Jan-04	NA	Jul-04
Tripura	May-04	NA	NA	NA
Uttaranchal	Sep-02	Feb/Mar-04	NA	NA
Uttar Pradesh	Sep-98	Dec-03	Jun-02 **	Feb-05 **
West Bengal	May-99	Oct-03	NA	Draft

Grievance Redressal Mechanism



SERC authority eroded by :

1 CGRF members – now only utility employees (as per MoP rules)!

2 App. Tribunal order on MERC Avg & Supp Bill effectively prevents class action cases in SERC

Quality of Supply... limitations

- voltage, interruptions, supply hrs etc.
  - No RC monitors this. Some ask utility to submit data on limited parameters. Most RCs ignore this totally!
  - Rural hours of supply sharply falling. Rural-urban divide increasing – despite same tariff
  - Voltage norms?? ... several times it's a matter of minor investment (11 KV reconfiguration, capacitors etc.)

Quality of Service... limitations

- Metering, billing, payment, & complaint handing
  - > 85% of complaints to CGRF in Delhi were related to metering-billing. Despite hi-tech consumer care infrastructure, no data on primary number / nature of complaints.
  - Billing software norms / audit not done
  - Remote metering planned even for 30 KVA customers, but same tech not used for DT level or 11KV hours of supply / voltage levels! (billing v/s utility accountability)

Consumer Education / Awareness

- SERCs supposed to educate consumes
  - Most consumers do not know existence / powers of SERCs (Delhi case)
  - Only a few SERCs have worked towards this
    - Consumer intervention is seen as a trouble, rather than accountability and feed-back mechanism
  - SERCs are usually unaware of critical needs of consumers
  - Lack of capable consumer groups may result in opposition even to good initiatives

New Challenges for SERCs

- Multiple utilities to monitor
- Several Franchisees in rural area
- Potential multiple licensees (in same area)
- Competition in generation – may add to complications and hence RCs' problems (such as high cost of traded power)
- Increased expectations by Nat. Policies and people in general (hrs of supply etc)
- Large addition of very poor consumers

Good beginning but miles to go...

- Competition has serious limitations in helping reduce tariff and increase quality
- Hence, regulating service and tariff of monopoly is inherent part of RC function
- New formulations like MYT / AT&C won't eliminate this need.
- RCs are just beginning to realize this...

We all are consumers of one service or another, so lets jointly find ways to improve regulation as well as service delivery...

GIRISH SANT

girish@prayaspune.org

Regulatory Approaches to Quality of Service (QoS)

K. Ramanathan
Distinguished Fellow, TERI

DRUM Training Program on Regulation of Distribution Business
Delhi, 17 May 2005

Outline of Presentation

- Some basics traits of QoS >
- Rationale for QoS regulation ≥
- Regulatory tasks ≥
- Challenges on the regulatory front ≥
- Role of other stakeholders in promoting QoS ≥
- Experience of some Asian countries

QoS: Some Basic Traits

- **Societal needs of quality are highly heterogeneous**
  Depends on income & life styles, affordability of services, etc.
- **Quality needs are seldom static**
  Changes over time as consumer needs & expectations change
- **High economic importance & social value in modern world**
  Blackouts in Europe & US (including the Californian experience)
  South Asian experiences
  High political sensitivities

Often more difficult to regulate than price

QoS: Some Basic Traits

- **Developing countries more prone to QoS problems**
  - High demand growth
  - Supply shortages
  - High level of losses (non-revenue consumption)
  - Lack of redundancies in supply chain
  - Low levels of access and urgent need to increase it
  - Resource constraints
  - Lack of competition & incentives/ motivation
- **Serious quality concerns in many developing countries.**

Rationale for Regulation

- **Why regulate?**
  - Market forces may not ensure societal needs of quality

  Especially true in developing countries with little competition. Further, all activities in the supply-service chain are not competitive (network services in electricity sector). Pursuit of privatized utilities for increased profitability and competitiveness might adversely affect quality
- **Who should regulate?**
  - Reform Acts entrust responsibility of price and quality regulation to independent regulators.

  Setting of some of the technical standards and regulation of environmental & safety aspects may be by other agencies.

Regulatory Tasks

- **Identification of quality indicators >**
- **Setting standards of performance ≥**
- **Regulations for monitoring & reporting ≥**
- **Enforcement of standards ≥**

Identification of Quality Indicators

Basic considerations :

- **Reflect consumer needs and priorities**
- **Time & physical dimensions meaningful to all stakeholders**
- **Practicability of data collection**
- **Easy for consumers to comprehend the level of quality**

Commonly Used Indicators

1. Power supply interruptions :

No., frequency & duration of interruptions (individual & system level)

2. System level reliability indices:

SAIFI: System Average Interruption Frequency Index

SAIDI: System Average Interruption Duration Index

MAIFI: Same as SAIFI for interruptions durations (eg: less than 5 minutes)

CAIFI: Customer Average Interruption Frequency Index

CAIDI: Customer Average Interruption Duration Index

(Force-majeure events are normally excluded)

Most countries use the above indices. Spain uses TIEPI & NIEPI which refer to duration and number of interruptions equivalent to full load of the area

Commonly Used Indicators

3. Voltage quality indicators

Number & extent of variations in voltage magnitude
Extent & duration of variations in frequency
Voltage flicker and spikes
Harmonic content voltage (individual and THD)

4. Service indicators

Time taken to provide new connections, respond to fuse-off calls, repair/ system improvement works, metering & billing related complaints, customer contact and keeping of appointments, safety record, etc.

Basic Considerations in Setting Standards

- **Consumer needs & priorities**
- **Willingness to pay**
- **Prevailing levels of quality**
- **Likely time & cost to effect improvements**

Common Approaches in Setting Standards

- **Approach paper**
  Based on available performance data on from incumbent utility, consumer perception surveys, practice in similar utilities, etc
- **Modest & realizable targets to start with**
- **Distinctions in standards**
  Based on urban & rural areas, timing of complaints, network, etc
- **Periodic review & graduated tightening of standards**

Classification of Standards

Guaranteed standards:

Relate to level of service each consumer is entitled to.

Example: Time taken for restoration of supply, attending to billing & metering errors, voltage complaints, etc.

Overall standards:

Relate to areas where it may not be appropriate to provide individual guarantees, but where consumers have a right to expect a minimum level of service.

Example: Percentage of achievement of a target standard of performance at the system level. Reliability indices, etc

→ This could also serve as a tool for tracking utility's performance and for inter-utility comparisons.

Guaranteed Standards

NEPRA (Pakistan) Performance Standards (Distribution)

Standards based on voltage of supply, duration [long (> 3 min) & short (< 3 min)] and type (unplanned & planned) interruption

GS 1: Supply restoration after long interruptions: 10h(U) 16h (R)

GS classification (based on duration & type of interruption)	≥ 66kV	33/11 kV	400/230 V	
			U	R
GS 2: Max no. for each consumer/ year – unplanned LD (>3 min)	6	30	60	80
GS 3: Aggregated duration (h) per year – unplanned LD (>3 min)	26	44	88	175 KERC: 240
GS 4: Max no. for each consumer/ year - planned LD (>3 min)	4	8	16	16
GS 5: Aggregated duration/ year – planned LD (>3 min)	36	64	80	96
GS 6: Max no. for each consumer/ year – unplanned SD (≤3 min)	4	140	275	300

Guaranteed Standards

OERC (India), Regulations 2004

- **Restoration of power supply**

  Normal fuse off/ line breakdowns/ DT failure/scheduled outage (duration & advanced notice)
- **Voltage variations**

  LV/HV/EHV limits, time for correction
- **Harmonics**

  THD limits 11/33/132 kV; phased introduction proposed
- **Complaints about meters, billing**
- **New connections/ additional load**
- **Transfer of ownership/ conversion of services**
- **Reconnection following disconnection**

Overall Standards

NEPRA (Pakistan) Performance Standards (Distribution) 2005

OS 1. SAIFI ; OS 2. SAIDI

OS 3. Time limit for new connections: Target :95%

5 categories: up to 400 V, 15 kW: 30 days ; 66 kV & above: 496 days

OS 4. Voltage Magnitude: Target: 95%

Limit: +/- 5 %

OS 5. Frequency

Magnitude: 50 ± 1%; Harmonic content: as per IEEE 519-1992

OS 6. Priorities and principles of load shedding

OS 7. Safety to personnel & equipment

Overall Standards

OERC (India), Regulations 2004

Excerpts

Service	Standard	Target
HT supply restoration	1-6 h	75%
Replacement of failed DTs	24-48 h	95%
Giving new supply/additional load	30 days	95%
Complaints in billing	Due date*	95%
Replacement of meters	30 days	95%
Voltage fluctuations and voltage complaints	48 h	90%
Making and keeping appointments	Given time@	95%

*If received 3 days before the due date

@ 24 hour notice in case of cancellation

Overall Standards

OERC (India), Regulations 2004

- Restoration of power supply

  Overall percentages: 90 – 95%
- Reliability indices: SAIFI, SAIDI, MAIFI
- Frequency variations
- Voltage unbalance
- Street light faults: Rectification in 6 h in 90% cases
- Billing mistakes: 0.1%
- Faulty meters: <5%
- Decrease in electrical accidents

  Fatal/ non-fatal ; human/ animal

Monitoring & Reporting of Performance

- **Regulations to specify:**

  Data set (based on indicators already identified)

  Format & periodicity of reports
- **Exception monitoring**

  Special contracts

  worst circuit monitoring

  provision for more frequent reporting for such indicators whose performance falls below specified for 2 or more reporting periods

Contd ...

Monitoring & Reporting of Performance

- **A credible system for monitoring & reporting**

  Independent audit, data on affidavit, etc and also wide publicity

- **Comparison with other utilities**

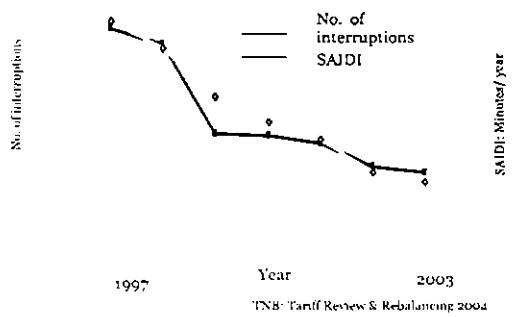
  Useful for tracking relative performance & setting of benchmarks

  Has to reckon with characteristics of the power system and tariff levels

Some examples of reported data from different countries on reliability levels .....

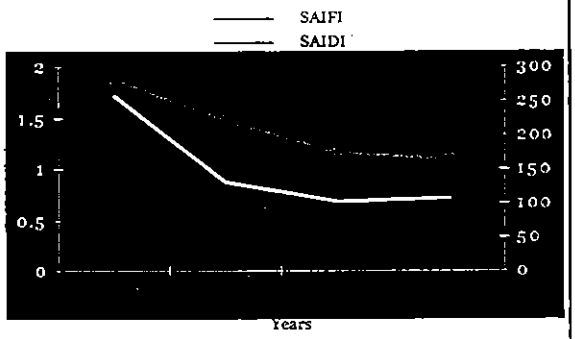
TNB – Interruption Data

Overall : Generation+ Transmission + Distribution



TNB: Tariff Review & Rebalancing 2004

TNB: Distribution SAIDI & SAIFI



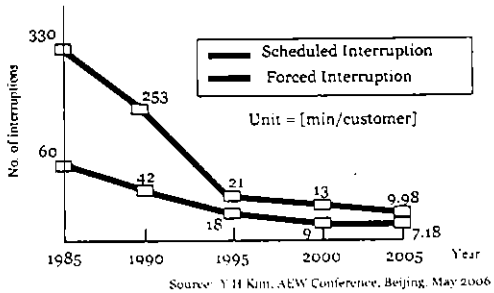
TNB: Tariff Review & Rebalancing 2004

Comparison of SAIDIs

As reported by TNB

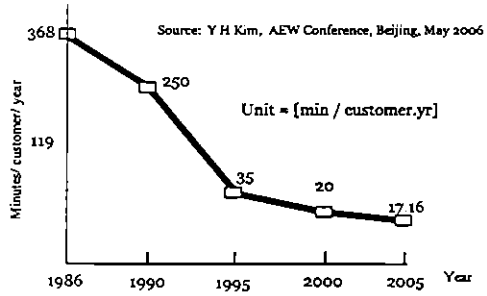
Country	SAIDI Minutes/ customer/year	Av. selling price sen/unit at PPP (2003)
TNB Malaysia	114	23
HK Electric/CLP	6	31
Thailand	114(U) 154(I) 241(R)	50
Japan	4	34
Singapore	2	26
Philippines	1814 – 3268 (dep. Grid)	111
Australia	180 – 225 (dep. Grid)	21-24

Source: TNB, Tariff Review & Rebalancing 2004

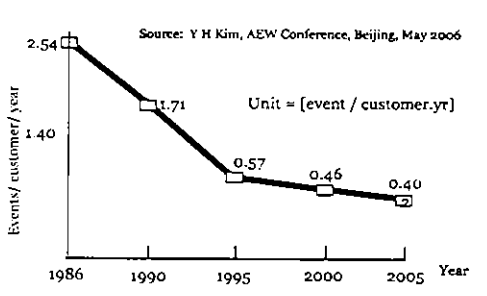


Source: Y.H Kim, AEW Conference, Beijing, May 2006

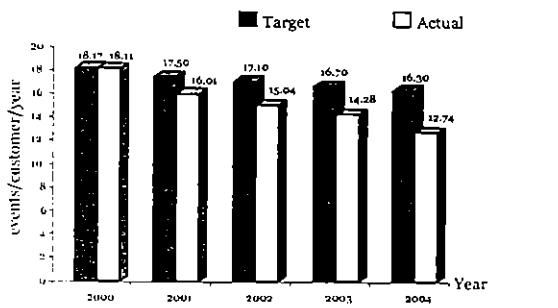
Distribution Side



Distribution Side

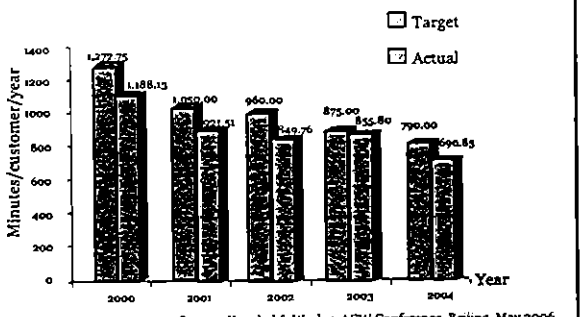


PEA, Thailand: Trend in SAIFI



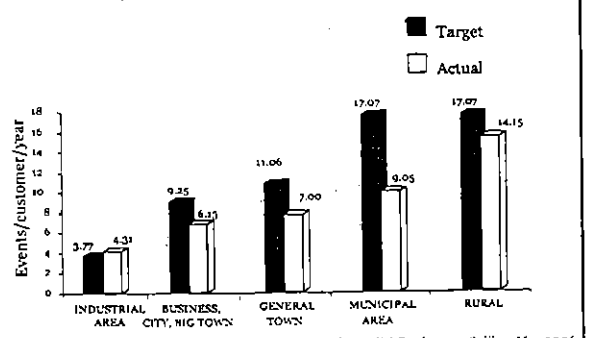
Source: Koyukul & Wasley, AEW Conference, Beijing, May 2006

PEA, Thailand Trend in SAIDI



Source: Koyukul & Wasley, AEW Conference, Beijing, May 2006

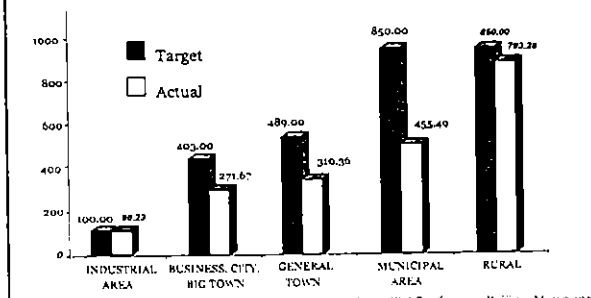
PEA, Thailand SAIFI (2005)



Source: Koyukul & Wasley, AEW Conference, Beijing, May 2006

PEA, Thailand SAIDI (2005)

Units: minutes/customer/year



Source: Koyukul & Wasley, AEW Conference, Beijing, May 2006

OERC

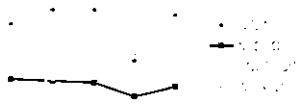
Performance of Discoms

- **Data on 14 indicators furnished *on affidavit***
  - Supply restoration, voltage variation, providing new connection, reconnection of supply), provision/replacement of meter accidents
  - OERC notes reservation on data authenticity, request public comments

Example:

Accident Data Report (Requirement: Should decrease from previous year)

Nos (human+animal; fatal+ non-fatal)



Common Approaches for Enforcement of Standards

- Provision of grievance redressal mechanism
- Reliance on consumer & peer pressure
- Penalties for non-compliance
- Incorporating QoS performance in tariff regulation

(Consumer rebate, quality incorporated benchmarking of utilities, etc)

Grievance Redressal Mechanism

Electricity Sector, India (as per EA 2003

- **Institutional arrangements**

Utility's internal complaint centres, Consumer Grievance Redressal Forum & Ombudsman (established as per regulations), ERC, Courts

- **Procedure:**

Complaint centre/ Consumer Grievance Redressal Forum

Option to approach Electricity Ombudsman

[While waiting for the Forum's decision/ not satisfied with decision]

Approach the ERC or court as provided in regulations

[If adjudication of the Ombudsman not acceptable to the consumer]

Penalties for non-compliance

Normally applied for guaranteed standards

Linked to each Guaranteed Standard/ combination of a few standards/ Special contracts between the consumer & utility

Issues in design

Estimation of penalty amount: Effective deterrent against breaching standards; but not impacting on financial viability of utility? - How to estimate in advance (unknowns: likely no. of consumers affected, penalty paid in each case, etc.) Adequate to compensate loss to consumer?

Equity concern: Is it likely that high income & influential may be the ones who complain and get their claims settled?

Mode of payment: Automatic or to be claimed? Paid to consumer or Regulator ? Consumer rebate based on quality index?

Penalty Scheme

India (TNERC) Some excerpts

Service	Standard	Penalty
Interruption to supply		Rs. 50 for each 6 hr (or part)
HT supply failure U/ R	1 - 6 h	Max. Rs. 2000
Ind. service connection U/ R	3 - 9 h	
Replacement of meters	30 days	Rs. 100/ day ; Max Rs. 1000
Complaint in billing	Due date*	Rs. 150 for non-reply
Voltage complaints	48 h@	Rs. 250 failure to visit/convey findings in stipulated time
Supply on request	60 days**	Rs. 100 per day; Max Rs 1000
Confirmed appointments	On time	Rs. 50 for failure

* If received 3 days before due date; otherwise next billing

** Extension& improvement without transformers; otherwise 90 days

Penalty Scheme

Pakistan (NEPRA) Some Excerpts

Standard	132kV and above	66 kV	33/ 11kv	400/230 Volts
	Rs	Rs	Rs	Rs
GS 1-6	10,000	5,000	1,000	300
GS 1,3,&5 (for each additional 6 hour)	2,000	1000	1000	200
Gs 2,4,6 for each additional interruption	2,000	1,000	500	200

Fines (indexed to CPI) to be paid to NEPRA
NEPRA to issue show cause notice
GS: 1-4 long duration Unplanned ; GS 5: long duration planned ; GS 6: long duration unplanned

Source: Performance Standards (Distribution) 2005

QoS linked tariff in Sri Lanka

Proposed customer rebate for poor quality

- Quality Index to comprise SAIFI, SAIDI & proportion of customer letters & emails responded to in 10 working days
- Quality score for each component to be calculated as a % by which the actual score falls short of target score (max. 100)
- Customer rebate to be calculated based on the % by which the quality score falls short of 100%
- Rebate expressed as % of customer bills in preceding year

PUCSL to ensure that the actual level of rebate is sufficiently high in customer perspective but not endanger financial viability of utility

Source: W M Bandusena SAFIR core course

Quality Incorporated Benchmarking

- Concern: Possibilities of compromise on quality while in pursuit of profits on operating expenditure
- Need to establish relationship between cost efficiency and service quality
- Main challenge: Maintaining a pragmatic balance between financial and quality-oriented incentives

Norwegian regulatory model *(not yet implemented)*

Revenue = 0.4 C (t-2) + 0.6 Cn + KLIE + System operator cost (based on expected cost level)

Where, C (t-2) = Own cost 2 years ago; Cn = Norm cost based on benchmarking against other TSO

KLIE = Adjustment for security of supply

Common Challenges

- Lack of base line data on QoS performance
- Inadequate metering & recording systems
- Reliability of data from utilities
- Low consumer awareness
- Unbundled utilities: separating out performance & accountability of different service providers

  (eg: Generation, transmission & distribution in electric utilities)
- Effectiveness in case of government owned monopolies

Role of Utilities & Other Stakeholders

- **Utilities**

Planning , design, construction and O&M

Choice of contingency levels, design & layout of substations, protection schemes, live line maintenance, temporary supplies; etc

Issues: *Associated cost elements? Impact on competitiveness?*

Development of reliable data base

Increased use of IT in system operation

SCADA, Call centres, use of cell phones and SMS facilities for attending to faults, consumer commercial data on web site, AMR, etc

Well planned customer outreach strategy

contd ...

Role of Utilities & Other Stakeholders

- **Governments**

Appropriate legal & regulatory framework; requisite policy & administrative support

[Anti-theft legislation, special courts, support to check pilferages, etc]

- **Consumer forums & NGOs**

Assist in quality monitoring and bringing out instances of non-compliance; defining societal needs of quality; partnership with local franchisees, etc

- **Research & academic institutions**

Consumer perception surveys, design of regulatory instruments, capacity building of consumer organizations, etc

Sum Up

- **QoS has high economic & social value**

Concerns & challenges are high in developing countries

- **QoS needs to be regulated**

Should have a clear understanding of consumers' QoS perceptions & prevailing levels and also utility's network characteristics

Tasks: Identification of quality indicators, setting standards of performance, design of regulatory instruments, monitoring and enforcement

Major challenges: Lack of reliable data base, low levels of consumer awareness, cost & time requirements, pricing constraints, etc

- **Need for utility-specific studies & strategies**
- **Role for Utilities, Governments & consumer forums**
- **Scope & need for inter-country learnings**

Drum Training Programme
Open Access: Cross-subsidy issues
May 18th 2006

PRICEWATERHOUSECOOPERS

E-Act 2003: Strategic Context
A Paradigm shift in approach

- Change from "sector centric" economic and financial rationale to "economy wide" targeting of benefits
- Change from State "Administered Reforms" to "Stakeholders influenced" reform process
- Change from monopoly to competitive markets by providing choice to consumers
- Differential Institutional arrangements for urban and rural supply

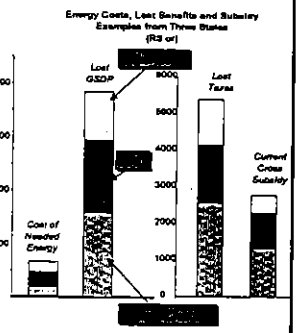
The Cost of Unserved Energy Needs – Case of Maharashtra, UP and Rajasthan

Electricity Growth : State GDP Growth
- While various other factors impact as well, typically 1% - 1.5% elasticity*

Current State Shortages
- 2008 shortages potentially as great as about 30,000 MU for 3 states combined

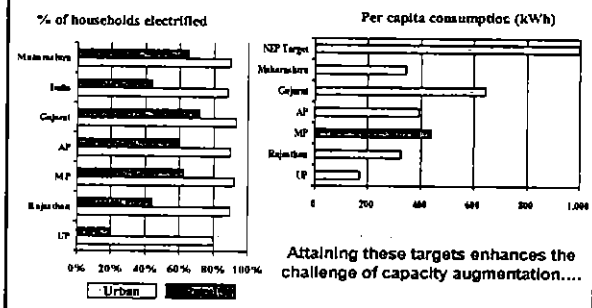
Loss of State GDP, Tax Revenues
- Potentially 76,600 Rs cr lost GSDP
- Lost tax revenues exceed needed cross subsidy
- Selective curtailment policy helps, but erodes consumer amenity

"Backup Tax" Currently Imposed
- Businesses face carrying cost of 0.8 Rs cr / MW / year for on-site backup



* As per IEA's estimate, though in India supply constraints have other dimensions

Challenges Ahead - Capacity Addition

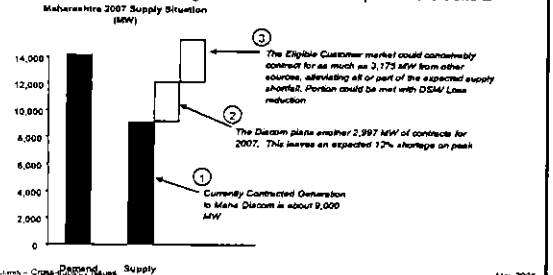


Attaining these targets enhances the challenge of capacity augmentation....

Capacity Additions – Maharashtra example

Dynamic deficits : Additional demand of 1,000 MW in recent months implying projected 13% Peak deficit in FY2007 may be understated

3,175 MW of Open Access Eligible Demand could help alleviate deficits

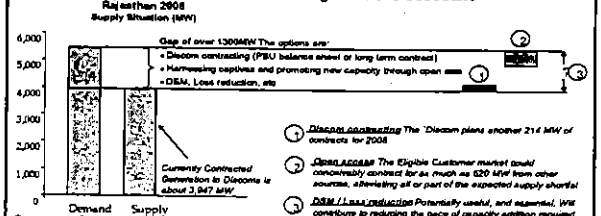


Capacity Additions – Rajasthan example

For 2008, Rajasthan expected to have about 24% peak deficit.

Size of Open Access Eligible Customer market at that point – some 618 MW could partly alleviate the deficit

Multiple pathways to meeting deficits required, hence Open Access is complimentary to Discom direct contracting and not a substitute

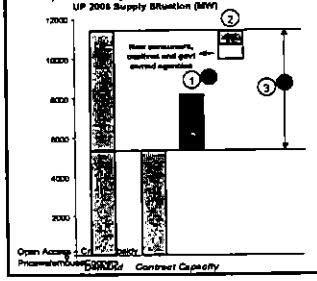


Capacity Additions – UP example

For 2008, UP expected to have about 28% peak deficit.

Size of Open Access Eligible Customer market based on existing consumption – some 735 MW could partly alleviate the deficit

Multiple pathways to meeting deficits required, hence Open Access is complimentary to Discom direct contracting and not a substitute



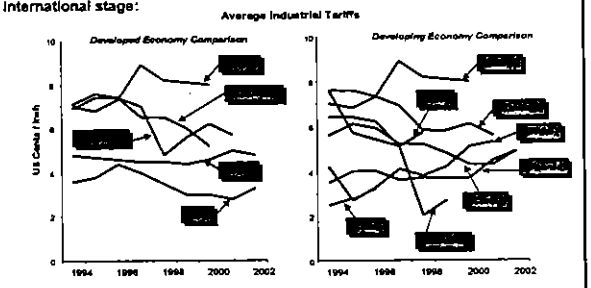
① *Discom Contracting: An additional 2,827 MW capacity is planned to be under contract by 2008. This leaves a 28% peak deficit.*

② *The Eligible Customer Market: By 2008, 735 MW of Minimum Eligible Customer load will exist (does not include eligible load of new customers).*

③ *DSM / Loss Reduction: Potentially useful, and essential. Will contribute to reducing the gaps of capacity addition required, but not eliminate the need for capacity addition.*

Tariff Cross Subsidies Result in High Industrial Costs

High industrial tariffs impose high production costs on local industries and potentially place local industries at a competitive disadvantage on the international stage:



Risks of Incomplete Transition

Multiple Challenges across Multiple Dimension

Though considerable progress made, industry faces certain problems and risks if further steps are not taken. Major include:

- Continued lower-than-desired service levels to consumers
- Continued load shedding and suppressed demand in many areas, leading to both direct and indirect costs for consumers
- Continued development of sub-optimal "parallel" captive systems
- Potentially difficult "obligations to serve" on distnbutors
- Complexities arising out of marriage between Retail Supply Tariff, Open Access and Imbalance Charge (Arbitrage Opportunities)

Clear mandate w.r.t open access / competition

Electricity Act 2003

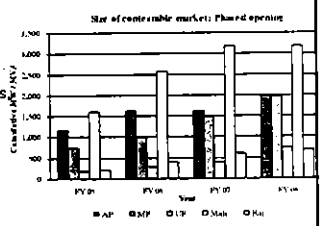
- Supplier choice to consumers with demand > 1MW by 2008
- No license required for generation

National Electricity Policy

- SERC to announce wheeling charges, surcharge and Open Access regulations by June 2005
- SERC's are advised to introduce the ABT regime at the State level within one year of Policy

National Tariff Policy

- Promote competition
- Surcharge based on Marginal Cost



Progress till date on Open Access

22 SERC's have issued open access regulations including the phasing of open access. However only 4 Commissions have issued orders on cross-subsidy surcharge

State	Consumer Category	Surcharge (paise/unit)	Remarks

Hurdles to fostering competition

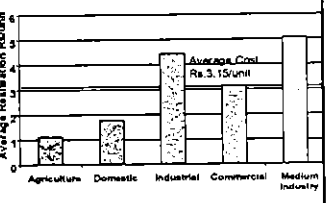
Large cross subsidies need to be unwound

Need for detailed rules and complex systems for fair competition in power market

Inadequate network capacity and fuel supply can constrain free entry of generators

Capital market to be convinced to take power market risk (as alternate to long term PPAs)

Convincing stakeholders than open access benefits are not at cost of non - eligible consumers



Are Open Access transactions new to India?

Andhra Pradesh

- 626 MW of open access transactions out of which about 213 MW is Group Captive and the balance 413 MW are third party transactions
- Persons using wheeling are connected at 730 points (and 468 involves banking)
- 55 private generators supplying them

Kamataka

- Bhouraka Power Generation company sold power to third party consumers

Of course, significant captive capacity is currently wheeled through state level grids

Implementation imperatives for Open Access

Key consumer concern in choosing OA

- Will reliability of supply improve ?
- Will distributor ensure exemption from load shedding ? In-fence captive, though costlier, may still be preferable
- What is net cost of availing open access (stand by, wheeling, etc)?

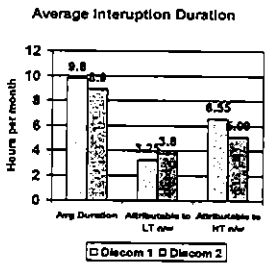
Regulator will need to

- Set Service standards for each network operator
- Monitor and enforce non-discrimination

Ensure that Intra-Government interests are Balanced and Working Together

Need to invest in transmission and distribution

Eventually, separation of wires and supply business preferable



Implications of Cross-subsidy surcharge

- Present a framework for assessing the financial impact of open access / surcharge on stakeholders
- Highlight the implications / desired responses of stakeholders

Contents

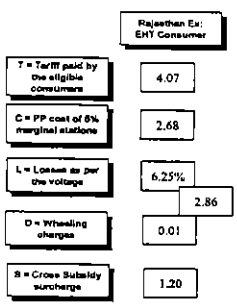
Cross-subsidy surcharge and implications for stakeholders

- Surcharge based on National Tariff Policy
- Discom perspective – Framework, analysis, implication
- OA user perspective – Framework, analysis, implication
- Implementing the Surcharge
- Issues for discussion

Cross-subsidy surcharge and implications

National Tariff Policy (para 8.5.1)

$$S = T - [C(1 + L/100) + D]$$

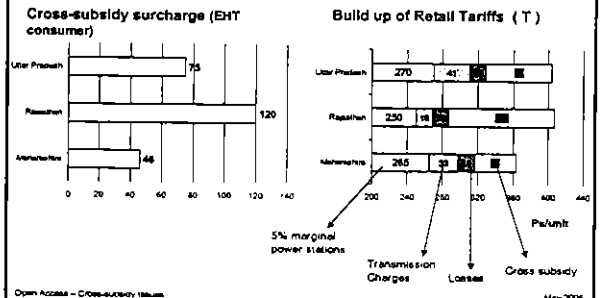


- S is sec 42(2) surcharge
- T is tariff for relevant category
- C is weighted average cost of power purchase (including fixed and variable) of top 5% at the margin excluding liquid fuel based generation and renewable
- D is the Wheeling charge
- L is the system Losses for applicable voltage level

Cross-subsidy surcharge and implications

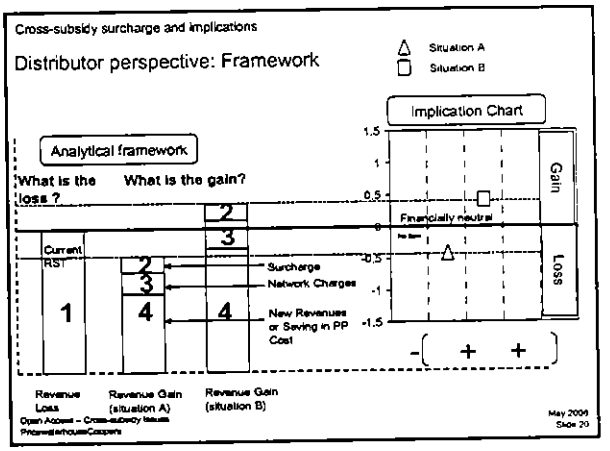
National Tariff Policy Surcharge results for 3 states

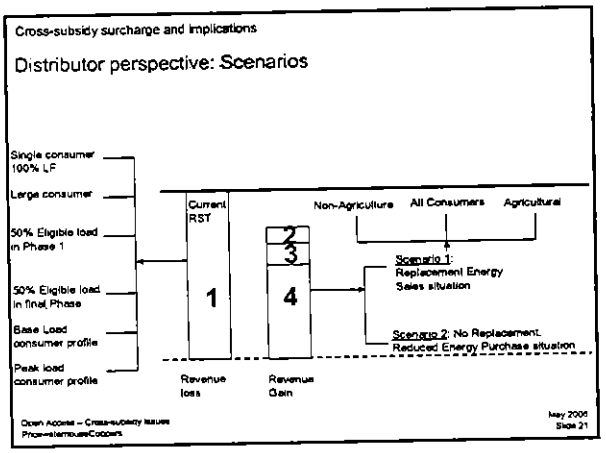
$$S = T - [C(1 + L/100) + D]$$

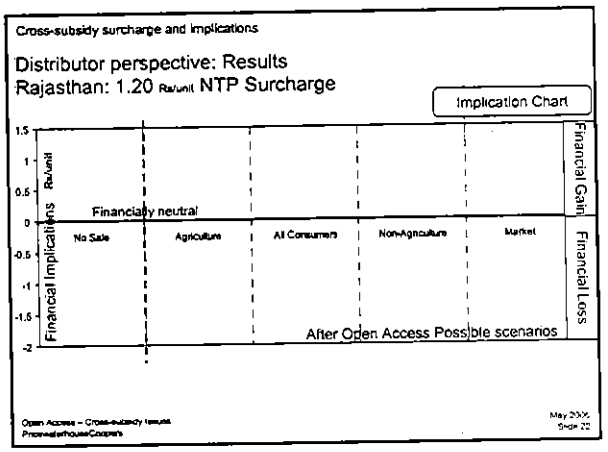


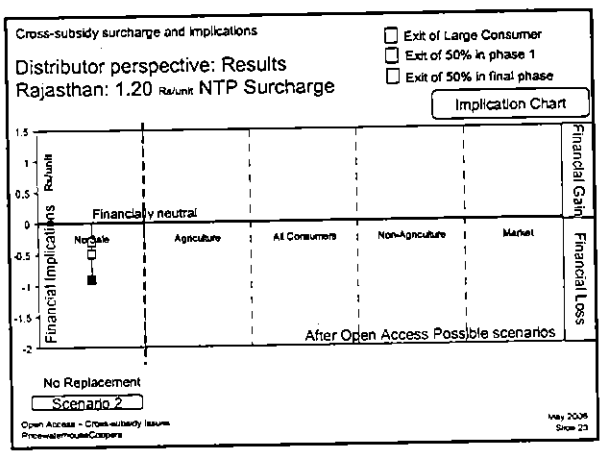
Contents

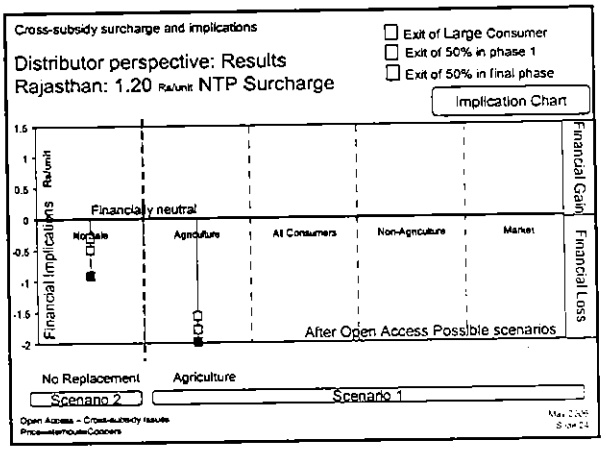
Cross-subsidy surcharge and implications for stakeholders
- Surcharge based on National Tariff Policy
- Discom perspective – Framework, analysis, implication
- OA user perspective – Framework, analysis, implication
- Implementing the Surcharge
- Issues for discussion

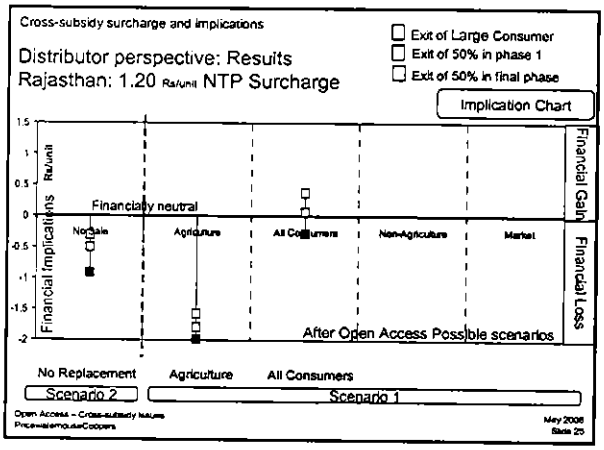


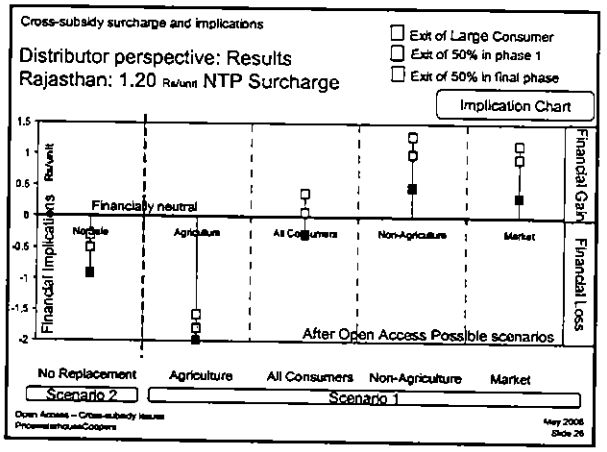


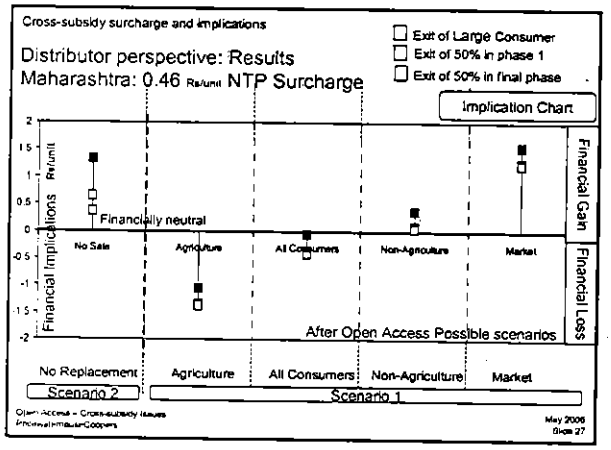


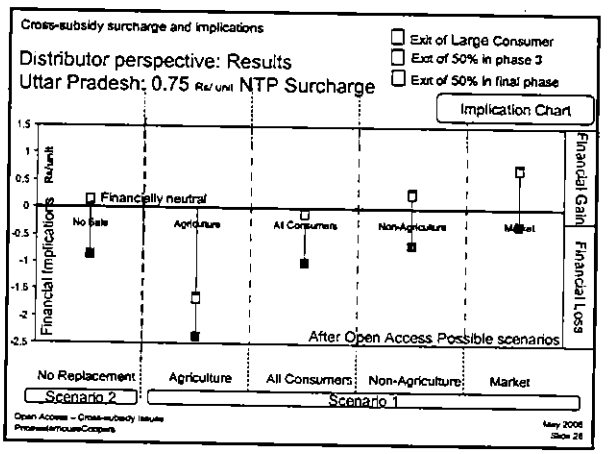


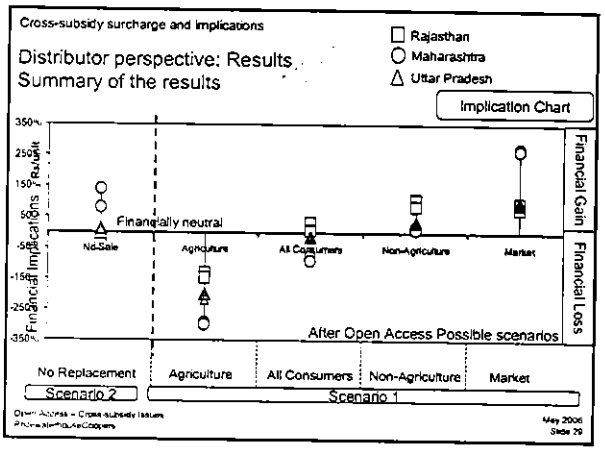


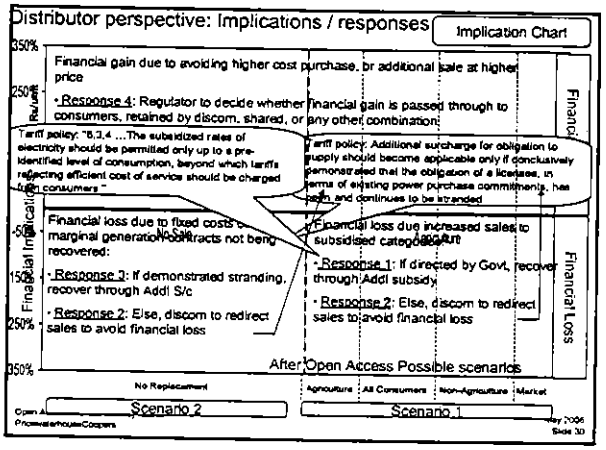

Cross-subsidy surcharge and implications
Distributor perspective: Results
Rajasthan: 1.20 Rs/unit NTP Surcharge
Exit of Large Consumer
Exit of 50% in phase 1
Exit of 50% in final phase
Implication Chart
Financial Implications
Financially neutral
No Sale
Agriculture
All Consumers
Non-Agriculture
Market
Financial Gain
Financial Loss
After Open Access Possible scenarios
No Replacement
Agriculture
All Consumers
Scenario 2
Scenario 1


Cross-subsidy surcharge and implications
Distributor perspective: Results
Rajasthan: 1.20 Rs/unit NTP Surcharge
Exit of Large Consumer
Exit of 50% in phase 1
Exit of 50% in final phase
Implication Chart
Financial Implications
Financially neutral
No Sale
Agriculture
All Consumers
Non-Agriculture
Market
Financial Gain
Financial Loss
After Open Access Possible scenarios
No Replacement
Agriculture
All Consumers
Non-Agriculture
Market
Scenario 2
Scenario 1


Cross-subsidy surcharge and implications
Distributor perspective: Results
Maharashtra: 0.46 Rs/unit NTP Surcharge
Exit of Large Consumer
Exit of 50% in phase 1
Exit of 50% in final phase
Implication Chart
Financial Implications
Financially neutral
No Sale
Agriculture
All Consumers
Non-Agriculture
Market
Financial Gain
Financial Loss
After Open Access Possible scenarios
No Replacement
Agriculture
All Consumers
Non-Agriculture
Market
Scenario 2
Scenario 1

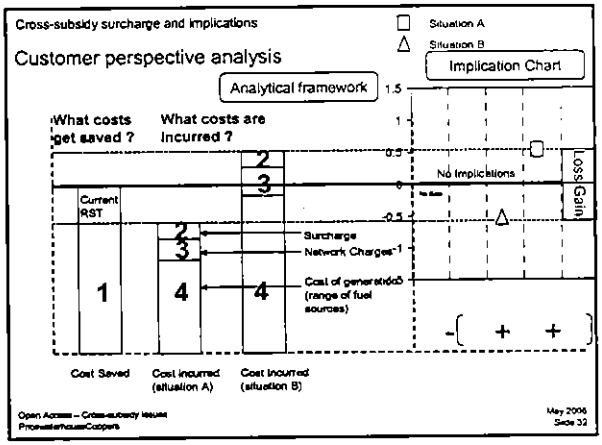

Cross-subsidy surcharge and implications
Distributor perspective: Results
Uttar Pradesh: 0.75 Rs/unit NTP Surcharge
Exit of Large Consumer
Exit of 50% in phase 3
Exit of 50% in final phase
Implication Chart
Financial Implications
Financially neutral
No Sale
Agriculture
All Consumers
Non-Agriculture
Market
Financial Gain
Financial Loss
After Open Access Possible scenarios
No Replacement
Agriculture
All Consumers
Non-Agriculture
Market
Scenario 2
Scenario 1

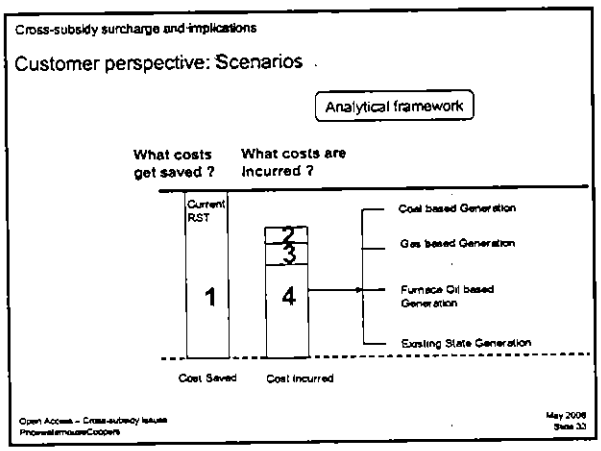

Cross-subsidy surcharge and implications
Distributor perspective: Results
Summary of the results
Rajasthan
Maharashtra
Uttar Pradesh
Implication Chart
Financial Implications
Financially neutral
No Sale
Agriculture
All Consumers
Non-Agriculture
Market
Financial Gain
Financial Loss
After Open Access Possible scenarios
No Replacement
Agriculture
All Consumers
Non-Agriculture
Market
Scenario 2
Scenario 1

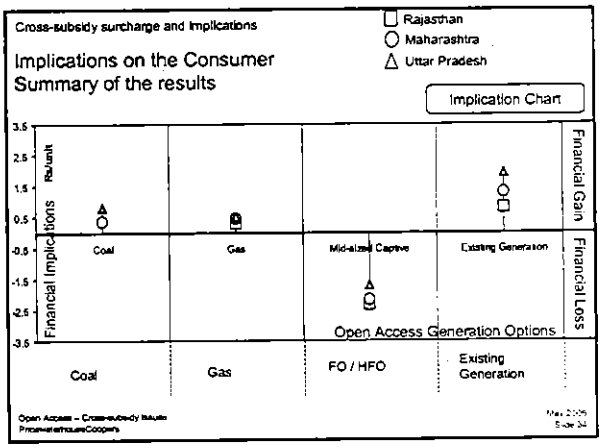

Distributor perspective: Implications / responses
Implication Chart
Financial gain due to avoiding higher cost purchase, or additional sale at higher price
• Response 4: Regulator to decide whether financial gain is passed through to consumers, retained by discom, shared, or any other combination
Tariff policy: "6.3.4 ...The subsidized rates of electricity should be permitted only up to a pre-identified level of consumption, beyond which tariffs reflecting efficient cost of service should be charged from consumers."
Tariff policy: Additional surcharge for obligation to supply should become applicable only if conclusively demonstrated that the obligation of a licensee, in terms of existing power purchase commitments, has arisen and continues to be stranded
Financial loss due to fixed costs of marginal generation contracts not being recovered:
• Response 3: If demonstrated stranding, recover through Addl S/c
• Response 2: Else, discom to redirect sales to avoid financial loss
Financial loss due increased sales to subsidised categories
• Response 1: If directed by Govt, recover through Addl subsidy
• Response 2: Else, discom to redirect sales to avoid financial loss
Financial Implications
Financial Gain
Financial Loss
After Open Access Possible scenarios
No Replacement
Agriculture
All Consumers
Non-Agriculture
Market
Scenario 2
Scenario 1

Contents

Cross-subsidy surcharge and implications for stakeholders
- Surcharge based on National Tariff Policy
- Discom perspective – Framework, analysis, implication
- OA user perspective – Framework, analysis, implication
- Implementing the Surcharge
- Issues for discussion







Customer perspective: Implications / responses

NTP formula appears marginally attractive for coal and gas based generation
- Costs not considered (grid support, imbalance, etc) could tilt the balance
- If negative, captive / group captive may appear attractive
- Calculations based on lifecycle costs – different pricing over life of plant, potential efficiency, etc – could still make it attractive
- As the CSS declines (as required in Act and NTP), OA may become more attractive to consumers / generators

5% marginal cost of the Discom sets benchmark for generators
- Conceptually, power purchase cost permitted to Discom is also feasible through OA
- In cases where existing Discom PP cost is low, certain generation may not be encouraged (since new build cost is not necessarily captured in 5%)

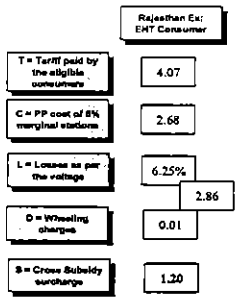
Contents

Cross-subsidy surcharge and implications for stakeholders
- Surcharge based on National Tariff Policy
- Discom perspective – Framework, analysis, implication
- OA user perspective – Framework, analysis, implication
- Implementing the Surcharge
- Issues for discussion

Cross-subsidy surcharge and implications

Implementation issues: Calculations

$$S = T - [C(1 + L/100) + D]$$



- Transmission cost to be included in power purchase cost
- "Must runs" other than renewable (nuclear) to be excluded from C ?
- Appropriate loss adjustment (distribution and transmission)

Cross-subsidy surcharge and implications

Implementation issues: Surcharge reduction trajectory

Options for reduction trajectory

- Year-by-Year Re-Set – based on revised RST, power purchase, etc
- Short-Term (e.g., 3 Year) Fixed Surcharge Levels
- Fixed Ramp-Down Period from First Year (NTP)
- "Buy Out"

To prepare for cross subsidy / surcharge reduction, need for analysis of impact ...

- Increased industrial competitiveness – impact on economy, employment, tax revenues, reduced contingent liabilities on Govt, etc
- Increased tariffs of subsidized categories, fiscal ability to absorb subsidies during the transition, improved targeting of subsidies, etc
- ... and coping strategies for various constituents

Contents

Cross Subsidy Surcharge: Discussion Questions
Issues for Regulators - Distributor point of view

CSS might not match the financial effect of OA on the Discom

- How should financial losses be addressed – particularly if they arise due to additional sales to subsidised categories?
- Who keeps any financial gains – Discom Customers or the Discom itself?

To whom should or could the freed up energy be sold?

- What freedom of choice of customer should the Discom have?
- Does "obligation to serve" require sale to categories being curtailed ? If yes, how will the additional subsidy requirement be met ?

Is the NTP Surcharge Formula appropriate for all Discoms?

- Legally, is the Policy binding? Need to record reasons for deviation ?
- Regardless of CSS methodology, is the financial analysis framework still relevant?
- Would other approaches inhibit Open Access? Are any special circumstances relevant?

Cross Subsidy Surcharge: Discussion Questions
Issues for regulators – Customer / Generator point of view

What Level of Savings Relative to RST are Necessary to Make Open Access Attractive?

How Important are Grid Support / Backup Services?

- Are these services available now; if so, at what prices?
- Should these be regulated obligatory services to be provided by discoms, or can they be competitively procured?

Might customers want to serve load partly through Open Access and partly through Discom services?

- Do Discoms have an obligation to serve a portion of a Local Open Access Customer's load under a regulated tariff?
- What tariff changes might be required?

Thank You

PRICEWATERHOUSECOOPERS

Drum Training Programme
Open Access: Cross-subsidy issues
May 18th 2006

PRICEWATERHOUSECOOPERS

E-Act 2003: Strategic Context
A Paradigm shift in approach

- Change from "sector centric" economic and financial rationale to "economy wide" targeting of benefits
- Change from State "Administered Reforms" to "Stakeholders influenced" reform process
- Change from monopoly to competitive markets by providing choice to consumers
- Differential Institutional arrangements for urban and rural supply

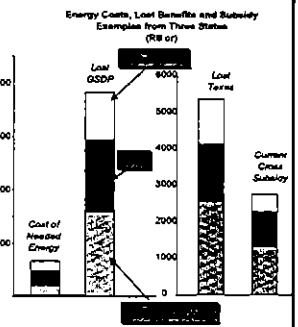
The Cost of Unserved Energy Needs – Case of Maharashtra, UP and Rajasthan

Electricity Growth : State GDP Growth
- While various other factors impact as well, typically 1% - 1.5% elasticity*

Current State Shortages
- 2008 shortages potentially as great as about 30,000 MU for 3 states combined

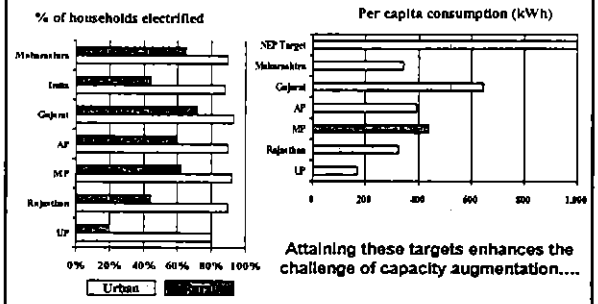
Loss of State GDP, Tax Revenues
- Potentially 76,600 Rs cr lost GSDP
- Lost tax revenues exceed needed cross subsidy
- Selective curtailment policy helps, but erodes consumer amenity

"Backup Tax" Currently Imposed
- Businesses face carrying cost of 0.8 Rs cr / MW / year for on-site backup



* As per IEA's estimate, though in India supply constraints have other dimensions

Challenges Ahead - Capacity Addition

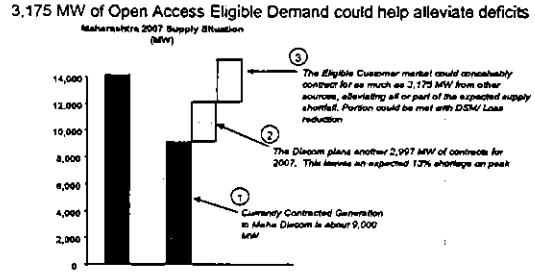


Attaining these targets enhances the challenge of capacity augmentation....

Capacity Additions – Maharashtra example

Dynamic deficits : Additional demand of 1,000 MW in recent months implying projected 13% Peak deficit in FY2007 may be understated

3,175 MW of Open Access Eligible Demand could help alleviate deficits

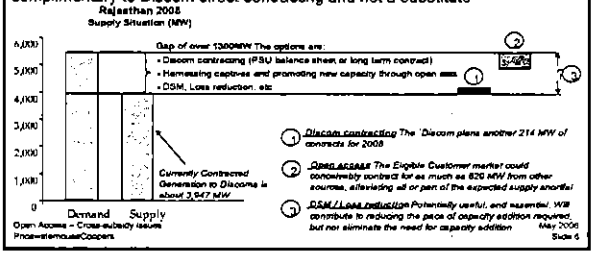


Capacity Additions – Rajasthan example

For 2008, Rajasthan expected to have about 24% peak deficit.

Size of Open Access Eligible Customer market at that point – some 618 MW could partly alleviate the deficit

Multiple pathways to meeting deficits required, hence Open Access is complimentary to Discom direct contracting and not a substitute

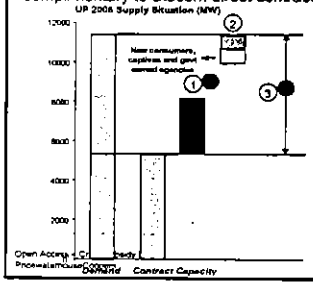


Capacity Additions – UP example

For 2008, UP expected to have about 28% peak deficit.

Size of Open Access Eligible Customer market based on existing consumption – some 735 MW could partly alleviate the deficit

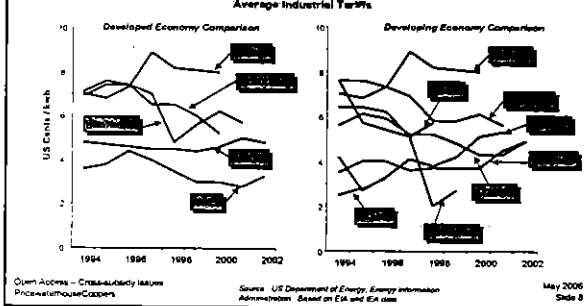
Multiple pathways to meeting deficits required, hence Open Access is complimentary to Discom direct contracting and not a substitute



1. *Discom Contracting: An additional 2,827 MW capacity is planned to be under contract by 2008. This leaves a 28% peak deficit.*
2. *The Eligible Customer Market: By 2008, 735 MW of Minimum Eligible Customer load will exist (does not include eligible load of new customers).*
3. *DSM / Loss Reduction: Potentially useful, and essential. WB contribute to reducing the pace of capacity addition required, but not eliminate the need for capacity addition.*

Tariff Cross Subsidies Result in High Industrial Costs

High industrial tariffs impose high production costs on local industries and potentially place local industries at a competitive disadvantage on the international stage:



Source: US Department of Energy, Energy Information Administration. Based on EIA and IEA data

Risks of Incomplete Transition

Multiple Challenges across Multiple Dimension

Though considerable progress made, industry faces certain problems and risks if further steps are not taken. Major include:

- Continued lower-than-desired service levels to consumers
- Continued load shedding and suppressed demand in many areas, leading to both direct and indirect costs for consumers
- Continued development of sub-optimal "parallel" captive systems
- Potentially difficult "obligations to serve" on distributors
- Complexities arising out of marriage between Retail Supply Tariff, Open Access and Imbalance Charge (Arbitrage Opportunities)

Clear mandate w.r.t open access / competition

Electricity Act 2003

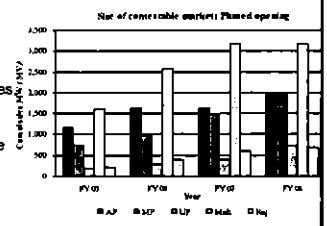
- Supplier choice to consumers with demand > 1MW by 2008
- No license required for generation

National Electricity Policy

- SERC to announce wheeling charges, surcharge and Open Access regulations by June 2005
- SERC's are advised to introduce the ABT regime at the State level within one year of Policy

National Tariff Policy

- Promote competition
- Surcharge based on Marginal Cost



Progress till date on Open Access

22 SERC's have issued open access regulations including the phasing of open access. However only 4 Commissions have issued orders on cross-subsidy surcharge

State	Consumer Category	Surcharge (p/unit)	Remarks

Hurdles to fostering competition

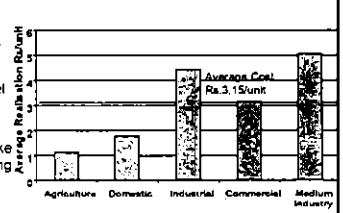
Large cross subsidies need to be unwound

Need for detailed rules and complex systems for fair competition in power market

Inadequate network capacity and fuel supply can constrain free entry of generators

Capital market to be convinced to take power market risk (as alternate to long term PPAs)

Convincing stakeholders than open access benefits are not at cost of non - eligible consumers



Are Open Access transactions new to India?

Andhra Pradesh

- 626 MW of open access transactions out of which about 213 MW is Group Captive and the balance 413 MW are third party transactions
- Persons using wheeling are connected at 730 points (and 468 involves banking)
- 55 private generators supplying them

Karnataka

- Bhouraka Power Generation company sold power to third party consumers

Of course, significant captive capacity is currently wheeled through state level grids

Implementation imperatives for Open Access

Key consumer concern in choosing OA

- Will reliability of supply improve ?
- Will distributor ensure exemption from load shedding ? In-fence captive, though costlier, may still be preferable
- What is net cost of availing open access (stand by, wheeling, etc)?

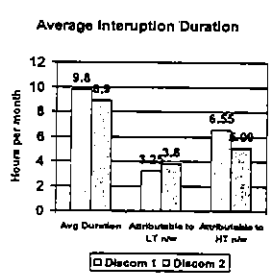
Regulator will need to

- Set Service standards for each network operator
- Monitor and enforce non-discrimination

Ensure that Intra-Government Interests are Balanced and Working Together

Need to invest in transmission and distribution

Eventually, separation of wires and supply business preferable



Implications of Cross-subsidy surcharge

- Present a framework for assessing the financial impact of open access / surcharge on stakeholders
- Highlight the implications / desired responses of stakeholders

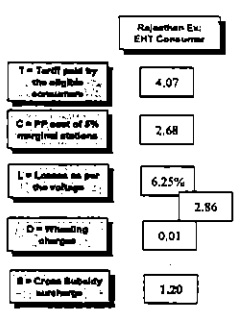
Contents

Cross-subsidy surcharge and implications for stakeholders
- Surcharge based on National Tariff Policy
- Discom perspective – Framework, analysis, implication
- OA user perspective – Framework, analysis, implication
- Implementing the Surcharge
- Issues for discussion

Cross-subsidy surcharge and implications

National Tariff Policy (para 8.5.1)

$S = T - [C(1 + L/100) + D]$

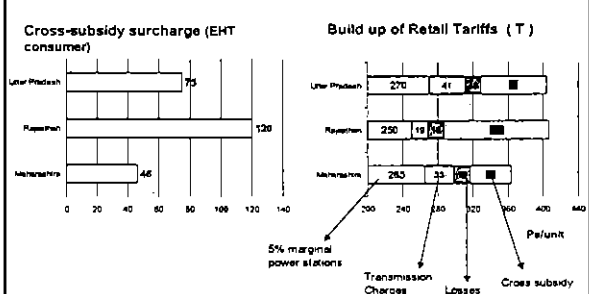


- S is sec 42(2) surcharge
- T is tariff for relevant category
- C is weighted average cost of power purchase (including fixed and variable) of top 5% at the margin excluding liquid fuel based generation and renewable
- D is the Wheeling charge
- L is the system Losses for applicable voltage level

Cross-subsidy surcharge and implications

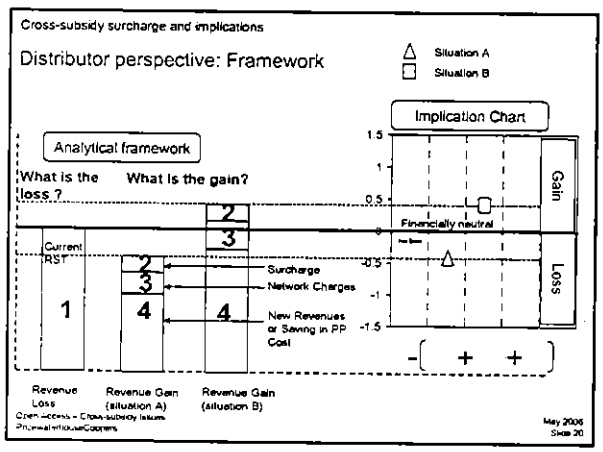
National Tariff Policy Surcharge results for 3 states

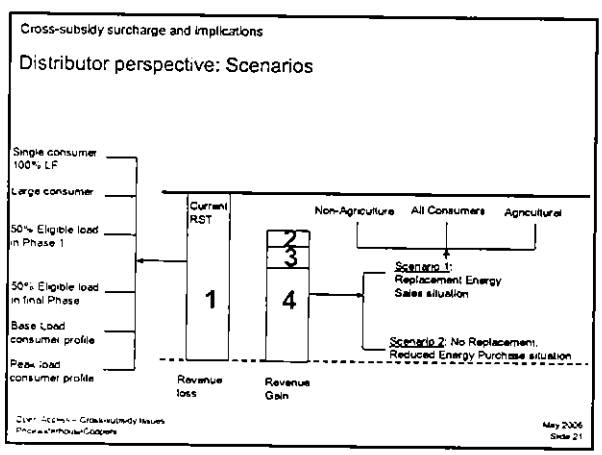
$S = T - [C(1 + L/100) + D]$

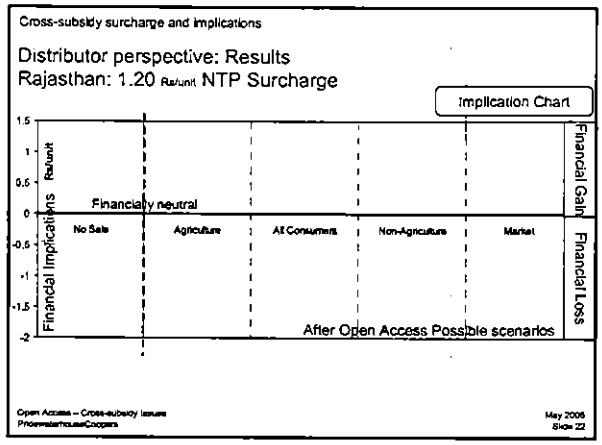


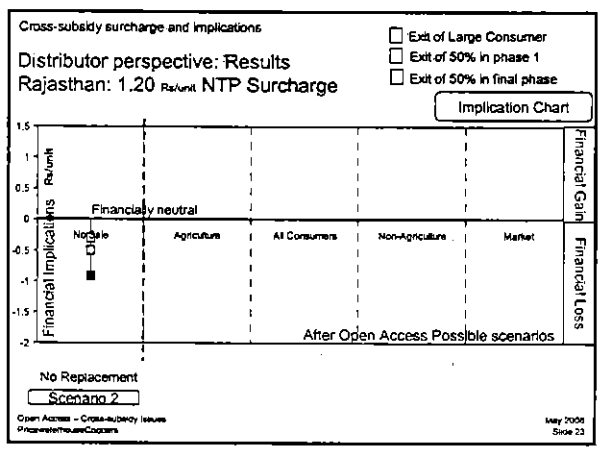
Contents

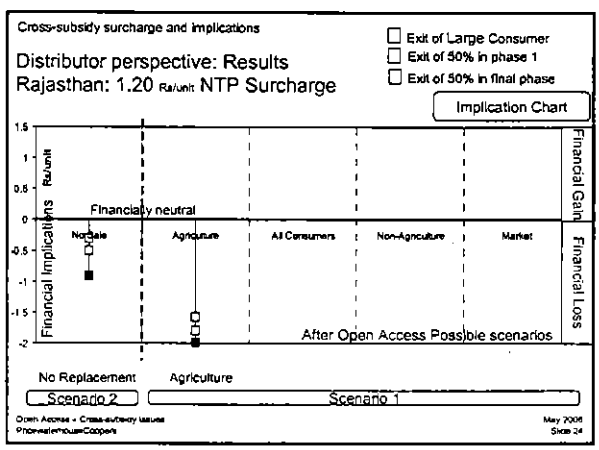
Cross-subsidy surcharge and implications for stakeholders
- Surcharge based on National Tariff Policy
- Discom perspective – Framework, analysis, implication
- OA user perspective – Framework, analysis, implication
- Implementing the Surcharge
- Issues for discussion

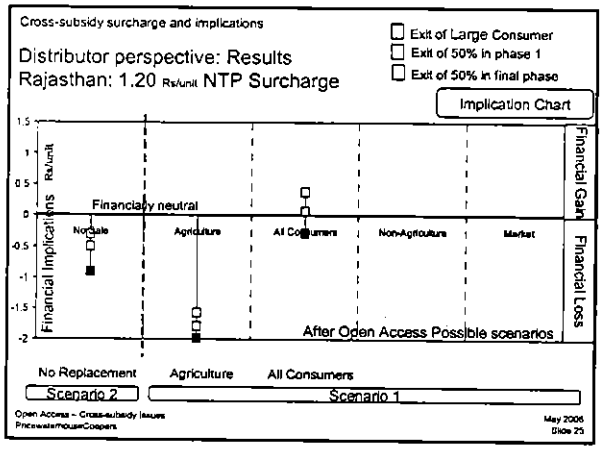


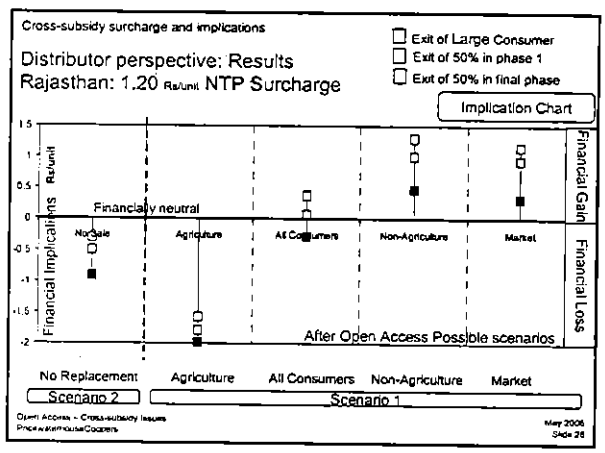


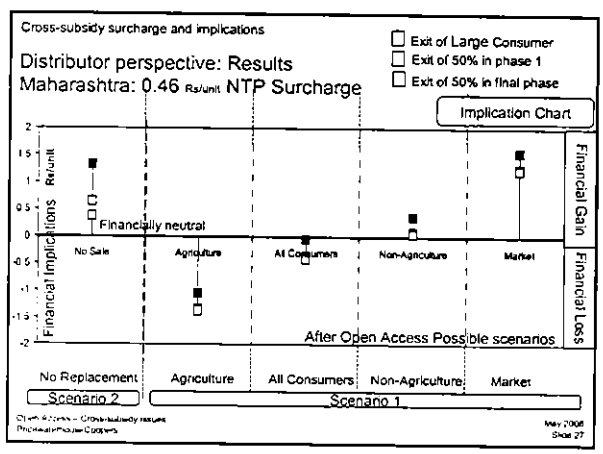

Cross-subsidy surcharge and implications
Distributor perspective: Results
Rajasthan: 1.20 Rs/unit NTP Surcharge
Implication Chart
Financial Implications
Rs/unit
Financially neutral
No Sale
Agriculture
All Consumers
Non-Agriculture
Market
Financial Gain
Financial Loss
After Open Access Possible scenarios
Open Access – Cross-subsidy issues
May 2006
Slide 22

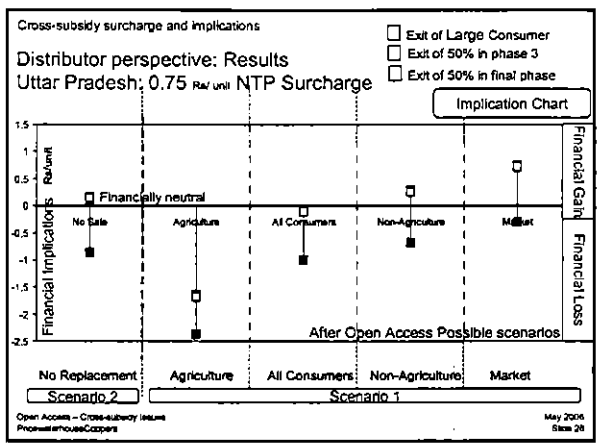

Cross-subsidy surcharge and implications
Distributor perspective: Results
Rajasthan: 1.20 Rs/unit NTP Surcharge
Exit of Large Consumer
Exit of 50% in phase 1
Exit of 50% in final phase
Implication Chart
Financial Implications
Rs/unit
Financially neutral
No Sale
Agriculture
All Consumers
Non-Agriculture
Market
Financial Gain
Financial Loss
After Open Access Possible scenarios
No Replacement
Scenario 2
Open Access – Cross-subsidy issues
May 2006
Slide 23

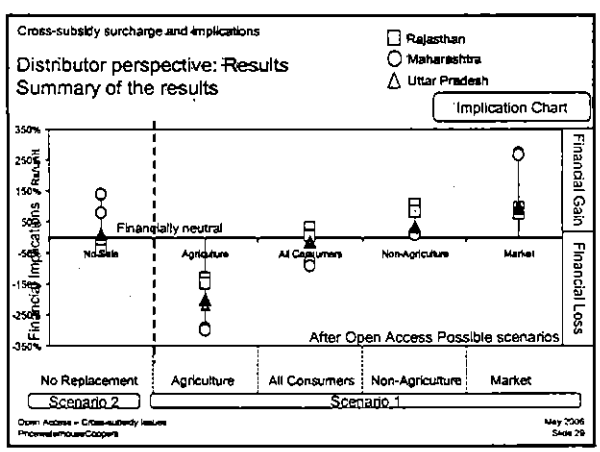

Cross-subsidy surcharge and implications
Distributor perspective: Results
Rajasthan: 1.20 Rs/unit NTP Surcharge
Exit of Large Consumer
Exit of 50% in phase 1
Exit of 50% in final phase
Implication Chart
Financial Implications
Rs/unit
Financially neutral
No Sale
Agriculture
All Consumers
Non-Agriculture
Market
Financial Gain
Financial Loss
After Open Access Possible scenarios
No Replacement
Agriculture
Scenario 2
Scenario 1
Open Access – Cross-subsidy issues
May 2006
Slide 24

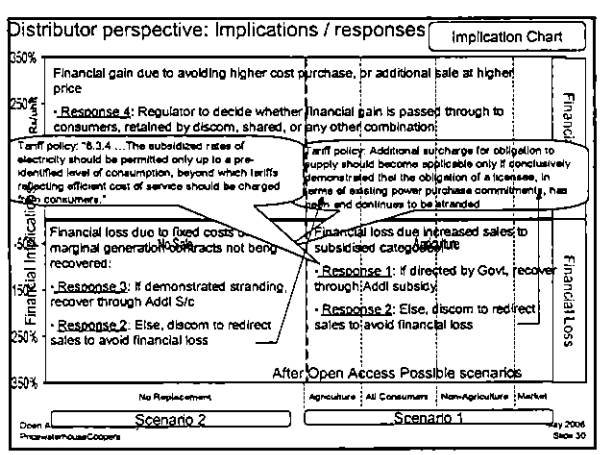

Cross-subsidy surcharge and implications
Distributor perspective: Results
Rajasthan: 1.20 Rs/unit NTP Surcharge
Exit of Large Consumer
Exit of 50% in phase 1
Exit of 50% in final phase
Implication Chart
Financial Implications
Rs/unit
Financially neutral
No Sale
Agriculture
All Consumers
Non-Agriculture
Market
Financial Gain
Financial Loss
After Open Access Possible scenarios
No Replacement
Agriculture
All Consumers
Scenario 2
Scenario 1
Open Access - Cross-subsidy Issues
PricewaterhouseCoopers
May 2006
Slide 25


Cross-subsidy surcharge and implications
Distributor perspective: Results
Rajasthan: 1.20 Rs/unit NTP Surcharge
Exit of Large Consumer
Exit of 50% in phase 1
Exit of 50% in final phase
Implication Chart
Financial Implications
Rs/unit
Financially neutral
No Sale
Agriculture
All Consumers
Non-Agriculture
Market
Financial Gain
Financial Loss
After Open Access Possible scenarios
No Replacement
Agriculture
All Consumers
Non-Agriculture
Market
Scenario 2
Scenario 1
Open Access - Cross-subsidy Issues
PricewaterhouseCoopers
May 2006
Slide 26


Cross-subsidy surcharge and implications
Distributor perspective: Results
Maharashtra: 0.46 Rs/unit NTP Surcharge
Exit of Large Consumer
Exit of 50% in phase 1
Exit of 50% in final phase
Implication Chart
Financial Implications
Rs/unit
Financially neutral
No Sale
Agriculture
All Consumers
Non-Agriculture
Market
Financial Gain
Financial Loss
After Open Access Possible scenarios
No Replacement
Agriculture
All Consumers
Non-Agriculture
Market
Scenario 2
Scenario 1
May 2006
Slide 27

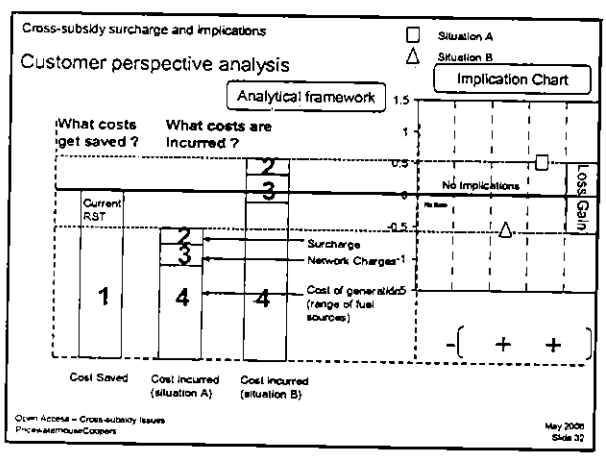

Cross-subsidy surcharge and implications
Distributor perspective: Results
Uttar Pradesh: 0.75 Rs/ unit NTP Surcharge
Exit of Large Consumer
Exit of 50% in phase 3
Exit of 50% in final phase
Implication Chart
Financial Implications
Financially neutral
No Sale
Agriculture
All Consumers
Non-Agriculture
Market
Financial Gain
Financial Loss
After Open Access Possible scenarios
No Replacement
Agriculture
All Consumers
Non-Agriculture
Market
Scenario 2
Scenario 1

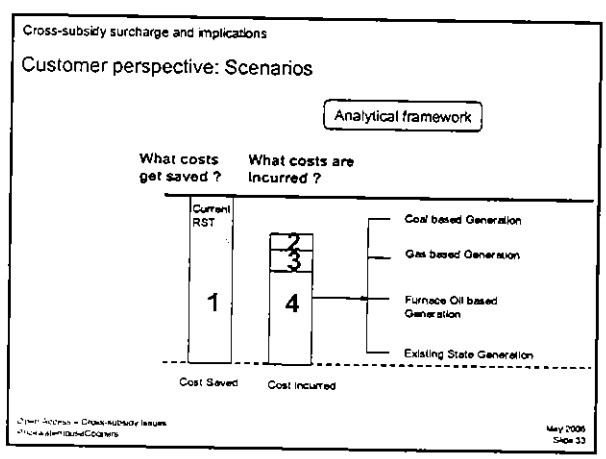

Cross-subsidy surcharge and implications
Distributor perspective: Results
Summary of the results
Rajasthan
Maharashtra
Uttar Pradesh
Implication Chart
Financial Implications
Financially neutral
No Sale
Agriculture
All Consumers
Non-Agriculture
Market
Financial Gain
Financial Loss
After Open Access Possible scenarios
No Replacement
Agriculture
All Consumers
Non-Agriculture
Market
Scenario 2
Scenario 1

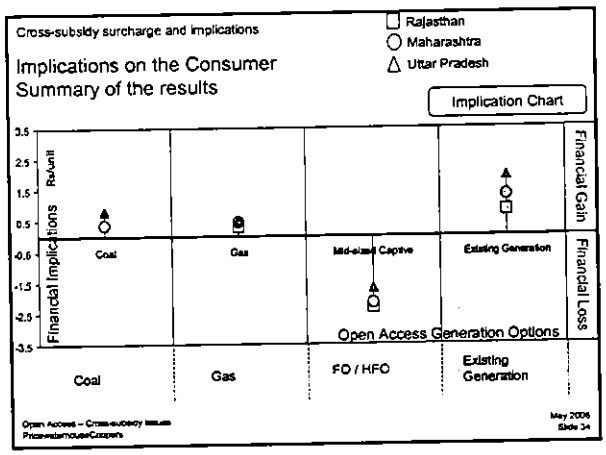

Distributor perspective: Implications / responses
Implication Chart
Financial gain due to avoiding higher cost purchase, or additional sale at higher price
• Response 4: Regulator to decide whether financial gain is passed through to consumers, retained by discom, shared, or any other combination
Tariff policy: "8.3.4 ...The subsidized rates of electricity should be permitted only up to a pre-identified level of consumption, beyond which tariffs reflecting efficient cost of service should be charged from consumers."
Tariff policy: Additional surcharge for obligation to supply should become applicable only if conclusively demonstrated that the obligation of a licensee, in terms of existing power purchase commitments, has arisen and continues to be stranded
Financial loss due to fixed costs of marginal generation contracts not being recovered:
• Response 3: If demonstrated stranding, recover through Addl S/c
• Response 2: Else, discom to redirect sales to avoid financial loss
Financial loss due increased sales to subsidised category
• Response 1: If directed by Govt., recover through Addl subsidy
• Response 2: Else, discom to redirect sales to avoid financial loss
Financial Implications
Financial Loss
After Open Access Possible scenarios
No Replacement
Agriculture
All Consumers
Non-Agriculture
Market
Scenario 2
Scenario 1

Contents

Cross-subsidy surcharge and implications for stakeholders
- Surcharge based on National Tariff Policy
- Discom perspective – Framework, analysis, implication
- OA user perspective – Framework, analysis, implication
- Implementing the Surcharge
- Issues for discussion







Customer perspective: Implications / responses

NTP formula appears marginally attractive for coal and gas based generation

- Costs not considered (grid support, imbalance, etc) could tilt the balance
- If negative, captive / group captive may appear attractive
- Calculations based on lifecycle costs – different pricing over life of plant, potential efficiency, etc – could still make it attractive
- As the CSS declines (as required in Act and NTP), OA may become more attractive to consumers / generators

5% marginal cost of the Discom sets benchmark for generators

- Conceptually, power purchase cost permitted to Discom is also feasible through OA
- In cases where existing Discom PP cost is low, certain generation may not be encouraged (since new build cost is not necessarily captured in 5%)

Contents

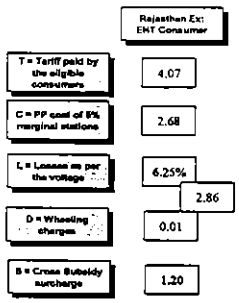
Cross-subsidy surcharge and implications for stakeholders

- Surcharge based on National Tariff Policy
- Discom perspective – Framework, analysis, implication
- OA user perspective – Framework, analysis, implication
- Implementing the Surcharge
- Issues for discussion

Cross-subsidy surcharge and implications

Implementation issues: Calculations

$$S = T - [\, C\,(1 + L/100) + D \,]$$



- Transmission cost to be included in power purchase cost
- "Must runs" other than renewable (nuclear) to be excluded from C ?
- Appropriate loss adjustment (distribution and transmission)

Cross-subsidy surcharge and implications

Implementation issues: Surcharge reduction trajectory

Options for reduction trajectory
- Year-by-Year Re-Set – based on revised RST, power purchase, etc
- Short-Term (e.g., 3 Year) Fixed Surcharge Levels
- Fixed Ramp-Down Period from First Year (NTP)
- "Buy Out"

To prepare for cross subsidy / surcharge reduction, need for analysis of impact ...
- Increased industrial competitiveness – impact on economy, employment, tax revenues, reduced contingent liabilities on Govt, etc
- Increased tariffs of subsidized categories, fiscal ability to absorb subsidies during the transition, improved targeting of subsidies, etc
- ... and coping strategies for various constituents

Contents

Cross-subsidy surcharge and implications for stakeholders
- Surcharge based on National Tariff Policy
- Discom perspective – Framework, analysis, implication
- OA user perspective – Framework, analysis, implication
- Implementing the Surcharge
- Issues for discussion

Cross Subsidy Surcharge: Discussion Questions
Issues for Regulators - Distributor point of view

CSS might not match the financial effect of OA on the Discom
- How should financial losses be addressed -- particularly if they arise due to additional sales to subsidised categories?
- Who keeps any financial gains -- Discom Customers or the Discom itself?

To whom should or could the freed up energy be sold?
- What freedom of choice of customer should the Discom have?
- Does "obligation to serve" require sale to categories being curtailed ? If yes, how will the additional subsidy requirement be met ?

Is the NTP Surcharge Formula appropriate for all Discoms?
- Legally, is the Policy binding? Need to record reasons for deviation ?
- Regardless of CSS methodology, is the financial analysis framework still relevant?
- Would other approaches inhibit Open Access? Are any special circumstances relevant?

Cross Subsidy Surcharge: Discussion Questions
Issues for regulators – Customer / Generator point of view

What Level of Savings Relative to RST are Necessary to Make Open Access Attractive?

How Important are Grid Support / Backup Services?
- Are these services available now: if so, at what prices?
- Should these be regulated obligatory services to be provided by discoms, or can they be competitively procured?

Might customers want to serve load partly through Open Access and partly through Discom services?
- Do Discoms have an obligation to serve a portion of a Local Open Access Customer's load under a regulated tariff?
- What tariff changes might be required?

Thank You

PRICEWATERHOUSECOOPERS

Annual Revenue Requirement- Key Issues

Vivek Mishra
Director (Tariff)
MPERC

PROCESS OF REVIEW

- Utility files a tariff application a few months before the start of the period for which tariff determination is to be done. The filing is in accordance with the regulation of the Commission.
- The Commission through the process of technical validation checks the utility's application for consistency and sufficiency of data.
- The Commission approves the application.

PROCESS OF REVIEW

Contd.....

- The utility publishes the approved petition in the newspapers inviting comments from various stakeholders.
- Based on the comments and public hearing, the Commission decides the reasonability of various issues.
- The Commission delivers its reasoned order.

METHODS OF TARIFF DETERMINATION

1. Cost Plus.

- The actual cost incurred are considered.
- The incurred costs are examined for usefulness and prudence in detail.
- If any cost item does not fulfill the requirement of two tests it is disallowed.
- This approach is data intensive and may be affected by data asymmetry that exists between utility and the Commission.
- Provides no incentive to the utility as costs/benefits pass on to the consumers profitability is dependent upon investment and therefore it encourages utility to over capitalize.

METHODS OF TARIFF DETERMINATION

Contd.....

2. Performance based regulation.

- Targets are set for key operating and cost performance parameters and based on these targets total allowable cost is determined.
- These targets are not necessarily extensions of past performance but may be based on the performance of other similar utilities.
- If the utility exceeds these targets it would earn profit and if it falls short it means loss. This provides an incentive to the utility to improve its efficiency and reduce cost.
- The variants of this method are price cap and revenue cap. In price cap maximum tariff that can be charged from consumer categories is fixed while revenue cap total allowable revenue is fixed . The utility fixes the tariff.

METHODS OF TARIFF DETERMINATION

Contd.....

3. Market Based Tariff.

- Principles of demand and supply of the market are used.
- The Electricity Act 2003 envisages that this principle would be used for fixing tariff for generation, transmission (open access) and retail tariff.
- All the requisite market conditions need to be established.

PRINCIPLES OF TARIFF DETERMINATION

1. Historical cost principle.
- Actual historical costs are corrected for charges beyond the control of the utility.
2. Marginal cost principle.
- Tariff is set equal to the cost of supplying additional unit.
- Tariff set on this principle give correct price signal to consumers.
- Tariffs can vary from year to year and there could be over or under recovery of cost of the marginal cost diverges significantly from average cost.

PERIODICITY OF REVIEW

1. Annual Review.

- The utility files its expected costs annually along with the costs actually incurred in pervious years.
- This practice is in vogue for cost plus method.
- No incentive for utility as the entire benefits/costs passes on to the consumers.

Periodicity of Review

2. Multi Year
- Cost determination principles are set for control period (3 or 5 years)
- Operating parameters are also fixed for the control period
- Tariffs are fixed according to these principles for the control period and are adjusted only to accommodate uncontrollable variations in cost.

Process of Tariff Approval

1. Power Purchase/ Generation Cost
- The cost of generation in case of central generating stations / IPPs is determined by CERC and for State Generating Stations /IPPs it is done by SERC
- The Costs considered are O&M, Depreciation, Interest on Loans, Return on Equity and Other Charges
- The operating parameters for thermal considered are availability, PLF, Station Heat rate, GCV and auxiliary consumption while for Hydro CI index
- Tariffs in multi year regime are fixed for the entire control period

Process of Tariff Approval... contd.

2. Transmission Cost
- The inter-state transmission cost is determined by CERC while intrastate transmission cost by SERC
- The Costs considered are O&M, Depreciation, Interest on Loans, Return on Equity, Other Charges and Income tax
- The operating parameter is line and substation availability
- In a multi year tariff regime tariff is fixed for the control period

Process of Tariff Approval... contd.

3. Demand Estimation
- Estimation of sales, connected load and numbers of metered categories
- Estimation of consumption by un-metered consumers
4. Projection of T&D loss
- Based on the estimated sale and T&D loss power purchase requirement is worked out.

Process of Tariff Approval... contd.

6. Estimation of total power purchase cost
7. Estimation of O&M Costs (employee, repairs & maintenance and a&g), Interest cost, Bad debts, Depreciation, Other miscellaneous charges and Return on equity
8. The total cost is then split into variable and fixed cost allocating them to different consumer categories on the basis of various allocating factors

Process of Tariff Approval... contd.

9. For estimated sales, revenue is estimated at existing tariffs
10. Non tariff income is also projected
11. Government indicates the subsidy amount along with category
12. If projected revenues non tariff income and subsidy are less/more then the estimated cost then tariffs are increased/reduced accordingly
13. Fixed and the variable charges are fixed so that these match fixed and variable cost of the utility and the cost to supply various consumer categories determined in step 8

Other Considerations

- Fuel and other cost adjustments based on the approved formula based on automatically to consumers
- Past uncontrollable cost allowed
- Regulatory Asset, a portion of approved expenses not recovered through tariffs
- Regulatory Liability akin to taking loans from consumers

Tariff Setting process

- Cost of Service Model developed based on the characteristics of the consumer categories, approved cost and approved losses.
- Tariffs reflect Cos
- Tariff linked to kind of service: voltage, load factor, pf, time of day
- Tariff linked to quality of supply

Issues in tariff setting

1. Financial sustainability of utilities
   - All prudent costs must be allowed
2. Increase in allocative efficiency
   - Subsidy & Cross-Subsidy
   - Mismatch between fixed & variable cost
   - ToD

Issues in tariff setting....contd.

3. Increase in operational efficiency
   - Incentives for improved performance
   - Setting Performance Standards
   - Providing a trajectory for loss reduction, reduction in unmetered sales, improvement in collection efficiency and reduction in employee cost

Issues in tariff setting....contd.

4. Proper risk allocation
   - Truing up for uncontrollable cost (previous rate setting)
   - A mechanism for regular pass through of fuel cost
   - Cost of capital
   - Demand Estimation

Issues in tariff setting....contd.

5. Reduced regulatory risk
6. Uniform/Non-Uniform tariffs through out the state. Efficient and Non-Efficient companies cannot have same return. Stimulation of market conditions.
7. Linking of quality and price
   - Establishing quality indices and providing incentives for their achievements.

Issues in tariff setting....contd.

8. Price Stability and Simplicity of structure
   - Reduced number of consumer categories and slabs within them
9. Redressal of environmental concerns
   - Cost of renewable considered
10. Demand Side management

MPERC DISTRIBUTION CODE AND QUALITY OF SERVICE

Vivek Mishra
Director (Tariff)

MPERC DISTRIBUTION CODE

LEGAL PROVISIONS

- **Distribution Code framed under Section 86(1)(i) and 181(1) of the Electricity Act, 2003.**
- **Section 9(j) of Madhya Pradesh Vidyut Sudhar Adhinyam 2000 has also provided for Distribution Code.**
- **Section 79(h) of the Electricity Act 2003 has provided for specification of Grid Code having regard to Grid Standards.**
- **MPERC Distribution Code has been notified as part of Grid Code.**

MPERC DISTRIBUTION CODE

Purpose

- The Code provides the basic frame work, rules and procedures governing technical aspects regarding:

✓ Planning
✓ Operation
✓ Maintenance
✓ Metering
✓ Protection
✓ Connectivity and use

MPERC DISTRIBUTION CODE

Process of Development of the Code

- Discussions with Distribution Utilities to determine the scope.
- Draft publication in newspaper and website for inviting comments from various stakeholders.
- Incorporation of acceptable comments in consultation with utilities and users.
- Sent for final notification
- Final Gazette notification (on 20th January 2006)

MPERC DISTRIBUTION CODE

USEFULLNESS

- Prescribes a uniform policy of distribution of electrical energy by the licensee.
- Extending co-operation to Distribution Licensee by other users and vise-versa.
- Easy and reliable communication between licensee and users.
- Smooth coordination between licensee and users for Distribution Planning, pre-arranged shut downs and easy escapes from system collapse or grid failure.
- Stringent provisions for maintaining continuity and reliability of supply.

MPERC DISTRIBUTION CODE

USEFULLNESS.. . ..Contd.

- Forecasting of demand through load forecasting methodology.
- Helps in establishing perfect data base with the licensee which is not available in complete terms.
- Specifies various connection points and boundaries of transmission system, generators to distribution system, CPP and HV consumers and LV and MV consumers.
- Guidelines for meeting out contingency planning through DSOCC (Distribution System Operations Control Centre) at identified 33KV substations.

MPERC DISTRIBUTION CODE

USEFULLNESS.. ...Contd.

- Responsibility of DSOCC to coordinate with SLDC and for receiving instructions regarding black out management, emergency operating instructions and restoration of supply etc.

MPERC DISTRIBUTION CODE

Applicability of the Code

- All Distribution Licensees of the State
- All consumers of the Licensee
- All users of the Distribution System

Responsibility for implementing the code

- All Distribution Licensees, Consumers and Users of the system. Distribution Licensee shall not be responsible if it acts on the information provided by the user.

MPERC DISTRIBUTION CODE

Management of code and its review

- By Distribution code review panel consisting of members of Distribution Licensees, STU, MPERC, EHV/HV consumers .

Operational issues in implementation

- SCDA is required
- *Distribution System Operations Control Centre* (DSOCC) for coordination with SLDC
- MIS capturing the operational data
- Load flow studies
- Load forecast

MPERC DISTRIBUTION CODE

Non-Compliance

- May lead to revocation of License and action under section 142 of the EA 2003

PERFORMANCE STANDARDS

LEGAL FRAME WORK:

- Section 181(1), (2)(za & zb) and 57(1) (ii) and 59(1) of Electricity Act 2003.
- Functions of Commission under 86(1)(i) of Electricity Act 2003.

PROCESS FOR DRAFTING AND NOTIFICATION

- Various parameters regarding commercial, technical and customer services were identified.
- Standards classified into commercial, customer services and technical parameters.
- Practical and possible time limits within which the services by licensee can be rendered were assessed and norms were fixed with reference to these time limits.

PERFORMANCE STANDARDS

- Guaranteed standards were fixed for each event of services.
- An overall standard for each event of service has also been prescribed to evaluate the shortfall by the licensee.
- Notional amount of compensation indicated against each standard alongwith a moratorium of one year for payment of compensation amount.
- The draft regulation discussed with the utilities and State Advisory Committee.
- The regulation was pre-published as draft to invite comments from stakeholders.

PERFORMANCE STANDARDS

- Final draft notified on 16th July, 2004.
- Status of licensees was taken as per the provisions of regulation for each quarter.
- The shortfalls/deviations were pointed out and advised for improvement wherever required.
- Provisional penalty imposed on the licensee due to shortfall in overall standards in case of repeated deficiencies.
- Improvement by the licensee has now been observed.
- Status of standards achieved/non-achieved by the licensee during FY 04-05 has been published as per provisions under section 59(2) of the Act.

PERFORMANCE STANDARDS

- The quarterly and annual status is also uploaded on Commission's and Licensee's website.

Objectives to be achieved

- Guidelines for providing efficient and reliable services
- Meet minimum Standards
- Enhance the quality of service over a period

PERFORMANCE STANDARDS

VARIOUS STANDARDS OF PERFORMANCE

- ✓ Safety standards
- ✓ Handling of complaints
- ✓ Interruption of power supply
- Fuse-off calls
- Line breakdowns
- DTR failures
- Power transformer failure
- Period of scheduled outages
- Cases of billing mistakes
- Cases of meter complaints

PERFORMANCE STANDARDS

- Time limit to serve new connection.
- Time limit to release additional load/temporary connection.
- Time limit for reduction in contract demand.
- Time limit for reconnection of supply followed by disconnection due to non payment of bill.
- Time limit for title transfer of ownership.
- Conversion from low tension to high tension or vise-versa.
- Benchmarking of transformer failure rate.
- Declaration of reliability indices
  - SAIFI
  - SAIDI
  - MAFI
- Fixing limits for above reliability indices on the basis of status observed during FY 04-05

PERFORMANCE STANDARDS

Non-Compliance

- Action under section 142 of the EA 2003
- Penalties for not achieving the benchmarks
- Supply to consumers if the directions are not complied

Issues & Challenges

- Capturing of the relevant data
- Validity of data
- Voluminous data
- Analysis of data for meaningful conclusion

PERFORMANCE STANDARDS

Suggestions

- Third party collection and verification of data
- MIS of the Licensee to be tapped for avoidance of duplication of effort
- Consumer needs to be informed of the existence of these standards

Process of revision of these standards

- Changes suggested by licensee, consumers and state advisory members
- Draft sent for publication. 21 days for comments
- Public hearing
- Drafts finalised based on the suggestions received
- Final notification

North Delhi Power Limited

PRESENTATION

ON

NEW METERING DEVICES

AND

REVENUE MANAGEMENT

NDPL WAY

TERI

Vikram D Apte
NDPL

MAY 2006

North Delhi Power Limited

COVERAGE

- INDIAN POWER SECTOR
- REFORMS AT NDPL, DELHI IN REVENUE MANAGEMENT
- CEA REGULATION – 2006 ON METER INSTALLATION AND OPERATION
- NEW METERING TECHNIQUES, BENEFITS AND CHALLENGES

North Delhi Power Limited

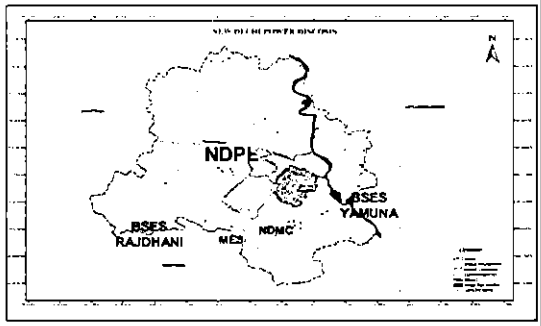
INDIAN POWER SECTOR IN 2006

- ALL STATES IN REFORM MODE
- 13 SEBs UNBUNDLED
- SEPARATE DISTRIBUTION COMPANIES
- FOCUS ON AT&C LOSS REDUCTION AND RELIABILITY OF POWER SUPPLY

REVENUE MANAGEMENT IS VITAL

North Delhi Power Limited

GEOGRAPHIC DESCRIPTION



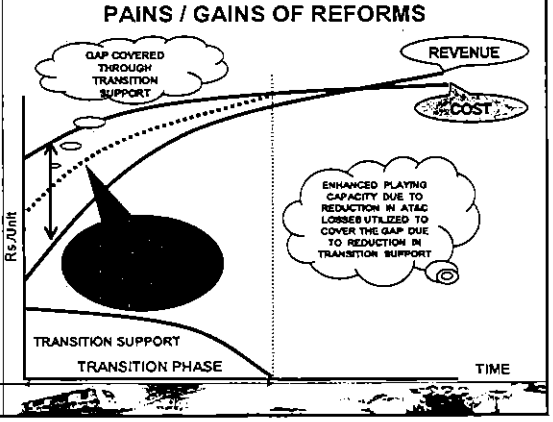
North Delhi Power Limited

NDPL PROFILE

TURNOVER (FY 2005-06)	RS. 1850 CR. (UP FROM RS 1100 IN FY 03)
PEAK LOAD	1000 MW
ANNUAL ENERGY REQUIREMENT (FY 2004-05)	5600 MN. UNITS
TOTAL REGISTERED CONSUMERS (0.743MN ON T/O)	0.91 MN. (ACTUAL ESTIMATED 1 MN.)
NUMBER OF EMPLOYEES	3700 (5600 IN JULY 2002)
AREA	510 SQ KMS
POPULATION SERVICED IN NETWORK AREA (APPROX)	4.5 MN.
PER CAPITA CONSUMPTION (UNITS)	1245 (NATIONAL AVERAGE OF 500, MUMBAI – CLOSE TO 850)
NUMBER OF CONSUMERS PER SQ.KMS	1784 (ONLY REGISTERED)
EMPLOYEES PER '000 CONSUMERS	4.06
EMPLOYEES PER MN. UNIT INPUT	0.66
LOAD / ENERGY GROWTH	05% / 02%

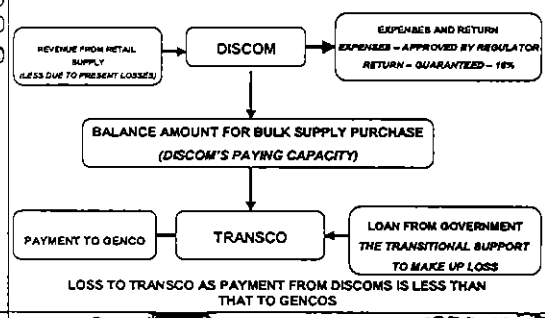
North Delhi Power Limited

PAINS / GAINS OF REFORMS



SELF SUSTAINING MODEL (AS PER DELHI MODEL)

FINANCIAL SUPPORT FROM GOVERNMENT DURING TRANSITION PERIOD



LOSS TO TRANSCO AS PAYMENT FROM DISCOMS IS LESS THAN THAT TO GENCOS

North Delhi Power Limited

EFFICIENCY IMPROVEMENT COMMITMENTS

ANNUAL BREAK UP OF COMMITMENTS AS QUOTED BY TATA POWER

	2002-03	2003-04	2004-05	2005-06	2006-07
ANNUAL REDUCTION IN LOSSES	0.50%	2.25%	4.50%	5.50%	4.25%
LOSS LEVELS AT THE END OF YEAR	47.6%	45.35%	40.85%	35.35%	31.10%

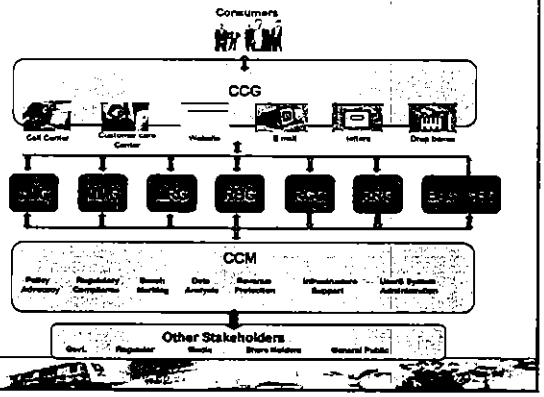
TOTAL COMMITMENT FOR LOSS REDUCTION IN 5 YEARS - 17.00%
OPENING LOSS LEVEL AS DECIDED BY REGULATOR - 48.10%
CLOSING LOSS LEVEL AFTER 5 YEARS - 31.10%

North Delhi Power Limited

INITIATIVE TAKEN BY NDPL IN REVENUE MANAGEMENT & CUSTOMER SERVICE

North Delhi Power Limited

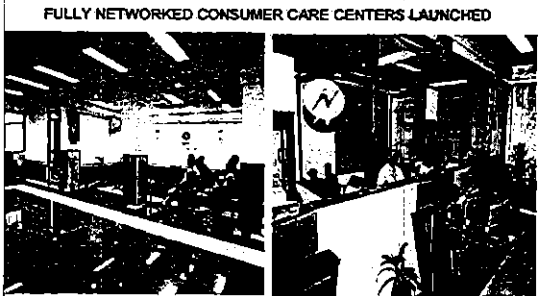
PROCESS RE-ENGINEERING



North Delhi Power Limited

ENHANCING CONSUMER CONVENIENCE

FULLY NETWORKED CONSUMER CARE CENTERS LAUNCHED



JULY 2002: 20 OPTIONS FOR PAYMENT OF BILLS

DEC 2004 : 1134 LOCATIONS FOR PAYMENT OF BILLS

North Delhi Power Limited

ENHANCING CONSUMER CONVENIENCE

1134 PAYMENT COLLECTION CHANNELS FROM JUST 20 IN 2 YEARS

AVERAGE WAITING TIME FOR CONSUMERS GONE DOWN FOUR - FOLD. NO QUEUES...

MORE THAN A DOZEN BILL PAYMENT OPTIONS PROVIDED

PAYMENT BY CHEQUE INSTRUMENT INCREASED FROM 30% TO 65%

COMPLAINT RESOLVING THROUGH CALL CENTER OPEN 365 DAYS

DOOR STEP SERVICE OFFERING

JUST A CALL AWAY – NEW CONNECTIONS FOR LARGE AND MEDIUM SIZE CONSUMERS

North Delhi Power Limited

ENHANCING CONSUMER CONVENIENCE

THE SUGAM EXPERIENCE...

50 YEARS SINCE INDEPENDENCE...
NO POWER DISTRIBUTION UTILITY THOUGHT ABOUT 100% TRANSPARENCY

1 YEAR AGO...
NDPL BECAME THE FIRST POWER UTILITY IN THE COUNTRY TO PROVIDE ON-LINE INFORMATION ON CONSUMPTION, BILLING & PAYMENT TO 100% CONSUMERS

NOW THROUGH WEBSITE 100% CONSUMERS CAN:-

- VIEW BILL
- VIEW CONSUMPTION GRAPH
- PRINT DUPLICATE BILL
- MAKE PAYMENT

North Delhi Power Limited

ENERGY ACCOUNTING & ENERGY AUDIT OF DISTRIBUTION SYSTEM

ENERGY ACCOUNTING AT NDPL HAS BEEN CLASSIFIED INTO 4 SERVICES:

SERVICE-1

VERIFICATION OF PEAK DEMAND & NET ENERGY DRAWN BY NDPL FROM TRANSCO (DTL) AND RELATED ACCOUNTING.

SERVICE-2

ASSESSMENT OF TOTAL LOSS IN THE SUB-TRANSMISSION SYSTEM OF NDPL GRID (UP TO START OF 11 KV FEEDERS) AND ENERGY DELIVERED FOR DISTRIBUTION AT 11 KV DISTRIBUTION TO EACH CIRCLE, DISTRICT & ZONE.

SERVICE-3

ASSESSMENT OF ENERGY DISPATCHED FROM 11 KV FEEDERS AND LOSS IN 11 KV FEEDERS UPTO DISTRIBUTION TRANSFORMERS.

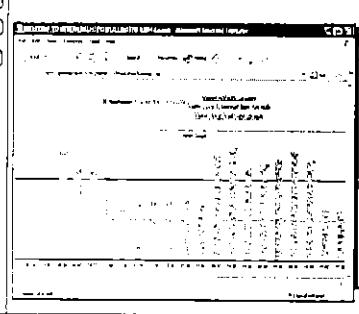
SERVICE-4

ENERGY DISPATCHED FROM DISTRIBUTION TRANSFORMERS (DT) & DT WISE LOSS.

North Delhi Power Limited

COMMERCIAL INITIATIVES -

BULK CONSUMER AMR DATA ON WEB



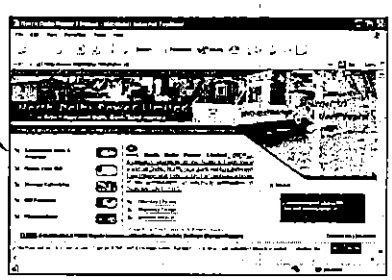
- For large consumers
- Choose the date
- View for the selected date half hourly average consumption, voltage, current, etc.
- View daily electricity consumption graphs

North Delhi Power Limited

North Delhi Power Limited

COMMERCIAL INITIATIVES - NDPL WEB SITE

View your account information



North Delhi Power Limited

CEA REGULATION 2006

INSTALLATION AND OPERATION OF METERS

North Delhi Power Limited

CEA REGULATION 2006

APPLICABILITY OF REGULATION

- METERS TO BE INSTALLED & ALREADY INSTALLED BY ALL STAKE HOLDERS
- NOW ONWARDS I.E. RULES 1956 RELATING TO INSTALLATION & OPERATION OF METERS SHALL NOT BE APPLICABLE
- SCOPE OF REGULATION:
  TYPES, STANDARDS OWNERSHIP, LOCATION, ACCURACY CLASS, METER SEALS & SPECIAL AND TAMPER FEATURES ETC
- INTERFACE, CONSUMER, ENERGY ACCOUNT AND AUDIT METERS.

North Delhi Power Limited

CEA REGULATION 2006

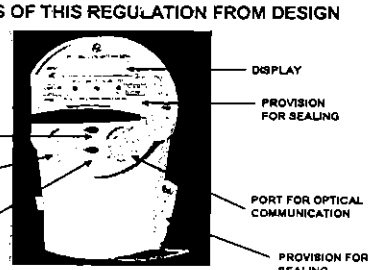
SALIENT POINTS OF THIS REGULATION FROM DESIGN POINT OF VIEW

- ALL METERS OF STATIC TYPE
- METERS SHALL HAVE ANTI-TAMPER FEATURES INCLUDING RECORDING ON SINGLE WIRE IN CASE OF 1 PHASE METER
- TO ADOPT NEW TECHNOLOGIES SUCH AS TOD, PREPAID & AMR ETC
- ALL METERS SHALL COMPLY BIS. IF BIS IS NOT AVAILABLE, THEN RELEVANT INTERNATIONAL STANDARD WITH CORRECTION TO SUIT INDIAN ENVIRONMENT.

North Delhi Power Limited

CEA (INSTALLATION & OPERATION OF METERS) REGULATION 2006

SALIENT POINTS OF THIS REGULATION FROM DESIGN POINT OF VIEW-



STATIC METER WITH VARIOUS FEATURES

North Delhi Power Limited

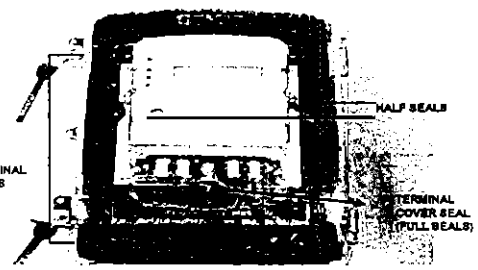
CEA (INSTALLATION & OPERATION OF METERS) REGULATION 2006

SALIENT POINTS OF THIS REGULATION FROM OPERATION POINT OF VIEW

- CONSUMER METERS SHALL BE GENERALLY OWNED BY LICENSEE
- LOCATION OF METERS SHALL BE AS PER REGULATION
- LEAD SEALS SHALL NOT BE USED IN THE NEW METERS
- POLYCARBONATE OR HOLOGRAPHIC OR ANY OTHER SUPERIOR SEALS SHALL BE USED
- ONLY PATENTED & UNIQUE SEAL FOR EACH UTILITY WITH THEIR LOGO OR NAME SHALL BE USED

North Delhi Power Limited

CEA (INSTALLATION & OPERATION OF METERS) REGULATION 2006



SEALING POINTS AS PER REGULATION

North Delhi Power Limited

CEA (INSTALLATION & OPERATION OF METERS) REGULATION 2006

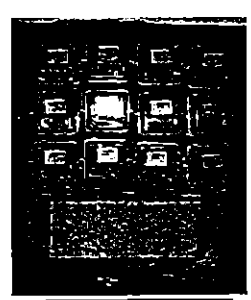
SALIENT POINTS OF THIS REGULATION FROM INSTALLATION POINT OF VIEW:

- THE CONSUMER SHALL ENSURE THAT THERE IS NO COMMON NEUTRAL OR PHASE OR LOOPING OF NEUTRAL OR PHASE OF TWO OR MORE CONSUMERS ON CONSUMER'S SIDE WIRING IN CASE OF SINGLE PHASE METERS
- LICENSEE SHALL INFORM CONSUMER IN CASE OF EARTH LEAKAGE INDICATION IN THE METER
- CONSUMER METERS SHALL BE INSTALLED EITHER AT CONSUMER PREMISES OR OUTSIDE THE CONSUMER PREMISES. IN LATER CASE, REAL TIME DISPLAY UNIT SHALL BE PROVIDED AT THE CONSUMER PREMISES

North Delhi Power Limited

GOOD INSTALLATION PRACTICES

BEFORE



AFTER

HT METERING CUBILCLE – NDPL WAY

North Delhi Power Limited

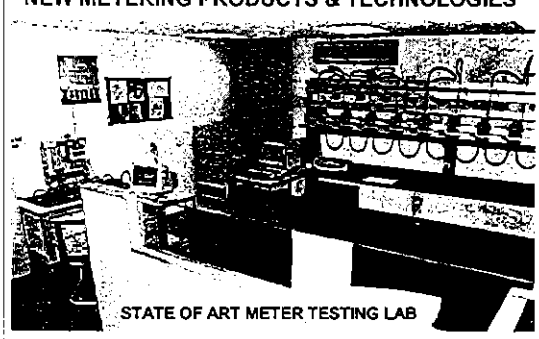
CEA (INSTALLATION & OPERATION OF METERS) REGULATION 2006

SALIENT POINTS OF THIS REGULATION FROM REGULATOR'S POINT OF VIEW:

- LICENSEE SHALL SET UP NABL ACCREDITED LABS IMMEDIATELY OR TAKE SERVICES OF SUCH LABS
- ALL METERS SHALL BE PERIODICALLY TESTED FOR THEIR ACCURACY AS PER REGULATION
- THE METERS NOT COMPLYING WITH THESE REGULATIONS SHALL BE REPLACED BY THE LICENSEE ON HIS OWN OR AT CONSUMER'S REQUEST
- ALL CONSUMER METERS SHALL HAVE ADDITIONAL FEATURES AS APPROVED BY APPROPRIATE COMMISSION

North Delhi Power Limited

NEW METERING PRODUCTS & TECHNOLOGIES

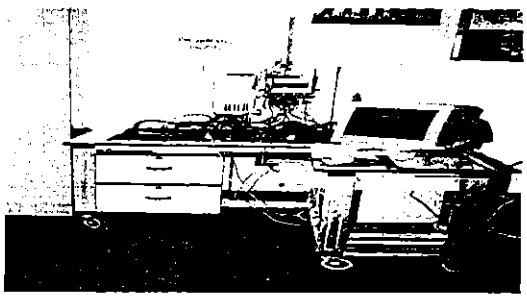


STATE OF ART METER TESTING LAB

NABL ACCREDITED LAB IS MUST FOR UTILITY

North Delhi Power Limited

NEW METERING PRODUCTS & TECHNOLOGIES



PORTABLE CUM FIXED STATION TESTING BENCH FOR METERS WITH AUTO GENERATED TEST REPORT

North Delhi Power Limited

NEW METERING PRODUCTS & TECHNOLOGIES

CONSUMER METERS

- CONFORMING TO RELEVANT STANDARDS IS:13779, IS:14697, CBIP-88 WITH LATEST AMENDMENTS
- SPECIAL FEATURES SUCH AS TOD, LOAD SURVEY, RS232 & AMR COMPATIBLE
- TAMPER PROOF & TAMPER EVIDENT
- SPLIT – TYPE (ON POLE) & DISPLAY UNIT AT CONSUMER PREMISES
- MODULAR (UPTO 20) - CONNECTIONS

North Delhi Power Limited

NEW METERING PRODUCTS & TECHNOLOGIES

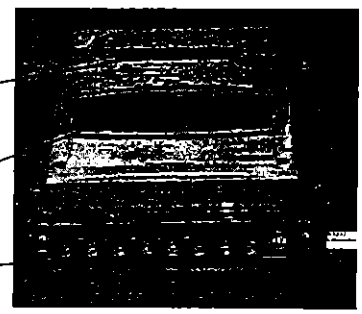
MAIN FEATURES OF NEW STATIC ENERGY METERS

- LCD DISPLAY WITH MULTIPLE PARAMETERS (AUTO, MANUAL SCROLL)
- MEASURING & RECORDING DATA FOR BILLING, LOAD SURVEY AND TAMPERING
- STORES DATA FOR 60 OR MORE DAYS AT 15/30 MINUTES TIME INTERVAL
- AMR & OPTICAL PORT PROVIDED
- TOD FEATURES

North Delhi Power Limited

NEW METERING PRODUCTS & TECHNOLOGIES

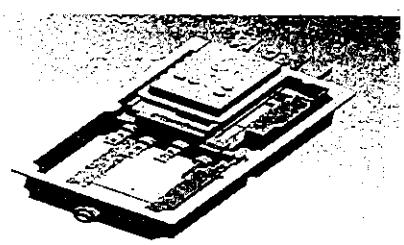
TRI-VECTOR METER
WITH RS 232



North Delhi Power Limited

NEW METERING PRODUCTS & TECHNOLOGIES
NDPL - WAY LT CT METER BOX

LT CT METER BOX WITH PIN TYPE TERMINAL CONNECTIONS
MODEM & METER



North Delhi Power Limited

STEPS TAKEN BY NDPL FOR QUALITY METERS

- METERS FROM ONLY 'A CLASS' MANUFACTURER
- METERS COMFORMING TO IEC AND IS:STANDARD
- METERS ARE TYPE TESTED-IS / IEC STANDARD
- METERS OF SMT TECHNOLOGY
- PROTECTION AGAINST 10 KV SURGE
- CONSTRUCTION OF METERS ENSURE
  - PERSONAL SAFETY
  - PROTECTION AGAINST FIRE
  - PROTECTION AGAINST DUST & WATER
  - SAFETY AGAINST EXCESSIVE TEMPERATURE

North Delhi Power Limited

North Delhi Power Limited

QUALITY CONTROL DURING MANUFACTURING

- AT INSERTION STAGE ALL METER COMPONENTS UNDER GONE COMPUTERIZED TESTING TO DESIGN PARAMETER AND ORIENTATION.
- REAL LIFE TESTING- 72 HOURS FOR 55 DEG.C.
- FUNCTIONAL TESTING BY AUTOMATIC TEST EQUIPMENTS
- TYPE, ROUTINE & ACCEPTANCE TEST CARRIED AS PER BIS.

North Delhi Power Limited

AUTOMATIC METER READING

AMR IS A SYSTEM WHICH COLLECTS THE METER DATA REMOTELY THRU A COMMUNICATION MEDIUM SUCH AS GSM/PSTN/ PLCC ETC.

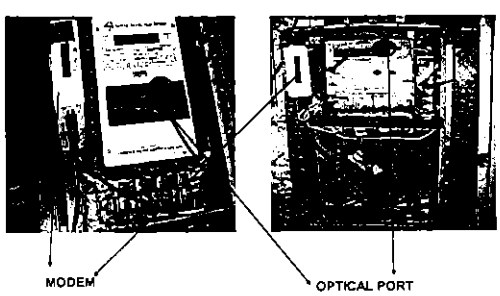
AMR'S OBJECTIVE:

- PROVIDE REQUIRED DATA FOR THE BILLING
- ANALYZE THE LOAD SURVEY AND EVENTS DATA BASED ON THE SYSTEM CONDITIONS TO GENERATE EXCEPTION
- SNAP SHOT OF TAMPER EVENTS LOGGED
- SCALABLE MECHANISM TO COVER MAJOR CONSUMER CATEGORIES

North Delhi Power Limited

NEW METERING PRODUCTS & TECHNOLOGIES

GSM MODEMS WITH METERS



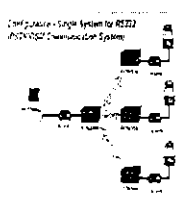
North Delhi Power Limited

NEW METERING PRODUCTS & TECHNOLOGIES

VARIOUS MAKE OF GSM MODEMS

North Delhi Power Limited

AUTOMATIC METER READING

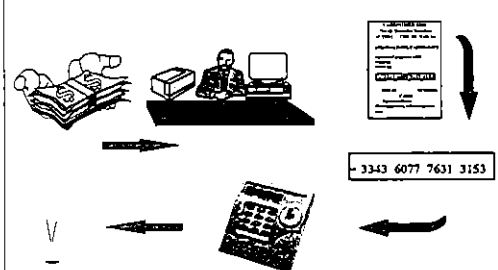


- METERS AT REMOTE LOCATIONS READ FROM CORPORATE OFFICE OF NDPL
- AMR COVERS
  - ALL BULK CONSUMERS
  - ALL EXCHANGE POINTS
  - ALL CONSUMERS ABOVE 15 KW
- DESIGNED UNIFORM FORMAT FOR AMR DATA IMPORT
- INTERFACE BETWEEN AMR AND BILLING SOFTWARE DEVELOPED
- AVAILABILITY BASED TARIFF SYSTEM DEVELOPED
- AMR LOAD SURVEY DATA OF BULK CONSUMERS DISPLAYED ON WEB

North Delhi Power Limited

NEW METERING PRODUCTS & TECHNOLOGIES

THE PREPAID CONCEPT "HOW IT WORKS"



North Delhi Power Limited

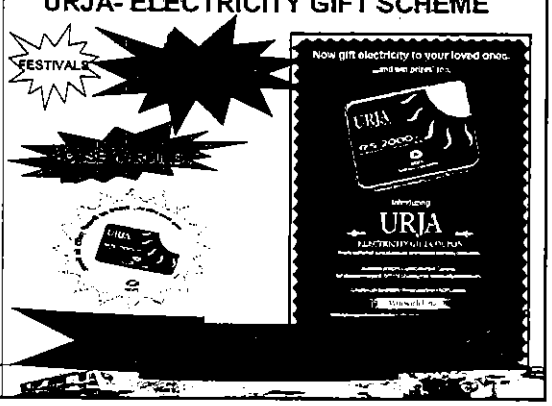
PRIVILEGED CONSUMER SCHEMES

RECOGNIZING AND REWARDING CONSUMERS FOR TIMELY PAYMENTS

MORE VALUE THAN JUST ELECTRICITY..

North Delhi Power Limited

URJA- ELECTRICITY GIFT SCHEME



North Delhi Power Limited

NDPL ACHIEVEMENTS

	AT TAKE OVER JULY 2002	FY 2005 -0 6
❑ AT & C LOSS	53 %	28.4 %
❑ REVENUE	1100 Cr/Annum	1850 Cr/Annum
❑ RELIABILITY	98.5 %	99.86 %


NDPL .... हम सब मिल कर
एक उज्जवल कल बनायेंगे
BY
TEAM NDPL
Thank You
North Delhi Power Limited

National Tariff Policy

May 2006

Outline of Presentation

- Few Initial Remarks
- Objectives of the Policy
- Cross-cutting provisions
- Specific provisions of the policy
- Specific studies commissioned to the Forum of Regulators (FOR)

Few initial remarks

- Certain provisions of the policy seem ambiguous and in contradiction with EA 2003
- Ambitious deadlines
- Delegated framing of various norms to the Forum of Regulators (FOR)
- Accounts for the prevailing regulatory practices
- Attempts to address environmental considerations

Specific Provisions of the Policy

- Generation (contd...)
  - **Promotion of grid connected captive generation**
  - **Promotion of generation through non-conventional sources**
    - Quotas to be fixed by April 1, 2006
    - 'Preferential' tariffs
    - CERC to lay down guidelines within 3 months for pricing 'non-firm' power

Specific Provisions of the Policy

- Transmission
  - Transmission tariff framework to be developed by CERC in consultation with CEA by April, 2006
    - Sensitive to **distance, direction and quantum of power flow**
  - Prior agreement with beneficiaries not necessary
  - CTU/ STU to undertake network expansion in consultation with stakeholders
  - CERC to establish within 1 year,
    - norms for capital and operating costs,
    - operating standards and performance indicators for lines at different voltage levels

Specific Provisions of the Policy

- Transmission (contd...)
  - Entry of private developer through **competitive bids**
  - Tariff framework for **intra-state transmission** to be implemented **two years after** the inter-state transmission tariff framework has been implemented
  - ABT compatible metering to facilitate **Time of Day (ToD) tariffs**
  - Overloading to be avoided through adequate capex
  - Financial incentives/ disincentives to be implemented for CTU/ STU around **key performance indicators (KPI)**

Specific Provisions of the Policy

- Distribution
  - Quality of Service (QoS)
    - SERC to notify standards
    - Penalties may be imposed
  - **Implementation of the MYT framework**
    - To ensure greater predictability in consumer tariffs by restricting tariff adjustments to known indicators on power purchase prices and inflation indices.
    - Framework to be applied to both private and public utilities

Specific Provisions of the Policy

- Distribution (contd…)
  - **Implementation of the MYT framework**
    - **Sharing mechanisms** for excess profits and losses with the consumers.
    - In the first control period, the utility may be incentivized at a higher level than being penalized – accelerating performance improvement of the utility
    - **Adequately flexible** to accommodate changes in the baseline data

Specific Provisions of the Policy

- Distribution (contd…)
  - **Implementation of the MYT framework**
    - Revenue gap to be met through tariff charges and alternative means such as **financial restructuring**
    - Suo moto determination of tariffs by SERCS in the event of petition not filed by the utility

Specific Provisions of the Policy

- Distribution (contd…)
  - **Framework for revenue requirement and costs**
    - Aggregate Technical and Commercial (AT&C) losses to serve as an indicator of efficiency
    - Realistic reduction targets for AT&C losses
  - **AT&C loss reduction strategies**
    - **Incentivise** AT&C loss reduction by linking returns in a MYT framework to an achievable trajectory

Specific Provisions of the Policy

- Distribution (contd…)
  - **AT&C loss reduction strategies**
    - AT&C loss reduction is more difficult and complex for Government owned utilities
    - MYT framework to **stimulate the political will** for reducing theft
    - Impose area/ **locality specific surcharge** for greater AT&C loss levels
    - Designing **Incentives/ disincentives** for utility staff

Specific Provisions of the Policy

- Distribution (contd…)
  - **Technical and non-technical losses to be treated separately** once metering is completed by March 2007
  - SERCs to comply with Section 65 of the Act that deals with the subsidy - Direction by the State Govt not operative unless subsidy is paid, as per SERC's mandate
    - SERC to determine the tariff initially
    - Subsidized tariff to be arrived at considering the subsidy by the State Government for different consumer categories
  - Working Capital/ bad debts to be allowed subject to approval of the SERC

Specific Provisions of the Policy

- Distribution (contd…)
  - **Regulatory Asset**
    - Circumstances to be clearly defined through regulations
    - To be evoked only in case of natural causes or force majeure conditions
  - **Tariff Design**
    - Suggests cross-subsidy to be replaced by direct subsidy
    - Electricity Duty may be a good source of direct subsidy
    - BPL consumers to be charged at least 50% of the average cost of supply
    - Target for tariff rebalancing
      - Tariffs to be within +/- 20% of the average cost of supply by 2010-11

Specific Provisions of the Policy

- Distribution (contd…)
  - **Tariff Design**
    - **Agriculture tariffs** to be linked with ground water table
    - **Provision of free electricity** encourages wasteful consumption of electricity
    - **Active participation of** panchayat institutions and co-operative societies in metering and management of distribution system in rural areas.

Specific Provisions of the Policy

- Distribution (contd…)
  - **Tariff Components**
    - **Two-part tariff**
    - ToD tariff for large consumers within one year
    - **Uniform retail tariffs** in a state
    - Incentivise **metering** through tariffs

Specific Provisions of the Policy

- Distribution (contd…)
  - **Cross Subsidy**
    - Cross subsidy surcharge
      - to compensate the distribution licensee
      - Should not obstruct competition
    - Computation – *'cost of supply' approach*
      - *Difference between, (a) tariff applicable to the relevant category of consumer and (b) cost of distribution licensee to supply electricity to the consumers of the applicable class*

Specific Provisions of the Policy

- Distribution (contd…)
  - **Cross Subsidy**
    - Surcharge Formula –
      - **S = T – [C (1 + L/ 100) + D]**
    - Cross subsidy surcharge to be brought down to a **maximum of 20%** of its opening level by the year 2010-11

Specific Role Assigned to FOR

- Uniform approach for **determination of rate of return for distribution**
- Comprehensive approach on ***'distribution margin'*** to be evolved within one year
- Uniform approach for determining **operating norms for distribution networks**
- Appropriate **tariff framework for intra-state transmission** to developed
- FOR to determine the **basic framework on service standards**

VII. RELEVANT BACKGROUND MATERIALS

IMPROVING THE PERFORMANCE OF THE DISTRIBUTION SECTOR: AN EVALUATION OF TWO APPROACHES

Daljit Singh and Sidharth Sinha

Today we have 2 cases that differ in their approach to reform of distribution of electricity which we can compare and contrast. In the case of Delhi, privatization was immediate and simultaneous with the decision to reform. Events followed in quick succession[19]. In Andhra Pradesh the decision to reform was followed by attempts which continue with vigour on the part of the successor companies (still public) to the SEB. The literature on the benefits of privatization do point to the large benefits in the phase of the preparation for privatization. In Delhi the process was dramatic and government was willing to lay out large sums to initiate change.

[illegible][20]

Before comprehensive power reforms were launched in Andhra Pradesh, the power sector in the state was plagued by shortages, high losses, and theft (Bhatia and Prasad 2003). As with many other states in the country, political interference made commercial operation of the utilities difficult, and lack of transparency in management and business processes undermined accountability. The result was that the state utilities were in poor financial health and put a heavy fiscal burden on the government. Like other states, Andhra Pradesh would have liked to combine efficiency improvements with some tariff increases, but political agitations after previous tariff hikes forced the Andhra Pradesh government, APERC, and the distcoms to focus on improving efficiency in order to ensure the financial health of Andhra Pradesh's power sector without tariff increases.

Consistent with this focus on efficiency improvements, APERC issues directives to licensees in its tariff orders on reducing losses, improved metering and billing, and building sales databases. The Commission meets periodically with the licensees to review compliance with these directives. However, each distcom is free to choose the approach to complying with the directives. This has led to a healthy competition amongst the companies with each distcom developing its own innovative techniques for loss reduction and revenue enhancement. In addition, there is cross-pollination of ideas with each company learning from the others.

Strengthening the Legal Framework to Reduce Theft

The Government of Andhra Pradesh amended Section (39) of the Indian Electricity Act, 1910 to provide tough penalties for theft of energy (Chatterjee 2003). The measures in the Act include: (1) a mandatory imprisonment of 3 months to five years; (2) a penalty of Rs 5000 to Rs 50,000; and (3) explicit recognition of collusion by staff of the licensees as an offence (Bhatia and Prasad 2003). In order to enhance enforcement, special tribunals have been created in each district headed by an additional district judge. The tribunals' decisions can be appealed to in a special appellate court at the state level that also handles high assessment cases directly. Bhatia and Prasad report that the enforcement is further strengthened by not allowing a stay of the court order unless the amount due is deposited. Further, the Act requires disposal of cases in 6 months.

The utilities deployed 2000 inspection teams throughout the state to launch the anti-theft drive (Bhatia and Prasad 2003). The success of the anti-theft programme can be gauged by the fact that during 2001–2, 36,000 cases were registered, assessments of Rs 30 crore made, and Rs 13 crore were collected (Chatterjee 2003). In that year, 860 people were arrested for theft. For the financial year 2002–3, until October, 8377 cases had been registered. The effectiveness of the Act was enhanced by a clause in the Act that allows a one-time voluntary disclosure. The state machinery was mobilized to make people aware of this clause and to get them to use it. Under this scheme, about 5 lakh domestic consumers have been regularized.

Tracking the Product Chain Better

The utilities are installing meters at key locations to enable a comprehensive energy audit. Pre-reform, there was not much metering at the boundaries of transmission (now Transco) and distribution (now the distcoms). Now all the interface points are accurately metered using 0.5 class accuracy meters (Chatterjee 2003). Furthermore, the

[19] See 'Why and When Do State Government Reform: The Case of Electricity in Delhi,' by Jagdish Sagar in section 7.3 of this report, for a discussion of the political and other basis for reform in the current context.

[20] In writing this section, we relied extensively on the presentation made by T.V.S.N. Prasad, then CEO of APCPDCL at the Brainstorming Workshop on Power Sector Reforms (Prasad 2003). We also benefited from our meeting with Rama Mohan Rao, Director, HRD and P&MM, AP Central Power Distribution Company, Hyderabad. Where not explicitly stated otherwise, data for this section is based on information provided in that meeting.

companies plan to install data loggers on all 11 kV feeders that feed primarily industrial load; about half of such feeders have already been covered. The data loggers are able to store data for 35 days and also provide full tamper details (Bhatia and Prasad 2003).

The distcoms are also putting considerable effort in revamping meters at the consumer end. Chatterjee (2003) states that earlier the companies were purchasing 6–7 lakh meters every year, while in 2000–1 alone, they purchased 28 lakh meters. In urban areas, existing meters are being replaced by high accuracy electronic meters for residential and commercial customers. For large consumers with more than 40 kW of load, high accuracy tamper-proof electronic meters with time of day and remote reading capabilities are being installed (Bhatia and Prasad 2003). The companies report that this has led to an increase in recorded consumption by upto 25 per cent in some cases.

Technology to the Fore

The most significant feature of Andhra Pradesh's approach to improving the performance of the distcoms is the reliance on technology, particularly information technology. As we describe in more detail in this section, technology has been used to accomplish the following goals: (1) to reduce technical losses; (2) to allow better management control; (3) to allow the distcoms to target areas of high commercial loss; and (4) to reduce the need for human intervention and bypass the need for difficult organizational change and to bypass difficult socio-political situations. While the initiatives we describe below are those that are being carried out by Andhra Pradesh Central Power Distribution Company Ltd (APCPDCL), the other 3 distcoms of Andhra Pradesh are also carrying out many of these initiatives.

High Voltage Distribution System (HVDS): Currently, APCPDCL is implementing HVDS on selected 11 kV feeders in the twin cities of Hyderabad and Secunderabad (APCPDCL 2003). HVDS will be extended to other feeders in a phased manner. HVDS is being introduced (a) to reduce technical losses; (b) to reduce commercial losses by making it more difficult to steal electricity; (c) to improve the quality of supply by reducing voltage drop along the length of line; and (d) to reduce outages.

Spot Billing: Spot billing using handheld computers was introduced in November 2001 in Hyderabad, and now it has been introduced throughout the state. A meter reader reads the meter and produces a bill immediately using the handheld computer. According to APCPDCL, there has been a remarkable increase in billing demand and in customer satisfaction. The company has been able to reduce the time from when the meter is read until the company receives the payment from the customer by half (from 90 days to 45 days). This has resulted in better cash flow for the company (Prasad 2003). As a result, the bills are not bunched, which is better monitoring and reduction of billing complaints.

Remote Metering: Meters at some selected locations are being read remotely from the corporate office of APCPDCL. These locations fall into one of the following categories (Prasad 2003):

- Interface points between CPDCL and AP Transco and AP Genco;
- Agricultural feeders;
- Feeders at selected substations providing power for major loads;
- Some large consumers.

With real time information about power consumption at various levels in the distribution link thus available to the company it is able to identify meters, which are (a) tampered with; (b) wrongly connected; (c) not reading properly. In addition, consumption in agricultural feeders can be monitored to ensure that power is available only for the stipulated time. In this way, interference from local politicians to extend power beyond the stipulated time is considerably reduced.

Micro-controllers: In order to regulate power supply to agriculture and eliminate 'over-consumption' of electricity by customers under agricultural tariffs, the distcoms segregate feeders and fix circuit breakers with timer controls on distribution transformers feeding agricultural loads (Prasad. 2003). Micro logic controllers are used to trip the breaker as per schedule in 600 substations to ensure that the 9-hour limit on supply is observed. Data is recorded so that reports can be generated regarding the actual power supply, which can, in turn, be used to provide feeder wise reports or other data for load research.

Customer Analysis Tool (CAT): This is an Oracle-based software tool that mines data to identify customers whose consumption or payment pattern is unusual indicating problems such as stuck meters, zero consumption, bills unpaid for 12 months, etc. (APCPDCL, 2003). This tool is particularly useful for consumer categories, which have a large number of consumers making it difficult to pick out 'exceptionals' by hand. The distcoms use the data to identify theft or malpractice and also for customers with genuine problems.

GIS Mapping: Geographic Information Systems (GIS) are used for modelling, analysis, and management of geographically-located resources. They combine database operations of Andhra Pradesh such querying and statistical analysis with the visual benefits of maps. The Andhra Pradesh distcoms plan to use GIS mapping to integrate trouble call management and transformer-based consumer database to

improve the response to trouble calls. APCPDCL claims that this is currently being done for 2 districts.

Customer Value

Improving Customer Service: The distcoms have established call centres in all major towns in addition to the district headquarters (Chatterjee 2003). In addition, APCPDCL has launched a website to cater to 15 lakh customers in Hyderabad and Rangareddy.

Trouble Call Management (TCM): APCPDCL has developed a TCM system that has been implemented in Hyderabad. Geographical and non-geographical data about the network and consumers is combined in a comprehensive database and is used to manage trouble calls more effectively (APCPDCL 2003). When a trouble call is received, the database is queried to get the location of the problem. The Supervisory Control and Data Acquisition (SCADA) system is then used to determine if there is indeed a technical problem at that location. Once the complaint is verified, SCADA is used to assist in repair. If the problem is not technical but is related to billing, then the calling customer is informed accordingly.

Common Billing System: The distcoms have developed a common billing software to replace multiple programmes that were being used previously by private accounting agencies (Bhatia and Prasad 2003).

Focusing on High Value Customers: One part of the strategy adopted by the companies is to get better realization from high-yield consumers. About 700 feeders that have more than 50 per cent of their load as industrial load have been labeled express feeders (Chatterjee 2003). These feeders are not subject to interruptions of supply. In addition, the HT tariff has been rationalized, and the company reports that this has resulted in an increase in consumption of 26 per cent in the year 2002–3.

Business Practices

Performance Monitoring: The distcoms have defined roles and responsibilities of employees in various positions and accountability has been fixed at each level through performance targets and grading on achieving those targets (Chatterjee 2003). The performance of the system is monitored by top management using the software tools such as CAT described earlier. On a daily basis the management monitors critical parameters such as energy drawls, collections, supply to agricultural consumers, line breakdowns, and transformer failures (Prasad 2003). Employees are also given performance targets for billing and revenue collections and graded on their performance. These grades received by individuals are posted on the website in order to create incentives for performance improvement. In addition, the company states that employees receiving poor grades are counselled in order to help develop a strategy for improving performance.

Employee Training: As part of the re-engineering of business processes, the electric companies of Andhra Pradesh have provided extensive training to their employees (Bhatia and Prasad 2003). In addition to a Central Training Institute at the Transco level, there are training centres at all 4 distcoms[21]. At these centres, employees are trained not only in their routine responsibilities, but also in any new systems such as HVDS that are introduced in the service territories of the distcoms.

Delhi BSES Companies

Loss Reduction

For loss reduction, and augmenting the system and quality improvement BSES plans to carryout or is already carrying out the following:

- Installing electronic meters at the incoming 66/33 kV feeders;
- Installing electronic meters on all 11 kV feeders;
- Installing electronic meters at each interface location;
- Consumer indexation, that is, link consumers to distribution transformers, 11 kV feeders and grid substations;
- Collecting details of units billed, amount billed, and amount collected;
- Computing AT&C losses monthly;
- Replacing existing defective meters;
- Streamlining and improving the billing system;
- Streamlining and improving the payment collection system;
- Electrifying and metering jhuggi–jhopri (JJ) clusters and unauthorized colonies;
- Installing of capacitor banks;
- Replacing overloaded or defective cables and upgrading lines;
- Replacing and providing switch gear; and
- Introducing an LT less distribution system wherever feasible.

Improving Quality of Service

- Improving quality of service by improving complaint handling, using fault-locating vans, and using mobile breakdown vans;

[21] The details of the training programmes described here are based on a conversation with by K. Durga Prasad, Joint Managing Director, Vigilance.

• Giving cell phones, wireless pagers, and mopeds to their service personnel to reduce the time to respond to a complaint.

Delhi—The North Delhi Power Limited (NDPL)[22]

NDPL has a strategy similar to the BSES's companies to improve the performance of the company. The strategy of NDPL is spread over 5 years and includes the following:

• The company plans to replace all meters. According to company personnel, 3 lakh meters have already been procured. (NDPL has about 8 lakh customers.) NDPL claims that the billed consumption has increased by about 10 per cent wherever they have replaced meters.

• For meter reading and energy audit, there are 3 things they are implementing: (1) on an experimental basis, the company is using a digital camera to take a picture of the meter reading and the meter reading is fed directly into the system; (2) using a handheld device for data entry; and (3) automatic meter reading (AMR) for high value customers. Meters for these customers read the consumption level periodically and store the data. The data can then be accessed through a dial-up facility. This has been done for 100 customers.

• NDPL is providing power to unauthorized colonies through a HT (11 kV) network rather than a LT network. Such an HVDS makes it difficult for customers to 'hook' the conductor and steal electricity.

• Furthermore, because power is provided to customers through pole mounted transformers with 3–5 customers per transformer, there is feeling of ownership of the transformer. This, in turn, makes it difficult for others to tap into the line. NDPL estimates that there are 170 unauthorized colonies with 600 customers each. HVDS is expected to reduce both technical and commercial losses in these colonies.

Improving Reliability

• It is introducing primary side protection for transformers. Earlier there was no protection on the primary side, and the transformer failure rate was about 20 per cent. Of the total of 3200 transformers in 2300 substations, NDPL has installed primary side protection in 968 transformers. The company claims that the failure rate is 9 per cent, although it might increase somewhat during the summer.

• The company has hired one company to do all the cable joints rather than have unmanageably many. The company claims that cable joint faults have been reduced from about 16–20 cable joint faults per day to about 4 faults per day.

• This has increased the capacity of the distribution by 25 MVA.

• NDPL plans to use about Rs 300 crore of APDRP funds over the next half year. The company claims that Rs 150 crore of equipment—capacitors and primary side protection for transformers has already been ordered.

• For handling additional load that is likely to materialize in the future, the company plans to add 4–6 sub-stations every year.

Improving Customer Service

NDPL has implemented several measures to improve the quality of customer service:

• Customer care centres now have air-conditioning, a television, and provide each visiting customer with a number and a display, which shows the number being serviced.

• Now NDPL has district-level billing.

• Customer bills are available on the company's website.

• NDPL has breakdown vans and has provided mobile phones to all its field staff, for quicker response to complaints.

• The company has established a call centre.

• Scheduled and emergency outages are announced 3 times a day on FM radio.

Training Employees

Training of both in-house and external personnel has been introduced. NDPL also has an exchange programme with Baltimore Gas & Electric (BG&E), USA and about 5 employees have gone over to BG&E under this programme.

Progress in Andhra Pradesh

Level of Investment

Table 7.4.1 shows the level of investments made by the distcoms over the 3-year period from FY2001 to FY2003. The level of investment by the distribution companies over this period has not shown any major change.

However, the companies are planning to make capital expenditures in the near future to enhance their performance. For example, for improvement of the distribution system in the twin cities of Hyderabad and Secunderabad, about Rs 307 crore has been sanctioned under APDRP funds from the Government of India. From these funds, about Rs 188 crore is to be used for installation of HVDS and the remaining Rs 119 crore is for installing high quality meters and other works (APCPDCL 2003).

[22] This section is based on information provided by V.D. Apte, GM (Technical Services & Corporate Monitoring), NDPL.

Table 7.4.1
Investments Made by AP Discoms (Rs crore)

	FY 2001	FY 2002	FY 2003
Eastern	99	119	126
Central	239	189	137
Northern	71	100	109
Southern	109	114	85
Total	518	522	457

Note: (1) Numbers are for capital expenditure in that year including IDC and capitalized expenses.
(2) FY01 numbers from tariff order for FY03.
(3) In FY 2000, transmission and distribution investments were not separated.
Source: FY02 and FY03 numbers were obtained from the tariff order for FY04. FY03 figures are projections made by APERC.

Earlier we discussed the Metering Plan of the Andhra Pradesh discoms and the great number of meters ordered in the year 2000–1. Table 7.4.2 also shows the number of meters that have been installed in each of the years. As shown in Table 7.4.3, from the most recent tariff order the licensees have been claiming all non-agricultural sales as metered sales. This effectively assumes 100 per cent non-agricultural metering. This is also being reported to the Ministry of Power.

Table 7.4.2
Achievements on Metering by AP Discoms

	FY 2000	FY 2001	FY 2002	FY 2003
Number of Meters Replaced	556,530	2,218,630	511,846	463,283
Number of New Meters—Non Ag.	544,760	1,784,508	506,612	476,103
Number of New Meters—Ag.	0	0	0	39,128
Percentage of Sales that are Metered	36.89	38.05	42.66	46.40

Note: Ag.—Agricultural
Source: Summary Sheet from APERC

Table 7.4.3
Metered Sales

(All Figures in MU)	FY 2001	FY 2002	FY 2003	FY 2004
Metered Sales	15,905	17,353	20,040	22,107
Sales to Agriculture + Losses	25,894	23,325	23,148	22,285
Metered Sales/Total Purchases	38.10%	42.70%	46.40%	49.80%
Sales to Agriculture + Losses/ Total Purchases	61.90%	57.30%	53.60%	50.20%

FY 03 and FY 04 data are based on projections

In its latest tariff order (Tariff Order 24/3/2003, para 249) the APERC has noted that the sale of electricity to the metered categories of consumers consists of 2 parts: (a) metered and billed units, and (b) assessed units. The latter part refers to units billed to the consumer in case the meter reading is not available to the distcoms on account of meter defects, door locks, etc. The APERC staff analysed the sales database filed by the distcoms for LT Category I: Domestic consumers for all 4 distcoms for varying periods. The meter readings were verified for consistency by comparing the metered units and billed units for each consumer. If these two are not similar, the staff reckoned that the consumer's electricity consumption is assessed by the distcom and billed accordingly.

The Commission 'notes with disquiet that out of the bills issued, bills and units billed on assessment basis constituted far more than the 2–3 per cent which the distcoms normally should reckon in their estimates. In some circles/districts, the proportion of assessed bills and units is more than 50 per cent. It is generally in the range of 14 to 25 per cent.' Therefore, despite the claim of 100 per cent non-agriculture metering there is a serious problem of non-functioning meters. Unfortunately, this problem does not seem to have been fully addressed so far.

T&D Losses

Table 7.4.4 shows the reductions in losses and improvements in revenue collection that have been achieved by the distcoms of Andhra Pradesh. As can be seen there has been a dramatic reduction in the T&D losses. Over a period of 3 years, the losses have gone down by about 11 percentage points—from 39 per cent in 1999–2000 to 28 per cent in 2002–3. Because much of agricultural consumption is not metered, it is difficult to separate agricultural consumption from T&D loss. Therefore, we also look at the sum of agricultural consumption and losses. This quantity too has declined by 11.7 per cent over 3 years. Another indicator of improved revenue collection is the cost coverage, that is, the ratio of the revenue realized per kWh to the cost incurred per kWh. Here too there has been a commendable improvement with the cost coverage increasing from 62.5 per cent in 2000–1 to 80.2 per cent in 2002–3. As a consequence of the improved cost coverage, the requirement for subsidies from the Government has decreased by 1200 crore over 3 years.

We reviewed the loss data for all the circles for one distcom—APCPDCL. Table 7.4.5 shows the results. The 2 urban districts showed dramatic reductions in losses and improved collection per kWh of input. In rural areas the loss reduction was not uniform across all districts. Two of the five rural districts (Mahabubnagar and Nalagonda) showed very significant reductions in losses; for the other

Table 7.4.4
Loss Reductions and Revenue Increases by AP Discoms

	FY 2000	FY 2001	FY 2002	FY 2003
T&D Loss	38.9%	35.5%	29.8%	27.6%
(Sales to Agri + Losses)/ Total Purchases	63.11%	61.9%	57.3%	53.6%
Cost Coverage	56.9%	62.5%	68.4%	80.2%
Govt. Subsidy (Rs crore)	3064	2759	2457	1859

Note: FY03 and FY04 data are based on projections.

number of interesting features emerge from this table. Agriculture sales as a proportion of input has varied between a narrow 25–27 per cent band since 1996–7. During the same period sales to agriculture as a proportion of total sales increased from 37 per cent in 1996–7 to 41 per cent in 2000–1 (first year of reforms) and has since declined to 34 per cent in 2002–3. The loss percentage was almost constant at 32–33 per cent during 1996–7 to 1999–2000, the pre-reform period. There was a sudden increase to 35 per cent in 2000–1, after

Table 7.4.5
Efficiency Improvements by District for APCPDCL

	Losses			Avg. Revenue Rs/kWh input		
Circle	FY 2001	FY 2002	FY 2003	FY 2001	FY 2002	FY 2003
Rural						
Ananthapur	24.22%	26.92%	25.56%	0.92	0.94	1.16
Kurnool	22.38%	25.14%	25.67%	1.28	1.38	1.79
Mahabubnagar	42.22%	35.67%	25.24%	0.56	0.62	0.89
Nalagonda	34.14%	26.15%	20.30%	0.83	0.93	1.39
Medak	27.06%	21.33%	24.86%	1.32	1.39	1.51
Urban						
Rangareddy	29.63%	21.97%	16.79%	2.01	2.24	2.57
Hyderabad	35.09%	32.09%	22.77%	2.59	2.91	3.32
Total Company	31.58%	27.04%	22.49%	1.44	1.58	1.96

Source: Presentation by T.V.S.N. Prasad at IIM Bangalore.

Table 7.4.6
T&D Losses and Sales to Agriculture

Year	Input MU	Total Sales MU	Agri Sales MU	Agri Sales/ Total Sales	Agri Sales/ Input	Loss of Power (MU)	Loss/Input (T&D Loss)	Agri + Loss/ Input
1994–5	28,629	23,095	10,922	47%	38%	5534	19%	57%
1995–6	29,149	23,562	11,399	48%	39%	5587	19%	58%
1996–7	31,600	21,068	7835	37%	25%	10,532	33%	58%
1997–8	35,818	23,944	9336	39%	26%	11,874	33%	59%
1998–9	37,612	25,224	9866	39%	26%	12,388	33%	59%
1999–2000	40,759	27,523	11,138	40%	27%	13,236	32%	60%
2000–1	41,799	26,976	11,071	41%	26%	14,823	35%	62%
2001–2	40,678	28,556	11,203	39%	28%	12,122	30%	57%
2002–3	43,188	31,277	11,237	36%	26%	11,911	28%	54%
2003–4	44,392	33,457	11,350	34%	26%	10,935	25%	50%

Note: FY 2003 and FY 2004 data are based on projections.

3 districts it was not so. However, all 5 rural districts showed increases in revenue per kWh of input.

T&D loss measurement is inextricably tied up with estimates of supply to agriculture. T&D losses reduced from 11,399 MU in 1995–6 to 7835 MU in 1996–7 following an intensive energy audit. However, the estimate steadily increased to the 1995–6 level by 1999–2000 and has stabilized at that level.

Table 7.4.6 shows agricultural consumption and its relationship to sales and losses from FY1995 to FY2004. A which it has steadily decreased to 28 per cent in 2002–3. If 2000–1 is considered as the first year of reforms, then compared to 1999–2000 losses are lower in 2002–3 by only about 4 per cent. During the same period the share of agriculture in total sales has also decreased by 4 per cent—from 40 per cent in 1999–2000 to 36 per cent in 2003–4.

It is possible that the pre-reform loss figures, even after the audit of agriculture in 1996–7, are manipulated downwards by inflating the total sales figure through 'bogus' bills which were never collected. In contrast during the

Table 7.4.7
33 kV Interruptions in the Service Territories of AP Discoms

Company	FY 2000		FY 2001		FY 2002		FY 2003	
	Number	Avg Duration (Hours)	Number	Avg Duration (Hours)	Number	Avg Duration (Hours)	Number	Avg Duration (Hours)
APEPDCL	15,021	1.35	15,760	0.95	12,199	0.76	7276	1.22
APSPDCL	28,722	1.07	26,365	1.04	15,788	1.12	NA	NA
APCPDCL	816	5.10	60,396	1.11	25,964	1.02	NA	NA
APNPDCL	32,881	1.07	24,038	1.33	19,155	2.09	NA	NA
All Discoms	77,440	1.17	126,559	1.12	73,106	1.28	NA	NA

11 kV Interruptions in the Service Territories of AP Discoms

Company	FY 2000		FY 2001		FY 2002		FY 2003	
	Number	Avg Duration (Hours)	Number	Avg Duration (Hours)	Number	Avg Duration (Hours)	Number	Avg Duration (Hours)
APEPDCL	88,297	2.46	101,086	1.79	101,741	1.48	39,980	0.88
APSPDCL	291,985	2.24	255,012	1.64	244,262	1.51	NA	NA
APCPDCL	6458	3.06	382,281	2.53	261,099	0.83	NA	NA
APNPDCL	308,174	1.85	232,748	1.80	208,458	2.49	NA	NA
All Discoms	694,914	2.10	971,127	2.04	815,560	1.54	NA	NA

reform period the collection performance is almost 100 per cent. Therefore, the actual loss figures could have been higher in the pre-reform period than what had been reported. This would imply an increase in the pre-reform loss figures and a sharper reduction in losses during the reform process.

One important measure of Quality of Service (QOS) is the duration and frequency of power outages[23]. We look at the number and average duration of the interruptions. Table 7.4.7 shows the results for 33 kV and 11 kV interruptions. On these metrics there is no clear indication of an improvement of performance. For example, based on the aggregate data for all four distcoms, for 11 kV interruptions, while the average duration has decreased from 2.10 hours to 1.54 hours, the number of interruptions has increased.

Table 7.4.8 shows the financial performance of the distcoms over the period FY2001–FY2003. The ratio of collection to expenditure has increased from 62 per cent to about 80 per cent, with almost 100 per cent collection performance.

[23] Ideally, one would like to use indices such as the System Average Interruption Duration Index (SAIDI) or System Average Interruption Frequency Index (SAIFI) that account for not only the duration of an outage but also how many customers are affected by individual outages. Such data is not available for the AP distcoms.

Table 7.4.8
Financial Performance During the Reform Period

Rs crore	2000–1	2001–2	2002–3
Revenue (billed) (Rs crore)	5592	6199	7239
Collections (Rs crore)	5592	5968	7094
Collections/Billing	100%	96%	98%
Actual Expenditure Incurred	8951	9061	9031
Collection/Expenditure	62%	66%	79%
Financial Profit of licensees	–1073	–876	–819
Financial Profit of licensees reworked by Commission	–1024		–254
Subsidy (approved) (Rs crore)	1626	1561	1509
Addl. Govt. Support provided	1133	896	350
Total	2759	2457	1859

Note: Financial profits are after taking into account the 'approved' subsidy; FY 2003 data are based on projections.

However, the distcoms continue to incur financial losses of close to Rs 1000 crore a year, after accounting for government subsidies. The total government subsidy has decreased from Rs 3064 crore in 1999–2000 to Rs 1859 crore in 2002–3.

Cross-subsidy in Tariffs

Because an important objective of the reform process is to reduce cross-subsidy in tariffs, we also looked at how the distcoms fared on this measure of performance. As seen from Table 7.4.9, the cross-subsidy in tariffs continues to be quite significant. This is true not only for supply to agriculture but also for domestic consumers.

Table 7.4.9
Revenue Rs Per Unit Sold

	2002–3	2001–2	2000–1
Domestic	2.34	2.09	2.09
Commercial	5.88	5.78	5.61
Industrial LT	4.13	4.16	4.11
Agri	0.32	0.22	0.21
Total LT	1.77	1.47	1.46
HT Industry	4.55	4.72	4.83
Railway Traction	4.6	4.61	4.57
Total HT	3.9	3.92	3.94
Total Discom	2.31	2.03	2.05

Note: FY 2003 data are based on projections.

Consumer Perceptions of QOS[24]

Consumer representatives state that while there is improvement in supply to the large urban centres, some villages are getting supply for 3–4 hours only instead of the 9 hours that they were promised. Similarly, while urban consumers are getting monthly bills, rural customers are getting bills once every 2 months. In general, agricultural consumers are not happy with the progress being made in the power sector in Andhra Pradesh. They feel that there is a lack of adequate supply, and in spite of that the tariffs were increased. Their fear is that the tariff may be raised further as part of the reform process. However, the consumer representatives did concede that the voltage and frequency had stabilized considerably following the introduction of the grid code and ABT.

Analysis and Conclusions—Andhra Pradesh

While the performance of the distcoms in Andhra Pradesh OS for rural consumers and reduction of power outages has been disappointing, we note that on reduction of T&D losses and increase in revenues, the performance of the distcoms is very impressive. This was also the area of greatest interest to the Government of Andhra Pradesh. What factors have contributed to this success? We look at the role played by the government and APERC.

Role of the Government[25]

The Chief Minister of Andhra Pradesh, Chandrababu Naidu, has played a pivotal role in the changes that have occurred in the power sector in the state. The most important ingredient in the significant reductions in losses is the commitment to reforms shown by the chief minister. The administrative machinery was mobilized to assist in the power sector reforms. The most important assistance provided was that of law and order. Without visible police support, reductions in theft would not have occurred and the implementation of the anti-theft legislation would not have been effective. The government also mobilized the administrative machinery to promote awareness of the problem of power theft and of the anti-theft legislation. The second important role played by the chief minister was in the selection of reform-minded commissioners for APERC. He is said to have avoided selecting political appointees to fill positions at APERC. Similarly, he handpicked people to head the licensees (distcoms and Transco) based on their competence and ability to get things done.

Having selected the APERC members and the chairman for their competence, the GoAP did much to protect and enhance the legitimacy of the APERC. On occasions where the government disagreed with the Commission, as in the case of allowing captive power in the state, it voiced its concerns and even appealed the decision at Court but accepted the Court's decision. Another example is the case when the government wanted the domestic tariff to remain the same but the industrial tariff to increase. In that case, the APERC did not follow the government's request, but the government did not malign the Commission in public or do anything else to reduce its legitimacy. The government also supported the reform process by providing subsidies on time and in full.

Role of the APERC

With every tariff order the APERC issues directives to the licensees. Many of these directives give targets for efficiency and QOS. For example, the tariff order for the FY 2002–3 covered the following areas: metering of new services; regularization of unauthorized agricultural connections; identification of multiple connections; energy audit; completion of census of agricultural pumpsets; collection of arrears, preparation of databases, reduction in failure of distribution transformers; appropriations for contingencies reserve; approvals for new schemes and details of Capital Works in Progress (CWIP); credit to non-drawl bank accounts of employee funds and revenue estimation. In the tariff order for FY 2003–4, APERC's directives covered some of the same issues but also included a target of 7 per cent for the transmission losses incurred by AP Transco.

Having set performance targets through its directives, the APERC monitors the performance of the distcoms through periodic review meetings. These meetings help the regulators and the distcoms to understand each other's perspectives. In addition, the APERC can point out areas

[24] This section is based on information provided during meetings or phone conversations with Thimma Reddy of Cenvicon, Hyderabad, Vijayakar and Sivaram Krishna of Loksatta, Hyderabad, and Bhavani Prasad of AP Farmers' Association.

[25] This section is based on information provided by G.P. Rao, Chairman, APERC, and C. Rama Mohan Rao of APCPDCL.

of poor performance and push the distcoms to perform better.

[illegible] – Delhi

Investment

Table 7.4.10 shows the investments made by the distcoms in the 9-month period following privatization. It also shows the amounts proposed to be spent by the companies in FY 2004 and the amounts spent by DVB in the year preceding privatization. The total amount spent by the distcoms (Rs 181 crore) is considerably lower than the amount spent by DVB (Rs 493 crore) in the year preceding privatization. Noting the low level of capital expenditure by the companies, the Commission opined that because the companies took over operations from DVB during the summer when the system was overloaded, their attention was focused on repair and maintenance (DERC 2003). Consequently, the level of investment was low. The Commission has directed the distcoms that the investments proposed under APDRP for FY 2004 be completed so that the Companies may avail of the benefits of the APDRP schemes. The distcoms are proposing a total investment of Rs 1046 crore as shown in Table 7.4.10.

Table 7.4.10
[illegible] Made by Delhi Distcoms

Company	FY 2002 (DVB Era) (Rs crore)	FY 2003 (Rs crore)	FY 2004 (Rs crore)
BSES Rajdhani	NA	76	423
BSES Yamuna	NA	56	336
NDPL	NA	49	287
Total	493	181	1046

Source:
(1) The amount for investments in FY 2002 were obtained from the DERC Order on DVB's tariff proposal for 2001–2, Table 3.13. Information on investments by circle was not available and only the total for DVB as a whole was available.
(2) The FY 2003 investment levels were based on the amounts approved by DERC for inclusion in the ARR in its orders on the ARRs for FY 2002–3 and 2003–4, dated 26 June 2003, Table 3.4.

The Delhi government decided to use the Aggregate Technical and Commercial Loss (AT&C loss) as the measure of efficiency for tariff setting principles. Explaining the rationale for selecting AT&C losses, the government argued that losses of any kind, technical, non-technical, or non-realization of payments, ultimately result in a loss of revenues, and, therefore, the measure of efficiency gains must include all these kinds of losses (GNCTD, 2001, para 9). AT&C losses are defined as the difference between the units input and the units realized, that is the units billed and collected. According to this definition units realized are equal to the product of units billed and the collection efficiency.

In the privatization package, AT&C loss reduction targets were made the bidding criterion and thus pre-set for 5 years based on the bid amounts (Sagar 2003). The initial bids received were much lower than the levels stipulated by the government. After negotiations, although the winning bidders did raise their bids they were still lower than the levels stipulated by the government. For the purposes of setting tariffs, the values of AT&C loss reduction are to be those bid by the purchasers and accepted by the government (GNCTD 2001 para 2). If the actual AT&C losses for a distcom are lower and, therefore, better than the levels stipulated by the government, then the licensee is to be allowed to retain 50 per cent of the additional revenue resulting from the better performance. If the AT&C loss for a distcom is higher and, therefore, worse than the finally accepted bid level, then the entire shortfall in revenue is to be borne by the distribution licensee. Lastly, if the actual AT&C loss is between the accepted bid level and the level originally stipulated by the government, then the entire additional revenue from the better performance will be used to reduce tariffs.

The actual performance of the companies for the nine month period from July 2002 to March 2003 is shown in Table 7.4.11. Only one of the distcoms, BSES Rajdhani, bettered the AT&C loss reduction target: actual AT&C losses were 47.4 per cent compared to a target of 47.55 per cent. NDPL's actual AT&C losses were 47.8 per cent and were slightly higher than the target of 47.6 per cent. In contrast, BSES Yamuna's actual AT&C losses were 61.89 per cent and considerably higher than the target of 56.45 per cent. NDPL claims that the reason that it missed the target AT&C loss is because the starting level was much higher than the base level[26] set by the Commission (Sardana 2003). NDPL says that the starting level of AT&C loss in July 2003 was 63.1 per cent which was much higher than the base level of 48.10 per cent set by the DERC. It contends that it has reduced AT&C losses dramatically (Figure 7.4.1).

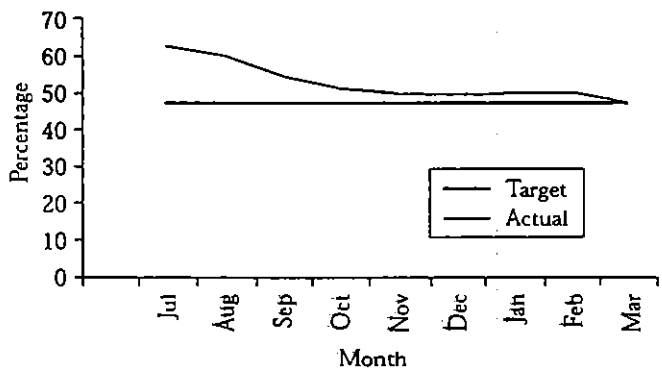
Outages

The DERC's tariff order dated 26 June 2003 did not address many of the issues regarding QOS. In their filings, the distcoms had provided data on outages, transformer failures

[26] In the auction for privatizing DVB, Tata Power and BSES bid to reduce the AT&C losses by at least the bid amount. For example, Tata Power bid that in the first year it would reduce AT&C losses by 0.5 per cent from the opening (or base) level. The base level was determined by the DERC in its order dated 22 February 2002.

Table 7.4.11
AT&C Loss Reductions by Delhi Distcoms

Company	Base Level Losses	Losses July 2002–March 2003 (Committed)	Losses July 2002–March 2003 (Actual)
BSES Rajdhani	48.10%	47.55%	47.40%
BSES Yamuna	57.20%	56.45%	61.89%
NDPL	48.10%	47.60%	47.80%



Source: Sardana (2003)

Fig. 7.4.1 AT&C Loss Reduction—NDPL

and other indicators of QOS. However, because of the timing of the original filings, data on these QOS indicators were provided from July to September in the case of NDPL and July to November in the case of the BSES filings. In its deliberations on the companies filings, the DERC did not require them to update their filings on these indicators to cover the entire nine month period of July 2002 to March 2003 even though it required them to update other data. Therefore, there are not much data on QOS issues that have been vetted by the Commission. In our analysis of the performance of the Delhi distcoms during their first year as private entities we have been forced to rely on data provided by the companies but not ratified by the Commission.

While data is not available for the level of outages due to faults in the distribution system, the companies have provided information on the number of transformer failures before and after privatization. The BSES companies report that the transformer burnout rate has decreased from 20 per cent in May 2002 to 7.4 per cent in May 2003. NDPL also reports a significant reduction in transformer failures.

Consumer Perceptions of QOS

According to some newspaper reports, the availability of power at the consumers' premises has been much higher during the summer of 2003 compared to other years making May 2003 'one of the best Mays in recent years' (Indian Express 2003). During the summer consumers reported that there were fewer outages and with shorter durations.

Both companies also reported reduced load shedding. NDPL reported a reduction from 30 MU in the summer of 2002 to 6.9 MU in the summer of 2003 (Sardana 2003). Load shedding was lower in all 3 months of 2003. However, it is difficult to attribute these reductions to superior performance by the distcoms. It may simply be a result of more power being purchased by the Transco and thus more being available for the distcoms.

Analyses and Conclusions—Delhi

There has been some improvement in the performance of the distribution companies. This can be seen from the reduction in AT&C losses assuming that the starting point was higher than the base levels established by the DERC, lower transformer failure rates, and fewer and shorter outages. While the performance of the distcoms has not been spectacular post-privatization, it is reasonable given that only 9 months have passed since the private companies took over, and that the takeover took place in the summer when the operational difficulties are the greatest and the system at its most vulnerable to breakdowns. Based on the experience in Andhra Pradesh and Delhi, we list some lessons that can be drawn for improving the performance of the distcoms in other states.

1. Political will and support is the most important ingredient for the success of reforms. As we have shown earlier in this chapter, one of the main reasons for the rapid improvement in the performance of the AP distcoms is the role played by the chief minister. He appointed reform-minded individuals at the ERC and at top-management positions in the distcoms. In addition, he directed the state machinery, particularly the law and order agencies, to give full support to the distcoms in their efforts to reduce theft. Even in the case of Delhi, political support has been important[27]. The chief minister and other members of the government take a keen interest in the sector and meet informally with the companies to review the power situation and to give feedback on specific actions the companies propose to take. The companies report several examples of support provided by the government.

- The government issued a circular to its agencies directing them to budget for, and pay for their electricity consumption.
- The government generally does not interfere in cases of theft.

[27] The statements on the experience in Delhi are based on information provided by Maheshwari of BSES.

- The government takes a balanced and unbiased stance in any disputes between the Transco and the distcoms.
- When there were power cuts in Delhi because of a major breakdown on the Dadri–Rihand–Mandola transmission line, the government did not malign or blame the distcoms for the power cuts. Instead the Transco publicly acknowledged that the problems were arising because it (Transco) had not contracted for additional power.

2. Cooperation between the government, the ERC, and the distcoms greatly facilitates reforms.

- Technology can be used to bypass the need for organizational change or to bypass difficult socio-political issues.
- Under some circumstances, it maybe easier to improve performance of a distcom as a State owned enterprise (SOE) before privatization[28].

While the above conditions are not unique, they are certainly not commonplace in the Indian power sector. But when these conditions are likely to exist, it may be easier to first improve the performance of a distcom while it is still government-owned and then to privatize, rather than privatizing directly. Some of the reasons are:

- It is easier to for an SOE to obtain law and order support for theft reduction than it is for a privately-owned company.
- An SOE is likely to get the support of other parts of the administration such as happened when the anti-theft legislation had to be publicized and the state machinery of Andhra Pradesh was mobilized for that purpose.
- An SOE may be more reverential towards the ERC and thus less likely to challenge directives.
- The problems with asymmetric information are likely to be less severe with an SOE. A private company is more likely than a publicly-owned company to use its asymmetric access to information to its own advantage and thus act in a way detrimental to the consumers' interests.
- Improving the performance of a distcom and then privatizing may allow employees and consumers to get comfortable with change and they may be more open to privatization. If privatization is done directly, then vested interests may play on the fears of employees and subsidized groups.

7.5 THE BEGINNINGS OF DISTRIBUTION REFORMS IN WEST MADHYA PRADESH: A REPORT

Ajay Pandey and Sebastian Morris

Despite opening up the sector to private participation through independent power producers (IPPs), the actual progress of reforms in electricity has been atrociously slow.

The unbundling of the industry by trifurcating the SEB and allowing private participation in the distribution sub-sector, as attempted by Orissa, failed to result in the desired objectives of improving efficiency or even restoring financial viability of the sector. The problem was of not frontally attacking the main and obvious problem, namely, the interruption of the cash flow through leakage, theft, and inefficiency. Fragmentation per se without a market design or working regulatory model to put the sector together was not solution. It may have even exacerbated the situation by creating massive restructuring, policy, and regulatory risk, which all but kept private investments out. We have argued that the IPP policy with full cost recovery even on the base load stations at 68.5 per cent, to give a return of 16 per cent[29] was itself part of the problem.

The Problems

The 'reform efforts', until the ERC Act and Electricity Act 2003 came into operation, were in the perverse direction (Morris 1996 and 2000).

After the Orissa experiment, and with unbundling and hardening budget constraints, it soon became apparent that the true T&D losses were of the order of 40–50 per cent as against 20–25 per cent claimed by the SEBs (Sinha, S. 2002).[30] The inter-related problems of high T&D losses and the mode and extent of subsidies for agriculture are also now recognized as inter-related as unmetered agricultural supplies in particular, and price differences in general between consumer groups, could be exploited to hide commercial losses, mainly, theft. In, last 2 to 3 years, the focus of the governments has shifted to the reforms in the distribution sub-sector through initiation of the Accelerated Power Development and Reforms Programme (APDRP), which provides fiscal assistance and incentives to the states to

[28] In developing this sub-section and the next we benefited from ideas suggested by Geeta Gouri of APERC, C. Rama Mohan Rao of APCPDCL; and T.V.S.N. Prasad, then CEO of APCPDCL.

[29] The effective return may have been as high as 28 per cent for possible capacity utilization close to 90 per cent. Additionally, the way the rate base was calculated meant that the returns were higher than this figure too.

[30] See Morris (1999) for an earlier discussion on this issue and the identification of the same as the root cause of the problem.

One should also consider the role of the private sector promoters who bid for and take over the state power utilities. If full and realistic information is not provided to them at the time of bidding, their assumptions will not be correct and they will run into problems later. As happened in Orissa, they will be required to provide more funds than originally anticipated. On the other hand, if central government's grant funds meant for state utilities would also go to them, then these need to be identified and factored in at the time of bidding.

Lastly, one needs to look at the role of the central government. It is heartening to note that it has started providing some funds under APDRP. But considering the large requirement, this alone may not be enough. If reforms have to be expedited, the central government would need to provide financial assistance to meet cash requirement during the reform period, which may be partly as grant and partly as loan, but it should be determined after critically examining the total reform period requirement and how that would be met fully through various sources.

Conclusion

For reforms to succeed, it is very important to estimate realistically the fund requirements during the reform period and to ensure that these are fully met through various sources. The financial commitments made by different agencies would be more like 'financial closure' for reforms and would provide a solid base for reforms. If such financial closure is achieved, the reforms will not be hampered or slowed for want of funds.

7.3 WHY AND WHEN DO STATE GOVERNMENTS REFORM: THE CASE EXPERIMENTS IN ELECTRICITY IN DELHI

Jagdish Sagar

The losses imposed by non-reform of the electricity sector are not an adequate force to bring about change and reform. This is because governments do not respond to financial losses the way businesses do. Moreover, on a cash basis over the small time horizon (3 years) or so, according to the government's consideration, reform would have involved higher costs. The pressures for reform, therefore, do not come from tightening budgets but, rather, are political in nature. When there is a 'need' to do something about a power situation which has become exasperating for a large number of people, the political capital that may be made from correcting a bad situation is the principal driver of reform.[2]

The goals of reform in the power sector are commonly stated in economic terms—to make the sector self-sustaining, incentivizing efficiency improvement, restoring the effectiveness of price signals, ensuring that any remaining subsidies are direct and transparent. In practice these goals will translate into the simplified objective of finding a feasible way to distance the government both from regulation of the industry and from operational control of it. This is especially true of the distribution segment which is the point of interface with consumers and the source of the whole industry's revenues. The extent of willingness to relinquish control is, therefore, the best measure of a state government's intention to reform. In principle, even the willingness to put suitably qualified persons in charge of the State Electricity Board (SEB) and allow them to function with complete independence, under independent regulation, would be a reforming intention; though of course in practice, given the realities of our political economy, few would suggest that reform could be achieved without restructuring the SEB. In the Indian context, the paradigm case would be the unbundling of an SEB with the definite prior intention of privatizing distribution in particular (whether immediately or as a second stage) plus the transfer of all regulatory functions to a State Electricity Regulatory Commission (SERC).

There cannot, of course, be any precise index of such willingness to reform. A state government's decision-making is in any case not necessarily a coherent process: the course of policy may shift and meander with the entry and exit of different actors[3] within the government. It may also be

[2] At the time of writing, it has been over a year since the DVB was unbundled and much has happened since then, including Government of the National Capital Territory of Delhi's (GNCTD's) decision of its own to provide an additional subsidy of about Rs 52 crore (explicitly, and as fixed by the Regulatory Commission) to maintain the previous year's tariff for the majority of Delhi's consumers; this subsequent development is strictly outside the scope of the present paper but it is consistent with the thesis that financial considerations were not the driving force of the Delhi reforms.

[3] In the case of Delhi, the process from start to finish (1999 to 2002) saw successively 2 ministers, 3 chief secretaries, and 3 secretaries in charge of the Power Department; however, there was no change of government (that is, of chief minister) and the same person continued throughout as chairman of DVB.

influenced variously by such factors as externally imposed conditionalities for badly-needed financial assistance, or the prospect of disconnection for non-payment to centrally-owned utilities, and the like. But expressed intentions to reform in response to such external pressures are likely to include some element of window-dressing. In Delhi, the intention to reform was as clear-cut as possible once the government had (by early 2001) decided to unbundle and privatize distribution simultaneously, that is, without an intermediate stage of corporatization. In other cases, where such an intermediate stage is envisaged beforehand as a necessary step in the process,[4] the intention to actually distance the government from operational management of the power industry has to be considered as being contingent or hesitant, at least until the final step has been taken.

The DVB

The Delhi Vidyut Board (DVB) came into existence as an SEB in February 1997, succeeding the Delhi Electric Supply Undertaking (DESU), which had handled Delhi's power supply since 1958 as a wing of the Municipal Corporation of Delhi. DESU in turn had succeeded the earlier Delhi State Electricity Board (DSEB) that had been set up in 1951. Organizationally though, DSEB, DESU, and DVB alike were afflicted with the hierarchies, procedures, and work culture of similar government utilities in other states. These changes in legal status were not accompanied by any significant changes of personnel. Performance in terms of the key parameter of (T&D) losses[5] deteriorated from the mid-1970s, and very sharply in the 1990s, apparently correlating quite remarkably with the establishment of a Legislative Assembly and the elected Government of the National Capital Territory of Delhi (GNCTD) in 1993. The organization's general image for quality of service and consumer relations also deteriorated, perhaps touching its nadir by 1998.

Some features of Delhi's power supply situation are:

- high per capita consumption by Indian standards, that is, 1382 kWh per annum in 2001–2;
- generally high rate of load and consumption growth;
- sharp diurnal and seasonal variation between peak and off-peak load, attributable to the climate plus the absence of agricultural and other possible off-peak consumption. Also, consumption during the peak seasons (mainly May to August, and January) has been growing more rapidly than during the off-peak season. Delhi's own generation is limited and the scope for expanding it locally is constrained by cost and environmental considerations so far as coal thermal generation is concerned, and for the time being (though this is likely to change) by a shortage of gas. There is, therefore, an endemic peaking shortage that has to be met annually by costly bilateral arrangements, further increasing the cost of power;
- the presence of a large population in unauthorized colonies and jhuggie basties (squatter hutments) tends to offset the advantage of negligible agricultural consumption. The unplanned character of much of Delhi's growth, and the mismatch between planned and unplanned land use even in many planned areas, have obvious implications for power supply as for other services. However, their effects in respect of the power sector were compounded by certain provisions of the Delhi Electricity Control Order (DECO) in force from 1959 (until largely withdrawn in 1999) which restrained the utility from supplying power to unauthorized structures or for unauthorized (commercial or industrial) use. This virtually compelled a very significant proportion of the population to steal electricity. Thus, in 2001, DVB estimated that about 14 per cent of Delhi's power consumption was going unmetered and unbilled to unauthorized colonies and jhuggie basties (mostly to the former). This factor compounded the utility's growing difficulties.

Performance and Reform

DESU and later DVB were notoriously subject to the ills attributable to political interference and, more broadly, to political goal setting and the consequent skewed reward system, that have afflicted most SEBs. The low priority accorded to commercial performance is also evident from the fact that even when (down to the early 1990s) DESU's T&D losses were at relatively 'acceptable' levels, the utility's retail tariff was insufficient to cover its costs (Table 7.3.1). But as this fact itself suggests, it would be wrong to suppose that DVB's poor financial performance was by itself the primary driver of the reform process. There is a difference between mere poor financial performance (as would have been reflected in the utility's accounts, if they had been prepared[6] or even as visibly reflected in the mounting dues to central utilities as well as to the Delhi government itself) and actual, perceived inconvenience to the government in power.

Losses Do Not Create Pressure ...

SEBs have actually been able to survive, sliding comfortably downhill whilst cheerfully accumulating liabilities, for a

[4] Which is the usual pattern: Delhi is perhaps the only case where corporatization and privatization were simultaneous.

[5] Unaccounted energy being the difference between energy input and energy billed.

[6] DESU and DVB accounts were finally brought up to date in 2001–2, but remain to be audited from 1991–2 onwards.

Table 7.3.1
Commercial Performance of DESU/DVB

Year	T&D Losses (%)	Collection Efficiency (%)	Revenue Realized (Rs Cr)	Net Commercial Loss (Rs Cr)	Operating Deficit (Rs Cr)
1983–4	22.16	82.13	150.36	86.92	63.59
1984–5	21.56	79.62	182.96	100.59	73.92
1985–6	19.00	85.89	288.17	40.74	4.92
1986–7	25.43	87.91	328.23	104.25	52.43
1987–8	30.78	83.05	360.63	226.16	165.81
1988–9	23.49	72.69	456.08	242.20	165.65
1989–90	24.46	72.45	529.09	241.63	199.94
1990–1	22.33	76.73	701.16	208.82	150.98
1991–2	26.50	87.23	865.00	90.96	15.50
1992–3	42.66	89.92	1072.00	328.79	216.38
1993–4	41.96	92.42	1322.78	245.46	114.14
1994–5	45.27	89.45	1555.09	326.55	172.95
1995–6	48.46	87.44	1711.95	500.76	354.35
1996–7	48.41	88.10	1970.19	709.74	491.81
1997–8	48.61	88.27	2699.14	536.31	281.98
1998–9	48.21	88.28	3031.99	833.47	502.23
1999-2000	47.52	90.8	90.81	3266.75	833.93
2000–1	45.64	91.00	3554.32	1104.41	462.63
2001–2	47.45	90.61	4004.73	1196.04	248.04

Note: DESU/DVB's annual accounts audited up to 1990–1; unaudited accounts thereafter.

surprisingly long period. They have not managed to do so merely on the strength of subsidies. They also have been surviving by not paying for power purchases (Table 7.3.4) and not repaying government loans. Not even the extremes of non-performance and the prospect of severe curtailment of power supply are necessarily sufficient by themselves to goad a state government into effective reform. Thus in the summer of 2003, with electric supply officially available for a little over 9 hours a day in most of the state, and for only 16½ hours a day even in district headquarters.[7] Uttar Pradesh was restricting its own power purchases under financial compulsion, imposing heavy power cuts and even selling power to Delhi to improve the short-term liquidity of the state's transmission and distribution utility.[8] This was done presumably because the government perceived the cost and inconvenience of genuine effective reform as being incommensurate with the possible benefits, that it could envisage as accruing to itself from such reform. We must also make allowance for the fact that a government is very likely to assess this balance of pain and pleasure with reference to the limited time span of its own term of office. And for the nature of motivation and the quality of understanding and foresight available at the effective decision-making levels (which may simply be inadequate to the purpose). And these in turn are likely to be influenced by the prevailing political culture of the state, within the context of which those in power will judge the electoral value of reform. Finally, in practice it is remarkably easy, even in such circumstances as described, for an SEB to get by for the time being (which might well be the limit of a government's concern) with a slight, but more or less promising show of improvement, which may or may not be more than window-dressing.[9]

Table 7.3.2 shows the budgetary costs to GNCTD of continuing with DVB and of adopting the reform package that was actually adopted. It is in 2 parts, the first showing all budgetary costs and benefits and the second showing the cash outflows from the government. A state government is much more likely to be swayed by the latter than it is by the former, as it is the latter that actually presents it with a choice involving an immediately perceptible opportunity

[7] Uttar Pradesh Electricity Regulatory Commission (UPERC)'s Tariff Order of Uttar Pradesh Power Corporation Limited (UPPCL) for 2003–4, ch 2. UPERC found that 'Instead of adopting harsh measures to improve collection efficiency and T&D losses, the Licensee appears to have taken the easy route of curtailing power purchase as a result of which almost all categories of consumers have been starved for electricity...'

[8] In UP, the SEB was unbundled into a generation company and a T&D company (UPPCL) in 2000; the next stage of creating separate distribution companies has, at the time of writing, yet to materialize.

[9] This applies equally to an unbundled but still government-owned distributing utility; since a state government can buy time by going through the motions of reform, unbundling it into companies that are subjected to the same malign influences as the SEB is an alternative.

Table 7.3.2
Cost to Government of Delhi under Various Arrangements

Budgetary (A) Cost if DVB without Reform Continued

Years	Plan Fund	Central Plan Assistance	Interest Accured (Re-Loaned)	Special Loan	Govt. Subsidy	Total
	A	B	C	D	E	A+B+C+D+E
2000–1	842.83 **	292.59 **	401.04 **	103.50 **		1639.96
2001–2	693.00 **	315.00 **	471.75 *	60.98 **	104.50 **	1645.23
2002–3	762.30 **	326.03 **	523.20 *			1611.53
2003–4	838.53 *	339.07 #	579.80 *			1757.40
2004–5	922.38 *	365.00 #	624.06 *			1911.44
2005–6	1014.62 *	392.93 #	692.55 *			2100.10
2006–7	1116.08 *	422.99 #	767.88 *			2306.95

Budgetary (B) Cost After Reforms

Years	Cash Flow (Repayment of Loan Interest)	Grant (For Pension Trust)	Loan (With 4 Years Moratorium)	Transco/ Genco Plan Investments	Assistance to DVB to Liquidate Outstanding Dues of DVB	Total
	A	B	C	D	E	B+C+D+E+A
2000–1	0.00					
2001–2	0.00	860.00 **			142.00 **	1002.00
2002–3	0.00	21.00 **	1364.00 **	209.00 **	120.00 #	1714.00
2003–4	0.00	5.58 ^	1260.00 **	200.00 **	120.00 #	1585.58
2004–5	0.00		690.00 **	200.00 #	120.00 #	1010.00
2005–6	0.00		138.00 **	200.00 #	120.00 #	458.00
2006–7	414.00 #		0.00	200.00 #	120.00 #	-94.00

Cash Outflow (A) if DVB without Reform Continued

Years	Plan Fund	Central Plan Assistance	Special Loan	Govt. Subsidy	Total
	A	B	C	D	A+B+C+D
2000–1	842.83 **	292.59 **	103.50 **		1238.92
2001–2	693.00 **	315.00 **	60.98 **	104.50 **	1173.48
2002–3	762.30 **	326.03 **			1088.33
2003–4	838.53 *	339.07 #			1177.60
2004–5	922.38 *	365.00 #			1287.38
2005–6	1014.62 *	392.93 #			1407.55
2006–7	1116.08 *	422.99 #			1539.07

Cash Outflow (B) after Reforms

Years	Cash Flow (Repayment of Loan Interest)	Grant (For Pension Trust)	Loan (With 4 Years Moratorium)	Transco/ Genco Plan Investments	Assistance to DVB to Liquidate Outstanding Dues of DVB	Total
	A	B	C	D	E	B+C+D+E+A
2000–1						
2001–2	0.00	860.00 **			142.00 **	2175.48 §
2002–3	0.00	21.00 **	1364.00	209.00 **	120.00 #	1714.00
2003–4	0.00	5.58 ^	1260.00	200.00 **	120.00 #	1585.58
2004–5	0.00		690.00	200.00 #	120.00 #	1010.00
2005–6	0.00		138.00	200.00 #	120.00 #	458.00
2006–7	414.00 #		0.00	200.00 #	120.00 #	-94.00

Notes: All figures are in Rs cr. Actually, DVB was unbundled w.e.f. 1 July 2002. These statements ignore the period 1 April 2002 to 1 July 2002.

* As per proposals submitted by DVB to GNCTD in December 2001; ** Actuals; # Estimated; ^ Balance of Rs 886.58 cr., to be paid by GNCTD; § Includes cash outflow to DVB, as it continued to exist in 2001–2.

cost. Costs that do not involve any present cash outflow are, in practice, likely to be ignored for years together: Howsoever grave their long-term implications may be, these are 'painless' costs. Again, those costs that have become a regular annual feature in the budget[10] are unlikely to be scrutinized unless there are special reasons for doing so, as when the cost increases suddenly. We may call these costs, which the government is likely to take for granted, 'normal' costs.

Of course, when there is a very severe overall shortage of resources all costs may become painful. However in such a case a State Government will, at least initially, try to meet the crisis by restricting costs that are neither normal nor painless. In such a situation, if reform involves an immediate cash outflow, it will not appear attractive even if it promises substantial long-term benefits—unless, of course, it is made a condition for much-needed financial assistance. Reform that starts with such financial assistance may indeed be sincerely intended, but should be looked at with some caution since in practice the lender may find it difficult to ensure that it really takes place, and the State Government may be able to buy time with assurances and a show of improvement.[11]

Costs of Not Reforming

The costs of DVB to GNCTD included (a) diversion of Delhi's Central Plan Assistance by the central government, (b) annual plan assistance to DVB, which was in theory a loan repayable with interest of about 12 per cent; (c) non-plan assistance, also in theory a loan, given on an ad hoc basis from time to time; (d) the mounting dues from previous loans, none of which had ever been repaid, the amount repayable each year being treated as a fresh loan; (e) mandatory subsidy payments).

Central Plan Assistance

Delhi's entire Central Plan Assistance (CPA) was being diverted for direct payment to the Badarpur Thermal Power Station (BTPS) owned by the Ministry of Power. This was a clear loss to GNCTD of potential resources for capital investment, which might be avoided through effective reform (that is, assuming that the successor entities to DVB would have the necessary paying capacity.) However, by the time the reform process began it was sufficiently long-established to be treated in practice as a 'normal' annual cost.

[9] Including capital investments of the kind for which there is no annually recurring provision in the State Plan, for example, those for augmentation of the T&D system (as distinct, for example, from provision for a new generating station, which is a 'one-time' decision).

[11] And the lender's motivation might be sufficiently ambivalent to live with this situation.

Annual Plan Loan

Delhi's power system requires quite heavy capital investment every year just to keep pace with the rapid growth of load and consumption (that is, even without necessarily improving the quality of service). The annual plan loan for capital expenditure accounted for a very significant proportion of the territory's Annual Plan. Although in principle this was a loan, it had never been repaid and it was quite well understood in practice that it never would be. In the event of unbundling with privatization of distribution, the annual capital investment in distribution would cease to be the government's responsibility and, assuming that the reforms did achieve financial viability, any future plan loans for the generation and transmission sectors would be repaid. It would also be possible for the new generation and transmission entities, assuming them to be as creditworthy as DVB was not, to raise funds for capital investment from financial institutions, thus freeing yet more of Delhi's annual plan resources for other purposes. This, again, was in the category of 'normal' costs. Table 7.3.3 shows Annual Plan expenditure broken up between generation, transmission, and distribution, and as a proportion of the total Annual Plan expenditure.

Non-Plan Assistance

Fresh non-plan loan assistance to DVB was given only at particular times to meet with particular situations. However, notional loan assistance, to cover DVB's repayment obligations to GNCTD, increased annually. The two kinds of assistance are very distinguishable in practice, the latter being 'painless' and the former decidedly painful. However, as the former had been necessary only occasionally, it did not weigh heavily in this case.

Subsidy

Before the reform explicit subsidy assistance had been provided only once. Since the previously existing tariff (fixed in 1997) had provided for Fuel Adjustment Charges (FAC)[12] to be paid only by industrial and non-domestic (that is, commercial) consumers the Delhi Electricity Regulatory Commission (DERC) in its Tariff Rationalisation Order dated 16 January 2001 required GNCTD to pay the cost of FAC for domestic and agricultural consumers; this remained operational until the next tariff order became effective in June 2001, hence, the government paid DVB a total of Rs 104.50 crore in April and May 2001. This was, in short, an atypical occurrence and there was no continuing

[12] These charges actually covered increases both in the cost of fuel for DVB's own generation and DVB's power-purchase costs.

Table 7.3.3
Power Sector Expenditure and Shares in Delhi's Total Plan Expenditure

Year	Generation	Transmission	Distribution	All Electricity	Total for All Sectors
1993–4	57.39	120.62	131.02	309.03	969.58
	5.92	12.44	13.51	31.87	100.00
1994–5	57.67	121.29	131.55	31.52	1149.00
	5.02	10.56	11.45	27.02	100.00
1995–6	33.03	70.08	180.33	283.43	1298.25
	2.54	5.40	13.89	21.83	100.00
1996–7	10.27	53.56	257.99	321.81	1879.88
	0.55	2.85	13.72	17.12	100.00
1997–8	1.50	63.12	198.69	263.31	1978.31
	0.08	3.19	10.04	13.31	100.00
1998–9	7.39	91.16	339.44	438.00	2054.56
	0.36	4.44	16.52	21.32	100.00
1999–2000	68.70	74.35	336.36	479.41	2298.20
	2.99	3.24	14.64	20.86	100.00
2000–1	292.57	79.07	349.46	721.10	3129.11
	9.35	2.53	11.17	23.04	100.00
2001–2	414.70	42.06	349.54	806.31	4009.50
	10.34	1.05	8.72	20.11	100.00

Notes: The first row for each year gives the amount of expenditure in Rs crore, and the second row give the per cent to total for all sectors of expenditure of the Delhi government.

burden of subsidy that the government might hope to shed by reform.[13]

The Practical Implications

DVB's financial performance in the last two years of its existence (2000–1 and 2001–2) is summarized in Table 7.3.4. Its accumulated liabilities (as in July 2001) are shown in Table 7.3.5. Nothing that will be said hereafter should be read as making light of DVB's mounting losses and of the apparent impossibility of turning it around.[14] But against these realities, if we wish to consider the actual probability of their motivating an elected Government to reform, we must weigh the following considerations:

- GNCTD was not facing any such pressing financial difficulties as to compel it to consider divesting itself of DVB for purely financial reasons. Nor was it compelled to seek external assistance under terms that compelled it to make any commitments to reform the power sector. It is noteworthy that DESU and DVB had never even approached the Power Finance Corporation (PFC) for loan assistance for its capital expenditure. And this was not for want of creditworthiness, since it was in a better position relative to

Table 7.3.4
Summary of DVB Accounts (Unaudited) 2000–2

	2000–1	2001–2
Income		
Revenue from Sale of Power	3194.51	3549.62
Revenue Subsidies and Grants	0.28	104.50
Other Income	359.44	350.61
Total	3554.22	4004.73
Expenditure		
Purchase of Power	3085.03	3402.77
Generation of Power	364.80	370.03
Repair and Maintenance	127.65	111.45
Employee Costs	436.23	429.61
Administration and General Expenses	62.75	83.12
Depreciation and Related Debits (Net)	216.04	240.02
Interest and Finance Charges	425.74	707.99
Sub Total	4718.23	5344.98
Less Expenses Capitalized		
Interest and Finance Charges Capitalized	24.70	13.67
Other Expenses Capitalized	126.97	130.71
Sub Total	151.67	144.39
Total Net Expenditure	4573.68	5209.52
Profit/(Loss) Before Tax	−1019.46	−1204.79
Provision for Income tax	0.00	0.00
Profit/(Loss) After Tax	−1019.46	−1204.79
Net Prior Period Credits/(Charges)	−84.95	8.74
Surplus/(Deficit)	−1104.41	−1196.04

[13] As we have seen (footnote 2 of this chapter) GNCTD post-reform as voluntarily decided to give an explicit subsidy: it can afford to do so when it considers it necessary.

[14] If DVB's T&D losses were miraculously to have been reduced from about 47 per cent (as they were in the last year of its existence) to about 11 per cent (being the T&D losses of BSES in Bombay) the resultant revenue gain at the same tariff would exceed Rs 2500 crore giving it a surplus (or a possible saving to the public) of over Rs 1300 crore in 2001–2. However, those without experience of the distribution business often fail to appreciate the hypothetical nature of this calculation.

Table 7.3.5
Sectoral Liabilities of DESU/DVB (March 2001)

DESU Period Liabilities (Up to 25 February 97)	
Loans to DESU	126
Loan from GOI	13
Loan from CEA	57
Interest accrued and due on loans	2863
Loan from Delhi Administration Plan and Non-plan	726
Interest accrued and due on loans	816
Total	4601
Power purchase dues	3506
Energy dues	4846
Surcharges	
Grand Total	12953
DVB Liabilities	
Loans from GNCTD to DVB Plan	2078
Non-Plan	2317
Interest accrued and due	445
Total	4840
Power/fuel purchase dues	1710
Energy dues	2747
Surcharge	4457
Total	9297
Liability to Terminal Benefit Fund	887
Grand Total	10184
Total Liabilities (DESU+DVB)	23137

other SEBs, but merely because the funds for capital expenditure that were available from the State Plan had always been more than adequate (at any rate, in terms of the utility's ability to utilize them).

- In any case, reform offered no immediate benefit. The financial benefits of reform to the government would begin to flow only a few years after the decision to reform.
- The GNCTD was perfectly justified in disclaiming responsibility for that large part of the utility's dues that pertained to the DESU period. DESU, being a wing of the Municipal Corporation of Delhi, had been under the statutory control (under the Delhi Municipal Corporation Act) of the central government in the Home Ministry, and not of GNCTD. (The break-up between DVB and DESU liabilities in Table 7.3.5 may be noted in this connection.) The existence of this unresolved issue not only reduced the magnitude of the problem of accumulated liabilities but also provided a justification for delaying any action to address the question pending its resolution.
- When liabilities have reached such astronomical proportions, it is natural (and correct) to presume that they will have to be dealt with by some special debt-restructuring scheme (as has since happened, with the Ahluwalia Committee Report), or simply be written off. It is obvious that no utility or state government will ever actually be able to pay off liabilities on such a scale, hence it will never be required to do so. In fact, accumulated dues to central utilities and the central government from DESU amounting to Rs 1407 crore (mostly interest) were actually waived in 1989, and Rs 1004.10 crore of principal due converted into a perpetual loan that was 50 per cent interest-free. Under the current Ahluwalia Report scheme, too, it is only the principal and 40 per cent of accumulated interest that is being securitized; the remaining interest is being waived. In the circumstances, DVB and GNCTD would have had little practical incentive to begin to discharge part of the accumulated liabilities even supposing they had been able to. The utility in such a situation can actually earn a lot of goodwill simply by paying most of its current dues, as indeed DVB was doing in its last few years. DVB's operating loss was not increasing rapidly, rather it would decrease with the occasional tariff revisions every few years; the balance sheet looked worse every year mainly because of the compounding of debt.
- We have already remarked that it may be possible to get by for the all-important time being with just some apparent improvement in performance. This was certainly the case with DVB during its last few years, when it was able to discharge most current dues as it had not been doing earlier, and as most SEBs were still unable to do (Table 7.3.6). Thus during FY 2001–2, when NTPC was able to realize only 76.7 per cent of its current dues overall, its realization of over 98 per cent from DVB showed DVB in a very favourable light—making any thought of punishing DVB for its past defaults unlikely, at least for the time being.

Table 7.3.6
Payments made by DESU/DVB: Power Purchased and the Payment Per cent

Year	Power Purchase Bill Rs crore	Payment Made Rs crore	Payment Purchase %
1993–4	1017.48	591.84	58.17
1994–5	1290.13	911.65	70.66
1995–6	1551.20	1110.96	71.62
1996–7	1838.54	1321.53	71.88
1997–8	2380.08	1853.97	77.90
1998–9	2714.04	1972.62	72.68
1999–2000	2893.44	2770.11	95.74
2000–1	3085.03	2871.56	93.08
2001–2	3369.32	3160.29	93.80

- Finally GNCTD and DVB could always draw comfort from the circumstance that, as DVB served the national capital, there would at all times be a special sensitivity about restricting its power supply or denying it any kind of help to continue functioning.

While the case for immediate and drastic reform might in all financial logic be unanswerable, an elected territorial

government might not necessarily see the matter in the same light. It might well fail to perceive any overwhelming necessity to disturb the status quo during the short period of its own term of office, and when the same situation might be sustained indefinitely by sporadic 'just enough' improvements in DVB's performance from time to time. It might have been said of DVB, as it was said of the Austro-Hungarian Empire, that the situation was desperate but not urgent. We must, therefore, move on to consider those costs of continuing with DVB that were not so readily quantifiable, and also the real and potential costs, as the government might perceive them, of going in for reform.

Non-budgetary Costs of Not Reforming

The non-budgetary costs of failure to reform would include the loss of economic activity on account of inadequate or poor power supply; difficulties (caused by bureaucratic rigidity, inefficiency, or corruption) in obtaining access to power supply; the enhanced cost of power because of the utility's commercial inefficiency, which specially affects productive industrial and commercial activities that are made to cross-subsidize the more politically important consumer categories; all these have economic effects, and also implications for the government's revenues. There was also an added cost of maintaining law and order, because of disturbances of the peace as a result of power supply failures (though under the peculiar constitutional arrangements made for Delhi this remains the responsibility of the Ministry of Home Affairs and not of GNCTD). There are costs to the water supply and sewage systems, the functioning of which depends a great deal on power supply. And there are administrative costs, including loss of executive time, that are attributable to the power situation. However, a state government is likely to perceive all these costs more directly in terms of inconvenience and of damage to its image; the decision-making process in Delhi did not adopt any direct evaluation of reform in terms of social cost-benefit. Social cost-benefit may form part of the state government's calculation indirectly, to the extent (itself a variable related to the working of the political system) that it is reflected in the anticipated electoral consequences of a course of action.

Consequences of Unpopularity

It would be difficult to try to capture in these pages the atmosphere of governance in Delhi during periods of severe power shortages or breakdowns, especially during the summer season—demonstrations, riots, headlines; the constant 'monitoring' of harassed engineers; tense, repetitive meetings, press releases, press conferences, widely publicized ministerial site visits, frantic excuse-making at all levels. Eventually in 1998, probably for the first time in Delhi (and perhaps anywhere in the country), popular dissatisfaction with the quality of power supply was widely perceived as having had a major electoral impact. For the new government that took office in December of that year, electoral defeat would therefore have appeared as a distinct possibility penalty for failure to improve the power situation. If the government were further to be convinced (as in fact it was) that such an improvement entailed effective structural reform including privatization, then it would perceive the cost of failure to reform, and the corresponding potential reward for successful reform, as decisive.

Image of the Government

Delhi is the headquarters of sundry professional, industrial, voluntary or research organizations, the venue of a disproportionately large number of conferences, seminars, workshops, training courses, and the like. It is, therefore, home to an opinion-forming population which, though numerically insufficient to be of any direct electoral importance, is by no means unimportant for a territorial government in Delhi. The image a government obtains in this circuit should have a perceptible multiplier effect, not the least via the media. At a time when the discourse of reform was gaining ascendancy, the image of a territorial government that continued shamelessly to own DVB would certainly suffer in the eyes of this population. And, more broadly, voters might, and not wholly without reason, put the commercial and operational deficiencies of DVB down to its reputed corruption—a stain that in times of serious discontent would naturally tend to rub off on the government as a whole.

Non-budgetary Costs of Reforming

Against the above considerations, we may weigh what non-budgetary costs the government might perceive in its decision to reform.

Not a Mafia

The prospect of loss of illegitimate personal benefits, by an indeterminate number of individuals, is without doubt a factor capable of influencing a government's decisions on reform. 'Political interference' has become a euphemism for improper influence with corrupt motives. On the other hand, it is all too easy to succumb to the intellectual comfort of conspiracy theory and 'explain' the corruption and poor performance of SEBs by putting them down to some vaguely designated 'mafia' functioning under political protection that is projected as the main obstacle to reform. One has heard it confidently asserted that such a 'mafia' was swallowing the entire 'losses' of Rs 1200 crore (Table 7.3.4).

This is simplistic. It would be a digression to discuss how corruption operates in SEBs, but it is by no means the only or even the principal possible source of 'rent' for those in charge of a state government and for our purposes here it is best appreciated simply as an aspect of the self-inflicted role erosion, the sacrifice of power and patronage, that effective reform in this case necessarily involves.

Concern about such role erosion would also encompass a genuine apprehension of being left with responsibility to a sensitive electorate after having surrendered the power to intervene, especially perhaps where strict commercial measures need to be adopted, but also more generally. Moreover, the very inefficiency of organizations like the SEBs creates an opportunity of interface with the electorate: goodwill can be earned by getting wrong bills corrected, and crisis power-supply situations may be seized upon as an opportunity for visible, hectic activity to establish one's personal credentials with the public. The apprehension of role erosion will be more widely dispersed in the case of electricity distribution than in generation and transmission both because the nature of distribution activities tends to give rise to decentralized rents. It also provides local leadership with one more area of activity. Its importance as a factor influencing decisions about reform depends both on the personal motivation of those involved and on their capacity to impose their decision-making on legislators who, in this case, may feel directly affected. It will certainly help if they can convince legislators that the reforms will be electorally advantageous.

[illegible] Reform

Then, again, the reform process is likely to involve a certain amount of mindset discomfort, the pain of giving up settled notions, and that too at a perceived risk. The upward revision of tariff, which can hardly be avoided in the early stages of reform, will not be matched immediately by improvements in the quality of service. The reforms may not 'work,' privatization may be attacked as a 'scam,' there may be a very painful transition period with labour unrest, disruption of supply and popular criticism, the whole thing may prove counterproductive. These were all very real apprehensions at a time when relatively few states had taken up serious reforms in the power sector and it was necessary to innovate and improvise a reform package in the absence of an established success model. In Delhi, it is already too easy to forget how heavily these factors weighed at the time when the crucial decisions had to be taken.

[illegible] Reform Package

The reform package was designed around the overriding necessity to attract investor interest in the context of the experience in Orissa, where the aftermath of unbundling and privatization was unfolding contemporaneously with the reform process in Delhi over the period 1999 to 2002, while at the same time providing assurance that the distribution business would actually turn round within a reasonable time frame. The Orissa experience was not developing as a happy one for the investors there. Moreover, in 2000 the UP government's attempt to privatize the Kanpur Electric Supply Company (KESCO) fell through for want of investor interest. The summary description attempted below presents much too tidy a picture of the whole process, but this is not the place to recount all the twists and turns it actually took.[15]

The Reform Package

The main concerns that had to be addressed were identified as follows:

- Above all else, it was necessary to achieve results well within the government's term of office, for the reasons that have been described.
- It was necessary to create confidence in the data provided to investors, after the experience in Orissa where the T&D losses had turned out actually to be very much higher than what the investors had been led to believe.
- Something would have to be done to mitigate regulatory uncertainty, since in Orissa decisions regarding the extent of T&D losses that would be allowed in the Annual Revenue Requirements (ARRs) filed by the distribution companies were left entirely in the hands of the Orissa Electricity Regulatory Commission, which not only failed to allow reasonable and achievable targets but also each year, left uncertain what it would do the following year. It would be impossible for an investor to prepare a business plan, as the basis for his bidding, if this kind of uncertainty were now to be repeated in Delhi.
- Closely related to the above was the need to provide for reasonable and realistic annual efficiency improvement targets, in view of the experience in Orissa where the effective target for T&D loss reduction in the first year was as high as about 15 per cent, condemning the distribution companies to unavoidably heavy losses.

[15] Secretariat decision-making depends upon the movement of a file through numerous channels both vertically and horizontally, which can be sent backwards or sideways at any time with queries and observations, unknown to the originator; or simply sat upon. It is thus both painless and risk-free, even in the face of political will, for individuals to block or delay any decision. Of course the survival of such an inefficient method of consultation is itself significant Honest, useful brainstorming would threaten 'turf' and hierarchical authority—and, in any case, would presuppose a certain community of mindset that does not exist in such matters.

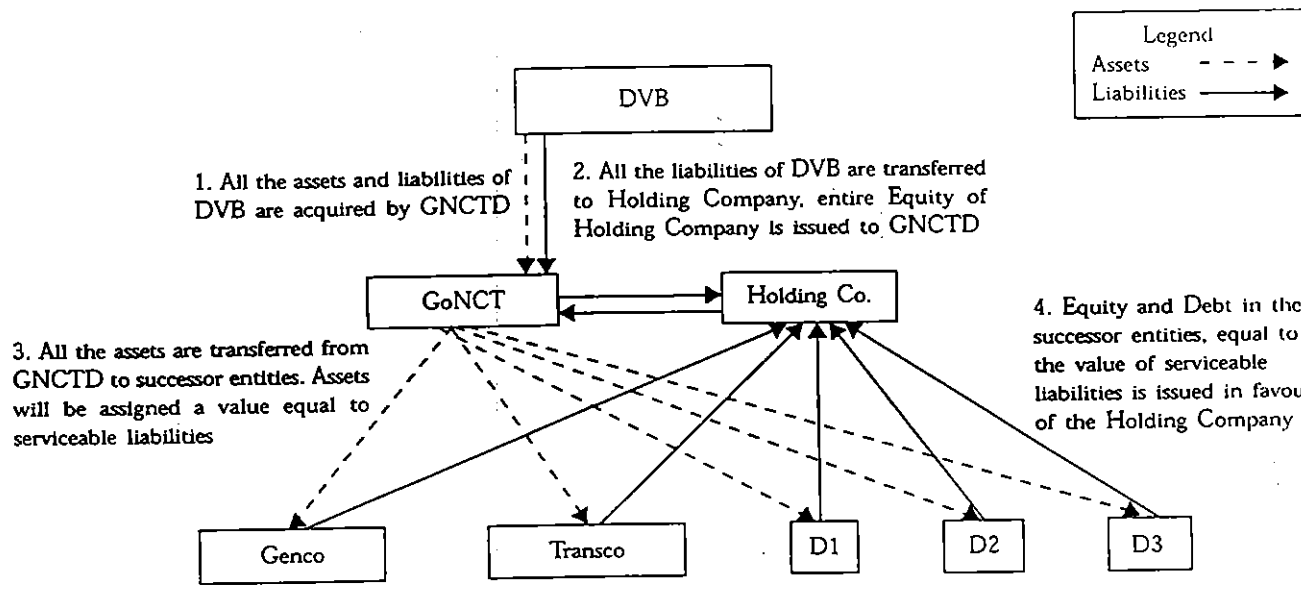


Fig. 7.3.1 DVB Financial Restructuring

- It would be necessary to value the assets without having up-to-date asset registers or even annual accounts for the past several years, and without the possibility of waiting for these to be prepared. It was equally necessary to ensure that the valuation of assets reflected their earning capacity and did not impose an undue burden on the tariff.
- The new distribution companies must not be saddled with any of DVB's liabilities, including its receivables.
- The interests of personnel to be transferred to the new companies, particularly the distribution companies that were to be privatized, must be protected in order to ensure a smooth transition. Moreover, it was necessary to give comfort, both to the employees and to the investors, that the latter would not be responsible for the retirement benefits of the former.
- Finally, it was vitally important to ensure both that there should be no 'tariff shock,' and that the investors would be assured of a reasonable return if they achieved reasonable efficiency improvements.

The main features of the package that was finally evolved over the period of the reform process, addressing the above identified issues, were briefly as follows:

- The projected time frame of reform did not permit the involvement of external agencies like the World Bank. SBI Capital Markets were engaged on the basis of their work in Kanpur.
- Aggregate technical and economic (AT&C) loss, being the difference between units of energy input and units for which payment is actually recovered, was adopted as the measure of commercial efficiency instead of the conventional measure of (T&D) loss.[16] This makes inflated billing figures, which artificially reduce the declared T&D loss of most SEBs, irrelevant. (In Delhi, in point of fact, the declared T&D losses were reasonably accurate since there was no unmetered billing, nevertheless AT&C loss was adopted as the efficiency criterion to remove all possible uncertainty).
- A business valuation methodology was adopted, based on projected revenue yields for each of the 3 distribution companies assuming certain tariff increases, efficiency improvements, government assistance, and normal cost escalation. The unserviceable liabilities of DVB were parked in a holding company and the new companies provided with clean balance sheets fixed by statutory rules. The restructuring is depicted in Figure 7.3.1. The serviceable liabilities of Rs 3160 crore comprised of the equity and debt (to the holding company) of the new companies.
- It was decided to adopt 5-year tariff setting principles in advance in respect of the one key parameter of efficiency improvement. Since it did not prove possible to persuade the Regulatory Commission to adopt such tariff-setting principles, the objective was achieved by means of statutory policy directions. At the same time, the vexed and highly sensitive issue of target fixation for efficiency improvement was resolved by making the percentage of efficiency improvement committed by the bidder for each year over a period of 5 years, rather than a premium on equity, the

[16] T&D loss is the difference between units input and units for which bills are raised. AT&C loss is the difference between units input and units for which bills are raised and payment actually recovered.

bidding criterion for potential investors. The targets set were thus justifiable as the outcome of a competitive bidding process.

- To obviate tariff shock, the government committed itself to providing the transmission company with loan assistance that would total about Rs 3450 crore over the transitional 5-year period, diminishing annually as the gap between acceptable tariff increases and the distribution companies' actual requirements decreased annually with the projected efficiency improvements (Table 7.3.2). The loan would be subsequently recoverable through the transmission company's charges for its service, when the tariff could bear this burden because of the reduction of AT&C losses that would have taken place. An additional advantage of this arrangement was that it would make it possible to maintain a uniform (across distribution companies) retail tariff, with differential bulk tariffs for the distribution companies, during the transitional period. This obviated one potential source of difficulty for the government, namely, that otherwise one of the distribution companies serving proportionately more of the poorer parts of Delhi, where the AT&C losses were higher, would have a much higher retail tariff.
- The government's success in securing acceptance of the reforms by the employees as represented through the majority union and various staff associations did much to smooth the process. The employees had two assurances: (a) that those in position would not be retrenched, nor their service conditions altered adversely; and (b) that the government would, through a trust it would set up, assume responsibility for their retirement benefits. The latter was also an important source of comfort for investors while, since staff costs are not crucial in the viability of the distribution business in present conditions in India, the cost of securing the existing employees against retrenchment was not burdensome. It involved a commitment by the government to provide funds to the Trust upfront, to meet the difference between the amount available in the fund DVB had been maintaining for the purpose and the amount needed according to actuarial valuation. This cost of Rs 886.58 crore is shown in Table 7.3.2; the bulk of it was paid in the financial year preceding DVB's unbundling.
- Another cost imposed by the reforms was that, in future, government departments and organizations would be under more effective constraint to pay their electricity bills. Their non-payments were not as acute a problem in Delhi as in some other states, but the Delhi Jal Board (DJB) had been consistently in default to the tune of Rs 7 to 9 crore a month. During the year 2001–2, in order to create a favourable environment for bidding, GNCTD provided additional assistance to DJB to enable it to pay its bills. During the negotiations with the successful bidders, it became necessary to make a commitment that GNCTD would continue to do so, taking responsibility for DJB's electricity bills whenever DJB failed to pay them in full. Table 7.3.2 provides for an estimated annual cost of Rs 120 crore to GNCTD on account of greater need to pay for electricity bills as a result of the reforms.

The budgetary costs of reform as shown in Table 7.3.2 will, it is hoped, be sufficiently clear from the foregoing discussion. The reforms presented excellent value in budgetary terms from the third year onwards, but the benefits would not begin to flow before the third year and would be significant only thereafter, well beyond the government's term of office, while in the initial stage they required additional budgetary provision that the government had to agree to as being advantageous to it for non-budgetary reasons.

Conclusion

At the time when GNCTD took the crucial decisions that led to the unbundling of DVB and the privatization of distribution, it was under no unavoidable, compelling pressure to do so. DVB was inefficient and unpopular but pressures on it arising from its continuing losses and mounting liabilities could have been finessed by a show of improvement for the time being—which DVB did, in fact, achieve. Second, there was no immediate budgetary advantage, in the sense of freeing resources for other purposes, that could accrue to the government during the remainder of its term of office from unbundling DVB and privatizing distribution. Rather, there was a budgetary outgo involving the sacrifice of other possible expenditures—and that too in the year immediately preceding the next election. There is never any prospect of a government's gaining widespread approbation (except among economists) for financial reform per se. Hence, GNCTD's decision to adopt the reform package would, unless purely altruistic, have to be driven by the hope of non-budgetary gains. The government understood that without a genuine turnaround there was no prospect of improving the quality of service to the level the electorate expected, that privatizing distribution was the best means of achieving it, and that it would be a popular step. It was reasonable to hope that even if it were to take time for the fruits of reform to materialize, the very fact that the government had taken decisive steps to reform the power sector would weigh in its favour in Delhi.

Can the Same Happen Elsewhere?

What wider conclusions can we draw from the Delhi experience? It does not follow that state governments will never take any steps to reform the power sector unless compelled by an angry electorate. Reforms that are made

under external pressure need to be viewed with caution, as we have pointed out. Nevertheless the collective impact of such pressures on state governments generally, both directly and because they also contribute to generating public opinion, is surely greater than it was just a few years ago. The establishment of SERCs in most of the major states over the past few years has not been wholly without effect. The Ministry of Power is currently attempting the carrot-and-stick of the Accelerated Power Distribution Reform Programme (APDRP) and the scheme for securitization and partial write-off of past dues, which also involves a new compulsion to pay central generating utilities under a threat of disconnection that is somewhat more credible than in the past. The EA2003 will force the pace of institutional restructuring, and it is designed to put pressure on the SEB or its successor licensees to improve their efficiency by potentially exposing them to competition.[17] The outcome of all this remains uncertain but, if nothing else, it is not as easy for state governments to resist change now as it was in the past. And to that extent the environment has already changed from what it was in 1999 when GNCTD and DVB began their 3-year journey to unbundling. Finally, reform might conceivably take place over a period of time as the cumulative effect of measures adopted in response to the various influences discussed above, rather than in pursuance of the conscious decisions of a particular government, as was the case in Delhi.

Nor can we conclude that reform will take place wherever it is popular. For example, UPERC reports that 80–90 per cent of respondents in Lucknow, Agra, and Allahabad districts supported the idea of privatizing the utility,[18] yet it would be naïve to expect the state government to hasten privatization in response merely to such a finding. The electorate is not an otherwise undifferentiated collection of persons whose response to polling on such an issue will itself determine the course of a government's policy. The 'people who say they are in favour of privatizing power distribution' are not generally identifiable as a coherent political force. For opinion to get translated into an effective influence on government policy—as it apparently did in Delhi—something more is required. When searching for the wellsprings of government decision-making, we may have to think in terms of a number of interrelated influences, which might (not necessarily in order of importance) include the following:

1. What is the relative weightage assigned by local politics to the delivery of services and quality of governance in general, as against issues affecting the allocation of resource to groups or localities, or to questions of 'identity' or other less rational considerations? The relative political importance of issues like the quality of power supply will vary according to the nature and the basis of support that the leadership feels it would be advantageous for it to seek.

2. State government leadership, and the advice available to it.

3. The local importance of power supply, which must vary with (among other things) the level of development and consequent dependence on electric power.

4. The prevailing climate of opinion in matters of economic policy (recalling what we said about 'mindset discomfort').

5. The SEB's image and its reputation—objectively of course no SEB's actual performance has been good enough to make reform unnecessary, but its image depends both on its performance and on consumer expectations. For example, DVB's technical and financial performance was not actually worse than that of some other SEBs which nevertheless failed to bring on themselves anything like the same degree of obloquy, their consumers being apparently more tolerant than those residing in the nation's capital.

6. The experience of other states, which influences the design of the reform package.

7. The state's financial situation, which may also expose it to external pressure to reform.

8. External pressures to reform, including both those from lending agencies and from the central government.

9. External compulsion to make structural changes such as those arising out of, and in the form of: new central legislation.

We cannot thus draw any simple, unqualified conclusions from the Delhi experience. We may, however, suggest 2 thumb rules: (a) we are unlikely to bring about reform by convincing a state government about the arithmetic of it. A government does not think like a business and the 'V' in its perception of the value for money (VFM) is unlikely to be budgetary in this case. (b) whatever other factors may support it, reform is most likely to take place quickly when the effective demand for better service matters seriously to the government. Looking back, at the foregoing list, we may note that the local situation, in respect of items (1) to (5) was conducive to reform at the relevant time in Delhi and that sufficed to bring about reform without any of the remaining possible influences coming to play. That is most unlikely to happen everywhere.

[17] It remains, of course, to be seen how effective this will prove, within the given political economy, in making government distribution utilities efficient.

[18] UPERC, *ibid.* UPERC had commissioned a survey by ORG-MARG.

BENCHMARKING AND REGULATION OF ELECTRICITY TRANSMISSION AND DISTRIBUTION UTILITIES: LESSONS FROM INTERNATIONAL EXPERIENCE

Tooraj Jamasb
Department of Applied Economics, University of Cambridge

Michael Pollitt
Judge Institute of Management, University of Cambridge

December 2000

Abstract

Since the early 1980's, many countries have implemented electricity sector reforms. Many of these reforms have unbundled the generation, transmission, distribution, and supply activities of the sector and introduced competition in generation and supply. An increasing number of countries are also adopting incentive regulation to promote efficiency improvement in the natural monopoly activities - transmission and distribution. Incentive regulation almost invariably involves benchmarking or comparison of actual vs. some reference performance. This paper reviews the main approaches to incentive regulation and discusses various benchmarking methods. We also present the findings of a survey of the use of benchmarking methods in the OECD and few other countries. Our survey finds a variety of methods used by the electricity regulators although with a notable preference for the non-parametric methods. We then draw conclusions based on the findings of the survey highlighting the main outstanding issues and lessons for best practice implementation of benchmarking in electricity regulation.

Keywords: electricity, benchmarking, incentive regulation, data envelopment analysis, stochastic frontier analysis

JEL classification: L43, L51, L94

BENCHMARKING AND REGULATION OF ELECTRICITY TRANSMISSION AND DISTRIBUTION UTILITIES: LESSONS FROM INTERNATIONAL EXPERIENCE

Tooraj Jamasb[1]
Department of Applied Economics, University of Cambridge
email: tooraj.jamasb@econ.cam.ac.uk

Michael Pollitt
Judge Institute of Management, University of Cambridge
email: m.pollitt@jims.cam.ac.uk

December 2000

1. Introduction

Since the late 1980s, a wave of reform has transformed the institutional framework, organisation, and operating environment of the infrastructure industries including that of the electricity sectors in many developed and developing countries.[2] In addition, a number of other countries are either implementing or evaluating some form of power sector reform. Although the structure of the power sectors and the approaches to reform vary across the countries, the main objective is to improve the efficiency of the sector.

The main feature of many power sector reforms is the market-orientation of their approaches to achieve the efficiency objective by using the discipline of the product and capital markets to achieve allocative and internal efficiency through the price mechanism, competition, and privatisation (see Vickers and Yarrow, 1988). These reforms generally involve introduction of competition into electricity generation, design of organised power markets, and unbundling of the electricity generation, transmission, distribution, and supply (or retailing) activities. Other power sector reforms have also involved ownership transfers and privatisation of the existing assets (see Joskow, 1998).

Most power sector reforms initially focus on the introduction of the price mechanism and competition in generation and supply of electricity while the transmission and distribution functions are, due to their natural monopoly character, less affected. As reforms in the competitive segments progress they call for regulatory reform of the non-competitive activities. Regulation of public utilities has traditionally been justified on the grounds of

[1] Corresponding author. The authors would like to thank the numerous people in the government agencies, regulatory authorities, and academic institutions in many countries for their generous contribution to this project with information and their time. We acknowledge detailed comments from Cemil Altin, David Newbery, Jon Stern, and Bernard Tenenbaum. The usual disclaimer applies. Support from ESRC project R00023 8563 is also gratefully acknowledged.

[2] See IEA (1999) and Bergman et al. (1999) for reviews of electricity reforms in the OECD countries and World Bank (1993; 1999) for developing countries.

public interest and natural monopoly characteristics of their industries (Priest, 1993). The dominant mode of utility regulation has been in the form of public regulation.[3] Some such as Littlechild (2000), view regulation as a necessary but temporary arrangement until effective deregulation involving competing private firms can be introduced.

The aim of the regulatory reforms is to provide the utilities with incentives to improve their investment and operating efficiency and to ensure that consumers benefit from the efficiency gains. In the US, incentive regulation is often termed as Performance Based Regulation (PBR). A related aspect of regulatory reform is that of regulatory governance which emphasises the formal status of the regulator and rules of conduct in carrying out their duties and exercising power (see ACCC, 1999; Newbery, 1999; Stern and Holder, 1999; Levy and Spiller, 1994; Berg and Jeong, 1991).

The recent interest in incentive regulation is not due to new contributions from economic theory. Rather, the need for practical solutions has resulted in design and implementation of regulatory arrangements that are not necessarily in line with the theory (Crew and Kleindorfer, 1996, p. 215). The regulatory reforms have emerged as an alternative to the traditional rate-of-return (ROR) or cost-of-service (COS) regulation of utilities and regulators have adopted a variety of approaches to incentive regulation. A common feature among the incentive regulation schemes is their use of benchmarking broadly defined as *comparison of some measure of actual performance against a reference or benchmark performance.*

This paper reports the results of an international survey on the use of benchmarking in incentive regulation of electricity distribution and transmission utilities. The survey covers the OECD and a few non-OECD countries. The following section is an overview of the main approaches to incentive regulation used by the electricity regulators. Section 3 reviews the benchmarking techniques used in incentive regulation. In Section 4 we present the main findings of the survey and highlight three selected cases of benchmarking. Section 5 is a conclusion suggesting some outstanding issues and lessons for best practice implementation.

2. The Main Approaches to Incentive Regulation

ROR Regulation

The ROR regulation is the traditional approach to regulation of privately owned monopolies and an alternative to public owned utilities. The method is a heavy-handed approach to regulation and it is generally identified with the regulation of investor-owned utilities in the US. The ROR regulation allows the utility to cover its operating and capital costs as well as a return on capital. Equation (1) shows calculation of the required revenue for firm i's targeted rate of return in year t from projected costs.[4] Alternatively, the required revenue can be calculated from the firm's historical costs.

---

[3] As opposed to private or voluntary regulation. See Blundell and Robinson (1999).

[4] See Hill (1995).

(1) $$RR_{i,t} = OE_{i,t} + D_{i,t} + T_{i,t} + (RB_i * ROR)_t$$

where:

RR_i	= *required revenue*	OE_i	= *operating expenses*
D_i	= *depreciation expense*	T_i	= *tax expense*
RB_i	= *rate base*	ROR_i	= *rate of return*

The shortcomings of ROR regulation are extensively discussed in the literature and were first presented in Averch and Johnson (1962). The main reservation against this approach is that it does not provide incentives for cost savings and efficiency improvements but rewards over-investments. Within the framework of the Principal-Agent theory, ROR regulation is believed to cause a managerial slack or X-inefficiency that is attributed to the absence of competition. In response to these deficiencies, incentive-based regulation methods such as price cap, revenue cap, sliding scale, partial cost adjustment, yardstick competition, targeted incentive, and hybrid schemes have been proposed. These methods are reviewed in what follows.[5]

Price Cap Regulation

The price cap approach to utility regulation, is perhaps the most widely discussed and significant innovation in utility regulation and alternative to ROR regulation. The method was first proposed in Littlechild (1983) and various versions of it have since been adopted in the regulation of infrastructure and utility industries in the UK and other countries.[6]

Price cap regulation essentially decouples the profits of the regulated utility from its costs by setting a price ceiling. The method is also referred to as the 'RPI-X' model. For each rate period, normally between 3 to 5 years, the price cap for each year is set based on the Retail Price Index (RPI) and an efficiency factor X.[7] Prices remain fixed for the rate period and the utility keeps or shares the achieved cost savings. In this regard price cap regulation resembles an ROR regulation with rate freeze or long regulatory lag. Equations (2)-(3) shows how the price ceiling for *i* is set.

(2) $$P_{i,t} = P_{i,t-1} * (1 + RPI - X_i) + / - Z_i$$

(3) $$P = \sum p_i q_i$$

For each year the price ceiling P_t is calculated based on the previous year's price ceiling P_{t-1} adjusted by RPI minus the efficiency factor X decided by the regulator. The price ceiling may be adjusted using a correction factor Z to account for the effect of exogenous extraordinary events affecting the utility's costs. The price cap P_t represents an index of the 'n' different tariffs $p_1 \ldots p_n$ of the regulated utility. The use of the price index often offers the utility some degree of freedom in setting the individual tariffs. A reservation against the use of price cap

---

[5] The review of the incentive regulation methods in this section is largely based on Hall (2000); Comnes et al. (1995); Hill (1995); Joskow and Schmalensee (1986).

[6] See Armstrong et al. (1994) and Rees and Vickers (1995) for detailed reviews of the price cap method and its application to privatised infrastructure industries in the UK.

[7] In the US the corresponding price index is termed Consumer Price Index (CPI).

regulation, particularly in the US, has been that their sales maximisation incentive conflicts with the objectives of socially desirable programmes such as those of Demand-Side Management (DSM) measures that utilities may be obliged to implement (MDTE 1995, p. 22; SEE 1997, p. 52).

Revenue Cap Regulation

The revenue cap method regulates the maximum allowable revenue that a utility can earn. Similar to the price cap regulation, the aim of the regulator is to provide the utility with incentive to maximise its profits by minimising the costs and allowing the utility to keep the cost savings achieved during the regulatory lag. Equation (4) shows the main elements of revenue cap regulation for a given year.[8]

$$\overline{R}_{i,t} = \left(\overline{R}_{i,t-1} + CGA_i * \Delta Cust_i\right) * \left(1 + RPI - X_i\right) + / - Z_i \tag{4}$$

where:

$\overline{R}_i$ = *authorised revenue*
CGA_i = *customer growth adjustment factor ($/customer)*
$\Delta Cust_i$ = *change in the number of customer*
X_i = *efficiency factor*
Z_i = *adjustment factor for events beyond management control*

The revenue cap method can also take the form of revenue-per-customer regulation in which case CGA is equal to average revenue per customer. In the UK, revenue cap regulation has been applied to the main transmission utility National Grid Company (NGC). An advantage of the method is that it can be aligned with DSM measures (MDTE 1995, p. 23). However, revenue cap regulation has been criticised for limiting the powerful incentive to increase the sales and competition and has therefore been characterised as inefficient (Crew and Kleindorfer, 1996).

Sliding Scale (ROR bandwidth)

In sliding scale or ROR bandwidth regulation, the utility's allowed rate of return is benchmarked against a target or reference ROR that lies within a pre-specified dead-band. Schmalensee (1979) points out that the first sliding scale regulations were used in England in the middle of the 19th century.[9] During the regulatory lag, the actual ROR can vary within the dead-band without causing rate adjustments. If the actual ROR falls outside the dead-band it can trigger profit sharing mechanisms or rate reviews. Equation (5) shows a simple sliding scale regulation.[10]

$$r_t = r_{t-1} - \lambda\left(r_{t-1} - r^*\right) \tag{5}$$

[8] See Comnes et al. (1995).
[9] Cited in Joskow and Schmalensee (1986).
[10] See Hill (1995).

where:

r_t = *allowed rate of return for the period under consideration*

r_{t-1} = *actual return in the pervious period*

r^* = *benchmark rate of return*

λ = *sharing parameter*

When the r_{t-1} is within the predefined dead-band the sharing parameter λ is equal to zero. For r_{t-1} below or above the dead-band, the sharing parameter can, depending on the extent of deviation, take values ranging between zero and one. The sliding scale rate of return regulation may be combined with price or revenue cap regulation.

Yardstick Regulation

In yardstick regulation the performance of a regulated utility is compared against that of a group of comparable utilities. For example, the mean of the costs of a peer group of firms can serve as performance benchmark. The method was first proposed in Shleifer (1985) and can be used to promote indirect competition among regulated utilities operating in geographically separate markets. Equation (6) shows the main elements of a cost-based yardstick regulation.[11]

$$P_{i,t} = \alpha_i C_{i,t} + (1 - \alpha_i) \sum_{j=1}^{n} (f_j C_{j,t}) \tag{6}$$

where:

P_i = *overall price cap for firm i*

α_i = *share of firm's own cost information (p=0 representing pure yardstick regulation)*

C_i = *unit cost of firm*

f_i = *revenue or quantity weights for peer group firms j*

$C_{j,t}$ = *unit costs (or prices) for peer group firms j*

n = *number of firms in peer group*

Weyman-Jones (1995) discusses some of the complexities associated with the application of yardstick regulation to electricity distribution utilities while Sawkins (1995) reports a relatively functioning and well-received implementation of the method in the privatised UK water industry. A main concern in applying yardstick regulation to electricity utilities is the degree to which the operating environment of the firms in question and their circumstances (i.e. major recent investments) are comparable. Another concern is the extent to which the data may adequately be adjusted in order to account for these differences.

Partial Cost Adjustment

Another approach to incentive regulation is to link the price adjustments to changes in the utility's own costs observed in a reference year. The cost minimisation incentive is provided by price periodic adjustments that are less than proportional to the actual changes in the costs. Equation (7) shows a simple partial cost adjustment scheme.[12]

---

[11] See Comnes et al. (1995).

[12] See Joskow and Schmalensee (1986).

(7) $$P_{i,t} = C_i^* + \lambda\left(C_{i,t} - C_i^*\right)$$

where:

P_i	= *adjusted price*	C_i	= *the actual cost per unit*
C_i^*	= *reference cost per unit output*	λ	= *sharing parameter*

Menu of Contracts

The menu of contracts method is an innovative approach to reduce the information asymmetry between the regulator and regulated firm. Under this scheme the regulator offers the utility a menu of incentive plans with constant consumer welfare. The utility can choose among the incentives and the flexibility in choosing among the alternatives reveals its welfare-enhancing preferences. The revealed preferences therefore represent a Pareto improvement (Crew and Kleindorfer, 1996). For example, a menu of incentives can be designed where the utility's share of profits σ or some specified reward is a function of deviation of the X-factor (or price cap) chosen by the utility from a base value (Equation 8).

(8) $$\sigma = f(X)$$

If the utility chooses a higher X-factor than the base value it will receive a higher reward as per equation. The major obstacles in the application of the method are the design of appropriate scheme as they require considerable information about distribution of efficiencies and the corresponding rewards.

Targeted Incentive Regulation

Targeted incentive schemes pursue narrower objectives than the broad incentive regulation approaches discussed in the above. The aim of these schemes is to target specific aspects of the operation of the utility and achieve an outcome that would not necessarily result from broad incentive schemes. Targeted incentive regulation may be used to promote DSM measures, environmental standards, technical efficiency, and improvement in quality of service. However, these schemes have been criticised on the ground that they distort efficient allocation of resources (Joskow and Schmalensee, 1986). Also, it has been suggested that such schemes cause distortionary effects and have been insignificant in the overall operation of the utility (Berg and Jeong, 1991).

Hybrid Schemes

The various incentive regulation methods discussed in the above are usually not observed in pure form. Rather, practical considerations and multiplicity of the regulatory objectives often result in using a combination of different incentive regulation methods. For example, targeted incentive schemes can supplement the broad incentive regulation methods. Also, incentive regulation may be combined with various profit or loss sharing schemes. As with targeted incentive, hybrid schemes may result in inefficient resource allocation.

3. Benchmarking Methods and Techniques

The main objective of incentive regulation method is to improve efficiency by rewarding good performance while the actual performance is measured relative to some pre-defined benchmark. As the rewards are based on performance measurements, two key issues are the choice of benchmarks and the techniques used to measure the performance. Regulators have adopted a variety of benchmarking methods and techniques in incentive regulation. According to one classification, actual performance can be measured against benchmarks that are "linked" (endogenous) or "un-linked" (exogenous) to performance or behaviour of individual firms (DTe 1999, p. 29). We use a somewhat different classification based on whether the benchmarks represent the 'best (frontier)' practice or some measure of 'representative (average)' performance.

From a regulatory policy point of view a major difference between the frontier and average benchmarking is that the former has a stronger focus on performance variations between the firms. The frontier methods are suitable at initial stages of regulatory reform when a priority objective is to reduce the performance gap among the utilities through firm-specific efficiency requirements. Average benchmarking methods may be used to mimic competition among the firms with relatively similar costs or when there is lack of sufficient data and comparators for the application of frontier methods.

3.1 Frontier Benchmarking Methods

The frontier-based benchmarking methods identify or estimate the efficient performance frontier from the best practice in an industry or a sample of firms. This frontier is the benchmark against which the relative performance of firms is measured. The main frontier benchmarking methods are Data Envelopment Analysis (DEA), Corrected Ordinary Least Square (COLS), and Stochastic Frontier Analysis (SFA).[13] DEA is based on the linear programming technique while COLS and SFA are statistical techniques.

In DEA the efficiency of the firms is computed rather than estimated. DEA identifies an efficient frontier made up of the most efficient firms in the sample and measures the relative efficiency scores of the less efficient firms in relation to these. Norway uses the DEA scores in setting the revenue caps for regional electricity transmission and distribution utilities. An advantage of DEA is that it does not require specification of a production or cost function. DEA allows calculation of allocative and technical efficiencies. The latter can be decomposed into scale, congestion, and pure technical efficiencies (Färe et al., 1985). DEA can also examine the effect of environmental variables (Yaisawarng and Klein, 1994). DEA results can be sensitive to the inputs and outputs in the model. The results are also sensitive to measurement errors in the frontier firms as the efficiency scores are measured relative to the frontier. Further, the number of efficient firms on the frontier is sensitive to the number of inputs and outputs.

[13] The review of these methods is based on Pollitt (1995). See also DTe (1999).

In SFA and COLS the relative efficiency scores are estimated rather than computed. Both techniques require specification of a production or cost function. The UK water and electricity regulators apply COLS to operating costs of water and electricity distribution utilities. Similar to DEA, the COLS technique assumes all deviations from the efficient frontier are due to inefficiency. The efficiency scores with COLS are therefore rather sensitive to the position of the frontier firms. On the other hand, SFA recognises the possibility of stochastic errors in the measurement of the inefficiencies. At the same time, if there are no inefficiency measurement errors in the sample, the error assumption would result in some inefficiency being regarded as noise. Consequently, due to the error factor, the estimated efficiency scores with SFA are likely to be higher than those measured by COLS.

There are also partial benchmarking methods such as the method used in the study of the distribution utilities Victoria (see UMS 1999). These methods assume separability of different cost categories and involve comparison of firms of different scales. This may however not be a problem for comparison of firms which have similar technologies and scale. The Norwegian Water and Energy Administration (NVE) uses a Value Chain Model (VCM) for one-to-one benchmarking of the state owned central grid utility Statkraft against the Swedish grid company Svenska Kraftnät. The model makes provision for adjustment of data for operational and environmental factors.[14]

3.2 Mean and Average Benchmarking

In contrast to frontier methods, benchmarking in incentive regulation can be in relation to some measure of mean or average performance. One such regression-based statistical method is the Ordinary Least Square (OLS) method that is closely related to COLS. However, OLS estimates an average production or a cost function of a sample of firms. The actual performance of firms can then be compared against the estimated performance by plugging their input, output, and environmental data measured into the estimated function.[15]

As discussed under yardstick regulation, the mean of the costs of a peer group of firms can serve as the benchmark for individual firms. In this approach, all the firms in the group are subject to the same price cap. A version of this approach is used by the National Energy Commission (CNE) in Chile to calculate the value added for the distribution services. The value added for a group of comparable firms is derived from a designed efficient model or reference firm (Rudnick and Donoso, 2000; Rudnick and Raineri, 1997). In Spain, the regulator uses model firms for specific geographical areas to allocate a portion of the total system revenues among distribution utilities.

Also, the sliding scale method can be viewed as a form of average benchmarking in which the target ROR in the dead-band is intended to represent a fair rate of return that is based on the return earned by comparable industries or firms in similar operating environments. The

[14] See Magnus and Midttun (2000) for a brief description of the method.
[15] See DTe (1999, pp. 30-31) for a comparison of the OLS, COLS, and SFA techniques.

regulated utility is therefore competing with the average performance in the industry or economy.

Another method based on average performance is to use Total Factor Productivity (TFP) as benchmark. This method can for example use the Tornqvist index as a measure of historical productivity growth of a firm, an industry, or the entire economy in setting the efficiency factor X in price cap regulation (see for example ESAA, 1994). The method is relatively easy to implement. However, less efficient firms may find it easier than efficient firms to outperform the TFP and earn large profits. Finally, targeted incentive schemes can use average or frontier performance benchmarks to address specific aspects of the operation of the firms. These benchmarks may be based on the past or expected performance of the firm or the industry.

4. Empirical Benchmarking Studies

A number of comparative performance studies have addressed efficiency aspects of the electricity industry. Many of these studies are concerned with economies of scale and density or the effect of the ownership form on utility efficiency (see Kumbhakar and Hjalmarsson, 1998). This section outlines some selected empirical studies of relative efficiency of electricity (mostly distribution) utilities. Most of these studies are conducted by third parties and are not, at least directly, part of the regulatory process. The scope of most of the efficiency studies is limited to relative efficiency in a single country while some studies have a cross-country focus. These studies illustrate the range of benchmarking techniques which have been applied to electric utilities.

4.1. Single-Country Studies

Weyman-Jones (1991) reports a DEA study of the 12 Area Electricity Boards (AEBs) in the UK in 1986/87 and finds a wide divergence among the AEBs while five of these are on the frontier. Burns and Weyman-Jones (1996) use SFA in a study of the Regional Electricity Companies (RECs) in the UK and find a significant but small cost-inefficiency and evidence of some economies of scale. Førsund and Kittelsen (1998) apply the Malmquist index to measure productivity development in the Norwegian distribution utilities between 1983 and 1989 and find an annual productivity growth of 2%.

Kumbhakar and Hjalmarsson (1998) apply DEA and SFA methods in a study of the distribution utilities in Sweden between 1970 and 1990 and find evidence of economies of scale, technical progress, and relative efficiency of private utilities. Hougaard (1994) in a DEA study of 82 Danish distribution utilities in 1991 finds significant potential for efficiency improvement. The study also shows that while the efficiency scores are sensitive to model specification the rank orders across the four models are rather robust.

Bagdadioglu, Price et al. (1996) in a DEA study find indication of relative efficiency among the Turkish distribution utilities offered for private franchise. Miliotis (1992) reports an efficiency study of 45 electricity distribution districts in Greece using DEA and econometric methods. Filippini (1998) and Giles and Wyatt (1993) use translog econometric models for Swiss and New Zealand distribution utilities and find economies of scale with the former recommending mergers among the utilities.

4.2. Cross-Country Studies

Benchmarking studies almost invariably focus on individual industries of one or more countries. Lawrence, Houghton et al. (1997) report a notable exception in the form of an international multi-industry benchmarking study by Australia's Bureau of Industry Economics. The project was carried out between 1991 and 1996 and examined relative efficiency of eight Australian infrastructure industries including the electricity sector using indicators of price, service quality, labour productivity, and capital productivity. The Australian electricity sector appeared to be closing some aspects of performance gap with international comparators.

Pollitt (1995) examines the effects of the public vs. private ownership on performance through an international comparison of electricity generation, transmission, and distribution utilities using DEA, COLS, and SFA models. IPART (1999) reports a cross-country study sponsored by a regulator that examines relative efficiency of 6 distribution utilities in New South Wales, Australia using a large sample of national and international comparators. Whiteman (1999) applies DEA and SFA to 7 Australian and an international sample of 32 electricity supply utilities and shows that X-inefficiency may have declined following the Australian electricity reform. In addition, Meibodi (1998), Yunos and Hawdon (1997), and Whiteman (1995) apply DEA to measure relative efficiency of the electricity systems in a number of developing countries.

Table 1: Single and cross-country benchmarking studies[16]		
Author	**Sample**	**Method of Analysis**
IPART (1999)	219 Australian, New Zealand, England & Wales, and US distribution utilities	DEA
Whiteman (1999)	7 Australian and in international sample of 32 utilities	DEA, SFA
Filippini (1998)	39 Swiss municipal electricity distribution utilities 1988-91	Translog cost function
Førsund and Kittelsen (1998)	1983-89 data on 150 Norwegian distribution utilities	Malmquist DEA
Goto and Tsutsui (1998)	9 Japanese and 14 US electric utilities 1983-93	DEA
Kumbhakar and Hjalmarsson (1998)	Swedish electricity distribution 1970-1990	Translog input requirement function, stochastic frontier framework, DEA
Meibodi (1998)	Panel data of 26 LDCs (2 years). Panel data of 30 Iranian plants (6 years) and 1 cross-section of 30 dist. organisations.	SFA, DEA
Zhang and Bartels (1998)	32 power supply authorities in Australia, 51 power boards in New Zealand, and 173 distributors in Sweden	DEA, Monte Carlo simulation, bivariate lognormal input distribution
Lawrence, Houghton et al. (1997)	8 Australian infrastructure industries incl. electricity 1991-96	Performance indicators, TFP, DEA
Yunos and Hawdon (1997)	Malaysian, 27 LDCs and the UK utilities	DEA
Bagdadioglu, Price et al. (1996)	76 Turkish distribution organisations (72 public, 2 private, 2 integ. private) 1991	DEA
Burns and Weyman-Jones (1996)	12 RECs in England 1980/81 to 1992/93	SFA using cross-sectional and panel data
Claggett et al. (1995)	74 municipals, 45 co-operatives under Tennessee Valley Authority 1985-89	Profit function mode, Cobb-Douglas model
Whiteman (1995)	Electricity systems of 85 LDCs	DEA
Berry (1994)	US rural electric co-operatives and investor-owned utilities 1988 (Gen., Trans, and Dist.)	Translog cost functions for IOUs and co-operatives
Burns and Weyman-Jones (1994)	RECs 1973-93	Non-parametric programming of relative efficiency, Malmquist productive indices
Claggett (1994)	157 TVA distributors 1982-89 (108 municipals and 49 co-operatives)	Standard translog cost function
Hougaard (1994)	82 Danish distribution utilities	DEA
Pollitt (1994)	129 US transmission utilities (23 public, 106 private), 145 distribution utilities (136 US, 9 UK; 119 private, 26 public)	DEA and OLS
Giles and Wyatt (1993)	60 regional Electricity Supply Authorities for New Zealand 1986/87	Translog cost model
Klein et al. (1992)	US Coal-Burning Gas Plants (a selection of plants 1975 to 1987)	DEA, Malmquist Index
Miliotis (1992)	45 electricity distribution districts of the Greek Public Power Corporation	DEA
Weyman-Jones (1991)	12 UK Area Electricity Boards (AEBs) for period 1986/87	Non-parametric linear programming efficiency measurement
Twada and Katayama (1990)	9 large Japanese electric power companies (generation only) 1965-82	Estimate production function for marginal productivity of factors
Charnes et al. (1989)	75 Texas electric co-operatives	DEA compared with existing ratios and regressions based systems

[16] Distribution utilities in the above studies usually include both the distribution and supply functions.

5. Results of the Survey

5.1. The Survey: Purpose, Scope, and Method

The previous sections emphasised that an increasing number of countries are implementing electricity sector liberalisation measures and regulatory reforms. We then reviewed the main models of incentive-based regulation and discussed the main benchmarking methods that are available to the regulators. In the wake of the regulatory reforms two central questions that emerge are: (i) to what extent the regulators have adopted or intend to use benchmarking in incentive regulation and (ii) what are the main features of the adopted benchmarking methods and processes?

In order to address these questions we conducted a survey of the electricity regulators in the OECD and a few other selected countries. In a few cases the information was provided by academic researchers with knowledge of the industry and regulatory process. The survey was conducted through a questionnaire containing 20 questions addressing different aspects of power sector and benchmarking methods and processes. The focus of the survey is on the regulation of transmission and distribution functions as the supply function is potentially competitive. Questionnaires were sent electronically to specific individuals who in advance expressed willingness to contribute to the survey. The recipients also received a complete questionnaire showing an example of full response. Some of the responses were followed up with additional questions. Several regulators who indicated no use or intention to use benchmarking were eliminated from the survey. Consequently, this survey includes 17 OECD and 4 non-OECD countries.

5.2. Review of the Findings

5.2.1. General Features of Power Sector and Benchmarking

Table 2 outlines the questions that form the basis of the findings presented in this paper. The questions are organised into three categories addressing (i) main features of the electricity sector, (ii) the adopted benchmarking method, and (iii) various aspects of the benchmarking process. A summary of the results are given in Tables 3 and 4. The results show that electricity regulators in several countries have adopted some form of benchmarking (Table 3). In addition, regulators in other countries such as Denmark, Ireland, and Brazil are planning or considering the use of benchmarking in regulation. Norway, UK, and Chile which were among the first countries to implement market-oriented reforms have also adopted, benchmarking in regulation of the natural monopoly segments. As shown in Table 3, other countries that use benchmarking have implemented power sector reforms during the second half of the 1990s.

The results also show that benchmarking is almost invariably conducted by independent regulators. The notable exceptions in this regard are Japan and Chile with government ministries functioning as the regulatory authorities. In the near future, more countries are expected to establish independent regulatory bodies. This is particularly the case in the European Union where the Electricity Directive has encouraged the establishment of electricity regulators in member countries and in the countries that seek membership of the Union. Also, the survey results indicate that countries that use benchmarking usually have or are in the process of establishing spot markets and a high degree of end-user market liberalisation both of which can be regarded as indicators of advanced levels of market liberalisation and regulatory reform.

However, there is a variety of benchmarking methods adopted by the regulators across the countries and jurisdictions within the same country such as in the case of the Australian states. As shown in Table 2, the regulators in Great Britain, Norway, Netherlands, New South Wales, and Colombia have used DEA in benchmarking as part of the price review process while in Finland the method has been used outside the price-setting process. The regulator in Queensland has replaced DEA with econometric methods. Regression based models are also used in Great Britain (COLS) in benchmarking of operating expenditures of distribution utilities.

The Ontario regulator uses the historical development of TFP in 47 distribution utilities. Among the average or mean-based benchmarking methods, regulators have generally chosen some form of yardstick regulation. In Japan, yardstick regulation is used together with ROR regulation by placing utilities in 3 performance groups for the purpose of setting the allowable costs and determining the rate base. Also, the Netherlands and Ontario envisage the use of yardstick regulation in the future following transition periods during which the performance gap among the utilities is reduced and better data is collected.

The regulators in Chile, and Spain, use theoretical or model firms in benchmarking of distribution utilities and yardstick regulation. The model firms are designed and dimensioned to represent efficient utilities that serve as reference or benchmark. This approach attempts to reduce the need for and reliance on cost information from the utilities to determine the benchmark by constructing models of efficient firms. In Chile, the representative model firms are used in yardstick regulation of distribution utilities. The Chilean model has also been adopted in some other Latin American countries (e.g. Peru). In Spain the model firms are used in allocating a portion of the total revenues of the system among the distribution utilities.

In addition to the above approaches, ROR can be combined with profit and loss sharing mechanisms and used in incentive regulation. The regulator in California uses a PBR scheme in distribution regulation of Southern California Edison (SCE) that combines price cap regulation with a profit and loss sharing schedule triggered by the difference between a benchmark ROR and the actual ROR. The electricity regulator of the state of Orissa, India uses a ROR-based reward system in a targeted incentive scheme. The utilities are rewarded with 1 percentage point ROR above the benchmark level for each percent reduction in transmission and distribution losses below the 35% level.

Nearly all regulators surveyed in this study have stated that they have full discretion with regard to the choice of the benchmarking method, model, and inputs. In addition, much of the implemented and proposed use of international benchmarking and performance comparisons are related to transmission activities. Regulators in the Netherlands, Norway, UK, and Colombia have engaged in international transmission benchmarking while the new regulator in Austria envisages use of cross-country comparisons in the future. This can be explained by the relatively limited number of transmission utilities in each country.

5.2.2 The Benchmarking Process

The length of the regulation lag in the countries that practice benchmarking is almost invariably between 3 and 5 years (Table 4). In addition, nearly all surveyed regulators have expressed at least one iteration in the process of setting prices with the industry in the form of consultation documents or issue papers the norm being 3 to 4 iterations. One exception in this regard is however Japan where the regulatory authority is not independent. With regards to treatment of operating and capital costs and possible trade-offs between these, the regulators in Belgium, Denmark, Northern Ireland, Norway, Spain, and Colombia do not separate these costs and just use total controllable costs.

Benchmarking of service quality is mostly in terms of setting minimum standards. However, Finland and the Netherlands have indicated their intention to include service quality in DEA studies while in Brazil the use of Multi-Criteria Decision Aid (MCDA) for ranking of the quality standards is under consideration.[17] In Great Britain, Brazil, Colombia, and Chile, the service quality standards are applied in conjunction with non-attainment penalties or compensation schemes.

Countries that use benchmarking in regulation also rely on the price and revenue cap arrangements as incentives for optimising investments. The Norwegian investment incentive is tied to the revenue cap by offering the utilities one-half of the percentage growth in demand. In Great Britain however, the investment incentive is based on a scheme for sharing the achieved savings in investments. The environmental impacts of electricity distribution activities are generally not considerable. However, it is possible to combine price or revenue regulation with incentive schemes designed to promote DSM programmes or green energy such as in the US and Belgium respectively.

Nearly all regulators require submission of information by the utilities in standardised formats. This information is however subject to different audit requirements. Most regulators rely on independent audits while others check or control the submitted information. However, publication of information on the regulatory procedures and decisions is not necessarily an integrated part of the benchmarking process. The most extensive public information is provided by the regulators in the Netherlands, Great Britain, Norway, Ontario, and the Australian states.

[17] See for example Yoon and Hwang (1995) for a review of some of the methodologies.

Further, among the countries surveyed Norway, Brazil, and Spain indicated active research sponsorship or joint studies and research projects. Indirect influence of academic and empirical research on adopting of benchmarking is rather difficult to determine but have been indicated by the regulators in Colombia and the Netherlands. However, several countries such as Turkey, Greece, Sweden, New Zealand, Switzerland, and Denmark for which there are independent efficiency studies do not to use benchmarking as part of the regulatory process (see Table 1).

Table 2: Survey questions

I. Power sector reform - general features

1. *Formal status of the regulator.*
2. *Initial dates of power sector reform and benchmarking.*
3. *Regulated activities of the power sector.*
4. *Types of power markets.*
5. *Degree of market liberalisation.*
6. *Number and ownership of transmission and distribution utilities.*

II. Benchmarking - method

7. *Is benchmarking used by the regulator?*
8. *The general benchmarking method used.*
9. *Regulator's discretion in selecting benchmarking method, model, and inputs.*
10. *Is international benchmarking used?*

III. Benchmarking - process

11. *Length of regulatory lag.*
12. *Number of iterations / consultations.*
13. *Separate handling of OPEX and CAPEX?*
14. *Is benchmarking of service quality used? Problems?*
15. *Incentives for service quality.*
16. *Incentives for optimum investments.*
17. *Incentives for environmental impact.*
18. *Is the required information standardised or audited?*
19. *Amount of information published.*
20. *Is adoption of benchmarking influenced by third-party studies?*

Table 3: Power sector reform and benchmarking features (abbreviations defined after Table 4)

	Power Sector – General						Benchmarking - Method			
	1. Regulator status	2. Reform & benchm. date	3. Regulated activities	4. Power markets	5. Degree of liberalisation	6. Ownership & No. Of utilities	7. Benchmarking in regulation	8. Benchmarking method	9. Regulator discretion	10. International Benchmarking
OECD – Europe										
Austria	Independent regulator From 1.10.01	reform: feb. 1999	T, D, S	balancing market	full liberalisation from 1.10.2001	T: 15 D: 300 (min. 51% public)	under consideration	tbd	-	for cross-border tariffs (future)
Belgium	Autonomous	reform: 1999	T, D & S (to captive customers (ROR)	-	1999: +100 MW 2003: + 10 MW 2007: other	T: 1 (private) D: 37 (20% of which public/municipal owned, 80% mixed)	under preparation,	tbd	full discretion	yes
Denmark	Independent, subord. to Min. of En. & Env.	reform: 2000	T, D	spot market	1.1.2000: 100 GWh 1.4.2000: 10 GWh 1.1.2001: 1 GWh	T: 2 national + 13 region. (owned by Ds) D: 120 coop./municipal.	under preparation (planned fr. 2001)	DEA	methods prescribed by the Ministry	no
Finland	Independent subord. to Min. of Trade & Ind.	reform: 1995	T, D. (ROR-oriented ex post control)	spot & forward mkt. (Nord Pool), balancing mkt. (El-EX)	full liberalisation from 1997	T: 1 national grid & 10 reg. nets privatised D: state, 71 county /municipal., 35 private	intends to use an efficiency model for setting ROR	regulator has used DEA but not as regulatory tool	large degree of freedom	no
France	independent (fr. May 2000)	reform: 2000	T, D, S	spot & balancing market	16 GWh (1999) 9 GWh (2003)	T: 1 (state) D: EDF+180 DNN	under consideration	-	-	-
Great Britain *England & Wales (T/D), Scotland (D)*	non-ministerial govt. dept.	reform: 1990 benchmarking: RECs 1995 NGC 1997	T, D, S	spot, forward, balancing mkt.	full liberalisation from June 1999	T: 1 privatised D: 12 privatised.	yes	T: TFP, DEA of 40 & survey of 15 utilities D: COLS for OPEX	large degree of freedom	yes. for National Grid Company
- Northern Ireland	non-ministrial govt. dept.	privatisation: 1992/93. EU directive 1.7.99	T, D, S	bilateral contracts	1.33 GWh p.a.	T/D: 1 public	yes (fr. 2002)	DEA and regression using a sample of GB utilities	full discretion	no
Hungary	indep., subord. to Min. of Econ. Affairs	Jul. 2001 (expected)	all activities currently regulated	no	tbd	T: 1 state-owned D:6 75-90% private	limited	some comparisons by independent consultants when auditing costs	large degree of freedom	discretion of independent consultants
Ireland	independent	reform: feb. 2000	T., D., and S. to capt. consumers (rev. cap, X for all firms 1%	spot & forward market for trade w. NI	28% (2000), 40% (2002), 100% (2005)	T: 1 D: 1 95% (public)	proposed - as a contributory factor	-	large degree of freedom	COC, CAPEX, OPEX, tech. eff., qual. of serv.
Italy	independent	reform: 1999	T, D, S	bilateral (existing) spot & forward mkt. (fr.2001) balanc. mkt. (under consideration)	consortia/groups of firms w. demand p.a. >30 GWh 1999 >20 GWh 2000 >9 GWh 2002	T: 1 national. grid (pub.) & 13 grid owners. D: 200 (priv. & municip.) – Enel (94%) u. privatisation	yes	comparisons	large degree of freedom	Euro. countries and int. firms examined in setting X factor, ROR, risk factor
Netherlands	independent, subord. to Min. of Econ. Affairs	reform: 1999: partial lib. benchm.: 2000	T, D . S (captive customers)	spot (APX), balancing and bilateral contract mkt. (near future)	full liberalisation from 2004	T: 1 public D: 19 public region. networks (T&D to be part privatised)	yes	DEA, yardstick regulation after a transition period	large degree of freedom	yes. for setting transm. tariffs

Norway	semi-autonom., subord. to Min. of Petrol. & En.	reform: 1991 benchm.: 1997	T: regional networks & D (rev. cap)	spot, futures (no physical deliv.), bilat. cont., bal. mkt.	full liberalisation since 1995	T: 1 state D: c.200 (77% public, 23% priv. & mix)	yes	DEA for 190 D units and 90 reg. netw.	large degree of freedom	T: w. Swedish T (Value Chain Method)
Spain	indep., subord. to Min. of Econ.	Jan. 1998	T, D, S (captive consumers) rev. cap	voluntary pool (day, intra-daily, constraints, ancillary ser.) & bilateral contract mkts.	gradual liberalisation - to be completed by 2007	T. grid 74.2% priv. D. private (4 large and many small)	yes	theoretical efficient model/reference firms for revenue retribution among utilities	discretion	-
Sweden	independent, subord. to Min. of Trade & Ind.	reform: 1996	T, D, light handed regulation (no ex ante tariff approval)	spot and forward markets (Nord Pool)	full liberalisation for all customers in from 2000	T:1 central grid (state) D: 20 plus 6 regional Ts (mixed ownership)	intends to use a GIS-based model to compare revs. to a benchmark rev.	the regulator has used DEA and SFA for follow-up but not tariff or revenue regulation	large degree of freedom	no
Other OECD										
Australia *- New South Wales*	independent	reform: 1996 benchmk.: 1994	T, D S (franchise customers)	compulsory spot mkt. financial contracts between S and G	Jan. 01: 100-160 MWh Jun. 01: 40-100 MWh Jan. 02: 0-40MWh p.a.	T: 1 (government) D: 6 (government)	yes	DEA, TFP, SFA, industry benchmark., partial indicator analysis	full discretion	yes, DEA/TFP and industry benchmarking
- Queens-land	present: Min. of Mines & En. from Dec. 2000: indep. regulator	reform: 1995 benchmarking: (DEA) 1996	T, D S (franchise customers)	national spot mkt., financial contracts	July 99: consumers w. demand > 0.2 GWh p.a.	T: 1 D: 2 all state govt. owned	yes	previously: DEA, currently: econometric, partial & total productivity factors	full discretion	US & Australian distribution utilities (T: 1996)
- Tasmania	independent	1997-98 rev. cap & unbundling of services	T, D as well as G and S for franchise customers	no competitive mkts., seeking to join the national spot mkt..	-	T: 1 (state-owned) D: 1 (state-owned)	yes	independent consultant reports	full discretion	yes
- Victoria	independent	reform: 1995 benchmk.:	T (nation. regul. 2001) D (price cap) S (max. retail tariff)	compulsory wholesale spot mkt, contract mkt.	6o MWh p.a., fr. mid-2001 full liberalisation	T: 1 D: 5	yes	OPEX: statistical industry (partial) benchmarking	full discretion	yes, internat. industry benchmarking
Canada *- Ontario*	independent quasi-judicial tribunal	reform: 2000 price cap (IPI - utilities TFP+Z)	T, D (IPI–TFP+Z)	spot & bilateral mkts. fr. mid-2001. In the future: emissions & T rights trading	-	T: 1 province-owned D: c.250 municip., 1 province, 4 priv. owned	yes	2000-02: hist. dev. Of TFP for 47 utilities next rate period: yardstick regulation	discretion	possible - for system reliability indicators in the future
Japan	Min. of Int. Trade & Ind.	reform: 1995 – gen./wholesale benchm.: 1995	T, D, & low-volume retail (ROR regulation)	-	March 2000 retail customers w. demand >2000kw & >20000V	10 private vertically integrated	yes	yardstick regulation – 3 perform. groups for setting allowable costs/rate-base	-	-
United States *- California (SCE)*	independent	reform: 1993 benchmark: 1997	T (ROR), D (PBR) S (bundled customers)	spot market	full liberalisation	private	yes	ROR-base profit sharing	full discretion	no
Non – OECD										
Brazil	independent	reform: 1995	T, D S (partial)	spot market (Sept. 2001)	-	T; 15 (state-owned) D: 65 (private)	fr. 2001	DEA	full discretion	-
Chile	government agency	reform: 1982 benchm.: 1986	T, D S (captive customers)	centralised marg. cost based dispatch pool	demand>2 MW (0.2 MW proposed)	T: 2 D: c.35	yes	yardstick regulation w. reference/model firms	full discretion	-
Colombia	indep., subord. to Min. of Mines & Energy	reform: 1995 benchmark.: 1997	T, D, S (captive customers) PPI-1% price cap regul.	spot 30%, & contracts 70% mkts. Futures mkt (anticipated)	custom. w. demand > 0.1 MW & 55 MWh per month	T: 12 (90% pub. /10% priv.) D: 35 (40% pub. /60% priv. - planned)	yes	DEA for S & T construction costs	full discretion	yes, for T construction costs
India *- Orissa*	independent	reform: 1995	T, D, S (captive customers) ROR reg.	bilateral long-term PPAs	-	T: 1 (state) D: 4 (state & private)	yes	ROR reward for T/D loss reduction	full discretion	-

Table 4: Benchmarking process

	BENCHMARKING – PROCESS									
	11. Regulatory lag	12. Iterations / consultations	13. Separate OPEX/CAPEX	14. Service quality benchmarking	15. Incentives for service qual.	16. Incentives for optim. invest.	17. Incentives for env. impact	18. Info. required stand. / audited	19. Published information	20. Influence of indepen. studies
OECD-Europe										
Austria	-	-	-	-	-	-	-	not stand. - proven by a consultants	consulting reports	1 study by the ministry, others under discussion
Belgium	1 year	annual 3-month long discussions under preparation	total controllable costs	tbd	-	use of tot. costs in rate-setting, project return analysis	obligation to supply min. 3% green energy by 2004	std. format under preparation, approved auditors	initial consultation documents and informal meetings	yes
Denmark	4 years	yes, 1-2 years	total controllable costs	no	-	tbd	-	standard reporting format audited by utility auditors	yes, statuary orders	indirect through consultants
Finland	annual assessments	yes	DEA study of OPEX (planned)	to be included in the DEA study	by including service quality in the DEA	no	no	questionnaire, some account. info indep. audited	key technical and financial figures	yes
France	-	-	-	-	-	-	-	-	-	-
Great Britain *England & Wales (T/D), Scotland (D)*	5 years	consultant. papers T: 4 D: 2	yes	no	compensation, loss of licence, fr. 2002 +/- 1% rev. reward	shared savings in investments	no	questionnaire, no explicit audit, some accounting info subj. to audit	consultation docs, & company business plans & submissions	no
- Northern Ireland	5 years	ca. 5 iterations	no	-	-	-	-	-	consultation documents and price reviews	through consultants
Hungary	4 years (1997-2000)	yes, ad-hoc	-	-	-	-	-	cost audit in standard. format	limited to info in annual report	limited
Ireland	likely 3-5 years	open consultation intended	tbd	tbd	tbd	based on RPI-X model and CAPEX assessment	tbd	tbd	tbd	to be established
Italy	4 years (2000-2003)	4 consultation documents	-	penalties for non-attainment of standards	uniform targets after trans. period reducing national /intern. gap	-	-	standardised (in the future also independent audit	-	-
Netherlands	4 years (2000-2003)	3 consultation & guideline documents	no, total controllable costs	from 2001	-	yes	-	standard format & company auditor	consultation docs & info meetings	New Zealand 1993 study, DEA research
Norway	min. 5 years 2002-2007	1 draft and final proposals	no	-	rev. cap from 2001	½ of expected % growth in delivery added to rev. cap	-	standard format, utility auditors, check by regulator	utility submissions, annual financial, techn. reporting	joint research - ministry, regulator, research orgs.
Spain	not fixed. current period 1999-2002	none	no	tbd – standards and compensation	tbd	rev. cap linked to productivity & demand growth	tbd	info. audited by the regulator	unpublished	research into model networks

Sweden	-	consultations with the industry	has used physical data for capital. intends to use replacement value	-	-	-	an incentive system for renewable energy under study	standard reporting format, audited annual accounts	-	indirect
Other OECD										
Australia - *New South Wales*	5 years	several iterations	yes	possible in future reviews	-	medium term caps, CAPEX prudency tests, optimisation of asset base	D required to consider DSM in lieu of CAPEX, retailers have targets for renewables & GH emissions	standard format reports, accounts subject to independent audit	efficiency studies, consultant's reports, financial projections	yes
- *Queensland*	min. 3 years	issue papers / draft determinations	O & M study & CAPEX-OPEX trade-offs	fr. 2001 consistent measuring of indicators & complaints reports	under preparation	benchmarking & DORC asset valuation method	-	independent audit – std. reporting formats under development	issue papers and determinations public	limited
- *Tasmania*	min.3 max 5 years	consultations, issue papers, draft reports	OPEX: benchm. CAPEX: DORC method	intended use of Australian benchmarks	-	'market benefits test' for inclusion of CAPEX in rate-base	-	audited info in specified format and guidelines	price determine. limited consulting reports	no
- *Victoria*	5 years	several iterations	yes	proxy benchmarks	reward and penalty	yes, with efficiency carry over to next regulatory period	-	utility auditors, standard reporting format planned	issue/consultation papers, draft decisions	indirect
Canada - *Ontario*	3 years (current regulatory period)	two-year consultation period	-	1st PBR period: min. quality standards 2nd.: benchmark. of collected data	2nd PBR period	through price cap mechanism	incentives for DSM in the 2nd. rate period	standard format & audited by the regulator	consultation papers & information	-
Japan	upon submission of proposal for price revision	-	-	-	-	-	-	-	-	-
United States - *California* (SCE)	5 years	several iterations	yes	yes	yes, quality standards	-	-	-	PBR guidelines, applications, decisions	-
Non - OECD										
Brazil	4 years	at least 1	-	MCDA	penalties	-	-	standard format reporting, audit by the regulator	-	research sponsorship
Chile	4-5 years	yes	separate	standards	penalties, revoking license	yes	-	standard format, company auditors	-	-
Colombia	5 years	at least 1 consult. doc. 1 year prior to application	benchm. total controllable costs	international benchm. of product & techn. service in S	compensation to customers	yes	-	standard format & no formal auditing	no	yes
India - *Orissa*	variable	variable	-	performance standards	-	-	-	standard reporting format, audited utility accounts	-	-

Abbreviations - D: distribution T: transmission S: supply tbd: to be decided w.: with fr.: from mkt.: market SCE: Southern California Edison

5.2.3 From Benchmarking to Price-Setting

The previous sections discussed the diversity of the benchmarking methods adopted by regulators. This section outlines the differences in the regulators' approach to translate benchmarking results into X-factors and price-setting. In liberalised power sectors the distribution function is often separated from supply or retailing. However, where there is no separation of distribution and supply, the X-factor for the distribution function can be applied to a rate base which excludes power purchase costs. Specific targeted incentive regulation schemes can then be designed to promote efficiency in power purchasing. Tables 5 and 6 summarise the main features of this process for distribution and transmission utilities respectively in selected countries.

As shown in Table 5, the Norwegian regulator uses a rather formalised approach involving a linear conversion of the efficiency scores from DEA into efficiency requirements. Also, the regulator uses the total controllable costs in benchmarking. These features may be explained in the light of the large number of distribution utilities in the sector which makes an equitable and consistent treatment of capital expenditures and X-factors of individual utilities rather difficult. In the Netherlands, England and Wales, and New South Wales where there are fewer utilities the regulators limit the scope of benchmarking to operating expenditures and treat capital expenditures individually. In New South Wales with just 6 distribution utilities there is no formalised procedure for conversion of efficiency scores into X-factors.

Chile represents an exception in this regard and as discussed previously the 35 utilities are benchmarked against efficient model firms. In California, Performance Based Regulation schemes are negotiated individually, the regulator uses rate of return regulation based on profit sharing which does not require direct comparisons. This approach is also consistent with the US legal environment which favours the use of utilities' actual costs rather than that of the most efficient technology and configuration available.[18]

Table 6 shows setting the X-factor for the central transmission grids in the Netherlands and Norway the two countries in our sample which make their benchmarking process clear. The Dutch regulator has used DEA and a large international sample of transmission utilities in order to overcome the lack of comparators in the domestic power sector. In Norway, in contrast to benchmarking of distribution utilities, the regulator has chosen a one-to-one benchmarking relative to the Swedish transmission utility. This approach appears to a large extent to be motivated by the view that the topography of the Statnett's operating environment is a crucial factor. The choice of the one-to-one benchmarking method of Value Chain Method which recognises and allows for such differences also reflects this view.

The following section highlights three cases of price setting and regulation involving different approaches to incentive regulation and benchmarking.

[18] See for example USCA (2000) for a ruling against the use of predictive pricing methodologies.

Table 5: Benchmarking and incentive regulation of distribution utilities in selected countries (latest price review)				
Country	**Benchmarking/regulation method**	**Benchmarking sample**	**Inputs and outputs**	**From benchmarking to X-factor/reward**
Great Britain	COLS analysis of OPEX Revenue cap	14 RECs in Great Britain	Input: OPEX Output: Composite variable (50% no. of customers, 25% electricity distributed, 25% network length)	High-cost utilities must move 75% of the distance to efficient frontier by 2001/02.
Netherlands	DEA: total controllable costs Revenue cap	19 Dutch utilities	Input: OPEX Output: units, peak demand high voltage, peak demand low voltage, network length, customers small, customers large	Benchmarking analysis and analysis of OPEX. X=8 to -2 for individual companies. Assume all inefficiency for companies below the maximum cap of 8 eliminated by year 3 and a frontier shift of 2% per annum (some companies could have been given up to X=17).
Norway	DEA: total controllable costs Revenue cap	Ca. 180 national regional networks and distribution utilities	Inputs: Capital (book value & repl. cost), goods/services, losses, labour Outputs: No. of customers, energy deliv., length of lines & sea cables	Utility's revenue cap for the 1998-2001 is reduced with 38.2% of the distance of utility's eff. score from the frontier: A 70% score means 11.5% rev. cap reduction or 3.5.% p.a. plus a 1.5% p.a. general eff. requirement.
Australia ***- New South Wales***	DEA, SFA, TFP Revenue cap	219 utilities – New South Wales, other Australia, New Zealand, England & Wales, and US	Inputs: Tot. O&M costs, transformer cap, network size Output: Electricity sold, no. of customers, peak demand	Various forms of benchmarking are used but there is not a single 'preferred' benchmarking technique or an automatic translation of the results of quantitative benchmarking analysis into the pricing determinations.
California ***- Southern California Edison***	ROR-based profit sharing Price cap	-	-	$P_0=P_{1996}$, $X_{1997}=1.2\%$, $X_{1998}=1.4\%$, $X_{1999\text{-}2001}=1.6\%$ -/+50 bps -> shareholders receive all revs./losses -/+50-300 bps -> shareholders' marg. share 25 to 100% -/+300-600 bps -> sharehlders receive the gains/losses >600 bps -> triggers rate review
Chile	Efficient theoretical reference / model firm Yardstick regulation	-	Input: CAPEX, O&M, losses, and customer related costs (low, medium, and high voltage) Output: Added distribution value (ADV) for efficient model firms	The estimated ADV (tariffs) for the model firms are applied to comparable real distribution utilities.

Table 6: Benchmarking and incentive regulation of transmission utilities in selected countries				
Country	**Benchmarking/regulation method**	**Benchmarking sample**	**Inputs and outputs**	**From benchmarking to X-factor/reward**
Netherlands	DEA Revenue Cap	40 international utilities (Sweden, Spain, UK, Germany, US, Norway, Finland)	Input: Total Cost Output: Units Transmitted (kWh); Maximum Simultaneous Demand (MW); +220kV Circuit Lines (km); and Transformers (number) Efficiency: 70% (2000)	X=4.2% including an assumed frontier shift of 2% p.a.
Norway	Value Chain Method (VCM) Revenue cap	One-to-one benchmarking against the Swedish transmission company - Svenska Kraftnät	Input: CAPEX & OPEX costs (C) , Units/No. of cost drivers (net length, transformers, connectors, stations) multiplied by assigned weights (CD) Output: C/CD used to compare relative efficiency • CAPEX eff. = 71.6% • OPEX eff. = 79.2% • Total eff. = 74.0%	Utility-specific efficiency requirement = 2.36%p.a 1997-01. (same conversion method as for the distribution utilities, some costs not included in the revenue cap) General efficiency requirement = 1.50%p.a. 1997-01

5.3. Selected Benchmarking Cases

Southern California Edison (SCE)
The state of California began in 1990 to study replacement of the cost-of-service regulation for gas and electric utilities with performance based regulation. Since 1993, the California Public Utility Commission (CPUC) has adopted various PBR schemes for generation and dispatch, base rate, gas procurement, and other operating revenues.[19] The SCE PBR was adopted in 1997 for transmission and distribution. In 1998, due to restructuring of the sector, this PBR was limited to distribution only. The SCE PBR incorporates: (i) a rate-indexing or RPI-X price cap formula, (ii) a revenue sharing mechanism, (iii) a cost of capital trigger mechanism, (iv) a Z-factor, (v) service quality performance incentives, and (vi) a monitoring and evaluation programme.

The initial rate (P_0) was derived from 1996 tariffs and for subsequent years, the X-factor was set at 1.2% (1997), 1.4% (1998), and 1.6% (1999-2001). The revenue sharing mechanism is based on a benchmark return on equity (ROE) established by the Commission and three rate bands surrounding the return. In the inner band (-/+50 basis points) the shareholders receive all net revenue gains or losses. In the middle-band (-/+ 50-300), the shareholders marginal share rises from 25 to 100%. In the outer-band (-/+300-600) shareholders receive the gains and losses. Outside the 600 basis points, the PBR scheme is re-evaluated. The cost of capital trigger mechanism makes provision for adjustment of the allowed return on equity based on half the change in a AA bond index value. The authorised ROE for 1997 to 1999 has been 11.6 % while the actual return has been 13.55% in 1997 (adopted), 11.16% in 1998 (reported), and 11.31% in (1999-reported). The high ROE in 1997 resulted in a ratepayer revenue share of $40.6 million or 6.7% and 3.8% of the utility's total net and operating income respectively. The Z-factor makes allowance for costs incurred due to extraodrdinary events such that are beyond the control of the utility's management such as changes in tax laws and natural disasters.

The service quality incentives comprise service reliability, customer satisfaction, and employee health and safety. Service reliability comprises outage duration and outage frequency benchmarks. The outage duration benchmark is 59 minutes average customer outage in 1997 and declines by 2 minutes in subsequent years. A dead-band of 6 minutes surrounds the benchmark. No penalty is payable if the utility achieves an average of 55 minutes for the 1997-2001 period. The reward or penalty is $1 million per minute for two-year averages with an upper limit of $18 million for outage and frequency. The frequency benchmark is 10,900 annual interruptions with $1 million reward or penalty for each 183 interruptions.

Customer satisfaction is measured by independent surveys and the satisfaction benchmark is 64%. The main reward and penalty is $2 million for each percentage below or above a 3% dead-band. The employee health and safety benchmark in brief is a ratio index of the number of accidents and illnesses. The benchmark value is 13 with a dead-band of 0.3 and $555,000

[19] See CPUC (2000) for reviews of this and other PBR cases adopted in California.

reward or penalty for 0.1 deviation increments beyond the band. The monitoring and evaluation programme includes procedures such as change of prices and cost of capital as well as revenue sharing and performance results.

Norway

The Norwegian power sector liberalisation began in 1991 as one of the first market-oriented attempts to reform the sector. The reform involved restructuring of the state-owned utility Statkraft, unbundling of services, and introduction of competition into electricity generation and supply. Unlike the England & Wales model, the Norwegian reform did not affect the ownership structure of the sector which is predominantly state, municipality, and county-owned.

Until 1996, the transmission and distribution activities were subject to cost of service regulation. Since 1997, an incentive-based revenue cap regulation was adopted for the central transmission grid, 40-50 regional transmission utilities, and ca. 200 distribution utilities. The central grid is owned by the state-owned company Statnett while the regional transmission and distribution utilities are owned by municipalities and counties. The utility profits are the difference between the revenue cap and actual costs and can vary in the range of +/-7% around the normal rate of return (currently 8.3%). The length of the current regulatory period is 5 years. The revenue cap for the initial year is shown in Equation (9).

(9) *Initial revenue cap = Expected network loss * Expected spot price + Revenue cap before network losses*

The revenue cap before network loss was based on average costs in 1994 and 1995. Also, the expected network loss is equal to average physical loss in 1994 and 1995. The initial revenue cap is then adjusted using Consumer Price Index, average spot price on the Nordic Power Exchange (Nord Pool), and 50% of the expected percentage increase in supply growth. The revenue cap is then further adjusted using an efficiency factor X that comprises a 'general' and a 'utility-specific' component.

The utility specific X-factor is calculated from DEA analysis of the distribution utilities while for Statnett the X-factor is calculated from Value Chain Method and comparison with the Swedish utility Svenska Kraftnät (see Magnus and Midttun 2000). From 2001 the revenue caps will be adjusted for quality of supply. The amount of reward or penalty equals the increase or decrease in the cost of interruptions to customers.

In 1997, a general efficiency requirement of 2% applied to all utilities and no utility-specific X-requirement. In 1998, the general X-factor was set at 1.5% while the weighted average of utility-specific X-factors was 0.6%. The corresponding figures from 1999 to 2001 are 1.5 and 1.1% respectively. In 1999, the total revenue cap for the utilities amounted to 14,360 million NKr.[20] In comparison, the total efficiency improvement requirement for the same year was 370 million NKr. The utility-specific efficient requirement amounted to 157 million NKr. of

[20] $1≈NKr 9.

which 70 million NKr applied to distribution utilities and 87 million NKr to regional networks.

Great Britain

The power sector reform in Great Britain began in 1990. The reform has involved restructuring of the industry, introduction of competition into generation and supply, and large-scale privatisation. The regional distribution utilities in England and Wales, which jointly owned the national transmission grid, were privatised in 1990 followed by most of generation capacity in 1991.[21] The regulated segments of the sector are the transmission grid National Grid Company (NGC), and distribution utilities. In addition, the domestic supply activities of the distribution utilities is subject to price cap regulation.

Some form of benchmarking is used in regulation of all regulation activities. The benchmarking of transmission grid for the current 4-year price control period (1997-01) involve TFP, DEA, and an international survey of 15 transmission utilities (OFFER 1996).[22] In setting the price caps for domestic supplies the regulator has used comparison and benchmarking of total operating supply costs. There is no regulation of independent suppliers (OFGEM ,1999c).

In regulation of the distribution utilities, the regulator considers the operating costs, value of existing assets, cost of capital, need for new investments, expected productivity growth, and competition conditions in setting the revenue caps (OFGEM, 1999). The regulator uses a high level benchmarking of total OPEX as well as an activity level benchmarking of specific types of operating costs such as engineering, information technology, and human resources. In addition, the regulator has used benchmarking of capital expenditures for average replacement costs across the companies for a particular asset age profile.

In setting the revenue caps for individual distribution utilities, the present value of the total revenue cap for the duration of the rate period is calculated. The revenue cap for each year is then determined based on utility-specific initial price levels P_0 and X-factors which are set simultaneously. There is therefore an infinite number of possible combinations of P_0 and X-factor. The regulatory period for distribution utilities is 5 years. For each period, prices for the initial year(s) P_0 vary across the utilities while they share the same X-factors. For example, for the rate period 1995/6-1999/00, the X-factors for 1996/97 and 1997/98 averaged 14 and 11.5% respectively and 3% p.a. for the 1997/98-1999/00 period. Similarly, for the current period 2000/01-2004/05, the average X-factor for the initial year 2000/01 is 23.4% (some of which accounts for transfers to the supply business) and 3% p.a. for the 2001/02-2004/05 period.

The price control review for the regulatory period 1995-2000 assume that the less cost efficient distribution utilities "move three quarters of the way to the efficient frontier by 2001/02 and retain that position relative to the frontier" (OFGEM, 1999a, p.21). Also, the

[21] The 2 Scottish public electricity suppliers were also privatised in 1990 but remained as vertically integrated companies.

[22] The next price control period is extended to 5 years (2001-06).

three utilities that are closest to the efficient frontier were rewarded with 1% of their price control revenue.

There have also been several incentive schemes that involve adjustments to price control revenues in respect of performance in the previous regulatory period. For the first year of the current rate period for distribution (2000-01), these 'within the range adjustments' could potentially amount to up to +2.0/-2.25% of the revenue. The actual maximum revenue adjustments however amounted to -1.25%. For example, efficiency in capital expenditure could be rewarded with up to +/-1% of the revenue. In addition, reward and penalty schemes were tied to customer satisfaction, quality of supply, energy efficiency, and accuracy of forecasts (penalty only) (OFGEM, 1999a; OFGEM, 1999b). From 2002 to 2005 quality of supply is due to be annually benchmarked using utility-specific quality targets that are tied to financial rewards and penalties. The maximum amount of revenue which will then be exposed to 'within the range adjustments' will be +/-2% p.a.

6. Conclusions

In closing we summarise the international experience to date from countries that have used benchmarking in incentive regulation. We then outline the main outstanding issues associated with the use of benchmarking and draw some lessons for best-practice implementation by regulators.

The incentive regulation and benchmarking in most countries is in the first or second regulatory period. Our survey showed that a number of regulators are using or considering benchmarking in the regulatory process. Most reforms have involved establishing independent regulatory authorities. New regulators seem to be less bounded by path dependency of institutional constraints to adopt new regulatory tools such as benchmarking. Therefore, benchmarking is likely to become more common as more countries implement reforms.

The time lag between implementation of reforms and establishing new regulatory agencies and adoption of benchmarking appears to be decreasing. As the number of regulators increases, there is more scope for exchange of experience with regulators in other industries and countries. Most incentive regulations use price and revenue caps. As we saw, the Southern California Edison's PBR is essentially a price cap regulation with profit sharing. Sharing mechanisms are uncommon although the UK also uses such a scheme for new investments. We did not find benchmarking cases with explicit treatment of environmental impacts. There is however a desire in the United States for the inclusion of DSM programmes in PBRs.

Further, we found that benchmarking is mostly practised in countries with well-developed upstream competition, spot market, and a high degree of market liberalisation. Finally, to the extent that consultation between the regulator and industry and high degree of published

information are regarded as indicators for transparency of the regulatory process, most benchmarking countries exhibit such transparancy.

Outstanding Issues

Although a number of regulators have used benchmarking and more are likely to do so, some theoretical issues are still open to debate. Frontier approaches are susceptible to shocks and errors in data. This is especially the case when cross-sectional data is used and there is no allowance for errors. In order to minimise problems due to data errors there should be very careful handling of data accuracy. For example, Norway and UK have made considerable effort to improve data standardisation and accuracy.

Firm specific efficiency scores are sensitive to the specification and assignment of the outputs, inputs and environmental variables. This raises questions as to the robustness and accuracy of calculated X-factors based on unstable rankings. The UK regulator has adopted a simple regression model with one dependent (cost) and one independent variable (composite output) to increase data robustness while Norway, perhaps due to a large sample size, has been able to adopt a more elaborate DEA model.

A problem with frontier methods is that it is not clear whether the frontier provides a valid comparator even in the absence of data errors and shocks. For instance in DEA models that assume constant returns to scale, a firm may be compared to a part of the frontier defined by firms of radically different scale. To reduce these problems some regulators such as in the UK just use national samples in benchmarking.

Separate analysis of capital and operating costs encourages intermediation between these cost categories. For example, firms may attempt to argue for higher capital costs to reduce operating costs. While benchmarking should ideally apply to total costs, this is difficult given the heterogeneous nature of capital. As a result, regulators in the UK and Norway have struggled with how to handle the possibility of intermediation. International comparisons are often restricted to comparison of operating costs because of the heterogeneity of capital but this may limit their applicability.

The calculation of the likely future rate of movement of the frontier is problematic. Measures of past productivity growth usually include both frontier shift effects and movements towards the frontier. However, the problem of estimating this is minimised if firms are compared to world best practice as, the range of variation in estimates of world best practice frontier shifts (given international benchmarking) is small (1-2% p.a.).

Once efficiency scores are calculated the crucial assumption in deciding the X-factors is the rate at which efficiency gaps can be closed. Therefore, national regulators will need to make allowance both for this and for in-country heterogeneity. In international comparisons, firms in some countries will be able to close the gap faster than others.

A major reservation against assigning firm specific X-factors has been that the cost saving incentives are blunted if companies are not allowed to retain efficiency savings beyond the

next price review. Benchmarking may result in firms having to run to stand still and hence there may be strong incentives to subvert the regulatory process.

International benchmarking raises particular difficulties. The most notable issue is that of comparability and quality of data which may only be improved in time and requires co-operation among the regulators. In addition, when comparing monetary units the correct handling of currency exchange rates is of particular importance. The relative differences in input prices (e.g. wage rates, taxes, and rates of return on capital) beyond the control of the firm may have to be taken into consideration.

Finally, design and implementation of incentive regulation schemes in developing countries may have to take certain political issues and concerns into consideration. In some Latin American countries, the governments, in order to guarantee regulatory commitment and to the secure success of privatisation programmes, have directly negotiated the terms (e.g. price caps) of the initial post privatisation rate periods with utilities and thus limited the regulators' discretion. Another concern is that of price subsidies in place which often serve social and political objectives. In other countries, it is important to maintain national uniform final electricity prices.

Lessons for Best Practice Implementation

Based on the results of the survey and the above theoretical and empirical concerns we can draw some lessons for implementation of benchmarking in regulation.

The regulators should use cost-linked benchmarking to calculate X-factors in the early period following power sector reforms. Benchmarking exercises should be viewed as just a transitional regime until competition can be introduced into the sector or international best practice arrives.

International benchmarking is more useful for comparison of transmission utilities as there is often a lack of domestic comparators. In addition, countries with a small number of distribution firms can benefit from international comparisons. Also, international benchmarking is generally advantageous in the case of non-US firms, as these are likely to be behind the frontier.

It is important that the regulators collect national and international data through formal co-operation and exchange. New regulators need to pay ample attention to developing good data collection and reporting systems. A precondition for international comparisons is to focus on the improving the quality of data collection process, auditing, and standardisation within and across countries.

The issue of choosing the most appropriate benchmarking methods and model specification can not be settled on theoretical grounds. Therefore, benchmarking should not be confined to a particular technique. In each case, regulators should use the latest techniques such as DEA. COLS, SFA, and partial benchmarking as well as sensitivity analysis to examine the consistency of results and robustness of the rank orders.

The regulator should also use benchmarking in order to estimate the scope for efficiency improvement subject to error bounds. In keeping with transparency criteria for regulatory governance regulators should publish data, method, and results and as an information revelation device and invite comments and solicit more information.

Further, benchmarking methods and their raw results should not be regarded as replacements to decision-makers and their judgements. Rather, the primary function of benchmarking methods is to serve as decision-aid tools that can help decision-makers overcome bounded rationality in a complex decision environment. Therefore, as in any area of public policy, regulatory decisions should ultimately be based on decision-makers' judgements and discretion.

Finally, it is important that the regulator has full discretion with regard to several aspects of the data, models, and methods used in benchmarking. The regulator should be free to decide specification of the important factors for national utilities and in weighting the results from different techniques. The regulator should exercise discretion through assessing the scope for future frontier shift, predicting the rate of demand growth and crucially in the estimation of the rate at which efficiency gaps should and can be closed. Benchmarking methods are an important decision-aid. However, they do not mean that regulators can not or should not use their informed judgment in setting prices and performance targets.

References

ACCC. 1999. Best practice utility regulation. Perth. Australian Competition and Consumer Commission - The Office of Water Regulation.

Armstrong, M., Cowan, S., and Vickers, J. 1994. Regulatory Reform: Economic Analysis and British Experience. London-Cambridge MA. The MIT Press.

Averch, H., and Johnson, L. L. 1962. Behavior of the firm under regulatory constraint. American Economic Review 52 (December), 1052-1069.

Bagdadioglu, N., Price, C. M. W., and Weyman-Jones, T. G. 1996. Efficiency and ownership in electricity distribution: A non-parametric model of the Turkish experience. Energy Economics 18, 1-23.

Berg, V. S., and Jeong, J. 1991. An evaluation of incentive regulation for electric utilities. Journal of Regulatory Economics 3, 45-55.

Bergman, L., Brunekreft, G., Doyle, C., von der Fehr, N.-H. M., Newbery, D., Pollitt, M., and Regibeau, P. 1999. A European Market for Electricity? London. Centre for Economic Policy Research (CEPR).

Berry, D. M. 1994. Private ownership form and productive efficiency: Electric cooperatives versus investor-owned utilities. Journal of Regulatory Economics 6, 399-420.

Blundell, J., and Robinson, C. 1999. Regulation without the State. London. Institute of Economic Affairs.

Burns, P., and Weyman-Jones, T. 1994. Regulatory incentives, privatisation, and productivity growth in UK electricity distribution. London. CRI.

Burns, P., and Weyman-Jones, T. 1996. Cost functions and cost efficiency in electricity distribution: A stochastic frontier approach. Bulletin of Economic Research 48 (1), 41-64.

Charnes, A., Cooper, W. W., Divine, D., Ruefli, T. W., and Thomas, D. 1989. Comparisons of DEA and existing ratio and regression systems for effecting efficiency evaluations of regulated electric cooperatives in Texas. Research in governmental and Nonprofit Accounting 5, 187-210.

Claggett, E. T. 1994. A cost function study of the providers of TVA power. Managerial and Decision Economics 15 (1 Jan.-Feb.), 63-72.

Claggett, E. T., Hollas, D. R., and Stansell, S. R. 1995. The effect of ownership form on profit maximization and cost minimization behavior within municipal and cooperative electrical distribution utilities. The Quarterly Review of Economics and Finance 35 (Special 1995), 533-550.

Comnes, G. A., Stoft, S., Greene, N., and Hill, L. J. 1995. Performance-Based Ratemaking for Electric Utilities: Review of Plans and Analysis of Economic and Resource Planning Issues, Volume I. Oak Ridge, Ten. Oak Ridge National Laboratory and University of California, Berkeley.

CPUC. 2000. Electric and Gas Utility Performance Based Ratemaking Mechanisms (September 2000 Update). California Public Utilities Commission, Energy Division (Prepared by: Richard Myers and Laura Lei Strain).

Crew, M. A., and Kleindorfer, P. R. 1996. Incentive regulation in the United Kingdom and the United States: Some lessons. Journal of Regulatory Economics Vol. 9, 211-225.

DTe. 1999. Price Cap Regulation in the Electricity Sector. Hague. Dutch Electricity Regulatory Service.

ESAA. 1994. International Performance Measurement for the Australian Electricity Supply Industry 1990-1991. Sydney. ESAA.

Färe, R., Grabowski, R., and Grosskopf, S. 1985. The Measurement of Efficiency of Production. Boston. Kluwer Academic Publishers.

Filippini, M. 1998. Are municipal electricity distribution utilities natural monopolies? Annals of Public and Cooperative Economics Vol. 69 (2), 157-174.

Førsund, F., and Kittelsen, S. 1998. Productivity development of Norwegian electricity distribution utilities. Resource and Energy Economics Vol. 20 (3 September), 207-224.

Giles, D. E. A., and Wyatt, N. S. 1993. Economies of Scale in New Zealand Electricity Distribution Industry. In Models, Methods and Application of Econometrics, edited by P. C. B. Phillips. Oxford, Cambridge MA. Blackwell.

Goto, M., and Tsutsui, M. 1998. Comparison of productive and cost efficiencies among Japanese and US electric utilities. Omega 26 (2), 177-194.

Hall, G. L. 2000. Electricity Pricing and Regulatory Practice in a Competitive Environment - Workshop Paper No. 2: Analysis of Alternative Ratemaking Methodologies. Manila. Prepared by Hagler Bailly Services, Inc. for Asian Development Bank and the Philippines Energy Regulatory Board and Department of Energy.

Hill, L. 1995. A Primer on Incentive Regulation for Electric Utilities. Oak Ridge National Laboratory.

Hougaard, J. L. 1994. Produktivitetsanalyse af dansk elproduktion (in Danish). Copenhagen. Amternes og Kommunernes Forskningsinstitut.

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

IPART. 1999. Efficiency and Benchmarking Study of the NSW Distribution Businesses. Sydney. Commissioned by the Independent Pricing and Regulatory Tribunal of New South Wales - Prepared by London Economics.

Joskow, P. J., and Schmalensee, R. 1986. Incentive regulation for electric utilities. Yale Journal on Regulation Vol. 4 (1), 1-49.

Joskow, P. L. 1998. Electricity sectors in transition. The Energy Journal Vol. 19 (No. 2), 25-55.

Klein, J. D., Schmidt, S., and Yaiswarng, S. 1992. Productivity changes in the U.S. Electric Power Industry. In Empirical Studies in Industrial Organization: Essays in Honor of Leonard W. Weiss, edited by D. B. Audretsch and J. J. Siegfried. Netherlands. Kluwer Academic Publishers.

Kumbhakar, S. C., and Hjalmarsson, L. 1998. Relative performance of public and private ownership under yardstick competition. European Economic Review Vol. 42, 97-122.

Lawrence, D., Houghton, J., and George, A. 1997. International comparisons of Australia's infrastructure performance. Journal of Productivity Analysis 8, 361-378.

Levy, B., and Spiller, P. T. 1994. The institutional foundations of regulatory commitment: A comparative analysis of telecommunications regulation. Journal of Law, Economics, and Organization Vol. 10 (2), 201-46.

Littlechild, S. 1983. Regulation of British Telecommunications' Profitability. London. Department of Industry.

Littlechild, S. C. 2000. Privatisation, Competition, and Regulation. London. The Institute of Economic Affairs.

Magnus, E., and Midttun, A., eds. 2000. Electricity market reform in Norway. Basingstoke. Macmillan.

MDTE. 1995. Investigation by the Department on its own motion into the theory and implementation of incentive regulation for electric and gas companies under its jurisdiction. Massachusetts Department of Telecommunications and Energy.

Meibodi, A. 1998. Efficiency Considerations in the Electricity Supply Industry: The Case of Iran. University of Surrey.

Miliotis, P. A. 1992. Data envelopment analysis applied to electricity distribution districts. Journal of Operational Research Society Vol. 43 (No. 5), 549-555.

Newbery, D. 1999. Privatization, Restructuring, and Regulation of Network Utilities. London, Cambridge MA. The MIT Press.

OFFER. 1996. The Transmission Price Control Review of National Grid Company: Fourth Consultation Paper. Birmingham. Office of Electricity Regulation.

OFGEM. 1996. The Transmission Price Control Review of National Grid Company: Fourth Consultation Paper. August 1996. London. Office of Gas and Electricity Regulation.

OFGEM. 1999. Reviews of Public Electricity Suppliers 1998 to 2000. Distribution Price Control Review. Final Proposals. December 1999. London. Office of Gas and Electricity Markets.

Pollitt, M. 1995. Ownership and Performance in Electric Utilities. Oxford-New York. Oxford University Press.

Pollitt, M. 1994. Productive Efficiency in Electricity Transmission and Distribution Systems. University of Oxford.

Priest, G. L. 1993. The origins of utility regulation and the "theories of regulation" debate. Journal of Law and Economics Vol. XXXVI, 289-323.

Rees, R., and Vickers, J. 1995. RPI-X Price-Cap Regulation. In The Regulatory Challenge. edited by M. Bishop, J. Kay and C. Mayer. Oxford-New York. Oxford University Press.

Rudnick, H., and Donoso, J. 2000. Integration of price cap and yardstick competition schemes in electrical distribution regulation. IEEE Power Engineering Review (August), .

Rudnick, H., and Raineri, R. 1997. Chilean Distribution Tariffs: Incentive Regulation. In (De)Regulation and Competition: The Electric Industry in Chile, edited by F. G. Morande and R. Raineri. Santiago. ILADES/Georgetown University.

Sawkins, J. W. 1995. Yardstick competition in the English and Welsh water industry. Utilities Policy Vol. 5 (No. 1), 27-36.

Schmalensee, R. 1979. The Control of Natural Monopolies. Lexington, MA. Lexington Books.

SEE. 1997. Performance-Based Regulation in Restructured Electric Industry. Washington, D.C. Prepared by Synapse Energy Economics, Inc., National Association of Regulatory Utility Commissioners.

Shleifer, A. 1985. A theory of yardstick competition. Rand Journal of Economics Vol. 16. 319-327.

Stern, J., and Holder, S. 1999. Regulatory governance: Criteria for assessing the performance of regulatory systems: An application to infrastructure industries in the developing countries of Asia. Utilities Policy Vol. 8, 33-50.

Twada, M., and Katayama, S.-I. 1990. On the technical efficiency under regulation: A case for the Japanese electric power industry. The Economic Studies Quarterly 41 (1), 34-47.

UMS. 1999. Operating Expenditure Benchmarking: Study Undertaken for the Regulator General of Victoria. UMS Group Australia, Government Strain.

USCA. 2000. Iowa Utilities Board v. Federal Communications Commission and United States of America, No. 96-3321 (and consolidated cases). United States Court of Appeals for the Eighth Circuit, July 2000. http://www.fcc.gov/ogc/documents/opinions/2000/96-3321.html.

Vickers, J., and Yarrow, G. 1988. Privatization: An Economic Analysis. London-Cambridge MA. The MIT Press.

Weyman-Jones, T. 1991. Productive efficiency in a regulated industry: The area boards of England and Wales. Energy Economics (April), 116-122.

Weyman-Jones, T. 1995. Problems of Yardstick Regulation in Electricity Distribution. In The Regulatory Challenge, edited by M. Bishop, J. Kay and C. Mayer. Oxford-New York. Oxford University Press.

Whiteman, J. 1995. Benchmarking developing country electricity systems using data envelopment analysis. Asia-Pacific Economic Review Vol. 1 (3), 71-78.

Whiteman, J. W. 1999. The potential benefits of Hilmer and related reforms: Electricity supply. The Australian Economic Review Vol. 32 (1), 17-30.

World Bank. 1993. The World Bank's Role in the Electric Power Sector: Policies for Effective Institutional, Regulatory, and Financial Reform. Washington, D.C. World Bank.

World Bank. 1999. Global Energy Sector Reform in Developing Countries: A Scorecard. Washington, D.C. World Bank.

Yaisawarng, S., and Klein, J. D. 1994. The effects of sulfur dioxide controls on productivity change in the U.S. electric power industry. Review of Economics and Statistics 76(3) (August 1994), 447-460.

Yoon, K. P., and Hwang, C.-L. 1995. Multiple Attribute Decision Making: An Introduction, Sage University Paper series on Quantitative Applications in the Social Sciences. Thousand Oaks, CA. Sage.

Yunos, J. M., and Hawdon, D. 1997. The efficiency of the national electricity board in Malaysia: An intercountry comparison using DEA. Energy Economics Vol. 19, 255-269.

Zhang, Y., and Bartels, R. 1998. The effect of sample size on the mean efficiency in DEA with an application to electricity distribution in Australia, Sweden and New Zealand. Journal of Productivity Analysis 9, 187-204.

This Chapter has been taken from a TERI Press Publication on
"Governing Power" by Prof. S L Rao
(With TERI Press Permission)

CHAPTER 9

Regulatory law: principles, processes, and procedures

Abstract

This chapter puts together some orders of selected ERCs (electricity regulatory commissions) on certain issues, as well as those of the superior courts in appeal against ERC orders. The objective is to attempt a preliminary assessment of whether there is a consistent, cohesive body that can be called 'regulatory law'. The finding is that while the superior courts have built a respectable body of such opinions, the SERCs (state electricity regulatory commissions) that have dealt with similar problems many times, have done so differently from one another. The Electricity Act, 2003, will make this impossible in the future, since much of the authority is taken away from the SERCs and is now legislated for issues like captive generation, third-party sales, open access, and trading, with many regulatory powers in formulating principles handed over to the CERC (Central Electricity Regulatory Commission). This chapter also looks at emerging issues like trading and the role of the ERCs and the experiences in other countries on some related issues.

Superior court orders

In India, ERCs (electricity regulatory commissions) have now been in existence for over eight years, having started with Orissa. Many of their orders have gone up in appeal to the concerned HCs (High Courts) and on occasions to the SC (Supreme Court). Here we consider whether the orders on appeal of the superior courts have resulted in a body of agreed principles and judgements that can be used all over the country and that can be said to lead to a body of electricity regulatory law. The orders of courts on appeal suggest that they are moving in this direction.

Legitimacy

In the judgement of *LML Ltd* vs *State of UP and others,*[1] the HC of Uttar Pradesh, Allahabad Bench, observed: *'There is good logic for conferment of such a power on the Commission. Hitherto the supply of electricity was being made by only one body, viz. UPSEB which being an instrumentality of State and functioning under the control of the Government was not expected to enhance the tariff in an arbitrary manner. In fact, the UPSEB and many Electricity Boards of other States were running on huge losses. The Central Act and the U.P. Act have been enacted to enhance generation of electricity and improve efficiency by bringing in private operators. If a licensee, after getting the licence for a particular area increases the tariff, the consumers will have no option but to pay the same. In order to guard against such an eventuality, provision has been made that while granting a licence the Commission may impose conditions and further no tariff can be implemented unless the same has been approved by it.'*

[1] MANU/UP/0227/2001

The court had thus recognized the role of the ERC in licensing and tariff setting but confined it to protecting the consumer interest in not having to pay higher tariffs. This was not reflective of the intent of the reforms and the amendments that had been introduced in 1998 to the two principal Electricity Acts.

Interests of consumers and investors

The HC of Madhya Pradesh has observed: *'On self-consideration by the Commission and having regard to the system strengthening charges it is necessary to take a holistic view and balance the interest of the Board and consumers. The reasonability of the charges, therefore, needs to be examined by an independent expert agency acceptable to both the parties, which can be entrusted with the task of examining the facts, figures and estimates in this regard and recommend the reasonable amount to protect interests of the potential consumers as also the Board.'* This court thus recognized the need for a neutral body that would study the data and take the interests of both investors and consumers into consideration. It reflects the need to balance both interests.

Quasi-judicial nature of commissions

In the case of *Indo-Bharath Energies Ltd Hyderabad* vs *State of AP*,[2] the HC of Andhra Pradesh observed on the CBRs (Conduct of Business Regulations) of the ERC: *'A bare reading of these regulations would in unmistakable terms reveal the nature of the Commission and proceedings, which are practically quasi-judicial in nature. The regulations prescribe the procedure for issuing notice, presentation and scrutiny of the pleadings, filing of reply, opposition, objections etc., and hearing of the matter at the place and date specified*

[2] MANU/AP/0369/2000

by the Commission. The principles of natural justice are in built in all these regulations.'

The court recognized the quasi-judicial nature of the ERC and the adequacy and rightness of its CBRs.

Commission to follow regulations

'There is absolutely no difficulty to hold that every person, generating company or licensee is duty bound to furnish such information. The information may enable the Commission to carry out its functions under the Act in an effective manner. But if the Commission intends to use such material for passing an order in discharge of its functions under Section 11 of the Reform Act, it has to necessarily set the law in motion in accordance with the regulations. The Commission has to necessarily follow the mandatory requirements as provided for in the regulations. The Commission, as we have already noticed, failed to follow the Regulations in initiating the proceedings leading to passing of the impugned order. The Commission could not have passed the impugned order on the basis of notice and questionnaire issued to the developers.' The strongest comment from the court was in the following terms: *'May be there is a need for metamorphoses of the personnel manning the Commission.'* The ERC must follow its own regulations.

Commission to be balanced

In *LVS Power Ltd* vs *Transmission Corporation of AP Ltd, Hyderabad and Ors*,[3] the HC of AP assailed the commission as follows: *'The Commission being a regulatory authority is expected to resolve and adjudicate the disputes on tariff, as contemplated under Section 1 1(1)(e) of the Reform Act. It, however, simply washed off its hands by observing that there is no way the Commission can compel*

[3] MANU/AP/0636/2002

APTRANSCO to purchase the power, having prevented the appellant from selling power to third parties and getting the agreements entered into by the appellant with third parties terminated. We, therefore, have no option except to observe that the order of the Commission is unconscionable, unjust, and unreasonable putting the appellant to untold miseries.'
The ERC is to resolve and adjudicate disputes and cannot shirk this responsibility. It has to strike a balance between all parties. If need be, it must use its full powers to compel compliance.

No justification for intemperate language

Another very interesting aspect of the entire debate is the criticism that the ERCs receive in the petitions. Here is what the HC of AP has to say on this:[4] '*The petitioners have freely used licentious, objectionable and intemperate language to question the conduct of the respondent authorities without disclosing anything which could justify such attack of the public authorities. The petitioners have made unwarranted insinuations and innuendos against the Commission and Governmental authorities. The affidavit filed in support of the writ petition contains wild and vague statements with no supporting proof in the form of any kind of evidence. The petitioners ought to have seen that when they level serious allegations against the Commission, they should be very responsible and accountable to what they allege. In levelling the allegations that the Commission is "a mere puppet in the hands of Governmental authorities"; the Commission "is not only taking cue from the governmental directions but is also acting virtually at their behest"; "the Commission has neither expertise nor it has taken up the exercise of applying its mind"; the Commission is hand-in-glove with the Government and Governmental authorities "to cover up*

[4] MANU/AP/0678A/2000

several thousands of crores of rupees of losses incurred by the defunct APSEB and to pass on those losses to the present Companies"; that "the Commission has become a mere instrument of the State to lay its seal of approval"; that the hike effected by the Commission in the electricity tariff is "steepest, harshest, horrible, horrendous and that it is a saga of harrowing hardship inflicted by the State and the Commission"; the State Government, the AP TRANSCO and the Commission "have taken the people for a ride by inflicting infinite agony and sufferings"; the increase in the electricity tariff permitted by the Commission does not have "a parallel anywhere in India"; the hike permitted by the Commission is "highest hike in the world for power and that it is high time the so-called 'Reforms' are thrown out and all electricity supply bodies may be auctioned for scrap value"; that "for getting a loan of some thousands of crores of rupees from the World Bank the State has bartered its economic freedom"; that now "our saga of sad and shameful purchases begin"; that "several senior politicians with experts in industry and agriculture in the Cabinet did not arise their voice for the sake of consumers and the Cabinet has failed its duty to the people"; that by the impugned hike the "common people are harassed, victimised and exploited", the petitioners have undoubtedly crossed the 'Lakshmana Rekha' of the pleading law. Large number of similar allegations and attacks are made against the respondent authorities by the petitioners throughout the affidavits, and those allegations are totally unjustified and unwarranted, and they are rather on the border of abuse than averments in a pleading, and they cannot be considered to be legitimate part of a proper pleadings. Is it necessary for us to point out that the above noticed part of the pleading, nay, the abuse is totally irrelevant, unwarranted to the decision-making? We emphatically say, No. Should the petitioners in the above two writ petitions note that the pleading is not a garb to

scandalize, humiliate others and if they do it, they should be accountable. The Courts cannot and shall not countenance any tendency to scandalize the opposite party in a litigative action. Innuendo, insinuation, sarcasm have no place in pleadings before a Court of law. Pleading is not and cannot be a medium to air the political or personal vendetta and tirade. In that view of the matter, we think that the complaint made by the Commission in its counter-affidavit that if such allegations are allowed to stand, the same will seriously affect the credibility and proper working of the Commission which is an important central statutory authority created under the Reform Act having been vested with vital and important powers and consisting of well qualified and experienced Chairman and members selected by a Selection Committee presided over by no other person than a retired Chief Justice of a High Court or a retired Judge of the Supreme Court is, in our view, well justified.' Thus, the ERCs are recognized as expert technical bodies and the court objects to intemperate language being used against them when they are also quasi-judicial in nature.

Courts have wide powers for review

Since the attitude of the courts has been that the extraordinary remedy of the writs to the HC and the SC always exists and is not even barred by the existence of alternate remedies, more and more cases are going to come before the HCs and SC challenging issues like regulatory scope of power. In the judgement of *RCI Power Limited* vs *Union of India*,[5] while deciding on the issue of maintainability of writ petitions, the court while citing earlier judgements of *Whirlpool Corporation* vs *Registrar of Trade Marks, Mumbai*,[6] and *Kavalappara*

[5] MANU/AP/0336/2003
[6] AIR 1999 SC 22

Kottarathil Kochunni @ Moopil Nayar vs *State of Madras*,[7] clearly held that the existence of other remedies does not bar the jurisdiction of the HC and the SC. The court observed: '*...the power of judicial review exercisable by the High Court under Article 226 as well as the Supreme Court under Article 32 of the Constitution over the actions of Legislature and executive so that they may not transgress the constitutional limitations in exercise of their functions and the power of judicial superintendence over the decisions of all Courts and Tribunals within their respective jurisdictions intended to oversee that the judicial decisions rendered by those who man the subordinate Courts and Tribunals do not fall foul of strict standards of legal correctness and judicial independence forms part of the basic structure of the Constitution of India vide L. Chandra Kumar vs. Union of India, AIR 1997 SC 1125. Hence, the power of judicial review exercisable by the High Court to test either the constitutionality of a legislation or an administrative action or the correctness of the orders of the Tribunals is on a high pedestal than that of an appellate Court under Common Law, which cannot be abrogated by a statute enacted by the Legislature in exercise of its legislative power. On that ground also we hold that a writ petition is maintainable in spite of an alternate remedy provided under the statute law.*'

This has two implications. One is that judicial review will ensure that at no level are the IRAs (independent regulatory agencies) exceeding their mandate and there is a check under the law besides what has been provided under the statute. This adds to those counter-arguments that have been raised against the creation of the IRAs citing the misuse of unabated power, etc. The other implication is that this will instil confidence in any private investor that there is a forum with vast experience

[7] AIR 1959 SC 725

and history to judge the issue and to prevent the over-exercise or misuse of power by the IRA.

Legislative, executive, and quasi-judicial functions with transparency

It is worth examining the attitude of courts vis-à-vis issues like whether an ERC constituted under the State Act has the power to levy wheeling charges. The best example of the judicial treatment of such an issue is the case of *RCI Power Limited* vs *Union of India.*[8] In this case, while dealing with the argument that tariff fixation is a legislative function and the courts cannot interfere with the legislative functions of the ERC, the court held that '*that power has to be exercised [by the Commission] for achieving the objects and the purposes of the Act and the Commission cannot exercise unbridled power to nullify the very intention of the Legislature, underlying the Act. There is no dispute with regard to the principle that fixation of tariff is a legislative function. Under the Reforms Act, the powers of the Government in giving licences and the power of the Board to fix the tariff were amalgamated into an independent transparent system, therefore the powers of the Government as well as the Board are made available to the Commission*'. The powers of the utility and the government now vest in the ERC, which has to function in an independent and transparent manner.

Courts not to go into details of tariff fixation

The court in the same case also cited the case of *Union of India* vs *Cynamide India Limited,*[9] where Justice O. Chinnappa Reddy speaking for the Bench with regard to the fixation of high prices by the manufacturers of bulk

[8] MANU/AP/0336/2003
[9] AIR 1987 SC 1802

drugs observes: '*We start with the observation, "Price-fixation is neither the function nor the forte of the Court." We concern ourselves neither with the policy nor with the rates. But we do not totally deny ourselves the jurisdiction to enquire into the question, in appropriate proceedings, whether relevant considerations have gone in and irrelevant considerations kept out of the determination of the price. For example, if the Legislature has decreed the pricing policy and prescribed the factors, which should guide the determination of the price, we will, if necessary, enquire into the question whether the policy and the factors are present to the mind of the authorities specifying the price. But our examination will stop there. We will go no further. We will not deluge ourselves with more facts and figures. The assembling of the raw materials and the mechanics of price fixation are the concern of the executive and we leave it to them. And, we will not re-evaluate the considerations even if the prices are demonstrably injurious to some manufacturers or producers. The Court will, of course, examine if there is any hostile discrimination. That is a different "cup of tea" altogether.*' On the issue of whether price fixation is a legislative function, the court finally concluded: '*We hold that though tariff fixation is a legislative function, since that power was conferred on the Commission under the provisions of the Reforms Act, it has to exercise the powers in the manner provided under the Act and consistent with the objectives and purposes for which the Commission is established read with the regulations framed by the Commission, relating to conduct of business as required under Section 54(2) (a) of the Act.*' Thus, the courts have adhered to a certain degree of judicial self-restraint with regard to the judicial review also. This is important because unabated judicial review leaves the whole notion of division of powers a worthless concept and tampers with the discretion vested in the executive by the legislature.

Extent of enquiry by commission

The court in the same case also observed, '*...Occasionally, the Legislature directs the subordinate legislating body to make "such enquiry as it thinks fit" before making the subordinate legislation. In such a situation, while such enquiry by the subordinate legislating body as it deems fit is a condition precedent to the subordinate legislation, the nature and the extent of the enquiry is in the discretion of the subordinate legislating body and the subordinate legislation is not open to question on the ground that the enquiry was not as full as it might have been. The provision for 'such enquiry as it thinks fit' is generally on enabling provision, intended to facilitate the subordinate legislating body to obtain relevant information from all and whatever source and not intended to vest any right in anyone other than the subordinate-legislating body...*' The ERC can enquire to the extent it deems fit and no one can question the extent of that enquiry.

Commission cannot take sides

It is pertinent to note the comments of the court on the reasoning process of the ERC. On the issue of the wheeling charges in the judgement of the RCI, the court observes on the reasoning adopted by the ERC that, '*A reading of the impugned order shows how the Commission went out of the way to pull out the licensee from the debt trap. From various orders passed by the Commission, we have a feeling that the Commission is acting more as an agent of the licensee and trying to save the sinking ship under its own weight at the cost of private Generating Companies.*' The ERC further observes, '*To our mind, it appears that the very approach to the issue by the Commission is a distracted one and not based on any realistic approach.*' The ERC observes, '*The case of the Commission is that as the supply of energy being a public utility service and the transmission*

and distribution system was brought into existence with the use of money contributed by public at large. Hence, the AP TRANSCO and DISCOMS have a principal claim over the network, which vested in them, having admitted that DISCOMS are independent companies. This very view of the Commission proves the fallacy of its contention that the Generating Companies have to bear system losses incurred by DISCOMS, which have nothing to do with the APTRANSCO and which have no control over the transmission lines of the APTRANSCO.' The ERC is supposed to be neutral between parties and cannot bend in favour of either.

Generating company cannot be asked to bear system losses

In the same judgement, the court observes: '*In Paragraph No. 8.28, the Commission observed that in an integrated system where electricity is supplied on displacement basis rather than direct conveyance of the particular electricity generated, the technical losses up to the voltage level at which the electricity is delivered alone cannot be considered. The technical losses of the total system need to be taken into account, as it is impossible to determine electricity from which source is being supplied to which particular consumer. The electricity from all sources gets combined in the system and loses its identity and the use of the system cannot be isolated from the losses in the system as they form an integral part of the system. We are rather astonished to see the reasoning given by the Commission. We have no doubt whatsoever that the power generated by the developer will be measured at the point of interconnection, while injecting the same into the grid of the licensee and again the electricity consumed by its end consumer will be recorded in the meters installed in the premises of the consumer... Under Section 2(3) of the Electricity Supply Act, "bulk licensee" means a licensee who is*

authorized by his licence to supply electricity to other licensees for distribution by them. From this it is evident that there is a clear distinction between bulk licensees and other licensees, who are authorized to supply electricity to the end consumers. Admittedly, in this case, the APTRANSCO holds licence for transmission of energy as well as for bulk supply of electricity to other licensees and under the second transfer scheme, it is authorized to supply electricity to the distribution companies for supply of energy to the end consumers. Hence, the stand taken by the Commission that the Generating Companies using the transmission lines of the licensee for transmitting the energy produced by them to their end consumers have to bear the distribution losses incurred by DISCOMS is meaningless and absurd. The action of the Commission is like a bus-owner asking the passengers travelling in his bus to pay the loss sustained by him in running the vehicle with some empty seats or asking them to reimburse the losses sustained by him if the vehicle meets with an accident. Another example would be asking the Railway platform vendors to reimburse the loss sustained by the Railways, if a train meets with an accident. Likewise, asking the Generating Companies to share the network charges proportionately, for using the transmission lines of the licensee is unknown to law. It is like the owner of a building asking the tenant to pay the cost of construction as he is living in the house on rent. Hence, the very idea entertained by the Commission that the Generating Company has to bear the system losses as well as network charges has to be rejected outright.'

This is a very clear direction to the ERC that it cannot try to dump a proportion of all system losses (including distribution losses) on the generator.

Irrational wheeling charges

Last, the court observes, '*Next, under the guise of public hearing, this proposal seemed to have emanated from one*

Economics Professor, working for the Commission. She appeared before this Court and when we asked her, how much a developer has to pay wheeling charges in kind, if the cash component is converted into kind, she is reluctant to answer. The Counsel appearing for the licensee half-heartedly agreed that it comes to 56.8% of energy wheeled in kind. In other words, the Commission wants that the Generating Company has to pay in kind 56.8% out of 100 units of the energy generated by it. We are astonished to see the logic behind the decision of the Commission.' The Court concludes, *'Viewed from any angle, we feel that the levy of wheeling charges is irrational, illogical and suffers from serious infirmities and in violation of the provisions of the Act. This issue is also answered in favour of the appellants and against the respondents.'* This judgement will have relevance under the Electricity Act, 2003, under which a surcharge is permitted on open access to meet cross-subsidy expenses. The court seems to say that such charges must not be unreasonably high.

Commission not to be an agent of the government or ignore its policy directives

The conflict between politics and regulation becomes less subtle when the ERC just goes overboard and rather than taking into account the policies of the state government, usurps the whole tenor of law.

The Court also observed, *'The Commission instead of ascertaining the views of the State Government simply usurped the power and took the stand that in exercise of its regulatory powers, it is not bound by the policy directions given by the State Government and it is not bound to honour the power purchase agreements entered into by the Board or the licensee. Surprisingly, the respondents started contending that the Commission being a regulator is not bound by any policy direction given by the Government, anterior to the*

Reforms Act since the Act did not say/save such policy decisions and the PPAs entered into between the Generating Companies with the then Electricity Board under the directions of the Government cannot restrain the Commission from exercising the regulatory power forgetting the fact that even under the Reforms Act, the State Government alone is entitled to take policy decisions on all matters concerning electricity in the State, including the overall planning and coordination. Under the Reforms Act, though the Government got itself divested with the day to day regulatory functions, under Section 12 of the Act, the State Government's power to give directions on policy matters concerning electricity in the State including the overall planning and coordination are retained in tact and all policy directions shall be issued by the State Government consistent with the objects sought to be achieved by the Reforms Act and they shall not adversely affect or interfere with the functions and powers of the Commission including, but not limited to determination of the structure of tariff for supply of electricity to various classes of consumers. To put it aptly the Legislature preserved the prerogative of the Government to give directions not only in policy matters but also in determination of the structure of tariff even for supply of Electricity to various classes of consumers and if any dispute arises between the Commission and State Government with regard to any policy direction that is likely to affect or interfere with the exercise of the functions of the Commission... We are really astonished to see the stand of the Commission. We do not know how a policy matter ceased to be a policy matter after the Act came into force more so when the power of the Government to give directions is specifically preserved under Section 12 of the Act including giving directions in determination of the structure of tariff for supply of electricity to various classes of consumers as well as under proviso to Section 56(2) of the Act. Such a stand was taken by the Commission forgetting the intention of

Legislature in constituting the regulatory commission (i.e.,) the Commission was constituted to improve the financial health of licensee, APTRANSCO, which is crumbling because of irrational tariff, the high level cross subsidies, poor planning and operation, inadequate capacity, total neglect of the consumer and to restructure the electricity industry in an efficient economic and competitive manner with the social objective of ensuring a fair deal to the consumer with the ultimate object of entrusting the transmission and supply of electricity to private companies, but not to meddle in every sphere of Electricity Trade, by presuming that it can do and undo the things in the alleged exercise of regulatory power. As far as generation and procurement of energy required, to meet the ever increasing demand is the primary responsibility of the State, which in turn having realised in early 1990s that it is not in a position to make a dent in the power deficit invited private enterprises to establish Generating Companies by offering several incentives. Even the new Act is intended to open avenues for participation of private sector to prevent monopoly of State organisation and increase competitiveness through participation of private sector and to manage electricity industry in an efficient, economical manner to ensure the social objective of fair deal to the consumer. The State Government in its wisdom decided to collect wheeling charges in kind duly keeping the parameters enshrined in Schedule V of Supply Act. Now the Commission being a delegatee of the power of the Government, as a regulator but not as a policy maker, is contending that it is all supreme and the delegator cannot give any direction to it though the said power of the delegator is very much preserved under the Act.'
Policy directives of the state are binding on the ERC, but the ERC must not meddle in all matters at its will.

Appellate forum not to interfere with orders of expert forum

On the issue of the extent to which the court in appeal from the tribunal can adjudge, the following extracts from the case of the Cellular Operators' Association are very relevant. '*West Bengal Electricity Regulatory Commission* vs *CESC Ltd etc., JT 2002(7) SC 578, wherein this Court has held that the rule of prudence in law is that the appellate power is not to be exercised for the purpose of substituting one subjective satisfaction with another, without there being any specific reason for such substitution and further in regard to the exercise of appellate power against the orders of expert tribunals, on facts, the appellate court which is not an expert forum should be doubly careful while interfering with such expert forum's finding on facts. While coming to the aforesaid conclusion, this court relied upon a series of earlier cases and held that "the appellate power of the High Court statutorily is not hedged in by any restriction, but in our opinion, the High Court merely because it has unrestricted appellate power, should not interfere with the considered order of the commission unless it is satisfied that the order of the commission is perverse, not based on evidence or on misreading of evidence, keeping in mind the fact that the commission is an expert body". The Court also relied upon the decision of this Court in Collector of Customs, Bombay* vs *Swastic Woollens (P) Ltd and Ors, 1988 Supp. SCC 796, wherein while considering the statuary appellate powers under Section 130-E(b) of the Customs Act, 1962, this Court had held: "We are, however, of the view that if a fact finding authority comes to a conclusion within the above parameters honestly and bona fide, the fact that another authority be it the Supreme Court or the High Court may have a different perspective of that question, in our opinion is no ground to interference with that finding in an appeal from such a*

finding. In the new scheme of things, the tribunals have been entrusted with the authority and the jurisdiction to decide the questions involving determination of the rate of duty of excise or to the value of goods for purposes of assessment. An appeal has been provided to this Court to oversee that the subordinate tribunals act within the law. Merely because another view might be possible by a competent court of law is no ground for interference under Section 130-E of the Act though in relation to the rate of duty of customs or to the value of goods for purposes of assessment, the amplitude of appeal is unlimited. But because the jurisdiction is unlimited, there is inherent limitation imposed in such appeals. The tribunal has not deviated from the path of correct principle and has considered all the relevant factors. If the tribunal has acted bona fide with the natural justice by a speaking order, in our opinion, even if superior court feels that another view is possible, that is no ground for substitution of that view in exercise of power under Clause (b) of Section 130-E of the Act."

(It may be stated that the three Judge Bench was considering the extent of the jurisdiction of the High Court in exercise of its appellate power under Section 27 of the ERC Act 1998, which according to the learned Attorney General is almost in pari material with Section 14 of the Act with which we are concerned in the present case). There is no dispute with the general proposition that when an appeal is provided under a statute against the decision of an expert body, notwithstanding the absence of any restriction for the exercise of that appellate power, the appellate Court would be reluctant to interfere with the findings and conclusions of the expert body unless it is so warranted either on the ground that the finding of the expert body is perverse or is based on no evidence or suffers from any glaring infirmity on account of which no reasonable man could come to that conclusion. The appellate Court indeed would be loath to interfere with the

findings arrived at by an expert body on the basis of re-evaluation of the materials or even if an alternative conclusion is possible. In this connection, it is worth mentioning the observations made by this Court in Tata Iron & Steel Co. Ltd vs *Union of India and Anr.,*[10] *wherein this Court had held that where legal issues are intertwined with those involving determination of policy and a plethora of technical issues, such as in this case, courts of law have to be very wary and must exercise their jurisdiction with circumspection for they must not transgress into the realm of policy-making, unless the policy is inconsistent with the Constitution and the laws. It was also held that on matters affecting policy and those that require technical expertise, the Court should show deference to, and follow the recommendations of the Committee, which is more qualified to address the issues. Learned Attorney-General had also relied upon the decision of this Court in the State of MP and Ors* vs *Nandlal Jaiswal and Ors, (1986) 4 SCC 566, wherein this Court had held that whatever observations have been made in regard to the legislation relating to economic matters must apply in regard to executive action in the field of economic activities, though the executive decision may not be placed on as high a pedestal as legislative judgement insofar as judicial deference is concerned. According to the learned Attorney-General, the government was entitled to make pragmatic adjustments which may be called for by particular circumstances and the Court cannot strike down a policy decision taken by the State Government merely because it feels that another policy decision would have been fairer or wiser or more scientific or logical, as was held in Permian Basin case, 20 Law Edition (2d) 312. Reliance was also placed on a three Judge Bench decision of this Court in the case of GB Mahajan and Ors* vs *Jalgaon Municipal Council*

[10](1996) 9 SCC 709

and Ors,[11] *wherein this Court had observed that in matters of economic policy which lack adjudicative disposition, unless they violate constitutional or legal limits on power or have demonstrable pejorative environmental implications or amount to clear abuse of power, the same could not be interfered with.'* This judgement limits the court's power to intervene in orders of the ERCs.

Courts not in policy-making

This is confirmed in the following quotation: '*It is worthwhile also to notice the views of Sir Gerard Brennan in Judicial Review of Administrative Action: "The Courts are kept out of the lush field of administrative policy, except when policy is inconsistent with the express or implied provisions of a statute, which creates the power to which the policy relates or when a decision made in purported exercise of a power is such that a repository of the power, acting reasonably and in good faith, could not have made it."'*

Uncircumscribed jurisdiction of electricity regulatory commissions

The court also held, '*The regulatory bodies exercise wide jurisdiction. They lay down the law. They may prosecute. They may punish. Intrinsically, they act like internal audit. They may fix the price; they may fix the area of operation and so on and so forth. While, doing so, they may as in the present case, interfere with the existing right so of the licensees... Statutory recommendations made by it are normally accepted by the Central Government, as a result of which the rights and obligation of the parties may seriously be affected. It was in the aforementioned premise that Parliament thought of creating an independent expert tribunal which, if an occasion arises therefore, may interfere with the finding of the fact,*

[11](1991) 3 SCC 91

finding of law or a mixed question of law and fact of the authority. Succinctly stated the jurisdiction of the tribunal is not circumscribed in any manner whatsoever.' The wide powers of ERCs are recognized.

Usurping the powers of electricity regulatory commissions

The fact that there has been a clear political will to usurp the power of ERCs is clear from the situation of the TNERC (Tamil Nadu Electricity Regulatory Commission) where cases like *JK Pharmachem Ltd* vs *Tamil Nadu Electricity Regulatory Commission,*[12] emerged wherein the fact that the chairman and one member of the ERC resigned as soon as being appointed, led to the passing of the tariff order as a government order which was the prerogative of the TNERC.

Jurisdictional issues

There have been cases wherein the courts have upheld the reasoning of the commission *in toto*. One such case is *Mardia Chemicals Ltd* vs *Gujarat Electricity Board and Anr.,*[13] where the issue in dispute was the jurisdiction of the Gujarat Electricity Regulatory Commission to entertain the applications regarding the implementation of the notice issued under Section 24(1) of the *Electricity Act, 1910,* by the Gujarat Electricity Board. The court in this particular case went into the detailed reasoning of the ERC and upheld its order. On the same line is the case of *LML Ltd* vs *State of UP,*[14] wherein the ERC's order levying 15% surcharge on the energy charge in the electricity bill of the petitioner was challenged by a writ

[12]MANU/TN/2254/2002
[13]MANU/GJ/0133/2002
[14]MANU/UP/0227/2001

petition under Article 226 of the Constitution. One highlight of the court's reasoning was that it cited the reform object of the central and state regulatory acts to justify its judgement besides going into the merits of the ERC's order. The court observed: '*There is good logic for conferment of such a power on the Commission. Hitherto the supply of electricity was being made by only one body, viz. UPSEB, which being an instrumentality of State and functioning under the control of the Government was not expected to enhance the tariff in an arbitrary manner. In fact, the UPSEB and many Electricity Boards of other States were running on huge losses. The Central Act and the UP Act have been enacted to enhance generation of electricity and improve efficiency by bringing in private operators.*'

In the case of *WBERC* vs *CESC*,[15] the WBERC (West Bengal Electricity Regulatory Commission) by an order determined the tariff for the sale of electricity by the CESC (Calcutta Electric Supply Company), which was challenged under Section 27 of the ERC Act. The HC allowed the appeal of the company by itself re-determining the tariff and enhancing the same. The main points of HC judgement were as follows.

- While rejecting the impleadment application of the appellant organisations, the HC proceeded to re-fix the tariff by only following the principles of Schedule VI to the Electricity Supply Act and to the exclusion of requirements of Section 29 of the 1998 Act.
- In the process, it re-fixed the average tariff for 2000/01 at 3.96 rupees per unit and at 4 rupees per unit for 2001/02.
- In the course of its judgement, the HC also came to the conclusion that the regulations framed by the ERC, especially the ones pertaining to the right of the

[15]MANU/SC/0859/2002

consumers to be heard in the proceedings, as also applications of the principles to be followed in determining the tariff, were contrary to law and directed in no uncertain terms that these regulations will have to be modified to bring them in conformity with its observations in the judgement, and further stated that failure to do so might result in the invocation of the HC's power under the Contempt of Courts Act.

- In deciding the validity of the regulations, the HC proceeded on the basis that while entertaining the power of appeal under Section 27 of the 1998 Act, it also has the power vested in it under Articles 226 and 227 of the Constitution of India.
- It also held that the *non-obstante* clause found in Section 29 of the 1998 Act and the other overriding provisions found in the 1998 Act could not come in the way of the application of the VI Schedule to the 1948 Act alone, while determining the tariff by the ERC.
- On factual aspects, it reversed many of the findings of the ERC (to which the court said it would make separate reference when it takes up those issues for consideration).
- The case went in appeal to the SC, which after analysing the various issues in the judgement, virtually rejected all the findings of the HC.
- On two main issues – the *locus standi* of the consumers before the ERC and power of the court to strike down the CBRs of the ERC – the SC dismissed the findings of the HC *in toto*.
- On the issue of *locus standi*, the precise issue before the SC was whether the consumers have a legal right or not to be heard in the proceedings before the ERC under Section 29(2) of the 1998 Act, as also in an

appeal under Section 27 of the said Act. The HC in the course of its judgement cancelled this right to the consumers, primarily on the ground that permitting a large number of consumers (who in the instant case are to the extent of 17 lakh) would amount to an indiscriminate representation. It observed that permitting such large-scale interference in the proceedings would lead to absurdity. It also held that normally a ratepayer is not heard before such a rate is fixed on the basis of public policy. In support of this conclusion, the HC relied upon the procedure for fixing the rate of income tax wherein a taxpayer had no such say in such fixation of the rate of income tax. While discussing this question, the HC also came to the conclusion that since the procedure laid down in Schedule VI to the 1948 Act is the sole consideration for the purpose of fixation of tariff and Schedule VI not having contemplated any role to be played by the consumers, the same procedure should be followed even in regard to fixation of tariff under the 1998 Act, which would mean that the consumers have no say whatsoever in the fixation of tariff. The court also held that if at all any representation of the consumers is permissible, the same should be done only in accordance with Section 26, by the Commission recognizing a particular consumer association to represent them. Even in this regard, the HC expressed some doubt because an organization chosen to represent the consumers by the ERC may not be acceptable to another section of the consumers and, therefore, in reality, such recognition of a particular organization by the ERC would also be futile.

- The SC went into the reasoning and intent behind the 1998 Act. It observed: '*While considering this question, it is relevant to notice that so far as the 1948 Act is*

concerned, the consumers had no such specific right. But we notice that the 1998 Act brought about a substantial change in the manner in which the determination of tariff has to be made. It not only took away the right of the licensee or a utility to determine the tariff, but also conferred the said power on the Commission. This was done because one of the primary objects of the 1998 Act was to create an independent regulatory authority with the power of determining the tariff, bearing in mind the interests of the consumers whose rights were till then totally neglected. The fact that the Commission was obligated to bear in mind the interests of the consumers is also indicative of the fact that the Commission had to hear the consumers in regard to fixation of tariff.'

- The second question analysed by the court was whether the HC sitting as an appellate court under Section 27 of the Act has the jurisdiction to go into the validity of the regulations framed under the Act. The reason for this was that the HC while considering the validity of the Regulations came to the conclusion that the 1998 Act does not contemplate hearing of the consumers, and also that the ERC's regulations have conferred an indiscriminate right of hearing on the consumers. The SC clearly held that these findings of the HC cannot be justified. Again citing the 1998 Act, which was overlooked by the HC, the court held that the '*...1998 Act has both expressly and impliedly conferred such right of hearing on the consumers... On the facts of the instant case there is no such allegation that the Commission has in fact given indiscriminate hearing to the consumers. As a matter of fact, the respondent Company which was the appellant before the High Court has not even raised this issue and the High Court has suo motu gone into this issue. On the basis of the provisions found in the Regulations framed by the Commission, we are of the*

opinion that there is no room for any indiscriminate hearing before the Commission. Therefore the finding of the High Court that the Regulations do leave room for such indiscriminate hearing is erroneous.'

- Another instance of the SC's looking into the intent of the 1998 Act and the spirit behind it is when the court turned down what was held by the HC in the method of tariff determination. The Court held: '*For deciding this question we will have to first notice the objects and reasons of enacting the 1998 Act. A perusal of the same shows that the Parliament felt that in spite of the existing enactments, it was necessary to bring about a new law which would facilitate the implementation of reforms contemplated by it, which reforms pertained to fundamental issues facing the power sector, namely, lack of rational retail tariff, high level cross subsidies, poor planning and operation, inadequate capacity, neglect of consumer, limited involvement of private sector's skills and resources and the absence of an independent regulatory authority. The view of the Administrative Staff College of India (ASCI) which strongly recommended the creation of an independent electricity regulatory Commission both at the Centre and the State are also noticed. It is with the above object, an Ordinance was promulgated on 25th April, 1998 which later came to be replaced by the 1998 Act. We also notice that while promulgating the said Ordinance it was mentioned that one of the salient features of establishing the Central and State Electricity Commissions was to determine the tariff for electricity, wholesale, bulk, grid and retail, apart from determining the tariff payable for use of the transmission facilities. Therefore, it is to be seen that in spite of the fact that the 1948 Act was in existence, the Parliament thought that it was necessary to constitute a regulatory authority both at the Centre and the State, which was to be an autonomous independent*

body. We have earlier noticed the composition of this body and the statutory provisions made in the Act to protect the autonomy of this Commission. Therefore from the Objects and Statements of this Act, as also from the provisions of this Act, it is clear that this is an enactment specially to provide for a procedure for determining the tariff for electricity, as also to confer the power of determination of tariff on an expert body like the Commission. In this regard we take note of Section 22(1)(a) of the 1998 Act, which in specific terms lays down that the Commission shall discharge the function of determining the tariff for electricity in the manner provided in Section 29. A plain reading of this Section leaves no room for doubt that so far as the State Commission is concerned, the Act has solely entrusted the responsibility of determining the tariff to it. Section 29 firstly requires the Commission to determine the tariff in accordance with the provisions of that Act. It then requires the Commission to frame Regulations providing for the terms and conditions for fixation of tariffs.'

Analysis of tariff orders of electricity regulatory commissions

This section takes advantage of an exhaustive study of tariff orders issued by the CERC and the SERCs. That study forms the base of this chapter and is reproduced with comments in Appendix 5 to this book.

State-level policies

With the reform acts and their establishment, the ERCs have worked on the presumption that formulation of policies on tariff issues is in their domain. Most state reform acts and also the ERC Act, 1998, required the SERCs to be guided by the provisions of the Sixth Schedule of the Electricity (Supply) Act, 1948. The Electricity Act, 2003, deletes Schedule Six. Although the

regulators were allowed to deviate from the Sixth Schedule by stating reasons in writing, few have done so in the past. Now the CERC will set out the principles for generation and transmission tariffs. However the central government is also to formulate a tariff policy. It is not known what shape it will take though the first draft seems to be less policy and more direction on details of estimating revenues, costs, and returns to the ERCs.

Long-term tariff principles

State regulators have been discussing the concept of MYTs (multi-year tariffs) versus the practice of determining tariffs for a year at a time. Many ERCs have issued consultation papers and subsequently also orders on LTTP (long-term tariff principles). The APERC (Andhra Pradesh Electricity Regulatory Commission) has done detailed work that is incorporated in its order. The key features of the LTTP order of the APERC, issued in March 2003, are as follows.

1 The object is to lend a greater degree of certainty to the principles of cost methods of determining tariffs in regulation, aspects like efficiency gain retention, etc. As with the cost-plus approach being followed in most of the country, the LTTP framework envisages continuation of the annual filings (ARR [annual revenue requirement]) by utilities and determination of tariffs by the regulator. However, the LTTP framework attempts to provide a greater degree of certainty on the treatment of individual cost and revenue elements. The philosophical approach to LTTP envisages the following.
   - Defining 'controllable' and 'uncontrollable' costs, with pass-through being allowed for uncontrollable costs and controllable cost deviations generally being to the account of the utilities

- Removal of caps on profits of the utilities (Despite a cost-plus approach, they will keep part of or the entire efficiency and other gains.)
- Mechanisms for sharing of profits over normative levels with consumers (The utility will not keep the whole of the gains but only a part so that there remains an incentive for it to achieve those gains.)
- Introduction of performance standards (Instead of looking at each utility separately, standards are laid down that apply to all; performance better than the standards – for instance, heat rate in generating stations – will go to the generator.)
- Recognition of all genuine costs of the licensees, including working capital costs and costs related to capital expenditure.

2 The detailed framework specifies how individual business drivers like sales, system losses, power purchase, network costs, capital investment costs, financing costs, asset base for returns (now more closely linked to the starting equity base of the licensed business), and quality parameters are to be treated. BSTs (bulk supply tariffs) determined annually will allow retention of efficiency gains by the respective distribution companies and their consumers.

3 The order defines a multi-year control period of three years, starting 2005/06. The processes in each year of the control period are defined along with the filing requirements. Actions for the end of period of review are also provided.

The LTTP is not an MYT principle or policy as adopted across the world. The intensity of regulation in this framework could be as high, if not higher, than it is today. It also does not address several key issues that

confront the sector, including cross-subsidy rationalization (now required to be eliminated within a time frame under the new Act), subsidy elimination (this should really feature in state policy directives since it is a highly volatile political subject), minimum tariff levels to different consumer categories, etc. Nor does it deal with operations under the competitive and trading framework that is likely to emerge with the new Act. For this to happen, an MYT framework would have to separate network and supply businesses, elimination of subsidies and cross-subsidies, administration issues, pricing of individual service offerings, service obligations, etc. The framework in the APERC order would need substantial overhaul to make it responsive to the needs.

Other policies

Other notable tariff-related policies issued by the states include FSAs (fuel supply agreements). Certain ERCs have agreed to consider the cost escalation beyond fuel costs, to include aspects like mix variation. The need for this has also been appreciated by the APERC, which has altered the present FSA formula to include mix variation under the LTTP regime.

Comparative analysis of tariff orders across reforming states in India

This analysis considers the following aspects.

1 Pass-through mechanisms
2 Efficiency improvement / loss reduction targets
3 Return to licensees
4 Subsidy and cross-subsidy determination / cost of service approaches
5 MYT principles
6 Differential BSTs
7 Incentives for consumer categories.

Various aspects mentioned above have been discussed in Appendix 4 with regard to Andhra Pradesh, Delhi, Haryana, Karnataka, Maharashtra, Orissa, and Uttar Pradesh. Some key conclusions are as follows.

1 There is a growing consensus that external (uncontrollable) costs must be passed through during the year after regulatory review instead of being considered after the year is over. This consensus is among regulators as well as observers. It is felt to be fair on the consumer, who is then not landed with a large liability for retrospective payments, as well as on the utility that gets reimbursed early for higher costs. The CERC had taken a similar view in its first consultation paper on BSTs. Andhra Pradesh Haryana, Maharashtra, and Uttar Pradesh have put in place appropriate mechanisms for pass-through of external cost variations. However, with the new law allowing trading and embedded generation in addition to contracted generation, the appropriateness of the mechanisms needs review.

2 To get maximum acceptance, MYT needs to become a part of the policy framework. This is now the case since it features in the new Act and earlier in state government policy directives. The key example in this regard is Delhi. However, the ATC (aggregate [technical and commercial]) loss framework there is under scrutiny for the various implementation issues that have emerged during the process.

3 An MYT framework seems to have greater acceptance and applicability under private ownership (as in Delhi where the DERC was not in favour of issuing it but it was required by private investors) than under public ownership (as in UPERC).

4 It is important to keep measurement requirements at a minimum. In spite of the interpretation issues the

ATC loss framework has less measurement requirements. This seems to make it more robust than the loss reduction target established in UP that is measurement-intensive and prone to disputes (requiring as in other cases an estimation of current and forecasted T&D [transmission and distribution] losses).

5 In spite of utilities' requests for deviations from the Sixth Schedule, regulators have stuck to the definition of the capital base as per the Sixth Schedule of the ES Act, 1948. With the Act now repealed, regulators would need to develop appropriate rate bases for calculation of the returns allowable to licensees. The LTTP order in AP has some useful directions in this regard. This is an urgent subject for the CERC now to decide upon.

6 There is a propensity among many state regulators to deny returns to the utilities, mostly with a view to reduce the financial gap but with the pretext of improving efficiencies. This is an unhealthy practice and adequate returns need to be an essential feature of the new regime and should be a basic principle enunciated by the NTP (national tariff policy). What this should be and whether it should be different between different types of generation, and for transmission, distribution, and supply, must be studied. The CERC started this exercise in issuing its December 2000 order but did not conclude it. But the CERC's recent (2003) consultation paper does not raise the issue except as one of a single minimum return for all.

7 There is a tendency to use average cost of service as the benchmark for tariff design instead of the cost to serve each category. This results in wrong economic signals but it does facilitate implementation and minimize controversy regarding the level of subsidy

and cross-subsidy extended. But there is so far no methodology/mechanism to measure the actual cost to serve each category. AP tried to estimate it but there are doubts about the robustness of the procedure. (It has been pointed out by Mr Satish Chandran, a former power secretary to the Government of India, that a good deal of theoretical work in the US on distributed cost pricing for systems like telecommunications and power that serve different markets, is available.)

8 Across the country, there is a tendency to maintain retail tariffs inside the state at uniform levels for any particular category. This is done by two means: (1) subsidies to make good the gap in any DISCOMS or (2) differential BSTs. The ERCs in AP and Karnataka have recognized that this is an unsustainable practice and can result in covering up gaps in efficiency. It is inevitable that the system must move to differential retail tariffs.

9 Incentive schemes have produced extremely beneficial results when consistently adopted. They have resulted in the return of consumers to the grid. The experiences of AP and Orissa have been very positive.

Review of practices on tariff policy in selected reforming countries and regions

This section should have appeared in an earlier chapter on the experience of independent regulation in other countries. We have incorporated it here for the ease of comparing with the comments made in this chapter on the Indian experience. It studies primarily the Latin American countries since sufficient time has elapsed since their reforms began, allowing for a reasonable analysis to be conducted. The initial conditions are also similar to India on a relative scale. However, brief

analyses of the US and England and Wales have also been included.

In Latin America, governments in general have withdrawn from the role of policy formulation on tariffs after implementation of reforms. In most, governments and private entrepreneurs have signed very precisely defined concession contracts binding on both parties. Regulatory bodies have the authority to oversee implementation of the contractual conditions, but do not have any discretion in interpreting them since the contracts clearly define the formula of tariff computation and the responsibilities and obligations of various parties. This is what is being suggested in Karnataka as well, under the new reforms under discussion since 2001.

Two major Latin American countries – Brazil and Argentina – have a federal structure similar to India. In Brazil, the regulatory structure is just a little different from India, since the federal regulator, ANEEL has hierarchical supremacy over state regulators. (The Electricity Act, 2003, does this in India but without stating so in as many words.) State regulators in Latin American countries only implement the orders and directives of the central regulator (not at all the Indian situation under the new Act), although there is an expectation that as the regulatory system matures, the responsibilities for review at the end of the control period will be transferred to state regulators. The system in Argentina is similar to that in India and the state regulators are independent of the national regulator ENRE though not entirely so in India after the new Act. However, there is one crucial difference. The national regulator has exclusive responsibility for implementing competitive markets and open access. Since the Argentinian market is highly competitive with all loads above 30 kW being contestable, the need for any external

policy to ensure consistency in tariff regulation is low. Currently, the role of the government is restricted to overseeing the functioning of the market and determining policies in this regard. Markets in Brazil are not as contestable with 3 MW being the minimum load for a consumer to be contestable.

Chile has had all the requirements of competitive arrangements in place for quite some time now. However the market is small and dominated by two major generating companies. These companies also own the bulk of the transmission network. There is no apparent effort to bring about changes in ownership structures and increase the levels of competition since the operators are perceived to be efficient. As with Brazil and Argentina, the concession contracts are well defined and there is a continuing government role in tariff policy formulation. However, the regulator is a part of the government and is hence not as 'independent' as other Latin American regulators.

The common factor in regulation across these jurisdictions has been the implementation of MYT. The concession contracts clearly define the formula applicable along with risk sharing between stakeholders. The tightness of the framework leaves little scope for alternative interpretations and discretion on the part of the regulators. The degree of regulatory intervention possible during any MYT period is very low. The agreements are too detailed and leave little scope for discretion. This has lent the framework the credibility and certainty conspicuously absent in Indian electricity regulation. (This is what is being suggested for India now that the new Act mandates MYT.)

The key lessons from Latin America from a tariff policy perspective are as follows.

1 Instruments of regulation need to be precisely defined and little room for discretion and alternate interpretation should exist. Akin to concession contracts, the Indian government or the CERC or FOIR (Forum of Indian Regulators) could formulate and notify model licenses for adoption by the various states.
2 The form of MYTs implemented should be clearly defined and should preferably be formulaic in design, where only different parameters have to be entered to get the final answer. The approach should envisage very little regulatory intervention during a control period.
3 As with the Latin American countries, jurisdiction issues between central and state regulators should either be decided through structures (for instance, the hierarchy between regulatory bodies in Brazil) or through roles (open access rules being decided by the central regulator exclusively in Argentina). The National Electricity Policy and Tariff Policy could be a key instrument in design of the solutions. (In any case, the new Act gives a much bigger role to the CERC and its chairman could also use the FOIR, of which she/he is now statutorily the chairman to work out agreed directions with the SERCs.)
4 Beyond high-level issues like defining model licenses, the overall MYT approach and principles, or the roles and responsibilities of individual regulators, the government should not have any other continuing role through the NTP on tariff formulation issues. This is however not the way the Indian government appears to view matters as evidenced by the 2003 Draft Tariff Policy.

The evidence in Latin America is supported by experiences in the US and the UK. The jurisdiction of central and state regulators is clearly laid out and any discretion is avoided. In the US, for instance, while the FERC regulates the wholesale supply of electricity and oil, it is the individual states that regulate retail sales. The FERC also has jurisdiction over inter-state transmission and hydroelectric licenses. However, after the new Act this is no longer an issue in India.

Further, the markets in these countries have matured to a level that limited regulatory oversight exists, as compared to developing countries. In the UK, while the regulator has traditionally followed price-cap-based regulation, in recent times it has moved towards price deregulation for electricity and gas suppliers. This is based on the premise that competition has developed to such an extent that all price controls can be removed, leaving market pressures to ensure that customers are protected.

Role of governments in tariff issues

Appendix 6 provides a brief account of the price regulations, regulatory role, and role of the government in tariff issues in selected countries. It might repeat some elements from there but is useful to have them discussed in this chapter as well.

State tariff orders

Some tariff orders of selected states are quoted below. They show variations between states as well as poor implementation and raise questions about the target setting process of the ERCs and their understanding as to how well their orders can actually be implemented.

Haryana

This is based on the tariff order of 2001/02. In Haryana, one of the factors was the incomplete information supplied by the power utilities themselves. Before any tariff order is passed, the ERC requires a survey of the past order and the prevailing situation. In this regard, a lot of cooperation from power utilities is required, which was often not available. The following extract from the tariff order brings this out. What is more surprising is that the ERC, rather than enforcing any penalty, repeats the same concessions given in the earlier ruling.

'The Commission also observes that in spite of this being the third filing of ARR by HVPNL, the information as required under the Commission's Guidelines for filing ARR has not been furnished completely and therefore the Commission had no option but to grant a number of waivers which were granted last year also. The situation did not improve in the next successive year also. The Commission has time and again pointed out that timely availability of quality data is a prerequisite for processing of information. In its earlier orders also, the Commission has directed the Licensee to develop a modern system of data collection, storage, retrieval and analysis through computerisation at sub-divisional level. We expect the Licensee to improve the quality and consistency of data required by the Commission for monitoring and evaluation of the performance of the utility. As per clause 17.6 of the Distribution and Retail Supply Licence, the Licensee is required to submit a report on the performance on the distribution system for FY 2001-02 by 30.6.2002. The Licensee has neither submitted this report nor applied for any extension of time for filing of the same till date.

In the absence of the same, the performance of the Licensee's Distribution System could not be analysed.'

On the issue of distribution losses, Haryana presents the same dismal picture of (non) implementation as with the orders of other commissions. '*The Commission is distressed to note that the distribution losses instead of showing a decreasing trend have actually been increasing. This is also corroborated by the Performance of Distribution System Report for the year 1998-99 to 2000-2001 filed by HVPNL with the Commission. The line losses in all the circles have either increased or are more or less at the same level.*'

The HERC (Haryana Electricity Regulatory Commission) had fixed the T&D losses to be more than what was proposed by the utility. The utility had proposed achievement of T&D losses of 35.76% after taking certain steps. However, the HERC contradicted the target and fixed the T&D losses at 40.76%. Though the HERC may have been looking to pass a more realistic order, this time the issue is whether it was actually so. The HERC's reasoning for the higher number was this: '*The Commission finds it very difficult to accept the high level of T&D losses for the tariff purposes, given the licensee's failure to improve the situation. Accepting the ever-increasing loss levels would show that the Commission's intent is to reward the licensee for inefficiency and burden the consumers with avoidable costs. The Commission acknowledges that reduction of losses is a challenging task for the licensee and some consumers contribute to the high loss level. Nevertheless, it is the licensee's lack of effort and corresponding results that seem to drive the current losses beyond reasonable level.*'

However, the fact remains that even in the previous year, the HERC had made ambitious plans that were not achieved. Following is the extract from order of 2001/02,

which discusses the previous year's order: '*The Commission has not seen any evidence of the utility's ability to reduce these losses so far. Any deviation from the targeted loss reduction would have revenue recovery consequences. Therefore, this requires strong commitment of management command and control in tackling the problem areas where commercial losses are reportedly high. The facts as brought out from the analysis of arrears as well as billing clearly reveal that utility has not been able to address the areas where commercial losses can be brought down by exercising effective management option. The Commission in its order on ARR and Tariff for FY 2000-01 expressed concern over the increasing level of actual losses and understating of losses by the licensee and stated the following:*

> *"The Commission is fully* aware *that the reduction of technical losses will take time and require considerable investment but at the same time, the Commission cannot ignore that reduction of commercial losses is possible within a relatively short period of time with proper management and planning. The Commission would not like to mince words and state that the so called non-technical losses have a very significant component of power theft, which needs to be controlled and if it is not controlled, the Licensee's financial viability will be in jeopardy. In order to check theft of power, the management has also to take stringent action against its employees who are found to be conniving with the consumers in pilferage of electricity. It will be unfair and unjust to burden the consumers of the state with high cost of power due to inefficiency and mismanagement of the Licensee. While trying not to interfere with the indoor management of the utility, the Commission would like to give some directions in this direction.*

The following directions are hereby given to the Licensee for strict compliance.

1 *The licensee should prepare a feeder-wise report where distribution losses are above acceptable limits and monitor those feeders regularly and submit a report to the Commission quarterly.*
2 *The Licensee should speed up the replacement of defective meters and complete this work latest by June 2001."'*

Are these directions adequate or should the HERC have evolved a much more detailed and time-bound plan of action to be agreed with the DISCOM and then closely monitored? This, of course, brings up the question of how far an ERC should go without actually becoming a manager of the system. In practice, the licensee, instead of complying with the directions requested for a waiver stating these reasons: '*Such a study requires elaborate investment and time. The License is committed to conducting the study but seeks a waiver in the current ARR application as the metering would take considerable time and resources.*' Though the HERC was concerned about the adverse impact of high T&D losses on the cost of service for consumers, it was not – over three years of orders – able to get the licensee to achieve any improvement in loss reduction.

Karnataka

In the case of Karnataka, we quote from the tariff order of 2003. On T&D losses, the KERC observed, '*The distribution loss in towns and cities, which contain a significant percentage of non-technical loss, has not come down. Even though the performance evaluation formats developed by the Commission have been furnished by ESCOMs from the month of November 2002, the reports are*

not in the form required by the Commission. Much needs to be done in respect of reduction of technical losses and non-technical losses. Focused action seems to have not been taken in this regard. In spite of specific directions, the prioritization of capital works is not done, estimates are not realistically prepared and accounting of expenditure has not been streamlined to facilitate monitoring.' But more important for KERC is Table 1, which compares what was approved in the previous tariff order and the performance of the utility as per accounts.

Table 1 Discrepancies in actual achievements by Karnataka Power Transmission Corporation Ltd versus approvals by the Karnataka Electricity Regulatory Commission (crore rupees)

Particulars of expenditure	*Approved in ERC for FY 2002*	*Actual as per accounts*	*Difference (actual - approved)*
Power purchase	4723.63	4826.25	102.62
Employee cost	699.41	731.32	31.91
Repair and maintenance	100.88	88.44	-12.44
Administration and general	94.67	107.89	13.22
Interest and financial charges	463.77	641.00	177.23
Depreciation	354.66	349.50	-5.16
Other expenses	19.36	141.16	121.80
Net prior period expenses/credits	11.68	-59.17	-70.85
Less expenses capitalized	-94.38	-53.28	41.10
Total expenses before rate of return	6373.68	6773.12	399.44
Return on net financial assets	82.97	83.94	0.97
Total expenditure	6456.65	6857.06	400.41
Surplus/deficit	22.31	-0.01	-22.32

ERC – electricity regulatory commission

Thus, on all key factors – including those like interest and financial charges, which are reasonably predictable – the distributing company fell well behind requirements.

This may be because of some mismanagement by the utilities but that does not take away from the fact that the ERC is way off the mark in its orders vis-à-vis the ground reality and hence the need to make the order more implementable.

Orissa

In case of Orissa, the tariff order of 2002/03, it makes a mention of one of the objectors saying, '*...clarification with reference to the logic behind increasing level of T&D loss for the year 2001-02 in comparison to the previous years. He pointed out that the Commission had approved distribution loss of 31.4% and transmission loss of 3.7%, while fixing the tariff for FY 2000-01 whereas the same has increased to 42.21% and 4.7% respectively for FY 2001-02.*' While there is no observation by the OERC (Orissa Electricity Regulatory Commission) in the order to support or deny this statement, clearly it is placed in a very untenable situation where its targets are not achieved.

Conduct of business regulations

Appendix 7 to this book compares the CBRs of the first few ERCs, including the CERC. These regulations are in the nature of subordinate legislation having been notified in the Gazette and placed on the table of concerned legislatures. They specify the manner of functioning of the ERCs. The first one was issued by the OERC. The CERC came next and served as a model for all the others that followed.

The CERC regulations were thought through and written by the members without any external consultant advice and reflect their approach to the issues. The CBRs do not confine the ERCs to a purely courtroom manner of functioning though this has actually happened in all the ERCs. That may have constrained the opportunity

for everyone to be heard. At the same time the courtroom discipline of petitions, affidavits, limited time for verbal presentations, etc. is essential if the ERCs are to perform their task speedily as is required of them. Indeed, the CERC put time limitations on itself within which it had to decide on the petitions before it.

The CBRs try to prevent the ERC from becoming the haunt of lawyers by defining an advocate appearing before it as almost any expert professional. However, the experience has been that lawyers bring in a measure of clarity and detail that others are not able to bring in to the proceedings. But the obverse to this is that it leads to all proceedings being adversarial in nature. This may not fit all requirements. For example, when the CERC was considering principles for tariff determination for generation and transmission, culminating in its detailed order of December 2000, there were earlier consultation papers, responses, and conferences ending with public hearings. These were adversarial, a format quite unsuitable for the purpose. The Telecom Regulatory Authority of India process for such matters as well as that of OFFER (Office of the Electricity Regulator) in the UK might be better suited in such cases.

In this chapter, we have quoted the SC judgement on the order of the West Bengal HC on an order of the WBERC relating to tariffs of the CESC (Calcutta Electricity Supply Company). The order upholds the CBRs of the WBERC that had been struck down by the HC and upholds also the hearing of the views of consumer organizations on tariffs. This is an important judgement since it now recognizes their validity.

Appendix 7 also gives a comparison of the various CBRs of the CERC and the following ERCs: HERC, APERC, MERC, KERC, and OERC.

Trading and the role of the ERCs

The Electricity Act, 2003, gives the ERCs a role in electricity trading in terms of, in the case of CERC (section 79[c]) 'to issue licenses to persons to function as...electricity trader with respect to their inter state operations' and (section 79 [j]) 'to fix the trading margin in the inter-state trading of electricity, if considered necessary'. The SERCs have a similar role in fixing margins for intra-state trading. The new Act thus recognizes trading as a separate activity. In section 66, it cursorily says, 'The Appropriate Commission shall endeavour to promote the development of a market (including trading) in such a manner as may be specified and shall be guided by the National Electricity Policy referred to in Section 3 in this regard.'

Thus, the Act provides for the development of markets but has so far made no effort in this direction. Allowing trading without providing for markets and an exchange means that there will be limited trading and on a one-to-one basis. The possibility of multiple trades and hedging against forward trades is not available as yet. Even in the present conditions there are a number of issues that the ERCs must address.

1 If trading is to take place, the contracts must be binding. Any reneging on contracts without penalties will upset the trust and confidence on which trading – especially forward – has to be based.
2 Some provision for margin money must be made. Since there is no exchange, the ERCs must find a suitable body to hold it. The buyer and the seller must provide this.
3 There must be standardized trading agreements that the ERC must formulate and approve.

4 There is obviously a difference between inter- and intra-state power when trading and there must be strong systems in place to enable this distinction to be effected.
5 There is need for independent load dispatch centres for intra-state trading. These do not exist today, the state load dispatch centres being a part of the local utility mostly under state ownership that is in transmission, is buying power, and many times also distributing it.
6 When all tariffs are determined by the ERC under the law, trading becomes doubtful since it will require each trading transaction to have the tariff approved by the regulator, a time-consuming task for which the instant nature of trading is not suited.
7 Currently, ERCs determine tariffs that act as price caps and ERCs could consider permitting trading without any further approvals so long as they are under the price caps.
8 Merchant generators are not specifically allowed in the new Act but will come into being using the flexible definition of 'captive generation' but they will need to be outside ERC tariff approval.
9 In all this, there is the need to recognize open access to the T&D lines and without a surcharge. So long as the sword of a surcharge stays, trading will remain confined to licensees and 'captive' consumers. There is thus a major role for ERCs – especially the CERC – to develop a framework that will enable widespread trading and soon lead to a market for electricity. There is also need for the law to be made much more liberal than it is.

Additional readings

Estache A and Rodriduez-Pardina M. 1998
Light and lightning at the end of the public tunnel: the reform of the electricity sector in the Southern Cone,
a working paper
Washington, DC: World Bank

Mendoca A F and Dahl C. 1999
The Brazilian electrical system reform
Energy Policy 27: 73–83

Wolak F A. 2001
The Crisis in Electricity Industry Restructuring
Stanford: Department of Economics, Stanford University

Bakovic T, Tenenbaum B, and Woolf F. 2003
Regulation by Contract: a new way to privatize electricity distribution?
Washington, DC: The World Bank Group's Mining Sector Board

CHAPTER 2

Regulation and policy

Abstract

This chapter examines various ways in which the word 'regulation' has been used and its significance in the context of public governance. It argues that elected legislatures enshrine state policy in the laws they pass. The implementation of the legislation by the executive requires the framing of necessary rules and regulations to take care of all the possibilities that the law may have to deal with. The staff of the executive, which implements these laws and the related rules, are the 'regulators'. Neither laws nor the rules and regulations relating to them can, despite the best intentions, take all possible situations into account. Hence, the regulator always has discretionary decisions to take on matters that might range from the very major to the very minor depending on the strictness with which the laws and rules for them have been drafted. We call the system of implementation as part of the government department as 'old-style regulation'. When the whole or a part of the implementation is transferred to an independent regulatory agency, we have 'new-style regulation'. In such a transfer, the rule-making powers enjoyed earlier by the old-style regulator must be transferred to the newly-formed independent regulator. To the extent that the law is loosely drafted and leaves flexibility in implementation, the new-style regulator must be able to set out the necessary rules and regulations. Of course, the executive could also transfer merely the execution without the rule-making powers. In that event, the very need for such a new agency must be questioned.

Federal–state relationships

Both India and the US have federal Constitutions. The difference between them is that the US is a true federation formed by states that came together voluntarily (others seceded and were brought back after a civil war), while India had a highly centralized government till independence. The Indian Constitution in 1951 gave away many of the powers of the centre to the states. In the US, inter-state characteristics determine whether the jurisdiction is with the federal or the concerned state government. Any inter-state transaction comes under federal jurisdiction while any transaction within the state is under state jurisdiction. In India, this is specified by the listing of subjects in the Constitution. There are some items that fall under the concurrent jurisdiction of both. Electricity is one of them. It may be recalled that the technology of transmitting electricity over long distances was not available in the late 1940s and early 1950s. If it had been, the Indian Constitution might well have looked for much greater central direction and control over electricity.

Both in the US and India there has been a tendency over the years for the centre to take on more powers in relation to the states. This has been particularly so in the case of electricity in which the requirements of a national or regional interconnected grid demand uniform legislation, rules, and practices all over the grid and, hence, over the country. In the US, there has been much resistance from some states to this perceived encroachment. In India, the resistance has not been particularly strong. The major blackout in the US in August 2003 might push all parties to go for a greater degree of central control. (However the Bush

administration has made it clear that the crux of the proposal, namely independent transmission system operation would be on a purely voluntary basis and no state would be compelled to join.) In India, legislation puts regulation of inter-state transmission under the Central Electricity Regulatory Commission and the operator is a national transmission utility. For the present, this is a government-owned company—the Power Grid Corporation of India Ltd. Since this is a commercial enterprise and makes profit from operating the transmission system, it is desirable that it is soon divested of authority over the load dispatch function. With many players, this function must be and seen to be neutral, without any commercial interest of its own.

An article by Nancy Spring, had appeared in *Issue Alert* <www.utilitpoint.com>, dated 1 May 2003. It examines the future of the attempt by the Federal Energy Regulatory Commission to regulate inter-state transmission in the US that would have increased FERC control over some functions currently with the states. Because of resistance by some states, the senate demanded modification. FERC has now concluded that its regulation of inter-state transmission can happen only gradually and on the initiative of the states.

Yet there is a strong case against leaving it to the jurisdiction of state commissions to require, or otherwise regulate, wheeling by local public utilities. Since any electricity has to be transmitted, it requires wheeling on transmission wires. In an interconnected grid, inter-state power will flow along any connected wires. That is why the state government or the state electricity regulatory commission must not have the jurisdiction to set the rules for wheeling along transmission wires. The definition of inter-state transmission in India recognizes this.

Definitions of regulation

The term 'regulation' refers to the various instruments by which governments impose requirements on enterprises and citizens. It thus embraces laws, formal and informal orders, administrative guidance, and subordinate rules issued by all levels of government, as well as rules issued by non-governmental or professional self-regulatory bodies to which governments have delegated regulatory powers.

The judgement of *Air India Statutory Corporation* vs *United Labour Union*[1] held, 'The legislature passes laws within the overall constitutional framework. These laws are state policy. Its implementation is by the Executive. The person/s implementing the laws are regulators who are regulating the implementation. A regulator must convert the legislation into rules, regulations, and procedures that make it possible to achieve the intentions of the legislation. Legislation can lay down general directions or it can be very detailed. In whichever manner that legislation may be drafted, every implementing bureaucrat exercises varying degrees of discretionary authority as he interprets the law.'

This discretionary authority is not different from the policy-making authority of the legislature. Of course, the legislature could – if it wishes – legislate in greater detail as in countries like Chile. However, in any event, the regulator is constrained by the boundaries of the legislation that he has to implement. When the legislation is not precise or is ambiguous, there is scope for the regulator to interpret it and even to stretch his authority under the shelter of that interpretation. To the extent that the legislature has drafted the legislation loosely, many major and minor policy decisions might be taken

[1] Supreme Court proceedings, MANU/SC/0163/1997

during implementation. If the legislation is drafted in a very tight fashion, the flexibility required because of varying local situations might make the implementation process excessively constrained. The drafting of legislation has to strike a balance between flexibility for the implementing agency and ensuring that the intention of the legislature is carried out. The American and Indian legislative processes produce legislation that provides flexibility; the Latin American legislation is much more closely drafted and lays down considerable detail, thus reducing the extent of flexibility.

As an example, the Indian law (Electricity Regulatory Commissions Act, 1998; now repealed) asks regulators to promote competition, efficiency, and economy; encourage investment in the sector; and safeguard consumer interest.[2] It does not lay down the targets for transmission and distribution losses, metering, extent of rural electrification, electricity quality, returns on investment to investors in generation, etc. As a consequence, these have been left to the ERCs (electricity regulatory commissions) to decide. In practice, state governments have sometimes laid down 'policy directives' even on many of these matters and the central government in its draft tariff policy in 2003 has also done this.

In *Black's Law Dictionary,* 'regulation' is defined as 'the act of regulating; a rule or order prescribed for management or Government; a regulating principle; a precept, rule or order prescribed by superior or competent authority relating to action of those under its control'.

In *Corpus Juris Secundum,* it has been provided that the power to regulate carries with it full power over the

[2] Section 13 (d) of the Electricity Regulatory Commissions Act, 1998

thing subject to regulation and, in the absence of restrictive words, the power must be regarded as plenary or in the interest of public. It has been held to contemplate or employ the continued existence of the subject matter.

In *Craise on Statute Law*, it is stated that if the legislation enables something to be done, it gives power at the same time 'by necessary implication, to do everything, which is indispensable for the purpose of carrying out the purposes in view'. Thus the legislation sets out the objects it seeks to achieve and lays down the responsibilities, authorities, and penalties and the regulator has to formulate the rules, principles, etc. in order to carry them out. However, the Government of India has issued (June 2003) a first draft of a tariff policy, which is modelled on Chilean regulatory law and lays down extremely detailed rules for tariff determination. The Karnataka government, in attempting to combine multi-year tariffs with privatization, has proposed amendments to the Karnataka Electricity Reforms Act that will also severely circumscribe the regulator's flexibility. The conceptual basis for this detailed control is provided by a World Bank paper issued in March 2003 (Bakovic, Tenenbaum, and Woolf 2003).

Tight legislation: the case of Chile

The legislation in Chile is extremely detailed and allows little discretionary powers to the regulator. As an example, here are the highlights of Chile's telecommunications law.

1 Demand is estimated for each service/zone/firm bundle.
2 The efficient firm is defined as one that starts from scratch and only uses the assets necessary to provide a particular service.

3 For each service, the incremental cost of development is calculated, which is merely the long-run marginal cost, if no investment plans are considered. The law stipulates that regulated companies must have a minimum of five years of investment plans. These plans are prepared by the companies and presented to the telecommunications regulatory agency on the basis of a specified detailed outline.
4 Revenue for each service is estimated such that the net present value of providing the service is zero. This revenue is the incremental cost of development.
5 Moving from the incremental cost of development to the long-run average cost, full coverage of cost is attained by increasing efficient tariffs in the least distorting fashion.
6 A fair RoR (rate of return) is made up of the cost of capital (cost of borrowing in the market) and the cost of risk in that industry for that enterprise. This is usually calculated on the basis of long-term share prices in the stock market. In the absence of such information, a similar industry is used as surrogate and share values are tracked to give an idea of the risk. Risk could be on account of many reasons: market volatility, government policies, competitive strengths, viability of consumers, etc. However, payment risks are not usually taken into account since they are covered by surcharges for delayed payments.
7 Since tariffs are calculated every five years, the law allows firms to adjust tariffs every two months, using various indices.
8 A committee of experts (one nominated by each party and the third by mutual agreement) settles disputes between companies and regulators.

The law was introduced in 1982, amended in 1985 to make some aspects even more specific, and further amended in 1987 prior to the privatization of the two operators. Regulatory laws in Chile are extremely specific, to the point of stipulating the type of regression to be estimated to measure the fair RoR to the 'efficient' firm (Spiller 1996). However, the Chilean experience also shows how difficult it is to write such a comprehensive law in a sector characterized by technological change. Indeed the telecommunications law in Chile was changed several times prior to privatization, and prior to the advent of democracy.

Policy formulation, policy implementation, and regulation

While *Black's Law Dictionary* refers to policy as 'the general principles by which a government is guided in its management of public affairs or the legislature in its measures', *Webster's Third International Dictionary* defines policy as 'a definite course or method of action selected (as by a government institution, group or individual) from among alternatives and in the light of given conditions to guide and usually determine present and future decision'. While, in a general sense, policy could be understood as principles and guidelines around certain issues within the broad framework of which laws are made and translated into action, it specifically refers to a proposed course of action adopted by, for example, an individual, a group, an institution, or a government to realize a specific objective or purpose within a given environment. In other words, it is policy that lays down the framework within which organizational goals are to be accomplished. The objectives of an organization, which are often vague and general, are concretized in the policy goals, which set the administrative wheels in motion.

Policy-making is a very complex process and there exists some confusion regarding policy formulation, its conversion into acts through legislation, and the implementation of these acts. In fact, the confusion has stemmed mostly from the politics–administration dichotomy model[3] in public administration, propounded by Woodrow Wilson. As opposed to this model, the latest theories of policy-making emphasize the role of multiple agencies in policy-making. In earlier literature, while the focus was on legislature and the role of the executive in the formulation stage during which bills become acts, more recently a number of additional stages have been identified in the policy-making process. According to the 'policy cycle' theory, they include agenda setting or policy initiation, formulation, implementation, evaluation, and review.

While policy initiation sets the agenda by defining certain problems and issues as matters that engage the interest of the government, policy formulation is seen as a crucial stage in the policy process as it develops a political issue into a firm policy proposal through a process of debate, analysis, and review. Policy implementation, on the other hand, comprises the

[3] This refers to the sharp distinction drawn between politics and administration. While politics was concerned with the laying down of policies, the administration's task was to carry out these policies as economically and efficiently as possible. Thus, the spheres of the two were made to appear quite separate and distinct. While Woodrow Wilson, the father of public administration, in his article titled *The Study of Administration* (Wilson 1966), considered politics and administration as separate processes and attempted to conceptually distinguish between the two areas of study, Goodnow (1990) observed that politics has to do with policies or expressions of state while administration has to do with the execution of such policies. Thus while policy-making was regarded as the realm of politics, execution was considered the realm of public administration.

actions through which policy is put into effect, sometimes in ways that differ from the original intentions of policy-makers. As Edelman (1964) observes, policies in American politics are largely symbolic. They are often vague and general and the actual meanings are attached during implementation. Some scholars believe that most policies are made during this stage (Nachmias and Rosenbloom 1978; Meier 1979; Ripley 1982). In fact, there is considerable evidence that most *de facto* policies are made by 'street-level bureaucrats'—the administrators who interact with the clients (Lipsky 1980).

It is clear that policy-making is a complicated and interactive process and the content of policies is not merely determined in the decision-making phase. Rather, as Nelson (1996) observes, policy content is negotiated over and over again in problem definition, legislation, regulation, and court decisions and yet again in the decisions made by street-level bureaucrats. While arguing in favour of insulating administration from partisan political interference, Goodnow (1990) stated that when one moves beyond general execution to specialized administration (as in the case of present-day regulators having specialized knowledge, technical expertise, and quasi-judicial authority), 'much must be left to official discretion, since what is demanded of the officers is not the doing of a concrete thing but the exercise of judgment'. It has been suggested that there must be a 'reinterpreted dichotomy'. This would reinforce legislative supremacy while permitting a policy-making role for the manager. Montjoy and Watson (1995) have actually suggested a one-way dichotomy that keeps elected officials out of administration but allows administrators to be active in policy-making.

Thus, it is clear that policy-making does not end with the Cabinet decision on a particular issue or the

legislature's enactment of the law. In fact, it takes place at various stages and at various levels. In implementing laws or acts (based on government policies) passed by the legislature, by drafting concrete rules and regulations for smooth transaction of government business, administrators (executive) at every level of bureaucracy interpret policy by applying their own judgement and regulate the behaviour of members of the society. It thus appears that policy implementation necessarily involves some amount of 'discretion', which the administrators (as regulators) apply to define and refine it periodically.

'Delegated legislation' is the means by which the legislature delegates the executive with law-making power on a variety of complex issues. It empowers the administrators to design the detailed rules and regulations within their discretion. With the expansion in the functions of the government; laws have to be made on a variety of issues. Many of these are complex. Legislators may not have the expertise or the time needed to understand them. This gives the opportunity for the executive to interpret and make rules that would otherwise have been in the legislation.

The growing complexity of public policy continues to erode the effectiveness of traditional command-and-control techniques of government bureaucracy. Until fairly recently, most tasks undertaken by national governments were simple enough to be organized along traditional bureaucratic lines. Once a policy or programme was enacted, the details of its operations could be formulated and appropriate commands issued by highly centralized centres. 'By contrast, the single most important characteristic of newer forms of economic and social regulation is that their success depends on affecting the attitudes, consumption habits and production patterns of millions of individuals and

hundreds of thousands of firms and local units of government. The tasks are difficult not only because they often deal with technologically complex matters but even more because they aim ultimately at modifying expectations' (Schultze 1977). In this new context, credibility becomes an essential condition of policy effectiveness. Achieving this requires delegating powers to designated institutions.

The nature of regulation

The nature of regulatory powers or functions that traditional administrators enjoy involves drafting of clear and concrete rules and regulations concerning the subject and implementing or enforcing them. It thus involves only legislative and administrative powers. It does not confer judicial powers.

As opposed to old-style regulation, independent regulatory commissions – as they have come into existence since the mid-1990s – wield regulatory powers with legislative, executive, and judicial jurisdiction and are termed quasi-judicial authorities. As Phillips (1993) observes, 'The independent regulator considers information available to him as well as the evidence presented by the company and intervenors, and makes a decision when prescribing certain rules of conduct for a utility, such as fixing prices. Contrary to the basic pattern of American government, which is based on the doctrine of separation of powers, a commission assumes the tasks of administrator, judge, and legislator. When investigating rates or service and safety standards, a commission performs an administrative function. When holding hearings, examining evidence and making decisions, a commission acts as a judge of the utility's conduct. Moreover, the commission can even determine

the rules it wants to administer, and it can decide to prosecute a utility and gather evidence against the firm. It then sits in judgment on the evidence collected by it. This suggests that the independent regulatory commission acts in a legislative capacity as well.'

A similar comment is made in the report of the Indian Parliamentary Standing Committee when examining the Electricity Bill (2001), which is now the Electricity Act (2003).

In addition to technical expertise and specialized knowledge, the quasi-judicial power to hear petitions, examine evidence, and take a decision differentiates today's independent regulatory authorities from the traditional public administration entities.

Indian administrative law

Apart from legislation that is presented to legislatures, debated, and passed with or without amendments, there are many orders and decisions of the government that have the status of law. The following section details the procedures that administrators have to follow. It is relevant in that the CBRs (Conduct of Business Regulations) of the ERCs are in this category while their orders are in the nature of judgements since they are subject to review and appeal. Both are, therefore, part of the legal framework.

Laying procedure for rules and regulations before the Parliament

In India, quasi-judicial bodies like the ERCs are required, by the legislation that created them, to place their orders before the concerned legislature. The ERCs also notify by gazette their CBRs. This makes CBRs into delegated legislation. There is, however, no general law in

India requiring all delegated legislation to be laid before the legislature. It depends upon the parent statute.

The procedure of laying legislation before legislatures can be negative or positive (Sathe 1999). In India, recommendations on this subject exist. However, many statutes do not yet comply with these guidelines.[4]

Section 31 of the SEBI (Securities and Exchange Board of India) Act, 1992, provides for the laying down procedure. It provides that every rule and every regulation made under this Act shall be laid, as soon as possible after it is made, before each House of the Parliament while it is in session. (This is for a total period of 30 days, in one session or in two or more successive sessions.) If both Houses agree in making any modification in the rule or regulation or if both Houses agree that the rule or regulation should not be made, the rule or regulation shall thereafter have effect only in such modified form or be of no effect, as the case may be. However, any such modification or annulment will not affect the actions taken earlier under the original rule or regulation. This clause is the standard format of laying procedure. It has been used almost uniformly in central statutes including the legislation creating independent ERCs. However, the statute has not clarified the effect of failure to lay the rules and regulation made by the delegated authority under the Act.

Section 179 of the Electricity Act, 2003

'Every rule made by the Central Government, every regulation made by the Authority, and every regulation made by the Central Commission shall be laid, as soon

[4] In fact, to incorporate these provisions in the earlier Acts, the Parliament passed the Delegated Legislations Provisions (Amendment) Act, 1983, incorporating the laying procedure on as many as 50 old Acts.

as may be after it is made, before each House of Parliament, while it is in session, for a total period of thirty days which may be comprised in one session or in two or more successive sessions, and if, before the expiry of the session immediately following the session or the successive sessions aforesaid, both houses agree in making any modification in the rule or regulation or agree that the rule or regulation should not be made, the rule or regulation shall thereafter have effect only in such modified form or be of no effect, as the case may be; so, however, that any such modification or annulment shall be without prejudice to the validity of anything previously done under that rule or regulation.'

Section 182 of the Electricity Act, 2003

'Every rule made by the State Government and every regulation made by the State Commission shall be laid, as soon as may be after it is made, before each House of the State Legislature where it consists of two Houses, or where such Legislature consists of one House, before that House.' If the legislature were to examine and discuss these documents, it might bring greater accountability of the regulators to the legislature. However, there has been no instance of the concerned legislature studying and changing the documents tabled by the ERCs. In the case of the SEBI Act, Section 31 uses the word 'shall'. But in *Jan Mohd* vs *State of Gujarat*,[5] while considering the effect of the same clause, the Supreme Court held that the rules made under the parent Act were valid from the date on which they were made. The Act did not provide that they could be invalidated by failure to place them before the legislature.

[5] AIR 1966 SC 385; see also *Atlas Cycle Industries* vs *State of Haryana (1979) 2 SCC 196.*

This proposition of law laid down by the court makes it clear that unless the clause for laying procedure of rules and regulations expressly prescribes the effect of failure to lay the rules and regulation, rules and regulations cannot be declared invalid merely because they were not laid before the Parliament.[6] Thus the clause for laying procedure of rules and regulations is not an effective instrument of parliamentary control unless failure to lay rules and regulation before the Parliament renders the rules and regulation so made under the parent Act invalid in the eye of law. We need to bear this in mind in any discussion of accountability of the ERCs. Sections 101 and 105 of the Electricity Act, 2003, provide for annual reports and regulations of the ERCs to be laid before the legislature but there are no consequences for any ERC that does not do so. The result is that such regulations of reports remain valid.

Removal of difficulty clause

The Acts discussed so far have provisions to remove difficulties. Such clauses are normally present in legislation that implements a new socio-economic order. Since not all eventualities can be foreseen by the legislation, this clause enables the executive to remove any difficulty that might arise during implementation. The underlying condition of course is that nothing can be done that violates the intent and purpose of the legislation. The following are the requirements that a *power to remove difficulty clause* should satisfy to stand the test of permissible delegation.

[6] This aspect of the discussion owes much to Mr Nishant Kumar Singh and Mr Vivek Jha, both students of the National Law School of India University, Bangalore.

1 Time limit it operates for
2 No finality (can be challenged before a court of law)
3 Specific doubt or difficult as a *sine qua non*
4 Laying procedure before the Parliament.

In the case of *Jalan Trading Co.* vs *Mill Mazdoor Union*,[7] the court struck down Section 37 of the Payment of Bonus Act, 1965, containing similar removal of difficulty clause as invalid. However, subsequently in the case of *Gammon India Ltd* vs *Union of India*,[8] the court appeared to have overruled the decision in the earlier case. The SEBI Act under Section 34 provides for this. If any difficulty arises in giving effect to the provisions of the Act, the central government may, by order published in the Official Gazette, 'make such provisions not inconsistent with the provisions of this Act as may appear to be necessary for removing the difficulty'. Section 183 of the Electricity Act, 2003, has a similar provision.

Sub-delegation of power

Sub-delegation is used on an elaborate scale as an administrative technique in independent regulatory institutions in the US. Section 97 of the Electricity Act, 2003, provides for delegation by a commission in writing of such of its powers and functions (except the powers to adjudicate and the powers to make regulations) as it may deem necessary. This delegation can be to any member, secretary, officer of the appropriate commission, or any other person. The general rule is that sub-delegation is permissible only when the parent statute expressly provides it. If the statute provides expressly for

[7] AIR 1967 SC 691
[8] AIR 1974 SC 960; see also *M V Sinai* vs *Union of India*, AIR 1975 SC 797.

sub-delegation, it cannot be struck down. When a sub-delegation, as permitted by the enabling Act is made, it does not divest the delegator of his statutory authority.[9] He can cancel the sub-delegation and resume his authority or may even exercise concurrent powers without cancelling the sub-delegation.

It has been consistently held that judicial, legislative, and administrative powers cannot be sub-delegated unless the statute provides so expressly or by irresistible/ necessary implication (Galligan 1996). Section 19 of the SEBI Act, 1992, expressly prohibits only sub-delegation of the SEBI's legislative function in the Act. Similarly, the Electricity Act, 2003, expressly forbids delegation of powers to adjudicate and the powers to make regulations.[10]

Publication of the rules and regulations

The Electricity Act, 2003, does not specifically provide for the ERCs to notify their CBRs by gazette. However, Section 92 gives them the powers to make rules for conduct of the business of the ERC: '...and shall observe such rules of procedure in regard to the transaction of business at its meetings (including the quorum at its meetings) as it may specify...' There is no uniform procedure in India for making subordinate legislation (except in the case of rules and bye-laws made under those central acts or regulations, which impose the condition of 'previous publication', which bring into play the procedure prescribed in Section 23, General Clauses Act, 1897.) When the enabling Act does not contain any provision that the delegated legislation should be

[9] *Gordon* vs *Morris* (1945) 2 All ER 616 (621); see also *Godawari S Perulekar* vs *State of Maharashtra*, AIR 1966 SC 1404 (1406).
[10] AIR 1965 SC 1486

published, the consequences of late publication or non-publication are matters of doubt and difficulty. However, in *Harla* vs *State of Rajasthan,*[11] the Supreme Court of India said that publication in some suitable form is essential before the delegated legislation can take effect.[12] Any issue not covered by these CBRs would fall under the Civil Procedure Code. If any provision in them is in conflict with the Code, the CBR will prevail.

References

Bakovic T, Tenenbaum B, and Woolf F. 2003
Regulation by Contract: a new way to privatize electricity distribution?
Washington, DC: The World Bank Group's Mining Sector Board

Edelman M. 1964
The Symbolic Uses of Politics
Urbana: University of Illinois Press

Galligan D J. 1996
A reader on administrative law, p. 108
Oxford: Oxford University Press

Goodnow F J. 1990
Politics and Administration
New York: Macmillan

Lipsky M. 1980
Street Level Bureaucracy
New York: Russel Sage

Meier K. 1979
Politics and Bureaucracy: policy making in the fourth branch of government
North Scituate: Duxbury Press

[11]AIR 1951 SC 658
[12]See also *B K. Srinivasan* vs *State of Karnataka,* AIR 1987 SC 1059.

Montjoy R S and Watson D J. 1995
A Case for Reinterpreted Dichotomy of Politics and Administration as a Professional Standard in Council-Manager Government
Public Administration Review 55(3): 231–39

Nachmias D and Rosenbloom D H. 1978
Bureaucratic Culture: citizens and administrators in Israel
New York: St. Martin's Press

Nelson B J. 1996
Public Policy and Administration: an overview
In *A New Handbook of Political Science*, edited by Robert E Goodin and Hans-Dieter Klingemann
Oxford: Oxford University Press

Phillips (Jr) C F. 1993
The Regulation of Public Utilities: theory and practice
Arlington: Public Utilities Reports, Inc.

Ripley R. 1982
Bureaucracy and Policy Implementation
Homewood: Dorsey Press

Sathe S P. 1999
Administrative Law (6th edn)
New Delhi: Butterworths India

Schultze C L. 1977
The Public Use of Private Interest
Washington, DC: Brookings Institution

Spiller P T. 1996
A positive political theory of regulatory instruments: contracts, administrative law or regulatory specificity?
Southern California Law Review (January 1996)

Wilson W. 1966
The Papers of Woodrow Wilson, Vol. 5
Princeton, New Jersey: Princeton University Press

Additional readings

Schwartz B. 1994
Administrative Law
London: Little, Brown, and Co.

Schwartz B, *et al.* 1972
Legal control of government: Administrative law in Britain and the United States
Oxford: Clarendon Press

Basu D D. 1998
Administrative law (5th edn)
Calcutta: Kamal Law House

Longley D, *et al.* 1996
Administrative justice: Central issues in UK and European administrative law
London: Cavendish Publishing Ltd

Garner J F, *et al.* 1985
Administrative Law (6th edn)
London: Butterworths

Lewis N. 1996
Choice and the legal order: Rising above politics
London: Butterworths

Wade W. 1995
Administrative Law (7th edn)
London: Clarendon Press

Agarwal O P and P Paul. 2001
Framework for Independent Regulation in India: an overview
In *Regulation in Infrastructure Services: Progress and the Way Forward*, edited by S K Sarkar and Kaushik Deb
New Delhi: Tata Energy Research Institute

Mitchell J M, *et al.* 1972
Political Analysis and Public Policy: an Introduction to Political Science
New Delhi: Thomson Press India Ltd

Turnbull P. 1999
Regulation or Re-regulation of Transport? [Discussion Paper] Geneva: International Labour Organization
[Available online at <www.oftel.gov.uk/publications/about_oftel/whit0700.htm>, last accessed on 10 February 2004]

Weatherly R, *et al.* 1977
Street-Level Bureaucrats and Institutional Innovation in Implementing Special Educational Reforms
Harvard Educational Review 17(2): 171–97

CHAPTER 4

History of electricity in India

Abstract

This chapter discusses how the electricity sector has developed in India, its different players, the influences that have affected its development, and its current state.[1] This should be read in conjunction with the appendices at the end of this book, which detail the various policies of the central government in relation to electricity before the passing of the Electricity Regulatory Commissions Act, 1998, that gave many of the powers to issue such notifications to the newly created Central Electricity Regulatory Commission and state electricity regulatory commissions. Since 1948, the generation, transmission, and distribution of electricity in India have made enormous progress. A considerable number of urban and rural households have been electrified. Electricity has no doubt been a force behind India's economic development. At the same time, under government ownership the SEBs (state electricity boards) have lost money and accumulated debts. Private investment has been meagre because of doubts about the payments being forthcoming from the buyers, namely the SEBs. The new consolidated Electricity Act, 2003, along with other central government initiatives appear to have created a new environment in the electricity sector that might change the whole structure of the industry and enable its more rapid profitable growth.

[1] Substantial portions of this chapter have been borrowed from Rao (2002). A succinct history of the development of electricity in India is provided in the Report of the Committee on Power (1980),

Before India's Independence, its electricity sector was decentralized. Electricity was generated and supplied locally by private entrepreneurs, enterprising municipalities, and provincial governments. The Tata hydroelectric project in Khandala supplied power to Bombay while the Mettur dam on the Cauvery supplied power to Madras Presidency. However, the emphasis was on supply to large urban concentrations, and there was little coordination or cooperation between different suppliers. The first legislation in this context was passed in 1877, providing 'for the protection of person and property, from injury and risks, attendant to the supply and use of electricity for lighting and other purposes' (Rao 2002). This Act was repealed and replaced by the Indian Electricity Act, 1903. 'It was clearly recognized to be a somewhat tentative measure' that would be amended with experience. The new Indian Electricity Act, 1910, 'to amend the law retaining to the supply and use of electrical energy', left 'the granting of all licenses in the hands of the local government, laying down some rules regarding safety'. It was a comprehensive piece of legislation to 'regulate the generation, supply and use of electricity and dealt with licensing, regulation and safety', giving considerable authority to the provincial governments.[2] In 1948, the Electricity (Supply) Act, on the broad lines of the Electricity (Supply) Act, 1926, in force in the UK, was passed 'to facilitate the establishment of regional coordination in the development of electricity transcending the geographical

Government of India, chaired by V G Rajadhyaksha. The report is usually referred to as the Rajadhyaksha Report.

The data referred to in this chapter has been taken from various reports of the Reserve Bank of India, the Planning Commission, and TERI and publications like *PowerLine*.

[2] Introduction to The Indian Electricity Act, 1910

limits of local bodies'. It provided 'for the rationalization of the production and supply of electricity, and generally for taking measures conducive to the electrical development of the Provinces of India'.[3] It enabled the creation of SEBs (state electricity boards) for promoting the coordinated development of generation, supply, and distribution in the provinces and other areas of the country. Subsequent amendments introduced significant additions and changes.

The CEA (Central Electricity Authority) was created to develop a national power policy and coordinate electricity planning across India. The Industrial Policy Resolution of 1956 reserved generation and distribution of electricity almost exclusively for the states, letting existing private licensees, however, to continue. This led to the gradual domination of the electricity sector by government enterprises. Initially, state governments were apparently reluctant to create SEBs because they would conflict with existing departments of government. However, by the late 1950s, all state governments had established SEBs. Amendments in 1976 enabled generation companies to be set up by central and state governments, resulting in the establishment of NTPC (National Thermal Power Corporation), National Hydro Power Corporation, North Eastern Electric Power Corporation, Mysore (now Karnataka) Power Corporation, and Water and Power Consultancy Services (the consulting firm). REBs (regional electricity boards) comprising part-time members were constituted in 1964 to promote regional coordination and operation of power supply by a 1964 office order of the Government of India (inserted into the Act in 1991 by an amendment). These

[3] This emphasis on electrical development in the Provinces of India was introduced by an amendment in 1950.

REBs had as members, the chairmen of the SEBs, while members of the SEBs ran the technical committees. The REB's administrative head was an officer on deputation from the CEA and was, therefore, also subservient to it. Private licensees did not find place in the REBs. Joint sector projects between states and also the central government were also made possible, as with the Damodar Valley Corporation and Neyveli Lignite Corporation.

By amendments in 1991, generation was opened to private investment, including foreign investment. RLDCs (regional load despatch centres) were also established at the same time to operate the power system in a region, ensure regional grid security, and integrate with power systems of other regions and areas. Tariffs in cases of interregional movements and transmission charges were to be determined by the central government on the advice of the CEA. Further amendments in 1998 opened transmission to private investment subject to the approval of the CTU (central transmission utility) with a license to be issued by the CERC (Central Electricity Regulatory Commission). The CTU (a CPSU [central public sector undertaking] designated by the central government) would operate the RLDCs and the STUs (state transmission utilities) would operate the SLDCs (state load dispatch centres).

The ERC (Electricity Regulatory Commissions) Act, 1998, enabled the creation of ERCs at the centre and in the states. The CERC's primary functions were to regulate tariffs of CPSUs generating electricity, tariffs of power generated and supplied inter-state, inter-state tariffs for transmission services, and issue of licenses to private investors in inter-state transmission. The SERCs (state electricity regulatory commissions) determined tariffs to be charged to customers and the tariffs and

functioning of intra-state transmission, including the operation of the SLDC.

Since 1998, the sector includes SEBs that generate and distribute power in the states, the CPSUs that generate and transmit power to be sold on a pre-agreed basis to different states with tariffs set by the central government, private generating companies, private transmission companies, private distribution companies (in addition to licensees), CTUs and STUs, RLDCs and SLDCs, the CERC and SERCs, and the CEA. However, the SEB has a veto over any new generation in its state and supply by any non-SEB generator to customers within its state. Trading as an activity in electricity was not recognized and access to transmission lines is at the discretion of the CTU or STU.

The players

Electricity is a concurrent subject under the Constitution. The centre has so far been careful to ensure that it does not tread on state government preferences. The two principal players in the electricity sector are the central and the state governments. Between them, they account for the ownership of over 95% of generation, transmission, and distribution capacity in the country. Almost all inter-state supplies today are of electricity generated by CPSUs. Inter-state transmission is a monopoly of the Power Grid Corporation, currently designated as the CTU, and most of the remaining generation is by state-controlled SEBs or companies, with distribution in private hands only in Orissa and Delhi (apart from old licensees like Tata and Bombay Suburban Electric Supply [now known as Reliance Energy], CESC in Calcutta, etc.) Amendments in 1998 opened transmission to private investment. This has taken place only in an inter-state project through a

joint venture between Power Grid and Tata Power called Power Links, which will take power from Tata in Bhutan to Delhi. No independent private investment has taken place in inter- or intra-state transmission till now.

The interests of the centre and the states have been increasingly in conflict after the creation of the central generating companies. The SEBs have been unable to pay for electricity purchased from the central companies, and for other products and services like rail and coal. Till 2000, the tariffs of the central companies were set by the central government. In 2000, the CERC issued its own norms for those tariffs. Between 1998 (when the CERC was established) and 2000, the existing tariffs were permitted by CERC to be continued. These tariffs have gone up over the 1990s by much more than the rate of inflation. However, the SEBs, because of lack of commercial expertise, lack of accountability for losses that were in any case a charge on the state governments, and also because of the guilt of having large unpaid bills, were not able to and did not strongly resist.

The state governments, the SEBs, and their successors have politicized power tariffs within the states to such an extent that power is priced well below costs of service to farmers and domestic consumers in all states. Industry, commercial establishments, and railways are overcharged to make up for the losses on these accounts. The drive to supply electricity to all rural locations has led to overloading of low-tension lines, zero or poor metering, misuse by farmers of free electricity given for energizing one pump set, and poor billing and collections. Thefts (many times in collusion with SEB employees) are rampant, especially in urban centres, by the well-off as well as slum dwellers, by large as well as small industrial units. Overstaffing is common, as are the absences of a commercial outlook, professional management, and a

sense of accountability among individual employees. Ruet (2001) points this out in an excellent study of three SEBs. Substantial cost reductions are possible if there were improved management. While political parties understand the problems, none is willing to cooperate for their resolution when they are in opposition (and not in power) while those in power oppose the changes when they are in opposition.

State governments and the SEBs need prosperous customers who pay their bills (such as industries, railways, etc.), since the extra that these customers are charged helps cross-subsidize inefficiencies, thefts, and politicized populist tariffs for agricultural and domestic customers. They would prefer it if such customers could remain with no choice in suppliers. Such choice could be available to the customers engaging in captive generation, or buying from someone other than the state entity. States therefore have been rather averse to allowing customers to buy directly from other suppliers or to generate their own power. Since states also control the transmission wires within the state, they charge penal tariffs for any use of the transmission lines, sometimes even if lines are not used.

It is unlikely that in the foreseeable future these subsidized customers will pay what it costs to supply them. At the same time, state governments are also not likely to have enough resources to pay subsidy costs from their revenues. Cross-subsidies may be inevitable, though the Electricity Act, 2003 provides that the SERCs must phase them out in five years. It is possible that state governments will find a way to extend this phase-out period.

Governments have also considered the power sector as an important source for political funding. Investment expenditure is substantial, vast civil works need to be

undertaken, a good part of the plant and equipment is bought from private parties (many of whom might be overseas), and all these could be sources for significant amounts of commission earnings. The anticipated loss of this lucrative source of funds – if government-owned undertakings are privatized – may well be an important reason for the resistance to privatization of electricity at both central and state levels, among all political parties.

The bureaucracy responsible for the power sector at the central and the state levels has a strong vested interest in retaining control. Power is a vital sector and massive in terms of turnover and investments. Even if it is not commercially viable, it is a source of providing jobs and favours to people. It is also a source for meeting the expenses (many that are apparently legitimate but not allowed under government rules to be paid by government) of ministers and officers.

Multilateral agencies – such as the World Bank and the Asian Development Bank – and bilateral agencies are lending agencies first. Their mandate is to lend and have their loans properly serviced and repaid in time. They will always promote policies that ensure that borrowers are able to do so. At times, they may also act in the interests of governments whose mandate is to promote business for their countries' suppliers. It is safer in many instances to lend to a government than to a private party, especially when the government has a reputation for being a good borrower, like in India. In order to ensure debt servicing, such lenders might well promote high front-end tariffs, which would enable them to get their money back earlier. It has been said that the World Bank encouraged the creation of the NTPC and other CPSUs in generation and transmission because it saw in them safe credit risks, backed by the Government of India, and large prospective borrowings. Similarly, the World Bank

was in favour of high returns on equity, protection against foreign exchange fluctuations, sovereign guarantees, etc. To balance this unfavourable view, it may be noted that it was the World Bank that blew the first whistle against the viability of the Dabhol Project promoted by Enron. It was also the World Bank that insisted on the creation of independent regulatory commissions to assure prospective investors that tariffs would not be subject to populist influences. Again, it was the World Bank that floated a paper (Bakovic, Tenenbaum, and Woolf 2003) that would circumscribe the independence and powers of the ERCs considerably.

In the realm of generation and transmission, the central public sector lagged in the 1990s in using its special advantages to speedily set up additional capacities. Instead it tended (as NTPC did) to sit on large cash reserves, with poor leveraging of equity to raise debt in relation to that permitted. Power Grid has been very slow to attract private investment into inter-state transmission, and it is felt by many that this is primarily due to its desire to maintain national monopoly. For these companies, central government ownership and proximity to policy-makers is an enormous commercial advantage. Obviously, objective tariff determination by independent regulators, privatization, or the opening of the market to competition would make it more difficult for them. It was to be expected that they would resist such changes. They would prefer a tariff policy that allowed them all costs to be passed through to customers, substantial incentive payments for achieving targets surpassed by them many years earlier, accelerated depreciation allowances to build up large cash reserves, and operational norms fixed at easily surpassable levels to give them extra profits.

In India, the establishment of independent ERCs was a crucial component in the restructuring of the electricity sector and was recommended by experts, especially from the World Bank. The World Bank was willing to consider loans to state government only if they accepted some conditions, including the setting up of ERCs. The government-owned Power Finance Corporation offered to state governments loans on concessional interest if they set up ERCs. Soon, several states – through their own legislation (Orissa, Haryana, and Andhra Pradesh being among the first to pass their own Electricity 'Reform Acts') or through the (central government's) ERC Act, 1998 – adopted this new form of governance for electricity and created the SERCs.

The SERCs were expected to play multiple crucial roles, including the following, which were expected to create credibility and acceptance, necessary for enforcing rationality and discipline in the governance of the sector.

- Prevent political interference in the power sector
- Protect consumers (as well as non-consumers) by regulating operations of power utilities and the tariffs charged to consumers
- Cure the ills caused by irrational decision-making and lax implementation by ensuring complete transparency and meaningful public participation in the governance processes.

The Electricity Act, 2003, as described in the previous chapter introduces a new provision. The CERC is given the authority to make regulations on transmission charges, surcharge for open access, reduction and elimination of surcharge, and cross-subsidies and the period in which they should be done, and the proportion of revenues from other business of the utility that must be utilized for reducing the transmission and wheeling

charges. In the earlier legislation, there was no consistency between states and each could be protecting local state-owned monopolies or subsidizing vested interests.

The case for power privatization[4]

Privatization is now accepted by all governments in India as the means to bring about improvement in the electricity sector. This is despite the fact that, so far, the evidence of private operation does not show that they are vastly superior in performance. Privatization requires governments to do numerous things in advance and to financially support the new private entities for a few years while they improve efficiencies. What is the logic for privatization?

Power cannot be stored for marketing but must be sold the instant it is produced. It was generally assumed that power sector had to be a vertically integrated monopoly of generation, transmission, and distribution. And since power was vital for every country, it was also assumed that the monopoly had to be in the hands of the government. Where generation, transmission, and distribution are in the hands of PSUs, investment requirements consistent with adequate and reliable supply had to be fully met by the undertakings or through governmental planning / budgetary process. This did not happen during the last few decades and the quality and reliability of power supply deteriorated in almost all states as shown in Tables 9 and 14.

Yet, the dogma that electricity supply – like other public services – should be provided by the state, persisted in most countries. When the state provided this service, it had to cross-subsidize between different

[4] Inputs from Baijal (1999)

classes of consumers to achieve stated socio-economic objectives. The introduction of subsidies made the electricity market inefficient and the lack of competition enhanced the inefficiency. When the state supplied electricity, there was inadequate pressure to pay for the service. Cross-subsidies led to very high tariffs for some classes and often, when these tariffs became unviable, the state itself allowed these classes to set up captive power plants. This led, at times, to uneconomic and unviable fragmentation of the grid and avoidable investment by investors in power units, which did not form their core competence. To introduce private capital, some countries with similar situations privatized new generation. That led to more problems as the T&D (transmission and distribution) sector continued to be inefficient and unviable. This made entry of private capital in generation very difficult and expensive. The crisis of the government-managed electricity sector hit the economies of several countries hard. They tried various measures of reform with varying degrees of success. The privatization of the power sector is a recent but internationally widespread trend, which has placed greater reliance on market forces and less dependence on government in the allocation of resources (Baijal 1999). The privatization has been facilitated by the recognition that the sector could be separated into generation, transmission, and distribution sectors. Even these could be broken down into several companies, without compromising the economic advantages of a vertically integrated government monopoly. Other countries have also had such vertically integrated (mostly government-owned) monopolies, later unbundled.

The investments made by governments in the electricity sector (generation, transmission, and distribution) have been lagging for many years due to

inadequate funds largely caused by the lack of surplus (indeed rising deficits) from the sector. High inefficiencies (low PLFs [plant load factors], high T&D losses, poor maintenance and renovation) resulted in poor capacity utilization. State governments had to pay for subsidies, which they did partially, placing further burdens on their finances. It has now been recognized that introduction of private capital into the power sector, if properly structured and implemented, can lead to the following advantages (Baijal 1999).

- Improved public finances through sale of state assets and gradual elimination of subsidies
- Improved performance of power entities through the introduction of competition between different players, primarily by the creation of a wholesale power market, giving higher returns to those supplying power at lowest rates
- Lowered consumer tariffs through the creation of an institutional framework for dealing with consumer concerns
- Influx of increased investment, including foreign investment
- Development of wider private share ownership in key economic activity
- Improved revenue realization at all levels, making services more efficient.

However, privatization should not replace state monopoly with private monopolies. This is the case with privatization in both Orissa and Delhi. This can be avoided if distribution wires remain a neutral natural monopoly while small supply circles related to each sub-station are privatized. They could be affordable for small investors like newspaper distributors and local cable operators. By going for large distribution circles for

privatization, only financially powerful companies can hope to pay the price and bear the initial losses and investment costs.

Sector overview

Tables 1 through 16 will give the reader an idea of the major problems faced by the sector. These can be summed up as inefficiencies, populist pricing, poor professional management, and lack of a commercial mindset. They are important for understanding the way in which this sector has deteriorated over the years. At the same time, it has built enormous capability to satisfy – to a great extent – the demand for electricity in a growing economy. It has done so with increasingly unbalanced tariffs between different consumer segments and almost penal tariffs on industry, forcing the latter to go for captive generation in a big way.

The outlay and expenditure on power in the various Plans have been rising each year but expenditure has lagged behind Plan provisions (Table 1, Figure 1). Despite this, the shortfalls in peak availability have not been as much as they should have been because demand forecasts have invariably been high and also because of the influx of substantial captive generation capacities and the improvement in operating efficiencies of generating plants over the years. However, the fact remains that investment expenditure has been inadequate. In no part of the system do we have reserve margins, so necessary in a sector that has high demand fluctuations from day to night, from season to season.

Table 2 shows that India has very low per capita consumption of electricity compared to Egypt and China (almost double that of India); comparisons with developed countries like the US and the UK are stark.

Table 1 Five-Year Plan outlay and expenditure for the power sector

Plan period	*Outlays* (crore rupees)		*Power sector as a percentage of all sectors*	*Expenditure* (crore rupees)		*Power sector as a percentage of all sectors*
	Power sector	*All sectors*		*Power sector*	*All sectors*	
Seventh Plan (1985–90)	34273.46	180000.00	19.04	37895.30	218729.60	17.33
Eighth Plan (1992–97)	79589.32	434100.00	18.33	76677.38	485457.17	15.79
Ninth Plan (1997–2002)	124526.00	859200.00	14.49	NA	NA	NA
Annual Plan (1997/98)	20830.51	155904.67	13.36	19396.28	129757.30	14.95
Annual Plan (1998/99)	25741.79	185907.47	13.84	21159.02	149403.46	14.16
Annual Plan (1999/2000)	26825.00	192262.89	13.95	21327.42	160608.30	13.28
Annual Plan (2000/01)	26554.36	203359.35	13.06	22066.39	187930.90	11.74
Annual Plan (2001/02)	27842.67	228492.86	12.19	NA	NA	NA

NA – not available

Source Various Plan documents

Table 2 Per capita consumption of electricity in select countries, mid-1990s

Country	*Per capita electricity consumption (kilowatt-hours)*
United States	8747
Australia	6606
United Kingdom	5843
Brazil	1783
Egypt	787
China	719
India	348

The 2001 Census of India shows that only 44% of Indian households have an active electricity connection.

Hydrogeneration capacity spurted in the new century but the major growth was in thermal, primarily coal, though gas and naphtha also grew (Table 3). Nuclear power generation remained low probably because of high costs, government monopoly, poor technologies, non-standard plants, and lack of opening up to private investment. Despite generation having been opened to private investment in 1998, the dominance of state and central generation in capacity additions continued. This was primarily because distribution remained primarily under state government ownership and distribution and supply were showing rapidly rising losses and, hence, inability to pay for the electricity purchased.

During the 1990s, power purchases by SEBs were almost entirely from the NTPC followed by other CPSUs. Without these, shortfalls in availability would have been even more severe. With every passing year, the SEBs were able to satisfy lesser and lesser demands on them in their states. At the same time, there was practically no transfer between states because of lack of transmission capacity and, perhaps, of state government

Table 3 Plan-wise addition to installed capacity (megawatts)

	Ninth Plan (Target)	*1997/98 (Actual)*	*1998/99 (Actual)*	*1999/2000 (Actual)*	*2000/01 (Actual)*	*2001/02 (Actual)*	*Ninth Plan (Actual)*
Mode							
Hydel	9819.7	233.0	542.5	1371.5	1285.0	1106.2	4538.2
Thermal	29545.5	2993.5	3699.5	2721.0	2173.9	2009.0	13596.9
Nuclear	880.0	0	0	440.0	440.0	0	880.0
Total	40245.2	3226.5	4242.0	4532.5	3898.9	3115.2	19015.1
Ownership							
State	10747.7	1676.0	1675.4	2329.1	2375.7	1393.9	9450.1
Central	11909.0	333.0	991.6	1615.4	659.0	905.0	4504.0
Private	17588.5	1217.5	1575.0	588.0	864.2	816.3	5061.0
Total	40245.2	3226.5	4242.0	4532.5	3898.9	3115.2	19015.1

Table 4 Details of generation and sales of state electricity boards

	1996/97 (Actual)	*1997/98 (Actual)*	*1998/99 (Actual)*	*1999/2000 (Provisional)*	*2000/01 (RE)*	*2001/02*
Gross generation (MkWh)	252016	243611	258283	260402	275932	284722
Auxiliary consumption (percentage)	6.56	7.14	7.03	7.19	7.18	7.05
Power purchase (MkWh)	166620	176342	198502	267655	295371	325071
Net availability at Busbar (MkWh)	360509	376707	402759	431420	471020	504378
Transmission and distribution losses (percentage)	24.6	24.0	24.9	30.8	29.9	27.8
Sales (MkWh)	268031	283650	296136	298649	314835	340061

MkWh – million kilowatt-hours; RE – revised estimate

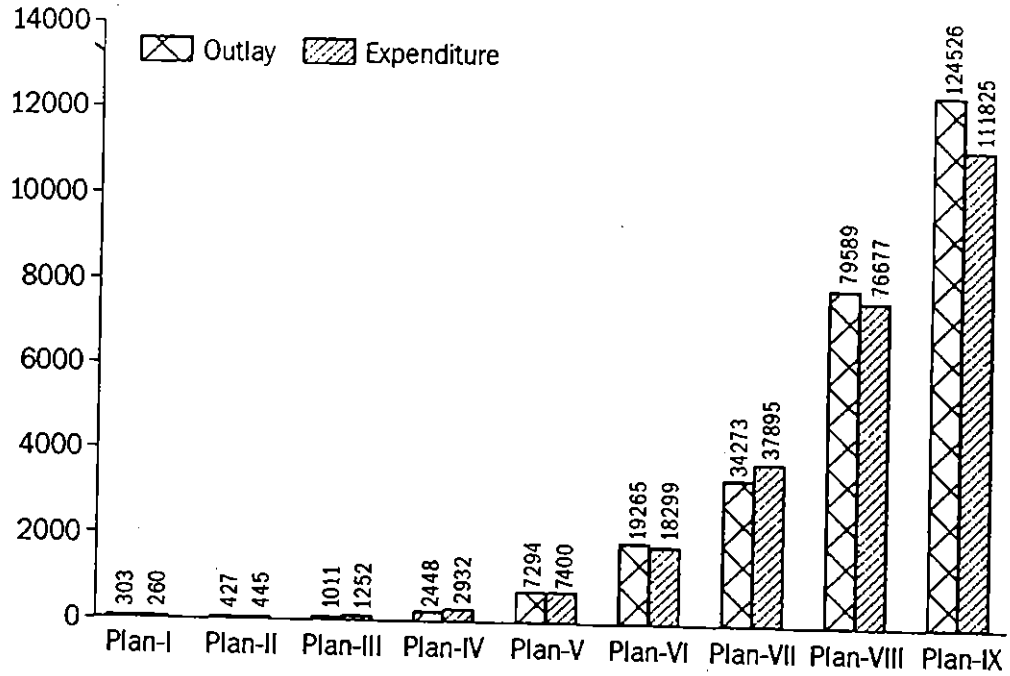


Figure 1 Five-year Plan-wise outlay and expenditure on the power sector (crore rupees)

initiative. Table 5 shows the cost problems of the SEBs. Fuel costs went up with sharp rises in administered costs of coal in. However, the biggest increase was in power purchase costs. Power was purchased almost entirely from the central public sector whose tariffs were determined by the central government.

India's eastern and north-eastern regions, despite being large producers of power, rank the lowest in per capita consumption (Table 6). The southern region has shown significant growth in the 1990s, perhaps also reflecting the growing imbalance in economic development in India. The T&D losses, which are avoidable to a large extent, amount to almost half as much power as actually consumed (Table 7). They represent poor maintenance of transmission lines, lack of investment, and losses on account of poor metering, billing, collection, and pilferage.

Table 5 Percentage share in unit cost of supply

	1996/97	*1997/98*	*1998/99*	*1999/2000*	*2000/01*	*2001/02*
Fuel	23.4	23.1	20.0	15.2	14.2	13.1
Power purchase	34.1	36.4	38.8	48.9	50.5	52.9
Operation and maintenance	4.2	4.1	3.6	2.8	2.7	2.6
Establishment and administration	13.7	13.6	14.6	13.3	13.5	12.7
Miscellaneous	2.4	2.2	2.4	3.0	2.4	1.8
Depreciation	7.4	7.4	6.4	6.0	5.9	6.0
Interest	14.0	13.2	13.5	10.3	10.7	11.1

Table 6 Per capita electricity consumption in India, by region (in kilowatt-hours)

Year	*Northern*	*Western*	*Southern*	*Eastern*	*North-eastern*	*All-India*
1985/86	173	259	186	115	50	178
1986/87	192	275	202	119	50	191
1987/88	202	297	205	125	62	201
1988/89	217	314	229	135	63	217
1989/90	241	334	249	129	76	236
1990/91	249	367	272	150	89	253
1991/92	265	391	286	156	88	268
1992/93	282	406	312	162	93	283
1993/94	286	437	335	174	94	299
1994/95	302	468	369	182	96	320
1995/96	308	513	377	195	99	336
1996/97	306	522	366	188	104	334
1997/98	313	538	400	192	103	348.5
1998/99	324	557	406	201	117	360
1999/2000	318	535	400	192	103	355

Table 7 India's power balance (million kilowatt-hours)

Year	*Gross generation*	*Auxiliary consumption*	*Net generation*	*Purchase from outside*	*Transmission and distribution losses*	*Total consumption*
1991/92	287029	21011	266018	3066	61439	207645
1992/93	301362	22060	279302	2937	61565	220674
1993/94	324050	23670	300380	3200	65010	238570
1994/95	350490	24795	325695	3560	69569	259686
1995/96	379877	27221	352657	3785	79363	277079
1996/97	395889	28804	367085	1493	91105	277473
1997/98	421747	30684	391063	3926	97919	297070
1998/99	448544	31423	417121	4353	111484	309734
1999/2000	481032	33913	447119	4097	141851	309620

Table 8 Plant load factor and plant availability factor in various years (all-India)

Year	*Plant availability factor* (percentage)	*Plant load factor* (percentage)	*Transmission and distribution losses* (percentage)
1996/97	79.00	64.40	24.53
1997/98	79.40	64.70	24.79
1998/99	78.70	64.60	24.90
1999/2000	80.30	67.30	30.80
2000/01	80.50	69.00	29.90
2001/02	NA	69.90	27.80

NA – not available

Physical performance

Plant availability has remained more or less stable over the five-year period from 1996/97 to 2001/02 (Table 8). The PLFs have improved, even in many state-government-owned generation plants, though the improvement has been uneven across the country (Table 9). However, in the decade since 1992, there has been significant improvement in PLF in every region, except the North-East where it declined. The maximum improvement was in the South (Figure 2). Despite the media focus and public attention on T&D losses – and the creation of ERCs, T&D losses were rising till the year 2000 (Table 8), almost negating the improving PLFs and generation efficiencies of thermal power plants. After 2000, the T&D losses started to decline, reflecting the measures taken in states like Andhra Pradesh, the incentives provided by regulators and central government schemes, improvement in metering, etc.

There has been significant improvement in PLFs in all segments of ownership, though SEBs still lag behind CPSUs and private generating stations (Table 9). The

Physical performance of India's power sector: some facts

- The installed generation capacity of India's utilities (as in March 2002) is 1 04 917.5 MW (megawatts), of which 59.33% is owned by the states, 30.12% by the centre, and 10.55% by the private sector.
- The share of hydro capacity is about 25.03%.
- Against the Ninth Five-Year Plan target of a capacity addition of 40 245 MW, the actual addition has been about 19 015 MW, which is 47.2% of the planned target.
- Capacity addition in the central sector is 4504 MW, which is 37.8% against the target of 11 909 MW.
- Capacity addition in the state sector is 9450.1 MW, which is 87.9% against the target of 10 748 MW.
- Capacity addition in the private sector is expected to be 5061 MW, which is 28.8% against the target of 17 589 MW.
- Slippage in the case of hydro as well as thermal capacity is 59.9%.
- Capacity addition in nuclear power is 880 MW as targeted.
- The plant load factors of thermal power stations have improved from 64.4% in 1996/97 to 69.9% in 2001/02.
- Transmission and distribution losses have increased from 24.53% in 1996/97 to 25% in 1998/99 and are expected to further rise to about 27.8% during 2001/02.
- The actual power supply position in March 2002, as assessed by the Central Electricity Authority, indicates a peak deficit of 12.6% and energy deficit of 7.5% at the all-India level as against a peak deficit of 18% and energy deficit of 11.5% during 1996/97.
- India's per capita electricity consumption was 355 kWh (kilowatt-hours) during 1999/2000 against 334 kWh in 1996/97. In China, during 1997, it was 719 kWh.

performance of the eastern regions is abysmal, perhaps reflecting on the quality of local governance.

Financial performance

As can be seen in Table 10, fuel consumption in thermal generation has been well controlled over the years. It is the costs of coal and oil that have risen substantially leading to rising costs of generation.

Table 9 Plant load factor by ownership and region

	1992/93	*1993/94*	*1994/95*	*1995/96*	*1996/97*	*1997/98*	*1998/99*	*1999/2000*	*2000/01*	*2001/02*
Ownership										
State	54.1	56.6	55.0	58.1	60.3	60.9	60.7	63.7	65.6	67.0
Central	62.7	69.8	69.2	71.0	71.1	70.4	71.1	73.8	74.3	74.3
Private	58.8	57.0	65.8	72.3	71.2	71.2	68.0	68.9	73.1	74.7
Region										
Northern	62.0	63.9	59.1	62.1	64.8	66.7	67.2	70.9	73.1	75.1
Western	59.7	63.4	63.8	68.1	70.2	70.3	70.7	72.3	73.4	74.2
Southern	62.6	68.3	69.1	74.7	75.8	77.0	75.4	79.6	82.0	82.3
Eastern	39.8	44.8	43.7	42.7	42.2	43.0	44.1	46.1	47.9	48.7
North-eastern	24.3	19.9	26.8	28.6	27.1	21.3	18.8	18.2	18.5	16.8
All India	57.1	61.0	60.0	63.0	64.4	64.7	64.6	67.3	69.0	69.9

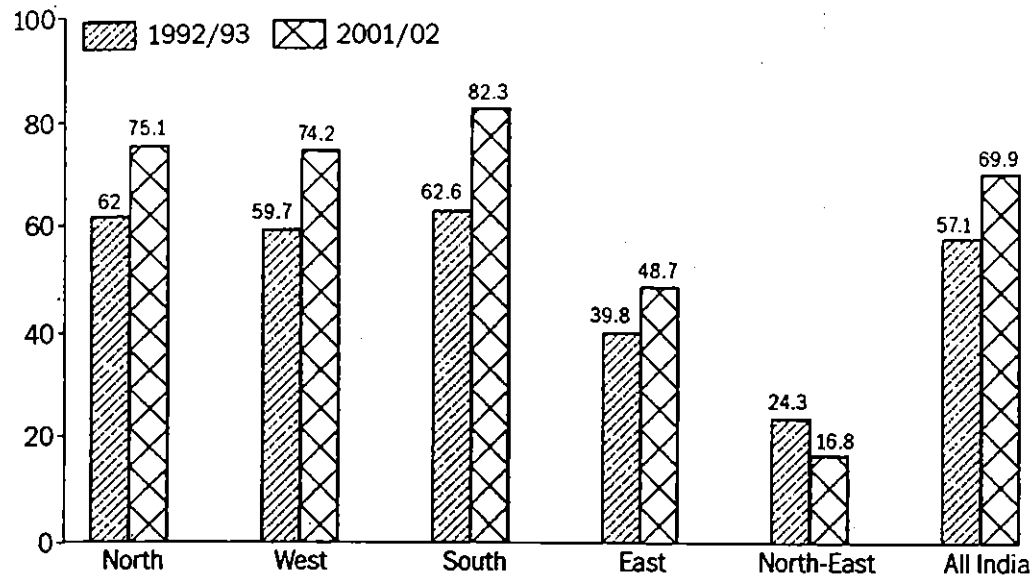


Figure 2 Plant load factor of thermal plants (percentage)

Table 10 Consumption and cost of fuel in coal-based thermal generation (various years)

	Fuel consumption per kilowatt-hour		*Fuel cost per kilowatt-hour*	
Year	*Coal* (kg)	*Oil* (ml)	*Coal* (paise)	*Oil* (paise)
1992/93	0.75	7.82	53.4	3.7
1993/94	0.77	5.61	64.2	3.5
1994/95	0.77	6.64	66.6	4.0
1995/96	0.76	10.80	70.1	6.8
1996/97	0.76	5.51	82.5	4.2
1997/98	0.76	4.17	92.1	3.7
1998/99	0.75	4.25	94.1	3.4
1999/2000	0.74	3.71	94.8	3.5
2000/01 (RE)	0.73	3.48	100.3	4.3
2001/02 (AP)	0.74	3.59	105.5	4.8

RE – revised estimate; AP – Annual Plan

Financial performance of India's power sector: some facts

- The average tariff charged to consumers has increased from 165.30 paise in 1996/97 to 239.92 paise in 2001/02.
- The cost of supply has increased from 215.60 paise in 1996/97 to 349.85 paise in 2001/02.
- The gap between average cost of supply and average tariff has increased from 50 paise per kWh (kilowatt-hour) in 1996/97 to 110 paise per kWh in 2001/02.
- The recovery of cost of supply through tariff has declined from 76.7% in 1996/97 to 68.58% in 2001/02.
- Domestic and agricultural consumers continue to get power at subsidized rates. The estimated tariffs for domestic and agricultural consumers for 2001/02 are 195.62 paise per kWh and 41.56 paise per kWh, respectively, as against the average tariff of 239.92 paise per kWh.
- The tariff charged to agricultural consumers has increased marginally from 21.2 paise per kWh in 1996/97 to 41.54 paise per kWh in 2001/02. And yet, this is much below the minimum 50 paise per kWh recommended by the Chief Ministers Conference.
- Subsidy payable by the state government on account of energy sales to domestic consumers is likely to increase from 4386 crore rupees in 1996/97 to 12238.5 crore rupees in 2001/02.
- Subsidy on account of sales to agricultural consumers is estimated to increase from 15 586 crore rupees in 1996/97 to 28 123 crore rupees in 2001/02.
- Gross subsidy for domestic, agricultural, and inter-state sales has increased from 20 210 crore rupees in 1996/97 to 40 721 crore rupees in 2001/02.
- Subvention given by the state governments to partly compensate the subsidized sales to domestic and agricultural consumers is estimated at 8339.6 crore rupees in 2001/02 as compared to 6630.60 crore rupees in 1996/97.
- Uncovered subsidy, after taking into consideration the subvention received from state government and surplus generated from sales to other consumers, is estimated at 26 622.96 crore rupees during 2001/02 as compared to 5805.03 crore rupees in 1996/97.
- The estimated commercial losses of SEBs (state electricity boards) without subsidy during 2001/02 are 33 177 crore rupees as

Continued...

compared to 11 305 crore rupees during 1996/97. The commercial losses with subsidy payable by state government for these years are 24 837 crore rupees and 4674.31 crore rupees, respectively.

- The net internal resources of SEBs continue to be negative, estimated at –19 104 crore rupees in 2001/02 as compared to –2090.7 crore rupees in 1996/97.
- The share of domestic and agricultural consumers in total energy sales has been increasing over the years, from 49% in 1996/97 to about 50.1% in 2001/02.
- The share of industry in the total energy sales is showing a declining trend. In 2001/02, it was 29% as against 33% in 1996/97.

Coal has been an administered price controlled by the central government, as is the cost of railway transportation. Both have gone up significantly in cost without associated improvements in the financial performance of the producing enterprises.

The cost of supply of SEBs has risen by over 50% in the second half of the 1990s. The average tariff per kilowatt-hour has also gone up in almost the same proportion. However, the percentage recovery of costs has declined sharply despite agricultural tariffs having been raised by almost 100% (though continuing to be well below the cost of generation and even further below the cost of supply to agriculture). The ballooning commercial losses of SEBs have resulted in a significant rise in their proportion in the state revenue deficits. To a great extent, this is due to the increase in costs of subsidies for domestic and agricultural consumers, neither of which have any caps placed on them in any state. The gross subsidy in 2001/02 was over 40 000 crore rupees while the commercial losses were a little over 33 000 crore rupees, showing that there is a limit to how much cross-subsidization can help in cutting subsidies to these privileged groups. While the gross

Table 11 Financial performance of state electricity boards

Major performance criteria	*1996/97 (Actual)*	*1997/98 (Actual)*	*1998/99 (Actual)*	*1999/2000 (Actual)*	*2000/01 (RE)*	*2001/02 (AP)*
Cost of supply (paise per kilowatt-hour)	215.60	239.73	263.05	305.12	327.16	349.85
Average tariff (paise per kilowatt-hour)	165.30	180.30	186.77	206.98	226.26	239.92
Percentage of recovery	76.70	75.21	71.00	67.84	69.16	68.58
Average agriculture tariff (paise per kilowatt-hour)	21.20	20.22	21.01	22.61	35.38	41.54
Commercial losses (with subsidy) (crore rupees)	-4674.31	-7597.95	-10508.75	-15088.14	-17793.72	-24837.22
Commercial losses (without subsidy) (crore rupees)	-11305.00	-13963.00	-20860.00	-26353.00	-25259.00	-33177.00
Net internal resources (crore rupees)	-2090.70	-6209.00	-8954.40	-13316.30	-15620.60	-19103.90
Subsidy for domestic consumers	4386.01	5258.43	6332.48	8121.11	10036.07	12238.51
Subsidy for agricultural consumers	15585.20	17706.67	20693.87	22508.61	24699.18	28123.27
Gross subsidy (crore rupees)	20209.96	23422.23	27482.23	31003.28	35079.85	40721.59
Subvention received (crore rupees)	6630.60	6364.80	10351.55	11264.53	7465.33	8339.62
Uncovered subsidy (crore rupees)	5805.03	8046.61	8785.42	14431.69	21867.29	26638.42
Gross subsidy per unit of sales (paise per kilowatt-hour)	75.40	82.57	92.80	103.81	111.42	119.75

RE – revised estimate; AP – Annual Plan

subsidy per unit of sales has risen by over one-third, the uncovered subsidy has risen four times, made up by long overdue payments to suppliers, mainly CPSUs (Table 11).

Agricultural tariffs, though having risen on an average, are still a fraction of the industrial and commercial tariffs. State governments have paid up only a part of the subsidy costs. The subsidy per unit has risen by 50%.

There is no sign of reduction in the commercial losses of SEBs. Indeed, the commercial losses from 1998 to 2000 total over 70 000 crore rupees, which is more than the total for the period from 1990 to 1997 (Figure 3). Table 12 shows that the burden of low tariffs to domestic and agricultural consumers has been borne by the commercial, industrial, and traction (railways) customers.

Table 13 encapsulates the problems of the sector. Cost recovery has been on the decline, exacerbated by stifling subsidies and T&D losses—the bane of the SEBs. In the process, the paying customers have had to bear

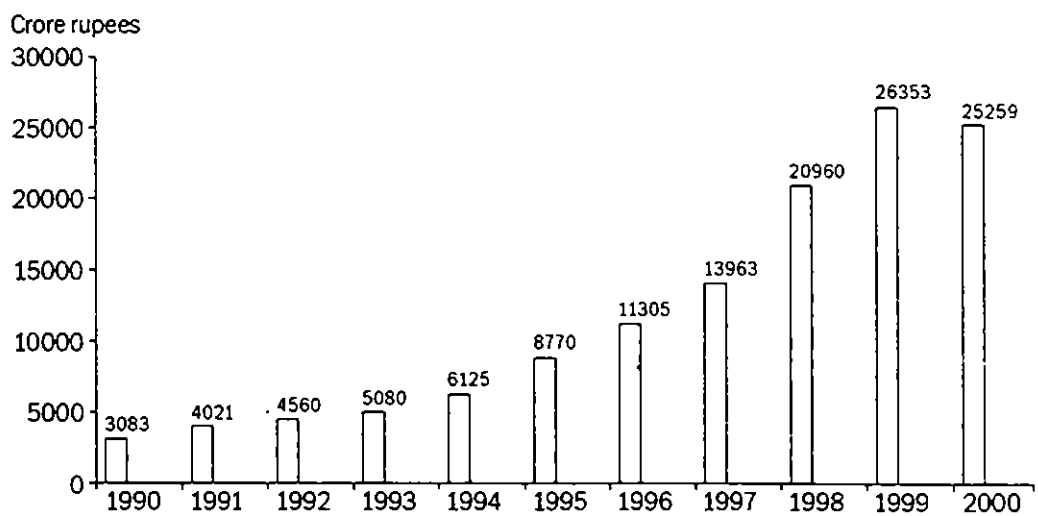


Figure 3 Annual commercial losses of the state electricity boards (crore rupees)

Table 12 Average tariff (paise per kilowatt-hour), by consumer category

	1996-97 (Actual)	*1997-98 (Actual)*	*1998-99 (Actual)*	*1999-2000 (Provisional)*	*2000-01 (RE)*	*2001-02 (AP)*
Domestic	105.7	136.2	139.1	160.7	183.1	195.6
Commercial	239.1	293.6	330.2	369.9	404.2	426.3
Agriculture	21.2	20.2	21.0	22.6	35.4	41.6
Industry	275.5	312.7	322.8	342.0	366.5	378.7
Traction	346.8	382.2	410.3	415.3	435.9	449.2
Outside state	151.4	138.1	163.8	190.1	187.9	194.4
Overall	165.3	180.3	186.8	207.0	226.3	239.9

Table 13 Recovery of cost through tariff

Year	*Average cost* (paise per kilowatt-hour)	*Average tariff* (paise per kilowatt-hour)	*Recovery as percentage of cost*
1992/93	128.2	105.4	82.2
1993/94	149.1	116.7	78.3
1994/95	163.4	128.0	78.3
1995/96	179.6	139.0	77.4
1996/97	215.6	165.3	76.7
1997/98	239.7	180.3	75.2
1998/99	263.1	186.8	71.0
1999/2000	305.1	207.0	67.8
2000/01	327.3	226.3	69.1
2001/02	349.9	239.9	68.6

the burden. Cost recovery has declined precipitously because tariffs have not kept pace with costs. Figure 4 shows the widening gap between costs and tariffs. Tables 14 and 15 show the dismal commercial situation of the sector and that uncovered subsidies are the major cause.

In current circumstances, the minimal tariff of 50 paise for agricultural consumption that has been

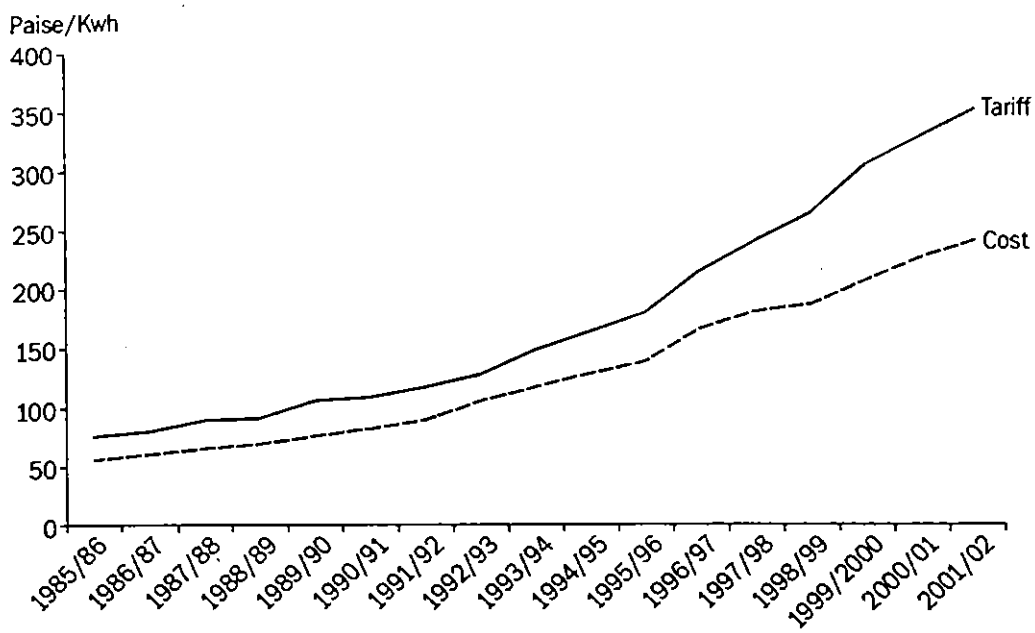


Figure 4 Average cost versus average tariff

proposed and been under consideration by some states since 1996 will make a dent of less than 10% in the subsidy bill. Substantial increases in overall tariffs to give a minimum return of 3% as per the earlier Schedule Six of the Electricity Supply Act, 1948, could make a large difference. If tied up with efficiency improvements, the required increase could be reduced. Table 16 shows what is needed to make the sector more viable. A tariff of 50 paise on agriculture will not help, as it is far less than the cost to serve.

The data in this chapter leads to some clear conclusions about the causes of the ills of India's power sector. They are best summarized in Ruet's analysis of the three SEBs of Haryana, Andhra Pradesh, and Orissa. SEBs are 'first characterized by a simultaneous search for competing objectives that are heterogenous and hence not tradable with each other through any common criteria—and thus not by a monetary one; and second by

Table 14 Growing unviability of the sector (crore rupees)

Year	*Total revenue*	*Revenue expenditure*	*Gross operating surplus*	*Depreciation*	*Net operating surplus*	*Total interest payable*	*Commercial profit/loss*
1996/97 (Actual)	52567.42	44508.29	8059.13	4840.85	3218.28	7892.59	-4674.31
1997/98 (Actual)	59620.68	53250.66	6370.02	5199.94	1170.08	8768.03	-7597.95
1998/99 (Actual)	66475.06	61068.07	5406.99	5465.18	-58.19	10450.56	-10508.75
1999/2000 (Provisional)	75095.42	74952.49	142.93	5897.59	-5754.66	9333.48	-15088.14
2000/01 (RE)	84015.73	84751.09	-735.36	6139.42	-6874.78	10918.94	-17793.72
2001/02 (AP)	92817.71	97691.84	-4874.13	7090.54	-11964.67	12872.55	-24837.22

RE – revised estimate; AP – Annual Plan

Table 15 Subsidy costs (crore rupees)

Year	*Subsidy to agricultural consumers*	*Subsidy to domestic consumers*	*Subsidy on inter-state sales*	*Gross subsidy*	*Subvention received from state*	*Net subsidy*	*Surplus from other sectors*	*Uncovered subsidy*
1996/97 (Actual)	15585.20	4386.01	238.75	20209.96	6630.60	13579.36	7774.33	5805.03
1997/98 (Actual)	17706.67	5258.43	457.13	23422.23	6364.75	17057.48	9010.87	8046.61
1998/99 (Actual)	20693.87	6332.48	455.88	27482.23	10351.55	17130.68	8345.26	8785.42
1999/2000 (provisional)	22508.61	8121.11	373.56	31003.28	11264.53	19738.75	5307.06	14431.69
2000/01 (RE)	24699.18	10036.07	344.60	35079.85	7465.33	27614.52	5747.23	21867.29
2001/02 (AP)	28123.27	12238.51	359.81	40721.59	8339.62	32381.97	5743.55	26638.42

RE – revised estimate; AP – Annual Plan

Table 16 Additional revenue mobilization (crore rupees)

Year	*With 0% rate of return*	*With 3% rate of return*	*With 50 paise per unit agriculture tariff*
1992/93	4723.0	5642.5	2191.5
1993/94	5248.9	6310.2	2217.3
1994/95	6611.9	7863.2	2412.2
1995/96	8277.8	9822.9	2621.1
1996/97	11304.9	13037.8	2380.5
1997/98	13962.7	15788.6	2728.5
1998/99	20860.3	22690.8	2753.7
1999/2000 (Provisional)	26352.7	28186.8	2510.9
2000/01(RE)	25259.1	27197.2	2116.1
2001/02 (AP)	33176.8	35432.5	1984.0

RE – revised estimate; AP – Annual Plan

a strong external discretionary power of the State. Conversely, the environment of decision-making shows radical uncertainties and the effects of a single decision are mainly delinked from the decision itself. Pros and cons analysis is simply not possible, and hence cost–benefit comparisons all the more so'. Also, 'SEBs have to be reformed from an administration to an enterprise to be able to deal with costs' (Ruet 2001). The internal organization of SEBs has to be questioned. They behave and are organized as administrations with objectives different from those of public enterprises. Such behaviour is to be expected, given the administrative system of which they are a part. They must function as public enterprises, not public administrations.

Conclusion

India's electricity sector is large (though there is nowhere a calculation available about its rupee turnover). It is fundamental to economic growth and prosperity and

people's well being. It has beneficial effects on important aspects of human development like education and health. Yet, it has seen little study and research by economists, cost and financial accountants, management scientists, and scholars from other social sciences. Apart from the Rajadhyaksha Committee Report on Power (1980) and studies by Ruet (2001) and Kannan and Pillai (2003), there have been few holistic studies to analyse the issues that hinder the efficient development of India's power sector. The exploding number of electricity regulators, engineer-dominated utilities, generalist policy-makers in government, Indian and foreign consultants (lawyers, accountants, and management specialists), merchant bankers and rating agencies, as well as media commentators, require such studies.

The Indian power sector, characterized by inadequate capacity, underutilization, and huge losses, remains poor in its supply. The financial performance of the SEBs has also been affected by the time overruns of power projects. They involve 'manifold and thus heavy costs, besides incurring the cost escalation of the projects and the power purchase costs'; 'the system also is forced to forgo additional sales revenue obtainable' (Kannan and Pillai 2003) Kannan and Pillai (2003) also estimate the unit costs savings from efficiency improvements on account of operational efficiency improvement resulting in reduced power purchase, reduction in overmanning resulting in savings on establishment and administration expenses, and in interest payments by introduction of a 1:1 debt–equity ratio. They show that in 1997/98 the all-India system would have gained 94 588.25 million rupees from these measures.

We must question the value of simple extrapolation of historical trends in forecasting electricity demand growth. It is better explained as an 'econometric function

of six "causal" factors; population, per capita personal income, the prices of electricity and natural gas, elasticity of demand and measures for conservation of power'. In recent years, developed economies – particularly the US – have shown significant economic growth accompanied by very low energy demand growth due to measures for improving energy efficiencies and conservation in production, distribution, and wrong equipment purchased in the last 15 years or so. Indian forecasts have generally assumed that growth of demand for power is determined by the growth of number of (connected) consumers and that of the intensity of their power consumption, as also the interaction between these two factors. Reliance on past demand data for forecasting purposes has led to gross errors. Ruet (2001) concluded that the lack of a commercial mindset and professional management was behind the inefficiency of SEBs. The CEA, which has been making these forecasts for many years, has been proven particularly wrong.

It is also not true that the government has no resources meant for power development, because it is overspending in reality. The problem is the inefficiency of management coupled with corruption. False data, thefts, poor metering, and inefficient billing and collection aggravate T&D losses. There may also be a link between the incentives offered by the central government in 1989 for reduction of T&D losses and the manipulation of data, including concealment of these losses under agricultural consumption, in order to win awards.

Pricing of electricity has seen some rational approaches since the creation of the CERC and SERCs. The series of consultation papers issued by the CERC and some SERCs and their numerous orders incorporate new principles for tariff regulation and determination. For example, the CERC issued orders on availability-based

tariff, which for the first time anywhere, uses a commercial mechanism to improve power frequencies to bring a better matching of load and generation forecasts to actual demand and generation. The CERC issued the first-ever consultation paper on bulk tariffs and a series of papers on risk and return in electricity, depreciation norms, etc., which were then incorporated in a major order on tariff norms and principles. The CERC also imposed a charge for use of reactive power with a view to bringing voltage levels under some control. Similarly, some SERCs have attempted to estimate costs of serving different consumer categories and determined tariffs for each. They have used performance-based tariff regulation to target efficiency improvements, especially on reduction of T&D losses. However, these measures have had little effect since SEB losses continue to be high.

In many other countries, one of the most pronounced effects of liberalization of the power sector is the improved power supply position, as against the power shortage that was a major problem there and a primary reason for opening up the power sector to independent private power producers. Competition may also have had an effect, as almost certainly the introduction of trading in electricity. Through the Electricity Act, 2003, India has now introduced trading and the enabling conditions to make it possible. The Act has also made it possible to introduce competition. The results will take some time to be visible.

References

Baijal P. 1999
Restructuring the Power Sector in India: a base paper
Economic and Political Weekly, 25 September 1999

Bakovic T, Tenenbaum B, and Woolf F. 2003
Regulation by Contract: a new way to privatize electricity distribution?
Washington, DC: The World Bank Group's Mining Sector Board

Kannan K P and Vijayamohan Pillai N. 2003
Plight of the Power Sector in India: inefficiency, reform and political economy
Thiruvananthapuram: Centre for Development Studies

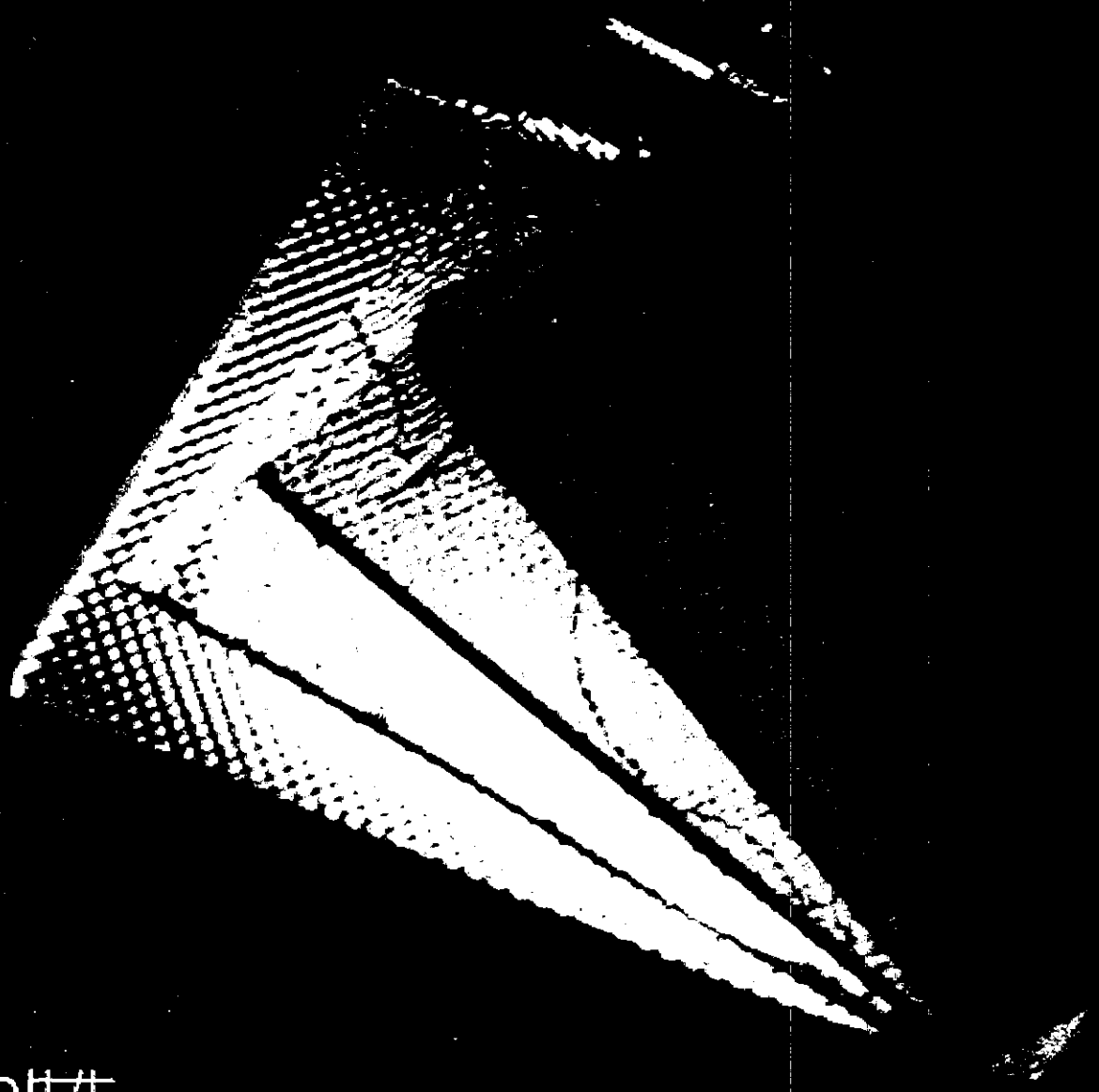
Rao S L. 2002
The political economy of power
Economic and Political Weekly, 17 August

Rao S L. 2003
Review of *Plight of the Power Sector in India: inefficiency, reform and political economy*, by K P Kannan and N Vijayamohan Pillai
Journal of Social and Economic Development, 5(1), January–June 2003

Ruet J. 2001
Winners and losers of the SEB reforms: an organizational analysis
New Delhi: French Research Institutes in India

Quality of Service of Distribution Utilities

– Need for End to End Commitment



प्रयास

ऊर्जा, उर्जा, विकास आणि पर्यावरण
या विषयावरील विशेष प्रयत्न
Prayas Energy Group, Pune

Prayas Occasional Report – 1/2005

Prayas Occasional Report – 1/2005

Quality of Service of Distribution Utilities – Need for End to End Commitment

Published by
Prayas
Athawale Corner, Karve Road,
Deccan Gymkhana, Pune 411 004. **India**
Phone: 020 - 2542 0720/5620 5726
Fax : 020 - 2542 0337
E-mail : prayasenergy@vsnl.net, Website : prayaspune.org

October 2005

Lead Authors :
Sreekumar N., Shantanu Dixit

Other members of Prayas Energy Group Research Team :
Girish Sant, Subodh Wagle, Nikit Abhyankar

Cover design :
Ramakant Dhanokar

Cover Photograph :
Shamin Kulkarni

DTP and Layout :
Abhay Dhamdahre

Printed by :
Gayatri Graphics, 5/82 UmaShankar Society, Bibwewadi, Pune 411 037

Requested contribution :
Rs. 50/-

For private circulation

PRAYAS
Initiatives in Health, Energy,
Learning and Parenthood

ABSTRACT

One of the features of the Indian power sector reforms is the increased attention to the distribution sector. Systems and procedures for monitoring Quality of Service (QoS) of distribution utilities have been finalised by State Electricity Regulatory Commissions, especially subsequent to the Electricity Act 2003. This Prayas report reviews the QoS process of distribution utilities.

Report gives an overview of the QoS process consisting of Grievance Redressal Forum, Ombudsman and Standards of Performance regulations. As many as 18 states (of the 28) have finalised regulations on grievance forum and 11 states on standards of performance. Details of the QoS process in the state of Andhra Pradesh as a case study is given, followed by a comparative study of 11 states.

Systems to improve consumer interface, quantify performance and to monitor progress in a transparent manner are necessary and welcome steps. QoS process meets one of the many long felt needs to improve distribution sector. At this initial stage, it is crucial that the distribution utilities and regulatory commissions show serious end to end commitment in the QoS process. This includes the steps of formulating the system, reporting performance, monitoring progress and taking corrective measures. It is also important to proactively work for the active participation of consumers at all stages of the process. With such an approach, over the years, QoS process can evolve to be the necessary and sufficient condition for continuous improvement of the distribution sector.

ABBREVIATIONS

AE	Assistant Engineer
APDRP	Accelerated Power Development and Reform Programme
APERC	Andhra Pradesh Electricity Regulatory Commission
ARR	Annual Revenue Requirement
CAIDI	Consumer Average Interruption Duration Index
CAIFI	Consumer Average Interruption Frequency Index
CE	Chief Engineer
CEA	Central Electricity Authority
CESC	Calcutta Electricity Supply Company (now called CESC Limited)
CII	Confederation of Indian Industry
DE	Divisional Engineer
DERC	Delhi Electricity Regulatory Commission
DISCOM/DISTCOM	Distribution Company
DT	Distribution Transformer
E-Act	Electricity Act
ERC	Electricity Regulatory Commission
FOIR	Forum of Indian Regulators
GERC	Gujarat Electricity Regulators
GRF	Grievance Redressal Forum
HERC	Haryana Electricity Regulatory Commission
KERC	Karnataka Electricity Regulatory Commission
MAIFI	Momentary Average Interruption Frequency Index
MERC	Maharashtra Electricity Regulatory Commission
MIS	Management Information System
NERC	North American Electricity Reliability Council
OERC	Orissa Electricity Regulatory Commission
Ofgem	Office of Gas and Electricity Markets (UK)
PBR	Performance Based Regulation
QoS	Quality of Service
RERC	Rajasthan Electricity Regulatory Commission
RoR	Rate of Return Regulation
SAIDI	System Average Interruption Duration Index
SAIFI	System Average Interruption Frequency Index
SE	Superintending Engineer
SERC	State Electricity Regulatory Commission
SoP	Standard of Performance
TNERC	Tamil Nadu Electricity Regulatory Commission
TRANSCO	Transmission Company
TRAI	Telecom Regulatory Authority of India
UPERC	Uttar Pradesh Electricity Regulatory Commission
WBERC	West Bengal Electricity Regulatory Commission

CONTENTS

ACKNOWLEDGEMENTS

At the early stages of work, we have benefited from discussions with Secretary- APERC, YG Muralidharan of ECON-KERC and Veera Mahender. We had requested review comments from professionals who have experience in electrical distribution and regulation. We thank Utpal Bhattacharya, P Pandya, MK Kundu, DK Roy and JL Bajaj who have given insightful review comments in their personal capacities.

1. INTRODUCTION

Systems and procedures to ensure that financial performance is not achieved at the cost of quality are essential. Therefore, regulatory measures to improve quality of service are welcome steps, helping the consumer to get better service from the utility.

Indian power sector has been undergoing 'reforms' from the 1990s. Starting from the introduction of private companies into generation, there has been major paradigm shifts in ownership, utility structure and policy. In many ways, the Electricity Act 2003 has been a consolidation and culmination of this process. To some extent, the State and Central Electricity Regulatory Commissions have helped to increase transparency, accountability and participation in the working of utilities [1]. This has been through measures like draft discussion papers, public hearings, consumer charters, advisory committees, grievance redressal forums, electricity ombudsman and regulations on standards of performance.

One key aspect to note is the increasing attention given to the distribution sector. Distribution is the first interface of the utility with the consumer, the source of revenue and a major instrument of government policy. But this sector has not received the attention it deserves in terms of investment or performance analysis. A balanced proportion of investment between Generation and Transmission & Distribution is 1:1 -1 for generation and 1 for transmission & distribution[1] [2]. The actual ratio of state investment has been more like 2:1, but is reported to be improving in favour of transmission & distribution from mid 90s. While many states and the Central Electricity Authority (CEA) have been preparing annual reports on performance of generating stations, it is only recently that CEA has announced a report on performance of distribution utilities in India. Reasons cited for this neglect of analysis of distribution sector include lack of credible data. T&D loss, percentage of billing & collection and revenue arrears are the few performance indices of the distribution sector which have gained attention in the past few years. Distribution sector also has the dubious image of insensitive consumer interfacing, corruption and inefficiency at all levels. But it is good to notice a strong sense of realisation that a performing distribution sector is crucial to improve the power sector. Accelerated Power and Distribution Reforms Programme (initiated by Ministry of Power in 2001), the committees on distribution reform, corporatisation/privatisation of distribution in some states and the initiatives towards improving the quality of service are some indicators of this increased attention. One of the results of this focus on distribution has been the increased attention to quality of consumer service. Public declaration of Citizens' charter (on performance and service), formation of consumer Grievance Redressal Forum/Electricity Ombudsman and regulations on Standards of Performance are all the result of this increased focus.

Financial performance of the utilities has been a key focus of the reform program. The current method of regulation employed for tariff setting – rate of return regulation (ROR) – does not provide for penalties or rewards based on quality of service. Some attempts to use performance based regulation (PBR) have been made in India, for example in Delhi. But PBR has its own problems related to relative benchmarking of performance. Many question the efficacy of using benchmarking for tariff fixation. As a paper from the

[1] The suggested proportion, as per the Rajadhyakha committee report is 4:2:1:1 for Generation: Transmission: Distribution: Rural electrification

American consulting firm NERA observes: *'Benchmarking for ratemaking ... would be extremely burdensome. Regulators who attempt to simplify the methodology to make it manageable risk making arbitrary judgements that confuse inefficiency with heterogeneity'* [18].

It is also not right to assume that quality issues will automatically be addressed by competition. As a report of the South African regulator (NER) notes: *'In an ideal world, power quality levels would be determined by competition in the supply industry. However, given the nature of the electricity supply industry, some regulatory requirements on power quality will probably be necessary'* [11]. We are far from ideal world or ideal competition. NER report also quotes from a study by European regulators: *'Where market competition replaces monopoly regimes, quality competition should replace quality regulation. However, complete withdrawal of the regulator is not usually possible because, while some quality factors can be individually negotiated, others cannot'* [11]. This approach is also supported by another European regulator survey (Energy Regulators Regional Association – ERRA), which observes: *'The measurement and control of quality of supply is one of the means to protect consumers against possible abuses of market power. Quality regulation can ensure that cost cuts are not achieved at the expense of quality'* [10].

In the Indian context, even today affordable access is one of the major challenges for the distribution utility. Poor public image of the consumer interface, badly maintained infrastructure, top-down & personality driven approach and rampant corruption at all levels are some of the major obstacles in the path to achieve it. Arriving at a right mix of performance indices with the optimum level of detail that can be supported by data and a monitoring system that facilitates transparency, accountability & participation can help in the turnover of the utility.

With these considerations, systems and procedures to ensure that financial performance is not achieved at the cost of quality are essential. Therefore, regulatory measures to improve quality of service are welcome steps, helping the consumer to get better service from the utility. However, like all initiatives, an end-to-end commitment from planning stage to implementation stage is essential to ensure effectiveness. It should also be noted that these measures would yield the desired result only if these are fully utilised – which in turn can happen only with active participation of public interest groups. As an effort to explore this aspect, this Prayas Occasional Report focuses on the measures to improve the quality of service of Distribution Utilities in India. Efforts in the post-reform period are reviewed, with more details on the progress after the Electricity Act 2003 (E-Act). This report is largely based on information available in the public domain – consolidated from the publications and websites of the regulatory commissions and distribution utilities.

The next section of this report gives a background of the procedures and systems towards ensuring Quality of Service (QoS). Grievance Redressal Forum (GRF), Ombudsman and Standards of Performance (SoP) regulations are covered. Section 3 gives details of the SoP regulation and the Grievance Redressal Forum/ Ombudsman regulation for a typical state, Andhra Pradesh. Section 4 looks at 10 other states for the purposes of comparison. States covered are Orissa (the first state to have a state regulatory commission and a SoP regulation), Karnataka, Maharashtra, Haryana, Uttar Pradesh, Gujarat, Rajasthan, Delhi, Tamil Nadu and West Bengal. Many Indian utilities have looked up to British systems and procedures to formulate their own regulations. The case of QoS regulations is no different. With this idea, a brief preview of the performance regulations of Ofgem (Office of Gas and Electricity Markets, UK) is also given. The last section has some comments and conclusions aimed at improving the process, since we feel that this is indeed a welcome step with lot of potential.

A few general points about this report: Data in this report is updated as of June 2005. Throughout this report, the term 'distribution utility' has been used to denote 'distribution licensee' also. The term 'Quality of Service' (QoS) is used throughout to address the issue of 'Quality of Supply and Service'.

2. OVERVIEW OF THE QOS PROCESS

2.1 Introduction

The Indian Electricity Rules (1956) does give few power supply quality indices[2] and some utilities have come out with citizens' charters stating quality and service commitments to consumers. Many utilities have consumer grievance handling procedures and the some have the practice of holding open consumer courts. There have been some consumer surveys and few studies on quality of service in the power sector (see Annexure 1.1- Consumer Surveys and Quality of Service studies). These have helped to gain understanding of the issues related to quality of service.

All the existing mechanisms to improve quality of service address only few issues in this area. Comprehensive regulations on Standards of Performance (SoP) for distribution utilities have been prepared from 1998 by some state RCs. They cover many aspects of quality of supply and service (hereafter referred as Quality of Service – QoS). Subsequent to the Electricity Act, many RCs have prepared regulations on Consumer Grievance Redressal Forum (GRF) and Ombudsman. These regulations comprehensively cover consumer grievance handling procedure, supply quality and service indicators, performance targets, benchmarks and compensation aspects of distribution utilities.

As of March 2005, 24 of the 28 states have formed SERCs. 18 of the RCs have come out with regulations on GRF and 11 with regulations on SoP. Table A3.1 (in Annexure 3) gives a list of states, with date of formation of RC, website address of the RC, date of GRF/ Ombudsman regulation, date of first version of SoP regulation and date of recent version of SoP regulation. This table is prepared mostly from information available at the respective RC websites and reflects the status as of May 2005.

[2] Some quality indices from IER: Voltage of supply to be within +/-6% for Medium Voltage, +6/-9% for HT, +/- 12% for EHT (Rule 54); Frequency to be within +/- 3% (Rule 55)

2.2 Grievance Redressal Forum and Ombudsman

Section 42 of the E-Act[1] gives the duties of distribution licensees. Subsections 5, 6, 7 and 8 cover the setting up of Grievance Redressal Forum (GRF) and Ombudsman for the distribution licensees. These are mandated to be done within 6 months of the Act (June 2003) or 6 months of granting (new) license. Clause 5.13.3 of the National Electricity Policy [22], notified by Ministry of Power in February 2005, advises all SERCs to formulate regulations for GRF/Ombudsman and appoint them within 6 months. Accordingly, GRF and the institution of Electricity Ombudsman have been set up in some states (Orissa, Maharashtra are examples). GRF is 2-4 member body. There may be one GRF per zone (as in MSEB with 12 GRFs) or one per circle for each licensee (2-3 per DISTCOMs, in Orissa) or it can be one per licensee. GRF is set up by the distribution licensee and typically has retired judges, working/retired utility employees, lawyers and in most cases consumer activists as members. After exhausting the normal complaint procedure of the licensee, any consumer can approach the GRF. GRF regulations provide typical timeframes for disposing the complaint (45-60 days). Consumer can appeal to the Ombudsman, if she/he is not satisfied with the GRF. It is an important point to note that only the consumer can appeal against the decision of the GRF.

Ombudsman is an institution to be appointed by the State Electricity Regulatory Commission (SERC). There can be one or more Ombudsman for a distribution licensee. Ombudsman itself can be having one or more members, though, in most cases, it is expected to be a one-member body. Senior persons with expertise in legal, engineering, education, industry, administration or consumer affairs are expected to be appointed as Ombudsman. Any consumer can appeal to the Ombudsman if he/she is not satisfied with the order of the GRF. Ombudsman has the power to call for documents and is expected to settle the dispute within about 3 months.

GRF is funded by the utility and Ombudsman by the SERC. Of course, money for this is raised from the

consumers. GRF and Ombudsman are expected to submit annual reports of their functioning – GRF to utility and SERC, Ombudsman to the SERC. With good consumer participation, support of utilities and supervision by Regulatory Commissions, these can go a long way to bring consumer empowerment and change of utility's perception, leading to improved consumer satisfaction.

2.3 Standards of Performance regulation

Few Standards of Performance (SoP) regulations, prepared before the E-Act were based on the respective State reform Act or the Central ERC Act 1998, under which State RCs were formed. Some of the states like Orissa, Haryana, AP and Karnataka had prepared SoP regulations under this framework (see SoP-1 in Table-A3.1).

Subsequent to the E-Act, as mandated by the Act, many more states have prepared SoP regulations and many states have revised their previous regulations. Sections 57,58 and 59 of the E-Act cover SoP for distribution licensees. E-Act mentions the need for SoP regulation, need for compensation (if the licensee does not meet the SoP conditions) and the need for licensees to report level of performance. These regulations are typically 10-15 pages long. Structure of the regulation is different for each state, but the contents can be broadly divided into 5 parts – performance indicator, performance target, overall performance benchmark, compensation and other issues. These are briefly outlined below.

i) Performance Indicator

Performance indicators can be divided into 4 groups:

a. Distribution network
b. Metering &. Billing
c. New connections
d. Other

Network indicators relate to the reliability and quality of power supply. Reliability indicators include duration for supply restoration, notice for power cuts, monthly/yearly outage statistics etc. Power supply quality indicators include supply voltage variation, frequency variation, harmonic content etc. Metering indicators include time taken to attend to faculty meters and Billing indicators relate to handling billing complaints. Indicators related to new connections include the response to applications for new connections or modifications in existing connections. Other indicators include accidents, complaint letters etc. A typical SoP regulation has 30 - 40 indicators.

ii) Performance Target

For each of these indicators, SoP regulation gives a performance target. For example: A fuse-off call in urban area will be attended within 4 hours; a voltage problem will be sorted out within a week if there is no network change involved; new connection for LT will be released within 30 days if no network change is involved. Utility has to pay compensation to the consumer if this target is not met. Many regulations call this as the 'Guaranteed Standards of Performance'.

iii) Overall Performance Benchmark

For each of these indicators, SoP regulation also gives an overall performance benchmark. This is to measure the performance of the utility with respect to an indicator meeting the specified performance target over the period of time - 1 year or 1 month. For example: Fuse-off calls in urban area will be attended within 4 hours *for 99% of the complaints*; voltage problems will be sorted out within a week if there is no network change involved *for 90% of the complaints*; new connection for LT will be released within 30 days if no network change is involved *for 95% of the applications*. Many regulations call this as the 'Overall Standards of Performance'.

iv) Compensation

Another feature of the SoP regulation is the compensation to the consumer if the performance target is not met. Utility is expected to pay the consumer if such default happens. For example: A fuse-off call in urban area will be attended within 4 hours – *Rs. 50/ to be paid to the consumer in case of default*; a voltage problem will be sorted out within a week if there is no network change involved - *Rs. 100/ to be paid to the consumer in case of default*; new connection for LT will be released within 30 days if no network change is involved *Rs. 50/ day to be paid to the consumer in case of default.*

v) Other issues

All licensees are expected to have a well publicised procedure to receive and record complaints. This could be phone numbers (like 1912 in AP), complaint registers and written complaints. Compensation is to be given automatically in some cases and on consumer demand in some other. There are of course some exceptions for utility like natural disasters, factors not in utility control, review with RC etc. Licensees are expected to give periodic reports on supply and service indicators to the Regulatory Commission.

3. QOS PROCESS IN ANDHRA PRADESH (A CASE STUDY)

It is required to look in detail at least one set of State level regulations and systems to understand the QoS process. In this section, the QoS process in Andhra Pradesh (AP) state is described, as a case study example.

Andhra Pradesh (AP) is considered one of the most 'reforming' states. The World Bank supported reforms were initiated in AP in 1997, after Orissa and Haryana states. SERC was constituted in March 1999 and the power sector unbundled into 6 state owned corporations (APTRANSCO, APGENCO and 4 DISCOMs) in April 2000. Private generation, under the IPP process has been active in the state with 4 working projects having a total capacity of 1000 MW and 4 more under construction with a capacity of about 1500 MW. Unlike Orissa, privatisation of distribution. (as planned in the reform programme) was not carried out. Quoting high interest and unacceptable conditions, the 5 stage World Bank loan was suspended by the State in 2003, after the first stage.

APERC has been regular in issuing tariff orders, having issued an order per year from June 2000. The distribution companies have done well in reducing losses and improving quality of service, especially in urban centres. Upto June 2005, APTRANSCO was responsible for power purchase and coordination of all DISCOM operations. From June 2005, power purchase function has been transferred to DISCOMS. APGENCO has been getting performance awards for its generating stations. In the power sector rating process of CRISIL/ ICRA started in 2003, AP power sector stood first in 2003, 2nd in 2004 and 1st again in 2005[3].

3.1 The internal mechanisms

The internal grievance redressal mechanism of the distribution utilities in AP include consumer rights statement (APERC, 2002), citizen charter (released by the utilities - see Box 1), centralised complaint booking facility (e.g. Centralised complaint number - 1912 for DISCOMs), consumer service centres and periodic public meetings (Adalats) conducted with consumers to sort out complaints.

Box 1: AP Citizen's Charter

The idea of Citizen's Charter was initiated by MoP in 1999, when a model charter was released. The AP Citizen's charter begins with:

The aim of Transmission Corporation of Andhra Pradesh Ltd. (APTransco)/Discoms is to declare publicly, the service assurance given to the customers, who pay their bills regularly, for power and utility services from APTransco/Discom.

Citizen's charter commits time limit for handling fuse off calls, voltage problems, meter & billing complaints, new connections etc. It gives formats for applications, complaints and details of officers who should be approached for filing complaints. Posters with a summary of this charter were widely distributed throughout the state.

The first regulation on Standards of Performance (SoP) was notified by APERC in September 2000. This regulation covers quality of service indicators and time limits for responding to consumer complaints. Areas covered are: I) Restoration of power supply, II) Quality of supply – voltage & frequency, III) Period & notice of scheduled outages, IV) Meter complaints, V) Application for new connection/modification and VI) Billing complaints. Details of 29 performance indicators spread over these 6 areas are given in Table A3.2.

It can be seen that there is no compensation to the consumer if the target time limit is not met by the utility and there is no overall performance benchmark. The regulation also does not require utility to file reports on standards of performance. Subsequent to the E-Act, a modified SoP regulation was prepared, as detailed in section 3.3. Regulation on Grievance Redressal Forum

[3] It should of course be noted that this rating process is heavily linked to the investment climate in the State

and Ombudsman was also prepared after the E-Act, as described in the next section.

3.2 GRF and Ombudsman

Table A3.3 summarises the AP Regulation on Grievance Redressal Forum (GRF) and Ombudsman. APERC prepared a draft regulation in November 2003 and invited suggestions from general public, consumer groups and utilities. The final regulation was prepared in February 2004.

APERC notes in the introduction of the regulation that all distribution utilities already have a complaint handling procedure. GRF is an additional forum, which the consumer can approach if he/she is not satisfied with this procedure or even without going through that. APERC also notes that by and large, GRF is an internal forum of the utility. The provisions of having a co-opted member from a consumer group and the clauses to ensure transparency are expected to give some objective status to the forum.

3.2.1 GRF

Every distribution utility is expected to set up GRF, in addition to the existing complaint handling mechanisms. The GRF regulation suggests setting up one GRF/utility. After an initial review, if consumer complaints are not sorted out in 45 days, utility can consider setting up more GRFs. As can be seen from Table A3.3, each GRF has 4 members, appointed by the utility. Qualifications of the members ensure that technical, financial, legal and consumer expertise is present in the GRF. All members, except the co-opted one are expected to be serving or retired employees of the utility. The idea of having a GRF member from the consumer groups is indeed welcome. But relegating the member to a co-opted position and not giving voting right is disappointing. As seen in Section 4.2 and Table A3.5, many states have the provision of having consumer group representative in the GRF with voting rights. GRF members have a fixed tenure of 3 years giving them some stability. Procedure for removal of members calls for significant failure on the part pf the member and can be done after a due enquiry. Age limit of the members is 62 years and there can be no re-appointment. Vacancies are expected to be filled in 2 months. GRFs are expected to file regular reports to the utility and the SERC. The complainant (not the utility) can appeal against the decision of the GRF to the Ombudsman.

Initial steps for setting up GRFs were taken in February 2005 with one GRF per DISCOM and some of the GRFs are functional. But the general awareness of GRFs is poor in the State as of now. Information about GRFs is not available on the websites of the DISCOMs (as of June 2005) and there has been very little publicity about them in the media.

3.2.2 Ombudsman

The institution of Ombudsman is called 'Vidyut Ombudsman' in AP. Considering the fact that areas like banking, insurance and stock exchange already have their own 'ombudsman', giving a separate name is welcome. The initial regulations giving the broad functions of Vidyut Ombudsman was released by APERC in February 2004, but another one giving details of appointment and terms & conditions is in draft stage. Therefore, Vidyut Ombudsman is still not appointed by the APERC (as of June 2005).

Table A3.3 gives summary of the provisions of the two regulations of Ombudsman. Every distribution utility may have one Ombudsman each or one may handle two or more utilities. Vidyut Ombudsman is expected to be a single person institution with a support staff of 4. Its office is expected to be located at Hyderabad with the provision that hearings may be held at other places in the State. A fairly senior person with long years of experience (as given in Table A3.3) is expected to be selected by the APERC. A 3 –year fixed term is specified with no re-appointment. Age limit is 65 years and SERC can remove the Ombudsman after an enquiry finds fault.

Appeals to Ombudsman can be filed by a complainant within 30 days of decision by the GRF. Appeal can also be given if the GRF does not give any decision on a complaint within the stipulated 45 days. Ombudsman is expected to try for a reconciliatory settlement after hearing both the complainant and the utility. The final decision by the Ombudsman is expected to be given within 90 days.

3.3 SoP regulation

APERC published a draft SoP regulation, subsequent to the E-Act, seeking comments from public and utilities. Subsequently, the SoP regulation was notified in June 2004. This regulation differs from the earlier one in three main aspects: 1) there are more performance indicators;

2) utility has to pay compensation to the consumer if the performance target is not met and 3) an overall performance benchmark is specified for performance indicators. Table A3.4 gives the details of 39 indicators distributed over 4 areas- I) Restoration of power, II) Quality of supply, III) Metering & Billing and IV) New connections/modifications.

Time target is the maximum time the utility is expected to take to rectify the fault after it receives a complaint. In the SoP regulation, this is called the guaranteed standard of performance. In cases involving consumer payment (e.g. new connection), time target is the time taken after all formalities and receiving payment. Utility is expected to register every complaint and give a complaint number to the consumer.

The fourth column gives the compensation payable in case of default. The amount given is for the situation when a single consumer is affected. In case of power breakdowns or voltage problems, when more than one consumer is affected, the compensation payable to each consumer is half the respective amount. For example, if a DT failure in a rural area is not attended within the stipulated 48 hours, if many consumers are affected, each of them will get Rs.50/-. Provision of paying compensation is effective after 3 months of notification (June 22, 2004), urban areas and 1 year in rural. It is to be paid by the utility as adjustment of bills within 90 days from the date of default. If the utility does not pay this amount, consumer can approach the GRF.

The last column gives the overall performance benchmark in percentage. This value is the percentage of complaints satisfactorily attended within the time limit. For example, 99% of the fuse-off complaints from urban areas are to be rectified within 4 hours. The period used for calculation of this is not explicitly stated, but it is expected to be 1 year. The SoP regulation gives these benchmark values in Schedule III, 'Overall standards of performance'. This section also gives permitted variation for frequency, voltage unbalance, billing mistakes and faulty meters. These are given in the Notes below Table A3.4.

The AP regulation suggests using 3 supply reliability indices SAIFI (System Average Interruption Frequency Index). SAIDI (System Average Interruption Duration Index) and MAIFI (Momentary Average Interruption Frequency Index). These are typical reliability indices related to consumer supply, calculated using annual field data. See Annexure 2 for the standard definition of these indices. The AP regulation (and as seen subsequently, all other State regulations) use these indices in the feeder context, with some change in the formula for calculation. Thus SAIFI, SAIDI and MAIFI refer to 11 kV feeder interruptions (not consumer interruptions) and the index is calculated using one month data (not annual data). The interruption is also given a weightage, based on the connected load on the respective feeder. To illustrate using the case of SAIFI:

$$\text{SAIFI} = \frac{\Sigma\,(\text{Connected load of feeder} \times \text{Number of sustained interruptions of this feeder in the month})}{(\text{Total connected load on all feeders})}$$

It can be seen that this is not an average value, since the total number of interruptions is not used in the calculation. SAIFI as calculated here is the weighted total number of feeder interruptions, i.e., the sum of individual feeder interruptions weighted by the proportion of load it carries. Thus, it cannot be used to compare reliability figures of two utilities which have different number of feeders.

Indices for rural and urban feeders are to be calculated separately. Feeders serving predominantly agriculture loads are excluded from the calculation and indices for those are also to be separately calculated. Since these calculations are new, the regulation does not suggest any target values for these indices.

Considering the lack of reliable data on consumer interruptions, it is a good idea that SoP regulation suggests using feeder interruption data to calculate reliability. But then, it was perhaps not necessary to employ jargon like SAIFI, SAIDI etc, especially since the formulae suggested are not as per the standard (given in Annexure 2). Calculating the average duration and frequency of 11 kV feeder interruptions, calculating the per km interruption of 11 kV feeders etc would have been easier and sufficient to assess system reliability.

The regulation gives conditions when the utility can get exemption from meeting these standards of performance. These '*regulations are suspended during Force Majeure conditions such as war, mutiny, civil commotion, riot, flood, cyclone, lightening, earthquake, or other force and strike,*

lockout, fire affecting the Licensee's installation and activities'. It is hoped that this clause will be used only in extreme cases and not for any storm or lightening, which in fact are the times when it is critical for consumer to get good service[4]. It shall also not apply if the violation of the regulation is due to '*grid failure, a fault on the Transmission Licensee's network, or on account of instructions given by SLDC, over which the Distribution licensee has no control'*. In a 3rd clause, the Regulatory Commission may absolve the licensee from compensating the consumer for any default, after hearing the Licensee and the affected consumers. RC can give such an order, if it is satisfied that the reasons for the default are not '*attributable to the Licensee and the further that the Licensee has otherwise made efforts to fulfil the obligations'*. These are the 3 escape routes for the utility provided in the regulation. These can be justified provided that they are used in the right spirit to handle uncontrollable situations and not as an excuse to avoid accountability.

Utilities are expected to report the status of SoP implementation to the APERC. The regulation specifies monthly reports and annual consolidated report on committed time lines for complaint response. Quarterly and annual consolidated reports are to be filed regarding the performance targets, compensation and overall performance benchmarks. APERC has provided detailed format for providing these reports and it is understood that all utilities are filing these reports. This is a welcome step and one hopes that APERC is able to carry out detailed analysis of these reports and suggest areas of improvement to utilities. As a step towards improving transparency and participation, it will also help if these data are made available to interested public at the RC or utility websites. A part of these reports are given in the annual ARR filings submitted by DISCOMs during the tariff process. But the amount of detail given in these is quite less. They currently cover only few gross level indices like 11 kV feeder breakdowns, DT Failures, meter burnouts etc. See Box 2 on 2004 ARR filing in AP.

Box 2: QoS Reporting in ARR by DISCOMs [3]

The amount of data and the level of analysis of QoS indicators in the ARR submissions are not comprehensive or complete. In the ARR submissions made in November 2004, all the 4 DISCOMs in AP gave data related to 11 kV and 33 kV system (mainly feeder outages), number of pending applications for new connections, accidents and defective meters (Sections 7.8 to 7.12, ARR for 2005-6). Only one DISCOM (NPDCL) gave the outage data of the LT network, and that too for urban areas (Table 11.a.3, ARR for 2005-6). This covered number of complaints received and time taken for rectification – maximum, minimum and average – for individual fuse off, service wire defect, LT fuse off, LT line fault, HT fuse off and DT failure in urban areas. A cursory analysis shows that over 35,000 individual fuse off calls were received in the year 2003-4 from towns and municipalities in NPDCL. The maximum time taken to rectify them was 9 hours and minimum was 6 minutes. Average was about 2 hours. Compared to this, the 4 hour time limit for urban fuse off rectification in the SoP regulation looks very comfortable. The number of DT failure complaints was about 600 in 2003-4. Minimum time for rectification was 75 minutes and maximum 24 hours. Average was around 5 hours in most towns, but was 15 or 18 hours in some. The SoP time limit for rectifying DT failure in urban areas is 24 hours.

[4] It is interesting to note that in the October 2002 storms in UK, the regulator received over 3000 consumer complaints related to standards of performance and after processing, they had to pay 1.8 million pounds – about Rs. 11 Crores – as compensation! [7].

4. COMPARATIVE REVIEW OF OTHER STATES

4.1 Introduction

This section gives a brief comparison of the ongoing QoS process in 11 different states. Regulations on GRF, Ombudsman and SoP are compared based on a few selected parameters. The objective is to initiate a discussion on possible best practices. The states chosen are:

i) Andhra Pradesh (AP)
ii) Delhi
iii) Gujarat
iv) Haryana
v) Karnataka
vi) Maharashtra
vii) Orissa
viii) Rajasthan
ix) Tamil Nadu
x) Uttar Pradesh (UP)
xi) West Bengal (WB)

States with a relatively long history of regulation with many tariff orders and regulations (Orissa, Haryana, AP, Karnataka, Maharashtra, UP, West Bengal) form one group of states. Delhi (a union territory and not a State) is chosen considering the privatisation of distribution in mid 2002. Tamil Nadu is comparatively new to the regulatory processes, but is known for established systems and practices. Gujarat and Rajasthan are two other major states taken to provide more coverage. Considering that UK has been in the forefront of power sector restructuring and Indian systems have largely borrowed from UK practices, few SoP parameters specified by the UK regulator (Ofgem) for distribution utilities are also given.

Comparison is carried out for GRF, Ombudsman and SoP Regulations. For GRF and Ombudsman, key parameters like date of regulation, constitution of the body including qualification of members and time limit for handling the complaint are compared. These are given in Tables A3.5 & A3.6 and explained in sections 4.2 & 4.3 respectively.

For SoP, comparison uses 12 parameters. These are: 1. Fuse off, 2. DT Failure, 3. Resolve voltage problem – no network change, 4. Resolve voltage problem – with network change, 5. Burnt meter replacement – licensee problem, 6. Burnt meter replacement – consumer problem, 7. Bill complaints – no additional information needed, 8. Bill complaints- additional information needed, 9. LT (non-agriculture) new connection – no network change needed, 10. LT connection title change, 11. Connection category change and 12. Effective date – for standards and compensation. Table A3.7 gives the data on SoP and section 4.4 explains the comparison.

4.2 Grievance Redressal Forum

Table A3.5 gives the comparative data on GRFs for 11 States. In most cases, there is a single regulation for GRF and Ombudsman. Orissa, Maharashtra, Delhi, Gujarat, AP and Tamil Nadu have formed GRFs. In half the cases one GRF is planned per utility/licensee. In other, more GRFs are formed in the state with 1/ zone or circle – Orissa has 10, Maharashtra 15 and Tamil Nadu 37 GRFs. West Bengal has planned a 3 – tier grievance handling mechanism, with district, regional and corporate level tiers. In cases where only one GRF/ licensee is planned, there is a provision to increase the number of GRFs based on consumer convenience (e.g. TN mentions less than 100 km travel) or if cases are not handled within the target time. The strength of GRF is typically 3, except in cases like AP (4) and UP (2). Typically the GRF is to be constituted from working or retired employees of the utilities and the Chair is to be a rank of SE or higher. Maharashtra, Tamil Nadu and UP regulations provide for having GRF members drawn from a wider spectrum – like judges, professors, civil servant etc. Almost all states have the provision of having one member drawn from consumer group/NGO. AP and Orissa regulations call them as co-opted members and

do not give them voting rights. In all cases, the utility has the responsibility of appointing all the GRF members, except a minor variation in the Tamil Nadu regulation, which gives the District Collector the authority to appoint the consumer representative. The West Bengal regulation gives power to the RC to remove a grievance officer, where as in other cases, utility has the power to remove a GRF member. All regulations provide the time limit for GRF to dispose the complaints and it is 45-60 days, except in Haryana, which provides 90 days.

Delhi has 3 distribution companies and each have one GRF, functioning from June 2004. Table 1 shows the details of the complaints received by the three GRFs till July 2005 [24].

It can be seen that the number of complaints are high at 1558, which works out to 43 complaints/month/ DISCOM. Out of these, it is commendable to see that 95% have been disposed off and out of these 79% were in favour of consumers. It may also be noted that, of the total 1558 complaints, majority (84%) are in the area of metering & billing.

4.3 Ombudsman

Table A3.6 gives comparative data on Ombudsman in 11 states. Only Maharashtra, West Bengal and Delhi have formed Ombudsman, even though the regulations have been notified sometime ago. In most cases, Ombudsman is expected to be a single member institution for the whole state. The regulation has given a list of areas of expertise for the position, but it appears that a judicial background may be preferred. State Regulatory Commission will appoint the Ombudsman. Ombudsman is expected to arrive at a compromise between the consumer and the utility to the maximum extent possible. The time limit for deciding on a case is typically 90 days. Some states (Haryana) give the provision of appeal to the SERC on Ombudsman decision. This is a debatable issue, since the E-Act does not provide for this and perhaps it is best that the SERCs are kept out of the consumer grievance issues.

Data available about Ombudsman in Delhi and CESC – Kolkotta from June 2004 for one year is given in Table 2 [24,25].

It can be seen that Kolkata had more number of complaints and most of them were admitted. (Case is not admitted if the due procedure is not followed. e.g. Utility or GRFs were not approached before). CESC has a larger backlog of cases. In Delhi, most of the cases have been decided in favour of the consumers. Similar data is not available for CESC, Kolkata.

4.4 Standards of Performance

Table A3.7 gives comparative data for SoP regulations for 11 states and the UK regulator Ofgem. State regulations typically cover 30-40 performance indices each. Few are chosen for comparison. Another task is to capture all the performance indicators covered in these 11 states. This is described later. A few important observations from Table A3.7 are given below.

a. Most states have given performance targets (e.g. replacement of DT within 24 hours) and the compensation to the consumer if utility fails to meet this target. But only AP, Haryana, Karnataka,

Table 1: GRFs in New Delhi- Complaint information (June 2004- July 2005)

1	2	3	4	5	6	7
Total Complaints	Disposed off	In favour of consumers	Metering & Billing complaints	New Connections	Frequent breakdowns	Other
1558	1319 (85% of 1)	1037 (79% of 2)	1303 (84% of 1)	122 (7.5% of 1)	29 (2% of 1)	104 (6.5% of 1)

Table 2: Ombudsman - Complaint information (June 2004- July 2005)

Location	Total Complaints	Admitted	Disposed off	In favour of consumers
New Delhi	36	18	13	10
CESC- Kolkotta	101	96	52	NA

Orissa, and TN have consistently given overall performance benchmarks (e.g. DTs will be replaced within 24 hours in **95%** cases). Specifying an overall performance benchmark, reviewing the actual time taken to attend to complaints and analysing this data for different consumer groups will make it easier to monitor performance and thus help in improving it.

b. Parameters for some performance indices are surprisingly similar for many utilities, though these utilities operate under widely different geographical conditions, load patterns, consumer mix and O&M resources. This is the case for Fuse off calls, DT failure and LT new connection. It is interesting to note that in the case of Fuse off call, most utilities have similar target figures as Ofgem (3-4 hours, compared to 3 hours of Ofgem). It is of course a good beginning to start with some numbers, since it helps in monitoring. But in a critical vein, one could wonder if the reason for similarity of figures is that very comfortable targets have been specified. A cursory comparison with the previous SoP regulations (made 4-5 years ago in cases like Orissa, AP) show that there has not been much change in the performance target figures. One has to analyse actual performance data to decide if these figures are right. If the actual performance figures of utilities are much better than those specified, then these figures need to be revised downwards.

c. Only West Bengal has specified graded performance indices and compensation values, which change over the years. For example, urban fuse off call is to be attended within 4 hours in first year, 3 hours in second and 2 hours thereafter. The compensation for not meeting this target is Rs. 25/ hr in the first year, 125 in the second and 500 subsequently. West Bengal also has different target figures during monsoon period.

d. The amount and the mode of compensation vary a lot. In most cases, compensation is a fixed figure payable per default. But there are many cases in which the compensation increases with delay in rectification of the complaint. This can be per hour, day or week or units like per 6 hour. It would have been better to bring some common approach across all states to make this matter simpler.

e. Payment of compensation is specified as automatic in most cases in Haryana and Tamil Nadu. In most other states, consumer has to apply for compensation. Making the payment automatic will put more pressure on the utilities.

f. Both the numerator and denominator has to be looked it for comparing compensation figures. Maharashtra has relatively high compensation for not attending to fuse off calls (50/hr), but low for many other cases (e.g. 100/week for burnt meter replacement, new connection) and not specified for many cases. In Gujarat and TN, compensation for fuse off is low (Rs. 25/6 hr and 50/6hr) and so is for DT failure (Rs. 25/6 hr and 50/6hr).

g. The compensation specified by Ofgem for UK utilities is quite high. For example, converting to the same currency, it can be seen that Ofgem compensation for fuse off call is nearly 25 times that of the AP one, when the per-capita income in UK is only about 10 times that of India. One has to see if this is due to the very liberal performance parameters specified by Ofgem.

h. SoP regulations are quite complex, with many performance indices, variety of time frames for rectification and differences in compensation. Compared to this, the Ofgem regulation has much fewer performance indicators. See Tables A3.8 and A3.9 for Ofgem details.

Tables A3.8 and A3.9 give details of the British regulator - Ofgem parameters to monitor quality of service for distribution utilities in UK. It can be seen that the number of indicators are few - 9 guaranteed standards with time targets and 6 overall standards with % benchmark figures. But from the Ofgem annual reports [9], it can be seen that the quality of data collection and rigour of analysis is quite good, perhaps because these indicators are used for performance based regulation. Many other European standards have similar structure with few indicators [10].

Table A3.10 gives a consolidation of the quality indicators included by 11 states. It can be seen that there are 54 indices spread over 5 categories (restoration of supply, quality of supply, metering & billing, new connections/ modifications and other). Accident compensation, complaints on inadequate clearances, identity card for staff and keeping of appointments are some interesting indices included by some states. All regulations require SoP reports to be prepared by the utilities. Maharashtra regulation requires these reports to be made available on the utility website.

□

NOTES

5. ON TRACK, BUT MILES TO GO

5.1 Introduction

In the previous 4 sections, the background and the process of the quality of service (QoS) for distribution utilities have been covered. Efforts towards quantifying the performance indices for QoS and setting up monitoring systems have increased subsequent to the E-Act 2003. This process is being led by the State Electricity Regulatory Commissions. As a typical case, the QoS process in AP was covered in some detail – giving information about GRF, Ombudsman and the SoP regulations. Since many states have initiated the QoS process, an exercise in comparison of the provisions in the GRF, Ombudsman and SoP regulation was done covering 11 states and the UK regulator Ofgem. This and the consolidation of all the SoP indices may help to cull out the best practices.

5.2 QoS Process – Necessary and on Track ...

Formulation of performance indicators, reporting, incentives and awards in the generation sector have been in place for decades now. Similar systems for the distribution sector should have been in place much earlier and monitoring mechanisms stabilised. Delay in formalising can be attributed to the long neglect of the distribution sector. But it is a welcome sign that many utilities are now working on a process of systematically monitoring and improving quality of supply and service. The GRF, Ombudsman and SoP regulations have introduced **measurable quality indicators** and form a very important necessary step in this process.

Institutions of GRF and Ombudsman have the potential of making the complaint handling process of utilities more transparent and accountable. This is indeed a positive development and consumer groups should take advantage of this. A vibrant, sensitive, participative GRF can indeed go a long way to improve the public image of the utility and improve consumer confidence. It is to be seen how this new institution positions itself between the utility staff and consumers for fair handling of grievances.

Even if the regulatory mechanism does not financially reward quality supply and service, there is an important need for monitoring the quality of service of the utility. This is because of the realisation that poor quality of power supply and service are costly to society. Studies on use of voltage conditioning equipment, agriculture pump or DT burn outs have brought out this issue. The SoP regulation has introduced a variety of consumer related performance indices in place of a few macro utility related indicators like T&D loss, Aggregated Technical & Commercial loss (ATC), percentage billing & collection, total arrears etc. It is true that few consumer related indicators like 11 kV breakdowns or DT failure have been recently added to this list of macro indicators. But these macro indicators mostly relate to utility performance and improvements in these areas improve the health of the utility. And the assumption is that an improved utility provides better service to consumers. This correlation need not necessarily be true. SoP regulation, by increasing the granularity of performance measures, has the potential of mounting pressure on the utility to continuously improve consumer service in a more equitable manner. This makes sense in case of private utilities, where the consumers have no direct route to fight for accountability, as well as for public utilities where institutions for accountability have been eroded over the past many years. Of course, there has to be balanced approach to the quality required, since quality comes with a price. This is possible with proper prioritisation of quality measures.

5.3 ... But little progress?

There are many indications showing the slow or poor progress in making the QoS systems effective. These could be the teething problems or due to lack of commitment of the utility and regulators. Sections below give some details.

5.3.1 Poor publicity

As shown in the Karnataka consumer survey (see Annexure 1) and judging from the amount of information

in the media, awareness of quality of service processes is very poor. Number of cases registered with the GRFs are as low as 4-5/month in some cases. Utility and regulators can do much better in giving wide publicity and generating more awareness on these regulations and to undertake consumer capability building measures so that these are utilised. Websites of distribution utilities and SERC should have details of the GRF and Ombudsman – functions, procedures, contact details etc. (as done in some states). Innovative use of websites, conducting training programs, campaigns through posters or using electricity bills and wide publicity using media etc will help.

5.3.2 Quality of GRF/Ombudsman appointments & staff

All states should finalise the GRF and Ombudsman regulations. Positions of GRF and Ombudsman should be filled in a transparent manner through advertisements. In many states, positions of GRF and Ombudsman and supporting staff members have not been filled. They should be finalised and the offices set up. Its members need to be trained to appreciate the provisions of the relevant regulations (GRF & Ombudsman, Standard of Performance, Licence conditions, Terms & conditions of supply etc). They also need to get an appreciation of practices in states where GRFs are already functional.

At this initial stage, GRF and Ombudsman have to make significant pro-active efforts to win the confidence of the consumers as a credible institution, sensitive to their problems. Complaint registration and processing systems of GRF and Ombudsman should be transparent and open to participation by those interested. Proactive measures to address grievances of the consumer should be taken. Complaints and suggestions should be encouraged. Surveys could be undertaken to understand the consumer problems.

It is a credibility building measure to have consumer representatives as members of GRF. In this context, the provision about GRF in the recent publication of Electricity Rules by MoP in June 2005 [21] indicating that GRF members shall consist of officers (of utility) is a retrograde move. It is disappointing that the MoP is insisting that all members of GRF should be officers of the licensee, when many existing state regulations include consumer representatives and GRFs have already been set up with them as members!

5.3.3 Credibility of the SoP targets & benchmarks

Target and benchmark values for quality of service could have been arrived through **consumer surveys** and **study of current level of performance**. It is surprising to see similar target values for all licensees in a state and across states, when the nature of distribution system and problem vary widely (for example, urban fuse off call is to be addressed in 4-6 hours for all licensees). In these initial stages, when we depend on utilities to do self-regulation, these figures may do as starting numbers. But there is a need to collect ground level data – in terms of performance levels and problems (like complaint register details, actual time taken to attend to complaint etc) to make these performance targets and benchmarks meaningful. In addition to consumers, employees and intermediaries (like wiremen, contractors) also should be included in the survey.

It will be useful if some typical consumers (or consumer groups) are equipped with **quality monitoring and analysis tools** (like simple equipment to monitor and record presence of supply, simple computer based analysis tools) to provide credible feedback. Performance data should be made available to all those who wish to monitor and validate it through cost effective tools like web pages. These steps will help to evolve credible performance indicators over a period of time.

There have been little systematic efforts to capture SoP data, review them and have **independent validation** with a view to validate the data and improve the targets and benchmarks. The telecommunication regulator TRAI commissions independent studies on the quality of service of telephone utilities and periodically publishes reports. Ideas can be borrowed from this approach. Perhaps India needs agencies like the North American Electricity Reliability Council (NERC) of the USA[5], which focus on independent monitoring of bulk power systems.

5.3.4 Re-look at the prioritisation of performance indices

There is also a need to prioritise indicators. At this stage, the focus could be on **consumer interfacing and group**

[5] NERC is a non-profit corporation with the 10 regional reliability councils of North America as members. The members of these councils come from all segments of the electric industry: investor-owned utilities; federal power agencies; rural electric cooperatives; state, municipal and provincial utilities; independent power producers; power marketers; and end-use customers. These entities account for virtually all the electricity supplied and used in the United States and Canada.

indicators – complaint handling system, distribution transformer failure, feeder interruptions, tail end low voltage, etc which have impact on a large number of consumers. It is important to give high attention to good quality 11 kV metering, division / zone wise MIS reports, DT metering etc. These are 'low lying fruits' for improvement of quality of service - easy to measure and monitor. Improving the consumer interface including the complaint recording procedure and response to complaints are critical to build confidence in the system. For example, it is good to see the TN regulation on SoP having a performance index related to keeping consumer appointment.

The regulations could be made simpler with few essential indices and time taken to stabilise the monitoring system. This is essential to gain credibility at the initial stages. Initial measures of quality of service could even be from a mix of qualitative consumer satisfaction surveys and few measurements. After having a few measurable indices, a phased **approach** can be taken to expand the list. The approach could be guided by the initial goal of taking the whole system with a poor performance level (satisfaction level below 50% as shown by some consumer surveys – see Annexure 1) to a reasonable level of say 75%. One should not be caught in the craze to improve 99% performance levels of some urban systems to 99.99% level. It should be understood that web enabled services, bank payments, check drop facility etc, which are typically helpful to urban middle class should not be overemphasised while measuring consumer service. The idea of having difference performance targets based on geography or consumer category also needs to be explored. This is right now limited to having different indicators for rural and urban areas. But of course, it should not happen that **rural quality of service** is forever neglected by giving extremely comfortable performance targets.

Complex indices like SAIFI, SAIDI, harmonic content etc can be considered much later or on a very selective basis. Method of calculation suggested also needs discussion as mentioned in section 3.3. Almost all state regulations mention these sophisticated indices to be implemented in future. There is no consistency in the methods suggested for calculating and monitoring these indicators[6].

The approach towards phasing is summarised in Table 2. The first phase is related to consumer interface, the second one to quality of supply and the third one to system improvement. Phase 2 could be taken up once the required minimum systems for monitoring Phase-1 are in place and satisfactorily operational. The same applies to Phase 3.

5.3.5 Joint work is a must

There could have been better joint work between the SERCs and the utilities while preparing the regulations. This could have avoided duplication of work and ensured meta level consistency. Regulations and procedures of different RCs/utilities are structured in a variety of ways with irritating minor differences. There are few minor typos in some of the regulations which could have been avoided. (e.g. AP: Resolution of complaints on consumer bill – rows are interchanged; Karnataka: Normal Fuse off rectification in urban areas is given as 6 hours in Schedule I and 4 hours in Schedule II). Some common guidelines in content & format of regulations and consensus on few key features (example – amount and mode of compensation) can even now be worked out, perhaps under the initiative of Forum of Indian

Table 3: Phased approach to Quality of Service

Phase No	Phase	Activities
1	Consumer interfacing	Complaint handling, bill payment, transparency of information, survey of existing performance levels, consumer issues. This phase is the essential first step for all utilities.
2	Quality of power delivery	Minimise interruptions, voltage, frequency problems. Stabilise monitoring systems. The second step, once Phase 1 is satisfactory
3	System improvement	Pro-active continuous background activities required to maintain quality of service. Transformer sizing, line maintenance, earthing, protective fencing etc. Use monitoring systems to detect abnormal system operation (overload, under-voltage etc) and to improve even complex indices like SAIFI, harmonic content etc.

[6] Eg. While most indicators use these indicators for feeder reliability, the Maharashtra regulation specifies SAIDI and SAIFI in the consumer context. It defines momentary interruption as those lasting 3 minutes (as against 5 in others) and uses data for 1 year for calculations (as against 1 month in others). It also mentions that data on reliability index will be made available at the RC website.

Regulators (FOIR). It will be also be useful to work out the 'best practices' in regulations, reporting, compliance, improvement etc based on implementation experiences. Table A3.11 is a tentative list of best practices for GRF and SoP regulations prepared by us. This includes inclusion of consumer representative for GRF; automatic compensation, benchmark values etc for SoP.

It is also important that the utilities, SERCs, GRFs and the Ombudsman continue to work in close coordination. Intra-state open access and trading are being introduced with GRFs and Ombudsman given roles of dispute resolution. These are much more complicated than consumer grievances and institutions have to be geared up to handle them.

Table 4: Reporting on SoP status

Reports	E-Act Provisions	State Regulations	Information available in Public domain
Reports by Utility to RC	- Section 59 (1), (2) - Level of performance targets - Number of compensation cases and total amount	- Monthly and Annual reports - Level of performance targets - Number of compensation cases and total amount - Measures taken to improve performance - Utility assessment of targets - Level of performance benchmarks - Measures taken to improve performance	- Some data in annual tariff submissions of utilities - Gross level information like feeder breakdowns, DT failures etc - No analysis/validation by RC or independent agencies - Complete data on SoP indicators not available on utility website - No data on status of cases with GRF/Ombudsman on utility website
Reports by RC	- Publish information at least once a year	- To publish information at intervals as RC deems fit	- Gross level information like feeder breakdowns, DT failures etc - Complete data on SoP indicators not available on RC website - No data on status of cases with GRF/Ombudsman on RC website

5.3.5 End to end commitment

Utilities and Regulatory Commissions should be serious to make QoS provisions work as pressure points on the utility performance and accountability. There has to be sincerity and openness from both, especially the utility to include consumers in the process. Reporting on SoP regulations should be detailed and available for public review.

The E-Act and State regulations require that reports on Standards of Performance are prepared. Table 4 gives the provisions in the E-Act, in the State Regulations and the current status.

It can be seen that E-Act provides a framework for reporting on SoP of utilities. Many State level regulations have elaborated on these. Some RCs like APERC have provided detailed formats for utilities to report SoP. Part of this information (only at a gross level) is made publicly available in utility tariff submissions. Box 2 in section 3.3 covered the AP case, and similar gross level information is available in few other tariff submissions (eg. NDPL, New Delhi). Tariff orders of some RCs also provide some gross level information on SoP.

Steps to make complete data available in the public domain should be initiated. This is essential for independent analysis and validation of the data. Public interest groups should be empowered to use this data so that the QoS provisions become necessary and sufficient conditions to continuously improve distribution utility performance. All this can happen only if there is end to end commitment from the utility and SERCs at all stages- formulation, measurement, reporting, analysis, feedback and correction.

5.4 Miles to go

There are many indications to show that there are miles to be covered before the QoS process gains credibility in the eyes of the consumer and can start delivering.

The QoS process has gathered some momentum in the past few years and seems to be on track. Preparation of a framework for quantification of performance and creation of a system for monitoring them are two achievements. With end to end commitment of the utilities/regulatory commissions and participation by consumer groups, this can be put to good use and the objective of continuous performance improvement will be met. The QoS process can then indeed be called necessary and sufficient. □

ANNEXURES

ANNEXURE 1:
CONSUMER SURVEYS AND QUALITY OF SERVICE STUDIES

Consumer Surveys

There have been many consumer surveys and few studies on quality of service in the power sector. Many are related to the impact assessment and consumer perception on reforms (TARU survey in AP 2001 & 2004; INDICA survey in AP 2000; ORG Survey in MP 2001; XIM & NIRD surveys in Orissa; ERM study in Rajasthan etc). Many of these were supported by donor agencies and reports are not available in the public domain.

The Survey of electricity consumers in Karnataka, carried out by the Electricity Consumers Network, supported by the KERC [6] was conducted in 2002. It used consumer organisations to administer a questionnaire to over 5600 consumers from different categories. Questions were on service, quality, billing, metering, and general awareness. Only 18% said that the power quality was good. Half did not know about consumer charter and complaint handling procedures. 56% said that billing mistakes were rectified within a day. Only 14% had their defective meter replaced in 15 days. Many such insights are given in this study, available at the KERC website.

A Consumer satisfaction survey was conducted by ORG – MARG in UP in 2002. Results are reported in the UPERC Tariff order for 2004 [12]. 2609 consumer of different categories from 5 districts were covered. Parameters for survey were quality of supply, accessibility of supply, metering & billing and service. Each of these has further micro-parameters and feedback was obtained from consumer on the level of satisfaction. An overall consumer satisfaction index was calculated using this feedback and some assigned weightage. As per this survey, the overall satisfaction index (on a scale of 1) varied from 0.35 to 0.45. Industrial HT consumers with an index of 0.48 were the most satisfied and Commercial the most dissatisfied with an index of 0.34. The major cause of dissatisfaction was frequent interruption of supply. The same tariff order also reports the average duration of power supply in 2003: it was 9.08 hours/day for rural, 16.5 for district head quarters, 20.5 for cities and 23.4 for industry.

CII, in association with ORG MARG carried out a national level study in 2002 covering 15 states and a sample size of 3272. Consumer perception towards availability, accessibility, and affordability was studied. A Quality of Power Supply Index was calculated. The national average was 0.44, with 0.38 for North, 0.34 for East, 0.42 for West and 0.52 for South. Domestic consumers rated delays in getting connection as the main problem, commercial consumers the interruption problems, industrial consumers the high tariff and agricultural the poor quality of supply. A second study is planned in 2005 by CII, in association with AC Neilson ORG MARG for determining corrective measures with regard to availability, accessibility, reliability, quality and affordability of power supply. [13]

Surinder Kumar in his book [14] reports a survey conducted among employees and consumers in Punjab in the mid 1990s. The sample size of 249 consumers and 99 employees is rather small. But the study is interesting in terms of the variety of questions and depth of analysis. Both consumers and employees rate low voltage as the main supply problem. For consumers, interruption problem comes a close second, whereas it is the third for employees. But interestingly, 79% of the consumers will be happy with uninterrupted power supply. Employees ask for better performance incentives. This report highlights the importance of including utility staff and perhaps even the related intermediaries like wiremen and contractors in any study of the sector.

It is reported that consumer surveys are planned (by utilities like NDPL-Delhi and some SERCs) to gauge consumer perception of quality of service and methods of improving it.

Quality of service studies

Most of the studies so far have looked at gross level indicators like 11 kV feeder interruptions and DT failures.

CEA is reported to have recently prepared a report on the performance of 20 odd distribution utilities in India. Number of 11 kV interruptions and time taken to rectify them has been used as one benchmark. The number of urban 11 kV feeder interruptions vary from 0.004/feeder in Greater Mumbai to 15/ feeder in Kochi. Time taken for rectification varies from 1.85 minutes in Mumbai to 672 minutes for BSES Rajdhani [20].

ARR submissions of some utilities (e.g. AP DISCOMs) give interruption data of 33 & 11 kV feeders and DTs. Consolidated reports (covering utilities from different states) on urban 11 kV feeder reliability are being prepared. A 2004 consolidation by Infraline [17] show 99.997% availability for BEST, 97-99% for most urban centres and 70-80% in some states like UP. The 2005 report on rating of power sector by CRISIL and ICRA [16] give some performance analysis of the Transmission & Distribution system. Pointing out the very low DT burn outs (4.5%) and the high household electrification level (85%) in Kerala are some examples.

ANNEXURE 2:
WHAT ARE SAIFI, SAIDI AND MAIFI? ON RELIABILITY ISSUES [7,8]

SAIFI, SAIDI, MAIFI are some of the indices used to measure distribution system reliability. Before explaining them, a little on the subject of reliability.

Reliability can be defined as the ability of the power system components to deliver electricity to all points of consumption, in the quantity and with the quality demanded by the consumer. Reliability is often measured by the outage indices defined in one international standard called IEEE 1366. (IEEE is the Institution of Electrical and Electronics Engineers, the biggest professional body of Electrical & Electronics engineers. IEEE has its head office in the USA and has presence in most countries). These outage indices are based on the duration of each power supply interruption and the frequency of interruptions. It is clear that all three major functional components of the power system – generation, transmission and distribution contribute to reliability. As far as the consumer is concerned, transmission and distribution outages are important. In fact, surveys (in developed countries) show that 80-90% of the outages experienced by consumers are caused by distribution outages.

A power supply outage is an unplanned event and can be described in terms of the frequency, duration and amount of load (or consumers) affected. A momentary outage is defined as an outage lasting less than 5 minutes, corresponding to the time taken by automatic re-closure schemes to restore temporary faults; a sustained outage lasts longer than 5 minutes (NERC 1996). IEEE standard 1366 gives the definition for outage indices. These indices are calculated using details of consumer interruptions collected from past year's or several year's data. Definitions of few of the indices are given below:

System Average Interruption Frequency Index (SAIFI)

SAIFI is the average number of sustained interruptions per consumer during the year. It is the ratio of the annual number of interruptions to the number of consumers.

SAIFI = (Total number of sustained interruptions in a year) / (Total number of consumers)

System Average Interruption Duration Index (SAIDI)

SAIDI is the average duration of interruptions per consumers during the year. It is the ratio of the annual duration of interruptions (sustained) to the number of consumers. If duration is specified in minutes, SAIDI is given as consumer minutes.

SAIDI = (Total duration of sustained interruptions in a year) / (Total number of consumers)

SAIFI and SAIDI are the most used pair of reliability indices. A North American survey showed SAIFI figure of 1.1 (indicating 1.1 interruption/year/consumer) and SAIDI of 1.5 hours. Singapore is reported to have a SAIDI of 3 minutes. For comparison, the NDPL tariff submission for 2005-6 gives SAIDI figure of 38 hours for 2003-4 and a target of 30 hours for 2004-5 [23].

Consumer Average Interruption Frequency Index (CAIFI)

CAIFI is the average number of interruptions for consumers who experience interruptions during the year. It is the ratio of the annual number of interruptions to the number of consumers affected by interruptions during the year. Consumer is counted only once regardless of the number of interruptions.

CAIFI = (Total number of sustained interruptions in a year) / (Total number of consumers affected)

Consumer Average Interruption Duration Index (CAIDI)

CAIDI is the average duration of an interruption, calculated based on the total number of sustained interruptions in a year. It is the ratio of the total duration of interruptions to the total number of interruptions during the year.

CAIDI = (Total duration of sustained interruptions in a year) / (Total number of interruptions)

It can also be seen that CAIDI = SAIDI/SAIFI

Momentary Average Interruption Frequency Index (MAIFI)

MAIFI is the average number of momentary (less than 5 minutes) interruptions per consumer during the year. It is the ratio of the annual number of momentary interruptions to the number of consumers.

MAIFI = (Total number of momentary interruptions in a year) / (Total number of consumers)

ANNEXURE 3:
TABLES

Table –A3.1: STATUS OF RCs AND QOS REGULATIONS

S. No	State	Constitution of ERC	RC Website	GRF/Ombud-sman Regulation	SoP Regulation-1	SoP Regulation-2	Notes
1	Andhra Pradesh	Mar-99	ercap.org	Feb-04	Sep-00	Jun-04	1. NS: Not set up; NA: Not Applicable/ Available 2. (*): Arunachal Pradesh, Manipur and Mizoram are discussing on setting up a joint RC 3. Date given is the date of constitution & functioning of RC, notification of Regulation. Data from RC websites and News reports. 4. Private distribution utilities are not separately mentioned, since as of now, there is only one regulation for a SERC. All the utilities, including the private ones, follow these. For example, Tata Power and Reliance Energy in Mumbai follow the SoP regulation of MERC, just as MSEB does. 5. There are 28 States in India. Delhi, a Union Territory, is also included in this table for completeness. 6. **: Part of Supply code in UP.
2	Arunachal Pradesh	NS (*)	NA	NA	NA	NA	
3	Assam	Aug-01	aerc.nic.in	Dec-03	NA	Feb-05	
4	Bihar	NS	NA	NA	NA	NA	
5	Chattisgarh	Jul-04	cserc.nic.in	2004	NA	NA	
6	Delhi	Mar-99	dercind.org	Mar-04	Aug-02	Draft	
7	Goa	Apr-02	NA	NA	NA	NA	
8	Gujarat	Apr-99	gercin.org	Aug-04	NA	Mar-05	
9	Haryana	Aug-98	herc.nic.in	Apr-04	NA	Jul-04	
10	Himachal Pradesh	Dec-00	hperc.nic.in	Oct-03	NA	NA	
11	Jammu & Kashmir	Jul-04	NA	NA	NA	NA	
12	Jharkhand	Apr-03	jserc.org	Apr-05	NA	Draft	
13	Karnataka	Aug-99	kerc.org	May-04	2001	May-04	
14	Kerala	Nov-02	erckerala.org	Nov-04	NA	NA	
15	Madhya Pradesh	Jan-99	mperc.org	Apr-04	NA	Jul-04	
16	Maharashtra	Oct-99	mercindia.com	Dec-03	NA	Jan-05	
17	Manipur	NS(*)	NA	NA	NA	NA	
18	Meghalaya	NS	NA	NA	NA	NA	
19	Mizoram	NS(*)	NA	NA	NA	NA	
20	Nagaland	NS	NA	NA	NA	NA	
21	Orissa	Aug-96	orierc.org	Apr-04	Sep-98	May-04	
22	Punjab	Apr-01	pserc.nic.in	Draft	NA	Draft	
23	Rajasthan	Dec-99	rerc.gov.in	Nov-03	NA	Mar-03/Mar-04 (short amendment)	
24	Sikkim	NS	NA	NA	NA	NA	
25	Tamil Nadu	Jun-02	tnerc.tn.nic.in	Jan-04	NA	Jul-04	
26	Tripura	May-04	NA	NA	NA	NA	
27	Uttaranchal	Sep-02	uerc.org	Feb/Mar-04	NA	NA	
28	Uttar Pradesh	Sep-98	uperc.org	Dec-03	Jun-02 **	Feb-05 **	
29	West Bengal	Mar-99	wberc.net	Oct-03	NA	Draft	

Table A3.2: AP SOP REGULATION – 1, SEPTEMBER 2000

S.No	Performance Indicator	Target Time
I	**Restoration of Power**	
1	Fuse off - urban	4h
2	Fuse off - rural	12h
3	Line Breakdown-urban	6h
4	Line Breakdown-rural	24h
5	DT Failure - urban	24h
6	DT Failure - rural	48h
7	Street lights - faults	24h
8	Street lights - defective	7d
II	**Quality of supply**	
9	Respond to voltage & frequency complaint	4h
10	Rectify complaint or reply	10d
11	Rectify if n/w upgradation needed	120d
III	**Scheduled outages**	
12	Notify	NA
13	Duration of outage	12h
14	Time limit	1800 hrs
IV	**Meter complaints**	
15	Inspect meter	7d
16	Replace defective meter	30d
17	Replace burnt meter- utility problem	7d
18	Replace burnt meter- consumer problem	7d
V	**New connection/modification**	
19	LT-non-agriculture -No n/w change	15d
20	LT-non agriculture - With n/w change	30d
21	LT-agriculture	30d
22	HT	120d
23	EHT	180d
24	Title transfer	30d
25	Category change	30d
26	LT Single phase to 3-phase	30d
27	HT to LT and vice-versa	90d
VI	**Bill complaints**	
28	No additional info needed	1d
29	Other cases	15d

Notes:

1. h= hours; d= days; NA = Not Available; urban = cities/towns with population > 50,000
2. Time limit for 14 (of 1800 hrs) implies that there should be no scheduled outage after 1800 hrs.
3. For 18 to 27, the target is after all formalities and consumer payments.
4. For 21, if connection cannot be released due to target limits, reply to be given within 30 days.

Table A3.3: AP GRF AND OMBUDSMAN

Feature	GRF	Vidyut Ombudsman
Regulation Date	Feb-04	Feb-04, Another on appointment etc in draft stage
Expected date of formation	2 months after regulation or 6 months after license	Not specified
Actual date of formation	Feb-05	Not Formed
Number in State	1/ Utility = 4	4 or less
Strength of each	3 + 1 Co-opted = 4	1
Qualification of members	1.Chair: Retired/serving the utility, degree in Electrical, 20 yrs in Distribution, SE; 2. Retired/serving the utility, 10 yrs in Accounts, 5 in Revenue, Sr.Accounts Officer; 3.Retired/serving the utility, 5 yrs in Legal,Asst Secretary;4.Representative of a registered consumer organisation (co-opted)	Legal, engineering, education, industry, civil/administrative service, consumer affairs or eminence
Appointment & support	By utility	By SERC, separate regulation in draft stage
Tenure of member (Yrs)	3, no re-appointment	3, no re-appointment
Salary	Members: As entitled. Coopted: Rs.500/day of participation	22,400-525-24,500 + DA,HRA,CCA
Age Limit (Yrs)	62	65
Removal of member	By utility after enquiry	By SERC after enquiry
Maximum duration of vacancy (months)	2	Not specified
Complaint procedure	Can be at any stage, complaint to be in writing, no fixed format, to be acknowledged by GRF and decided within 45 days	If complainant not satisfied with GRF - within 30 days of GRF decision or decision target (45 days of complaint). Ombudsman can call for documents. Decide within 90 days of complaint.
Appeal	Complainant can appeal to Ombudsman within 30 days of GRF decision	Not specified
Reporting	Quarterly to utility, SERC; Annual report by 31-May to SERC	Quarterly to SERC; Annual report by 31-May to SERC

Notes:

1. GRFs can be more if 45 day target to dispose complaint is not met
2. No voting rights for co-opted member

Table A3.4: AP SOP REGULATION - 2

S. No	Performance Indicator	Target Time	Compensation Rs./default	Overall Benchmark %
I	**Restoration of Power**			
1	Fuse-off - urban	4 wh	50	99
2	Fuse-off - rural	12 wh	50	99
3	Overhead line failure - urban	6 h	50	95
4	Overhead line failure - rural	24 h	50	95
5	Underground cable failure-urban	12 h	50	95
6	Underground cable failure-rural	48 h	50	95
7	DT failure-urban	24 h	100	95
8	DT failure-rural	48 h	100	95
9	Street light faults	24 h		90
10	Notify Scheduled outages (other than load shedding)	24 h		
11	Outage duration -maximum	12 h	100	95
12	Outage time limit	1800 hrs	100	95
13	Reliability Indices	SAIFI, SAIDI, MAIFI		
II	**Quality of supply**			
14	Resolve voltage fluctuation - no network change	10 d	50/d	
15	Resolve voltage fluctuation - with network change	120 d	100/d	
16	Resolve voltage fluctuation - with substation erection	As specified by RC	250/d	
17	Total Harmonic Distortion - 11 kV	8%	Effective date to be notified	
18	Total Harmonic Distortion - 33 kV	8%	Effective date to be notified	
19	Total Harmonic Distortion - EHT	3%	Effective from 1 year of notification	
III	**Metering & Billing**			
20	Inspection of faulty meters-urban	7 d	50/d	
21	Inspection of faulty meters-rural	15 d	50/d	
22	Replace faulty meters - urban/rural	15d after inspection	50/d	
23	Replace burnt meters - licensee cause	7d	50/d	
24	Replace burnt meters - consumer cause	7d	50/d	After due payment
25	Bill complaint resolution - no additional info needed	24 wh	25/d	
26	Bill complaint resolution - additional info needed	7 wd	25/d	

S. No	Performance Indicator	Target Time	Compensation Rs./default	Overall Benchmark %
IV	**New connection/modification**			
27	Release of supply - no network change	30 d	50/d	After due payment
28	Release of supply- Agriculture	30d	50/d	If within target
29	Release of supply - network change, LT	30 d	50/d	After due payment
30	Release of supply - network change, HT	60 d	250/d	After due payment
31	Release of supply - network change, HT 33 kV	90 d	250/d	After due payment
32	Release of supply - network change, EHT	180 d	250/d	After due payment
33	Release of supply - network change, new substation needed	As specified by RC	500/d	After due payment
34	Title Transfer	7 d	50/d	After due payment
35	Category change	7 d	50/d	After due payment
36	LT single phase-three phase conversion & vice versa	30 d	50/d	After due payment
37	LT to HT and vice versa	60 d	100/d	After due payment
38	Re-connection -urban	4 wh	50	After due payment
39	Re-connection -rural	12 wh	50	After due payment

Notes:

1. h= hour; d= day; wh= working hour; wd = working day
2. Frequency variations = -2 to +1%; Voltage unbalance= 3% maximum at source;
   Billing mistakes <0.1% of bills issued; Faulty meters < 3% of meters in service
3. Voltage limits: LT = +6 to -6%; HT = +6 to -9%; EHT = +10 to -12.5%
4. Reliability index calculation: 33 & 11 kV non-agricultural feeders, 5 minute sustained interruption, weightage given to connected load, calculated monthly for whole DISCOM (see Annexure 2)
5. Compensation: Typically Rs/default. Else it is specified as Rs/h or Rs/d; If more than one consumer is effected, compensation is half the amount ;is effective after 3 months of notification (June 22.2004),urban areas, 1 year in rural; to be paid by the utility as adjustment of bills within 90 days from the date of violation
6. Rural = Areas covered by Gram Panchayats, including major and minor Panchayats

Table A3.5: COMPARISON OF GRF REGULATIONS - PAGE 1

S. No	State	Date of Regulation	Date of Formation	Number of GRFs	Strength	Qualification of GRF members	Maximum time for disposal-days	Remarks
1	Andhra Pradesh	Feb-04	Feb-04	1/Utility	3 + 1 coopted	1.Chair: Retired/serving the utility, degree in Electrical, 20 yrs in Distribution, SE; 2. Retired/ serving the utility, 10 yrs in Accounts, 5 in Revenue, Sr.Accounts Officer; 3.Retired/serving the utility, 5 yrs in Legal,Asst Secretary;4.Representative of a registered consumer organisation (co-opted)	45	Combined Regulation for GRF & Ombudsman. More GRFs if the 45 day target cannot be met. 4 GRFs fromed.
2	Delhi	Mar-04	Jun-04	1/Utility	3	1.Chair: Degree in Electrical,SE; 2. Degree in law, 10 yrs in Legal ;3.Representative of a registered consumer organisation, 5 years in consumer matters; Utility to advertise for posts, give 3 names for posts 1 & 2 to RC and get approval. 2 years after retirement from utilities	60	Combined Regulation for GRF & Ombudsman
3	Gujarat	Aug-04	Jan-05	As many as Utility decides	Odd	1. 1/3rd engineers with 10 years in electricity industry; 2. 1/3rd law graduates with 10 years; 3. 1/3rd from consumer associations appointed by utility. Utility to decide Chair person. If suitable person not found, appoint with RC approval.	45	Separate Regulation for GRF & Ombudsman. SEC & AEC formed one GRF each.
4	Haryana	Aug-04	ND	1/Utility or more	3	1. Degree in Electrical/Mechanical,20 years in transmission,distribution,trading, SE; 2. Degree in law, 10 yrs in Legal ;3.Representative of a registered consumer organisation/NGO, Graduate; Age for all between 40 & 62.	90	Combined Regulation for GRF & Ombudsman. Forms for filing complaints and reporting given
5	Karnataka	May-04	F	1/utility	3	1.Chair: Experience in Electrical,finance, law, administration 2. Employee of the utility, SE; 3. Representative of a registered consumer organisation, 5 years in consumer grievances; All should have working knowledge of Kannada	60	Combined Regulation for GRF & Ombudsman. Forms for filing complaints given.

Table A3.5: COMPARISON OF GRF REGULATIONS –PAGE 2

S. No	State	Date of Regulation	Date of Formation	Number of GRFs	Strength	Qualification of GRF members	Maximum time for disposal-days	Remarks
6	Maharashtra	Dec-03	Jul-04	1/zone	3	1. Senior judicial officer or a civil servant not below the rank of a Collector; or Principal of a reputed Engineering college or Professor of the Electrical Engineering of a reputed institute or a senior electrical engineer of the Government (all retired); 2. Executive Engineer rank; 3. Representative of a registered voluntary consumer protection organization of the area, working preferably for 5 years on consumer grievances	60	Combined Regulation for GRF & Ombudsman. Forms for filing complaints given. 1-member GRF if consumers < 1,00,000. 15 GRFs formed – 12 for MSEB, 1 each for TPC, REL & BEST
7	Orissa	Apr-04	Aug-04	1/utility	3	1. President:Serving/retired from the utility, 20 years in distribution, electrical engineer, SE; 2. Serving/ retired, 5 years in finance/accountancy/law in power sector, officer; 3. Representative from SAC/District Committee/Recognised consumer organisation (co-opted member)	45	Combined Regulation for GRF & Ombudsman. More GRFs if 45 day target cannot be met. 10 GRFs formed.
8	Rajasthan	Nov-03	ND & 1/utility	1/district	NS	NS	45	Separate Regulation for GRF & Ombudsman. Both are very brief.
9	Tamil Nadu	Jan-04	F	1/utility or more (37 formed)	3	1.Chair:Full time officer of utility,SE; 2. 15-20 years in finance/law, nominated by district collector; 3. From NGO/Consumer organisation, nominated by district collector	60	Combined Regulation for GRF & Ombudsman. Forms for filing complaints given. Number of GRFs to be such that none need travel > 100 kms.
10	Uttar Pradesh	Dec-03	F	1/circle	2	1. Presiding officer: SE in charge of circle or his nominee, at least EE; 2. Retired district judge/ additional district judge/lawyer with 20 years experience - nominated by GM of utility.	60	Combined Regulation for GRF & Ombudsman.More benches of GRFs if 60-day target cannot be met
11	West Bengal	Oct-03	F	3 Tier	1	3 Tiers - District: AE; Regional: DE, Corporate: CE	49	CESC had 3-tier system before E-Act. RC can change grievance officer

NF: Not Formed; F: Formed; ND: No data; NS: Not Specified; Ad: Advertisement ; Utility = Distribution Utility/Licensee

TableA3.6: COMPARISON OF OMBUDSMAN REGULATIONS

S. No	State	Date of Regulation	Date of Formation	Number of Ombudsman	Qualification	Maximum time for disposal-days
1	Andhra Pradesh	Feb-04	NF	1/Utility or 1/>2 utility	Legal,engineering,education,industry,civil/ administrative service,consumer affairs or eminence	90
2	Delhi	Mar-04	Jun-04	1 or more	Legal,management,engineering,finance, commerce, public administration,NGO. Secretary to the Govt of Delhi or equivalent. 2 years after retirement	90 Money to be deposited with licensee
3	Gujarat	Aug-04	ND	1/State or 1/few utilities or 1/utility. Can be odd numbers also. In that case, one will be the Chairperson.	Retired District Judge or qualified to be one; or 20 or more years in law, management or administration; or retired Chief Electrical Inspector / Chief Executive Officer / Managing Director / Chairman of an electricity sector utility or having 20 years of experience in the electricity industry.	Hearing within 45 days
4	Haryana	Aug-04		1/state	Electrical/Mechanical engineer, 25 years in transmisison,distribution,trading, CE. Age between 50 & 62.	90 Appeal on award to RC
5	Karnataka	May-04	Ad (Apr-05)	1/state	Knowledge in electrical engineering in power sector, finance, law, and administration, working knowledge of Kannada	60
6	Maharashtra	Dec-03	Dec-04	1/state	High Court judge or a Secretary to the Government, or Chief Executive Officer of an utility (all retired).	60
7	Orissa	Apr-04	ND	1/utility or 1/more than 1 utility	Legal,engineering,economics,finance,industry,civil service,consumer affairs or eminence	60 Selection committee = RC members
8	Rajasthan	Nov-03	ND	1/state	NS	90
9	Tamil Nadu	Jan-04	ND	1/state or more	Ability,integrity, experience in sector, high reputation.	90
10	Uttar Pradesh	Dec-03	NF	1/Utility	NS	NS UPERC planning to amend regulation
11	West Bengal	Oct-03	Jun-04	1/utility or 1/more than 1 utility	NS	20-30

NF: Not Formed; F: Formed; ND: No data; NS: Not Specified; Ad: Advertisement ; Utility = Distribution Utility/Licensee

Table A3.7: COMPARISON OF SOP REGULATIONS – PAGE 1

	1. Fuse Off				2. DT Failure				3. Resolve Voltage problem- no n/w change			4. Resolve Voltage problem- with n/w change		
State	Urban hrs	Rural hrs	Compen-sation Rs	Bench-mark %	Urban hrs	Rural hrs	Compen-sation Rs	Bench-mark %	Days	Compen-sation Rs	Bench-mark %, (Note no)	Days	Compen-sation Rs	Bench-mark %
1 Andhra Pradesh	4wh	12wh	50/def	99	24	48	100	95	10	50/d	NA(2)	120	100/d	NA
2 Delhi	3	8	NA	NA	48	48	NA	NA	3	NA	NA	180	NA	NA
3 Gujarat	4	24	25/6h	NA	24	72	25/6h	NA	NA	50/d	NA(2)	60	50/d	NA
4 Haryana	4	8	100/d	99	24	48	100/d	95	4h	100/def	95(2)	60	100/d	90
5 Karnataka	6	24	50/def	99	24	72	50/def	95	7	50/def	95(2)	120	50/def	90
6 Maharashtra	4	24	50/h	NA	24	48	50/h	NA	NA	100/w	NA(2)	NA	100/w	NA
7 Orissa	6	24	100/def	90	24	48	200/def	95	15	200/d	NA(2)	15	500/d	NA
8 Rajasthan	4	24	NA	NA	48	72	NA	NA	10	NA	NA(2)	180	NA	NA
9 Tamil Nadu	3	9	50/6h	75	24	48	50/6h	95	2	250/def	90	180	250/def	95
10 Uttar Pradesh	4	8	50/def	NA	24	72	50/def	NA	1	50/def	NA(2)	180	150/def	NA
11 West Bengal	4	12	25/h	NA	72	216	25/h	NA	15	25/d	NA	180	25/d	
Ofgem	3	NA	20/def	99.5	18	NA	50/def	99.5	NA	NA	NA	180	20/def	100

1. h = hour; d = day; wh/wd = working hour/day; w= week; bc = billing cycle; def= default; NA = Not Available
2. Voltage Limits:LT: +6,-6%; HT:+6,-9%;EHT: +10,-12.5%. Gujarat,Rajasthan has 2% as neutral voltage limit.
3. AP: Compensation is less (about half) if more than one consumer is affected
4. Delhi based on Draft SoP Regulations 2005; rural = suburban
5. Gujarat regulation has: details of filing complaints, monthly grievance meetings at subdivision & circle level; mentions that compensation is automatic after GRF/Ombudsman decision, has details on quarterly/annual reports to be submitted by utilities to RC, asks each utiltiy to form a SoP review committee
6. Haryana: In most cases, compensation is automatic; Regulation has format for monthly reporting; DT failures urban <5%, rural <10%
7. Karnataka: DT failures urban <5%, rural <12%
8. Maharashtra: Benchmark figures not given; Voltage compensation is only for Mumbai - rest to be notified later; Regulation asks for reports to RC and GRF as well as putting the information on website
9. Orissa: In most cases, compensation is automatic;
10. Rajasthan: Regulation has complaint record procedure; monthly grievance meeting at AE and SE levels; RC is to set overall standards and decide on compensation
11. Tamil Nadu: regulation has complaint registering procedure, utility reporting format
12. UP: SoP is a part of the bulky Supply Code regulation: Has detailed complaint procedures; few compensation are automatic, which are to be implemented later
13. West Bengal: Based on SoP draft Jun-04: Has some targets& compensation varying over years (eg.urban FO: 4,3,2 hrs; compensation:25,125,500); longer time frame for rural areas during monsoon (Jun-Sep); compensation automatic for new connections; has reporting formats and details of complaint management.
14. Ofgem: Guaranteed and Overall Standards of Performance 2003;FO- 3h on weekdays&working hrs, else 4 hrs; all compensation in GBP:DT Failure column gives Fault details

Table A3.7: COMPARISON OF SOP REGULATIONS – PAGE 2

		5. Burnt meter replacement - problem attributed to licensee			6. Burnt meter replacement - problem attributed to consumer			7. Bill Complaints - No additional info needed			8.Bill Complaints - additional info needed		
	State	Days	Compen-sation Rs	Bench-mark %	Days	Compen-sation Rs	Bench-mark %	Days	Compen-sation Rs	Bench-mark %	Days	Compen-sation Rs	Bench-mark %
1	Andhra Pradesh	7	50/d	NA	7	50/d	NA	1	25/d	NA	7	50/d	NA
2	Delhi	3	NA	NA	3	NA	NA	15	NA	NA	30	NA	NA
3	Gujarat	7	25/d	NA	7	25/d	NA	1	50/def	NA	10	50/def	NA
4	Haryana	1	200/d	95	7	200/d	95	1	100/d	99	7	100/d	99
5	Karnataka	7	50/def	90	1	50/def	95	I	50/d	99	7	50/d	99
6	Maharashtra	1	100/w	NA	1	100/w	NA	NA	NA	NA	NA	NA	NA
7	Orissa	30	200/def	NA	15	200/def	NA	30	50/d	NA	NA	NA	NA
8	Rajasthan	NA	NA	NA	60	NA	NA	I	NA	NA	7	NA	NA
9	Tamil Nadu	30	100/d	95	30	100/d	95	bc	150/def	95	bc	150/def	95
10	Uttar Pradesh	3	50/def	NA	3	50/def	NA	7	50/def	NA	7	50/def	NA
11	West Bengal	13	25/d	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Ofgem	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes:

1. h = hour; d = day; wh/wd = working hour/day; w= week; bc = billing cycle; def= default; NA = Not Available
2. AP- Faulty meters: to be < 3%; Billing mistakes to be < 0.1%
3. Haryana- Faulty meters to be < 1%; Billing mistakes to be <0.1%
4. Karnataka- Faulty meters: to be < 2.5%:Billing to be 100%; Collection efficiency to be 95%
5. Maharashtra: Burnt meter replacement in rural areas in 2 days
6. Orissa: Faulty meters: to be < 5%;Billing mistakes to be< 0.1%
7. Delhi,UP: If meter burn is due to licensee fault, license will pay for the meter. If it is due to consumer's fault he/she pays for it. amount depending on how old the meter is
8. WB: Burnt meter - urban=13d. rural=16d: reduces over the years, shorter duration if supply is effected – eg. Urban = 46 hours

Table A3.7: COMPARISON OF SOP REGULATIONS – PAGE 3

State	9. LT New Connection - no n/w change			10. LT Connection - title change			11. Connection - Category Change			12. Effective Date	
	Days	Compen-sation Rs	Bench-mark %	Days	Compen-sation Rs	Bench-mark %	Days	Compen-sation Rs	Bench-mark %	Standards	Compensation
1 Andhra Pradesh	30	50/d	NA	7	50/d	NA	7	50/d	NA	Jun-04	Aug-04/Jun-05
2 Delhi	29	(2)	NA	2 bc	(2)	NA	29	(2)	NA	Draft	Draft
3 Gujarat	60	50/d	NA	7	NA	NA	NA	NA	NA	Jan-05	Jun-05
4 Haryana	30	200/d	95	7	100/d	99	7	100/d	99	Jul-04	Aug-05/Aug-06
5 Karnataka	30	200/d	95	7	50/d	99	30	50/d	99	Jun-04	NA
6 Maharashtra	30	100/w	NA	2 bc	100/w	NA	(1)	100/w	NA	Jan-05	Jan-05
7 Orissa	30	100/d	NA	15	100/d	NA	30	100/d	NA	May-04	After RC order
8 Rajasthan	30	NA	NA	NA	NA	NA	NA	NA	NA	Mar-03	NA
9 Tamil Nadu	30	100/d	95	7	100/d	95	7	100/d	95	Sep-04	Sep-05
10 Uttar Pradesh	7	(3)	NA	7	100/def	NA	NA	NA	NA	Feb-05	Automatic later
11 West Bengal	30	25/d	NA	NA	NA	NA	20	25/d	NA	Draft	
Ofgem	30wd	NA	100	NA	NA	NA	NA	NA	NA	Apr-02	Apr-02

Notes:

1. h = hour; d = day; wh/wd = working hour/day; w= week; bc = billing cycle; def= default; NA = Not Available
2. Delhi: Compensation for delay in new connection= 10/1000 of the deposit/day, subject to max of 1000/d; for title transfer = 1000/billing cycle
3. UP: Compensation for delay in new connection= 5/1000 of the deposit/day, subject to max of 1000/d
4. WB: Compensation is Rs. 25/time slab.
5. Effective date for compensation: Many utilities are reported to have sought for extension of this date.

Table A3.8: GUARANTEED STANDARDS OF PERFORMANCE - OFGEM (2003)

S. No	Reporting Code	Service	Target Performance Level	Penalty Payment- Pounds
1	GS1	Respond to failure of distribution fuse	Within 3 hours on weekdays(at least) 7 am to 7 pm, and within 4 hours at weekends between (at least 9 am to 5 pm)	20
2	GS2 *	Restoration of supply following a fault	Supplies must be restored within 18 hours, otherwise payment must be made	50 domestic customers, 100 non-domestic, plus 25 for further 12 hours
3	GS2A *	Multiple interruptions	Four or more separate interruptions each lasting 3 or more hours in any single year (1 April - 31 March)	50
4	GS3	Estimating charges for connection	5 working days for simple jobs and 15 for most others	40
5	GS4 *	Notice of planned interruption to supply	Customers must be given at least 2 days notice	20 domestic customers, 40 non-domestic
6	GS5	Investigate voltage complaints	Visit within 7 working days or substantive reply within 5	20
7	GS8	Making and keeping appointments	Companies must offer and keep a morning or afternoon appointment, or a timed appointment if requested by the customer	20
8	GS9	Notifying customers of payments owed under the standards	Payment to be made within 10 working days	20
* :Customers need to claim under these standards, for the remaining standards payments are automatic				

Table A3.9: OVERALL STANDARDS OF PERFORMANCE – OFGEM (2003)

S. No	Reporting Code	Service	Benchmark Target level -%
1	OS1	Restoration of supply: Minimum percentage of supplies to be reconnected following faults within 18 hours	99.5
2	OS2	Voltage complaints: Minimum percentage of voltage complaints to be corrected within 6 months	100
3	OS3a	New connections: Minimum percentage of domestic consumers connected within 30 working days	100
4	OS3b	New connections: Minimum percentage of business premises connected within 40 working days	100
5	OS4	Correspondence: Minimum percentage of customers letters to be responded within 10 working days	100
6	OS5	Multiple interruptions (from 1 April 2002): Minimum percentage of customers experiencing no more than five interruptions lasting 3 minutes or more	96-99 *
*: Individual Company targets vary between 96-99%			

Table A3.10: CONSOLIDATION OF PERFORMANCE INDICATORS

S.No		Performance Index	Remarks
	I Restoration of Power		
1		Fuse-off - urban	
2		Fuse-off - rural	
3		Overhead line failure - urban	
4		Overhead line failure - rural	
5		Underground cable failure-urban	
6		Underground cable failure-rural	
7		DT failure-urban	Haryana, Karnataka give 5-10 % range
8		DT failure-rural	
9		Street lights - faults	
10		Street lights - defective	
11		Scheduled outage notification	
12		Scheduled outage duration	
13		Scheduled outage time limit	
14		Reliability Indices	SAIDI,SAIFI,MAIFI,CAIFI,CAIDI
	II Quality of Supply		
15		Resolve voltage fluctuation - no network change	Voltage limits as per IER
16		Resolve voltage fluctuation - with network change	
17		Resolve voltage fluctuation - with s/s erection	
18		Voltage unbalance	
19		Neutral Voltage limit	Gujarat, Rajasthan give 2% of supply voltage
20		Frequency variation	
21		Harmonic Content	Rajasthan, Maharashtra (IEEE 519-1992 std)
	III. Metering & Billing		
22		Inspection of faulty meters-urban	Most states give faulty meters to be less than 1-5%
23		Inspection of faulty meters-rural	
24		Replace faulty meters - urban/rural	
25		Replace burnt meters - licensee cause	
26		Replace burnt meters - consumer cause	
27		Meter Reading cycle	Maharashtra

S.No		Performance Index	Remarks
28		Meter Testing	Rajasthan
29		Bill complaint resolution - no additional info needed	
30		Bill complaint resolution - additional info needed	
31		Re-connection -urban	
32		Re-connection -rural	
33		Collection efficiency	Karnataka gives 95% for metered
	IV. New Connections/Modification		
34		Release of supply - no network change	Most states as per E-Act provision
35		Release of supply - network change, LT	
36		Release of supply - network change, HT	
37		Release of supply - network change, HT 33 kV	
38		Release of supply - network change, EHT	
39		Release of supply - network change, new s/s needed	
40		Title Transfer	
41		Category change	
42		LT single phase-three phase conversion & vice versa	
43		LT to HT and vice versa	
44		Refund of Deposit/Closure	
45		Temporary Connection- <10kVA	
46		Temporary Connection- >10kVA	Gujarat
47		Shifting of service (meter,line,transformer)	Gujarat
	V. Other		
48		Accident Compensation	Karnataka, Haryana
49		Issue of certificates	Karnataka, Haryana
50		Respond to complaints	TN,Gujarat, Rajasthan
51		Keep appointments	TN
52		Identity card for staff	Maharashtra
53		Closure of account	Maharashtra
54		Complaint of inadequate clearances	Rajasthan

Table A3.11: BEST PRACTICE FEATURES IN GRF AND SOP REGULATIONS

Grievance Redressal Forum											
S.No	Feature	AP	Delhi	Gujarat	Haryana	Karnataka	Maharashtra	Orissa	Rajasthan	TN	UP
1	Consumer Rep in GRF with voting rights	N	Y	Y	Y	Y	Y	N	NS	Y	N
2	Non-utility member in GRF with voting rights	N	Y	Y	Y	Y	Y	N	NS	Y	Y
3	Fixed Term for members	Y	Y	Y	Y	N	Y	Y	NS	Y	Y
4	No re-appointment	Y	N	Y	Y	Y	Y	N	NS	Y	Y
5	Time limit for grievance handling	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	Standards of Performance										
1	Performance Benchmark	Y	N	N	Y	Y	N	Y	N	Y	N
2	Automatic Compensation	N	N	N	Y	N	N	Y	N	N	N
3	SoP Reporting formats in regulation	N	N	Y	Y	N	N	N	Y	Y	Y

REFERENCES

1. A good beginning, but challenges galore: A survey based study of resources, transparency and public participation in Electricity Regulatory Commissions in India, Prayas, Pune, February 2003
2. YG Rajadhyksha Committee on Power, Ministry of Energy, Government of India 1980
3. Electricity Act 2003, Ministry of Power, Government of India
4. GRF, Ombudsman and SoP regulations of the 11 focus states
5. ARR & Tariff proposals by the Distribution companies in AP for the year 2005-6
6. Survey of Electricity Consumers in Karnataka, Electricity Consumers Network, KERC, Bangalore, December 2002
7. Reliability of the US Electricity system: Recent trends and current issues, Prepared for the US Department of Energy, J Osborn & C Kawann, Ernest Orlando Lawrence Berkeley National Laboratory, University of California, USA, August 2001
8. Reliability Indices, Tom Short, EPRI, presented in T&D World Expo, Indianapolis, USA, 2002
9. Electricity Distribution Quality of Service Report, for 2002-3, Ofgem, London, UK, July 2004
10. Quality of Electricity Supply – Comparative survey, Energy Regulatory Regional Association, Hungary, April 2004
11. NER directive on power quality – a regulatory framework for the management of power quality in South Africa, National Electricity Regulator, South Africa, March 2002
12. ORG MARG consumer satisfaction survey extracts, From Tariff order for UPPCL for 2004, UPERC, June 2003
13. Second Consumer attitude study proposal by AC Nielson, Infraline, New Delhi, March 2005
14. Electricity Theft: Empowerment of people and reforming power sector, Surinder Kumar, Manohar publishers, New Delhi 2004
15. Quality of service: issues and challenges before regulators, Workshop report, TERI, New Delhi 2000
16. Power sector rating, Consolidated report to Ministry of Power, CRISL & ICRA, March 2005
17. Report on Reliability index of urban 11 kV feeders (October-December 2004), Infraline, New Delhi, May 2005
18. Benchmarking for distribution utilities: A problematic approach to defining efficiency, Veronica Irastorza (NERA), The Electricity Journal, Elsevier 2003
19. Quantifying Reliability and Service Quality, Arshad Mansoor, Mark McGranaghan and Karen Forsten, EPRI PEAC, Transmission &Distribution World, September 2004
20. CEA reports on Distribution Companies: Infraline, New Delhi, May 2005
21. MoP Notification on Electricity Rules 2005, Ministry of Power, June 2005
22. National Electricity Policy, Ministry of Power, February 2005
23. Filing of Aggregate Revenue Requirement ("ARR") for the Financial Year 2005-06 and Determination of Tariffs of North Delhi Power Limited, December 2004.
24. Assessment made by DERC on the Working of Private Distribution Companies, Infraline, New Delhi, August 2005
25. Report by the Ombudsman, WBERC, West Bengal, sent to CESC, June 2005.

Selected Publications of Prayas (Energy Group)

1. "Least-Cost Power Planning: Case Study of Maharashtra State" - Energy For Sustainable Development, The Journal of International Energy Initiative, Vol. IV, No 1, June 2000.
2. "Power from Sardar Sarovar: An Inefficient Plan" - Amulya Kumar N. Reddy and Girish Sant, The Hindu Survey of the Environment 1994.
3. "Power Purchase Agreement (PPA) Between Dabhol Power Company and Maharashtra State Electricity Board: Structure and Implications" - Economic and Political Weekly, June 17, 1995.
4. "The Enron Controversy: Techno-Economic Analysis and Policy Implications" - Prayas Monograph 5. "Beneficiaries of IPS Subsidy and Impact of Tariff Hike" - Economic and Political Weekly, December 21, 1996.
6. "How Reliable are Agricultural Power Use Data?" - Economic and Political Weekly, April 12, 1997.
7. "Agricultural Pumping Efficiency in India: The Role of Standards" - Energy for Sustainable Development, the Journal of the International Energy initiative, Volume III, No.1, May 1996.
8. "The Enron Story: Controversial Issues and the Struggle" - Prayas Monograph
9. "WB-Orissa Model of Power Sector Reforms: Cure Worse Than Disease" - Economic and Political Weekly, April 25- May 1, 1998.
10. "Regaining Rationality through Democratisation: A Critical Review of Multilateral Development Banks' (MDBs') Power Sector Activities in India" - May 1999.
11. "The Real Challenge in Power Sector Restructuring: Instilling Public Control through TAP" - Prayas Energy Group, Energy for Sustainable Development, September 2001.
12. "Questionable Economics of LNG-based Power Generation: Need for Rigorous Analysis" - Economic and Political Weekly Vol. XXXVI, No. 20, May 19, 2001.
13. "Lessons of the Enron Disaster: Democratization through TAPing of Governance as the Remedy" - (An edited version of this article has been published in Infrastructure Report 2002, 3i Network)
14. "The Reforms Process and Regulatory Commissions in the Electricity Sector: Developments in Different States of India" - A Compilation of selected papers on status of reforms in different states, presented during a workshop organised by Prayas in December 2000.
15. "HT Energy Audit: The Crucial Starting Point for Curbing Revenue Loss" - Prayas Occasional Report 1/2002, February 2002.
16. Privatisation or Democratisation - The Key to the Crises in the Electricity Sector; The Case of Maharashtra - March 2001.
17. Bujagali Power Purchase Agreement -An Independent Review - A study of techno-economic aspects of power purchase agreement of the Bujagali project in Uganda - November 2002.
18. A Good Beginning but Challenges Galore -This is a report based on detailed survey of 12 electricity regulatory commissions in India. The report covers three important aspects of the regulatory process, viz. resources (financial and manpower) of the ERCs; transparency in their functioning; and the extent of public participation in the regulatory process.
19. Electricity Sector Reforms in Asia: Experiences and Strategies - This is a compilation of selected papers prepared for the Asia Power Sector Reforms Workshop. This workshop was organised by Prayas, (India), Transnational Institute (The Netherlands) and Focus on the Global South (Thailand) in October 2002. The compilation contains papers on two Indian states of Orissa and Andhra Pradesh and five Asian countries - Indonesia, Philippines, South Korea, Thailand and Vietnam.
20. "India Power Sector Reforms Update- various issues" Update of power sector reforms in Andhra Pradesh, Uttar Pradesh and Orissa
21. "Know Your Power" A Citizen's Primer on the Electricity Sector - May 2004.

About Prayas :

PRAYAS means determined efforts in a definite direction.

At PRAYAS, we apply our professional knowledge and skills to understand the issues afflicting society especially in the areas of health, energy, resources & livelihoods, as well as learning & parenthood. Further, we strive to translate this understanding in strategic but sensitive responses.

Underlying these responses is our belief that, if equipped with adequate information, sound analyses, and necessary skills, even disadvantaged sections of society can tackle their problems and shape their own future.

Our activities-research, policy analyses, information dissemination, public interest advocacy, skill development, provision of counselling support - are geared to the objective of equipping the disadvantaged and facilitating people's own action.

About Energy Group :

The Energy Group of Prayas has been active since 1990, though Prayas was officially registered in 1994.

The group started working in the energy sector, but soon restricted its work to electricity sector policies, covering techno-economic, financial, legal, procedural, planning, political, and institutional issues.

In the last fifteen years, the group has worked on a wide range of issues and themes such as integrated resource planning, agricultural subsidy, policies of the international financial institutions, power purchase agreements of independent power producers, electricity sector restructuring and reforms, and regulatory commissions.

Our Activities :

A diverse type of advocacy and public-education efforts based on the sound analysis has been the key feature of group's work. The activities of the group include, research, conceptual as well as empirical analysis, public education activities, media campaigns, advocacy, participation in national and international conferences, legal and regulatory as well as policy interventions at the state and national level. At times, the group also works at the international level to contribute to efforts of like-minded people and organisations. Our activities are supported through project-based grants from charitable foundations from India and abroad.

Prayas Occasional Report – 1/2005

Quality of Service of Distribution Utilities – Need for End to End Commitment

For private circulation - Requested contribution : Rs. 50/-

आरोग्य, ऊर्जा, शिक्षण आणि पालकत्व
या विषयातील विशेष प्रयत्न

Prayas, Energy Group, Pune

FORUM OF INDIAN REGULATORS

MINUTES OF THE MEETING HELD ON 17TH & 18TH DECEMBER, 2004 TO DISCUSS THE ISSUES OF SURCHARGE (CROSS – SUBSIDY) AND ADDITIONAL SURCHARGE

In the meeting of Forum of Indian Regulators held on 2nd December and 3rd December 2004, at Ranchi, a Group was constituted for the purpose of recommending methodology for computation of surcharge and additional surcharge on account of Open Access. The composition of the Group is as under:

1. Shri. K N Sinha, Member, CERC
2. Shri. R D Gupta, Member, UPERC
3. Shri. K Sreerama Murthy, Member, APERC
4. Shri. B C Jena, Member, OERC
5. Shri. Surinder Pal, Member, APERC
6. Shri A.K. Jain, Member, WBERC
7. Shri. Vivek Sharma, TERI

A few Papers/Notes, received from various Commissions/Members, were circulated and the meeting was held on 17th and 18th December, 2004 at the conference room of CERC, New Delhi to deliberate on the issues mandated.

The meeting was attended by all the members, except Shri A.K. Jain, Member, WBERC. Shri Sunil Kumar of PWC also attended the meting on a special request of the Group.

1) The Group started the deliberations keeping in view the intent of the Electricity Act, 2003 to promote interalia open access, thereby forcing incumbent utilities to improve efficiency. The Group felt that the surcharge

should have least possible financial impact on existing Licensees and at the same time it should promote competition.

2) Four options for determining surcharge were discussed. These were:

1. Average Cost Method;
2. Embeded Cost Method (or Cost of Supply Method)
3. Marginal Cost Method; and
4. Avoided Cost Method

a. Average Cost Method:

The simplest method to calculate surcharge (or cross subsidy) for the base year by taking the difference between the average realization from a consumer category and the average cost. The method is simple and the computation is easy to make, but since the method assumes that losses and costs are same for LT and HT and EHT consumers, it does not capture the reality. Also the extent of cross subsidy will be understated under this methodology. Also this approach does not provide correct economic signals to the Licensee or the consumers likely to move out. The Group observed that it will discourage open access since generation will not be available at such a low price at which it can be implemented.

b. Embeded Cost Method (or Cost of Supply Method)

The second method that was discussed was taking the difference between the average realization and the consumer category-wise/voltage-wise cost of supply (embedded cost). Even though this method is an improvement over the average cost method, it results in high level of surcharge. This would imply that competitive rates of generation at which open access can be implemented have to be very low, which again does not seem to be a reality. The net result would be that the method would not encourage open access.

c. Marginal Cost Method:

An alternative method of computing the quantum of surcharge is by taking the difference between the average realization for the respective consumer and the Marginal cost of supply by the Distribution Company. The different assumptions involved and the methodology adopted are:

1. The Marginal cost of supply by a distribution company is equivalent to the sum of –
   (i) Marginal cost of purchase of electricity by the distribution Company,
   (ii) Applicable Transmission and Wheeling charges,
   (iii) Applicable system losses
2. The Marginal cost of purchase of electricity to be equated to the highest power purchase cost of the utility including fixed and variable costs.

It was discussed and agreed that surcharge arrived at from this method is not revenue neutral and will adversely impact the licensees financials. The Group observed that surcharge in this method could be negative also.

d. **Avoided Cost Method:**

The methodology for computing the Avoided Cost is as follows:

(i) As a first step, the projected capacity that is likely to move away due to open access will be estimated.

(ii) Since, it will avoid purchase of power from marginal sources of supply, the weighted marginal cost of power purchase (variable cost) from such sources would be considered as avoided cost for variable components of power purchase.

(iii) To that avoided cost, other charges viz. applicable fixed charges of power purchase, and applicable transmission and wheeling charges will be added to arrive at the cost of supply.

(iv) The difference between the average realization of a category and the avoided cost of supply, discussed above, shall provide the cross-subsidy surcharge amount.

3. After detailed deliberation on various scenarios and examples, the Group came to the conclusion that avoided cost approach balances the twin objectives of safeguarding the financial viability of the licensee and promotion of competition. The Group therefore recommended the Avoided Cost Method over other methods. However, in adopting avoided cost approach, each Commission will have to look into certain specific and peculiar characteristics of their system. Nevertheless, this has to be dealt under the broad framework of avoided cost approach.

Additional Surcharge:

The Group was of the view that in the present scenario of shortage of generation, any generation capacity is not likely to get stranded due to migration of load. In the case of Intra-State transmission lines and distribution system, assets shall continue to be used by the open access consumer by paying wheeling charges etc. even after migration. Therefore, the question of stranded capacity does not arise. As and where, however, situation of stranded generation or intra-state transmission and distribution assets do arise, it (these) will have to be dealt with by the respective Commissions, on the basis of petition to be filed by the Licensees, on case to case basis. The Group felt that no cut and dry methodology could be or needs to be prescribed in this regard.

IN THE MATTER OF

Charges for Open Access for the year 2005-06.

O R D E R

Dated 30th June 2005

1. The Madhya Pradesh Electricity Regulatory Commission has notified the MPERC (Terms and Conditions for Intra-State Open Access in Madhya Pradesh) Regulations, 2005. This regulation has been published in the M.P. Gazette on 24th June, 2005.

2. This regulation covers Eligibility for Open Access and conditions to be satisfied, Categorisation of Open Access consumers, Criteria for allowing Open Access, Procedure to avail Open Access, Time schedule for processing application, Open Access Agreement, Principles for determination of surcharge and wheeling charges for Open Access and other requirements. While determining the above charges as shown in Annexure I of this regulation, it has been stated that actual determination of charges for the year 2005-06 shall be announced with the Tariff order.

3. The Commission has now issued the Tariff order for the year 2005-06 on 29 June 2005, which is based on the petition filed by MPSEB, objections received and hearings conducted on the same. This order is not based on the revenue requirements of the three distribution companies and the transmission company and therefore the transmission charges and wheeling charges for the distribution licensees have not been determined separately. These are expected to be determined when the Commission receives the petitions for Annual Revenue Requirement and Tariffs from each of the licensees.

4. The Commission has notified the regulations for availing open access and the schedule permits that with effect from the date of publication, a person may apply for open access if he fulfils the criteria mentioned in the Schedule attached to the Regulations. Therefore it is necessary that the Commission lays down the method of determining surcharge and wheeling charges and this has to be done without delay.

5. In view of this and in the interim, the Commission hereby orders that the Charges for Open Access shall be applicable for such consumers as determined on the basis of Tariff Order for the financial year 2005 and as shown below.

6. This will be applicable for Open Access consumers of MP State till any change is ordered by the Commission.

7. Transmission Charges for Open Access Customers

i. For Long-Term Customers:

The annual Transmission Charge (TSC) = Rs.305.70 Crore

The capacity of the transmission system (Av_CAP) = 5332.45 MW

Therefore, the Transmission Charges for FY05
= Rs.1570.64/MW/ Day

ii. For Short-Term Customers

ST_RATE = 0.25 x 1570.64
= Rs. 392.67 /MW /Day

The transmission charge shall be uniform across the state, at present but the Commission may revise the same to reflect the cost sensitivities based on distance and direction of transmission.

8. Wheeling Charges

The Wheeling charges shall be determined when the applicant for open access discloses full details of injection point, drawal point and the quantum of duration of service.

9. Reactive Energy Charge

The Commission has separately determined charges for kVArh consumption from the grid at 27 paise/unit. The same amount shall be payable by open access customer.

10. Connection charge

The connection charges for seeking connection to the network of the Transmission Licensee and Distribution Licensees shall be as specified in the Commission's order on Miscellaneous Charges applicable from time to time

11. Losses

For the year 2005-2006, the energy accounting shall be done based on a loss assumption of 5.86% for EHV system. This shall be adjusted based on loss approved by the Commission for FY 06.

The Energy losses in the transmission and distribution system shall be compensated by additional injection at the injection point

12. Cross Subsidy Surcharge

i. The Draft National Tariff Policy sates that cross-subsidy surcharge shall be computed as the difference between (i) the tariff applicable to the relevant category of consumers and (ii) the cost of the distribution licensee to supply electricity to the consumers of the applicable class..

ii. The draft policy states that in case of a consumer opting for open access, the distribution licensee would be in a position to discontinue purchase of power at the margin in the merit order. Accordingly, the cost of supply to consumer for his purpose may be computed as the aggregate of (a) the weighted average of power purchase costs (inclusive of fixed and variable charges) of top 5% power at margin in the merit order approved by the SERC adjusted for average loss compensation of the relevant voltage level and (b) the distribution charges determined on the principles as laid down for intra-state transmission charges.

iii. Based on the approved power purchase in the tariff order for FY 05, the sources that meet the requirement for the 5% power at margin i.e. 1419 MU on an annual basis is as follows.

Station at Top of Merit Order	Power Purchase Cost* (ps/unit)	Quantum of Generation (MU)
Northern Region	287	709
PTC	281	668
MSEB	267	8
GGPS	248	34
TOTAL	**283.13**	**1419**

* (including fixed charges)

iv. The weighted average cost of power purchase from these sources to purchase the last 5% of power i.e. 1419 MU works out to 2.83 Rs./unit. This is the cost of purchase that the licensee would avoid when the entire set of consumers avail of open access in the first year.

v. Illustrated below are sample calculations of cross-subsidy computation in case of "Other HT Industrial Power" at 132 KV and 33 KV. The difference in Power Procurement cost at the margin and the cost to serve HT consumers at the specified voltage (including transmission and wheeling charges and cash impact of T&D losses) works out as shown below:

13. Illustration of Charges for Open Access

Open Access at 132 KV (Case 1) *

Sr. No	Particulars	Rate/ cost (P/U)	Remarks/s
(1)	Average tariff applicable from HT consumers at 132 KV (excluding ED, Cess)	413	
(2)	Cost of power at margin	283	
(3)	Transmission charge	11	Based on the transmission network load factor of 65%
(4)	Cash impact of system losses	25	@ 8.19% system losses upto 132 KV
(5)	Cross Subsidy Surcharge	**94**	

	Difference (5) = (1)-(2)-(3)-(4)		

** Actual amount of surcharge recoverable from a particular open access customer may be different and will be based on the customer's actual category/subcategory as per prevelant tariff order.*

Open Access at 33 KV (Case 2)*

Particulars	Rate/ cost (P/U)	Remarks/s
Average realization from HT consumers at 33 KV (excluding ED, Cess)	423	
Cost of power at margin	283	
Transmission charge	11	Based on the transmission network load
Cash impact of system losses	47.7	@ 14.43% system losses upto 33 KV
Distribution/ Wheeling charge	18.50	Based on the assumption of wheeling ch of Rs 2570.12 / MW/ Day @ 57.8% LF fo network usage at HT level
Difference (6) = (1)-(2)-(3)-(4)-(5)	**63**	

** Actual amount of surcharge recoverable from a particular open access customer may be different and will be based on the customer's actual category/subcategory as per prevelant tariff order.*

14. The Cross subsidy surcharge collected by the distribution licensee shall be utilised for meeting the requirements of cross subsidy at the time of determining the ARR. The petitions for determination of revenue requirement by the distribution licensee shall include the estimate of cross subsidy surcharge accruals based on agreements signed by them with open access consumers for use of distribution system.

15. The above mentioned basis for determining wheeling charges and surcharge will be adopted during 2005-2006. Charges for State Load Dispatch Centre have been included in above charges. Provisions of the balancing and settlement code shall be binding on the Open Access Users connected to the licensees system in Madhya Pradesh. Each Open Access user shall be required to furnish full details of his requirement and the point of injection and point of drawal and the Commission shall pass specific order on each such application.

(R.Natarajan) **(D.Roybardhan)**
(P.K.Mehrotra)
Member (Econ.) **Member (Engg.)**
Chairman

Rajasthan Electricity Regulatory Commission
Jaipur

In the matter of determination of
Wheeling Charges and Surcharge

Petition No.RERC/40/2004

Filed by
Jaipur Vidyut Vitran Nigam Limited

Mr. S. M. Dharendra, Member

Date of hearing : 1st February 2005

Presents for the petitioner : Mr. R. P. Goyal, CE(Comml.)

for the objectors : Mr. D. S. Agarwal,
on behalf of Rajasthan Chamber of Commerce & Industries, Jaipur

: Mr. S. K. Wali,
on behalf of M/S J. K. Corp. Ltd., New Delhi.

Date of Order : **21st February 2005**

ORDER

1. In terms of the provisions as laid down in Section 9 and Section 42(2) of the Electricity Act 2003, any consumer, licensee, generating company including person who has established a captive generating plant shall be eligible for open access to distribution system of a distribution licensee on payment of various charges prescribed in the EA 2003.

2. The Commission has issued its order on Open Access on 25.5.2004 and notified the RERC (Terms and Conditions for Open Access) Regulations, 2004 on 26.5.2004 for the use of intra-state transmission and / or distribution system of licensees in the State, including when such system is used in conjunction with inter-state transmission system. The Commission has also allowed open access to the consumers of the Discoms in phases commencing from 1.4.2005. While issuing the order, the Commission directed all the Discoms to file petitions within two months from the date of order for determination of wheeling charge and surcharge for the open access consumers having contract demand of 15 MVA and above covered under first phase of open access.

3. The Jaipur Vidyut Vitran Nigam Limited (Nigam) vide its letter dt 26.7.04 and 20.9.04 requested the Commission to allow some more time to file the petition because the estimation of the cost of supply of different consumer categories required a plethora of data / information which were not readily available with them. Considering the genuine difficulty of the Nigam, the Commission allowed it to file the petition by 31st October 2004 vide its letter dt 1.10.04.

4. In pursuance of the resolution of the Board of Directors of the Company, the Nigam submitted the petition before the Commission on 16.10.04 under section 42(2) and 62 of the Electricity Act, 2003 read with the provisions of the Rajasthan Electricity Regulatory Commission (Terms and Conditions for Open Access) Regulations, 2004 for determination of wheeling charges for conveyance of electricity, category wise cost of supply and cross subsidy surcharge.

5. The petition was examined and comments of the Commission were communicated vide letters dt 2.11.04 and 25.11.04 asking the Nigam to provide additional information / clarifications. The Nigam was also asked to recast the figures, giving effect of the Commission's order dt 7.10.04 for the determination of generation tariff of RVUN for the year 2004-05. The requisite additional information / clarifications were received from the Nigam along with the revised figures vide its letter dt 1.12.04.

6. In the mean time, the petition was placed before the Commission in its 81st meeting held on 22.11.2004 and the petition being in order was admitted by the Commission. The Commission decided that a brief summary of the petition might be published by the Nigam in the newspapers for inviting comments/objections of general public within 30 days of the date of publication.

7. Accordingly, notices were published by the Nigam in the following news papers on the dates mentioned against each:

(i)	Rajasthan Patrika	14.12.04
(ii)	Rastradoot	14.12.04
(iii)	Hindusthan Times	15.12.04

8. The last date for receiving comments/objections was fixed as 15th January 2004.

9. The following persons/organizations submitted comments/suggestions by the prescribed date:
   (i) J.K.Corp. Ltd., New Delhi (J K Corp)
   (ii) Rajasthan Chamber of Commerce & Industry, Jaipur (RCCI)

10. Both the objectors made a request to the Commission to allow them personal hearing.

11. As the Commission issued Tariff Order dt 17.12.04 determining retail tariff for various categories of consumers effective from 1.01.05, the Nigam was asked to recast the revenue figures based on the revised rate of realization. Consumer category wise revenue realization figures were received from the Nigam vide its letter dt 15.1.05.

12. The Commission held hearing on the petition by inviting both the objectors on 1.2.05 at Jaipur.

13. The Commission has considered the reply given by the petitioner to the queries of the Commission, objections/comments received from the objectors, replies thereto furnished by the petitioners and oral submissions made by the objectors as well as petitioner and perused the record. The submissions of the petitioner and the objectors are discussed in the following paragraphs.

Consideration of objections / comments

Subsidy computation

14. RCCI and JK Corp have suggested that cross subsidy should be either worked out as the difference between realization and the average cost of supply or as proposed in the Rajasthan Electricity Bill 2004 i.e. some percentage (say 10%) of the prevalent tariff (Draft II) or some percentage (say 20%) of power purchase cost (Draft III). The Discom has stated that it has adopted a consistent and logical approach, followed nationally and internationally by utilities and regulators and, wherever necessary, has made reasonable assumptions for determination of category wise cross subsidy surcharge. In this respect, it is stated that the Commission, in its RERC (Terms and Conditions for Open Access) Regulations 2004, has already specified that the cost of supply to the category of consumers for the purpose of tariff to which the open access consumer belongs, the voltage at which he is connected and the realization from that category shall be the basis of calculating the extent of cross subsidy provided by such consumer. Moreover, the provisions appearing in the Draft II or III of the Rajasthan Electricity Bill 2004 cannot be given any cognizance, as the said bill has not been enacted so far and the determination of surcharge & wheeling charges are to be governed by the provisions of the EA 2003. Hence, the suggestion given by RCCI and JK Corp is not acceptable.

Wheeling charges in kind

15. RCCI and JK Corp have correctly pointed out that the losses in case of EHV consumers shall be taken care of by the Power Trader or Transmission Nigam and Discom has nothing to do with transmission losses. In fact, for the use of transmission system beyond the metering point of the open access consumer under first phase of open access, the consumer is liable to pay transmission charges as per the Commission's order, which consists of charges in kind to compensate the losses in addition to the charges in

cash per kW of contracted demand. As per the Regulations on open access, these charges are required to be paid by the consumer directly to RVPN. As such, the Nigam does not come in the picture for recovery of transmission losses in kind. However, the customer using the network of the Nigam shall be required to compensate for the losses accruing on the network, as allowed by the Commission, for the determination of the wheeling charges.

Wheeling charges in cash

16. RCCI and JK Corp have stated that an EHV consumer under open access does not use distribution system and does not avail the entire facilities / services except a very few services, like meter reading, billing etc. for which the discom may charge 1 paisa/ unit instead of charging full cost of around 50 paisa/ unit. While refuting their contention, the Nigam has argued that the wheeling charges are to be borne uniformly by all the beneficiaries of the network, as the cost being fixed in nature; all the beneficiaries (EHT, HT and LT consumers) of the network are expected to share it equitably. Also in the existing retail supply tariffs applicable to all the consumer categories, there is an element of wheeling charge, which is embedded in the tariff and is being borne by all the consumer categories, as they are beneficiaries of the distribution network. The Nigam has requested the Commission to make the wheeling charges revenue neutral to them. The Commission is of the view that uniform wheeling charge across consumer categories on an average basis is not justified. Taking a rational view, the Commission has determined voltage wise average wheeling charges in proportion to non-coincident demand of consumers. As EHT lines are the assets of RVPNL in the transfer scheme and their maintenance cost is covered in the transmission tariff , the Nigam shall not be entitled to recover wheeling charges from open access customers connected to EHT system except customer service cost determined by the Commission.

Reasonable return

17. RCCI and JK Corp have stated that based on guidelines of GoR, return on equity has to be considered and strategy to be adopted for FY 06 be clarified because open access is to commence from 1.4.05. As the petition has been filed based on ARR for the year 2004-05 and no return on equity has been envisaged in the Financial Restructuring Plan during 2004-05, the Nigam has not claimed any return on equity in wheeling charges.

Allocation of cost

18. RCCI has stated that only technical losses should be allocated to different consumer categories for considering voltage wise cost of supply because correct assessment of category wise commercial losses is not possible and would vary from circle to circle every year. The Nigam is of the view that in absence of detailed studies on commercial losses, reasonable assumptions on category wise commercial losses can be made, instead

of not considering commercial losses at all. As commercial losses do contribute to the cost of supply substantially, their allocation, even on some indicative basis, to consumer category wise cost has to be considered and cannot be ignored.

Technical losses at different voltages

19. RCCI has observed that technical losses considered for 33 kV and 11kV system do not seem to be reasonable, as the same are less than that considered for EHV system. The Nigam has clarified that on the basis of the study carried out by the planning department of the Nigam as part of the strengthening and augmentation of the distribution system, the average incremental loss in 33kV system is around 3.8%, while the average incremental loss in EHV system (400kV, 220kV & 132kV) is 4.6%. It is due to the fact that the transformation occurs in three stages from 400kV to 220kV, then 220kV to 132kV and finally from 132kVto 33kV. This results in a cascading effect on transformation losses. Besides, the line length of EHV transmission lines is longer than that of 33kV feeders.

Commercial losses

20. RCCI and JK Corp have stated that commercial losses for EHV consumers have been considered nil which is not correct, as there may be some losses on account of many reasons, including error in metering system, inaccuracy in measurements etc. In this respect, it is stated that error in metering system, inaccuracy in measurements etc. are not the commercial losses. Moreover, meters for EHV consumers are installed at EHV – GSS of RVPN where practically there is no possibility of commercial loss. Therefore, the assumption of the Nigam for considering nil commercial losses for EHV system appears to be logical.

Customer cost

21. The contention of RCCI and JK Corp is that the working out of customer cost on the basis of number of consumers belonging to each category may not always be correct because this depends upon density and size of consumer also. In fact, R&M, depreciation and interest expenditure on the assets and likewise, A&G expenses and employee cost allocable to customer service, being fixed in nature, are incurred without their linkage to energy drawls. However, after apportioning these expenses on the basis of number of consumers, the same have been worked out in terms of cost per unit.

Cost of Supply and Surcharge

22. RCCI and JK Corp have stated that subsidy to agriculture sector is provided by the State Govt., while industrial and commercial sectors are cross subsidizing to the commercial losses of about 20-25% in the system for which they should not be asked to pay surcharge. In this respect, it is stated that the subsidy provided by the State Govt. is lump sum and not consumer category wise. The subsidy so provided by the State Govt. has already been accounted for while determining the tariffs for different consumer categories.

23. Ajmer Zeela Laghu Udhyog Sangh, Ajmer (AZLUS) has inter alia raised the following objections in reference to the petition filed by the Ajmer Vidyut Vitran Nigam, Ajmer (AVVNL). Since the issues raised are relevant to all the Discoms, these are also discussed here for taking appropriate action by the Nigam.

(1) Petition should be submitted as per the audited accounts for the year 2004-05

(2) AVVNL should have first developed cost records as per the cost accounting records (Electricity Industry) Rules 2001 as notified vide GoI -Notification No. GSR 913(E) dated 21.12.01.

(3) Wheeling charges should be fixed in terms of per unit of energy based on distance and time of wheeling. Separate wheeling charges for peak, off peak, normal period and level of voltage be prescribed.

(4) Repair and Maintenance, Employees and A&G expenses should be flatly reduced by 13% and interest and finance charges should be reduced to Rs.4000 lakhs.

(5) Deviation from accounting standards in respect of computations of borrowing cost and interest may not be allowed.

(6) Contributions, grants and subsidy towards capital cost should be reduced from capital cost.

24. Our observations on the above objections are as under:

(1) While issuing the order dated 25.5.04 on RERC (Terms and conditions for open access) Regulations, 2004, the Commission had directed all the Discoms to file petition for determination of surcharge and wheeling charges within a period of two months. As such, there was no other alternative left with the Discoms but to file petitions based on audited account for FY 2002-03 and ARR approved by the Commission for FY 04-05. Moreover, the Commission has also determined the retail tariff vide its order dated 17.12.04 on the basis of the approved ARR, giving impact of generation tariff order dated 7.10.2004. The Discoms have also subsequently revised the figures accordingly. Therefore, the Commission considers it appropriate to determine the surcharge and wheeling charges on the basis of ARR for FY 2004-05, giving effect of generation tariff order dated 7.10.2004 and retail tariff order dated 17.12.04. However, in future years, all the Discoms shall be required to file petition for surcharge and wheeling charges by 31st October every year giving audited actuals of the previous year and projections for the current and ensuing year as per para 52 of the Commission's order on open access dated 25.5.04 read with regulation 5 of RERC (Terms and Conditions for determination of tariff) Regulations, 2004.

(2) While agreeing to the suggestion of AZLUS, all the Discoms are being directed to prepare cost Accounting Records as per the Cost Accounting Record(Electrical Industry) Rules,2001 notified by Ministry

of Law, Justice and Company Affairs (Department of Company Affairs) vide notification No.913(E) dated 21.12.2001. It is, however, observed that the Proforma No. D.II and E will not serve the purpose to work out cost of supply for each consumer category with allocation of T&D losses to arrive at energy cost and demand and customer costs. It is, therefore, directed that these two proformae should be suitably modified with the approval of the Commission, so as to reflect voltage wise and consumer category wise cost under energy, demand and customer cost heads for each circle ensuring that items of income and expenditure in the proforma No. F must reconcile with the financial accounts of the previous year. It is also further directed that while filing petition for surcharge and wheeling charges, all the Discoms must submit proforma No. D-II & F annexed to the Cost Accounting Record (Electrical Industry) Rules, 2001 as modified.

(3) Although AZLUS has suggested that wheeling charges should be sensitive to distance and time i.e. peak, off peak and normal hours, we are offering our comments on different methods applicable to wheeling pricing, their desirability and constraints for their implementation hereunder:

(i) Contracted Path Method:
Contracted path defined as the shortest route framed by a series of distribution /transmission lines capable to carry contracted power between point of injection and point of drawal, though distance sensitive, would not reflect true cost due to flow of energy in displacement mode and actual path being different from the contracted path.

(ii) Incremental Postage Stamp Method:
This method envisages the area of network to be demarcated into squares of 100kmx100km and charges payable by an open access customer are determined by the squares vertically & horizontally from the source to sink. However, the rate of carriage of energy in this method is sensitive to distance only in case it exceeds 100 km. Besides creation of artificial demarcation of area, its implementation involves digitization of the power map identifying all sub stations located in cities, towns & far flung villages.

(iii) Mega Watt-Mile Method:
This method reflects the cost of transmission /wheeling based on the megawatts of power flow and the network distance between injection & drawl points. However, this method requires load flow analysis involving complete network data for determination of wheeling charges.

(iv) Postage Stamp Method:

Under this method, the total cost to be recovered is distributed amongst the total energy carried, resulting in a fixed charge per unit of energy wheeled/transmitted, regardless of the distance that energy travels.

As it is not feasible to capture the actual distance of power flow due to the limitation of each method discussed above, more so when open access is allowed to more & more consumers, across congested & concentrated distribution network, from the point of view of simplicity, ease of application, the Commission is inclined to adopt a simple and hasselfree voltage wise average cost method on the basis of non-coincident demand to recover per unit cost of energy wheeled

As regards Time of Day wheeling charges, it is observed that as the Commission is not having reliable data for peak, off-peak and normal hours for each consumer category, it is not possible to workout the wheeling charges on TOD basis.

(4) The Commission does not subscribe to the view of AZLUS to reduce repairs and maintenance, employees and A&G expenses flatly by 13% and interest to Rs.4000 lakhs. As the Commission has approved the ARR for FY 2004-05 and also determined the tariff for FY 2004-05 on the basis of ARR giving effect of generation tariff and the Discoms have also revised the figures in the petition accordingly, there is no ground to revise these figures arbitrarily. However, interest and finance charges have been worked out only on working capital required for wheeling charges which have resulted in reduction of interest of Rs. 6711, 6340 & 5604 lakhs in case of Jaipur, Ajmer & Jodhpur Discoms respectively.

(5) Considering the objections raised by AZLUS, it is directed that all the Discoms must capitalize the interest in their accounts from the year 2004-05 as per accounting standard 16.

(6) As regards reduction of contribution, grants & subsidy towards capital cost, the management of the Nigam has argued that as consumers' contribution and grants are not asset specific, it is not possible for them to segregate assets specific grants & contribution and reduce their gross value corresponding to such grants & contributions. Therefore, it is reported that corporate office of the Nigam has made a reference to The Institute of Chartered Accountants of India to exempt them to follow Accounting standards (AS) No. 12. If, however, neither the Institute of Chartered Accountants of India exempts power utilities from AS-12 nor it is possible for the Nigam to deduct grant/consumers' contribution from the gross value of the relevant fixed asset, it is directed that such grant/contribution should

be treated as deferred income which should be recognized in the profit and loss account by allocating it over the periods and in proportions on the basis of average rate of depreciation of distribution assets, in accordance with the second alternative laid down in AS-12.

Determination of Wheeling Charges

25. The distribution network comprises of wires, transformers, sub stations and other infrastructure facilities. The Commission, in its Open Access Regulations, has elaborated that wheeling charge is a general term and inter alia comprises of its components, namely, conveyance of electricity on wires (i.e. on lines and transformers) and of providing facilities and services, like metering system, their testing, calibration, operation & maintenance, meter readings, billing, revenue collection, telecommunication and consumer service.

26. Broadly, there are two kinds of users who could benefit from the use of distribution system. These are:
    (a) The distribution licensee, to enable itself to supply electricity to the retail consumers. It passes on the cost imposed upon itself to the consumers through the retail tariff.
    (b) The person having the electricity wheeled from point of injection to point of drawl by him through the distribution system of the distribution licensee.

    It is, therefore, appropriate that both the above classes of persons who are beneficiaries equitably bear the cost for use of the distribution network.

27. The Nigam has claimed that the charges for Wheeling Services shall have two components namely:
    (a) In Kind: Adjustment in kind for losses in the system as a percentage of energy injected, and
    (b) In Cash: Cash payment for the use of network, in terms of rupee per unit wheeled.

In Kind

28. The Nigam has claimed that wheeling charges in kind are to be levied on open access customers. The percentage of energy to be deducted from the amount of energy wheeled would depend on the voltage at which the open access customer draws energy. The energy injected in the distribution system shall be reduced to the extent of technical loss applicable for the voltage level at the receiving end.

29. Having regard to the Regulation No. 22 of RERC (Terms and conditions for Open Access) Regulations, read with para 66 of its order on Open Access, the Commission has allowed the Nigam to consider only technical losses of its network for wheeling charges.

30. The actual loss to be applied to any open access customer would depend on the voltage level at point of injection and point of drawl, whichever is lower. If the energy wheeled is injected into Rajasthan system from outside Rajasthan Grid, then the outside state losses also need to be deducted from the gross energy wheeled by the customer. In the ARR approved by the Commission, the transmission losses within the state has been determined as 4.6% and the transmission losses outside the state have been determined as 4.25%. The average transmission loss for the Nigam works out to be 6.25%. The losses as proposed by the Nigam as 6.15% has to be corrected to this extent.

31. The Nigam has reported that on the basis of the study carried out by its planning department as part of the strengthening and augmentation of the distribution system, the average incremental loss in 33 kV system is around 3.80%. Adding it to the losses upto 132 kV level, the loss level for any consumption at 33 kV systems would be approximately 10 %.

32. No study is available with the Nigam for loss level at 11 kV. The incremental technical loss at 11 kV has been assumed to be 5% considering following factors:

    ? Transformation losses in 33/11 kV transformers is assumed to be 1.2% and

    ? The line losses in 11 kV system is assumed similar to 33 kV system i.e. 3.80%.

    Thus, the loss level at 11 kV is assumed to be 15%.

33. In absence of any study/information on the technical losses at LT voltages, it is assumed to be incremental @1.75% of transformation losses and 6% of line losses. Thus, the technical loss works out to be 22.75% at LT.

34. In absence of any study, for which the Commission is issuing necessary directions to the Nigam, the Commission is considering the above assumptions and considers the technical losses across the various supply voltages as under:

S.No.	Voltage	% of losses to be considered when power is injected	
		Within State	Outside State
1.	132 KV & above	4.60%	6.25%
2.	33 KV	8.40%	10%
3.	11 KV	13.40%	15%
4.	400 V	21.15%	22.75%

35. Based on the lowest level of voltage upto the use of network, these losses in percentage terms shall be accounted for by the concerned licensee for computing the quantum of energy injected and energy drawn.

In Cash

36. The distribution network cost as approved by the Commission in its ARR order DT. 17.4.04, is given in the following table:

Sl. No.	**Elements of ARR** (All Figures in Rs.Lakhs)	**FY05**
1	R&M Expense	3,694
2	Employee Expenses	17,793
3	A&G Expense	1,460
4	Depreciation	9,684
5	Interest & Finance Charges	16,306
6	Lease Rental	186
7	Contingency Reserve	409
Annual Revenue Requirement of Network Business		**49,532**

37. As working capital for the purchase of distribution of energy will not be required for determination of wheeling charges, only such components of working capital as O&M expenses for one month, maintenance spares for two months based on annual consumption equivalent to 1 % of gross fixed assets of the Nigam and receivables of wheeling charges for 60 days i.e. Rs 11 lakhs pertaining to consumers having contact demand of 15MVA or more are considered to work out interest and finance charges on working capital required for wheeling business only as per the Regulation No.95 (b) of RERC (Terms and Conditions for determination Tariff)Regulations, 2004.

38. The details of working capital required and interest thereon at prime lending rate of interest of SBI on short term loans are worked out as under:

Rs. In lakh

1.	O&M expenses for one month	Rs.1912
2.	Maintenance spheres for two months	Rs.274
3.	Receivable of wheeling charges	Rs.11
4.	Total	Rs.2197
5.	Less security consisting of 3 months billing	Rs. 71
6.	Net working capital requirement	Rs.2126
7.	Interest on the above @ 11% prime lending rate of SBI on the above	Rs.234

39. This amount of interest, when added to the interest on long-term loans availed by the Nigam, gives interest and finance charges of Rs 9595 lakhs, as against Rs. 16,306 lakhs in the ARR for 2004-05. The amount of interest and finance charges will be reduced by Rs 6711 lakhs, resulting in the corresponding decrease in ARR of network business. Thus, ARR of network business, when reduced by the amount of other income of Rs. 8690 lahks, works out to Rs 34131 lakhs as against Rs.49532 lakhs claimed by the licensee in the petition.

40. As the Nigam is entitled to recover only customer service cost towards network cost from open access customers connected to EHT and it is working out to be less than one paisa per unit, the Commission determines it @ 1 paisa per unit.

41. Considering the details of network cost given at **Annexure-1,** voltage wise wheeling charges per unit of energy drawn are determined as under:

S.N.	Lowest level of voltage of network used	Rate of wheeling charge
1	EHT	Rs.0.01/unit
2	HT – 33kV	Rs.0.25/unit
3	HT – 11kV	Rs.0.28/unit
4	LT	Rs.0.77/unit

Determination of Surcharge

Approach & Methodology

42. The Commission has already clarified in its open access regulations that the surcharge would be determined on the basis of the cost of supply to each category of consumer. The cost of supply to the category of consumers for the purpose of tariff to which the open access consumer belongs, the voltage at which he is connected and the realization from that category of consumers shall be the basis of calculating the extent of cross subsidy provided by such consumer.

43. Section 61 (g) of the Electricity Act 2003 envisages that while specifying the terms and conditions for determination of tariff, the Commission shall be inter alia guided by the consideration that the tariff progressively reflects the cost of supply of electricity and also reduces and eliminates cross subsidies within the period to be specified. Similarly, sub-section (3) of section 62 of the Electricity Act, 2003 also enjoins upon the Commission that while determining tariff, it should not show any undue preference to

any consumer of electricity, but may differentiate according to the consumers load factor, actual consumption of electricity during specified period or requirement of supply at a particular time, voltage level, power factor, nature of supply, purpose of supply and the geographical position of any area.

44. Following the spirit of the above provisions of the Electricity Act 2003, the Commission in the Regulation No. 15 (2) of RERC (Terms and Conditions for Open Access) Regulations, 2004 has laid down that voltage wise cost of supply to a particular consumer category belonging to tariff and realization from such category of consumers shall be the basis for calculating cross subsidy surcharge.

45. Similarly, Regulation No. 100 of the RERC (Terms and conditions for determination of Tariff) Regulations, 2004 also requires the licensee to work out voltage wise cost of supply to different consumer categories and the Regulation No. 101 provides for the Commission to determine tariff so that it progressively reflects the cost of supply and reduces the cross subsidy calculated on the basis of the cost of supply and realization from that category of consumer is reduced and eliminated in a period of 10 years from April 2005.

46. Complying with the directions given by the Commission in its order on open access regulations, the Nigam has adopted the method of classification and allocation of various costs among different consumer categories. The methodology adopted by the Nigam is broadly acceptable to the Commission.

47. To work out the cost of supply for individual consumer category, the Nigam has adopted following approach:
    (a) arriving at functional cost i.e. generation, transmission, distribution;
    (b) classification of cost into energy, demand, customers; and
    (c) allocation of voltage wise cost among different consumer categories;

    in proportion to their causation of the respective cost.

48. The Nigam is required to bear the fixed charges of RVUN and other Central Generating Stations in respect of its share in their generation capacities, in addition to variable charges based on two-part tariff. As RVPN is required to bear O&M charges for its share in partnership projects and generation cost net of outside sales is passed on to Discoms on no loss no profit basis, power purchase cost from RVPN is being classified as demand cost. As the Nigam is required to pay capacity charges to RVPN for transmission of energy, transmission cost has also been considered as demand cost.

49. Distribution network is designed to cater to the consumers' demand or to provide services to them. R&M cost, depreciation, interest and finance charges and lease rentals have been classified into demand and customer cost in proportion to the net fixed assets of the Nigam, apportioned between demand cost (98.32%) and customer cost (1.68%).

50. As the services of the employees of the Nigam are utilized either for creation/augmentation and O&M of distribution network or providing services to consumers, employee expenses and administrative & general expenses have also been considered as demand cost (69.80%)and customer cost (30.20%).

51. Other debits mainly comprising of bad and doubtful debts attributable to customers' defaults are classified as customer cost.

52. Since income from the difference of minimum billing amount is not towards energy sold, it has been subtracted from demand cost. Similarly, other income on loans and advance to staff and rent for staff-quarters has also been subtracted from demand cost, as it is not related to energy charges.

53. Inter Discom purchases of energy, unscheduled inter change charges have been classified as energy charges.

54. Thus, the energy, demand and customer costs have been allocated voltage wise among different consumer categories based on the following criteria mentioned against each:

(a) Energy cost: Energy input into the system i.e. drawl of energy plus technical & commercial losses attributable to consumer category.

(b) Demand cost:

Pertaining to	Based on	In proportion to
i) Generation	Share in capacities of generating stations	Coincident demand * of consumer category
ii) Transmission	Contracted capacity of PGCIL+RVPN+SLDC charges	Coincident demand* of consumer category

(c) Network cost:

Bifurcation	Based on	In proportion to
i) Demand cost	Net fixed assets	In proportion to non-coincident demand** of consumer category

ii) Customer cost	Net fixed assets	In proportion to number of customers in a consumer category

[Note: *Coincident demand (CD) represents peak demand of a consumer category at the time of system peak during the year.

Coincident Factor (CF) represents the fraction of demand to its peak demand caused by the consumer category at the time of system peak.

**Non-coincident demand (NCD) represents maximum demand caused on the system by the consumer category during the year.

Thus, CD = (Annual category energy x CF) / (Load Factor x 8760)

= NCD x CF]

Power purchase & Transmission cost

55. The tariff of a generating station is in two parts – fixed & variable. Fixed cost is towards demand and variable is towards energy charges. The tariff for capacity charges for transmission of power is fixed and towards demand charges. Power purchase and transmission expenses have been classified as per **Annexure-2** and are summed up as under:

	Demand	Energy	Customer	Total
Rs. Cr.	687.62	1262.93	0.00	1950.55
In %	35.25%	64.75%	0.00%	100.00%

Network cost

56. The Net Fixed Assets have been classified into Demand and Customer costs as narrated above and is summed up as under:

In **Rs. Crs.**

S.No.	Elements of ARR	Classification			TOTAL
		Demand	Energy	Customer	
1	R&M Expense	36.32	0.00	0.62	36.94
2	Employee Expenses	124.20	0.00	53.73	177.93
3	A&G Expense	10.19	0.00	4.41	14.60
4	Depreciation	95.22	0.00	1.62	96.84
5	Interest, finance Charges & Lease Rental	162.15	0.00	2.77	164.92
6	Other Debits	0.00	0.00	4.09	4.09
	Total Network cost	428.08	0.00	67.24	495.32

In working out the cost of supply, the network cost for EHT consumers has not been revised, assuming the effect on the cost of supply on this account would be compensated by the effect of load staggering of agricultural consumers during peak hours.

Net amount for allocation

57. Other income and the difference of minimum billing amount has been subtracted from the total cost to workout the net cost of supply. The net amount available for allocation is worked out as under:

	Demand	Energy	Customer	Total
Power purchase cost	687.62	1262.93	0.00	1950.55
Network cost	428.08	0.00	67.24	495.32
Total amount as per ARR	1115.70	1262.93	67.24	2445.87
Less Other Income	86.90	0.00	0.00	86.90
Less diff. of Minimum Charges	66.74	0.00	0.00	66.74
Net amount for allocation	962.06	1262.93	67.24	2292.23

Allocation of costs

58. The Commission has specified in paragraph 45 of its order on Open Access Regulations that segregation has to be made to identify the HT & LT consumers as well as to differentiate the consumers even within the same category based on their supply voltages.

59. Each of the three cost heads of Demand, Energy and Customer have been individually apportioned across the categories. The manner of apportionment for each of the cost heads has been explained in foregoing paras. The head wise apportionment is discussed in the following paragraphs.

Allocation of Cost to Energy

60. Energy cost has been allocated on the basis of energy drawl and technical & commercial losses caused by each consumer category.

Technical Losses

61. The technical losses at different voltage levels have already been discussed in forgoing paras and narrated as under:

S.No.	Voltage	% Losses
1.	EHT	6.25%
2.	HT - 33 KV	10%
3.	HT - 11 KV	15%
4.	LT	22.75%

Commercial Losses

62. In case of EHT consumers, the meters are installed at RVPN's GSS. So, the Nigam has proposed that there is practically no possibility of any commercial loss. Therefore, for all EHT consumers, the commercial losses has been assumed to be nil.

63. The Nigam has reported that the analysis of the Energy Audit conducted by it in Industrial Areas have yielded results that indicate the loss levels (cumulative technical & commercial loss) for HT consumers of the NDS, MIP, and Bulk Supply at Mixed Load categories. The loss levels that remain after netting off the technical losses are the commercial losses. Based on such study, the commercial losses at 11 & 33 kV voltages has been considered as 2.5% for Large Industry and 5% for the NDS, MIP, and Bulk Supply at Mixed Load.

64. In absence of any study to estimate the commercial losses for Agriculture consumers, the Nigan has worked out the losses for flat rate consumers based on 8 hours per day supply and considering similar nature of consumption pattern of the metered category consumers, the commercial losses for both categories of agriculture consumers (flat rate and metered supply) have been assumed as 40%. Though the Commission does not agree with the procedure adopted by the Nigam, yet, it is felt that assumption of commercial losses for Agriculture consumers does not appears to be abnormal.

65. The Nigam has apportioned the remaining losses over the rest of the categories, at the LT level. The PWW- S&M categories at the LT level have been assumed to have commercial losses at approximately 1/3rd the levels as the rest of the LT categories. The commercial loss levels for the LT categories of Domestic, NDS, PSL, SIP, MIP and Bulk Supply at Mixed Load have been assumed to be 31%, and the loss levels of PWW – S & M categories assumed to be 11%.

66. Category wise commercial losses assessed/assumed as above are listed as under:

Voltage	Consumer Category	Commercial losses
132 kV	All Categories	0.00%
33 kV & 11 kV	PWW	0.00%
	Large Industries	2.5%
	Non Domestic Medium Industries Mixed Load	5.0%
LT	Agriculture-Metered Agriculture-Flat Rate	40%
	Domestic Non-Domestic Public Street Lights Medium Industries Small Industries Mixed Load	31%
	PWW-Small PWW-Medium	11%

67. It is a fact that precise allocation of technical and commercial losses, in particular, is not possible unless a voltage wise and consumer category wise Loss Diagnostic Study is carried out first, which is under process. Therefore, till the Loss Diagnostic Study is not carried out and effect of quality of supply of energy and restricted hours of supply is not given, cost of supply to different consumer categories other than those connected to EHT voltage level is only indicative. However, at this stage, we are determining surcharge for the year 2005-06, to be recovered from open access consumers with contract demand of 15MVA & above connected to EHT system in whose case technical losses, within as well as outside the state, are known. Therefore, it would not be appropriate to hold on the process of determination of wheeling charges and cross subsidy surcharge for first phase of consumers till Loss Diagnostic Study is completed. Moreover, the over all technical and commercial losses have been restricted to the loss level of the Nigam considered by the Commission in the ARR for FY 05 and its Tariff Order for FY 05.

68. The importance of Loss Diagnostic Study is to workout voltage level wise and consumer category wise losses to account for cost of supply for determination of cross subsidy surcharge. In fact, even before coming into force of EA 2003, the Commission had directed to the Nigam to carryout Loss Diagnostic Study as early as in the year 2001 through its Tariff Order dt 24.3.01.It appears that the Nigam is not serious about the completion of the study which has resulted in non-ascertainment of consumer category wise technical and commercial losses, on the one hand, and consumption by flat rate Agriculture-consumers, on the other. The Commission has taken a serious view of the undue delay in completion of Loss Diagnostic Study and directs that first annual report on loss diagnostic study duly approved by their Board of Directors must be made available to the Commission within a period of 6 months from the date of issue of this order, failing which the Commission shall be constrained to take action and impose penalties under the RERC (Fines and Charges) Regulations for non-compliance of the directions. It is further directed that while filing next petition for determination of wheeling charge and surcharge for the year 2006-07, the Nigam must give effect of quality and restriction on supply for allocation of cost.

69. As the Nigam has used the load curves of certain consumer categories, as a proxy for others, it is also directed that before filing the next petition, load flow study in respect of each category of consumers must be carried out.

Cost Allocation

70. The **Annexure-3** details the category-wise sale of power in MU and the T&D losses attributable to each category of consumer and the corresponding category-wise energy input in MU.

71. The consumer category wise cost allocated to Energy has been worked out in **Annexure-5.**

Allocation of Cost to Demand

72. Demand Costs are the costs, which have been caused due to the demand that is imposed by consumers on the distribution system. The connected load information of all the LT consumers and contract demand in case of HT consumers, is used by the Discom to design the distribution network, as well as to determine the quantum of power it shall contract for and the kind of capital investment and revenue expenditure it shall have to make so as to operate the system within the range of desired level of reliability.

73. In view of the fact that wheeling and transmission facilities of network nearer to consumer points have a little diversity, demand cost of network has been allocated on the basis of non-coincident demand of consumer category.

74. The feeders that cater only to the NDS or to the Bulk Supply Mixed Load category do not exist. Therefore, for NDS & Bulk Supply, the load factor & co-incident factor have been assumed to be equal to the load factor & co-incident factor of mixed category load feeders.

75. The Agriculture consumers, including Farmhouse (Metered) category, availing 24-hrs supply have different consumption pattern with respect to General Agriculture consumers. These consumers consume power during peak hours also. There is no representative data available for separately calculating the Co-incident Factor of these consumers. Therefore, the Co-incident factor for such category is assumed to be the same as that derived for domestic consumers. However, the load factor for all the agriculture categories is assumed to be the same.

76. In the absence of availability of data specifically for the small industry, the load factor and coincident factor has been assumed to be the same as that for Agriculture.

77. In the absence of specific feeder data, the Load factor and Co-incident factor for the PWW (S) has been taken as the same that used for the Agriculture. However the Load Factor and Coincident factor for PWW (M) and PWW (L) are taken similar to corresponding industrial categories.

78. The load factor for the PSL category has been assumed to be 50% as power is consumed for about 12 hours on an average over the whole year. The co-incident factor has been assumed to be 100% as the category peak and the system peak coincide.

79. The category wise Load factor, coincident factor, coincident demand and non-coincident demand have been given in the **Annexure-4.**

80. As discussed above, the demand cost of power purchase and transmission capacity contracted has been allocated based on coincident demand. The consumer category wise cost allocated to Demand has been worked out in **Annexure-5.**

Allocation of Cost to Customer

81. Customer costs have been apportioned on the basis of the number of consumers that belong to each category. The consumer category wise cost allocated to Customer has been worked out in **Annexure-5.**

Cost of Supply

82. By summing up the item wise cost allocated to each category towards Energy, Demand and Customer, the category-wise cost of supply has been arrived at in **Annexure-5.**

Surcharge

83. The difference between the category-wise revenue per unit sold and the category-wise cost of supply per unit indicates the per unit subsidy or cross-subsidy for the respective category, details of which are given in **Annexure-6.**

84. The Commission through its Open Access Regulations has allowed the open access to the consumers in the following phases:

1st phase from 1.4.2005	-	for consumers with contract demand of 15 MVA & above.
2nd phase from 1.4.2006	-	for consumers with contract demand of 5 MVA & above.
3rd phase from 1.4.2007	-	for consumers with contract demand of 1.5 MVA & above.
4th phase from 1.4.2008	-	for consumers with contract demand of 1.0 MVA & above.

85. In view of the above analysis, the cross subsidy surcharge for EHT consumers having contract demand of 15 MVA & above works out to Rs. 1.72/unit. However, with a view to phasing out cross subsidy over a period of 10 years, surcharge for this category of consumers is determined at 90% of the current level of cross subsidy i.e. **Rs. 1.55/unit** of energy drawn.

86. The above charges for wheeling and surcharge shall be applicable for the year 2005-06.

(S. M. Dharendra)
Member

NOTIFICATIONS BY HEADS OF DEPARTMENTS, Etc.,

PUBLIC WORKS NOTIFICATIONS

ANDHRA PRADESH ELECTRICITY REGULATORY COMMISSION

TERMS AND CONDITIONS OF OPEN ACCESS TO INTRA-STATE TRANSMISSION AND DISTRIBUTION NETWORKS

Regulation No. 2 of 2005

Introduction:

Subsection (2) of Section 42 of the Electricity Act, 2003, mandates the introduction of open access in such phases and subject to such conditions as may be specified by the State Commission considering the relevant factors including operational constraints. The Commission formulated a draft Regulation on the terms and conditions for allowing open access for supply of electricity to consumers and sought comments / suggestions from interested persons by publishing the same in the Andhra Pradesh Gazette on 4-8-2004 and also putting it on the website of the Commission. Twenty-three (23) persons / organisations including one licensee and some generating companies have offered comments / suggestions on the draft Regulation. The Commission considered these comments / suggestions and finalised the Regulation.

In exercise of the powers conferred by sections 181(1) read with sections 42(2), 42(4),39(2)(d)(ii) and 40(c)(ii) of the Electricity Act 2003 (36 of 2003) and all others powers enabling it in that behalf, the Andhra Pradesh Electricity Regulatory Commission hereby makes the following Regulation, namely:-

1. Short title, commencement and interpretation

(a) This Regulation may be called the Andhra Pradesh Electricity Regulatory Commission (Terms and Conditions of Open Access) Regulation, 2005.

(b) This Regulation shall extend to the whole of Andhra Pradesh.

(c) This Regulation shall come into force on the date of its publication in the Andhra Pradesh Gazette.

(d) This Regulation shall be read with the Electricity (Removal of difficulties) Second Order, 2005, notified by Ministry of Power, Government of India, in the Gazette of India, Extraordinary, Part II, Section 3(ii), dated 8th June 2005.

2 Definitions

(i) In this Regulation, unless the context otherwise requires:-

(a) "Act" means the Electricity Act, 2003 (36 of 2003);

(b) "applicant" means a person who makes an application to the Nodal Agency for open access and includes any person engaged in generation, a licensee or any consumer eligible for open access under this Regulation;

(c) "available capacity" means the capability in megawatts (MW) or kilowatts (kW) of a transmission or distribution network to transfer power from one point to the other, after deducting the power requirements of already committed users;

(d) "Commission" means the Andhra Pradesh Electricity Regulatory Commission;

(e) "contracted capacity" in the context of open access for supply to consumers means the capacity contracted in megawatts (MW) or kilowatts (kW)for transmission and /or wheeling to a consumer under open access ;

(f) "open access agreement" means an agreement entered into between a licensee and the applicant to avail open access to the licensee's network for transmission and / or wheeling of electricity;

(g) "entry point" means a point at which electricity is injected into the electricity transmission network or the electricity distribution network ;

(h) "exit point" means a point at which electricity is drawn from the electricity transmission network or the electricity distribution network ;

(i) "Nodal Agency" means the entities referred to in clause 5 of this Regulation;

(j) "user" or " open access user" means a person using or intending to use the transmission system and / or the distribution system of the licensees in the state for receiving supply of electricity from a person other than the distribution licensee of his area of supply, and the expression includes a generating company and licensee.

(k) Words and expressions used and not defined in this Regulation but defined in the Act shall have the meanings as assigned to them in the Act, or in absence thereof, shall have the same meaning as commonly understood in the electricity supply industry.

3. Extent of application

This Regulation shall apply to open access to intra-state transmission and distribution systems of licensees in the State, including when such systems are used in conjunction with inter-state transmission system(s).

4. Categorization of open access users

The open access users of the transmission and/or distribution system(s) shall be classified as follows:

(a) **Long-Term Open Access User:** Any user of the transmission and/or distribution system(s) entering into an open access agreement with the concerned licensee(s) for a period of two years or more shall be categorised as a Long-Term Open Access User.

(b) **Short-Term Open Access User:** Any user other than a long term user of the transmission and/or distribution system(s) entering into an open access agreement with the concerned licensee(s) shall be treated as Short-term open access user, but open access shall not be allowed at a time for a period of more than one year.

5. Nodal Agency

5.1 For all long-term open access transactions, the Nodal Agency for receiving and processing applications shall be the State Transmission Utility (STU).

5.2 For short-term open access transactions, the Nodal Agency for receiving and processing applications shall be the State Load Dispatch Centre (SLDC). The SLDC shall, however, allow short-term open access transactions only after consulting the concerned transmission and/or distribution licensee(s) whose network(s) would be used for such transactions:

Provided that for short-term transactions with duration of less than one week, the SLDC may not consult the concerned licensees for permitting such transactions. The SLDC and Licensees shall devise procedures for coordination among themselves for allowing such short-term transactions.

6. Criteria for allowing open access to transmission and/or distribution systems

6.1 The long-term open access shall be allowed in accordance with the transmission planning criterion and distribution planning criterion stipulated in the State Grid Code and/or the Distribution Code and / or Indian Electricity Rules as the case may be.

6.2 The short-term open access shall be allowed, if the request can be accommodated by utilizing:

(a) Inherent design margins;

(b) Margins available due to variations in power flows and unutilised capacity, if any; and

(c) Margins available due to in-built spare capacity in transmission and/or distribution system(s) created to cater to future load growth

7. Provision for existing users:

7.1 Existing distribution licensees:

The existing distribution licensee (s) shall be deemed to be the long-term open access user (s) of the Intra-State transmission system (s) and / or the distribution system (s) for the term specified in / under the existing agreement (s) or arrangement (s) and shall make payment of transmission charges, wheeling charges and other charges, as applicable, and as may be determined by the Commission from time to time.

The existing distribution licensee (s) shall, within 60 days of coming into force of this Regulation, furnish details of their use of intra-state transmission system (s) and/or distribution system (s) to the STU, SLDC and the Commission.

7.2 Existing users other than the distribution licensees:

The existing user (s) other than the existing distribution licensees may continue to avail themselves of the wheeling facility as per the existing agreements for the period(s) specified in those agreement(s), to the extent they are not inconsistent with the Act and this Regulation:

Provided that such existing user (s) shall pay the transmission charges, wheeling charges and other charges as may be determined by the Commission from time to time :

Provided also that any additional capacity sought by such existing user (s) in addition to the capacity already contracted, shall be treated as new application for open access to the extent of additional capacity sought.

8. Phasing of Open Access

8.1 Where open access to the Transmission and/or Distribution systems is sought by any user, the Nodal Agency shall permit such open access strictly in accordance with the following phases:

Phase	Eligibility criteria	Commencement date
1.	Consumers availing of power from NCE developers irrespective of the quantum of contracted capacity	September, 2005
2.	Contracted capcity being greater than 5 MW	September, 2005
3.	Contracted capacity being greater than 2 MW	September, 2006
4.	Contracted capacity being greater than 1 MW	April, 2008

Provided that the Commission shall allow open access to consumers with contracted capacity of 1 MW or less in due course at such time and in such phases as it may consider feasible having due regard to operational constraints and other factors:

Provided further that the Commission may revise the above schedule for the subsequent phases of open access, as considered necessary, not being inconsistent with the provisions of the Act:

Provided also that the Commission may exempt any consumer or a class of consumers from this phasing scheme if it considers necessary or expedient in the public interest:

Provided also that only the consumers availing of supply from the existing users covered under clause 7.2 from a date prior to coming into force of this Regulation shall not be affected by the above phasing.

8.2 The licensees shall make all reasonable attempts to ensure that operational constraints in the Transmission and / or Distribution systems as the case may be, including metering, communication systems, capacity determination, etc. are removed as per the phasing plan indicated above so that, as far as possible, no eligible consumer is denied open access on the grounds of operational constraints in the system.

9. Criteria for allotment/reservation of capacity

9.1 A distribution licensee, due to its obligation to supply on request under section 43 of the Act, shall have the highest priority in allotment of capacity, long-term as well as short-term.

9.2 As regards the other applicants for allotment of capacity of transmission and/or distribution systems, the persons applying for Long-Term open access shall have priority over the persons applying for Short-Term open access. However, within a category, an applicant requesting transmission and/or distribution access for longer duration shall have priority over the person(s) seeking access for shorter duration.

9.3 Allotment of capacity in case of insufficient spare capacity/ congestion

9.3.1 For Long-Term applicants: In the event of insufficient spare capacity in distribution system/congestion in the transmission system hindering accommodation of all long-term open access applications, the Nodal Agency shall inform the applicants of the same and shall advise the concerned Licensee(s) to carry out an assessment of works required to create additional capacity by strengthening of the system to accommodate such applicant(s). After completion of such works, the Nodal Agency shall allot the capacity to such applicant(s). As regards capital expenditure incurred by the licensee(s) for system-strengthening, the licensee(s) can require a capital contribution from the applicant(s) subject to the provisions of clause 17.1 (v) of this Regulation.

9.3.2 For Short-Term applicants: In case of applicants for short-term open access with transactions required to be accommodated through congested corridors of the network, the Nodal Agency shall invite bids by Fax/e-mail with floor price equal to the un-congested price for the short-term users. The bidders shall quote percentage points above the floor price. The allotment of capacity shall be done in decreasing order of the price quoted. In case of quotes involving equal prices, the allotment of capacity shall be done, if required, *pro rata* to the capacity sought. The user getting allotment of capacity less than the capacity sought by him shall pay charges as per the price quoted by him. All other applicants getting capacity allotment equal to the capacity sought by them shall pay charges as per the price quoted by the last applicant getting full allotment of the capacity sought.

Explanation 1: For the purpose of clauses 9.3.1, and 9.3.2, "congestion" in the context of allotment of capacity for transmission of electricity shall be construed to have occurred when a transmission system cannot accommodate all transactions that would normally occur among users due to physical or engineering limitation.

Explanation 2 : For the purpose of clause 9.3.2, the term "un-congested price" means the transmission and / or wheeling charges required to be paid by the short-term users as per the rates approved by the Commission and published by the Nodal Agency from time to time.

10. Procedure of application for Long Term open access

10.1 The Nodal Agency (STU) shall make available the format of application for open access requiring broadly the details as set out in Annexure-1 to this Regulation, to the general public in physical form at its offices and in electronic printable form at its website.

10.2 An application for long-term open access shall be filed with the STU by the applicant, with a copy to the concerned transmission / distribution licensee(s) . The application shall be accompanied by a non-refundable processing fee as prescribed by the Commission in the Tariff Orders, or otherwise, from time to time:

Provided that till such time the processing fee is so prescribed by the Commission, it shall be Rs.10,000.

10.3 The Nodal Agency shall acknowledge the receipt of an application made under clause 10.2 above within 24 hours of the receipt of the application.

10.4 If after submission of the open access application, the applicant becomes aware of any material alteration in the information contained in the application, the applicant shall promptly notify the Nodal Agency of the same:

Provided that in case the Nodal Agency is made aware of the material alteration in the information contained in the application already submitted under clause 10.2 above, the Nodal Agency shall treat the application as if the same was received on the date the applicant notifies it of the said alteration.

10.5 All applications received within a calendar month e.g. during 1st April to 30th April, shall be considered to have been filed simultaneously. This window of a calendar month shall keep rolling over i.e. after the expiry of a monthly window, another window of the duration of the next calendar month shall commence.

10.6 Based on system studies conducted in consultation with other agencies involved including other Licensees, if it is determined that Long-Term open access sought can be allowed without further system-strengthening, the Nodal Agency shall, within 30 days of closure of a window, intimate the applicant(s) of the same.

10.7 If, on the basis of the results of system studies, the Nodal Agency is of the opinion that the Long-Term open access sought cannot be allowed without further system-strengthening, the Nodal Agency shall notify the applicant of the same within 30 days of closure of a window. Thereafter, at the request of the applicant, which shall be made within 15 days of such notification by the Nodal Agency, the Nodal Agency shall carry out further studies, if required, to identify the scope of works involved and intimate the same to applicant within 30 days of receipt of such request from the applicant. The Nodal Agency shall also inform the applicant of the probable time frame for execution of the works involved after consultation with the concerned licensee(s).

Provided that in such cases, the applicant shall fully reimburse the Nodal Agency for actual expenditure incurred to carry out such system studies to identify the scope of works involved in system-strengthening. The fee, as prescribed in clause 10.2, paid by the applicant shall be adjusted against the actual expenditure to be reimbursed by the applicant:

Provided further that while identifying the scope of works for such system-strengthening, the Nodal Agency shall follow the standards required under the Grid Code and / or Distribution Code and / or Indian Electricity Rules, as the case may be.

11. Procedure of application for Short-Term open access

11.1 The SLDC shall make available the format of application similar to the one referred to the clause 10.1 above, to the general public in physical form at its office and in electronic printable form at its website.

11.2 The application for short-term open access to Transmission and / or Distribution system(s) shall be filed with, the SLDC with copies to concerned licensees. The application shall be accompanied by a non-refundable processing fee as prescribed by the Commission in the Tariff Orders, or otherwise, from time to time:

Provided that till such time the processing fee is so prescribed by the Commission, it shall be Rs.1,000.

11.3 The SLDC shall process the applications for Short-Term open access within the following time limits:

Duration for which open access is required	Maximum processing time
Up to one day	12 hours
Up to one week	Two days
Up to one month	Seven days
Up to one year	Thirty days

12. Open Access Agreement

12.1 Based on the intimation by the Nodal Agency to the open access applicant, the applicant shall execute an open access agreement with the concerned Licensee(s), which shall broadly set out the information as given in Annexure-2 to this Regulation. The Licensees shall draft a standard open access agreement format and get the same approved by the Commission within 30 days of coming into effect of this Regulation.

12.2. The open access agreement referred to in clause 12.1 shall be bipartite, tripartite or multi-partite involving the applicant, the concerned Distribution Licensee in whose area of supply the applicant's exit point is located and the concerned Transmission Licensee or Licensees. The Open Access Agreement shall clearly bring out the rights and obligations of all parties which are broadly set out in Annexure – 3 with respect to exit points on transmission and distribution systems separately:

Provided that in cases where the open access applicant's point(s) of entry as well as the point(s) of exit are located within the distribution system of the same Distribution Licensee (at voltages 33KV and below), the applicant shall be required to execute an open access agreement only with such Distribution Licensee.

12.3 Subject to the capacity being available, the Licensee(s) shall, after the applicant for long-term open access has completed all the pre-requisite formalities, including the execution of open access agreement, make arrangements to provide access to the applicant within the time period specified in the Andhra Pradesh Electricity Regulatory Commission (Licensees' Duty for Supply of Electricity on Request) Regulation, 2004 (No. 3 of 2004):

Provided that in the case of short-term users, the open access shall be allowed as early as possible notwithstanding the time frame specified in the aforementioned Regulation.

12.4 Minimum term and renewal of the Open Access Agreement: The minimum term of an open access agreement is such term as the parties may agree and set out in the agreement subject to the provisions of clause 4 above. A long-term open access agreement between a long-term user and the licensee may be renewed for a further term of two years or more without the requirement of a fresh open access application, on receipt of at least three (3) months' notice from the concerned long-term user to the concerned licensee(s) and the Nodal Agency, before the expiry of the Agreement. . In case, no notice is provided by the Long-Term user, the Long-Term user shall forgo his right over the allotted capacity.

In case of short-term users, however, no extension of the original open access agreement shall be allowed, and a user wanting extension shall have to apply afresh to the Nodal Agency for open access.

13. Metering

13.1 All Long-Term and Short-Term open access users shall provide special energy meters capable of measuring active energy, reactive energy, average frequency and Demand integration in each 15-minute time block, with a built-in calendar and clock and conforming to BIS/CBIP Technical Report / IEC standards at all entry and exit points. This shall however be subject to the regulations to be made by the Central Electricity Authority under section 55 of the Act.

13.2 The users covered under clause 7 of this regulation shall have to provide the required metering at their premises within a period of 3 months from the date of coming into force of the Regulation failing which the Licensees shall no longer be obliged to wheel the energy to them. In such an event, all energy recorded at the premises of the user shall be deemed to have been supplied by the Distribution Licensee of that area of supply and shall be billed for by such Licensee accordingly at the appropriate tariff:

Provided that in the case of distribution licensees, the Commission may, considering the large number of meters required to be installed by them extend this 3-month time limit, as considered appropriate, on receipt of requests to this effect duly supported by valid reasons.

14. Procedure for determining the available capacity of transmission and distribution (T&D) networks

14.1 The licensees shall carry out load flow studies, system impact studies, etc. taking into account the existing capacity commitments and future projections of capacity requirements for open access users, load growth as projected by distribution licensees, growth of generation, network topology and consumption pattern, network investments, Repairs and Maintenance programs, etc. to determine the capacity available to

accommodate open access transactions. While so determining the capacity available for open access transactions, capacity commitments to all existing users of the network and the system reliability margin shall be deducted.

14.2 The Licensees shall keep updating the data on available capacity, taking into account the contracts with open access users, the impact of such transactions on the capacity of system elements, the increase/decrease in native load, changes in consumption pattern, network strengthening programs actually carried out and those projected, etc.

14.3 In order to decide the availability of sufficient spare capacity in the T&D networks so as to permit an open access transaction applied for, the Nodal Agency may also carry out load flow studies to simulate the impact of power flows associated with such open access transaction on the network and thus determine whether capacity is available to permit such open access transaction (in conformity with technical standards according to Grid Code and / or Distribution Code and / or Indian Electricity Rules , as the case may be) or there is a need to carry out system-strengthening works to ensure availability of sufficient capacity. The Nodal Agency may have to carry out this exercise on a case-to-case basis as and when an open access application is received.

14.4 The licensees shall carry out information exchange among themselves and keep one another and the Nodal Agency informed of the transactions on their respective networks.

14.5 The Nodal Agencies and Transmission / Distribution Licensees shall post details of available capacity on their respective websites, including the details of open access transactions permitted on different Licensees' networks with their respective entry and exit points, etc. on a daily basis

15. Underutilization

15.1 In the event a user expects to underutilize the capacity contracted under open access, the user may surrender a part of the capacity subject, however, to an advance notice as set out in the terms of the open access agreement, along with an explanation for such underutilization.

15.2 In the event of underutilization of the capacity contracted by the open access user, which, if made available, could be used to meet requirements of other applicant(s), the concerned licensee may file an application with the Nodal Agency to reduce or cancel the capacity allocated to the open access user :

Provided that the Licensee shall not so approach the Nodal Agency without first issuing a notice to the concerned user as set out in the open access agreement:

Provided further that the Nodal Agency shall not reduce or cancel the capacity allotted without giving a notice of at least 15 days, in advance, to enable the concerned open access user to file his objections if any in writing.

15.3 In the event of user's surrender of whole or part of contracted capacity as per clause 15.1, or reduction/cancellation of the capacity allotted to the user as per clause 15.2, the user shall pay compensatory charges to the licensees concerned as follows:

(a) An amount equivalent to 50% of current application fee for Long-Term or Short-Term users, as the case may be, if all the capacity surrendered or reduced/cancelled is fully re-allotted to other applicants within the notice period so given by the user or the licensee, as the case may be.

(b) If the capacity surrendered or reduced/cancelled could not be fully re-allotted to other applicants within the notice period, then –

(i) In case of Long-Term users, the user shall, as a one-time exit fee, pay 25% of the transmission charges and / or wheeling charges as the case may be, and the scheduling and system operation charges in force at that point in time, applied on the capacity that could not be re-allotted for the remaining term of the agreement; and

(ii) In case of Short-Term users, the user shall bear the full transmission charges and / or wheeling charges, as the case may be, and the scheduling and system operation charges in force at that point in time, applied on the capacity that could not be re-allotted for the remaining term of the agreement.

16. Flexibility to change entry and exit points

16.1 The Long-Term users shall have the flexibility to change entry and/or exit points twice a year subject to the results of system impact studies to be carried out by the concerned Licensees at the behest of such users. All expenses incurred by the Licensees to carry out such studies shall be reimbursed in full by such users.

16.2 A Short-Term user availing of open access for one full year may also change entry and/or exit points twice, subject to feasibility.

17. Open Access charges

17.1 The charges for the use of the transmission and / or distribution system by an open access user shall be regulated as under:

(i) Open Access users connected to the transmission/distribution system shall pay the transmission charges and / or wheeling charges and any other applicable charges as determined by the Commission from time to time, and notified in the relevant Tariff Order or otherwise, and as per the conditions stipulated therein:

Provided that the wheeling charges so payable shall be subject to a minimum level , as fixed by the Commission in the relevant Tariff Order or otherwise.

(ii) In case of utilization of inter-state transmission system in addition to the intra-state transmission system and/or distribution system by an open access user , the transmission charges and / or wheeling charges shall be payable for the use of intra-state system in addition to the charges for utilization of the inter-state transmission system

(iii) The Open access users of the Transmission and / or Distribution System where such open access is for delivery of electricity to the consumer's premises in the area of supply of a distribution licensee, shall pay to the distribution licensee the (cross-subsidy) surcharge as determined by the Commission from time to time under Section 42 (2) of the Act :

Provided that no (cross-subsidy) surcharge shall be payable if the open access is provided to a person who has established a captive generating plant for carrying the electricity to the destination of his own use.

(iv) The Open Access user shall also be liable to pay additional surcharge on charges of wheeling as may be specified by the Commission from time to time under section 42(4) of the Act, in case open access is sought for receiving supply from a person other than the distribution licensee of such consumer's area of supply, to meet the fixed cost of the distribution licensee arising out of his obligation to supply.

(v) Where an electrical plant or electrical line is to be constructed by the Licensee in order to extend power supply to an open access user, the Licensee may recover such expenditure as per the Andhra Pradesh Electricity Regulatory Commission (Licensee's Duty for Supply of Electricity on Request) Regulation, 2004(Regulation No.3 of 2004)

(vi) If network augmentation is required for providing access to an applicant, the Licensee shall carry out such augmentation only if (a) the Licensee can recover within a reasonable time the costs, the capital investment and a reasonable rate of return on the capital investment in respect of the augmentation, and (b) the Licensee has the ability to raise funds to finance such capital expenditure:

Provided that the Licensee may require the open access user to make a capital contribution towards such network augmentation.

(vii) Scheduling and system operation charges shall be payable by all open access users under scheduling by SLDC. Such charges shall be governed by the relevant Regulations issued by the Commission.

18 Payment terms and conditions

18.1 In case of Long-Term users, the concerned Distribution Licensee may invoice a user in respect of the open access charges as set out in clause 17 of this Regulation and the open access user must pay those charges, in accordance with the procedures set out in the open access agreement between the Licensees and the user:

Provided that the Distribution Licensee shall have appropriate back-to-back arrangements in place with the Transmission Licensee(s) in order to pass on the transmission charges so collected from the user to the concerned Transmission Licensee.

18.2 In case of short-term users, the Distribution Licensee(s) may invoice the user and the user shall pay the charges to the concerned Licensee(s) directly. The SLDC shall assist / advise the Distribution Licensee in the matter of energy accounting and allocation. .

18.3 All open access users shall pay the charges payable under the open access agreement from the date of commencement of open access specified in the open access agreement, regardless of whether or not such open access is used on and from that date, except if the failure to use such open access is due to the default of the concerned licensee(s) whose networks are being used.

18.4 In case of underutilization leading to surrender or cancellation of contracted capacity, the user shall pay such charges and in such manner as set out in clause 15 above.

18.5 Meter readings and Billing in respect of open access for supply to consumers: The Distribution Licensee in whose area the consumer is located shall take the meter readings at the exit point. The billing shall be done by the respective Licensees as per the open access agreement under clause 12 read with the provisions of clauses 17 and 20 of this Regulation.

18.6 For the purpose of clause 18.5 above, a consumer using the Transmission and /or Distribution systems for his total power requirements without any contracted maximum demand(CMD) from the Distribution licensee shall be deemed to be a consumer of the distribution licensee in whose area the consumer is located.

19. Other matters

19.1 Coordination among licensees and SLDC: For the success of open access implementation, the licensees and the State Load Dispatch Centre shall carry out information exchange among themselves on a daily basis to determine the level of open access transactions in their respective areas of supply, energy flows, loading of transmission and distribution lines and equipment to determine system stability, available capacity, congestions in the networks, etc.

19.2 Information requirements: The licensees and the State Load Dispatch Centre shall maintain the following information on their websites in order to ensure transparency and carry out information exchange among themselves required to process open access applications:

(i) Transmission and / or wheeling charges, as the case may be, for open access users located within the State; and

(ii) A status report on the current long-term users indicating name of user, period of the access granted (start date and end date), point(s) of injection and point(s) of drawal, capacity contracted and applicable charges. This report shall be updated as and when the status changes ; and

(iii) Information regarding usage of the inter-regional links as well as interface between the Central Transmission Utility and State systems and inter-state links indicating time of updating, name of the link, total transmission capacity of the link, scheduled capacity use and current capacity of the link in use. This information shall be updated at least on hourly basis and wherever feasible on 15-minute basis.

19.3 Quality of supply: The licensee(s) shall ensure compliance with Grid Code wherever applicable. The Distribution Licesees shall also comply with the quality of supply standards as prescribed under the Andhra Pradesh Electricity Regulatory Commission (Licensees' Standards of Performance) Regulation, 2004 (Regulation No.7 of 2004) in respect of all open access users of its network.

19.4 Energy and Demand Balancing: All open access users, and the users covered under clause 7.2, shall make reasonable endeavor to ensure that their actual demand or actual sent-out capacity, as the case may be, at an inter-connection does not exceed the Contracted Maximum Demand or allocated sent-out capacity for that inter-connection:

Provided that for carrying out balancing and settlement of energy and demand at all entry and exit points relating to open access agreements, the licensee shall strictly adhere to the Balancing and Settlement Code to be approved by the Commission, from time to time.

19.5 Curtailment due to constraints: The licensee, based on directions from SLDC, may curtail power to any open access user or users, whether long-term or short-term, in an event of emergency threatening grid security and stability. As far as practicable, the priority in curtailment shall be as prescribed hereunder:

(a) Short-term open access users of the network shall be curtailed in the first step, followed by
(b) All other consumers including long-term access users, but excluding distribution licensees, in ascending order of contract period , followed by
(c) Distribution licensees.

20. General Terms and Conditions of Supply

With regard to matters not contained herein, including but not limited to the following, and wherever the context so requires, the conditions set forth in the General Terms and Conditions of Supply shall generally be applicable:

(a) Voltage of supply vis-à-vis total Contracted Demand;
(b) Security Deposit;
(c) Disconnection for non-payment of charges;
(d) Title Transfer to successor entity ; and
(e) Levy and collection of Customer Charges

21. Dispute resolution

All disputes and complaint shall be referred to the Nodal Agency for resolution :

Provided that when the Nodal Agency is itself a party to the dispute, the dispute shall be referred for resolution to the Forum for Redressal of Consumer grievances set up under Regulation No.1 of 2004 :

Provided further that in case of wheeling of power from the captive generating plants, any disputes regarding the availability of transmission facility shall be adjudicated upon by the Commission.

22. Force Majeure

22.1 Events such as war, mutiny, civil commotion, riot, flood, cyclone, lighting, earthquake or other force and strike, lockout, fire affecting the premises, installations and activities of any of the parties having an open access agreement shall constitute force majeure events for the purpose of this Regulation.

22.2 If any person being party to an open access agreement is unable to, wholly or in part, perform on time and as required, any obligation under such open access agreement or this Regulation because of the occurrence of a force majeure event, then, subject to this Regulation, that obligation shall be treated as suspended to the extent and for so long as the affected person's ability to perform such obligation remains affected by that force majeure event.

23. Issue of orders and practice directions

Subject to the provisions of the Electricity Act, 2003, the A.P. Electricity Reform Act, 1998, and this Regulation, the Commission may, from time to time, issue orders and practice directions in regard to the implementation of this Regulation, the procedure to be followed and other matters, which the Commission has been empowered by this Regulation to specify or direct.

24. Power to remove difficulties

24.1 In case of any difficulty in giving effect to any of the provisions of this Regulation, the Commission may by general or special order, direct the Open Access users, generators and the licensees to take suitable action, not being inconsistent with the provisions of the Act, , which appears to the Commission to be necessary or expedient for the purpose of removing the difficulty.

24.2 The Open Access users, generators and the licensees may make an application to the Commission and seek suitable orders to remove any difficulties that may arise in implementation of this Regulation.

25. Saving: Nothing contained in this Regulation shall affect the rights and privileges of the users under any other law for the time being in force, including the Consumer Protection Act, 1986 (68 of 1986).

26. Power to amend: The Commission may from time to time add, vary, alter, modify or amend any provisions of this Regulation.

(BY ORDER OF THE COMMISSION)

S.SURYAPRAKASA RAO
SECRETARY

Annexure-1:

Suggested contents of Open Access Application

(a)

(i) Name and address of the applicant

(ii) Details of applicant's installation

(iii) Nature of wheeling i.e., whether it is for captive use or third party sale.

(iv) Name and address of consumers to whom the power is to be wheeled

(b) Type of open access required, whether long-term, or short-term

(c) Capacity in KW or MW required for open access in respect of each consumer

(d) Point(s) of Entry

(e) Point(s) of Exit

(f) Period for which open access is required

(g) Details of metering arrangements at the entry points and exit points as required under the Metering Code (part of the Grid Code or the Distribution Code, as the case may be) as amended from time to time

(h) Information whether the recipients of power are already consumers of Distribution licensee of their area. If so, furnish the Contracted Maximum Demand (CMD) of each of them with the Distribution Licensee concerned

Any other information reasonably required by the licensee / Nodal Agency.

Annexure-2:

Suggested essential features of Open Access Agreement

(a) The Entry and Exit points

(b) Allotted capacity (in kW or MW) for open access in the Transmission and / or Distribution system

(c) The rates and charges for providing various access services, such as:
- (i) Transmission and/or Wheeling charges as the case may be;
- (ii) Transmission losses and / or wheeling losses to be deducted;
- (iii) Cross-subsidy Surcharge ;
- (iv) Additional surcharge ;
- (v) SLDC charges;
- (vi) Reactive energy charges, if applicable; and
- (vii) Any other charges

(d) A requirement that the applicant's equipment / installations at all times for the entire duration of the contract complies with the provisions of the Grid Code and/or the Distribution Code, as the case may be

(e) The date of commencement of Open Access

(f) The manner of accounting of energy and demand balancing procedures, as per the Balancing and Settlement Code to be approved by the Commission, from time to time

(g) The billing cycle and the payment terms and conditions;

(h) The Agreement period and its termination / deration conditions

(i) Other terms and conditions including powers of the Nodal Agency on surrender of capacity, premature termination of open access agreement, penalty for under-utilisation of allotted capacity, etc.

(j) Provision for renewal of open access Agreement in applicable cases

Any other information as considered reasonable by the Licensee.

Annexure – 3:

Duties, rights and obligations of parties, inter-alia, in case of Tripartite Open Access Agreements referred to in clause 12.2 of the Regulation

Exit Points location on 132 KV and above (Transmission System):

(a) Concerned Transmission Licensee's obligation to provide transmission capacity – User's right on transmission capacity contracted :

(b) Duties of Distribution Licensee of that area of supply where such exit point is located for meter reading and billing (for transmission charges, surcharges, out-of-balance payments, etc.);

(c) User's duty to pay the charges, as billed for ; and

(d) Distribution Licensee's obligation to pass on the transmission charges so collected from the user to the concerned Transmission Licensee.

Exit Points location on 33 KV and below (Distribution System):

(a) Concerned Transmission Licensee's obligation to provide Transmission capacity – User's right on Transmission capacity contracted;

(b) Concerned Distribution Licensee's obligation to provide Distribution system capacity –User's right on Distribution capacity contracted;

(c) Distribution Licensee's duties for meter reading and billing (for Transmission charges, Wheeling charges, applicable surcharges, out-of-balance payments, etc.) ;

(d) User's duty to pay for charges as billed for ; and

(e) Distribution Licensee's obligation to pass on the transmission charges collected from the user to the concerned Transmission Licensee

KARNATAKA ELECTRICITY REGULATORY COMMISSION
No.9/2, 6th & 7th Floor, Mahalaxmi Chambers,
M.G.Road, Bangalore-560 001.

Present: Shri K.P.Pandey — Chairman
Shri H.S.Subramanya — Member
Shri S.D.Ukkali — Member

In the matter of determination of Transmission Charge, Wheeling Charge and Cross Subsidy Surcharge under Open Access

ORDER

No.Q/01/1 Dated 9th June 2005

1. Pursuant to section 42 and all other enabling provisions under the Electricity Act 2003, the Commission had issued KERC (Terms and Conditions for Open Access) Regulations, 2004, which has been notified in the gazette of Karnataka on 16.12.2004. Clause 11(i) of the said Regulations provide that transmission charges as determined by the Commission shall be applicable from time to time and the Commission would follow the postage stamp method for determination of transmission tariff for the present. Clause 11(ii) of the Regulations specifies that the wheeling charges as determined by the Commission shall be applicable from time to time. Further, clause 11 (iv) specifies that the Commission would determine the surcharge based on cost of supply to various consumer categories. In this context the Commission had directed KPTCL/ESCOMs to file proposals for determination of these charges.

2. Under the above Open Access Regulations, the Commission has allowed in Phase-I open access to all HT consumers with Contract Demand of 15 MW and above and with voltage level of 66 kV and above, effective from 10.6.2005. Thus there is an urgent need to determine the transmission charges, wheeling charges and surcharge in order to implement the said regulations. Since there has been no response from KPTCL/ESCOMs to file necessary proposals to determine these charges, the Commission is constrained to determine these charges with the available information, as an interim arrangement, in order to give effect to the open access allowed in Phase-I.

3. For determination of the above charges the Commission had issued a detailed discussion paper inviting comments/suggestions from stakeholders, experts and others, vide Commission's letter dated 25th April 2005 and views were sought specifically on the following points:

   (i) The methodology to be followed in determination of Transmission charges, wheeling charges and surcharge in Karnataka

(ii) Whether any preferential treatment is to be given for power supply from non-conventional sources under open access and if so to what extent?

(iii) Out of the Cross-subsidy determined, whether the cross subsidy surcharge for open access can be levied ranging from 50 to 90 % in order to encourage open access?

(iv) Whether commercial loss has to be allocated to all consumers including HT & EHT?

(v) Whether banking facility is to be provided under open access? If so, what type of generation facility should be provided banking and what should be the banking charges?

(vi) Other suggestions

4. The Commission has received written responses from 22 nos. of stakeholders/experts. A list of stakeholders/experts who have responded to the discussion paper is enclosed to this order vide Annexe-1.

5. There upon the Commission decided to hold public hearing in the matter on 25th May 2005. A notice to this effect was published in the following newspapers on 14th May 2005:

i)	The Hindu	(English Daily)
ii)	The Times of India	(-do-)
iii)	Kannada Prabha	(Kannada Daily)
iv)	Vijaya Karnataka	(-do-)

6. As scheduled, the hearing was held on 25th May 2005. A list of participants in the hearing is enclosed vide Annexure-2. In the said hearing, after presentation by various stakeholders/experts, MD/KPTCL sought time to present their views. The Commission permitted KPTCL to present their written comments by 31.5.05 and to make oral submissions in the hearing on 1st June 2005 Accordingly, MD/KPTCL has filed written comments on behalf of KPTCL/ESCOMs and presented their views on 1st June 2005.

7. A summary of the Commission's proposal, views/comments expressed by the stakeholders/experts in writing as well as during the hearings, and the Commission's decision thereon on each of the issues are given below:

7.01 **Methodology for determination of Transmission Charges::**

Commission's Proposal: In the discussion paper, the Commission had proposed to calculate transmission charges on postage stamp basis either on per unit basis or on per MW basis.

Comments received: Special Secretary (Reforms) GoK has opined that the methodology for determination of Transmission, wheeling charge and surcharge should take into account the capacity available in the system, nature of consumers, consumers who leave the grid and the new consumers who join the grid. KPTCL has stated that transmission charges should be determined on MW basis since energy based transmission charge may result in under recovery/over recovery of costs and also that the short tem open access customers may block the transmission path for others without paying any charges. KPTCL further stated that for calculating transmission charges on MW basis, available capacity should be considered as against the installed capacity. Indian Wind Power Association (IWPA) has suggested postage stamp methodology for determination of transmission charges. However for wind projects relaxation in methodology may be considered wherein the charges may be computed in both distance sensitive and distance neutral methodologies and least costs shall be arrived at based on these methods. Kalyani Steels has proposed that transmission charges be based on combination of distance sensitive slabs in steps of 25KMs/50 KMs with postage stamp based charges in a particular slab. Sri Govindappa former Technical Member, KEB, has stated that distance sensitive method shall be adopted for transmission charges. Sri B.G.Rudrappa former Chairman, KEB, has stated that open access customer should justifiably bear the proportionate cost of the transmission loss and also compensate the incremental transmission loss. He has further stated that in the present practice, the annual cost of transmission is divided by the units sold to the ESCOMs, which incidentally covers transmission loss also. It is difficult to determine the incremental line losses, as it is dependent on the location of consumer, location of supplier, hour of usage and season. Hence it is advisable to charge on per unit cost basis for open access customers also as is being followed now. Sri Venkata Subba Rao has opined that Transmission charges for the purpose of wheeling should be based on zonal stamp method, one for each ESCOM. Karnataka Working Group for Electricity has suggested to adopt postage stamp method for both transmission and wheeling charges. Some of the stakeholders have requested the Commission to adopt the methodology for computation of transmission charges as being followed by CERC. Sri Raghavendra Raju has also expressed the same views.

Commission's Views/Decision:

The Commission, in its Regulations has specified that it would adopt Postage Stamp method for determination of transmission charges as postage stamp method is simple and easy to implement, particularly in the absence of voltage-wise details of assets of transmission.

Regarding KPTCL's proposal to determine the charges on mega watt basis for open access customers, the Commission notes that the existing transmission charges for ESCOMs has been determined on energy basis since the formation of ESCOMs (In June 2002) considering the proposal of

KPTCL. The Commission also notes that the allocation of PPAs by GoK in the order dated 10.5.05 is also based on energy input to ESCOMs. The Commission pointed out to KPTCL during the hearing that determination of transmission charges on MW basis to open access customers and on energy basis to ESCOMs would amount to discrimination. KPTCL has not proposed transmission charges on MW basis even in the ERCs for FY05 and FY06 which are before the Commission for disposal. While the proposal of KPTCL to determine the charges on MW basis is a welcome move, the methodology should be uniformly applied to the ESCOMs as well as open access customers. Therefore, till such time the KPTCL files its proposals for determination of transmission chargers on MW basis to ESCOMs and also to open access customers, it is appropriate to follow energy based transmission charges uniformly.

In view of the above the Commission proceeds with determination of transmission charges based on per unit basis instead of per Mega Watt basis for the present.

7.02 **Methodology for determination of wheeling Charges::**

Commission's Proposal:
The Commission has determined wheeling charges in the Tariff Order 2003. However as indicated in the discussion paper, several stakeholders/ consumers have represented to the Commission stating that the wheeling charges determined by the Commission are exorbitant. After examining the alternative methods such as Postage stamp method, License plate, Zonal stamp method, Highway-zone method and Distance Sensitive (MW-km) methods for computation of wheeling charges, the Commission had proposed in the discussion paper to adopt Licence plate methodology with certain modification to avoid pancaking. The Commission had proposed ESCOM wise wheeling charges based on Cost of Service (CoS) methodology using NCP method.

Comments received
As discussed earlier, Special Secretary (Reforms)/ GoK has stated that the methodology should take into account the capacity available in the system, nature of consumers, consumers who leave the grid and the new consumers who join the grid. HESCOM has preferred licence plate methodology for computation of wheeling charges and has stated that Cost to serve should not be used for wheeling charges. CESCO has stated that licence plate methodology proposed would not be fair to ESCOMs. Karnataka Working Group for Electricity has suggested to adopt postage stamp method. Bangalore Chamber of Industry and Commerce has stated that Wheeling charges should be based on distance of flow at the respective voltage class. Sri Venkata Subba Rao has stated that wheeling charges for distribution network should be worked out based on load research and further wheeling charges for urban network should be more than rural network.

Commission's views/decision:

The Commission had proposed ESCOM-wise wheeling charges based on CoS methodology using NCP method. Most of the stakeholders including KPTCL have expressed concern over the reliability of the data used for CoS methodology. It would not be out of context to mention here that the Commission has been insisting on conducting studies to implement Cost to serve methodology both for tariff determination as well for determination of wheeling charges. The Commission has also addressed GoK in the matter. Despite allowing sufficient time to the utilities, the Commission notes that even in the latest ERC the utilities have proposed fixation of tariff on average cost basis without any indication on the action plan to implement the CoS methodology. During the hearing, KPTCL have assured that they would work out the CoS in the ERC to be filed in FY07. Regarding suggestion to determine the charges based on distance of flow and separate charges for urban & rural networks, KPTCL/ESCOMs may examine and come out with specific proposal in future.

In view of the above, the Commission considers it appropriate to determine the wheeling charges based on the average network cost of the respective ESCOMs for the present.

7.03 **Methodology for determination of Surcharge:**

Commission's Proposal:
The Commission, in its discussion paper, had proposed computation of cross subsidy surcharge by applying CoS Model and further to allocate the costs involved in generation, transmission & Distribution of electricity under the alternative methods such as 1 CP method, NCP method, CP & NCP method & Average & Excess Method.

Comments received
Special Secretary (Reforms)/GoK has opined that the methodology should take into account the capacity available in the system, nature of consumers, consumers who leave the grid and the new consumers who join the grid. HESCOM opined that surcharge to be equal to the difference between average realisation per unit and purchase cost (BST) per unit. Reliance Energy has suggested that Demand related costs should be allocated based on co-incident peak for generation and transmission and on NCP for distribution. Kalyani Steels has opined that surcharge should be based on average and excess method and it should be at lower levels to make the open access viable. Karnataka Working Group for Electricity has suggested that allocation of demand charges should be based on NCP method. Bangalore Chamber of Industry and Commerce has stated that surcharge to be based on RoR of 12% post tax on capital expenditure of T & D system less depreciation plus interest costs, manpower costs, R & M cost and working capital cost. Sri Venkata Subba Rao has stated that Surcharge shall be based on avoided cost of generation suggested by the Forum of Indian Regulators (FOIR) by suitably modifying the approach to calculate the avoided cost for Karnataka and

he also suggested that average cost of supply could be adopted for the present as it would not be fair to follow different approaches for determining retail tariff and surcharge.

KPTCL have proposed to calculate surcharge as the difference between average realisation rate & Bulk Supply Tariff (BST) charged to ESCOMs. They have stated that CoS calculation in the discussion paper is based on earlier MECON reports which themselves are based on several assumptions and cannot be relied upon and therefore in the absence of load research, surcharge calculations based on assumptions would have far reaching impact. In the public hearing, this aspect was elaborately discussed and the Commission pointed out that according to section 61(g) of the Electricity Act 2003, the tariffs shall reflect progressively the cost of supply of electricity and further that cross subsidies shall be reduced and eliminated within the period to be specified by the Commission. Therefore the alternative methodologies that could be adopted for the present for determination of surcharge are (a) Average Cost of Supply and (b) CoS only and KPTCL's proposal to adopt BST for the purpose lacks rationale. After discussions, KPTCL had proposed in the hearing to adopt average cost of supply for the present for determination of surcharge expressing apprehensions about the reliability of data for using CoS.

Commission's views/Decision:
Regarding KPTCL's suggestions to adopt BST for calculating the surcharge, the Commission do not find any rationale in the proposal. The Commission is of the view that surcharge will have to be computed with reference to cost of supply only as contemplated in the Act in future when tariffs are determined on CoS. However the Commission finds merit in the argument that since average cost of supply has been considered for tariff determination, the same methodology shall be adopted for determination of surcharge also and it would be inappropriate to adopt different methodologies. Since KPTCL have expressed serious reservation on the reliability of data to be used for CoS methodology and since KPTCL itself has proposed to adopt the average cost of supply for the present, the Commission is inclined to agree to the proposal till such time KPTCL/ESCOMs come out with CoS methodology for tariff determination in their filings. Consequently necessary amendment to KERC (Terms and Conditions for Open Access) Regulations, 2004 will be incorporated.

For the reasons stated above, the Commission decides to adopt average cost of supply for the present for determining the cross subsidy surcharge

7.04 **Need for Preferential treatment for power supply from non-conventional sources:**
Commission's Proposal:
The Commission had observed that a concessional rate of wheeling charges has been levied for NCE sources of power in some states like AP – 2%, Tamilnadu-4%, and Kerala 5% in order to promote generation from renewable sources. The Commission had sought the views of

stakeholders' whether the same confessional wheeling charges shall be extended in Karnataka also.

Comments received

Special Secretary (Reforms)/GoK has suggested that wheeling charges for NCE sources shall be so fixed that they are incentivised for supply to entities other than KPTCL and ESCOMs. ESCOMs in their written response have stated that no preferential treatment may be given for NCE projects. However, during the hearing, the MD/KPTCL who presented the views on behalf of KPTCL/ESCOMs stated that concessional wheeling charges extended in the neighbouring states could be extended in Karnataka as well to promote generation from NCE sources. IREDA has proposed that 2% wheeling charges as proposed by the MNES Guidelines may be retained for NCE sources and no other charges shall be levied so as to promote and develop renewable energy projects. Reliance Energy Limited has commented that preferential treatment should not be given to NCE sources of energy as they have the benefits of higher tariffs as well as mandatory purchase by ESCOMs under KERC Regulations. IWPA has stated that preferential treatment has to be given to renewables as it is justified by statutory substantiation, precedents and non-statutory aspects also. They further stated that by providing preferential treatment to wind projects, KERC is ensuring that its correlated mandate as per EA 2003, NCE Regulations and contractual protection and payment security mechanism are efficaciously implemented. All wind projects are locked in long term PPAs and in effect open access is applicable to new wind projects only and hence by conferring preferential treatment ESCOMs will not be affected. Also wheeled energy by these projects would be a very minute component of the total energy wheeled. IWPA has requested to fix wheeling charges at 4% for a fixed period of 10 years and further suggested that for captive loads wheeling charges should be 2%. They have also stated that no surcharge should be levied for wind projects under open access regime. Kalyani Steels Ltd have stated that no preferential treatment is required to be provided for the present. Most of the NCE developers have requested for preferential treatment to NCE projects in regard to open access charges. Some of the developers have proposed to levy wheeling charges in the range of 1 to 6% and such charges to be fixed for a period of 10 years. Karnataka Working Group, Bangalore Chamber of Commerce and Balekadarara Hitharakshaka Kendra are not in favour of providing any preferential treatment to NCE projects.

Commission's views/ Decision:

While the developers of the renewable energy sources have requested to extend concessions in wheeling charges, some of the stakeholders and experts have stated that renewable sources already enjoy preferential treatment such as minimum quantum of purchase, higher tariff etc., and extending further benefits would have adverse financial impact on the ESCOMs. However, during the hearing KPTCL/ESCOMs themselves have opined that preferential treatment needs to be extended to renewables keeping in view the benefits extended in the neighbouring states. MNES

as well as Special Secretary/GOK have also suggested for extending concessional wheeling charges.

The Commission notes that the concept of open access has been introduced to bring in competition so that consumer can get power at competitive rates. Since, at present, projects based on renewable sources cannot compete with conventional sources of energy, the Commission decides that concessional wheeling charges needs to be extended to renewable sources of energy as in the neighbouring states in order to promote NCE sources under open access.

7.05 **Extent of Levy of cross subsidy surcharge for open access:**

Commission's Proposal:
The Commission had suggested that out of the Cross-subsidy determined under CoS methodology, whether the cross subsidy surcharge for open access can be levied ranging from 50 to 90 % in order to encourage open access?

Comments received
Special Secretary Reforms GoK has stressed that there is an urgent need for reduction of cross subsidy, which will increase consumption by subsidising categories. Further he has stated that while reducing cross subsidy KERC should consider reduction of subsidy burden on the GoK. KPTCL is of the view that Electricity Act does not permit to charge surcharge at a reduced rate as the surcharge is meant to meet the current level of subsidies. Similar views were expressed by Karnataka Working Group. Some of the ESCOMs have favoured charging 90% surcharge to encourage open access. However CESCO has stated that ESCOMs will lose by charging 50 to 90% as proposed by the Commission. Reliance Energy is in favour of charging 100% surcharge to ensure and protect financial viability of ESCOMs. Kalyani Steel is in favour of charging 25 to 30%, Balekadara Hitarakshaka Sangha have proposed 50 to 80%. Sri B.G.Rudrappa suggests levying 75% and Sri Venkata Subba Rao favours charging 90%.

Commission's views/Decision:
Regarding Special Secretary's suggestion to reduce subsidy burden on the GoK , the Commission notes that it has a mandate under EA 2003 to reduce and eliminate cross subsidies over a period of time. This phasing out of cross subsidy depends on the GoK's policy on tariff to subsidised category of consumers like BJ/IP sets. The Commission has addressed the GoK in the matter and the response is awaited.

As discussed earlier, the Commission will determine cross subsidy for open access customers based on the average cost of supply for the present. Therefore applying a percentage of cross subsidy under CoS methodology will not arise for the present. The suggestions made by the

stake holders/ experts can be further examined while determining the cross subsidy based on CoS methodology in future.

7.06 **Banking facility to be provided for Renewable Sources of Energy:**

Commission's Proposal:
The Commission had observed that, due to the nature of electricity, it would be difficult to match the demand at the consumer end with that of the supply from the contracted source in real time operation under open access. Especially, in case of wind and mini hydel projects the generation is infirm and is dependent on nature such as wind or rainfall as the case may be and hence scheduling and balancing will not be practicable on a real time basis under open access. In this context commission had opined that in such cases banking facility for a period of 1 month needs to be provided without carry over to the next financial year.

Comments received
Special Secretary GoK is of the view that banking can be allowed only when both the input and drawal of energy is based on TOD meters and seasonal tariff. ESCOMs are not in favour of giving Banking facility to renewable sources of energy. KPTCL has stated that it is agreeable to provide banking facility to wind and mini-hydel projects on the condition that they pay the difference between the UI charge at the time of injection and the UI charge at the time of drawal without any time limit. IPPAI and IWPA also agreed to the said proposal of KPTCL. REDAK have suggested if banking is allowed, banking charges of 0.5% in kind shall be levied. Reliance Energy is in favour of providing Banking only for NCE and infirm sources of power. IWPA has stated that banking facility is bare necessity for the viability of the wind projects. Kalyani Steels is in favour of Banking facility at no or minimal charges. Similar views are expressed by Knowledge infrastructure & Energy Consulting Engineers. BEL states that for banking the charges should be 2%. Bangalore Chamber of Industry & Commerce states that banking facility should be based on commercial considerations. Sri Venkata Subba Rao is in favour of providing banking facility on a quarterly basis.

Commission's Views/Decision:
The Commission notes that most of the stakeholders including the GoK and utilities are in favour of banking to infirm sources of energy. After considering the above views, **the Commission hereby decides to allow banking facility in respect of wind and mini-hydel projects subject to payment of difference of UI charges between the time of injection and time drawal of the power from these sources, as suggested by KPTCL and also payment of banking charges @ 2% of the input energy.**

In case the UI charges are negative, KPTCL/ESCOMs are not liable to pay the difference in UI charges. KPTCL/ESCOM shall ensure that appropriate metering is provided both at injection and drawal points to

facilitate computation of UI charges. However, merit order despatch and scheduling shall not be applicable for these sources of energy.

7.07 **T & D Loss and sharing of Commercial losses by Open access customers:**
Commission's Proposal:
The Commission in its discussion paper, for the purpose of determination of Transmission charge, wheeling charge and surcharge had proposed the following losses:

KPTCL:	Transmission loss	4.8%
BESCOM:	Distribution loss	21.35%
MESCOM:	"	20.63%
HESCOM:	"	27.71%
GESCOM:	"	27.05%
Total	T&D loss	26.97%

(Note: ESCOM losses are expressed as percentage of input to the respective ESCOMs& KPTCL loss as percentage of input)

The Commission had also proposed to levy of 50% of the loss at the injection point and 50% loss at drawal point, where the open access transactions are at different voltage levels.

Further, the Commission had requested for views on whether commercial losses should be loaded to HT/EHT consumers under open access.

Comments received
a. Transmission loss
Special Secretary (Reforms)/GoK has stated that T & D loss is a key parameter which affects transmission & wheeling charges and surcharge. As IP Sets and BJ consumption is being assessed, it is absolutely necessary that an independent agency take up the study of T & D Losses. The average consumption of BJ/KJ based on the meter reading for the past six months is about 8 units per month as against 18 units assessed by KERC. KPTCL has opined that transmission loss, as per the draft Tariff Policy, should be based on a benchmark data. Since benchmarking has not been done, average loss figures of 4.8% of the entire transmission system may be considered irrespective of the voltage level of injection or drawal. They have suggested that the same approach may also be followed while calculating the wheeling charges. Further it is stated that the methodology adopted by the Commission in the discussion paper is not acceptable as 110 KV system and 66 KV systems are radially operated and also electricity travels on lines with other voltage levels even though the voltage at the injection and drawal level are the same. It is further requested by KPTCL/ESCOMs to consider the actual losses in FY05 for determination of open access charges. CESCO has opined that the allocation of 50% loss at injection point and 50% at drawal point is not correct as the power transfer involves other voltage networks in addition to the voltage level of injection and voltage level of drawal. Therefore the

average loss incurred in the system at injection and drawal points may be considered. Reliance Energy opines that allocating losses should be on a scientific basis and should provide correct signals for incentives. The transmission loss levels indicated at various voltage levels need to be looked into, as transmission losses should be lower at higher voltage levels. Kalyani steels has stated that, if transaction is at 66KV & above, the technical loss and commercial loss of the distribution licensee should not be considered. Dipkit Electrics Pvt. Ltd. have submitted that transformation losses from 66 kv to lower voltages should not be considered when the transaction is taking place at 66 kv and above. S.I.S Power Industries has expressed the same views. Karnataka working group has stated that system losses as proposed by the Commission are acceptable. Bangalore Chamber of Industry and Commerce has stated that open access is to provide competitiveness in the supply of power and therefore If the entire losses are passed on to open access consumers, it would amount to condoning the inefficiencies of KPTCL and ESCOMs and there will be no incentive or interest for KPTCL/ ESCOMs to reduce losses. Hence only 50% of losses for respective voltage class have to be considered. Sri B.G. Rudrappa has stated that the loading of loss (likely to be incurred while selling energy under social obligations) to EHT consumers should be worked out on rate per unit basis. Sri Venkata Subba Rao has stated that according to the discussion paper, losses at higher voltage levels are higher than lower level, which does not appear to be correct. While allocating losses, it would be better if 50% of the losses of lower and higher voltage transmission networks together with 100% losses of intervening transformation losses are considered in wheeling transactions.

b. Allocation of commercial loss:

Special Secretary, Reforms, GoK, has opined that commercial losses should not be allocated to those consumers who have accepted and implemented TOD tariff. KPTCL has stated that about 1 to 2% of the total commercial loss may be allocated to HT & EHT customers. Reliance Energy opines that commercial losses should be included while computing the wheeling charges or else it should be left out while calculating surcharge also. Kalyani Steels have stated that the commercial losses should not be allocated to EHT consumers. Dipkit has opined that commercial loss should not be loaded for transactions of 66 kv and above. S.I.S Power Industries has expressed the same views. Knowledge Infrastructure, Energy Consulting Engineers, Karnataka Working Group as also Balekadarara Hitarakshaka Sangha have opined that commercial losses should not be levied for drawal at EHT level. Sri Venkata Subba Rao has stated that commercial losses should not be loaded to HT and EHT consumers.

Commission's Views/Decision:

Regarding transmission loss in kind, the Commission had proposed in its discussion paper to charge 50% of the loss percentage at the injection point voltage level and 50% of the loss percentage at the drawal

point voltage level. Several stakeholders including KPTCL have objected to the above allocation stating that such allocation would not consider the losses at intervening voltage levels and that the data on voltage wise losses as indicated in the discussion paper is not correct, as the losses at higher voltage levels are more than the losses at a lower voltage levels, which should not be the case. In view of this, stakeholders have proposed to either apply marginal loss or the average loss of the entire transmission system.

The Commission notes that there is discrepancy in the voltage level wise losses as furnished by KPTCL. However the Commission cannot replace these figures by its own figures. As regards the marginal loss, KPTCL in their written submission have illustrated that marginal losses would be positive. However depending upon injection point, drawal point and the real time system, the marginal losses may be negative also. As stated by some of the experts, it would be difficult to determine the marginal losses due to complexities involved. **In view of the above, although the Commission would prefer to allocate voltage-wise losses, it is constrained to apply average transmission loss for the present irrespective of the voltage level of Transmission.**

Regarding allocation of commercial loss under CoS methodology, the Commission notes that commercial loss, in addition to theft, involves billing and metering errors. Hence, to that extent these losses should be loaded to HT/EHT consumers also. However, in the present case the Commission is determining the charges payable in cash on average cost basis. This loss level includes both technical & commercial losses. However, for charges payable in kind only technical losses are considered.

Regarding the comments made by the Special Secretary (Reforms) on estimation of consumption in BJ & IP and consequent estimation of losses, the Commission would examine this matter while dealing with the ERCs.

c. Wheeling Charge in kind:
Commission's Proposal:
The Commission had proposed in the discussion paper that the losses to be borne in kind for various ESCOMs, where the voltages at point of injection and point of drawal are the same as follows:

	33/11 kV	LT	Total
BESCOM: Distribution loss	6.12%	9.18%	15.30%
MESCOM: "	5.80%	8.71%	14.51%
HESCOM: "	9.21%	13.81%	23.02%
GESCOM: "	6.39%	9.59%	15.98%

The above losses are only technical losses. The allocation to HT & LT is in the ratio of 40:60 based on the studies conducted by MECON & CPRI for the Commission. It was suggested that where the voltages at

the point of injection and point of drawal are different, 50% of the loss % at the point of injection plus 50% loss % at the point of drawal shall be considered.

Comments received

The ESCOMs, in their comments have requested the Commission to consider actual loss levels for computing the wheeling charges as per FY05 figures. HESCOM has stated that distribution loss of 28.7% in HESCOM includes 4.87% commercial loss and for the purpose of wheeling, at the same voltage level, a loss level of 17.10% at HT level and 11.6% at LT level could be considered. For Transactions involving both HT & LT losses to be 14.35%, HESCOM has not made any study to allocate distribution loss category wise. Hence category wise loss allocation is not acceptable. GESCOM has stated that actual loss of 38.55% (22.77% technical loss & 15.78% commercial) need to be considered for computation of charges and for the purpose of wheeling, at the same voltage level, a loss level of 11.15% at HT level and 11.62% at LT level could be considered. For Transactions involving both HT & LT losses it shall be 11.39%. It is further requested that the commercial losses should also be loaded for open access customers, as otherwise the same has to be borne by the existing consumers. The utilities have requested to consider average losses instead of voltage wise losses. Further it is stated that the proposal to allocate 50% of losses at point of injection voltage and point of drawal voltage is not appropriate. On the other hand some of the experts/consumers have requested the Commission not to pass on the inefficiencies of the utilities on to the consumers. It is also stated by them that if the entire loss is loaded to the open access customers, there will not be any initiative on the part of utilities to reduce and eliminate the commercial losses.

Commission's Views/Decision:

The Commission is of the view that with proper and efficient management, commercial losses could be curtailed. The Commission appreciates the fact that while reduction of technical losses requires capital investment, reduction of commercial losses requires sincere and concerted efforts by the utilities. The Commission, therefore, agrees with the views expressed by the experts/consumers that passing on the inefficiencies of the utilities cannot incentivise the utilities to improve their performance. In respect of open access consumers, the Commission is of the view that commercial losses should not be loaded to open access customers, as they are in no way responsible for the commercial losses of the utilities. **Hence the Commission decides to allocate only technical losses to the open access customers for computing losses in kind.** Further, the allocation of distribution losses to HT level and LT level is based on studies instituted by the Commission earlier. The Commission had proposed 50% allocation criteria at the distribution level when the voltage level of injection and drawal is different. Since, the Commission is allocating

only technical losses for open access transactions, it is considered appropriate to allocate average distribution loss in such cases.

7.08 **Other Charges:** KPTCL has stated that without determining other charges such as backup charge, grid support charge, reactive power charge, transaction charge etc as specified in Open Access Regulations, implementation of open access would not be feasible. The Commission is of the view that KPTCL/ESCOMs should have taken advance action for determination of these charges to implement the phase-I of open access from 10.6.05 and for that reason implementation of open access can not be postponed. The Commission's views on each of these charges are as follows:

a) Back up charges: The Commission in its regulations has specified that the same have to be mutually agreed between the parties. Accordingly, the parties may negotiate and mutually agree to these charges and a copy of the agreement shall be filed with the Commission. In case the parties are unable to agree mutually, either party may approach the Commission for determination of these charges.

b) Grid support Charges: KPTCL/ESCOMs have not filed their proposals for determination of grid support charges before the Commission in spite of directions from the Commission. The utilities may file their proposals early and if required on a case-to-case basis. These charges would be made applicable to open access customers only after the KPTCL/ESCOMs file their proposal and the same is determined by the Commission.

c) Reactive Power Charges and Transaction Charges: The utilities shall file suitable proposals for determination of these charges before the Commission at the earliest and the same shall be applicable to open access customers after the same is determined by the Commission.

8. **Other Issues:**

8.01 Regarding the suggestion of GOk on metering, the Commission agrees that metering and online reading of meters is essential for proper accounting of wheeled energy. Hence the Commission hereby directs the KPTCL and ESCOMs to ensure that suitable TOD meters are installed and read for open access transactions.

8.02 KPTCL has suggested prescribing a minimum period of one year for short-term open access. This matter was deliberated during the public hearing. Some of the experts opined that if minimum period is not prescribed, it is likely that such short-term users may block the transmission system. IPPAI opined that open access transactions normally take place on hour ahead/day ahead/week ahead basis. Further as per the Act, power exchanges are contemplated to facilitate real time competition in power trading. In such a

situation, prescribing a minimum period would not be conducive to introduction of real-time competition in trading. Sri Jagannatha Guptha and Sri Venkata Subbarao also pointed out during the hearing that the ESCOMs are also open access customers under the Act and imposing any such restriction would not be in the interest of the ESCOMs as they may have to resort to short term purchases when the need arises.

The Commission, keeping in mind the objectives of the Act to introduce competition, is of the view that the present provision as specified in the open access regulations is appropriate.

8.03 The Commission in its discussion paper had used FY05 data as per the ERCs filed by the utilities to illustrate the impact of using different methodologies on open access charges. However, the Commission had earlier rejected the ERCs of ESCOMs for FY05 and KPTCL's ERC for FY05 is yet to be approved. The only validated data available with the Commission is that of FY04 as approved in its Tariff Order, 2003 and Tariff Amendment Order, 2003. Since ERCs for FY06 have since been filed by KPTCL and ESCOMs along with tariff filings, the Commission would be determining BST, transmission charges, wheeling charges and retail tariff after following the due process of validation and hearings. Therefore, the open access charges being determined in the present order would be applicable only for a few months till the new tariff order is in place. Hence, **the Commission considers it appropriate to adopt the data as approved in Tariff Order 2003 and Tariff Amendment Order, 2003 for determining the charges under open access in the present order purely as an interim arrangement.**

8.04 In the Tariff Order 2003, the Commission has determined transmission charges and also wheeling charges and it was indicated that the order would not be applicable to captive power plants. Since open access has been allowed to captive power plants under section 9 of the Electricity Act 2003, it is made clear that the charges determined in this order shall be applicable to all open access customers including captive power plants.

8.05 The Commission notes from the ERCs of KPTCL/ESCOMs that they have appealed to the Hon'ble High Court of Karnataka against certain expenses and losses not allowed by the Commission in the tariff orders. Therefore, this order shall be subject to outcome of the appeals pending in the Hon'ble High Court.

8.06 The Commission is aware that some of the generating companies have challenged the orders of KPTCL in respect of wheeling charges fixed by KPTCL earlier and the Hon'ble Court has passed interim orders. This order of the Commission shall not be applicable to such

cases and also cases of concluded contract where specific provisions in respect of wheeling charges are made during the currency of such contracts.

8.07 Subsequent to the hearing held by the Commission on 1.6.05, KPTCL and IWPA have made certain written submissions on their own. The Commission is unable to consider these submissions since these aspects were not put before the stakeholders for discussions in the public hearing held by the Commission.

9. Based on the discussions and conclusions arrived above, the Commission determines the various charges applicable to open access customers as detailed below:

9.01 **Wheeling Charges:**

I) The wheeling charges payable by Consumers availing open access under phase-I are as follows:

a. Transmission charges in cash as determined in Para 9.02 below
Plus
b. Transmission charges in kind as determined in para 9.03 below

II) The charges applicable to Captive power plants wheeling energy for its own use under open access are as follows:

i. In case wheeling transaction involves only Transmission:

a. Transmission charges in cash as determined in Para 9.02 below
Plus
b. Transmission charges in kind as determined in para 9.03 below

ii. In case the wheeling transaction involves only one ESCOM:

a. Network cost in cash of the ESCOM based on point of injection and drawal as determined at para 9.04 below plus
b. Network cost in kind of ESCOM based on point of injection and drawal as determined at para 9.05 below

iii. In case the wheeling transaction involves (i) transmission and one or more distribution network or (ii) involves more than one ESCOM

a. Transmission charges in cash as determined in Para 9.02 below
Plus
b. Transmission charges in kind as determined in Para 9.03 below
Plus
c. Network cost in cash (both HT & LT cost) of the drawal ESCOM (where the energy is consumed for end use) as determined at para 9.04 below
Plus
d. Network cost in kind (both LT & HT loss)of drawal ESCOM as determined at para 9.05 below

9.02 **Transmission Charge payable in cash:**

18.67 paise per unit as determined in Tariff Order 2003.

9.03 **Transmission Charge payable in Kind:**

6% transmission loss as approved in Tariff Order 2003/Tariff Amendment order 2003.

9.04 **Distribution network cost in cash:**

(i) The wheeling charges as determined by the Commission in Tariff Order 2003 for using HT network:

Licensee	Wheeling charge-HT Paise per unit
BESCOM	10.58
MESCOM	16.44
HESCOM	13.35
GESCOM	13.58

The above charges shall be payable if the point of injection and point of drawal both are at HT level (33 kV/11 kV)

(ii) Wheeling charges for the LT network as worked out from Tariff Order 2003 is:

ESCOMs	Wheeling charge-LT paise per unit
BESCOM	24.68
MESCOM	38.37
HESCOM	31.15
GESCOM	31.70

The above charges shall be payable if the point of injection and point of drawal both are at LT level

iii) In case the both HT and LT network for wheeling of energy is used, the Captive Power Generator shall be liable to pay wheeling charges for LT network in addition to wheeling charges for HT network as determined above.

9.05 **Distribution network Charges in kind:**

The Commission had allowed the following loss levels for FY04, ESCOM wise in its Tariff Order 2003:

	(%)
BESCOM: Distribution loss	21.35
MESCOM: "	21.28
HESCOM: "	27.71
GESCOM: "	27.05

As per Tariff order 2003, the commercial losses as declared by the ESCOMs for FY03 are as follows:

	%Commercial loss
BESCOM:	9.09
MESCOM:	6.45
HESCOM:	7.00
GESCOM:	12.05

The Commission in order to estimate technical loss, has arrived at the commercial losses for FY04 on prorata basis as follows:

BESCOM: 7.59%
MESCOM: 5.68%
HESCOM: 6.24%
GESCOM: 11.04%

After deducting the commercial loss as above, the technical loss applicable for the purpose of wheeling would be as follows:

	33/11 kV	LT	Technical loss-Total
BESCOM: Distribution loss	5.50	8.26	13.76
MESCOM: "	6.24	9.36	15.60
HESCOM: "	8.59	12.88	21.47
GESCOM: "	6.40	9.61	16.01

i. If the point of injection & point of drawal are both at 33 kV/11 kV, only 33 kV/11 kV loss is payable in kind.

ii. If the point of injection & point of drawal are both at LT level, only LT loss is payable in kind.

iii. In case of transactions involving both HT & LT network, the open access customer shall bear the total technical losses indicated above.

9.06 **Cross subsidy surcharge:**

Average cost of supply as per Tariff (Amendment) Order, 2003: Rs. 3.62 per unit

Average billing demand for HT consumers in FY05 as per actuals Rs. 4.77 per unit

Hence, the Commission decides that the cross subsidy surcharge applicable shall be Rs. 1.15 per unit.

9.07 **Wheeling charges for NCE projects:**
Considering the discussions at Sl.No.4 above, the Commission determines the overall wheeling charges payable by NCE sources as 5% of the energy input into the system. Other than this wheeling charge, they shall not be liable to pay any transmission charges or wheeling charges either in cash or kind as determined in the preceding sections of this order. However, surcharge shall be payable where the wheeling of energy is other than for their own use.

This order is signed dated and issued by Karnataka Electricity Regulatory Commission on this 9th day of June 2005.

Sd/-	Sd/-	Sd/-
K.P.Pandey	**H.S.Subramanya**	**S.D.Ukkali**
Chairman	**Member**	**Member**

The Gazette of India

EXTRAORDINARY
PART I - Section 1
PUBLISHED BY AUTHORITY
Ministry of Power

New Delhi,
Dated the 6th January, 2006

RESOLUTION

No.23/2/2005-R&R(Vol.III)

TARIFF POLICY

1.0 INTRODUCTION

1.1. In compliance with section 3 of the Electricity Act 2003 the Central Government hereby notifies the Tariff policy in continuation of the National Electricity Policy (NEP) notified on 12th February 2005.

1.2. The National Electricity Policy has set the goal of adding new generation capacity of more than one lakh MW during the 10th and 11th Plan periods to have per capita availability of over 1000 units of electricity per year and to not only eliminate energy and peaking shortages but to also have a spinning reserve of 5% in the system. Development of the power sector has also to meet the challenge of providing access for electricity to all households in next five years.

1.3. It is therefore essential to attract adequate investments in the power sector by providing appropriate return on investment as budgetary resources of the Central and State Governments are incapable of providing the requisite funds. It is equally necessary to ensure availability of electricity to different categories of consumers at reasonable rates for achieving the objectives of rapid economic development of the country and improvement in the living standards of the people.

1.4. Balancing the requirement of attracting adequate investments to the sector and that of ensuring reasonability of user charges for the consumers is the critical challenge for the regulatory process. Accelerated development of the power sector and its ability to attract necessary investments calls for, inter alia, consistent regulatory approach across the country. Consistency in

approach becomes all the more necessary considering the large number of States and the diversities involved.

2.0 LEGAL POSITION

2.1 Section 3 (1) of the Electricity Act 2003 empowers the Central Government to formulate the tariff policy. Section 3 (3) of the Act enables the Central Government to review or revise the tariff policy from time to time.

2.2 The Act also requires that the Central Electricity Regulatory Commission (CERC) and State Electricity Regulatory Commissions (SERCs) shall be guided by the tariff policy in discharging their functions including framing the regulations under section 61 of the Act.

2.3 Section 61 of the Act provides that Regulatory Commissions shall be guided by the principles and methodologies specified by the Central Commission for determination of tariff applicable to generating companies and transmission licensees.

2.4 The Forum of Regulators has been constituted by the Central Government under the provisions of the Act which would, inter alia, facilitate consistency in approach specially in the area of distribution.

3.0 EVOLUTION OF THE POLICY

The tariff policy has been evolved in consultation with the State Governments and the Central Electricity Authority (CEA) and keeping in view the advice of the Central Electricity Regulatory Commission and suggestions of various stakeholders.

4.0 OBJECTIVES OF THE POLICY

The objectives of this tariff policy are to:

(a) Ensure availability of electricity to consumers at reasonable and competitive rates;

(b) Ensure financial viability of the sector and attract investments;

(c) Promote transparency, consistency and predictability in regulatory approaches across jurisdictions and minimise perceptions of regulatory risks;

(d) Promote competition, efficiency in operations and improvement in quality of supply.

5.0 GENERAL APPROACH TO TARIFF

5.1 Introducing competition in different segments of the electricity industry is one of the key features of the Electricity Act, 2003. Competition will lead

to significant benefits to consumers through reduction in capital costs and also efficiency of operations. It will also facilitate the price to be determined competitively. The Central Government has already issued detailed guidelines for tariff based bidding process for procurement of electricity by distribution licensees for medium or long-term period vide gazette notification dated 19th January, 2005.

All future requirement of power should be procured competitively by distribution licensees except in cases of expansion of existing projects or where there is a State controlled/owned company as an identified developer and where regulators will need to resort to tariff determination based on norms provided that expansion of generating capacity by private developers for this purpose would be restricted to one time addition of not more than 50% of the existing capacity.

Even for the Public Sector projects, tariff of all new generation and transmission projects should be decided on the basis of competitive bidding after a period of five years or when the Regulatory Commission is satisfied that the situation is ripe to introduce such competition.

5.2 The real benefits of competition would be available only with the emergence of appropriate market conditions. Shortages of power supply will need to be overcome. Multiple players will enhance the quality of service through competition. All efforts will need to be made to bring power industry to this situation as early as possible in the overall interests of consumers. Transmission and distribution, i.e. the wires business is internationally recognized as having the characteristics of a natural monopoly where there are inherent difficulties in going beyond regulated returns on the basis of scrutiny of costs.

5.3 Tariff policy lays down following framework for performance based cost of service regulation in respect of aspects common to generation, transmission as well as distribution. These shall not apply to competitively bid projects as referred to in para 6.1 and para 7.1 (6). Sector specific aspects are dealt with in subsequent sections.

a) **Return on Investment**

Balance needs to be maintained between the interests of consumers and the need for investments while laying down rate of return. Return should attract investments at par with, if not in preference to, other sectors so that the electricity sector is able to create adequate capacity. The rate of return should be such that it allows generation of reasonable surplus for growth of the sector.

The Central Commission would notify, from time to time, the rate of return on equity for generation and transmission projects keeping in view the assessment of overall risk and the prevalent cost of capital which shall be followed by the SERCs also. The rate of return notified by CERC for transmission may be adopted by the State Electricity Regulatory Commissions (SERCs) for distribution with appropriate modification taking into view the higher risks involved. For uniform approach in this matter, it would be desirable to arrive at a consensus through the Forum of Regulators.

While allowing the total capital cost of the project, the Appropriate Commission would ensure that these are reasonable and to achieve this objective, requisite benchmarks on capital costs should be evolved by the Regulatory Commissions.

Explanation: For the purposes of return on equity, any cash resources available to the company from its share premium account or from its internal resources that are used to fund the equity commitments of the project under consideration should be treated as equity subject to limitations contained in (b) below.

The Central Commission may adopt the alternative approach of regulating through return on capital.

The Central Commission may adopt either Return on Equity approach or Return on Capital approach whichever is considered better in the interest of the consumers.

The State Commission may consider 'distribution margin' as basis for allowing returns in distribution business at an appropriate time. The Forum of Regulators should evolve a comprehensive approach on "distribution margin" within one year. The considerations while preparing such an approach would. inter-alia, include issues such as reduction in Aggregate Technical and Commercial losses, improving the standards of performance and reduction in cost of supply.

b) **Equity Norms**

For financing of future capital cost of projects, a Debt : Equity ratio of 70:30 should be adopted. Promoters would be free to have higher quantum of equity investments. The equity in excess of this norm should be treated as loans advanced at the weighted average rate of interest and for a weighted average tenor of the long term debt component of the project after ascertaining the reasonableness of the interest rates and taking into account the effect of debt restructuring done, if any. In case of equity below the normative level, the actual equity would be used for determination of Return on Equity in tariff computations.

c) **Depreciation**

The Central Commission may notify the rates of depreciation in respect of generation and transmission assets. The depreciation rates so notified would also be applicable for distribution with appropriate modification as may be evolved by the Forum of Regulators.

The rates of depreciation so notified would be applicable for the purpose of tariffs as well as accounting.

There should be no need for any advance against depreciation.

Benefit of reduced tariff after the assets have been fully depreciated should remain available to the consumers.

d) **Cost of Debt**

Structuring of debt, including its tenure, with a view to reducing the tariff should be encouraged. Savings in costs on account of subsequent restructuring of debt should be suitably incentivised by the Regulatory Commissions keeping in view the interests of the consumers.

e) **Cost of Management of Foreign Exchange Risk**

Foreign exchange variation risk shall not be a pass through. Appropriate costs of hedging and swapping to take care of foreign exchange variations should be allowed for debt obtained in foreign currencies. This provision would be relevant only for the projects where tariff has not been determined on the basis of competitive bids.

f) **Operating Norms**

Suitable performance norms of operations together with incentives and dis-incentives would need be evolved along with appropriate arrangement for sharing the gains of efficient operations with the consumers. Except for the cases referred to in para 5.3 (h)(2), the operating parameters in tariffs should be at "normative levels" only and not at "lower of normative and actuals". This is essential to encourage better operating performance. The norms should be efficient, relatable to past performance, capable of achievement and progressively reflecting increased efficiencies and may also take into consideration the latest technological advancements, fuel, vintage of

equipments, nature of operations, level of service to be provided to consumers etc. Continued and proven inefficiency must be controlled and penalized.

The Central Commission would, in consultation with the Central Electricity Authority, notify operating norms from time to time for generation and transmission. The SERC would adopt these norms. In cases where operations have been much below the norms for many previous years, the SERCs may fix relaxed norms suitably and draw a transition path over the time for achieving the norms notified by the Central Commission.

Operating norms for distribution networks would be notified by the concerned SERCs. For uniformity of approach in determining such norms for distribution, the Forum of Regulators should evolve the approach including the guidelines for treatment of state specific distinctive features.

g) **Renovation and Modernatisation**

Renovation and modernization (it shall not include periodic overhauls) for higher efficiency levels needs to be encouraged. A multi-year tariff (MYT) framework may be prescribed which should also cover capital investments necessary for renovation and modernization and an incentive framework to share the benefits of efficiency improvement between the utilities and the beneficiaries with reference to revised and specific performance norms to be fixed by the Appropriate Commission. Appropriate capital costs required for pre-determined efficiency gains and/or for sustenance of high level performance would need to be assessed by the Appropriate Commission.

(h) **Multi Year Tariff**

1) Section 61 of the Act states that the Appropriate Commission, for determining the terms and conditions for the determination of tariff, shall be guided inter-alia, by multi-year tariff principles. The MYT framework is to be adopted for any tariffs to be determined from April 1, 2006. The framework should feature a five-year control period. The initial control period may however be of 3 year duration for transmission and distribution if deemed necessary by the Regulatory Commission on account of data uncertainties and other practical considerations. In cases of lack of reliable data, the Appropriate Commission may state assumptions in MYT for first control period and a fresh control period may be started as and when more reliable data becomes available.

2) In cases where operations have been much below the norms for many previous years the initial starting point in determining the revenue requirement and the improvement trajectories should be recognized at "relaxed" levels and not the "desired" levels. Suitable benchmarking studies may be conducted to establish

the "desired" performance standards. Separate studies may be required for each utility to assess the capital expenditure necessary to meet the minimum service standards.

3) Once the revenue requirements are established at the beginning of the control period, the Regulatory Commission should focus on regulation of outputs and not the input cost elements. At the end of the control period, a comprehensive review of performance may be undertaken.

4) Uncontrollable costs should be recovered speedily to ensure that future consumers are not burdened with past costs. Uncontrollable costs would include (but not limited to) fuel costs, costs on account of inflation, taxes and cess, variations in power purchase unit costs including on account of hydro-thermal mix in case of adverse natural events.

5) Clear guidelines and regulations on information disclosure may be developed by the Regulatory Commissions. Section 62 (2) of the Act empowers the Appropriate Commission to require licensees to furnish separate details, as may be specified in respect of generation, transmission and distribution for determination of tariff.

(i) **Benefits under CDM**

Tariff fixation for all electricity projects (generation, transmission and distribution) that result in lower Green House Gas (GHG) emissions than the relevant base line should take into account the benefits obtained from the Clean Development Mechanism (CDM) into consideration, in a manner so as to provide adequate incentive to the project developers.

5.4 While it is recognized that the State Governments have the right to impose duties, taxes, cess on sale or consumption of electricity, these could potentially distort competition and optimal use of resources especially if such levies are used selectively and on a non- uniform basis.

In some cases, the duties etc. on consumption of electricity is linked to sources of generation (like captive generation) and the level of duties levied is much higher as compared to that being levied on the same category of consumers who draw power from grid. Such a distinction is invidious and inappropriate. The sole purpose of freely allowing captive generation is to enable industries to access reliable, quality and cost effective power. Particularly, the provisions relating to captive power plants which can be set up by group of consumers has been brought in recognition of the fact that efficient expansion of small and medium industries across the country will lead to faster economic growth and creation of larger employment opportunities.

For realizing the goal of making available electricity to consumers at reasonable and competitive prices, it is necessary that such duties are kept at reasonable level.

5.5 Though, as per the provisions of the Act, the outer limit to introduce open access in distribution is 27.1.2009, it would be desirable that, in whichever states the situation so permits, the Regulatory Commissions introduce such open access earlier than this deadline.

6.0 GENERATION

Accelerated growth of the generation capacity sector is essential to meet the estimated growth in demand. Adequacy of generation is also essential for efficient functioning of power markets. At the same time, it is to be ensured that new capacity addition should deliver electricity at most efficient rates to protect the interests of consumers. This policy stipulates the following for meeting these objectives.

6.1 Procurement of power

As stipulated in para 5.1, power procurement for future requirements should be through a transparent competitive bidding mechanism using the guidelines issued by the Central Government vide gazette notification dated 19th January, 2005. These guidelines provide for procurement of electricity separately for base load requirements and for peak load requirements. This would facilitate setting up of generation capacities specifically for meeting peak.

6.2 Tariff structuring and associated issues

(1) A two-part tariff structure should be adopted for all long term contracts to facilitate Merit Order dispatch. According to National Electricity Policy, the Availability Based Tariff (ABT) is to be introduced at State level by April 2006. This framework would be extended to generating stations (including grid connected captive plants of capacities as determined by the SERC). The Appropriate Commission may also introduce differential rates of fixed charges for peak and off peak hours for better management of load.

(2) Power Purchase Agreement should ensure adequate and bankable payment security arrangements to the Generating companies. In case of persisting default in spite of the available payment security mechanisms like letter of credit, escrow of cash flows etc. the generating companies may sell to other buyers.

(3) In case of coal based generating stations, the cost of project will also include reasonable cost of setting up coal washeries, coal beneficiation system and dry ash handling & disposal system.

6.3 Harnessing captive generation

Captive generation is an important means to making competitive power available. Appropriate Commission should create an enabling environment that encourages captive power plants to be connected to the grid.

Such captive plants could inject surplus power into the grid subject to the same regulation as applicable to generating companies. Firm supplies may be bought from captive plants by distribution licensees using the guidelines issued by the Central Government under section 63 of the Act.

The prices should be differentiated for peak and off-peak supply and the tariff should include variable cost of generation at actual levels and reasonable compensation for capacity charges.

Alternatively, a frequency based real time mechanism can be used and the captive generators can be allowed to inject into the grid under the ABT mechanism.

Wheeling charges and other terms and conditions for implementation should be determined in advance by the respective State Commission, duly ensuring that the charges are reasonable and fair.

Grid connected captive plants could also supply power to non-captive users connected to the grid through available transmission facilities based on negotiated tariffs. Such sale of electricity would be subject to relevant regulations for open access.

6.4 Non-conventional sources of energy generation including Co-generation:

(1) Pursuant to provisions of section 86(1)(e) of the Act, the Appropriate Commission shall fix a minimum percentage for purchase of energy from such sources taking into account availability of such resources in the region and its impact on retail tariffs. Such percentage for purchase of energy should be made applicable for the tariffs to be determined by the SERCs latest by April 1, 2006.

It will take some time before non-conventional technologies can compete with conventional sources in terms of cost of electricity. Therefore, procurement by distribution companies shall be done at preferential tariffs determined by the Appropriate Commission.

(2) Such procurement by Distribution Licensees for future requirements shall be done, as far as possible, through competitive bidding process under Section 63 of the Act within suppliers offering energy from same type of non-conventional sources. In the long-term, these technologies would need to compete with other sources in terms of full costs.

(3) The Central Commission should lay down guidelines within three months for pricing non-firm power, especially from non–conventional sources, to be followed in cases where such procurement is not through competitive bidding.

7.0 TRANSMISSION

The transmission system in the country consists of the regional networks, the inter-regional connections that carry electricity across the five regions, and the State networks. The national transmission network in India is presently under development. Development of the State networks has not been uniform and capacity in such networks needs to be augmented. These networks will play an important role in intra-State power flows and also in the regional and national flows. The tariff policy, insofar as transmission is concerned, seeks to achieve the following objectives:

1. Ensuring optimal development of the transmission network to promote efficient utilization of generation and transmission assets in the country;
2. Attracting the required investments in the transmission sector and providing adequate returns.

7.1 Transmission pricing

(1) A suitable transmission tariff framework for all inter-State transmission. including transmission of electricity across the territory of an intervening State as well as conveyance within the State which is incidental to such inter-state transmission, needs to be implemented with the objective of promoting effective utilization of all assets across the country and accelerated development of new transmission capacities that are required.

(2) The National Electricity Policy mandates that the national tariff framework implemented should be sensitive to distance, direction and related to quantum of power flow. This would be developed by CERC taking into consideration the advice of the CEA. Such tariff mechanism should be implemented by 1st April 2006.

(3)Transmission charges, under this framework, can be determined on MW per circuit kilometer basis, zonal postage stamp basis, or some other pragmatic variant, the ultimate objective being to get the transmission system users to share the total transmission cost in proportion to their respective utilization of the

transmission system. The overall tariff framework should be such as not to inhibit planned development/augmentation of the transmission system, but should discourage non-optimal transmission investment.

(4) In view of the approach laid down by the NEP, prior agreement with the beneficiaries would not be a pre-condition for network expansion. CTU/STU should undertake network expansion after identifying the requirements in consonance with the National Electricity Plan and in consultation with stakeholders, and taking up the execution after due regulatory approvals.

(5) The Central Commission would establish, within a period of one year, norms for capital and operating costs, operating standards and performance indicators for transmission lines at different voltage levels. Appropriate baseline studies may be commissioned to arrive at these norms.

(6) Investment by transmission developer other than CTU/STU would be invited through competitive bids. The Central Government will issue guidelines in three months for bidding process for developing transmission capacities. The tariff of the projects to be developed by CTU/STU after the period of five years or when the Regulatory Commission is satisfied that the situation is right to introduce such competition (as referred to in para 5.1) would also be determined on the basis of competitive bidding.

(7) After the implementation of the proposed framework for the inter-State transmission ,a similar approach should be implemented by SERCs in next two years for the intra-State transmission, duly considering factors like voltage, distance, direction and quantum of flow.

(8) Metering compatible with the requirements of the proposed transmission tariff framework should be established on priority basis. The metering should be compatible with ABT requirements, which would also facilitate implementation of Time of Day (ToD) tariffs.

7.2 Approach to transmission loss allocation

(1) Transactions should be charged on the basis of average losses arrived at after appropriately considering the distance and directional sensitivity, as applicable to relevant voltage level, on the transmission system. Based on the methodology laid down by the CERC in this regard for inter- state transmission, the Forum of Regulators may evolve a similar approach for intra-state transmission.

The loss framework should ensure that the loss compensation is reasonable and linked to applicable technical loss benchmarks. The benchmarks may be determined by the Appropriate Commission after considering advice of CEA.

It would be desirable to move to a system of loss compensation based on incremental losses as present deficiencies in transmission capacities are overcome through network expansion.

(2) The Appropriate Commission may require necessary studies to be conducted to establish the allowable level of system loss for the network configuration, and the capital expenditure required to augment the transmission system and reduce system losses. Since additional flows above a level of line loading leads to significantly higher losses, CTU/STU should ensure upgrading of transmission systems to avoid the situations of overloading. The Appropriate Commission should permit adequate capital investments in new assets for upgrading the transmission system.

7.3 Other issues in transmission

(1) Financial incentives and disincentives should be implemented for the CTU and the STU around the key performance indicators (KPI) for these organisations. Such KPIs would include efficient network construction, system availability and loss reduction.

(2) All available information should be shared with intending users by the CTU/STU and the load dispatch centers, particularly information on available transmission capacity and load flow studies.

8.0 DISTRIBUTION

Supply of reliable and quality power of specified standards in an efficient manner and at reasonable rates is one of the main objectives of the National Electricity Policy. The State Commission should determine and notify the standards of performance of licensees with respect to quality, continuity and reliability of service for all consumers. It is desirable that the Forum of Regulators determines the basic framework on service standards. A suitable transition framework could be provided for the licensees to reach the desired levels of service as quickly as possible. Penalties may be imposed on licensees in accordance with section 57 of the Act for failure to meet the standards.

Making the distribution segment of the industry efficient and solvent is the key to success of power sector reforms and provision of services of specified standards. Therefore, the Regulatory Commissions need to strike the right balance between the requirements of the commercial viability of distribution licensees and consumer interests. Loss making utilities need to be transformed into profitable ventures which can raise necessary resources from the capital markets to provide services of international standards to enable India to achieve its full growth potential.

Efficiency in operations should be encouraged. Gains of efficient operations with reference to normative parameters should be appropriately shared between consumers and licensees.

8.1 Implementation of Multi-Year Tariff (MYT) framework

1) This would minimise risks for utilities and consumers, promote efficiency and appropriate reduction of system losses and attract investments and would also bring greater predictability to consumer tariffs on the whole by restricting tariff adjustments to known indicators on power purchase prices and inflation indices. The framework should be applied for both public and private utilities.

2) The State Commissions should introduce mechanisms for sharing of excess profits and losses with the consumers as part of the overall MYT framework .In the first control period the incentives for the utilities may be asymmetric with the percentage of the excess profits being retained by the utility set at higher levels than the percentage of losses to be borne by the utility. This is necessary to accelerate performance improvement and reduction in losses and will be in the long term interest of consumers by way of lower tariffs.

3) As indicated in para 5.3 (h), the MYT framework implemented in the initial control period should have adequate flexibility to accommodate changes in the baselines consequent to metering being completed.

4) Licensees may have the flexibility of charging lower tariffs than approved by the State Commission if competitive conditions require so without having a claim on additional revenue requirement on this account in accordance with Section 62 of the Act .

5) At the beginning of the control period when the "actual" costs form the basis for future projections, there may be a large uncovered gap between required tariffs and the tariffs that are presently applicable. The gap should be fully met through tariff charges and through alternative means that could inter-alia include financial restructuring and transition financing.

6) Incumbent licensees should have the option of filing for separate revenue requirements and tariffs for an area where the State Commission has issued multiple distribution licenses, pursuant to the provisions of Section 14 of the Act read with para 5.4.7 of the National Electricity Policy.

7) Appropriate Commissions should initiate tariff determination and regulatory scrutiny on a suo moto basis in case the licensee does not initiate filings in time. It is desirable that requisite tariff changes come into effect from the date of commencement of each financial year and any gap on account of delay in filing should be on account of licensee.

8.2 Framework for revenue requirements and costs

8.2.1 The following aspects would need to be considered in determining tariffs:

(1) All power purchase costs need to be considered legitimate unless it is established that the merit order principle has been violated or power has been purchased at unreasonable rates. The reduction of Aggregate Technical & Commercial (ATC) losses needs to be brought about but not by denying revenues required for power purchase for 24 hours supply and necessary and reasonable O&M and investment for system upgradation. Consumers, particularly those who are ready to pay a tariff which reflects efficient costs have the right to get uninterrupted 24 hours supply of quality power. Actual level of retail sales should be grossed up by normative level of T&D losses as indicated in MYT trajectory for allowing power purchase cost subject to justifiable power purchase mix variation (for example, more energy may be purchased from thermal generation in the event of poor rainfall) and fuel surcharge adjustment as per regulations of the SERC.

(2) ATC loss reduction should be incentivised by linking returns in a MYT framework to an achievable trajectory. Greater transparency and nurturing of consumer groups would be efficacious. For government owned utilities improving governance to achieve ATC loss reduction is a more difficult and complex challenge for the SERCs. Prescription of a MYT dispensation with different levels of consumer tariffs in succeeding years linked to different ATC loss levels aimed at covering full costs could generate the requisite political will for effective action to reduce theft as the alternative would be stiffer tariff increases. Third party verification of energy audit results for different areas/localities could be used to impose area/locality specific surcharge for greater ATC loss levels and this in turn could generate local consensus for effective action for better governance. The SERCs may also encourage suitable local area based incentive and disincentive scheme for the staff of the utilities linked to reduction in losses.

The SERC shall undertake independent assessment of baseline data for various parameters for every distribution circle of the licensee and this exercise should be completed latest by March, 2007.

The SERC shall also institute a system of independent scrutiny of financial and technical data submitted by the licensees.

As the metering is completed upto appropriate level in the distribution network, latest by March, 2007, it should be possible to segregate technical losses. Accordingly technical loss reduction under MYT framework should then be treated as distinct from commercial loss reduction which require a different approach.

(3) Section 65 of the Act provides that no direction of the State Government regarding grant of subsidy to consumers in the tariff determined by the State Commission shall be operative if the payment on account of subsidy as decided by the State Commission is not made to the utilities and the tariff fixed by the State Commission shall be applicable from the date of issue of orders by the Commission in this regard. The State Commissions should ensure compliance of this provision of law to ensure financial viability of the utilities. To ensure implementation of the provision of the law, the State Commission should determine the tariff initially, without considering the subsidy commitment by the State Government and subsidised tariff shall be arrived at thereafter considering the subsidy by the State Government for the respective categories of consumers.

(4) Working capital should be allowed duly recognising the transition issues faced by the utilities such as progressive improvement in recovery of bills. Bad debts should be recognised as per policies developed and subject to the approval of the State Commission.

(5) Pass through of past losses or profits should be allowed to the extent caused by uncontrollable factors. During the transition period controllable factors should be to the account of utilities and consumers in proportions determined under the MYT framework.

(6) The contingency reserves should be drawn upon with prior approval of the State Commission only in the event of contingency conditions specified through regulations by the State Commission. The existing practice of providing for development reserves and tariff and dividend control reserves should be discontinued.

8.2.2. The facility of a regulatory asset has been adopted by some Regulatory Commissions in the past to limit tariff impact in a particular year. This should be done only as exception, and subject to the following guidelines:

a. The circumstances should be clearly defined through regulations, and should only include natural causes or force majeure conditions. Under business as usual conditions, the opening balances of uncovered gap must be covered through transition financing arrangement or capital restructuring;

b. Carrying cost of Regulatory Asset should be allowed to the utilities;

c. Recovery of Regulatory Asset should be time-bound and within a period not exceeding three years at the most and preferably within control period;

d. The use of the facility of Regulatory Asset should not be repetitive.

e. In cases where regulatory asset is proposed to be adopted, it should be ensured that the return on equity should not become unreasonably low in any year so that the capability of the licensee to borrow is not adversely affected.

8.3 Tariff design : Linkage of tariffs to cost of service

It has been widely recognised that rational and economic pricing of electricity can be one of the major tools for energy conservation and sustainable use of ground water resources.

In terms of the Section 61 (g) of the Act, the Appropriate Commission shall be guided by the objective that the tariff progressively reflects the efficient and prudent cost of supply of electricity.

The State Governments can give subsidy to the extent they consider appropriate as per the provisions of section 65 of the Act. Direct subsidy is a better way to support the poorer categories of consumers than the mechanism of cross-subsidizing the tariff across the board. Subsidies should be targeted effectively and in transparent manner. As a substitute of cross-subsidies, the State Government has the option of raising resources through mechanism of electricity duty and giving direct subsidies to only needy consumers. This is a better way of targetting subsidies effectively.

Accordingly, the following principles would be adopted:

1. In accordance with the National Electricity Policy, consumers below poverty line who consume below a specified level, say 30 units per month, may receive a special support through cross subsidy. Tariffs for such designated group of consumers will be at least 50% of the average cost of supply. This provision will be re-examined after five years.

2. For achieving the objective that the tariff progressively reflects the cost of supply of electricity, the SERC would notify roadmap within six months with a target that latest by the end of year 2010-2011 tariffs are within ± 20 % of the average cost of supply. The road map would also have intermediate milestones, based on the approach of a gradual reduction in cross subsidy.

For example if the average cost of service is Rs 3 per unit, at the end of year 2010-2011 the tariff for the cross subsidised categories excluding those referred to in para 1 above should not be lower than Rs 2.40 per unit and that for any of the cross-subsidising categories should not go beyond Rs 3.60 per unit.

3. While fixing tariff for agricultural use, the imperatives of the need of using ground water resources in a sustainable manner would also need to be kept in mind in addition to the average cost of supply. Tariff for agricultural use may be set at different levels for different parts of a state depending of the condition of the ground water table to prevent excessive depletion of ground water. Section 62 (3) of the Act provides that geographical position of any area could be one of the criteria for tariff differentiation. A higher level of subsidy could be considered to support poorer farmers of the region where adverse ground water table condition requires larger quantity of electricity for irrigation purposes subject to suitable restrictions to ensure maintenance of ground water levels and sustainable ground water usage.

4. Extent of subsidy for different categories of consumers can be decided by the State Government keeping in view various relevant aspects. But provision of free electricity is not desirable as it encourages wasteful consumption of electricity besides, in most cases, lowering of water table in turn creating avoidable problem of water shortage for irrigation and drinking water for later generations. It is also likely to lead to rapid rise in demand of electricity putting severe strain on the distribution network thus adversely affecting the quality of supply of power. Therefore, it is necessary that reasonable level of user charges are levied. The subsidized rates of electricity should be permitted only up to a pre-identified level of consumption beyond which tariffs reflecting efficient cost of service should be charged from consumers. If the State Government wants to reimburse even part of this cost of

electricity to poor category of consumers the amount can be paid in cash or any other suitable way. Use of prepaid meters can also facilitate this transfer of subsidy to such consumers.

5. Metering of supply to agricultural / rural consumers can be achieved in a consumer friendly way and in effective manner by management of local distribution in rural areas through commercial arrangement with franchisees with involvement of panchayat institutions, user associations, cooperative societies etc. Use of self closing load limitors may be encouraged as a cost effective option for metering in cases of "limited use consumers" who are eligible for subsidized electricity.

8.4 Definition of tariff components and their applicability

1. Two-part tariffs featuring separate fixed and variable charges and Time differentiated tariff shall be introduced on priority for large consumers (say, consumers with demand exceeding 1 MW) within one year. This would also help in flattening the peak and implementing various energy conservation measures.
2. The National Electricity Policy states that existing PPAs with the generating companies would need to be suitably assigned to the successor distribution companies. The State Governments may make such assignments taking care of different load profiles of the distribution companies so that retail tariffs are uniform in the State for different categories of consumers. Thereafter the retail tariffs would reflect the relative efficiency of distribution companies in procuring power at competitive costs, controlling theft and reducing other distribution losses.
3. The State Commission may provide incentives to encourage metering and billing based on metered tariffs, particularly for consumer categories that are presently unmetered to a large extent. The metered tariffs and the incentives should be given wide publicity.
4. The SERCs may also suitably regulate connection charges to be recovered by the distribution licensee to ensure that second distribution licensee does not resort to cherry picking by demanding unreasonable connection charges. The connection charges of the second licensee should not be more than those payable to the incumbent licensee.

8.5 Cross-subsidy surcharge and additional surcharge for open access

8.5.1 National Electricity Policy lays down that the amount of cross-subsidy surcharge and the additional surcharge to be levied from consumers who are permitted open access should not be so onerous that it eliminates competition which

is intended to be fostered in generation and supply of power directly to the consumers through open access.

A consumer who is permitted open access will have to make payment to the generator, the transmission licensee whose transmission systems are used, distribution utility for the wheeling charges and, in addition, the cross subsidy surcharge. The computation of cross subsidy surcharge, therefore, needs to be done in a manner that while it compensates the distribution licensee, it does not constrain introduction of competition through open access. A consumer would avail of open access only if the payment of all the charges leads to a benefit to him. While the interest of distribution licensee needs to be protected it would be essential that this provision of the Act, which requires the open access to be introduced in a time-bound manner, is used to bring about competition in the larger interest of consumers.

Accordingly, when open access is allowed the surcharge for the purpose of sections 38,39,40 and sub-section 2 of section 42 would be computed as the difference between (i) the tariff applicable to the relevant category of consumers and (ii) the cost of the distribution licensee to supply electricity to the consumers of the applicable class. In case of a consumer opting for open access, the distribution licensee could be in a position to discontinue purchase of power at the margin in the merit order. Accordingly, the cost of supply to the consumer for this purpose may be computed as the aggregate of (a) the weighted average of power purchase costs (inclusive of fixed and variable charges) of top 5% power at the margin, excluding liquid fuel based generation, in the merit order approved by the SERC adjusted for average loss compensation of the relevant voltage level and (b) the distribution charges determined on the principles as laid down for intra-state transmission charges.

Surcharge formula:

$$S = T - [\, C\,(1 + L / 100) + D \,]$$

Where

S is the surcharge

T is the Tariff payable by the relevant category of consumers;

C is the Weighted average cost of power purchase of top 5% at the margin excluding liquid fuel based generation and renewable power

D is the Wheeling charge

L is the system Losses for the applicable voltage level, expressed as a percentage

The cross-subsidy surcharge should be brought down progressively and, as far as possible, at a linear rate to a maximum of 20% of its opening level by the year 2010-11.

8.5.2 No surcharge would be required to be paid in terms of sub-section (2) of Section 42 of the Act on the electricity being sold by the generating companies with consent of the competent government under Section 43(A)(1)(c) of the Electricity Act, 1948 (now repealed) and on the electricity being supplied by the distribution licensee on the authorisation by the State Government under Section 27 of the Indian Electricity Act, 1910 (now repealed), till the current validity of such consent or authorisations.

8.5.3 The surcharge may be collected either by the distribution licensee, the transmission licensee, the STU or the CTU, depending on whose facilities are used by the consumer for availing electricity supplies. In all cases the amounts collected from a particular consumer should be given to the distribution licensee in whose area the consumer is located. In case of two licensees supplying in the same area the licensee from whom the consumer was availing supply shall be paid the amounts collected.

8.5.4 The additional surcharge for obligation to supply as per section 42(4) of the Act should become applicable only if it is conclusively demonstrated that the obligation of a licensee, in terms of existing power purchase commitments, has been and continues to be stranded, or there is an unavoidable obligation and incidence to bear fixed costs consequent to such a contract. The fixed costs related to network assets would be recovered through wheeling charges.

8.5.5 Wheeling charges should be determined on the basis of same principles as laid down for intra-state transmission charges and in addition would include average loss compensation of the relevant voltage level.

8.5.6 In case of outages of generator supplying to a consumer on open access, standby arrangements should be provided by the licensee on the payment of tariff for temporary connection to that consumer category as specified by the Appropriate Commission.

9.0 Trading Margin

The Act provides that the Appropriate Commission may fix the trading margin, if considered necessary. Though there is a need to promote trading in

electricity for making the markets competitive, the Appropriate Commission should monitor the trading transactions continuously and ensure that the electricity traders do not indulge in profiteering in situation of power shortages. Fixing of trading margin should be resorted to for achieving this objective.

Sd/-

(U.N. PANJIAR)
Additional Secretary to the Government of India

To

The Manager,
Government of India Press,
Mayapuri.