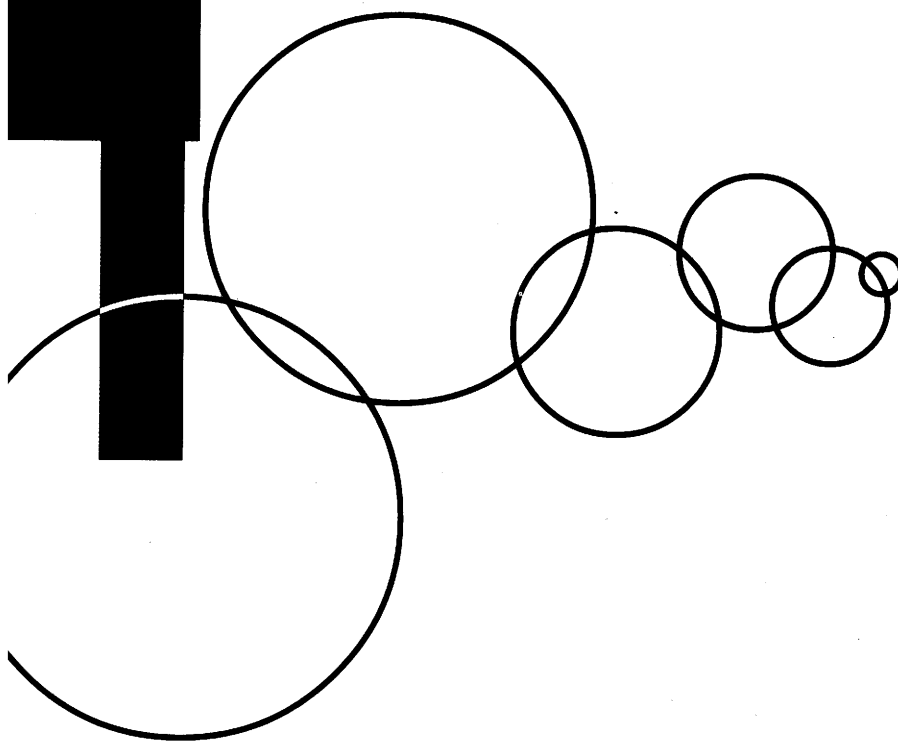




ASEDP 62

**ENVIRONMENTAL PROBLEMS IN CHINA'S
MARKET TRANSITION AND DIFFUSION
OF CLEANER TECHNOLOGIES**

Edited by
Nobuhiro Horii
and
Xiliang Zhang



INSTITUTE OF DEVELOPING ECONOMIES
JAPAN EXTERNAL TRADE ORGANIZATION

ENVIRONMENTAL PROBLEMS IN CHINA'S MARKET
TRANSITION AND THE DIFFUSION OF CLEANER
TECHNOLOGIES

Edited by

Nobuhiro Horii and Xiliang Zhang

INSTITUTE OF DEVELOPING ECONOMIES
JAPAN EXTERNAL TRADE ORGANIZATION
CHIBA JAPAN

Contributors

- Changming LI
(Chapter 1) Researcher, Institute of Industrial Economics,
Chinese Academy of Social Sciences
- Nobuhiro HORII
(Chapter 4) Visiting Research Fellow, Institute for Techno-
Economic and Energy System Analysis (ITEESA),
Tsinghua University
Research Fellow, Institute of Developing Economies
(IDE-JETRO)
- Shuhua GU
(Chapter 2) Professor, Institute for Techno-Economic and
Energy System Analysis (ITEESA),
Tsinghua University
- Wenqiang LIU
(Chapter 5) Official, Energy Efficiency and Renewable Energy
Division, Department of Resources Conservation
and Comprehensive Utilization, State Economic
and Trade Commission (SETC)
- Xiliang ZHANG
(Chapter 6) Associate Professor, Institute for Techno-Economic
and Energy System Analysis (ITEESA),
Tsinghua University
- Yingyun LU
(Chapter 3) Deputy Director, Energy Environment Economy
Research Institute (3E Reserch Institute), Tsinghua
University
- Yong REN
(Chapter 7) Senior Research Fellow, Policy Research Center for
Environment and Economy, State Environment
Protection Agency (SEPA)

Table of Contents

Preface

Chapter 1

Macro Analysis on China's Environment, Energy and Economic Development

Changming Li

Introduction.....	1
1.China's environment and the economic development.....	6
1.1Economic growth, energy and environment.....	7
1.2 Energy structure and environment.....	12
1.3 Technology structure and environment.....	14
2. Changes in the industrial structure and the environmental issue in China.....	16
2.1 Industrial structure is closely related to environmental issues.....	16
2.2 Comparison of the industrial structure in China and the industrial structure in Japan.....	21
2.3 Comparison of the foreign trade structure between China and Japan.....	25
2.4 China's industrial structure from the point of view of input and output statement.....	28
2.5 The transformation of industrial structure and the environmental issue.....	30
3. China's environment in the future and the environmental policies that could be adopted.....	36
Reference	
Appendix	

Chapter 2*

Energy and Environment in China's Rural Areas

Shuhua Gu

Introduction.....	
-------------------	--

1. Review on the history of the energy development	
in China's rural area.....	58
1.1 Severe energy shortage in the end of 1970s.....	58
1.2 The old energy consumption tradition caused	
deterioration of the ecological environment.....	60
1.3 The state implemented 4 major rural energy	
technology promotion program	
in the beginning of 1980s.....	63
1.4 In the 1990s started comprehensive development	
of rural energy on the county level.....	68
2. China's rural energy development program	
made tremendous achievements.....	75
2.1 Rural energy consumption level had	
increased significantly.....	76
2.2 Promoted and applied a batch of mature and	
practical renewable energy technologies,	
which had been transformed into products	
and entered into markets.....	79
2.3 Renewable energies have become important	
rural energy sources	86
2.4 The promotion and application of energy	
conservation technologies increased	
energy efficiency.....	86
3. Analysis on the future energy structure in China's rural areas.....	86
3.1 There will be fundamental changes in China's	
rural area in the next 50 years.....	87
3.2 Optimize energy structure and	
expand energy supply.....	89

Chapter 3

Energy Conservation Technologies

Yingyun Lu

Introduction.....	93
1. The characteristics of energy conservation	
development in China	93

1.1 Energy efficiency has been low and there is a great potential in energy conservation.....	93
1.2 Coal as the main component of the energy structure and energy conservation technologies developed on multi-levels.....	94
1.3 Under the planned economic system, administrative management has been the major measure in promoting and managing energy conservation.....	95
1.4 Some issues in the energy pricing affected energy conservation.....	95
1.5 The development of energy conservation technologies is closely related to the environmental protection...	96
2. The current status of energy conservation and its achievements in China.....	97
2.1 Relatively low energy consumption growth supported rapid economic growth.....	97
2.2 Specific product energy consumption has been gradually decreasing.....	99
2.3 Energy conservation has obtained great economic benefits.....	101
2.4 Great contributions to ecological environmental protection.....	102
3. The development of energy conservation technologies in the major energy consumption sectors in China.....	102
3.1 Development of energy conservation technologies in industrial sector.....	104
3.2 Civil energy conservation.....	112
3.3 Energy conservation in transportation.....	121
3.4 Energy conservation of industrial boilers.....	124
4. The energy conservation policies, laws and regulations and management in China	129
4.1 Implementation of energy conservation policies and measures.....	130

4.2 Gradually improve and perfect the energy conservation laws and regulation.....	133
4.3 The establishment of the largest energy conservation management, monitoring and technical service system in the world.....	134
4.4 Promote energy conservation through the market mechanism.....	136
5. Case study on the development of energy conservation technologies.....	137
5.1 Case study 1.....	137
5.2 Case study 2.....	142
5.3 Case study 3.....	144
5.4 Case study 4.....	146
5.5 Analysis on the conditions that affected the economic benefits of energy conservation projects.....	150
6. Barriers to the development of energy conservation technologies in China and the proposed solutions.....	153
6.1 The strategic importance of energy conservation in the new century.....	153
6.2. Barriers to the development of energy conservation technologies in the transitional period to the socialist market economy.....	154
6.3 Ways to overcome the obstacles and to promote the development of energy conservation technologies.....	158
6.4 Develop advanced energy conservation technologies.....	160
6.5 Coordinate the development of energy conservation and environmental protection, promote the development and application of energy conservation technologies by intensifying environmental protection	161

References

Introduction.....	164
1. The development of CCTs and its diffusion in China.....	167
1.1 Coal processing technologies before combustion process.....	168
1.2 High-efficiency coal combustion technologies.....	173
1.3 Coal transformation technologies through chemical reaction.....	175
1.4 Post combustion pollution treatment technologies.....	177
1.5 Evaluation on the application of CCTs in China and the existing problems.....	180
2. Analysis on the existing barriers to the deployment of the CCTs in China based upon the current coal distribution.....	181
2.1 Coal production structure.....	181
2.2 Coal consumption structure.....	186
2.3 The evolution of coal distribution system as a result of the market oriented reforms.....	189
2.4 Impacts on the diffusion of CCTs.....	190
3. Necessary policy framework for the diffusion of CCTs in China.....	195
3.1 The principle of the policy support for the diffusion of CCTs.....	195
3.2 Create an environment in which the market mechanism could play out its functions in the coal distribution structure..	196
3.3 Combine the various CCTs based upon the specific situations.....	197
3.4 The environmental protection measures should be based upon the overall coal distribution.....	198
3.5 Combine the CCTs deployment with the industrial restructuring, which is ongoing at the moment, and obtain the synergy effects..	200

3.6 Strengthen the contacts and coordination	
with the international fund raising mechanisms.....	201
Conclusion.....	202
References	

Chapter 5

Renewable Energies

Wenqiang Liu

Introduction.....	205
1. Overview.....	205
1.1 Renewable energies resources.....	205
1.2 Renewable energies technologies in China.....	207
2. Solar water heating.....	207
2.1 Growing market scale.....	207
2.2 Production capacities and structure.....	209
2.3 Major enterprises and brands.....	209
2.4 Market prospects--Expanding production scale and regulating market of solar water heater.....	211
3. Solar photovoltaics.....	212
3.1 PV Technology R&D.....	212
3.2 Market overview of Solar PV System.....	213
3.3 Manufactures and products.....	216
4. Wind power.....	220
4.1 Past development.....	220
4.2 Current status for windfarm development.....	220
4.3 Wind turbine manufacture.....	222
4.4 Future blueprints for wind power development.....	224
4.5 Small wind turbine.....	225
5. Geothermal energy.....	226
6. Biomass.....	228
6.1 Introduction.....	228
6.2 Biogas.....	228
6.3 Biomass gasification.....	229
7. Small Hydropower.....	230
7.1 Hydro resources.....	230

7.2 Small hydro development.....	230
7.3 Small hydropower generation turbine.....	231
7.4 Speeding up further exploitation of small hydro power....	231
8. Industrialization of renewable energies.....	232
8.1 Overall development targets.....	232
8.2 Strategic role of renewable energies.....	233
9. Institutions for renewable energies development.....	235
9.1 Current policies on renewable energies.....	235
9.2 Institutional changes for renewable energies industrial development.....	236
References	

Chapter 6

Sustainable Urban Transport Development: Case studies of Beijing, Shanghai, and Shenzhen

Xiliang Zhang

Introduction.....	241
1. Urban Transport Development of Beijing.....	241
1.1 Social and Economic Context.....	241
1.2 Vehicle Population and Mix.....	242
1.3 Transportation Infrastructure.....	244
1.4 Public Transport.....	244
1.5 Infrastructure Investment.....	246
2. Urban Transport Development of Shanghai.....	247
2.1 Social and Economic Context.....	247
2.2 Vehicle Population and Mix.....	248
2.3 Transportation Infrastructure.....	248
2.4 Public Transport.....	249
2.5 Infrastructure Investment.....	250
3. Urban Transport Development of Shenzhen.....	250
3.1 Social and Economic Context.....	250
3.2 Vehicle Population and Mix.....	252
3.3 Transportation Infrastructure.....	252
4. A Comparison of the Three Cities in Urban Transportation	253
5. Challenges.....	256

Conclusion.....	256
References	

Chapter 7

Environmental Policy and Environmental Industry in China

Yong Ren

Introduction.....	258
1. Evolution of Chinese environmental protection and environmental policy framework.....	259
1.1 Evolution of Chinese environmental protection.....	259
1.2 Framework of Chinese environmental policy.....	263
1.3 Current situation of environmental pollution.....	266
2. Current situation of Chinese environmental industry.....	268
2.1 Outline of the development of environmental industry.....	268
2.2 Sectoral components of environmental industry.....	269
2.3 Distribution of Chinese environmental industry.....	272
3. 3. Inter-relationship between environmental policy and environmental industry: dynamics mechanism.....	273
3.1 Assessment of the development of environmental industry in China.....	273
3.2 External causes to less development of Chinese environmental industry.....	274
3.3 Dynamics mechanism between environmental policy and environmental industry.....	275
4. New opportunities and trends China's environmental industries are facing.....	277
4.1 The Tenth Five-year Plan for Environmental Protection will create big actual demands for environmental industry.....	278
4.2 Macro-economic policy and the Guidelines/Plan will create a regulated market for environmental industry.....	279
4.3 4.3 Implications of WTO to Chinese Environmental Industry.....	279
Conclusions.....	279

Institute of Developing Economies, Japan External Trade Organization

3-2-2, Wakaba, Mihama-ku, Chiba city, Chiba 261-8545 JAPAN

All rights reserved, Published March 2002

Printed in China

IIDE-JETRO

ISBN4-258-55062-0C303