

Review Report
Report Number: CF-2021-09-21253190

15 November 2021

Critical Review of the Methodology for the LCI Database ""cm.chemicals"" by Carbon Minds

Carbon Minds GmbH
Eupener Str. 165
50933 Cologne

Documents for Review (sent between 22 June 2021 and 1 September 2021):

Methodology

- *cm_chemicals_methodology_V1_2021_01.docx*

Internal technical documentation

- *INTERNAL_METHANOL_docu.docx*

Input Data

- *final_distances.xlsx*
- *plant_production_volumes.xlsx*
- *SystemExpansion_coreLayer_V2.xlsx*
- *SystemExpansion_extensionLayer_V2.xlsx*
- *trade_volumes.xlsx*

Output Data

- *Folder ILCD_sample_TUEV20210722163632 containing sample data for 7 consumption mixes, 7 production mixes, 25 technology mixes in the core layer, 15 technology mixes in the extension layer and ILCD data set template*

Publications

- *Relevant documents on conferences, marketing and scientific publications*

Qualifications

- *Relevant documents on internal meetings, participation in conferences, CVs and certificates*

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Project:	Critical Review of the Methodology for the LCI Database "cm.chemicals"
Client:	Carbon Minds GmbH, Eupener Str. 165, 50933 Cologne
Contact person:	Raoul Meys (Carbon Minds GmbH)
Date of creation:	01.09.2021 (final documents)
Evaluated data:	Life Cycle Inventory (LCI) data for chemical industry
Inspector:	TÜV Rheinland Energy GmbH
Editor:	Susanne Jorre (Sustainability Expert) Susanne Dunschen (Sustainability Expert)
Test criteria:	Reliability, transparency, relevance and representativeness of the methods and data used; Conformity with ISO Norms 14040 and 14044
Scope:	Carbon Minds' methodology covers Life Cycle Inventory (LCI) data for approx. 1,000 products from the chemical sector in about 190 regions
Review checklist	Checkliste Methodenzertifizierung_Carbon Minds_TÜVRh_12.08.2021_CM_revTR.xlsx
Certificate	C01-2021-09-21253190, valid until 31.12.2022
Certipedia ID	81021

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1 General Information and Background of the Study

Carbon Minds GmbH (hereafter “Carbon Minds”) has developed a comprehensive Life Cycle Inventory (LCI) database for the chemical sector. TÜV Rheinland Energy GmbH (hereafter “TÜV Rheinland”) has carried out an independent review of Carbon Minds’ LCI methodology.

Scope of the review is to check if Carbon Minds’ methodology for compiling the LCI database are in accordance with the requirements of ISO 14040:2006/Amd.1:2020 and 14044:2006 + Amd 1:2017 + Amd 2:2020. In addition to the actual database, the motivation, method description(s), the technical suitability of the developers with regard to LCI/LCA topics as well as any existing templates and assumptions used, data sources and quality are also critically reviewed. TÜV Rheinland's services include an intensive review of the LCI methodology based on data sampling and comparison with relevant references. Carbon Minds is responsible for the content, methodology and its application. TÜV Rheinland’s conclusions are based on the assumption that the information and data provided by Carbon Minds is complete and accurate.

Carbon Minds’ methodology document and the completed audit as well as review checklist are considered to be framework documents defining the LCI methodology. These documents reflect the goal and scope of the cm.chemicals database, the LCI model, the documentation of LCI datasets and provide the motivation and the current status of implementation by Carbon Minds. The methodology document is publicly available and the review checklists are intended for internal use only.

The aim of this methodology review is to prove the consistency, transparency, relevance and representativeness of the underlying methods and data.

Relevant documents such as the methodology document, the underlying data and samples of LCI datasets were submitted between 22 June 2021 and 1 September 2021. Recommendations concerning the content of the documents, the LCI methodology, data used and open questions were discussed during an online conference call (30 August 2021).

Responsible for the LCI methodology review at Carbon Minds are Dr. Arne Kätelhön, Raoul Meys and Laura Stellner

2 Standards and Criteria

The review is carried out according to the international standards ISO 14040:2006 + Amd.1:2020 and 14044:2006 + Amd 1:2017 + Amd 2:2020.

The review shall ensure that:

- the methods used to model LCI data are consistent with this International Standard,
- the methods used to model LCI data are scientifically and technically valid,
- the data used are appropriate and reasonable in relation to the goal of the study,
- the interpretations reflect the limitations identified and the goal of the study, and
- the LCI dataset documentation is transparent and consistent.

TÜV Rheinland's scope comprised furthermore the following aspects:

- Carbon Minds' intended purpose of the LCI methodology,
- limited desktop review of the used background data,
- limited desktop review of Carbon Minds' data quality management,
- sample based review of technology data, market information, trade data and final LCI datasets.

3 Results of the Critical Review

The LCI data is modeled as required by ISO 14040 and ISO 14044. Carbon Minds has implemented a process to review data on relevance and accuracy, which takes place once a year for the cm.chemicals database and all output datasets. Updates are carried out for all data points that have been identified not to be representative based on Carbon Minds' quality ratings.

The quality assessment of the data used (technology data, market information and trade data) as well as the LCI dataset template for documenting LCI data were discussed in the review meeting. These were assessed as appropriate and suitable by the reviewers. The reviewers' recommendations for optimization of the template were adopted by Carbon Minds.

The reviewers recommend to update the methodology regularly to reflect future developments with regards to technology and data availability within the chemical sector.

The data base for modelling an LCI dataset consists of three types of data:

- Technology data depicting the full mass and energy balances for each production technology;
- Market information including production volumes of chemicals at specific sites for specific processes as well as meta-information on the company operating the plant or the first year of operation;
- Trade data reflecting import and export activities for the chemicals between countries. The data about international trade flows is based on reported information by each country to the United Nations Statistical Division

All data is derived from secondary data sources such as state-of-the-art data providers and literature research. The major sources are renowned databases, peer-reviewed studies and research papers. The different types of data, the data acquisition process as well as the process to derive LCI datasets are described in the methodology report. Regarding the available datasets, Carbon Minds differentiates between plant-specific, supplier-specific, and technology-specific datasets, as well as production mix and consumption mix datasets, depending on the level of detail and geographic scope needed by database users.

Altogether the data quality of the used sources and the quality of the resulting LCI datasets are estimated to be very high. It can be assumed that used data is appropriate. Nonetheless, a verification or quality check of all adduced studies and databases for sourcing data was not performed by the reviewer. To ensure the traceability of data, the modelling and documentation methods were explained within the provided documents. Altogether the data quality seems to be high in relation to the objective of the methodology.

It was noted by the reviewers, that the description of goal and scope, data acquisition, data modelling and documentation is presented in a detailed, consistent and transparent way.

A certification, which displays that the LCI methodology at Carbon Minds' meets the requirements of ISO 14040:2006 + Amd.1:2020 and 14044:2006 + Amd 1:2017 + Amd 2:2020, is approved by the reviewers.

4 Summary

In relation to the standards ISO 14040:2006 + Amd.1:2020 and 14044:2006 + Amd 1:2017 + Amd 2:2020 the reviewers conclude that the LCI database methodology developed by Carbon Minds GmbH is scientifically based and reflects the state of the art. The approach and principles behind the methodology are generally appropriate for the development of LCI datasets of the target industry. Furthermore the data used are appropriate for the goal and scope of the method. Necessary recommendations for the documentation and the datasets were discussed during the video conferences and implemented by Carbon Minds GmbH. For the future, TÜV Rheinland recommends to update the methodology in line with the developments in science and technology and to adapt the methodology document accordingly.

Literature

ISO 14040: 2006 + Amd.1: 2020: International Standard (ISO)

European Committee for Standardization (CEN),
Environmental management – Life cycle assessment – Principles and framework

ISO 14044:2006 + Amd 1:2017 + Amd 2:2020: International Standard (ISO)

European Committee for Standardization (CEN),
Environmental management – Life cycle assessment – Requirements and guidelines

Cologne, 15. November 2021



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