Life Cycle Assessment Carbon Footprint In Leather Processing

The book presents an overview of the International practices and state-of-the-art of LCA studies in the agri-food sector, both in terms of adopted methodologies and application to particular products; the final purpose is to characterise and put order within the methodological issues connected to some important agri-food products (wine, olive oil, cereals and derived products, meat and fruit) and also defining practical guidelines for the implementation of LCAs in this particular sector. The first chapter entails an overview of the application of LCA to the food sector, the role of the different actors of the food supply chain and the methodological issues at a general level. The other chapters, each with a particular reference to the main foods of the five sectors under study, have a common structure which entails the review of LCA case studies of such agri-food products, the methodological issues, the ways with which they have been faced and the suggestion of practical guidelines.

This book focuses on environmental footprints that have attracted considerable interest and discussion within academia, policy makers and the public as a tool to assess anthropogenic effects on the environment. It begins with an overview which provides a starting point for understanding the concept of environmental footprints. On the basis of a thorough investigation into the theoretical and methodological aspects of selected environmental footprints that have been widely adopted, a unified framework for structuring, categorizing and integrating various footprint indicators is established. Furthermore, the book brings clarity to the relationship between footprint analysis and life cycle assessment, and challenges the isolation of environmental footprints and planetary boundaries. The findings provide novel insights into the development of environmental footprints for environmental impact assessment and environmental sustainability assessment.

Environmental Life Cycle Assessment is a pivotal guide to identifying environmental problems and reducing related impacts for companies and organizations in need of life cycle assessment (LCA). LCA, a unique sustainability tool, provides a framework that addresses a growing demand for practical technological solutions. Detailing each phase of the LCA methodology, this textbook covers the historical development of LCA, presents the general principles and characteristics of LCA, and outlines the corresponding standards for good practice determined by the International Organization for Standardization. It also explains how to identify the critical aspects of an LCA, provides detailed examples of LCA analysis and applications, and includes illustrated problems and solutions with concrete examples from water management, electronics, packaging, automotive, and other industries. In addition, readers will learn how to: Use consistent criteria to realize and evaluate an LCA independently of individual interests Understand the LCA methodology and become familiar with existing databases and methods based on the latest results of international research Analyze and critique a completed LCA Apply LCA methodology to simple case studies Geared toward graduate and undergraduate students studying environmental science

and industrial ecology, as well as practicing environmental engineers, and sustainability professionals who want to teach themselves LCA good practices, Environmental Life Cycle Assessment demonstrates how to conduct environmental assessments for products throughout their life cycles. It presents existing methods and recent developments in the growing field of LCA and systematically covers goal and system definition, life cycle inventory, life cycle impact assessment, and interpretation. 26 Circular economy and regional implications -- 27 Life cycle management for regional development in France: Example of building sector -- 28 From product LCAs to territorial LCAs: Methodological principles -- 29 Integrated life cycle and risk assessment of human health impacts in Catalonia -- 30 LCA application in regional waste management in Chile -- 31 Water footprint assessment at the regional level -- 32 Carbon footprint of biofuels -- 33 Sustainable procurement based on life cycle costing -- 34 Sustainability performance in industrial parks -- 35 Sustainable redevelopment of degraded land and landscapes -- Part V: Integrated use of life cycle approaches in key economic sectors -- 36 Sustainable agri-food chains and LCA -- 37 Integration of LCA, LCC, and SLCA methods for assessing a bioeconomy region -- 38 Responsible mining - from a life cycle to a stewardship approach -- 39 Trends and considerations of renewable energy development: A regional perspective -- 40 Closing the loop: The example of packaging -- 41 Life cycle aspects of the Walloon wood sector -- 42 Global warming assessment of Himalayan buildings -- 43 Integrated waste management and resource recovery in India -- 44 Biodiversity restoration and sustainable tourism in south-western Australia -- Part VI: Life cycle perspectives for regional socio-economic development -- 45 Synthesis - life cycle approaches and perspectives for sustainable regional development -- Index

Assessing the Environmental Impact of Textiles and the Clothing Supply Chain

Sustainability Metrics and Indicators of Environmental Impact

The Carbon Footprint Handbook

A Critical Review of Applications and Implications

Towards a Sustainable Future - Life Cycle Management

Handbook of Life Cycle Assessment (LCA) of Textiles and Clothing

Land and wood products, among others, represent temporary carbon sinks. Since the embodied carbon is retained outside the atmosphere for a period of time, some radiative forcing is postponed. Carbon removal from the atmosphere and storage in the biosphere or anthroposphere, therefore, may have the potential to help mitigate climate change. Life cycle assessment and carbon footprinting are increasingly popular tools for the environmental assessment of products that take into account their entire life cycle. A robust method is required to account for the benefits, if any, of temporary carbon storage for use in the environmental assessment of products. Despite significant efforts to develop robust methods to account for temporary carbon storage, there is still no consensus on how to consider it. This workshop brought together experts on climate change, carbon footprinting and life cycle assessment to review available options and to discuss the most appropriate

method for accounting for the potential benefits of temporary carbon storage. The workshop continued the work developed under the International Reference Life Cycle Data System (ILCD), which provides methodological recommendations for use in business and policy for assessing the environmental impacts of goods and services, taking into account their full life cycle. This report is a summary of the presentations and discussions held during this workshop.

In the quest to mitigate the buildup of greenhouse gases in Earth's atmosphere, researchers and policymakers have increasingly turned their attention to techniques for capturing greenhouse gases such as carbon dioxide and methane, either from the locations where they are emitted or directly from the atmosphere. Once captured, these gases can be stored or put to use. While both carbon storage and carbon utilization have costs, utilization offers the opportunity to recover some of the cost and even generate economic value. While current carbon utilization projects operate at a relatively small scale, some estimates suggest the market for waste carbon-derived products could grow to hundreds of billions of dollars within a few decades, utilizing several thousand teragrams of waste carbon gases per year. Gaseous Carbon Waste Streams Utilization: Status and Research Needs assesses research and development needs relevant to understanding and improving the commercial viability of waste carbon utilization technologies and defines a research agenda to address key challenges. The report is intended to help inform decision making surrounding the development and deployment of waste carbon utilization technologies under a variety of circumstances, whether motivated by a goal to improve processes for making carbon-based products, to generate revenue, or to achieve environmental goals.

This student version of the popular bestseller, Life Cycle Assessment Handbook, is not a watered-down version of the original, but retains all of the important information and valuable lessons provided in the first book, along with helpful problems and solutions for the student learning about Life Cycle Assessment (LCA). As the last several decades have seen a dramatic rise in the application of LCA in decision making, the interest in the life cycle concept as an environmental management and sustainability tool continues to grow. The LCA Student Handbook offers a look at the role that life cycle information, in the hands of companies, governments and consumers, may have in improving the environmental performance of products and technologies. It concisely and clearly presents the various aspects of LCA in order to help the reader better understand the subject. The international success of the sustainability paradigm needs the participation of many stakeholders, including citizens, corporations, academia, and NGOs. The handbook links LCA and responsible decision making and how the life cycle concept is a critical element in environmental sustainability. It covers issues

such as building capacity in developing countries and emerging economies so that they are more capable of harnessing the potential in LCA for sustainable development. Governments play a very important role with the leverage they have through procurement, regulation, international treaties, tax incentives, public outreach, and other policy tools. This compilation of points to the clear trend for incorporating life cycle information into the design and development processes for products and policies, just as quality and safety concerns are now addressed throughout product design and development. The Life Cycle Assessment Student Handbook is not just for students. It is also a valuable resource for practitioners looking for a desktop reference on LCA or for any engineer, manager, or policy-maker wishing to learn about LCA.

Thorough and detailed, The Carbon Footprint Handbook encompasses all areas of carbon footprint, including the scientific elements, methodological and technological aspects, standards, industrial case studies, and communication of carbon footprint results. Written and edited by an international group of experts, the far-ranging topics on carbon footprinting are divided into three sections comprising chapters focused on methodology, modeling, and case studies. The concepts of carbon footprint and climate change are no longer new to the world. As a result, there is increasing interest in quantifying and reducing the carbon footprint around the world, from industrial to individual levels. This book describes modeling aspects and calculations of carbon footprint in organizations and production. It emphasizes the importance of locating non-polluting energy sources as well as sustainability. The book also provides case studies offering a wealth of information on practices and methods in detecting and addressing carbon footprint. The Carbon Footprint Handbook is an important reference that discusses, in depth, the essential details of carbon footprint assessment. It uses research and case studies on methods and practices from locations around the world including China, India, Spain, and Latin America. It demonstrates that the problems of carbon footprint are indeed worldwide while showing how they can be addressed in myriad areas of life, from industrial to personal action.

A Guide to Best Practice

Life Cycle Assessment and Water Management-related Issues

Life Cycle Assessment Student Handbook

Theory and Practice

Municipal Solid Waste Management, Sustainable Road Transport and Carbon Sequestration

Life Cycle Assessment in the Agri-food Sector

Growing concern about climate change and human impact on the environment have resulted in an increase in interest for evaluating the environmental impact of products and services we consume. Life cycle assessment (LCA) has become the most prominent method for

environmental evaluation. Life cycle assessment is the quantification of the environmental impacts of a product or service through its whole life cycle, from the extraction of materials to manufacturing and end of life. A carbon footprint is a subset of an LCA. LCAs are required as part of government regulations, used by companies to identify high resource use in their supply chain or to choose between product designs and by consumers to choose between alternative product choices. LCAs provide valuable information; however, they are resource intensive, time consuming and uncertain. Therefore, a methodology that addresses all these issues is needed. This study addresses the following question: Can LCAs be streamlined while still providing useful information? To answer this, an under-specification, probabilistic screening methodology is employed. The screening methodology uses a high level assessment of the footprint, incorporates uncertainty in the inputs, and refines data around the primary drivers of impact. The streamlined LCA procedure is extended to include a Sobol based sensitivity analysis methodology for identifying high impact activities. The effects of partial perfect information in subsequent data acquisition activities on the streamlining methodology are examined. Metrics to determine sufficiency in the data gathering procedure and to determine whether decision makers can sufficiently distinguish between two products or design alternatives are developed. A procedure to quantify the cost of additional information is developed. Finally, an exploration of the scenario space of the impacts is analyzed. The extended streamlined methodology is applied to a case study on tablets, with a focus on integrated circuits. This thesis finds that the streamlined, probabilistic methodology can be used to cost-effectively evaluate the environmental impact of products while still taking uncertainty into account. Metrics to determine sufficiency can be effectively used, and the presence of partial information does not limit the usefulness of the metrics. Furthermore, quantifying the cost of additional information can help determine sufficiency in data collection efforts and can help understand the challenges that companies face when performing an LCA.

It is universally recognised that, globally, the tourism industry is a noticeable contributor to the carbon footprint. The magnitudes of the greenhouse gas (GHG) emissions from specific tourism products and services at local levels are less established and large variations in estimates exist. Diversity of the tourism sector, constraints in data procurement and under-development of methods for tourism carbon impact appraisal are the primary reasons. These hinder accurate evaluations and hamper development of reliable carbon performance indicators, thus making direct comparisons between tourism products and services difficult. The issue of the 'indirect' carbon impacts, additional carbon requirements from the nonuse phases of a product or service life cycle, which can be further magnified by the supply chain, is of special concern. These carbon footprints have never been comprehensively assessed in tourism, especially at the level of specific products and services. The evidence from the non-

tourism literature suggests that the 'indirect' carbon impacts from tourism-related activities can be high, thus calling for more indepth research on this issue. The aim of this study is to contribute to the development of reliable carbon footprint assessment methodologies in tourism. It proposes an approach for more holistic estimates of GHG emissions from tourism products and services and appraises the Life Cycle Assessment (LCA) method whose merit in estimating the 'indirect' carbon impacts is broadly recognised. The evidence of the application of LCA in tourism is limited. To test the viability of a new technique in the tourism context, the study employs a case study approach and applies a simplified derivative of LCA, Life Cycle Energy Analysis (LCEA), to assess the carbon footprint from a popular tourism product, a holiday package tour. LCEA is compared against existing methodological alternatives for estimating carbon footprints from holiday travel. This is to understand strengths and weaknesses in the LCA (LCEA) approach, to critically evaluate the new technique compared to the alternatives, and to identify the most accurate and cost-effective method for holistic assessment. The assessment results demonstrate the importance of the 'indirect' GHG emissions in tourism. The findings also show that, despite the new outlook it brings to tourism carbon footprint appraisal, LCEA cannot effectively capture the full range of carbon impacts. This is because a number of methodological inconsistencies affect the accuracy of estimates. As limitations are also typical for the more established methodological alternatives, a new, hybrid LCEA-related assessment approach is developed. It is argued that this hybrid method can address the identified methodological shortcomings, thus representing currently the most rigorous technique for carbon impact appraisal in tourism. This study does more than reinforcing the methodological base for tourism carbon footprint assessment by developing a new method. It provides recommendations on how to improve the general quality and enhance the reliability of LCA (LCEA) for application in other industries where it has a long-standing tradition of use. Directions are also proposed on how to refine collection of the input data for carbon footprint assessment in tourism, in order to obtain more accurate results and reduce uncertainty in estimates. Last but not least, suggestions are made on how to integrate more carbon-effective practices in the design of specific tourism products and services.

This first hands-on guide to ISO-compliant Life Cycle Assessment (LCA) makes this powerful tool immediately accessible to both professionals and students. Following a general introduction on the philosophy and purpose of LCA, the reader is taken through all the stages of a complete LCA analysis, with each step exemplified by real-life data from a major LCA project on beverage packaging. Measures as carbon and water footprint, based on the most recent international standards and definitions, are addressed. Written by two pioneers of LCA, this practical volume is targeted at first-time LCA users but equally makes a much-valued reference for more experienced practitioners. From the content: * Goal and Scope

Definition * Life Cycle Inventory Analysis * Life Cycle Impact Assessment * Interpretation, Reporting and Critical Review * From LCA to Sustainability Assessment and more.

Environmental Life Cycle Assessment (ELCA) that was developed about three decades ago demands a broadening of its scope to include lifecycle costing and social aspects of life cycle assessment as well, drawing on the three-pillar or 'triple bottom line' model of sustainability, which is the result of the development of the Life Cycle Sustainability Assessment (LCSA). LCSA refers to the evaluation of all environmental, social and economic negative impacts and benefits in decision-making processes towards more sustainable products throughout their life cycle. Combination of environmental and social life cycle assessments along with life cycle costing leads to life cycle sustainability assessment (LCSA). This book highlights various aspects of life cycle sustainability assessment (LCSA).

A Case Study on Tablets

Life Cycle Assessment

Challenges and Prospects

Status and Research Needs

Rural-Urban Comparison

Proceedings of the Symposium on Life-Cycle Assessment of Pavements (Pavement LCA 2017), April 12-13, 2017, Champaign, Illinois, USA

The negative impacts of carbon emissions from human activities continue to dramatically reshape the environmental, political, and social landscape. These impacts coupled with cap and trade schemes iterate the importance and need to properly measure and reduce greenhouse gas emissions. Carbon Footprint Analysis: Concepts, Methods, Implementation, and Case Studies provides up-to-date technical information and practical guidance on measuring and reducing energy and GHG emissions. Presenting a comprehensive framework for carbon management, this book: Provides definitions, concepts, benefits, and background information regarding carbon footprint analyses Discusses the GHG accounting methods Outlines the general systems framework for conducting an audit Features four case studies in higher education, service, and manufacturing organizations The book includes detailed discussions of the concepts and explains how the different concepts fit together. It supplies the necessary background as well as systematic tools and procedures for organizations to measure and reduce their carbon footprints and begin to adapt to a carbon-constrained world.

The textile industry impacts the environment in a number of ways, including its use of resources, its impact on global warming, and the amount of pollution and waste it generates. Assessing the Environmental Impact of Textiles and the Clothing Supply Chain reviews methods used to calculate this environmental impact, including product carbon footprints

(PCFs), ecological footprints (EFs), and life cycle assessment (LCA). The first chapters provide an introduction to the textile supply chain and its environmental impact, and an overview of the methods used to measure this impact. The book goes on to consider different environmental impacts of the industry, including greenhouse gas emissions, the water and energy footprints of the industry, and depletion of resources, as well as the use of LCA to assess the overall environmental impact of the textile industry. It then deals with the practice of measuring these impacts before forming a conclusion about the environmental impact of the industry. Assessing the Environmental Impact of Textiles and the Clothing Supply Chain provides a standard reference for R&D managers in the textile industry and academic researchers in textile science. Reviews the main methods used to calculate the textile industry's use of resources, its impact on global warming and the pollution and waste it generates Reviews the key methods, their principles and how they can be applied in practice to measure and reduce the environmental impact of textile products Includes the following calculation methods: product carbon footprints (PCFs), ecological footprints (EFs) and life cycle assessment (LCA)

This open access book includes a selection of contributions from the Life Cycle Management 2019 Conference (LCM) held in Poznań, Poland, and presents different examples of scientific and practical contributions, showing an incorporation of life cycle approach into the decision processes on strategic and operational level. Special attention is drawn to applications of LCM to target, organize, analyze and manage product-related information and activities towards continuous improvement, along the different products life cycle. The selection of case studies presents LCM as a business management approach that can be used by all types of businesses and organizations in order to improve their sustainability performance. This book provides a cross-sectoral, current picture of LCM issues. The structure of the book is based on five-theme lines. The themes represent different objects that are focused on sustainability and LCM practices mainly related to: products, technologies, organizations, markets and policy issues as well as methodological solutions. The book brings together presentations from the world of science and the world of enterprises as well as institutions supporting economic development.

This book comprises recent developments in life cycle assessment (LCA) both with regards to the methodology and its application in various research fields, including mobility, engineering and manufacturing. Containing numerous original research articles from leading German research institutes, the book provides an

insightful resource for professionals working in the field of sustainability assessment, for researchers interested in the current state of LCA research as well as for advanced university students in different scientific and engineering fields.

Life-Cycle Assessment

Challenges and Solutions

Environmental Footprints

Industrial and Agricultural Life Cycle Assessment

Assessing Temporary Carbon Storage in Life Cycle Assessment and Carbon Footprint

Life Cycle Assessment (LCA)

Global warming and its effects are felt and understood by almost every one across the globe now. Carbon footprint calculation and mitigation in different industrial sectors is the need of the hour. There are numerous industrial sectors, whose carbon footprints need to be calculated and the ways to mitigate the greenhouse gas emissions from those sectors need to be started with immediate effect. This book highlights case studies involving the carbon footprints of municipal solid waste, sustainable road transport and Carbon footprint accounting of sources and sinks by studying carbon sequestration of Karnataka, a state in India.

Carbon footprints are spreading through society like rings in the water. The term carbon footprint should only be used for analysis of carbon emissions. In this approach, things are kept simple, and a carbon footprint is calculated through online. This paper will illustrate the carbon footprint, by studying two samples of different urban and rural structure related lifestyles in Bangladesh. Actually, substantially more carbon emissions seem to be caused on a per capita level in cities than in rural areas. The method of the study is a consumption-based life cycle assessment of carbon emissions. In more detail, a life cycle assessment (LCA) model, that is comprehensive in providing a full inventory and can accommodate process data, is utilized.

This report serves as a guide for the project team to define and model the structural system within the reference building design as required by green building standards and rating systems.

Sustainability Metrics and Indicators of Environmental Impact: Industrial and Agricultural Life Cycle Assessment covers trending topics on the environmental impact of systems of production, putting emphasis on lifecycle assessment (LCA). This methodology is one of the most important tools of analysis, as mathematical models are applied that will quantify the systematic inputs and outputs of the processes in order to evaluate the sustainability of industrial processes and products. In this sense, LCA is mainly a tool to support environmental decision-making that analyzes the environmental impacts of products and technologies from a lifecycle perspective. The emergence of ever-larger global issues, such as the energy dilemma, the changing climate and the scarcity of natural resources, such as water, has boosted the search for tools capable of ensuring the reliability of the results published by the industries, and has become an important tool in order to achieve sustainability and

environmental preservation. Thus, lifecycle assessment (LCA), including carbon footprint valuation is necessary to ensure better internal management. Provides guidance on environmental impacts and the carbon footprint of industrial processes Features guidelines in lifecycle assessment to support a sustainable approach, along with quantifiable data to support proposed solutions Includes a companion website with slides and graphics to quantity environmental impact and other metrics of lifecycle assessment

Special Types of Life Cycle Assessment

Environmental Life Cycle Assessment (Open Access)

Life Cycle Approaches to Sustainable Regional Development

Carbon Footprint Case Studies

Gaseous Carbon Waste Streams Utilization

Life Cycle Assessment of Forest Products

This book describes the importance of the goal and scope phase for the entire LCA study. In this first phase of the LCA framework (ISO standardized), the purpose of the assessment is defined and decisions are made about the details of the industrial system being studied and how the study will be conducted. Selecting impact categories, category indicators, characterization models, and peer review is decided during goal and scope definition. The book provides practical guidance and an overview of LCIA methods available in LCA software. Although not specified in the ISO standards, Attributional LCA and Consequential LCA are presented in order to appropriately determine the goal and scope of an assessment. The book closes with the interconnection between goal and scope definition and the interpretation phase. Example goal and scope documents for attributional and consequential LCAs are provided in the annexes.

Life cycle assessment (LCA) is used to evaluate the environmental impacts of textile products, from raw material extraction, through fibre processing, textile manufacture, distribution and use, to disposal or recycling. LCA is an important tool for the research and development process, product and process design, and labelling of textiles and clothing. Handbook of Life Cycle Assessment (LCA) of Textiles and Clothing systematically covers the LCA process with comprehensive examples and case studies. Part one of the book covers key indicators and processes in LCA, from carbon and ecological footprints to disposal, re-use and recycling. Part two then discusses a broad range of LCA applications in the textiles and clothing industry. Covers the LCA process and its key indicators, including carbon and ecological footprints, disposal, re-use and recycling Examines the key developments of LCA in the textile and clothing industries Provides a wide range of case studies and examples of LCA applications in the textile and clothing industries This book is published under a CC BY-NC 4.0 license. The editors present essential methods and tools to support a holistic approach to the challenge of system upgrades and innovation in the context of high-value products and services. The approach presented here is based on three main pillars: an adaptation mechanism based on a broad understanding of system dependencies; efficient use of system knowledge through involvement of actors throughout the process; and technological

solutions to enable efficient actor communication and information handling. The book provides readers with a better understanding of the factors that influence decisions, and put forward solutions to facilitate the rapid adaptation to changes in the business environment and customer needs through intelligent upgrade interventions. Further, it examines a number of sample cases from various contexts including car manufacturing, utilities, shipping and the furniture industry. The book offers a valuable resource for both academics and practitioners interested in the upgrading of capital-intensive products and services. "The work performed in the project "Use-It-Wisely (UiW)" significantly contributes towards a collaborative way of working. Moreover, it offers comprehensive system modelling to identify business opportunities and develop technical solutions within industrial value networks. The developed UiW-framework fills a void and offers a great opportunity. The naval construction sector of small passenger vessels, for instance, is one industry that can benefit." Nikitas Nikitakos, Professor at University of the Aegean, Department of Shipping, Trade, and Transport, Greece. "Long-life assets are crucial for both the future competiveness and sustainability of society. Make wrong choices now and you are locked into a wrong system for a long time. Make the right choices now and society can prosper. This book gives important information about how manufacturers can make right choices." Arnold Tukker, Scientific director, Institute of Environmental Sciences (CML), Leiden University, and senior scientist, TNO.

This book discusses the concepts, methods and case studies pertaining to Life Cycle Assessment (LCA) based Carbon Footprint Assessment. It covers chapters on Carbon Footprint Assessment with LCA methodology & case studies on carbon footprint calculation following the LCA approach on power plants in India, Impacts of Vehicle Incidents On CO2 Emissions and school buildings in India.

Whole Building Life Cycle Assessment

Guide to PAS 2050. How to Assess the Carbon Footprint of Goods and Services

Life Cycle Assessment (LCA) and Life Cycle Analysis in Tourism

Assessment of Carbon Footprint in Different Industrial Sectors, Volume 1

Individual Carbon Footprint

From Technology Adaptation to Upgrading the Business Model

Life Cycle Assessment is a scientific methodology to assess the environmental impact of a product, system or service along its life-cycle. This starts with the extraction of raw materials; follows with the manufacturing, distribution and use stages; and ends with the treatment of waste or byproducts. All this information allows us to avoid transfer of burdens between life cycle stages, geographical regions or environmental impact categories. For example, reducing the amount of material to manufacture a product (i.e. a washing machine, a car or a wastewater treatment plant) while not increasing energy consumption during its use or consumption.\nIn September 2012, from the 3rd to the 7th, the Laboratory of Environmental and Chemical Engineering (LEQUIA) and the Institute of the Environment of the University of Girona organized the 12th International Summer School for the Environment (ISSE) focused on

"Life Cycle Assessment and Water issues". It was framed within the European project Ecotech-Sudoe (www.ecotechsudoe.eu). Following the Lisbon Strategy, the research project Ecotech-Sudoe aims to merge sustainability and competitiveness. Ecotechnologies are powerful tools to achieve this, while providing the same level of service but with lower environmental and social impacts. They are based on emerging and promising research areas, such as social and environmental LCA (Life Cycle Analysis), ecodesign, and industrial and territorial ecology. \n\n\n This book provides insight into the Life Cycle Management (LCM) concept and the progress in its implementation. LCM is a management concept applied in industrial and service sectors to improve products and services, while enhancing the overall sustainability performance of business and its value chains. In this regard, LCM is an opportunity to differentiate through sustainability performance on the market place, working with all departments of a company such as research and development, procurement and marketing, and to enhance the collaboration with stakeholders along a company's value chain. LCM is used beyond short-term business success and aims at long-term achievements by minimizing environmental and socio-economic burden, while maximizing economic and social value.

This book is a uniquely pedagogical while still comprehensive state-of-the-art description of LCA-methodology and its broad range of applications. The five parts of the book conveniently provide: I) the history and context of Life Cycle Assessment (LCA) with its central role as quantitative and scientifically-based tool supporting society's transitioning towards a sustainable economy; II) all there is to know about LCA methodology illustrated by a red-thread example which evolves as the reader advances; III) a wealth of information on a broad range of LCA applications with dedicated chapters on policy development, prospective LCA, life cycle management, waste, energy, construction and building, nanotechnology, agrifood, transport, and LCA-related concepts such as footprinting, ecolabelling,design for environment, and cradle to cradle. IV) A cookbook giving the reader recipes for all the concrete actions needed to perform an LCA. V) An appendix with an LCA report template, a full example LCA report serving as inspiration for students who write their first LCA report, and a more detailed overview of existing LCIA methods and their similarities and differences.

Gases, Exhaust gases, Pollutant gases, Emission measurement, Emission, Life (durability), Specifications

Life Cycle Sustainability Assessment (LCSA)

Sustainable Construction Technologies

Goal and Scope Definition in Life Cycle Assessment

Developing and Evaluating Life Cycle Assessment (LCA) to Introduce a More Holistic Approach to Existing Methodologies

Assessing Anthropogenic Effects

Assessment of Carbon Footprint in Different Industrial Sectors, Volume 2

This brief contains information on the reduction of environmental impact and explains how it is a key driver for the R&D of new forest products. The authors, experts in the field, describe how Life Cycle Assessment (LCA) is used to assess the environmental impact of such products, e.g. in order to guide R&D or attract investments. The authors

describe the main challenges of carrying out LCAs on forest products, make recommendations for managing these challenges, and discuss future research needs. LCA case studies are used to illustrate the challenges, covering a variety of forest products: building components, biofuels, industrial chemicals, textile fibres and clothing. Described challenges include the planning of LCA studies (e.g.how can one use LCA in R&D?), the modelling of product systems (how can one handle multi-functionality and uncertainties related to waste handling and geographical location of future production?) and environmental impact (how can one assess water and land use impact, and the climate impact of biomass?).

Tourism is an activity that anyone can take part in, regardless of their age, gender, nationality or level of income. This makes tourism one of the most rapidly developing industries in the world. Despite the number of benefits which tourism produces, it also has significant negative impacts on the environment. To minimise the scope of these negative impacts, joint efforts combining tourism and environmental management are called for. This book examines the application of the Life Cycle Assessment (LCA) method and lifecycle thinking as a tool to generate more accurate and holistic appraisals of the environmental impacts of tourism. Looking at the issue of sustainability of tourism operations, the book evaluates how it can be improved. It highlights the potential of LCA to affect tourist behaviour and contribute to tourism policy-making and managerial practice. This book provides a valuable resource for undergraduates, postgraduates and researchers interested in sustainable tourism, sustainable development and environmental impact assessment.

Carbon footprint is one of the important environmental impacts, which has received greater attention from the public, government and media. It is one of the important topics of even any government’s agenda as well and every nation is trying its best to reduce its carbon footprint to the maximum possible extent. Every company would like to reduce the carbon footprint of its products and consumers are looking for the products which emit lower carbon emissions in their entire life cycle. Assessment of Carbon footprint for different products, processes and services and also carbon labelling of products have become familiar topics in the recent past in various industrial sectors. Every industry has its unique assessment and modelling techniques, allocation procedures, mitigation methods and labelling strategies for its carbon emissions. With this background, this book has been framed with dedicated chapters on carbon footprint assessment on various industrial sectors. In each chapter, details pertaining to the assessment methodologies of carbon footprint followed in a particular industry, challenges in calculating the carbon footprint, case studies of various products in that particular industry, mitigation measures to be followed to trim down the carbon footprint, recommendations for further research are discussed in detail. This first volume includes the carbon footprint assessment methodology of agricultural sector, telecommunication sector, food sector, ceramic industry, packaging industry, building and construction sector and solid waste sector.

Sustainable Construction Technologies: Life-Cycle Assessment provides practitioners with a tool to help them select technologies that are financially advantageous even though they have a higher initial cost. Chapters provide an overview of LCA and how it can be used in conjunction with other indicators to manage construction. Topics covered include indoor environment quality, energy efficiency, transport, water reuse,

materials, land use and ecology, and more. The book presents a valuable tool for construction professionals and researchers that want to apply sustainable construction techniques to their projects. Practitioners will find the international case studies and discussions of worldwide regulation and standards particularly useful. Provides a framework for analyzing sustainable construction technologies and economic viability Introduces key credit criteria for different sustainable construction technologies Covers the most relevant construction areas Includes technologies that can be employed during the process of construction, or to the product of the construction process, i.e. buildings Analyzes international rating systems and provides supporting case studies
Concepts, Methods, Implementation, and Case Studies
Progress in Life Cycle Assessment 2018
LCA Based Carbon Footprint Assessment
Background and Future Prospects in Life Cycle Assessment
Development of Metrics for Streamlined Life Cycle Assessments
Outcomes of an Expert Workshop, 7th-8th October 2010, Ispra (Italy).

This book consists of chapters based on selected papers presented at the EcoDesign2015 symposium (9th International Symposium on Environmentally Conscious Design and Inverse Manufacturing). The symposium, taking place in Tokyo in December 2015, has been leading the research and practices of eco-design of products and product-related services since it was first held in 1999. The proceedings of EcoDesign2011 were also published by Springer. Eco-design of products and product-related services (or product life cycle design) are indispensable to realize the circular economy and to increase resource efficiencies of our society. This book covers the state of the art of the research and the practices in eco-design, which are necessary in both developed and developing countries. The chapters of the book, all of which were peer-reviewed, have been contributed by authors from around the world, especially from East Asia, Europe, and Southeast Asia. The features of the book include (1) coverage of the latest topics in the field, e.g., global eco-design management, data usage in eco-design, and social perspectives in eco-design; (2) an increased number of authors from Southeast Asian countries, with a greater emphasis on eco-design in emerging economies; (3) high-quality manuscripts, with the number of chapters less than half of that of the previous book.

Followed by the previous part (Volume-1), Volume-2 of carbon footprint assessment book deals with the assessment of carbon footprint in different other sectors, which were not dealt in the first part. Attention on Carbon footprint is growing day-by-day from the public, government and media. Certainly it is one of the most important topics in the agenda of every nation, which is trying its best to reduce its carbon footprint to the maximum possible extent. Every manufacturing industry or sector would like to reduce the carbon footprint of its products and consumers are looking for the products which emit lower carbon emissions in their entire life cycle. Assessment of Carbon footprint for different products, processes and services and also carbon

labeling of products have become familiar topics in the recent past in various industrial sectors. Every industry has its unique assessment and modeling techniques, allocation procedures, mitigation methods and labeling strategies for its carbon emissions. With this background, volume two of this book has been framed with dedicated chapters on carbon footprint assessment on various industrial sectors, apart from the ones covered in Volume 1. In each chapter, details pertaining to the assessment methodologies of carbon footprint followed in a particular industry, challenges in calculating the carbon footprint, case studies of various products in that particular industry, mitigation measures to be followed to trim down the carbon footprint, recommendations for further research are discussed in detail.

This book presents specialised methods and tools built on classical LCA. In the first book-length overview, their importance for the further growth and application of LCA is demonstrated for some of the most prominent species of this emerging trend: Carbon footprinting; Water footprinting; Eco-efficiency assessment; Resource efficiency assessment; Input-output and hybrid LCA; Material flow analysis; Organizational LCA. Carbon footprinting was a huge driver for the market expansion of simplified LCA. The discussions led to an ample proliferation of different guidelines and standards including ISO/TS 14067 on Carbon Footprint of Product. Atsushi Inaba (Kogakuin University, Tokyo, Japan) and his eight co-authors provide an up-to-date status of Carbon Footprint of Products. The increasing relevance of Water Footprinting and the diverse methods were the drivers to develop the ISO 14046 as international water footprint standard. Markus Berger (Technische Universität Berlin, Germany), Stephan Pfister (ETH Zurich, Switzerland) and Masaharu Motoshita (Agency of Industrial Science and Technology, Tsukuba, Japan) present a status of water resources and demands from a global and regional perspective. A core part is the discussion and comparison of the different water footprint methods, databases and tools. Peter Saling from BASF SE in Ludwigshafen, Germany, broadens the perspective towards Eco-efficiency Assessment. He describes the BASF-specific type of eco-efficiency analysis plus adaptions like the so-called SEEBALANCE and AgBalance applications. Laura Schneider, Vanessa Bach and Matthias Finkbeiner (Technische Universität Berlin, Germany) address multi-dimensional LCA perspectives in the form of Resource Efficiency Assessment. Research needs and proposed methodological developments for abiotic resource efficiency assessment, and especially for the less developed area of biotic resources, are discussed.The fundamentals ofInput-output and Hybrid LCA are covered by Shinichiro Nakamura (Waseda University, Tokyo, Japan) and Keisuke Nansai (National Institute for Environmental Studies, Tsukuba, Japan). The concepts of environmentally extended IO, different types of hybrid IO-LCA and the waste model are introduced. David Laner and Helmut Rechberger (Vienna University of Technology, Austria) present the basic terms and procedures of Material Flow Analysismethodology. The combination of MFA

and LCA is discussed as a promising approach for environmental decision support. Julia Martínez-Blanco (Technische Universität Berlin, Germany; now at Inèdit, Barcelona, Spain), Atsushi Inaba (Kogakuin University, Tokyo, Japan) and Matthias Finkbeiner (Technische Universität Berlin, Germany) introduce a recent development which could develop a new trend, namely the LCA of Organizations.

Life Cycle Assessment addresses the dynamic and dialectic of building and ecology, presenting the key theories and techniques surrounding the use of life cycle assessment data and methods. Architects and construction professionals must assume greater responsibility in helping building owners to understand the implications of making material, manufacturing, and assemblage decisions and therefore design to accommodate more ecological building. Life Cycle Assessment is a guide for architects, engineers, and builders, presenting the principles and art of performing life cycle impact assessments of materials and whole buildings, including the need to define meaningful goals and objectives and critically evaluate analysis assumptions. As part of the PocketArchitecture Series, the book includes both fundamentals and advanced topics. The book is primarily focused on arming the design and construction professional with the tools necessary to make design decisions regarding life cycle, reuse, and sustainability. As such, the book is a practical text on the concepts and applications of life cycle techniques and environmental impact evaluation in architecture and is presented in language and depth appropriate for building industry professionals.

Life Cycle Management

Carbon Footprint Analysis

Reviewing the Carbon Footprint Assessment of Tourism

Pavement Life-Cycle Assessment

Reference Building Structure and Strategies

Sustainability Through Innovation in Product Life Cycle Design

This book offers a detailed presentation of the principles and practice of life cycle impact assessment. As a volume of the LCA compendium, the book is structured according to the LCIA framework developed by the International Organisation for Standardisation (ISO)passing through the phases of definition or selection of impact categories, category indicators and characterisation models (Classification): calculation of category indicator results (Characterisation); calculating the magnitude of category indicator results relative to reference information (Normalisation); and converting indicator results of different impact categories by using numerical factors based on value-choices (Weighting). Chapter one offers a historical overview of the development of life cycle impact assessment and presents the boundary conditions and the general principles and constraints of characterisation modelling in LCA. The second chapter outlines the considerations underlying the selection of impact categories and the classification or assignment of inventory flows into these categories. Chapters three through thirteen exploreall the impact categories that are commonly included in LCIA, discussing the characteristics of each followed by a review of midpoint and

endpoint characterisation methods, metrics, uncertainties and new developments, and a discussion of research needs. Chapter-length treatment is accorded to Climate Change; Stratospheric Ozone Depletion; Human Toxicity; Particulate Matter Formation; Photochemical Ozone Formation; Ecotoxicity; Acidification; Eutrophication; Land Use; Water Use; and Abiotic Resource Use. The final two chapters map out the optional LCIA steps of Normalisation and Weighting.

Life Cycle Assessment (LCA) has become the recognized instrument to assess the ecological burdens and human health impacts connected with the complete life cycle (creation, use, end-of-life) of products, processes and activities, enabling the assessor to model the entire system from which products are derived or in which processes and activities operate. This volume introduces the major new book series LCA Compendium - The Complete World of Life Cycle Assessment. In this volume, the main drivers in the development of LCA are explored. The volume also discusses strengths and limitations in LCA as well as challenges and gaps, thus offering an unbiased picture of the state-of-the-art and future of LCA.

An increasing number of agencies, academic institutes, and governmental and industrial bodies are embracing the principles of sustainability in managing their activities and conducting business. Pavement Life-Cycle Assessment contains contributions to the Pavement Life-Cycle Assessment Symposium 2017 (Champaign, IL, USA, 12-13 April 2017) and discusses the current status of as well as future developments for LCA implementation in project- and network-level applications. The papers cover a wide variety of topics: - Recent developments for the regional inventory databases for materials, construction, and maintenance and rehabilitation life-cycle stages and critical challenges - Review of methodological choices and impact on LCA results - Use of LCA in decision making for project selection - Implementation of case studies and lessons learned: agency perspectives - Integration of LCA into pavement management systems (PMS) - Project-level LCA implementation case studies - Network-level LCA applications and critical challenges - Use-phase rolling resistance models and field validation - Uncertainty assessment in all life-cycle stages - Role of PCR and EPDs in the implementation of LCA Pavement Life-Cycle Assessment will be of interest to academics, professionals, and policymakers involved or interested in Highway and Airport Pavements.

Life Cycle Impact Assessment

Dynamics of Long-Life Assets

Case Studies, Methodological Issues and Best Practices