

Chapter 17

Introduction to Part III: Application of LCA in Practice

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Abstract While Part II of this book presents the theoretical foundation and methodology of LCA, Part III is dedicated to a comprehensive discussion of how this methodology has been adapted and applied in practice. The chapters of Part III provide an easily readable and accessible introduction to different fields of LCA application with their specific decision situations, user competences and stakeholder needs, and associated methodological challenges and adaptations.

While Part II of this book presents the theoretical foundation and methodology of LCA, Part III is dedicated to a comprehensive discussion of how this methodology has been adapted and applied in practice. The chapters of Part III provide an easily readable and accessible introduction to different fields of LCA application with their specific decision situations, user competences and stakeholder needs, and associated methodological challenges and adaptations. Chapters 18–25 deal with the role of LCA and life cycle thinking in various decision contexts and discuss the methodological adaptations for specific uses of LCA, such as policy support, organisational LCA, life cycle management, ecodesign, and ecolabelling and differences and synergies between LCA and the Cradle-to-Cradle concept and certification system:

18. Life Cycle Thinking and the use of LCA in policies around the world
19. Globalisation and mainstreaming of LCA
20. Organisational LCA
21. Future-oriented LCA
22. Life Cycle Management
23. Ecodesign implementation and LCA
24. Environmental labels and declarations
25. Cradle to cradle and LCA

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The remaining chapters of Part III are all dedicated to the application of more ‘classic’ LCA to different technology domains comprising both some of the central sectors of society and some of the more specialised fields to give an introduction to the broad practical use of LCA in the assessment of products and technologies:

26. LCA of energy systems
27. LCA of electromobility
28. LCA of buildings and the built environment
29. LCA of food and agriculture
30. LCA of biofuels and biomaterials
31. LCA of chemicals and chemical products
32. LCA of nanomaterials
33. LCA of drinking water supply
34. LCA of wastewater treatment
35. LCA of solid waste management systems
36. LCA of remediation of soil and groundwater

Chapters 18–25 all have their individual structure and different learning objectives as stated in the beginning of each chapter, reflecting the diversity of the subjects that they cover. In contrast, Chaps. 26–36 on the use of LCA in different technology domains have a more harmonised structure covering the following aspects:

- **Introduction**, providing the context and a description of the sector or technology, a brief history of LCA application in this area, definitions of specific terminology relevant for the concerned application (e.g. first- and second-generation biofuels), and the main questions relative to the environment that LCA is used to answer (e.g. is organic agriculture better than intensive or extensive agriculture?).
 - **Literature review**, giving an overview over a selection of published case studies and essential further reading material focusing on
 - the main life cycle stages, drivers, and processes contributing to potential environmental impacts, and
 - what the main impacts are, including potential burden-shifting.
- **Specific methodological issues**, discussing what the literature survey has identified as the main methodological considerations and challenges when applying LCA to this technology field, structured into:
 - General issues (not specific to any of the following four methodological phases)
 - Goal and scope
 - Inventory and product system modelling
 - Impact Assessment
 - Interpretation.

- **Conclusions** of LCA studies for this sector/technology, summarising the main findings of LCA studies related to the respective technology field in terms of:
 - Main tendencies and shared conclusions among essential literature
 - Controversial conclusions among essential literature
 - Recent advances and achievements as well as remaining limitations
 - Perspectives and further research needs, i.e. the most important current methodological shortcomings for this technology/sector.

The learning objectives of the chapters on the use of LCA in different technology fields are also the same across all chapters and are thus presented only once, in the following. After studying one of the Chapters from 26 to 36, the reader should have acquired the following capabilities for the respective technology domain:

- Discuss the role, relevance and state of the art of LCA in the respective technology domain.
- Use the technology domain-specific terminology and definitions correctly.
- Explain the key methodological issues, challenges, limitations and good practice of applying LCA within the technology field and their implications for the results of an LCA.
- Contrast major environmental concerns and challenges related to the respective technology and its environmental performance against its benefits.
- Outline the main factors and hot spots influencing the environmental performance of a technology.
- Be aware of the main literature available for a technological application domain of LCA including its common findings as well as contrasted differences in conclusions drawn.

Enjoy the reading!