

# Contents

---

<i>Foreword</i>	ix
<i>Preface</i>	x
1 Sustainable development and climate change	1
Sustainable development	2
Scenarios	4
Sustainable-development scenarios	5
Audience and objectives	6
Structure of this book	7
2 Methodology	9
Why scenario analysis?	9
Building long-term E3 scenarios	10
3 Energy–economy–environment scenarios at IIASA-ECS	20
A comprehensive collection of energy–economy–environment scenarios	20
Exploring the ranges	21
IIASA's long-term E3 scenarios	24
Results of all three scenario sets	35
Analysis of mitigation scenarios	51
Analysis of sustainable-development scenarios	54
4 Technology clusters	82
Defining technology clusters	82
Technology kinship	85
Further examples of technology clusters	87
Identifying market success (MS) clusters	97
A comprehensive example of clusters and their relationships	106
5 A sustainable-development scenario in detail	109
Numerical assumptions for the two scenarios	110
Model results	126
Estimation of R&D expenditures plus policy implications	156

6 Summary and policy implications	160
Appendix MESSAGE: a technical model description <i>Manfred Strubegger, Gerhard Totschnig and Bing Zhu</i>	168
Introduction	168
Mathematical model description	179
MESSAGE-MACRO	209
The scenario generator (SG)	210
A brief summary of MESSAGE's applications	211
<i>Index</i>	215