

# Need to Know Guide

**Need to know:  
Life Cycle Assessment (LCA)**

**What is a Life Cycle Assessment (LCA)?**

LCA is a tool that measures the environmental footprint of a product or service over its life. LCA provides information to help businesses understand impacts and communicate their environmental results.

**Stages in a product's life cycle**

LCA calculates a snapshot of your product's environmental impacts, including:

- What goes into the product to make it (eg. energy and raw materials)
- What comes out when the product is used and disposed of (eg. waste, water pollution, carbon)

To know the impact, we consider your product's environmental footprint.

# Life Cycle Assessment Thinkstep

**Xiaolong Qi**



## **Life Cycle Assessment Thinkstep:**

*Goal and Scope Definition in Life Cycle Assessment* Mary Ann Curran, 2016-09-22 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 [Pavement, Roadway, and Bridge Life Cycle Assessment 2020](#) John Harvey, Imad L. Al-Qadi, Hasan Ozer, Gerardo Flintsch, 2020-07-02 An increasing number of agencies academic institutes and governmental and industrial bodies are embracing the principles of sustainability in managing their activities Life Cycle Assessment LCA is an approach developed to provide decision support regarding the environmental impact of industrial processes and products LCA is a field with ongoing research development and improvement and is being implemented world wide particularly in the areas of pavement roadways and bridges Pavement Roadway and Bridge Life Cycle Assessment 2020 contains the contributions to the International Symposium on Pavement Roadway and Bridge Life Cycle Assessment 2020 Davis CA USA June 3 6 2020 covering research and practical issues related to pavement roadway and bridge LCA including data and tools asset management environmental product declarations procurement planning vehicle interaction and impact of materials structure and construction Pavement Roadway and Bridge Life Cycle Assessment 2020 will be of interest to researchers professionals and policymakers in academia industry and government who are interested in the sustainability of pavements roadways and bridges *Workflows* Richard Garber, 2017-05-30 Workflows are being rethought and remodelled across the architecture engineering and construction AEC spectrum The synthesis of building information modelling BIM platforms with digital simulation techniques and increasing access to data charting building performance is allowing architects to engage in the generation of new workflows across multidisciplinary teams By merging digital design operations with construction activities project delivery and post occupation scenarios architects are becoming instrumental in the shaping of buildings as well as the design process Workflows expand the territory of architectural practice by extending designers remit beyond the confines of the design stage The implications for the AEC industry and architecture as a profession could not be greater These new collaborative models are becoming as important as the novel buildings they allow us to produce Contributors include Shajay Bhooshan John Cays Randy Deutsch Sean Gallagher Ian Keough Peter Kis Jonathan Mallie Adam Modesitt Rhett Russo Dale Sinclair and Stacie Wong Featured architects Arup Diller Scofidio Renfro GLUCK GRO Architects PLANT

Populous Young Ayata and Zaha Hadid Architects *Cascade Use in Technologies 2018* Alexandra Pehlken, Matthias Kalverkamp, Rikka Wittstock, 2018-08-14 The conference addresses general topics on how products and materials can be recycled and looks for application examples The focus is on the areas Material and Energy Flow Assessment Sustainable Mobility Industrial Ecology with a focus on renewable energy sources or WEEE Re Manufacturing Cascade Use and Waste Management 4 0 [Encyclopedia of Renewable and Sustainable Materials](#) ,2020-01-09 Encyclopedia of Renewable and Sustainable Materials Five Volume Set provides a comprehensive overview covering research and development on all aspects of renewable recyclable and sustainable materials The use of renewable and sustainable materials in building construction the automotive sector energy textiles and others can create markets for agricultural products and additional revenue streams for farmers as well as significantly reduce carbon dioxide CO2 emissions manufacturing energy requirements manufacturing costs and waste This book provides researchers students and professionals in materials science and engineering with tactics and information as they face increasingly complex challenges around the development selection and use of construction and manufacturing materials Covers a broad range of topics not available elsewhere in one resource Arranged thematically for ease of navigation Discusses key features on processing use application and the environmental benefits of renewable and sustainable materials Contains a special focus on sustainability that will lead to the reduction of carbon emissions and enhance protection of the natural environment with regard to sustainable materials *Life Cycle Assessment* Michael Z. Hauschild, Ralph K. Rosenbaum, Stig Irving Olsen, 2017-09-01 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 Student Handbook* Mary Ann Curran, 2015-07-10 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

**Progress in Life Cycle Assessment** Liselotte Schebek, Christoph Herrmann, Felipe Cerdas, 2018-09-22 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)** Walter Klöpffer, Birgit Grahl, 2014-04-21 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

*Life Cycle Assessment in Industry and Business* Paolo Frankl, Frider Rubik, 1999-11-26 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 Oosterhuis/Rubik Scholli 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.

Special Types of Life Cycle Assessment Matthias Finkbeiner, 2016-07-27. 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 adaptations 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 of Input-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 Analysis methodology. 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 Inditex, 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 Management** Guido Sonnemann, Manuele Margni, 2015-07-16. 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

*Life Cycle Assessment Handbook* Mary Ann Curran,2012-10-08 The first book of its kind the Life Cycle Assessment Handbook A Guide for Environmentally Sustainable Products will become an invaluable resource for environmentally progressive manufacturers and suppliers product and process designers executives and managers and government officials who want to learn about this essential component of environmental sustainability As the last several decades have seen a dramatic rise in the application of Life Cycle Assessment LCA in decision making the interest in the life cycle concept as an environmental management and sustainability tool continues to grow The LCA 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 content of the book was designed with a certain flow in mind After a high level overview to describe current views and state of the practice of LCA it presents chapters that address specific LCA methodological issues including creating life cycle inventory life cycle impact assessment and capturing eco systems services These are followed by example applications of LCA in the agri food industry sustainable supply chain management solid waste management mining and mineral extraction forest products buildings product innovation and sustainable chemistry and engineering 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 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 Potential of Reducing Environmental Impacts of Mountain Huts* Javier Sánchez García,2020 The background of the thesis arises from the Life European project Sustainhuts % Sustainable Mountain Huts in Europe The main goals of the project are modernization and optimization of energy generation in mountain huts This is addressed by means of automatization introduction of renewable energy sources as a substitute for fossil fuels and reduction of required energy for operation and transportation Consequently the reduction of environmental impacts is achieved which is especially important

in the areas where mountain huts are located Life Cycle Assessment LCA regarding the operational phase of ten mountain huts in four countries across Europe is performed in this thesis Specifically it is focused on electricity and heat generation as well as transportation required In this way energy balance of each mountain hut is accessed at the %%State Of Play at the Beginning%% SOPB and after modification of energy systems at the %%State Of Play at the End%% SOPE After completing a proper preliminary study GaBi Thinkstep software is used to set up LCA models for energy generation and transportation for every mountain hut case Environmental balances of LCA models provide results regarding emissions Particularly CO<sub>2</sub> NO<sub>x</sub> SO<sub>x</sub> and particles PM are the target emissions of the study Additionally Carbon Footprint is calculated for all huts at the SOPB and the SOPE Detailed analysis of results is completed to assess the effect of the newly suggested and installed solutions on emissions to environment The results are presented for each hut and in one case the presentation of results is done more deeply to present the basic approach used Overall target emissions are reduced on average by 45% considering all the mountain huts involved in the study On account of this it can be concluded that current energy generation systems in mountain huts enable rapid improvements that are economically feasible and have big potential in environmental impacts reductions Results offer some general conclusions that could be implemented to all other mountain huts across Europe

**The Computational Structure of Life Cycle Assessment** R. Heijungs, Sangwon Suh, 2002-05-31 Life Cycle assessment LCA is a tool for environmental decision support in relation to products from the cradle to the grave Until now more emphasis has been put on the inclusion quantitative models and databases and on the design of guidebooks for applying LCA than on the integrative aspect of combining these models and data This is a remarkable thing since LCA in practice deals with thousands of quantitative data items that have to be combined in the correct manner For this one needs mathematical rules and algorithmic principles for carrying out an LCA This book presents the first coherent treatment of the mathematical and algorithmic aspects of LCA These computational aspects are presented in matrix form so that a concise and elegant formulation is achieved This form moreover provides a platform for further extension of analysis using perturbation theory structural theory and economic input output analysis

**Life Cycle Assessment (LCA)** Allan A. Jensen, 1998 Life Cycle Assessment *Life Cycle Assessment (LCA) — Quo vadis?* S. Schaltegger, 2013-03-07 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) - Quo Vadis?** S Schaltegger,1996-08-28 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

**Organizational water footprint - analyzing water use and mitigating water scarcity along global supply chains** Forin, Silvia,Berger, Markus,Bunsen, Jonas,Finkbeiner, Matthias,2021-10-06

Freshwater is a vital resource for humans and ecosystems but is scarce in many regions around the world Organizations measure and manage direct water use at their premises but usually neglect the indirect water use associated with global supply chains even though the latter can be higher by several orders of magnitude As of 2015 there was no standardized life cycle based approach for analysing the water consumption of an organization Against this background the BMBF funded research project Water Footprint for Organizations Local Measures in Global Supply Chains WELLE has been launched by TU Berlin Evonik German Copper Institute Neoperl thinkstep and Volkswagen The project aims to support organizations in determining their complete Organizational Water Footprint identifying local hotspots in global supply chains and taking action to reduce their water use and mitigate water stress at critical basins Within the WELLE project a method for analysing an Organizational Water Footprint has been developed which analyses an organization s water use and resulting local impacts throughout its entire value chain In other words the Organizational Water Footprint considers not only the direct water use at production facilities but also the water used indirectly for energy generation and raw material production upstream in the supply chain as well as water use during the use and end of life phases of products downstream The Organizational Water Footprint method builds on two environmental assessment frameworks which have been identified as suitable for the purpose of this project Water Footprint ISO 14046 2014 and Organizational Life Cycle Assessment UNEP 2015 To support stakeholders in conducting Organizational Water Footprint studies this guidance document was developed which presents the method in a clear and concise way by illustrating each step with a practical example By analysing their Water Footprints organizations can determine water use and resulting local impacts at premises and beyond the fence along global supply chains In this way they can reduce water risks and contribute to a more sustainable use of the world s limited

freshwater resources Süßwasser ist eine lebenswichtige Ressource für Menschen und Ökosysteme ist aber in vielen Regionen der Welt knapp Organisationen messen und managen den direkten Wasserverbrauch an ihrem Standort vernachlässigen aber in der Regel den indirekten Wasserverbrauch der mit globalen Lieferketten verbunden ist obwohl Letzterer um mehrere Größenordnungen höher sein kann Bis 2015 gab es keinen standardisierten lebenszyklusbasierten Ansatz um den Wasserverbrauch einer Organisation zu analysieren Vor diesem Hintergrund wurde das vom BMBF geförderte Forschungsprojekt Water Footprint for Organizations Local Measures in Global Supply Chains WELLE von der TU Berlin Evonik dem Deutschen Kupferinstitut Neoperl thinkstep und Volkswagen gestartet Das Projekt zielt darauf ab Unternehmen dabei zu unterstützen ihren kompletten organisatorischen Wasserfußabdruck zu bestimmen lokale Hotspots in globalen Lieferketten zu identifizieren und Maßnahmen zu ergreifen um ihren Wasserverbrauch zu reduzieren und den Wasserstress in wasserknappen Einzugsgebieten zu mindern Im Rahmen des WELLE Projekts wurde eine Methode zur Analyse eines organisationsbezogenen Wasserfußabdrucks entwickelt die den Wasserverbrauch einer Organisation und die daraus resultierenden lokalen Auswirkungen entlang der gesamten Wertschöpfungskette analysiert Das heißt der organisationsbezogene Wasserfußabdruck berücksichtigt nicht nur den direkten Wasserverbrauch in den Produktionsstätten sondern auch den indirekten Wasserverbrauch für die Energieerzeugung und die Rohstoffproduktion vorgelagert in der Lieferkette sowie den Wasserverbrauch während der Nutzungs- und End of Life Phase der Produktion nachgelagert Die Methode des organisationsbezogenen Wasserfußabdrucks baut auf zwei Umweltbewertungsrichtlinien auf die für den Zweck dieses Projekts als geeignet identifiziert wurden Wasserfußabdruck ISO 14046 2014 und organisationsbezogene Bilanzierung UNEP 2015 Um Akteure bei der Durchführung von organisationsbezogenen Wasserfußabdruck Studien zu unterstützen wurde dieser Leitfaden entwickelt der die Methode klar und übersichtlich darstellt und indem jeder Schritt mit einem praktischen Beispiel illustriert wird Durch die Analyse ihres Wasserfußabdrucks können Organisationen den Wasserverbrauch und die daraus resultierenden lokalen Auswirkungen am Standort und entlang globaler Lieferketten ermitteln Auf diese Weise können sie Wasserrisiken reduzieren und zu einem nachhaltigeren Umgang mit den begrenzten Süßwasserressourcen der Welt beitragen

Life Cycle Engineering and Management of Products José Augusto de Oliveira, Diogo Aparecido Lopes Silva, Fabio Neves Puglieri, Yovana María Barrera Saavedra, 2021-08-24 This book presents the role of life cycle engineering and life cycle management of products and services and their contributions to corporate environmental sustainability and the circular economy It addresses the main techniques tools systems and practices for improving the environmental performance of business products and services throughout their life cycles The book covers the main topics and concepts related to life cycle engineering and life cycle management applied to the business context It presents the themes through basic and in depth theories In addition all chapters provide examples of real and hypothetical case studies for discussion and assimilation of theoretical content and its contextualization in the real and practical business

scenario The chapters are complemented by quantitative exercises

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