# Contents

I. List of Tables and Figures  
ii. Acknowledgements  

1. Introduction  
   1.1 End use Efficiency: Major Issues  
   1.1.1 Thermodynamic Indicators  
   1.1.2 Physical Indicators  
   1.1.3 Economic Energy Intensity Indicators  
   1.2 Differentiating the Effects  
   1.3 Scheme of Work  

2. Current Approaches to Energy Planning and Need for an Integrated Framework  
   2.1.1 Energy Balance  
   2.1.2 Reference Energy Systems  
   2.1.3 Pricing  
   2.1.4 Demand Projection  
   2.1.5 Other Aspects  

2.2 Energy Planning in India  
   2.2.1 The Energy Survey of India Committee  
   2.2.2 The Fuel Policy Committee  
   2.2.3 The Working Group on Energy Policy  
   2.2.4 The Advisory Board on Energy  
   2.2.5 Power Vision 2010  
   2.2.6 Hydrocarbon Vision 2025  
   2.2.7 Integrated Energy Policy  
   2.2.8 The Eighth Plan  
   2.2.9 The Ninth Plan  
   2.2.10 The Tenth Plan  
   2.2.11 The Eleventh Plan  

3. Energy Supply Scenario in India  
   3.1 Present Status of Development of Energy Resources
3.2 THE ENERGY SUPPLY INFRASTRUCTURE
   3.2.1 COAL
   3.2.2 OIL AND GAS
   3.2.3 ELECTRICITY

4. PATTERN OF ENERGY DEMAND IN INDIA
   4.1 AGRICULTURE
      4.1.1 USE OF MACHINERY AND LIVESTOCK
      4.1.2 ENERGY USE
   4.2 INDUSTRY
      4.2.1 IRON AND STEEL INDUSTRY
      4.2.2 CEMENT INDUSTRY
      4.2.3 ALUMINIUM INDUSTRY
      4.2.4 FERTILIZER INDUSTRY
      4.2.5 PULP AND PAPER INDUSTRY
      4.2.6 TEXTILE INDUSTRY
      4.2.7 CHEMICAL INDUSTRY
   4.3 TRANSPORT
      4.3.1 ROADWAYS
      4.3.2 SHIPPING
      4.3.3 RAILWAYS
      4.3.4 CIVIL AVIATION
   4.4 DOMESTIC CONSUMPTION
      4.4.1 ENERGY USE FOR COOKING
      4.4.2 ENERGY USE FOR LIGHTING

5. MAGNITUDE OF CHALLENGES AND ENERGY SECURITY
   5.1 ECONOMIC REFORMS AND ENERGY POLICY
   5.2 POLICY OPTIONS FOR ENERGY SECURITY

6. COVERAGE AND SCOPE OF ENERGY STUDIES

7. MODELS APPLIED IN ENERGY ANALYSES
   7.1 ENERGY MODELLING
   7.2 HIERARCHICAL MODELS (DEMAND)
      7.2.1 ONE SECTOR MODELS
         7.2.1.1 Energy – GNP Elasticity Concept
         7.2.1.2 Time Series Analysis
         7.2.1.3 Multi-country Analysis
      7.2.2 MULTI-SECTOR MODELS
         7.2.2.1 Parikh Model
         7.2.2.2 Resources for the Future
         7.2.2.3 Input/output Analysis
         7.2.2.4 Minimum Standard Energy Demand Model (MSEDM)
   7.3 HIERARCHICAL MODELS (SUPPLY)
      7.3.1 LINEAR PROGRAMMING
TABLE 4.11  DISTRIBUTION OF HOUSEHOLDS PER 1000 BY PRIMARY SOURCE OF ENERGY USED FOR LIGHTING FOR EACH MAJOR STATE. (RURAL INDIA) 72
TABLE 9.1  ENERGY INTENSITY (E/Y) IN DIFFERENT SECTORS 138
TABLE 9.2  SECTORAL COMPOSITION (Y/Y) OF DIFFERENT SECTORS 139
TABLE 9.3  CHANGE IN ENERGY INTENSITY BY EACH FUEL TYPE 153

FIGURES

FIGURE 9.1  ENERGY INTENSITY IN INDIA 132
FIGURE 9.2  PER CAPITA ENERGY CONSUMPTION IN INDIA 132
FIGURE 9.3  DISTRIBUTION OF ENERGY USE IN 1990-91 135
FIGURE 9.4  DISTRIBUTION OF ENERGY USE IN 2004-05 135
FIGURE 9.5  FUEL COMPOSITION BY SECTOR IN 1990-91 136
FIGURE 9.6  FUEL COMPOSITION BY SECTOR IN 2004-05 136
FIGURE 9.7  ENERGY INTENSITY CHANGE 140
FIGURE 9.8  CHANGE IN STRUCTURAL COMPOSITION 141
FIGURE 9.9  CHANGE IN ENERGY CONSUMPTION 144
FIGURE 9.10  CHANGE IN ENERGY CONSUMPTION 145
FIGURE 9.11  CHANGE IN ENERGY CONSUMPTION DUE TO INTENSITY EFFECT 146
FIGURE 9.12  CHANGE IN ENERGY CONSUMPTION DUE TO STRUCTURAL EFFECT 147
FIGURE 9.13  COEFFICIENT OF ENERGY CONSUMPTION DUE TO EACH EFFECT 149
FIGURE 9.14  CHANGE IN INTENSITY OF COAL USE DUE TO EACH EFFECT 154
FIGURE 9.15  CHANGE IN INTENSITY OF PETROL USE DUE TO EACH EFFECT 155
FIGURE 9.16  CHANGE IN INTENSITY OF ELECTRICITY USE DUE TO EACH EFFECT 156