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Gustav Sandin
Greg M. Peters
Magdalena Svanström

Life Cycle Assessment of Forest Products

Challenges and Solutions

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Under the editorship of Patrick Navard and a panel of experts, the series will include contributions from many of the world's most authoritative biobased polymer scientists and professionals. Readers will gain an understanding of how given biobased polymers are made and what they can be used for. They will also be able to widen their knowledge and find new opportunities due to the multidisciplinary contributions.

This series is aimed at advanced undergraduates, academic and industrial researchers and professionals studying or using biobased polymers. Each brief will bear a general introduction enabling any reader to understand its topic.

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Magdalena Svanström

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Gustav Sandin
SP Sustainable Built Environment
SP Technical Research Institute of Sweden
Gothenburg
Sweden

Magdalena Svanström
Chemistry and Chemical Engineering
Chalmers University of Technology
Gothenburg
Sweden

Greg M. Peters
Chemistry and Chemical Engineering
Chalmers University of Technology
Gothenburg
Sweden

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Preface

Reducing environmental degradation and our dependency of finite resources are important motivations for developing a more bio-based society. In such a society, the most abundant renewable resource on the planet—forest biomass—will play a much more prominent role than in our current fossil-based society. To guide this transformation and obtain the potential environmental benefits of a more bio-based society, there is a need for high-quality, context-adapted environmental assessments.

Different types of environmental assessments are needed for decision-making concerned with different types of entities: sites, products, organisations, industry sectors, regions, nations, etc. For studies of products and services, life cycle assessment (LCA) is the most commonly used assessment tool worldwide. LCA is capable of assessing a wide range of environmental impacts over the entire life cycle of products and services, from resource[1] extraction (the "cradle"), via production, transportation and use, to waste management (the "grave").

Although there is an array of useful consensus documents guiding the LCA practitioner—the 14040/14044 International Organization for Standardization's (ISO) standard, the EN 16760 standard, the international reference life cycle data system (ILCD) handbook, the product environmental footprint (PEF) guide, to name a few—it can be rather challenging to carry out an LCA. Key challenges include the modelling of the product system and its interaction with the environment, the translation of emissions and resource use into quantified environmental impacts, and the interpretation and use of the results in various contexts. For example, how should one allocate environmental impacts between the many outputs of a biorefinery? How can one assess the climate, biodiversity, and water cycle impacts of forestry operations? How can one get the most out of LCA in research

[1]Resource acquisition is sometimes called raw material acquisition, but according to the European standard EN 16760:2015, it is important to distinguish between resources and raw materials in LCA studies involving biomass. Resources are flows without previous human transformation entering the system, whereas raw materials are intermediary flows within the product system (Swedish Standards Institute (SIS) 2015).

and development projects? What do LCA results say in relation to the global challenges, for example, as expressed by the planetary boundaries?

The purpose of this book, belonging to the series "SpringerBriefs in Biobased Polymers", is to provide an introduction to some of the key challenges of carrying out LCAs of forest products and to suggest some means for handling them. The book can function as a gateway into the literature on LCA of forest products, as it is rich with reference to technical reports and scientific papers. The book is written primarily for LCA practitioners with some previous experience of LCA work, but also less experienced LCA practitioners and others interested in environmental aspects of forests products—such as decision makers confronted with LCA results—can hopefully find it interesting and useful.

As part of the first author's doctoral studies, some of the work presented in this book has previously been published in Sandin (2013, 2015). Figures, tables, and text in these publications might therefore be fully or partly reproduced in the present book.

Gothenburg, Sweden

Gustav Sandin
Greg M. Peters
Magdalena Svanström

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