7 Preface

10 Sustainability – Strategies for Action

Introduction by Felix Heisel and Dirk E. Hebel

20 The Clean Energy Transition in the Context of Sustainability

Introduction by Andreas Wagner

24 Digital Transformation

A Techno-optimistic Outlook Introduction by Moritz Dörstelmann

Better

28 Better – Efficiency as the Basis for a Successful Energy Transition

Introduction to Clean Energy Transition by Andreas Wagner

The Scale and Impact of the Clean Heating Transition

Reconciling Thermal Insulation, Renewable Energies and Social Justice

Commentary by Martin Pehnt

32 Heat Pumps – A Solution for the Transition from Fossil Fuels to Sustainable Heating Sources?

Article by Sebastian Herkel and Peter Schossig

36 Evaluating and Improving the Thermal Resilience of Residential Buildings

A Retrofit Strategy Using CityBES for Fresno, CA Case Study by Tianzhen Hong, Max Wei and Kaiyu Sun

46 Better – Digital Strategies for Reusing Building Materials

Introduction to Digital Transformation by Moritz Dörstelmann and Vincent Witt

49 Collaborative Digital Building

Commentary by Kathrin Dörfler

50 Parametric Design-to-Fabrication Platforms for Scaled Industrial Implementation

The Convergence of Technologies in Mass Timber Construction Article by Oliver David Krieg, Kristin Slavin and Oliver Lang

Less

58 Less – Refocusing on the Potential of Architecture

Introduction to Clean Energy Transition by Andreas Wagner

61 Sustainable Architecture in the Efficiency Trap?

Commentary by Thomas Auer

62 Controlled Natural Ventilation Systems for Non-residential Buildings

Case Study by Matthias Rudolph

70 Celebrating the Genius of Simplicity

The 2226 Concept by Baumschlager Eberle Architekten Article by Benjamin Weber and Andreas Wagner

75 Less – Digitally Customized Construction

Introduction to Digital Transformation by Moritz Dörstelmann

77 Building More with Less Material

Integrative Computational Design and Construction Commentary by Jan Knippers and Achim Menges



Different

80 Different – Rethinking System Boundaries for the Energy Transition

Introduction to Clean Energy Transition by Andreas Wagner

82 Greenhouse Gas Emissions – An Appropriate Target, Design and Assessment Parameter

Commentary by Thomas Lützkendorf and Alexander Passer

84 Occupant-centric Building Control

The Role of Occupants in Building Operation

Article by Matthias Berning

90 Climate-neutral Urban District Neue Weststadt, Esslingen

The P2G&H Concept – Green Hydrogen with Waste Heat Utilization

Case Study by M. Norbert Fisch

100 Advanced Super-cool Materials to Mitigate Urban Overheating

Article by Mattheos Santamouris and Konstantina Vasilakopoulou

107 Different – Innovation Fast Forward

Introduction to Digital Transformation by Moritz Dörstelmann and Erik Zanetti

109 A Different Architectural Practice

Circular Design, Fabrication and Living with Biogenic and Reclaimed Materials

Commentary by Martin Tamke and Mette Ramsgaard Thomsen

110 Digital Craft and Circular Construction

Article by Daniel Fischer, Erik Zanetti and Moritz Dörstelmann

116 The Reuse Potential of Steel Profiles for Hybrid Multi-storey Construction

Article by Hilke Manot and Julian Lienhard

124 Designing with Matter as Met

Article by Oliver Tessmann, Max Benjamin Eschenbach, Christoph Kuhn and Anne-Kristin Wagner

132 Architecture in Large Quantities

Article by Gilles Retsin

Better + Less + Different

142 Circular Construction Over Again

The RoofKIT Project at
Solar Decathlon Europe 21/22 –
An Example of a Holistic Approach
to Sustainability
Case Study by Elena Boerman,
Dirk E. Hebel, Felix Heisel and
Andreas Wagner

158 Acknowledgements

158 About the Authors

162 Illustration Credits

163 Index of Persons

164 Index of Firms, Institutions and Initiatives

165 Index of Projects, Products and Publications

167 Colophon