

Life Cycle Assessment Lca

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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

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

life cycle assessment lca has developed in australia over the past 16 years in a fragmented way with many different people and organizations contributing to the area at different times and largely through informal or unpublished work this publication will legitimize and document lca research and methodology development to act as a record of what has happened and a basis for future development and application of the tool the centre for design at rmit has been a leading research center in australia through its work on data collection

methodology development and contribution to knowledge through undertaking lca studies for leading companies and government departments ranging from products packaging buildings water management and waste management this work in addition to key work undertaken by other researchers will be presented the book will become a bridge between lca implementation and life cycle management lcm and provide discussion on how lca development will be in the future and how it integrates with available software tools

the book contains the latest developments in the field of life cycle assessment lca and its application it contains numerous research articles from leading german research institutes working towards the further development of the methodology the book provides important insights for professionals working in the field of sustainability assessment for researchers interested in the current state of the research of the methodology and its application as well as for advanced university students in different science and engineering fields

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

life cycle assessment

lca quo vadis discusses overarching topics new developments and major problems of life cycle assessment lca and compares lca with site specific environmental management the text profits from two years of interdisciplinary coordinated research activities of the priority programme environment of the swiss national science foundation how should system boundaries of a product life cycle be drawn how can environmental interventions be allocated to products how are background inventory data collected and used how can imprecision in the lca method be ascertained and checked how can relevant environmental interventions be distinguished from irrelevant ones what requirements should a software tool for lca meet a

concept of site specific lca is proposed in response to criticism of the current approach of lca furthermore managerial eco controlling the emerging method of site specific environmental management is discussed the book concludes with an outlook of possible paths in the future development of lca

life cycle assessment lca is internationally accepted as a core topic in the field of environmental management in various industries for obtaining a complete picture of the environmental impacts of products or processes in contrast to other types of environmental management tools or sustainability assessment methods lca methodologies take a holistic approach to include all relevant processes starting from the extraction of natural resources to various manufacturing stages that lead to the final product following an evidence approach lca is underpinned by quantitative methodologies to study real world problems and uncover hidden impacts beyond the conventional boundary of a single stage manufacturing system to develop sustainable strategies that consider regional or global production chains this book offers multi disciplinary perspectives of new lca developments and applications spanning from data variability to ecosystem services plus the evaluation of the net greenhouse gas from carbon capture and utilization ccu methods and waste management perspectives of green chemistry principles via lca combined with life cycle atom economy approaches are explored industrial symbiosis concepts lca as an entrepreneurial tool for business management and green innovations and blockchain enabled lca are also presented

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

miao guo s phd thesis provides scientific insights into the environmental issues related to biocomposites based on starch polyvinyl alcohol pvoh blends the author contributes significantly to the methodological issues underlying the life cycle assessment lca modelling approach as well as presenting complete lca inventories using primary data from a variety of sources guo develops a new modelling approach incorporating the process oriented biogeochemistry model denitrification decomposition dndc into site specific lca studies to simulate carbon and nitrogen dynamics in the wheat agro ecosystem this thesis addresses important lca data quality issues by using comprehensive sensitivity and uncertainty analyses and has resulted in a large number of publications in internationally renowned journals

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

1 1 life cycle assessment lea a fascinating and sophisticated tool the greening of the economy is not a new task but it is a challenge for which a lot of tasks still have to be done it is known that the main source of environmental deterioration by industry is not any more the chimneys and other process related emissions but the products and services produced products are regarded as carriers of pollution they are not only a potential source of pollution and waste during their use they are also a cause of resource depletion energy consumption and emissions during their life starting with the extraction of the raw materials and ending with their disposal i.e. connecting production and consumption stages the challenge of these decades is now the greening of products and services the new focus on products cp oosterhuislrubik scholi 1996 was introduced as a policy approach of shared responsibility in which different actors are involved along the life cycle of a product each having specific responsibilities

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 collection features five peer reviewed literature reviews on life cycle assessment lca of crops the first chapter discusses the application of lca to agricultural systems and highlights key issues associated with its implementation including delimitation of systems

boundaries defining the functional unit handling coproduction and the choosing of impact assessment methods the second chapter explores the concepts of lca and the coffee value chain the chapter discusses how carbon footprint performances can be used to upgrade coffee value chains the third chapter assesses the environmental impact of oil palm production during cultivation and as a result of land use change for new plantations the chapter describes the principles and modelling steps of lca as well as the challenges ahead regarding further development and application the fourth chapter reviews the core principles of lca methodology the state of the art of lca for fruits and associated key challenges the first complete lca case study for export mango is also discussed the final chapter assesses the environmental impact of banana production and highlights the importance of lca in influencing the adoption of practices that can reduce or offset the carbon footprint of the banana value chain

the transition towards renewable energy sources and green technologies for energy generation and storage is expected to mitigate the climate emergency in the coming years however in many cases this progress has been hampered by our dependency on critical materials or other resources that are often processed at high environmental burdens yet many studies have shown that environmental and energy issues are strictly interconnected and require a comprehensive understanding of resource management strategies and their implications life cycle assessment lca is among the most inclusive analytical techniques to analyze sustainability benefits and trade offs within complex systems and in this special issue it is applied to assess the mutual influences of environmental and energy dimensions the selection of original articles reviews and case studies addressed covers some of the main driving applications for energy requirements and greenhouse gas emissions including power generation bioenergy biorefinery building and transportation an insightful perspective on the current topics and technologies and emerging research needs is provided alone or in combination with integrative methodologies lca can be of pivotal importance and constitute the scientific foundation on which a full system understanding can be reached

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

lca quo vadis discusses overarching topics new developments and major problems of life cycle assessment lca and compares lca with site specific environmental management the text profits from two years of interdisciplinary coordinated research activities of the priority programme environment of the swiss national science foundation how should system boundaries of a product life cycle be drawn how can environmental interventions be allocated to products how are background inventory data collected and used how can imprecision in the lca method be ascertained and checked how can relevant environmental interventions be distinguished from irrelevant ones what requirements should a software tool for lca meet a concept of site specific lca is proposed in response to criticism of the current approach of lca furthermore managerial eco controlling the emerging method of site specific environmental management is discussed the book concludes with an outlook of possible paths in the future development of lca

life cycle inventory lci analysis is the second phase in the life cycle assessment lca framework since the first attempts to formalize life cycle assessment in the early 1970 life cycle inventory analysis has been a central part chapter 1 introduction to life cycle inventory analysis discusses the history of inventory analysis from the 1970s through setac and the iso standard in chapter 2 principles of life cycle inventory modeling the general principles of setting up an lci model and lci analysis are described by introducing the core lci model and extensions that allow addressing reality better chapter 3 development of unit process datasets shows that developing unit processes of high quality and transparency is not a trivial task but is crucial for high quality lca studies chapter 4 multi functionality in life cycle inventory analysis approaches and solutions describes how multi functional processes can be identified in chapter 5 data quality in life cycle inventories the quality of data gathered and used in lci analysis is discussed state of the art indicators to assess data quality in lca are described and the fitness for purpose concept

is introduced chapter 6 life cycle inventory data and databases follows up on the topic of lci data and provides a state of the art description of lci databases it describes differences between foreground and background data recommendations for starting a database data exchange and quality assurance concepts for databases as well as the scientific basis of lci databases chapter 7 algorithms of life cycle inventory analysis provides the mathematical models underpinning the lci since heijungs and suh 2002 this is the first time that this aspect of lca has been fundamentally presented in chapter 8 inventory indicators in life cycle assessment the use of lci data to create aggregated environmental and resource indicators is described such indicators include the cumulative energy demand and various water use indicators chapter 9 the link between life cycle inventory analysis and life cycle impact assessment uses four examples to discuss the link between lci analysis and lcia a clear and relevant link between these phases is crucial

this book outlines the methodologies approaches and tools for modelling chemicals in a life cycle assessment lca perspective and also covers the main advantages and drawbacks of applying lca to chemical processes in the first part of this book authors pay close attention to the limitations of modelling the environmental and social impacts of chemical processes providing valuable insights to the problems of the life cycle inventory lci analysis for chemical processes in the second part of this book readers will learn about the lca application to chemical processes in the laboratory and industrial scale in each chapter of this book readers will also find specific case studies on the modelling and application of lca in the chemical industry

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