Contents

Preface ................................................................................................................................. v
Contributors ....................................................................................................................... xv
List of Figures .................................................................................................................... xxi
List of Tables ..................................................................................................................... xxvii
List of Boxes ...................................................................................................................... xxxv

Part I Introduction

1 Industrial Ecology in the Age of Input-Output Analysis ......................... 3
   Reid Lifset

2 Input-Output Economics and Material Flows .............................................. 23
   Faye Duchin

3 Industrial Ecology and Input-Output Economics: A Brief History .......... 43
   Sangwon Suh and Shigemi Kagawa

Part II Material Flow Analysis

4 Conceptual Foundations and Applications of Physical Input-Output Tables ................................................................................................................. 61
   Stefan Giljum and Klaus Hubacek

5 Modelling Manufactured Capital Stocks and Material Flows in the Australian Stocks and Flows Framework ............................................ 77
   James A. Lennox and Graham M. Turner
6 An Input-Output Framework to Enhance Consistency in Hybrid Modeling ......................................................... 99
Susanne Kytzia

7 Physical Input-Output Analysis and Disposals to Nature............... 123
Erik Dietzenbacher, Stefan Giljum, Klaus Hubacek, and Sangwon Suh

8 Accounting and Modelling Global Resource Use ...................... 139
Stefan Giljum, Friedrich Hinterberger, Christian Lutz, and Bernd Meyer

9 Constructing Physical Input-Output Tables with Material Flow Analysis (MFA) Data: Bottom-Up Case Studies .......... 161
Ottilia De Marco, Giovanni Lagioia, Vera Amicarelli, and Antonella Sgaramella

10 Analysing the Economic Impacts of a Material Efficiency Strategy ............................................................... 189
Carsten Nathani

Part III  Life Cycle Assessment

11 A Comparison Between Conventional LCA and Hybrid EIO-LCA: Analyzing Crystal Giftware Contribution to Global Warming Potential .................................................. 219
Paulo Ferrão and Jorge Nhambiu

12 Application of the Sequential Interindustry Model (SIM) to Life Cycle Assessment .............................................. 231
Stephen H. Levine, Thomas P. Gloria, and Eliahu Romanoff

13 Life-Cycle Assessment (LCA) as a Management Tool: An Emphasis on Electricity Generation, Global Climate Change, and Sustainability ................................................. 247
Sergio Pacca

14 Methods in the Life Cycle Inventory of a Product ..................... 263
Sangwon Suh and Gjalt Huppes

Part IV  Sustainable Consumption

15 Principal Methodological Approaches to Studying Sustainable Consumption: Scenario Analysis, Ecological Footprints and Structural Decomposition Analysis .................. 285
Richard Wood and Manfred Lenzen
Contents

16 Global Environmental Impact of Dutch Private Consumption ............................................. 313
Durk Nijdam and Harry C. Wilting

Part V Policy Applications

17 A Hybrid IO Energy Model to Analyze CO2 Reduction Policies: A Case of Germany .................. 337
Stefan Vögele, Wilhelm Kuckshinrichs, and Peter Markewitz

18 Carbon Tax and its Short-Term Effects in Italy: An Evaluation Through the Input-Output Model ........ 357
Ignazio Mongelli, Giuseppe Tassielli, and Bruno Notarnicola

19 Comparing the Environmental Effects of Production and Consumption in a Region – A Tool for Policy .......... 379
Harry C. Wilting and Jan P.M. Ros

20 Prioritizing Within the Product-Oriented Environmental Policy – The Danish Perspectives .................. 397
Bo P. Weidema, Sangwon Suh, and Philippa Notten

21 Input-Output Equations Embedded Within Climate and Energy Policy Analysis Models .................. 417
Donald A. Hanson and John A. “Skip” Laitner

Part VI Energy and Climate Change

22 Application of the IO Methodology to the Energy and Environmental Analysis of a Regional Context ........ 435
Fulvio Ardent, Marco Beccali, and Maurizio Cellura

23 Thermodynamic Input-Output Analysis of Economic and Ecological Systems .......................... 459
Nandan U. Ukidwe, Jorge L. Hau, and Bhavik R. Bakshi

Kees Vringer, Kornelis Blok, and Barend van Engelenburg

25 Application of IO Energy Analysis for CO2 Emissions by the Portuguese Economy: The Case of Portugal ........ 507
Luís M.G. Cruz
<table>
<thead>
<tr>
<th>Chapter</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>26</td>
<td>Models for National CO₂ Accounting</td>
<td>533</td>
</tr>
<tr>
<td></td>
<td>Jesper Munksgaard, Jan Christoph Minx, Line Block Christoffersen, and Lise-Lotte Pade</td>
<td></td>
</tr>
<tr>
<td>Part VII</td>
<td>Waste Management</td>
<td></td>
</tr>
<tr>
<td>27</td>
<td>Waste Input-Output Analysis, LCA and LCC</td>
<td>561</td>
</tr>
<tr>
<td></td>
<td>Shinichiro Nakamura and Yasushi Kondo</td>
<td></td>
</tr>
<tr>
<td>28</td>
<td>Economy-Waste-Environment Input-Output Model: Effects of Portuguese Production and Consumption</td>
<td>573</td>
</tr>
<tr>
<td></td>
<td>Eduardo Barata</td>
<td></td>
</tr>
<tr>
<td>29</td>
<td>Environmental Household Accounts with Waste Discharge</td>
<td>603</td>
</tr>
<tr>
<td></td>
<td>Using the Waste Input-Output Table</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ayu Washizu and Koji Takase</td>
<td></td>
</tr>
<tr>
<td>Part VIII</td>
<td>National Accounts, Statistics and Databases</td>
<td></td>
</tr>
<tr>
<td>30</td>
<td>SEEA-2003 and the Economic Relevance of Physical Flow Accounting at Industry and National Economy Level</td>
<td>625</td>
</tr>
<tr>
<td></td>
<td>Ole Gravgård Pedersen and Mark de Haan</td>
<td></td>
</tr>
<tr>
<td>31</td>
<td>Environmental Input-Output Database Building in Japan</td>
<td>653</td>
</tr>
<tr>
<td></td>
<td>Keisuke Nansai</td>
<td></td>
</tr>
<tr>
<td>32</td>
<td>Developing the Sectoral Environmental Database for Input-Output Analysis: Comprehensive Environmental Data Archive of the U.S.</td>
<td>689</td>
</tr>
<tr>
<td></td>
<td>Sangwon Suh</td>
<td></td>
</tr>
<tr>
<td>Part IX</td>
<td>Advances in Modelling and Theory</td>
<td></td>
</tr>
<tr>
<td>33</td>
<td>Ecological Input-Output Analysis of Material Flows in Industrial Systems</td>
<td>715</td>
</tr>
<tr>
<td></td>
<td>Reid Bailey</td>
<td></td>
</tr>
<tr>
<td>34</td>
<td>Modelling Sustainability of the Austrian Economy with Input-Output Analysis</td>
<td>735</td>
</tr>
<tr>
<td></td>
<td>Andrea Stocker and Mikuláš Luptáčik</td>
<td></td>
</tr>
<tr>
<td>35</td>
<td>Multistage Process-Based Make-Use System</td>
<td>777</td>
</tr>
<tr>
<td></td>
<td>Shigemi Kagawa and Sangwon Suh</td>
<td></td>
</tr>
</tbody>
</table>
36 Input-Output Analysis and Linear Programming ............................. 801
Klaus-Ole Vogstad

37 Time Use and Sustainability: An Input-Output Approach
in Mixed Units ................................................................. 819
Jan Christoph Minx and Giovanni Baiocchi

38 The Application of Multi-regional Input-Output Analysis
to Industrial Ecology ....................................................... 847
Glen P. Peters and Edgar G. Hertwich

Author Index ................................................................. 865

Subject Index ............................................................... 875