

Contents

<i>List of figures</i>	vii
<i>List of tables</i>	ix
<i>List of boxes</i>	x
<i>List of contributors</i>	xi
<i>Foreword</i>	xiii
<i>Preface</i>	xvii
<i>Introduction</i>	xix
1 Translating sustainable development into practice: a ‘patchwork’ of some new concepts and an introduction to material flows analysis	1
<i>Peter Bartelmus, Stephan Moll, Stefan Bringezu, Sebastian Nowak and Raimund Bleischwitz</i>	
1.1 Concepts for sustainable development: an overview	1
1.2 The rationale of dematerialization	16
1.3 MFA: a methodology to analyse material flows	22
1.4 MFB: a consistent information framework integrating most environmental pressures information	31
1.5 Some empirical findings: an MFB comparison of Germany, Japan and the United States	32
2 Towards a new kind of technological progress	39
<i>Raimund Bleischwitz</i>	
2.1 The eco-efficiency revolution	42
2.2 Consumption and social change	44
2.3 Eco-efficiency measurement: materials matter	45
2.4 Towards innovation-inducing regulation	45
2.5 Methodological thoughts regarding any application of eco-efficiency concepts	50
3 Emerging regulatory policies for eco-efficiency	56
<i>Raimund Bleischwitz, Stephan Moll, Stefan Bringezu, Dirk Assmann, Manfred Fishedick, Stefan Thomas, Holger Wallbaum and Rainer Lucas</i>	
3.1 Introduction	56

3.2	Raw material taxes	59
3.3	The German Renewable Energy Sources Act: creating a dynamic market	69
3.4	Policies to stimulate demand-side energy services	76
3.5	Eco-efficiency related to buildings	82
3.6	End-of-life vehicles regulation in Germany and Europe	91
3.7	Formulating target-oriented policies: Factor Four and more	107
4	Sustainable business and consumption strategies <i>Justus von Geibler, Michael Kuhndt, Eberhard K. Seifert, Rainer Lucas, Sylvia Lorek and Raimund Bleischwitz</i>	116
4.1	Introduction	116
4.2	Strategies for sustainable business development	116
4.3	Sustainable consumption: policy strategies, consumers' behaviour and market development	141
5	Bridging the data gap <i>Stephan Moll, Stefan Brinzezu, Dirk Assmann, Thomas Hanke, Holger Wallbaum and Raimund Bleischwitz</i>	165
5.1	Introduction	165
5.2	Material flows	165
5.3	Energy	176
5.4	Buildings	180
6	Concluding thoughts <i>Raimund Bleischwitz</i>	193
	<i>References</i>	196
	<i>Index</i>	221

Figures

1.1	Carrying capacity, equal allocation, environmental space	4
1.2	Industrial metabolism	6
1.3	Industrial ecology	7
1.4	Welfare intensity of GDP and nature productivity	12
1.5	Decomposition of material flow-related total environmental pressure	18
1.6	Economy-wide material flows	27
2.1	A productivity increase by a factor of ten is possible	40
2.2	An illustration of material flows	46
2.3	Emergence of policies between governments and business	47
3.1	Materials cycle and possible policy levers	61
3.2	Extraction of raw materials, Denmark, 1989–99	66
3.3	Recycling rate for construction and demolition waste in Denmark compared to the waste tax rate	67
3.4	Development in use of renewable energies in Germany since the beginning of the 1990s	70
3.5	Dynamic development of wind energy in Germany since the beginning of the 1990s	74
3.6	Public spending (government aid) on renewable energies in 2000, by technology	76
3.7	Induced volume of investments in 2000, by technology	76
3.8	Development of additional costs for German consumers of electricity by reaching the aim of doubling power generation	77
3.9	The final product: energy services provided by interdependent markets	78
3.10	The Danish Electricity Savings Trust and its context	81
3.11	Energy demand for heating according to different heat protection standards (detached house)	85
3.12	Material flows of ELV	92
3.13	Materials in end-of-life vehicles	94
3.14	Treatment, recycling and re-use of vehicles in Germany	98
3.15	Outline of a return and dismantling system in Germany	101
3.16	The system of ELV regulation	102
4.1	Different phases for sustainable business development	118
4.2	Levels to reach SMEs	130

4.3	Comparison of the traditional and integrated model of supply chain management	132
4.4	Stepwise approach to integrated product chain management	133
4.5	An integrated approach for market analysis	146
4.6	Shares of household energy purposes	148
4.7	Actor influences on different housing indicators	149
4.8	Governmental initiatives and regulation unleashing market forces	150
4.9	Potential of future market volumes in Germany	158
4.10	Consumers' profiles concerning organic food in Germany	159
4.11	Development of eco-markets	162
5.1	German environmental economic accounting	169
5.2	Organization of data and process steps of the HEAT model	186

Tables

1.1	Types of material flow-related analysis	26
1.2	General accounting scheme for an economy-wide material flow balance with derived indicators	29
3.1	Waste taxes excluding sludge, 1996–98	65
3.2	Revenue from the waste tax and the tax on raw materials 1996–99	66
3.3	Comparison of efficiency of different models to support renewable energies in Europe	73
3.4	Comparison of the minimum demands defined in the current Heat Protection Regulation 1995 and the Energy Conservation Regulation 2002	85
3.5	Eco-efficiency strategies in the building sector	89
3.6	Number of end-of-life vehicles in Japan	93
3.7	Passenger cars' material ratio	95
4.1	Overview of corporate management tools	120
4.2	Green purchasing approaches	134
4.3	Energy carrier of household energy consumption (per cent)	152
4.4	Comparative analysis of wind energy usage in Germany, the USA and Japan	153
4.5	Market development and volume of organic food production in Germany	157
5.1	Overview on MFA activities in selected countries	166
5.2	Content of the biannual material and energy flow reports of the German Federal Statistical Office	170
5.3	General accounting scheme for an economy-wide material flow balance with derived indicators	173
5.4	Definition of typical houses and their share of floor space in West Germany, 1995	182
5.5	Characteristic building values	184
5.6	Building issues	188
5.7	Age of buildings in Japanese building stock	188

Boxes

1.1	Environmental space	5
1.2	The two generic eco-efficiency ratios	11
1.3	De-linking of GDP and some environmental indicators in Japan	13
1.4	ZERI methodology	15
1.5	Basic rules and limitations for a ‘cycling economy’	22
1.6	The level of industrial metabolism in industrialized economies, its development over time and the link with economic growth	33
1.7	Composition of TMR: domestic v. imported, hidden v. non-hidden	34
1.8	Major components of material inputs	35
1.9	Output flows of industrialized economies: composition of domestic processed output (DPO) to nature	36
1.10	Net additions to stock	37
2.1	Factor Four best practices: light-emitting diodes for general lighting	53
2.2	Factor Four best practices: circulating pumps for heating systems	54
2.3	Factor Four best practices: dirt-repellent surfaces with lotus effect	55
3.1	Concerning re-use and recovery (directive in article 7)	99
4.1	Low acceptance of certified EMS: some experiences	124
4.2	Transparency of cost structure	129
4.3	Factors hindering the progress towards sustainability	138
5.1	EU-wide database for indirect flows	175