

**Meira Oy**

# **External critical review of carbon footprint report**

**Kulta Katriina Organic Light & Dark**

**21.3.2024**

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## 1. Introduction

This document is a critical review report of life cycle assessment conducted according to the standard ISO 14067:2018 “Greenhouse gases. Carbon footprint of products. Requirements and guidelines for quantification”. The critical review follows the standard ISO 14071:2014 “Environmental management. Life cycle assessment. Critical review processes and reviewer competencies: additional requirements and guidelines to ISO 14044:2006”. The critical review is conducted by Ecobio Oy.

The table below provides the basic information of the life cycle assessment report in concern.

<b>Title of the study</b>	Life cycle assessment report. Products: Kulta Katriina Organic Light & Dark.
<b>The commissioner of the carbon footprint study</b>	Meira Oy
<b>The practitioner of the carbon footprint study</b>	Nordic Offset Oy
<b>The exact version of the report to which the critical review statement belongs</b>	<i>Meira KK Organic Carbon Footprint Report – reviewed 12.3.2024.pdf &amp; KK Organic Carbon Footprint Summary – reviewed 15.3.2024.pdf.</i>
<b>The reviewers</b>	Minttu Valjakka, Ecobio Oy
<b>The review was performed based on...</b>	ISO 14044:2006, 6.2 (critical review by external expert)
<b>The review was performed a) in parallel, b) at the end of the study</b>	B) The review was performed at the end of the study.
<b>The reviewer a) included b) excluded an assessment of the LCI model</b>	A) The reviewer included the assessment of the LCI model.
<b>The reviewer a) included b) excluded an analysis of individual data sets</b>	A) The reviewer included an analysis of individual data sets
<b>Description of how comments were provided, discussed, and implemented</b>	Comments from the reviewer were collected on table 1 attached in this report (Appendix A) and they were discussed together with the practitioners by email. The practitioners had time to respond to the comments and make corrections to the carbon footprint report. Critical review meeting was held where LCA practitioner introduced the LCI model, and the comments were discussed.
<b>A statement of the result of the critical review</b>	The carbon footprint study follows the guidance of and is consistent with the international standard for carbon footprint of the products ISO 14067.

According to the standard ISO 14071:2014, critical review is the conformity assessment approach according to ISO 14040 and ISO 14044. In addition, according to ISO 14067, a critical review of carbon

footprint of product studies, if any, shall be performed in accordance with ISO/TS 14071. Critical review conducted by internal or external reviewers is established as a key feature for the acceptance of the life cycle assessment (LCA) study by stakeholders. According to ISO 14044, critical reviews are mandatory when studies are intended to be disclosed to the public and they make comparative assertions. However, critical reviews can be performed for non-comparative LCA studies too to improve the study robustness and to increase their credibility. As explained in ISO 14040:2006, 7.1, a critical review can neither verify nor validate the goals that are chosen for an LCA by the commissioner of the LCA study, nor the ways in which LCA results are used.

## 2. The carbon footprint study in concern

This critical review concerns carbon footprint study conducted by Meira Oy. The study is done according to the standard ISO 14067 (on top of ISO 14040 and ISO 14044). The impact assessment method used was IPCC Assessment Report (AR6) and the results declare the Global Warming Potential over 100-year time horizon of the product life cycle. The aim of the study is to provide customers with reliable and comparable information on the environmental impacts of Meira's products. The results can also be utilized internally for development purposes. Critical review is conducted by external reviewer Ecobio Oy.

### 2.1. Criteria for third party carbon footprint reports

According to ISO 14067 the purpose of the carbon footprint of products (CFP) study report is to describe the CFP study, including the CFP or the partial CFP, and to demonstrate that the provisions of the standard have been met. "CFP study report" is a specific term relating to the carbon footprint of products. Other standards use different terminology for the same type of document, e.g., "third-party report" used in ISO 14044. According to ISO 14044 when results of the LCA are to be communicated to any third party (i.e. interested party other than the commissioner or the practitioner of the study), regardless of the form of communication, a third-party report shall be prepared. The third-party report constitutes a reference document and shall be made available to any third party to whom the communication is made. The third-party report shall cover the following aspects:

#### a) General aspects:

- 1) LCA commissioner, practitioner of LCA (internal or external);
- 2) date of report;
- 3) statement that the study has been conducted according to the requirements of this International Standard.

#### b) Goal of the study:

- 1) reasons for carrying out the study;
- 2) its intended applications;
- 3) the target audiences;
- 4) statement as to whether the study intends to support comparative assertions intended to be disclosed to the public.

#### c) Scope of the study:

- 1) function, including
  - i. statement of performance characteristics, and
  - ii. any omission of additional functions in comparisons;

- 2) functional unit, including
    - i. consistency with goal and scope,
    - ii. definition,
    - iii. result of performance measurement;
  - 3) system boundary, including
    - i. omissions of life cycle stages, processes or data needs,
    - ii. quantification of energy and material inputs and outputs, and
    - iii. assumptions about electricity production;
  - 4) cut-off criteria for initial inclusion of inputs and output, including
    - i. description of cut-off criteria and assumptions,
    - ii. effect of selection on results,
    - iii. Inclusion of mass, energy and environmental cut-off criteria.
- d) Life cycle inventory analysis:**
- 1) data collection procedures;
  - 2) qualitative and quantitative description of unit processes;
  - 3) sources of published literature;
  - 4) calculation procedures;
  - 5) validation of data, including
    - i. data quality assessment, and
    - ii. treatment of missing data;
  - 6) sensitivity analysis for refining the system boundary;
  - 7) allocation principles and procedures, including
    - i. documentation and justification of allocation procedures, and
    - ii. uniform application of allocation procedures.
- e) Life cycle impact assessment, where applicable:**
- 1) the LCIA procedures, calculations and results of the study;
  - 2) limitations of the LCIA results relative to the defined goal and scope of the LCA;
  - 3) the relationship of LCIA results to the defined goal and scope, see 4.2;
  - 4) the relationship of the LCIA results to the LCI results, see 4.4;
  - 5) impact categories and category indicators considered, including a rationale for their selection and a reference to their source;
  - 6) descriptions of or reference to all characterization models, characterization factors and methods used, including all assumptions and limitations;
  - 7) descriptions of or reference to all value-choices used in relation to impact categories, characterization models, characterization factors, normalization, grouping, weighting and, elsewhere in the LCIA, a justification for their use and their influence on the results, conclusions and recommendations;
  - 8) a statement that the LCIA results are relative expressions and do not predict impacts on category endpoints, the exceeding of thresholds, safety margins or risks. And, when included as a part of the LCA, also
    - i. a description and justification of the definition and description of any new impact categories, category indicators or characterization models used for the LCIA,
    - ii. a statement and justification of any grouping of the impact categories

- iii. any further procedures that transform the indicator results and a justification of the selected references, weighting factors, etc.,
  - iv. any analysis of the indicator results, for example sensitivity and uncertainty analysis or the use of environmental data, including any implication for the results, and
  - v. data and indicator results reached prior to any normalization, grouping or weighting shall be made available together with the normalized, grouped or weighted results.
- f) **Life cycle interpretation:**
- 1) the results;
  - 2) assumptions and limitations associated with the interpretation of results, both methodology and data related;
  - 3) data quality assessment;
  - 4) full transparency in terms of value-choices, rationales and expert judgements.
- g) **Critical review**, where applicable:
- 1) name and affiliation of reviewers;
  - 2) critical review reports;
  - 3) responses to recommendations.

### 3. Critical review process

According to the critical review standard ISO 14071, the review process needs to be documented in the critical review report. At least one round of comments and associated modifications of the study should be performed to the study draft. After completion of all review comment iterations, the critical review statement shall document the final outcome of the critical review process. The review statement shall be issued for the final version of the carbon footprint study report.

The standard ISO 14071 uses life cycle assessment standard ISO 14044:2006 as its base, and according to the standard ISO 14044:2006, the critical review process shall ensure that:

- the methods used to carry out the LCA are consistent with standard ISO 14044:2006
- the methods used to carry out the LCA 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
- the study report is transparent and consistent.

#### 3.1. Review process of Meira Oy's carbon footprint study

Ecobio received a version (version dated 15.2.2024) of Meira Oy's carbon footprint report and after revision, Ecobio's experts listed their comments and notes on a table form presented in Appendix A. Also, the summary of the report (version dated 15.2.2024) was received. Comments related to the summary are presented in Appendix B. The comments varied from general editorial comments to more technical ones. The carbon footprint study practitioner was given time to do adjustments to the study based on the comment before review meeting. In the meetings the reviewers and the practitioners of the study then discussed the comments together to get a common understanding of the modifications

needed. After discussion, practitioners made the adjustments needed to finalize the study report and wrote their comments to the reviewers' table. These comments were checked by the reviewers and the finalized version of the carbon footprint study report (version dated 21.3.2024) was used for the critical review statement. The LCI model and individual datasets were reviewed generally in the review meeting and from Sphera's GaBi Dataset search engine and ecoinvent database available in Ecobio and from the background material Meira Oy provided for Ecobio.

### 3.2. Critical review of Meira Oy's Kulta Katriina Organic Light & Dark products' carbon footprint study

The critical review goes through the most important parts of the carbon footprint study performed by Meira Oy.

#### 3.2.1. Goal and scope of the study

The practitioner of the study has defined the goal and the scope of one's study to use life cycle assessment to compute the environmental impact of Meira Kulta Katriina Organic coffee products during their life cycle. The aim of the results is to provide customers with reliable and comparable information on the environmental impact of Meira's products. The results can also be utilized internally for development purposes.

The declared unit of the study is set to be 1 kg of the product (Kulta Katriina Organic Light roast or Kulta Katriina Organic Dark roast). Both products (light roast or dark roast) have same packaging sizes. The products are manufactured in Helsinki, Finland. The system boundary includes upstream module, core module and downstream module. The upstream module includes actions of coffee bean producers (cultivation in Honduras and in Tanzania), harvesting, transport to farm, pulping, drying, packaging, and transport to temporary storage of coffee beans) and coffee exporter (transport to own storage, mechanical drying, sieving, scaling, other handling, packaging and transport to port). The core module includes manufacturing process of Meira Oy (transport from Port-Antwerp to Vuosaari, transport from Vuosaari to Espoo, roasting and grinding, and packaging of coffee product). The downstream module includes actions of customers (distribution, use of the product, and product end-of-life). As the use phase has a significant role in coffee product's emissions, it is a good practice to include the use phase in the system boundary studied.

The reviewers find the goal and scope of the study do comply with the ISO standards requirements for now.

#### 3.2.2. Inventory analysis, including data collection and modelling

The practitioner of the study has collected the primary data concerning the coffee cultivation directly from 15 coffee farms in Honduras and from Boncafe with an Excel form. The data represents the coffee cultivation period May 2022-April 2023. For Tanzania, no primary data on coffee cultivation was available, so the most representative generic dataset was chosen. Primary data concerning the Kulta Katriina Organic coffee production was collected directly from Meira using an Excel form. For Meira's operations, the data represents the year 2021. Generic data used for modelling the upstream and downstream processes was collected from the Sphera and Ecoinvent 3.9.1 databases. No cut-off criteria were implemented. Data quality assessment was done from the perspectives of time, technological, geographical representativeness. Also, data precision, consistency and reproducibility, uncertainty, completeness, and treatment of missing data were evaluated. The reviewers recommended adding

evaluation concerning the sources of data in the assessment. Statements presented in the data quality assessment are well-justified.

The data studied is modelled with well-known life cycle assessment software. Allocation principles and mass-balance of material flows are well explained in the report. Allocation principles were discussed in the report and Numerical justification for allocations table is well-illustrative. Sensitivity analysis is reasonable. The reviewers find the inventory analysis do meets the requirements of ISO standards in its current state.

### 3.2.3. Impact assessment

The practitioner was calculated the emissions from different life cycle stages using the rules set in standard ISO 14040 and ISO 14044. Discussion of the results is well conducted. The reviewers recommended including more discussion of the results relationship with the goal and scope of the study and the LCI results and even rethink the original goal and scope. Other statement and limitations related to results were explained clearly.

The reviewers agree the presentation of impact assessment is in line with ISO standards rules.

### 3.2.4. Life cycle interpretation

Results of the study are reasoned and discussed well in the interpretation. Most important emission phases, and limitations and uncertainty analysis are considered. After all, points discussed in the interpretation were well explained and justified. Result figures for different packaging sizes and life cycle stages ease the understanding and interpretation of the results.

The reviewers agree that the life cycle interpretation meets the requirements of ISO standards.

## 4. Critical review statement

This statement concerns the finalized carbon footprint study report (version dated 21.3.2024) of Meira Oy's coffee products Kulta Katriina Organic Light roast and Kulta Katriina Organic Dark roast. After couple of modifications listed in the appendices, the reviewers confirm that the carbon footprint study follows the guidance of and is consistent with the international standard for carbon footprint of the products ISO 14067.



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Minttu Valjakka  
Consultant  
Ecobio Oy



# Appendix A

Critical review of the life cycle assessment report, comments from the reviewer on the carbon footprint report (version 15/03/2024)

Meira Oy, Products: Kulta Katriina Organic Light roast & Kulta Katriina Organic Dark roast

Reviewers: Minttu Valjakka, Ecobio Oy

Terms used in the review comment table 1:

“Type of the comment”: the type may be referring to “general” (ge), “editorial” (ed) or “technical” (te)

“Reviewer recommendation”: a place is left to the reviewer to propose recommendation

“Practitioner of the study response”: a place is left to the practitioner of the study to elaborate about the comment; if the response does not resolve the comment, it can be resubmitted in the next round of feedback.

In- dex	Clause/ sub- clause	Paragraph / Figure / Table	Type of comment	Reviewers comment #1	Reviewer question / recommendation	Practitioner of the study response #1	Reviewers comment #2	Practitioner of the study response #2
1	Goal and scope		ge	Missing info on LCIA methodology and types of impacts, and interpretation to be used	Add information on LCIA methodology and types of impacts, and interpretation to be used. (ISO 14044: 4.2.3.1). Now the scope is not describing properly what the study is about.	Added.	OK	
2	Goal and scope		ge	Statement of comparative assertions	Add a statement as to whether the study intends to support comparative assertions	Added.	OK	

					intended to be disclosed to the public.			
3	System boundary		te	Missing information of quantification of energy and material inputs and outputs	From the figure cannot be seen how material and energy flows and their quantities proceed in the system. Please add, at least for main flows.	Figure updated.	OK	
4	Annex 1	Transport processes	ge	Unit of transportations	The unit is [km], no [tkm]? Is this correct? Also, it is interesting to see how the transportations are modelled since the results seem relatively high.	The units are shown here as they are input in the LCA model, so they are correct. In the model, the transport distances are connected to the corresponding masses so eventually the calculation is done based on tonne kilometers.	OK	
5	Annex 1	Upstream module	te	Data geography	I assume electricity datasets with geographical representativeness of USA were assumed being most relevant for Honduras? Considered Rest-of-World datasets?	Yes, for electricity geographical representativeness was assumed most relevant for Honduras. Global data was not available in Sphera database for the specified forms of electricity (hydro and geothermal power).	OK	

6	Annex 1	Upstream, core and downstream modules	te	Output of unit processes	<p>What is the output of unit processes? How you calculate the results per 1 kg of product? Please describe.</p> <p>Also, hard to evaluate the correctness of input quantities since the output quantities are not shown.</p>	<p>Outputs of unit processes were added to annex 1 tables.</p>	OK	
7	Allocation principles	Table of allocations	te	Mass balance of life cycle	<p>Please, explain or describe how the mass balance of unit processes and whole production chain works? How can 86 310 kg of green coffee make over 11 million kg of coffee products in total? This could be added in the system boundary diagram, too.</p>	<p>The allocations were made for three separate entities 1) Coffee cultivation, 2) Boncafe operations and 3) Meira operations. For coffee cultivation, the basis for allocating electricity etc. was the 86 310 kg green coffee output of the 15 sample farms. This is assumed to be representative for the cultivation of the whole volume of 555 036 kg collected and exported by Boncafe for the purposes of Kulta Katriina Organic.</p> <p>Similarly for Boncafe, the basis for allocation was their total handled</p>	<p>Please, mention in the table, that there are 17 303 564 kg (= 18 116 067 kg – (559 275 kg + 253 228 kg)) of other co-products to which manufacturing inputs upstream emissions have been allocated.</p>	<p>Added this note to text on page 6. <b>OK.</b></p>

						green coffee volume of 555 036 kg to get the consumption per 1 kg of handled green coffee. The 11 million kg described the whole coffee production volume of Meira, the total production volume (incl. spices) is 18 million kg, which was used as a basis of allocation of electricity etc. used in the Meira factory.		
8	Data quality assessment	Table of data quality assessment	te	Missing information of sources of the data	Add data quality assessment about sources of the used data.	Added to data quality assessment table.	OK	
9	Life cycle inventory		te	Missing information of sensitivity analysis	Was any sensitivity analysis done during the LCI? Any considerations how, e.g., choices of datasets affect on the system boundary or the results? Could the energy scenarios for core module be sensitivity of results related to energy sources?	Sensitivity analysis was made only regarding the choice of different energy sources of the roasting factory.	OK	
10	Page 6		ed	Empty page	Please, remove empty page.	Removed.	OK	
11	Life cycle	Paragraph 4	te	Results relationship with the goal and	Can you further discuss what is the relationship of the results	Added to page 10, interpretation.	OK	

	impact assessment			scope of the study and the LCI results	with defined goal and scope and the LCI results?			
12	Life cycle impact assessment	Paragraph 2	te	Impact categories	<p>Why only results of GWP-fossil impact category are presented? How it relates to the goal and scope where it is stated that aim is to provide customers with reliable and comparable information on the <i>environmental</i> impacts, and then only impact category is GWP-fossil? This is somewhat parallel question to the previous one.</p> <p>Could be considered, should the study be “carbon footprint of products” instead of LCA and also follow ISO 14067, if only interesting results are GHG emissions? If not, the choice of omitting results of other impact categories from the study should be justified (ISO 14044: 4.4.2.2.1).</p> <p>When communicating the results to consumers the study should follow the</p>	<p>The report has been revised to follow ISO 14067 and all the results tables and figures were updated.</p>	<p>Change the report title “Carbon footprint report”. And still, in the report’s goal and scope is written that “The goal of the study was to use life cycle assessment to compute the <b>environmental impact</b> of Meira Kulta Katriina Organic coffee products during their life cycle. The aim of the results is to provide customers with reliable and comparable information on the <b>environmental impact</b> of Meira’s products.” If your aim was to calculate carbon</p>	<p>Title changed and page 3 terms edited to “carbon footprint”. OK.</p>

					requirements which are set for LCA strictly. Reporting should be transparent, precise, and different choices made during the study should be reported clearly and justified well. Also, when buying organic coffee, customers might be interested on aspects as biodiversity or social sustainability, so it's highly recommended to justify omitting all other impacts than GHG emissions (at least) and changing the scope of the study or adding the other impact categories in the study (preferable).		footprint of the product, state so.  Result tables and figures OK.	
13	References		ge	Missing reference for impact assessment method	Please, add reference to impact assessment method, all characterization models, characterization factors and methods used, including all assumptions and limitations.	Added.	OK	

# Appendix B

Critical review of the life cycle assessment report, comments from the reviewer on the carbon footprint summary (version 15/03/2024)  
 Meira Oy, Products: Kulta Katriina Organic Light roast & Kulta Katriina Organic Dark roast  
 Reviewers: Minttu Valjakka, Ecobio Oy

Terms used in the review comment table 1:

“Type of the comment”: the type may be referring to “general” (ge), “editorial” (ed) or “technical” (te)

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In- dex	Clause / sub- clause	Paragraph / Figure / Table	Type of comment	Reviewers comment #1	Reviewer question / recommendation #1	Practitioner of the study response #1	Reviewers comment #2	Practitioner of the study response #2
14	1.1. Life cycle as- sessment	Information box about LCA	ge	Misleading infor- mation in relation to results	In LCA generally, 15+ environ- mental impact indicators <i>can be</i> analyzed, but it’s a bit misleading to state that 15+ indicators <i>are</i> analyzed and then only present results for one of them (GWP-fos- sil). Please fix this.	Fixed: In this project, the GWP of the studied products was examined, following the standard ISO 14067.	OK	
15	1.3. Scope of the study	System boundary figure	ge	Missing infor- mation of quanti- fication of energy and material in- puts and outputs	Recommended to fix the figure in the summary in addition to the report. Also, now figures are not identical.	Figure updated.	OK	

16	1.4 Studied products	Table of products	te	Allocation of emissions between product sizes	In the report, it is presented the results for each packaging sizes. Can you clarify, how the allocation was done between the product sizes?	The final result for 1 kg was simply scaled for other product sizes by multiplying it with 0,45kg, 44x0,1kg or 15x0,3kg.	Add this information on page 10 or next to figure in the LCA report.	Added on page 10. OK.
17	2.1 Summary of results	Second bullet point	te	Difference in natural gas consumption	Add information about difference in natural gas consumption in the LCA report. For example, in the System boundary section where the core module is described and in the Allocation principles section to clarify the allocation shares.	Added on page 8 (studied products).	Couldn't find the information in the LCA report. Please add.	Added on page 10. OK.
18	3.2 Emission reductions	List of identified emission reduction actions	ge	Inconsistency between summary and LCA report	Listed identified emission reduction actions are not in line with the issues recognized in the results interpretation in the LCA report. You should discuss the actions listed in the summary also in the report.	Added section "conclusions and recommendations" in the report.	OK	
19	3.4 Carbon offsetting	Total carbon footprint	ge	Total amount	Earlier in the summary (2.2) you discuss total values without delivery and coffee consumption. This is understandable since those are scenarios. In 3.4 Carbon offsetting, what's included in the total value?	In section 3.4 both cradle-to-gate and full life cycle figures are presented in their own rows. The recommendation is to use the full life cycle results as a basis for possible carbon offsetting.	OK	



