

## **Advancements in life cycle impact assessment method development**

Tomas Rydberg, Serenella Sala, Rosalie Van Zelm

Wednesday May 25, 8:15 AM - 12:50 PM, Salle R2

This session gives a platform for impact characterization frameworks and models showing latest developments in typical and new impact categories and impact assessment frameworks, both for mid-point or end-point approaches.

Progress in frameworks, models and case studies that allow for the integrated assessment of impacts on humans and/or ecosystems are welcome, especially if mutual learning, capitalisation of knowledge and interaction between the approaches taken in LCA and other field (e.g. RA) are presented.

The goal of this session is to present original papers which address impact assessment modelling, enhancing the methodology for assessing impacts at midpoint or endpoint and highlighting research needs towards increased robustness and comprehensiveness.

## **Advances in Social Life Cycle Assessment and Life Cycle-based Sustainability Assessment**

Tomas Ekvall, Marzia Traverso, Alessandra Zamagni

Thursday May 26, 8:15 AM - 10:15 AM, Salle 150

There is a growing interest in and accumulated experience from social life cycle assessment (SLCA) and life cycle-based sustainability assessment (LCSA). The methodology is growing rapidly, and many new approaches have been proposed, related to both the methods to be used in the context of LCSA and the LCSA framework itself. An important discussion in SLCA is how to couple the engineering perspective adopted so far with the social science, to add consistency, coherence and a solid background for applications at several levels, ranging from products to more complex systems. The need to take into account local conditions often makes difficult to define a standardized set of indicators that can capture the reality and allows for a correct interpretation towards the improvement of stakeholders' social conditions: e.g. the pathway of child labour to wellbeing. The challenge is even greater in LCSA: sustainability is a broad concept with a large number of environmental, economic and social aspects, and the interlinkages in between. The scope of a sustainability assessment can be overwhelming, particularly if it also has a broad systems perspective. In addition, many sustainability aspects can be difficult to identify, quantify and/or communicate.

This session aims to present contributions to increasing understanding of the scientific basis and operational methods for SLCA and LCSA. The session includes methodological contributions and reviews but also case studies that test and demonstrate innovative SLCA and LCSA approaches. Such approaches can include, for example, the selection of indicators, data collection and modelling, interpretation of the results, and communication of the study and its results.

## **Challenges in data analysis, weighting, valuation and visualisation - How to enable decision makers to make trade-offs while being transparent for all stakeholders**

Thomas Kägi, Wouter De Soete

Thursday May 26, 10:50 AM - 12:50 PM, Salle R0-A

At the last SETAC Europe conference in 2015 there were discussions about midpoint, endpoint or single score for decision support. The overall preliminary conclusion was that endpoint (e.g. DALYs, Disability Adjusted Life Years) or single score results such as "ecopoints" or "external costs" might be very helpful for decision support. Previous SETAC Europe sessions have also discussed the use of hotspots analysis at multiple levels (e.g. national, city-scale, industry sector, product category) to rapidly assimilate data and information from a range of sources (e.g. life cycle analysis, scientific research, market information, expert opinion and stakeholder concerns) to provide actionable information and data visualisation to both technical and non-technical decision-makers. However, in all cases, the tricky task is to communicate the results of any analysis in a way that is transparent and actually understood by all stakeholders, including decision-makers, who can be non-technical colleagues. The session includes contributions dealing with methodological challenges related to:

- Integrating Risk Assessment and LCA
- Midpoint versus endpoint and the single score methodology (e.g. monetarisation)
- Normalisation & Weighing advances in LCSA
- Identify relevant impacts to focus improvement efforts

All of above mentioned methodological advances should be made aiming at B2B and/or B2C communications (how do we provide both transparency and valuable information?) with as ultimate goal support in decision making processes for industries, policies and publically funded research and innovation projects.

## **Development, standardization and implementation of LCA and integration with economics for transportation infrastructure and operations**

Jullien Agnès, Arpad Horvath, Chantal Proust

Tuesday May 24, 8:15 AM - 10:15 AM, Salle R2

The session considers climate change and other environmental impacts and includes international benchmarking results and case studies showing how the life cycle of transport is assessed.

- Methods for LCA and LCCA; tools
- Benchmarking approaches for LCA and databases
- Case studies of implementation and recommendations from analyses
- How to move recommendations to implementation at the international scale.

Life Cycle Assessment (LCA) is today a powerful systemic approach developed to provide decision support for questions regarding the environmental impact of industrial processes and products. Over the last 15 years it has been broadened to roads and railways. For that purpose LCA has then been applied to infrastructure materials and services in various countries namely around Europe and in the US. The scientific community working on road and railways sustainability working together with practitioners decided several years ago to share knowledge at the international level on methodologies, databases and results. Today improving LCA interest in the transport field means benchmarking as regards GHG assessment, climate change and others global and local impacts of transports, taking into account the energy mix, local materials and construction processes and water supply in each country, and extension of LCA from the project-level design questions to network-level management questions.

The application of LCA to road and railways management, vehicles and energy providers, and therefore more generally to transport modes design, construction, maintenance, operation, will be discussed in the session. The objective is to share information regarding: approaches for conducting LCA for transport, recommendations from LCA and LCCA for different regions and situations, and consensus regarding approaches for reducing impacts in each phase of life cycle, including use phase and assessment of multimodality services in rural and urban areas.

## **Expanding LCA: looking at organizations and at new policies**

Stephane Morel, Paolo Masoni, Alessandra Zamagni

Tuesday May 24, 2:00 PM - 4:00 PM, Salle R2

In Life Cycle Assessment (LCA), consistency is a key principle affecting both data inventory and impact assessment indicators. Next to consistency in modelling, other quality criteria are still important topics in the LCA research. For instance, the discussion around certain accounting issues (notably the necessity to increase spatial and temporal resolution of datasets along with the need to pinpoint data documentation on sources and ranges of uncertainty) has been progressing in the LCA community, given also the importance played by these aspects when it comes to the interpretation of assessment results. Increasing data availability is also necessary to facilitate the use of LCA. Nowadays, several data sources have also emerged facilitating data availability through a wide array of public outlets or through other forms of data exchange on demand. This has been made possible thanks to smart metering in production processes and social media, among others. One of the advantages of this profusion of data sources is that such information can, in principle, be harvested to create new LCI datasets and for quality assurance of existing datasets. Additionally, modern approaches for data mining and management and for dealing with imperfect data sources offer new possibilities for working with non-LCA data sources. Last but not least, access to linked data is recently advocated in the LCA community as well.

Contributions on the advances in consistency and fine-tuning of LCA data modelling approaches are welcomed. How to better conciliate process-based LCA and economic input output tables is also in the scope of this session. The session aims at discussing theoretical aspects and case studies about data collection and computational challenges faced by the current increasing sophistication of LCI. Particularly welcomed are ideas and methods integrating and/or using computational tools that have been typically conceived outside of the LCA sphere, but that can enrich and bring forward the discussion towards the advancement of current spatial, temporal and uncertainty issues.

Consequential LCA has gained interest and it is considered by many as a suitable policy support, because of its ability to model some consequences (presently at market level) that arise when a decision is taken. However, whether we adopt an ALCA, a CLCA or another life cycle-based model, still limitations exist: usually a steady-state and linear type of modelling is applied. This session does not want to debate about the use of ALCA vs CLCA but on whether and how LCA, considering all its modeling facets, can aid robust decision making. We invite contributions that present approaches on how to model complex systems, their strengths and drawbacks and the effective support they provide. Aspects related to the communication of these results to policy makers, i.e. acknowledging complexity and uncertainty of the assessment and results, clarifying how the uncertainty translate in risk, are welcome. We also encourage presentations discussing the role of LCA in the implementation of the circular economy, as well as its complementarities and discrepancies with other product design strategies, explicitly focused on the circularity of resources.

## **Life Cycle Data and Modeling Developments - From Data Collection to Usage**

Bruce W. Vigon, Llorenç Mila i Canals, Christoffer Krewer

Monday May 23, 8:15 AM - 4:00 PM, Salle R2

Much is happening to mainstream life cycle approaches these days. Given the criticality of well-characterized, accurate, and relevant data that are readily exchangeable across the globe, this session aims to present the range of ongoing research, development, and applications to support practitioners and decisionmakers. Included in the session topics are forums and working activities around making data sharable in the international and national arenas from a guidance and standardization perspective. Also included are recent developments in making data public, data review procedures and criteria, nomenclature and flow naming conventions, and ensuring user awareness of data quality characteristics during dataset development and data selection. The latter is often referred to as the documentation of meta-data, and efforts towards agreeing common frameworks on meta-data reporting are also invited to this session. All life cycle based approaches, Life Cycle Assessment (inventory and impact assessment), hotspots analysis, environmental product declarations and labels, and others are accommodated as long as the focus is on databases, data, and meta-data.

## **Methodological challenges for LCA of agricultural supply chains producing food, fibre and bioenergy**

Angel Avadí, Sebastien Humbert, Funda Cansu Ertem, Hayo van der Werf

Tuesday May 24, 10:50 AM - 12:50 AM, Salle R2

LCA theory and practice still feature a number of methodological challenges, some of which are not fully solved by the research community. When LCA is applied to agriculture (i.e. cradle to farm gate), as well as to agri-food, bioenergy and fibre systems (i.e. cradle to processing plant gate) and supply chains, specific challenges arise, regarding for instance, modelling of direct emissions, allocation strategies and their consequences, land use and land use change (LULUC) and their impacts on biodiversity and climate change, responsible sourcing of agricultural products, the role of LCA to assess production and utilisation of bioenergy; as well as the extrapolation of farm level assessment to describe agricultural regions.

Among methodological challenges, models for direct emissions in particular have been continuously developed and expanded to address the transportation and fate of pesticides (see FATE track), LULUC, carbon sequestration, and specific soil and water emissions, among other topics. A key question regarding direct emission models would be whether a common methodological framework is possible and desirable. Regarding the use of LCA to compare competing agricultural strategies, including bioenergy and fibre production, both at the farm, regional and supply chain (i.e. beyond regional) levels; certain methodological challenges hinder the validity of these comparisons.

This session intends to advance discussion on methodological challenges to agricultural LCA and its solutions, with emphasis on convergence of methods towards a common framework acceptable for both academia and industry. It will appeal to LCA practitioners studying agri-food, bioenergy and fibre-based systems and supply chains, but also to modellers dealing with agricultural systems at the field, farm and regional levels. The presentation of case studies is acceptable when it contributes to introduce methodological developments towards overcoming current (and future) challenges of LCA of agricultural systems and supply chains, including bioenergy production systems.