# Roadmap toward addressing and communicating uncertainty in LCA

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# ABSTRACT BOOK

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member reviewer. For e.g. ILCD EL the minimum required experience to be an independent reviewer are: 2 years of experience in verification/audit, 2 reviews performed, 2 years of experience in LCA methodology and practice, participation in 4 LCI works, at least 2 years of sectorial experience (public or private organisation, for each sector of eligibility) a single reviewer is eligible as member of a team, if is fulfilling at least 1 of the mentioned requirements. Different schemes are also defining the rules on the number and type of reviewers required (e.g. independent internal, independent external, or dependent internal reviewer). Those eligibility criteria are case-sensitive and therefore not implemented in the Reviewer Registry.

**MO237**

**Roadmap toward addressing and communicating uncertainty in LCA**

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Life Cycle Assessment (LCA) models for quantifying emissions and resources used as part of the life cycle inventory (LCI) step and for characterizing related impacts on human health, ecosystem quality, and natural resources as part of the life cycle impact assessment (LCIA) step together contribute considerable uncertainty and variability at different assessment phases. These contributions have led to questions about the ability of LCA results to be used in decision-making. Mainly, variability is related to spatiotemporal, technological, and interspecies and inter-individual differences, while uncertainty is further related to input data, model selection and choices, amongst other aspects. Currently, methods exist to assess and assign uncertainty and variability on LCI data as well as LCIA characterization results. However, often uncertainty is only assessed and reported qualitatively, is not comparable across impact categories and not consistently assessed and reported across levels of detail. Furthermore, many existing methods and models do not report uncertainty at all or limit their uncertainty assessment to a sensitivity analysis of selected input parameters, while ignoring variability, model uncertainty, and uncertainty related to choices and human errors. As part of the LCA Capability Roadmap, a committee of nearly 40 contributors under the auspices of the SETAC North America LCA Interest Group is currently working to identify research needs in the area of ill-characterized uncertainty. The group has investigated current best LCA practices, such as refinements to the pedigree matrix used to assess LCI data quality. In parallel, in the frame of UNEP-SETAC Life Cycle Initiative flagship project on providing Harmonization and Global Guidance for Environmental Life Cycle Impact Assessment Indicators, a task force focusing on uncertainty aspects has been established. This task force currently investigates best practices in existing LCIA methods and works on a minimum set of criteria for consistently reporting uncertainty in LCIA. These best practices and state of the art will be presented along with proposed milestones toward providing guidance of how to address and report uncertainty in LCA to improve current practice. Feedback is encouraged.

**MO238**

**Glucose production: influence of the datasets and of the long term emissions on LCA results**

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The aim of this study is to have a good understanding of the environmental impact of glucose production. Glucose is generally produced from corn or wheat. Since agricultural processes are known to be difficult to evaluate by LCA, the results obtained with two different LCA databases, Gabi and EcoInvent, are compared in this work. The production of glucose from raw materials can be divided in two steps: the agricultural step allowing the cereal production, and the conversion step including the extraction of the starch from the plant and its hydrolysis into glucose. Preliminary results underline the high impact of the agricultural step, so a special attention has been paid to these data. Specific Belgian data collected by the Walloon Agricultural Research Centre (CRA-W) (2014) have been used as primary data (yield, amount of fertilizers, etc.), either using EcoInvent or Gabi datasets background data to model fertilizers, diesel consumption, etc. A third model was built using only data available in Ecoinvent for corn and wheat cultures. For the conversion steps, literature data have been used along with some industrial data. Based on these multiple sources, it is possible to compare the LCA results for the production of 1 kg of glucose for three different cases. The results underlined that the differences between the two databases are smaller than the differences between specific data (Belgium data) or non-specific data (Ecoinvent) for the agricultural steps. Nevertheless, in some impact categories, the differences between the two databases remain high. The presentation will underline where these differences are coming from. This leads to also analyze the differences between background data such as energy generation or fertilizer production. Moreover, special attention has been put on the influence of long-term emissions, in the Ecoinvent database. As these emissions have a large influence in some impact categories, we have to clarify if we should include them or not in view of comparison with GaBi database. Moreover, the Ecoinvent model and the GaBi models have been realized in two different software (Simapro and GaBi, respectively), therefore, some checks have been performed to see if some differences can be induced by the software. In conclusion, this presentation will underline which is the sensibility of the results to parameters not controlled by the LCA practitioner, such as the datasets hypotheses, the software differences, etc.

**MO239**

**Exploring prospective scenarios of water supply mix**

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Recent research has been conducted for the development of a water supply mix (WSmix) for LCA. The WSmix is a mix of water resources and related technologies to meet a user at a specific time and location at a worldwide scale. The WSmix was inspired by 1) the concept of the electricity production mix in LCA 2) specific literature on inclusion of water in the LCI and the Quebec tap water supply mix, integrated in ecoinvent v3.2. The proposed WSmix represents a snapshot of what is embedded today in a m3 of water in terms of resources consumed and pollutants emitted to produce it. However, changes in water resources, mainly driven by changes of climate and socio-economic factors, will occur in the future. Climate change affects directly water availability, vegetation needs and land-use, while socio-economic factors like projected population growth directly impact future water consumption patterns, and water demand by different users. In this context, the WSmix should be able to consider those changes over time, in particular for products or infrastructure with long lifespans. Thereby, it would provide temporally projected water mix profiles, capable of reflecting the water-use environmental impacts under projected future conditions at any given location in LCA.The global model for future scenarios of WSmix builds on the current WSmix and presents the following specificities: i) per country (and watershed) ii) seasonal, annual, ii) for domestic, extended to agriculture and industrial uses, iv) for conventional and non-conventional water resources, v) for conventional and emerging new technologies. Several data sources have been analysed (water management plans, climate models, etc). Based on that, three major global variables seem to be the main driving forces for the modelling of future WSmix: climate change, growth and migration of populations and economic development. Literature review and data analysis on the future evolution of water resources and water needs has been done for several countries at a watershed level. Preliminary results on future scenarios for WSmix for several countries have been constructed. Aiming to cover more watersheds and countries, a global model for the forecast of WSmix scenarios has been created. The prospective WSmix model developed is an essential element for water-use impact assessments in LCAs for long lifespan products or infrastructures. Also, it can have a relevant applicability on water resource planning and management.

**MO240**

**Best Proxy: A New Methodology for Selection of LCI Dataset to Achieve Regionalized LCA**

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The common practice of using generic or country-specific LCI datasets for LCAs for which site-specific LCI datasets are not available can result in inaccuracies and affect the relevance of the LCA results. On the other hand comprehensive site-specific LCI datasets require considerable time and effort, and data that are rarely available at the level of desired detail. We present a new best proxy methodology for systematic selection of the most appropriate LCI dataset for a specific site, out of the available LCI datasets for a specific background process. The aim of the methodology is to select the dataset that will result in the LCA impact scores that are closest to "true values", at only a small fraction of the effort needed to generate a comprehensive site-specific LCI dataset. When used as a background process for an LCA of a product/service at that site, the selected dataset will evidently lead to better estimations of LCA results than a generic or random country specific LCI dataset. The selection process is based on the concepts of characteristics associated with each dataset for the background process and of "distance" between LCI datasets in the characteristics space, where the missing LCI dataset of the analyzed site is also represented by a set of descriptive characteristics. A rigorous mathematical approach is used to define the "distance" between any two datasets for a specific process in the characteristics space. The dataset with the minimum distance to the site with the missing dataset is the selected as the best proxy dataset. The methodology is general and can be applied to various background processes. The methodology is demonstrated and validated on a model of water supply systems that serves as a case study using a harmonized set of 23 published LCA studies and corroborated on a harmonized set of electric power stations fired by coal. The results demonstrate the validity and the predictive power of the methodology. The methodology has an incorporated learning capability, demonstrated with the case of the Israeli water system LCA. The cost-effectiveness of the methodology is demonstrated by comparing the effort needed to carry out a site-specific LCA of the Israeli water supply system to the effort of implementing the model for one site. The model developed for water supply systems can be used in sites for which site-specific LCAs are not available. The methodology can be