

Contents

Jörg Böttcher

1 Introduction — 1

Part 1: Overview

Tibor Fischer

2 Investments and Regulation – What Needs to be Done Now: A Systemic Investment Policy for the Further Expansion of Renewable Energies — 13

Heinz-J. Bontrup

3 Socio-Economic Framework Conditions – The Macroeconomic Effects of the Energy Transition and the Resulting Political Challenges — 33

Jane O’Sullivan

4 Population – The Emissions Multiplier — 57

Jennifer Kowallik and Alexandra Oboda

5 A Road to Sustainability for Economy and Society — 99

Andreas Gabler

6 The Political Will – The European Path to a Sustainable Future — 125

Sebastian Helgenberger and Roman Buss

7 Social and Economic Co-Benefits on Our Way to Carbon-Free Societies and Economies — 171

Farid Mohamadi

8 CO₂ Reduction Measures in Colombia: Seizing Economic Reactivation Opportunities to Overcome Climate Change Challenges — 187

Kwesi Annan-Takyi

9 Ghana’s Example of De-Carbonization — 231

Part 2: Sector Specific Approach

Jelto Lange, Michael Schulthoff and Martin Kaltschmitt

10 Status of Renewable Energies and the Way Forward — 243

Oliver Opel, Jörg Böttcher, Darius Bonk, Jim Lukas Armbruster and
Marlies Wiegand

11 Heat Pumps — 281

Jörg Böttcher

12 Use of Geothermal Energy — 305

Attakan Janpidok

**13 Indonesia's Deep Geothermal Drilling Program:
Background and Experiences — 335**

Jens Kühne

14 Solar Thermal Systems Within a District Heating Concept — 361

Jochen Weilepp

**15 Levelized Cost of Electricity – Understanding the Concept and Setting the
Right Priorities — 377**

Jörg Böttcher

16 Project Finance – The Finance Method for Established Technologies — 397

Kathrin Langewald

**17 The Strategic Role of Green Hydrogen in Germany's International Energy
Policy: A South African Case Study — 429**

Thies Goldner, Christoph Torwegge, Felix Jaeger

**18 Supportive Systems in a Decarbonized World With Fluctuating Renewable
Resources: What Has to be Done? — 463**

Part 3: General Toolbox

Andreas Luczak

19 The Role of Hydrogen – Technology, Integration and Economics — 511

Nicolai Herrmann

**20 Pricing and Trading CO₂: Concepts, Assessment and Impacts on
Competition — 535**

Jasmine Ramsebner

21 The Concept of Sector Coupling: Where is the Business Model? — 555

Tomas Haug, Philipp Hiemann, Lorenz Wieshammer

22 Improvement of Grid Infrastructure — 607

Torsten Cziesla, Alexander Stuckenholtz, Jens Thorn

23 Digitalization and Climate Change – Business Models and Services — 641

Jan Lüken

24 Towards a Circular Economy – Business Rationale and Steps Forward — 673

Stefan Wenzel, Adrien Pagano, Clemens Weiß

25 Nuclear Power — 733

Part 4: Industry Specific Solutions

Jörg Böttcher

26 Market Failure and Consequences for the Financing of the Energy Transition — 763

Jörg Böttcher

27 Markets and Markets Behaviour – Some Practical Aspects — 783

List of Figures — 805

List of Tables — 811

List of Contributors — 813

Index — 821

