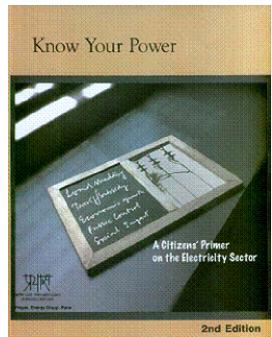
#### A Citizens' Primer on the Electricity Sector

The first edition of the Primer (published in mid 2004) was sold out in about 18 months time. This Second Edition is an attempt to give an updated comprehensive macro perspective of the Indian power sector. This Edition has been updated based on the feedback from our readers and the developments in the power sector in the last 2 years. Foreword to this edition has been written by Shri. A. K. Basu, the Chairman of CERC.

Response to the first edition has been very encouraging, indeed a sign of citizens' eagerness to 'know their power'. The Primer has reached a varied audience - politicians, bureaucrats, farmer organisations, trade unions, consumer groups, teachers, students, environmental activists and many interested citizens. Institutions which have purchased the Primer include Ministry of Power, Regulatory Commissions, Electric Utilities, Training Institutes, Research Libraries, and Funding Agencies. There have been many changes in the Indian power sector in the last two years. The state of flux, which started in the 1990's – IPPs, Orissa reforms, Delhi privatisation, and the E Act continues. Any public spirited citizen, who wishes to respond to this flux is faced with too many new issues. A basic understanding of the technical and economic aspects of the sector is necessary to gain a foothold. An insight into the planning and policy processes, along with an appreciation of their linkages with the technical and economic issues, is essential to equip oneself for meaningful intervention.

This Primer provides a comprehensive perspective for such public spirited citizens, as well as power sector professionals and analysts.

## Know Your Power A Citizens' Primer on the Electricity Sector [2nd Edition] by Prayas Energy Group, Pune



Published in July 2006, 154 pages; Requested contribution: Rs. 400/- or US \$25

### **PRAYAS** (Initiatives in Health, Energy, Learning and Parenthood)

Amrita Clinic, Athawale Corner, Deccan Gymkhana, Karve Road Pune 411 004, India Tel.: 020 - 2542 0720 / 6520 5726 Fax: 020 - 2542 0337 Email: prayasenergy@vsnl.net Website: www.prayaspune.org

## TABLE OF CONTENTS

#### 1. THE NEED FOR A PRIMER

- 1.1. Economy to energy to electricity
- 1.2. Power as infrastructure
- 1.3. What is special about electricity?
- 1.4. Flux in the power sector
- 1.5. Why this book?

#### 2. UNDERSTANDING THE POWER SYSTEM

- 2.1. Introduction
- 2.2. Components of the power system
- 2.3. Basic concepts of electricity
- 2.4. How is power utilised?

#### 3. PRODUCTION AND DISTRIBUTION OF ELECTRICITY

- 3.1. Generation
- 3.2. Transmission and distribution system
- 3.3. Transmission system
- 3.4. Distribution system
- 3.5. Dancing to one tune: the grand show that goes on and on

# 4. HOW DOES THE POWER SYSTEM WORK?

- 4.1. Distribution system
- 4.2. Transmission system
- 4.3. Generating system
- 4.4. The headquarters
- 4.5. Regulatory commission
- 4.6. What is new?

## 5. OVERVIEW OF THE INDIAN POWER SECTOR

- 5.1. Introduction
- 5.2. Players in the power sector

#### 6. ECONOMIC ASPECTS OF THE POWER SECTOR

- 6.1. Introduction
- 6.2. Understanding some economic concepts

- 6.3. Cost structure of the power sector
- 6.4. Financing of power sector investment
- 6.5. Changing composition of costs of SEBs

#### 7. POWER TARIFF

- 7.1. Introduction
- 7.2. Process and principles of regulatory review
- 7.3. Typical process of tariff approval
- 7.4. Special considerations in tariff setting
- 7.5. Consumer tariff
- 7.6. Conclusion

#### 8. PLANNING - WHAT & HOW?

- 8.1. What is planning?
- 8.2. Short term operational planning
- 8.3. Long term planning
- 8.4. Improving the planning process
- 8.5. Planning in the new environment

#### 9. THE INDIAN POWER SECTOR-EMERGING TRENDS

- 9.1. Introduction
- 9.2. Reform, deregulation and restructuring
- 9.3. Reforms in India
- 9.4. Market operation of the power sector

#### **10. KNOW YOUR POWER**

- 10.1. What have we covered?
- 10.2. Where are we?
- 10.3. Where do we need to go?
- 10.4. Furthering the public

interest agenda

List of Reading and Reference Material Abbreviations Index

### FOREWORD

Electricity is the prime mover of a modern economy. Not only is it a basic infrastructure, but it has also become an essential part of our daily existence, in the first hundred years of its commercialization, electricity was supplied to consumers by vertically integrated monopolies. It was generally felt that this was the only feasible option due to its complexity as a commodity and its natural monopoly aspects. In many countries worldwide, unbundling of the electricity supply industry was started during 1990s, so that it could be subjected to market discipline rather than being controlled through monopoly regulation. It was around this time that India embarked on the path of reform and restructuring of the sector, the enabling legal framework of which has now been enshrined in the Electricity Act 2003. The Act, which is landmark legislation, aims at development of a power system which catalyses investment, promotes competition and protects consumer interest.

Prayas - a dedicated non-governmental organization with focus on energy, health, learning and parenthood and resources and livelihoods - has been working for quite some time towards improvement of India's power scenario. The Energy Group of Prayas has contributed significantly in capability building through publications and analyses of important issues facing the sector, and also through workshops and discussions.

Originality of approach is the unique feature of the activities of Prayas. The book, "Know Your Power: A Citizens' Primer on the Electricity Sector", bears testimony to this fact. This book exhaustively covers the technical, operational, economic and financial aspects as well as the reform models envisaged in the power sector. It explains each of these issues in a very simple and lucid manner. The book examines with precision the basic concept of the power system, and goes on to describe how the system works. It deals systematically with the economics of electricity, including cost structure and the tariff setting process. The publication also presents, in an unbiased manner, an overview of emerging trends. The book caters to the requirements of ordinary citizens as well as technical experts, by providing a comprehensive overview.

The first edition of the book received overwhelming response from readers cutting across various interest groups, and proved to be a major capacity building tool for individuals and institutions.

I am glad that Prayas has now brought out this second edition, with finer refinement and updation, based on discussions and feedback from the readers. It is a very handy reference manual for every stakeholder interested in India's power sector and seeking to contribute to its development. I am sure that this excellent publication would continue to serve as a useful primer for civil society and power sector professionals, and prepare them for an informed debate on the complex issues concerning the electricity sector.

Ashok Basu Chairperson, Central Electricity Regulatory Commission May 2006

## **About Prayas (Energy Group)**

Prayas is a registered charitable trust based in Pune. Prayas' activities cover four substantive areas of Health, Energy, Learning and Parenthood, and Resources and Livelihoods. The Energy Group of Prayas is mainly engaged in policy analysis in the electricity sector and capability building of civil society institutions.

The past work of Prayas Energy Group includes: analysis of the power purchase agreement between Dabhol Power Company and the Maharashtra State Electricity Board, analysis of the Sardar Sarovar Project, development of a least-cost, integrated resource plan (IRP) for the state of Maharashtra, analysis of agricultural power consumption and subsidy, and critique of the activities of the multilateral development banks in the energy sector in India, and organising numerous capability building workshops.

Since the last few years, the Energy Group has focused mainly on issues relating to power sector reforms and regulation. Its work in the areas of reforms and regulations include: study of the regulatory aspects of the Orissa model of power sector reforms; several policy and regulatory interventions at Central and State levels; and survey based report on the Electricity Regulatory Commissions. In the current phase, the Energy Group is concentrating on the issues thrown up by the passage of the Electricity Act 2003 as well as democratisation of sector operation and planning.

The strategy for this involves enhancing transparency of operation, ensuring accountability of decision makers and improving participation of civil society.

All major publications, presentations and reports of the Energy Group are available on Prayas website. Prayas activities are supported through project-based grants from charitable foundations.

#### PRAYAS

#### (Initiatives in Health, Energy, Learning and Parenthood)

Amrita Clinic, Athawale Corner, Karve Road Pune 411 004, India Tel: 020 2542 0720/6520 5726, Fax: 020 2542 0337 Email: prayasenergy@vsnl.net Website: www.prayaspune.org

I am sure that this excellent publication would continue to serve as a useful primer for civil society and power sector professionals, and prepare them for an informed debate on the complex issues concerning the electricity sector. (Ashok Basu, Chairperson, CERC, Foreword to 2nd Edition)

#### **Feedback on the First Edition**

I very much appreciate your admirable efforts in making the public aware of the various dimensions of the reform process in the power sector.

(K. Rajendra Reddy, Farmers' association, Andhra Pradesh)

In fact, we are indebted to you for this excellent job. With your permission, we are planning to translate the publication into Kannada and use it for our consumers here. (Philipose Matthai, Chairman, KERC)

The publication is praise worthy as the officers of our Ministry appreciated its contents related with electricity, energy Indian power sector.

(Librarian, Ministry of Power, India)

All in all, the primer is a very useful tool. Not only NGOs, consumer groups and trade unions benefit from it, but one suspects that given the compartmentalised nature of the utilities, even those working in the power sector would benefit from it.

(Shripad Dharmadhikary, Manthan)

It is an excellent publication and can interest both the initiated and not so *initiated people.* (Senior Officer, CESC, Kolkata)

This book addresses one of the major training needs expressed by many in India and similar developing countries. (IEEMA Journal, Mumbai)

### **ORDER FORM**

Name (IN BLOCK LETTERS):

Designation:

Organization:

Address:

City:

State:

PinCode:

Country:

Tel.:

Fax:

Mobile:

E-mail:

Area of Interest:

Sector (Please tick):

- Public Sector a
  - **Research Institute** q
  - NGO a
  - Government q
  - Academic Institute q
  - Industry/Corporate House q
  - Other (please specify) a

Enclosed is a demand draft/cheque\* number ..... for Rs. Dated ..... payable to Prayas, for ..... copies of "Know Your Power"

\* Please add Rs. 75/- for cheques payable in India (outside Pune) Enclose your business card.

#### PRAYAS.

Athawale corner, Karve road, Mail Pune 411 004, India. to Tel: 020-2542 0720, 6520 5726 Fax: 020 2542 0337 Email: pradnya@prayaspune.org