

Contents

Acknowledgments ix

- 1 Motivation and Organization of the Book 1**
 - 1.1 Socio-Technical Approach 2
 - 1.2 Climate Change and Energy Security 4
 - 1.3 Preview of Chapters 8
- 2 A Tale of Five Challenges 13**
 - 2.1 Electricity 16
 - 2.2 Transportation 25
 - 2.3 Forestry and Agriculture 33
 - 2.4 Waste and Water 42
 - 2.5 Climate Change 53
 - 2.6 Conflicts and Complementarities 63
- 3 Technologies for Mitigating Climate Change 65**
 - 3.1 Energy End Use 69
 - 3.2 Energy Supply 84
 - 3.3 Capturing and Sequestering Carbon 102
 - 3.4 Reducing Other Greenhouse Gases 110
 - 3.5 Integrated Systems 116
 - 3.6 Synthesis 123
- 4 Technologies for Geo-Engineering and Adaptation 125**
 - 4.1 Geo-Engineering 127
 - 4.2 Adaptation 139
 - 4.3 Synthesis 146
- 5 Barriers to Effective Climate and Energy Policies 147**
 - 5.1 Public Goods, Market Failure, and Policy Failure 149
 - 5.2 Barriers to Cost Effectiveness 153

5.3	Fiscal, Regulatory, and Statutory Barriers	160
5.4	Intellectual-Property Barriers	165
5.5	Other Cultural, Social, and Institutional Barriers	167
5.6	Toward Carbon Lock-In	175
6	Overcoming Barriers to Effective Climate and Energy Policies	179
6.1	The Risk Paradigm versus the Precautionary Principle	181
6.2	Types of Public Policies and Ways to Evaluate Them	185
6.3	Putting a Price on Carbon	191
6.4	Complementary Policies	199
6.5	The Need for Synergy	213
7	The Case for Polycentric Implementation	215
7.1	The Benefits of Global Action	224
7.2	The Benefits of Local Action	233
7.3	The Case for Polycentrism	236
7.4	Challenges to Polycentrism	238
7.5	Conclusion	239
8	Case Studies	241
8.1	Denmark's Electricity Policy, 1970–2001	246
8.2	Germany's Feed-in Tariff, 1990–2009	253
8.3	Brazil's Proálcool Program and Promotion of Flex-Fuel Vehicles, 1975–2009	260
8.4	Singapore's Urban Transport Policy, 1971–2009	274
8.5	Bangladesh's Grameen Shakti, 1996–2009	284
8.6	China's National Improved Stove Program, 1983–1998	292
8.7	The Oasis Project in the Atlantic Rainforest of Brazil, 2006–Present	301
8.8	The Toxic Releases Inventory in the United States, 1988–2007	307
8.9	Conclusion	316
9	Conclusions	317
9.1	The Socio-Technical Nature of Climate and Energy Challenges	319
9.2	Justification for Government Intervention	320
9.3	Speed, Scope, and Scale	325
9.4	The Power of Polycentrism	327
9.5	Coordinated, Progressive, and Consistent Policies	327
Appendix A Experts Contacted and Interviewed for Case Studies		331
Appendix B Methodology for Case Studies		339
Notes		343
Bibliography		403
Index		413