

2018

Critical Review Statement: Life cycle assessment of drainage channels of BG-Graspointner GmbH & Co KG

Life Cycle Assessment of drainage channels of BG-Graspointner GmbH & Co KG.

Summary report

Version: May 03, 2018.

Authors: Dr. Adriana Díaz and Dr. Wolfgang Wimmer.

"ECODESIGN company" engineering & management consultancy GmbH

www.ecodesign-company.com



**Graspointner
Holding GmbH**

Life cycle assessment of drainage channels of BG-Graspointer GmbH & Co KG

Critical Review Statement

Reviewer

Dr. Niels Jungbluth
ESU-services Ltd.
Vorstadt 14
CH-8200 Schaffhausen
Tel. +41 44 940 61 32
jungbluth@esu-services.ch
www.esu-services.ch

Customer

Klemens Wiese
Group Managing Director
Graspointner Holding GmbH
Gessenschwandt 39
4882 Oberwang | Austria
Mobil: +49 (173) 67 52 281
Tel.: +43 (6233) 8900 - 202
Klemens.Wiese@bg-company.com
www.bg-company.com

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Imprint

Title	Life cycle assessment of drainage channels of BG-Graspointner GmbH & Co KG
Authors	Niels Jungbluth
Commissioner	Graspointner Holding GmbH
Publications	Each reference to this review statement is only allowed if the same publication shows also the full review statement without alterations.
Version	04.05.18 11:53 C:\Users\Niels Jungbluth\Dropbox\Niels\597 CR bg-company ecodesign\Jungbluth-Critical Review-statement-LCA-drainage-channels-v1.0.docx

1 Background and Objectives

The customer has prepared an LCA/EPD study for showing the environmental impacts of different products made from conventional concrete and lightweight concrete. The two types of main materials are investigated in 6 scenarios for different types of application in drainage channels. The LCA is carried out according to EN 15804 (European Committee for Standardisation (CEN) 2014) and shall form the basis for an EPD of these products.

The LCA study was carried out according to the standards ISO 14040-44 and EN 15804. In this context, the customer has launched an external critical review according to the standard ISO 14040. This critical review shall turn around points defined by the standard ISO (objectives and scope, analysis of the inventory, the evaluation of the impacts and the interpretation). For this LCA one LCA expert has reviewed the LCA (for compliance to ISO14044).

2 Description of the work to be reviewed

The commissioner asked Dr. Niels Jungbluth for a critical peer review. Key characteristics for this review are summarized in the following Tab. 2.1.

Tab. 2.1 Key characteristics of the work to be reviewed

Title	Life cycle assessment of drainage channels of BG-Graspointer GmbH & Co KG
Commissioner	Graspointner Holding GmbH
Main authors	Dr. Adriana Diaz, Ao. Univ. Prof. Dr. Wolfgang Wimmer, Ecodesign-Company
Products and variants investigated	LCA for concrete and new lightweight concrete drainage channels in different dimensions.
Scope	Cradle to gate and transport to construction place
Functional unit	1 m of drainage channel
Standard to be applied	European Committee for Standardisation (CEN) 2014; Institut Bauen und Umwelt e.V. 2013; International Organization for Standardization (ISO) 2006a, b A product category rule (PCR) was not applied in this study.
Product category rules	none
Comparative study	No comparison with market products. Different types of products of one producer are investigated, but not explicitly compared.
Publication foreseen	Yes
Size of documentation provided for review	80 pages report
Software for background calculations	SimaPro 8.3
Background database	Ecoinvent v3.3 (ecoinvent Centre 2016, Allocation at point of substitution), ecoinvent Centre 2010; IES 2007
Foreground data	Production of concrete and concrete products
Provision of LCI data for review	Documented in SimaPro project available for review
Life cycle impact assessment	Indicators pre-defined in EN 15804 (European Committee for Standardisation (CEN) 2014)
Stages of the review	One stage for review of the full LCA
Meetings in person	None
Reviewer	Dr. Niels Jungbluth, ESU-services Ltd.

The International Organization for Standardization (ISO) (2006a:6.3) states the following concerning the procedure for the review of a comparative study planned to be published:

“A critical review may be carried out as a review by interested parties. In such a case, an external independent expert should be selected by the original study commissioner to act as chairperson of a review panel of at least three members. Based on the goal and scope of the study, the chairperson should select other independent qualified reviewers. This panel may include other interested parties affected by the conclusions drawn from the LCA, such as government agencies, non-governmental groups, competitors and affected industries.”

3 Standards and review criteria

The critical review was carried out according to the International Standards ISO 14040 and 14044 (International Organization for Standardization (ISO) 2006a, b).

The LCA was reviewed according to the following five aspects outlined in ISO 14040. It is assessed whether

- *“the methods used to carry out the LCA are consistent with this International Standard,*
- *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, and*
- *the study report is transparent and consistent.”*

4 Tasks of the reviewers

The task of the reviewer is to review the provided documentation according to Tab. 2.1 including the four LCA phases, namely

- Goal and scope definition,
- Inventory analysis,
- Impact assessment, and
- Interpretation and conclusions

The following interactions between the commissioner, the practitioner and the reviewer took place:

- Announcement of review (10.4.2018)
- Provision of draft LCA report dated 10.4.2018, 67 pages in PDF-format, including a full description of the study.
- Submission of first round of review comments (11.4.2018)
- Provision of LCI model in SimaPro format (12.4.2018) with about 250 unit processes.
- Submission of additional review comments for SimaPro model (12.4.2018)
- Telco for discussing comments with the main author (17.4.2018)
- Feedback on a one-page summary of the study (18.4.2018)
- Provision of revised draft LCA report dated 30.4.2018, 81 pages in PDF-format
- Submission of second round of review comments (3.5.2018)
- Provision of the final LCA report dated 3.5.2018, 80 pages in PDF-format

- Most questions of the reviewer were answered sufficiently. Upon reviewer's request revisions were made concerning documentation in the report and description of results. The critical review process took place in an open and constructive atmosphere. The final study report includes almost all the comments of the reviewer given in the earlier stages of the review process.
- The present final version of the review report considers the revisions made by the practitioner after submitting the feedback on the pre-final report.
- The goal of the study as such was not reviewed as this lies in the responsibility of the commissioner. However, it was reviewed whether the goal is stated explicitly and transparently. The definition of the scope was part of the critical review, the definition of the functional unit, the system definition and its boundaries and the allocation approaches.
- The review of the inventory analysis includes the inventory raw data in SimaPro format (input data), the modelling approaches and selected inventory results. There were more than 250 unit processes modelled for this project, which have been checked randomly.
- The review of the impact assessment includes the impact indicator results.
- No revisions have been made by the authors concerning issues identified in the life cycle inventory modelling and the application of characterisation factors for LCIA methods in SimaPro. But, the data used are described in the report.
- Within the interpretation phase, the consistency of the modelling, the data used, and the conclusions are reviewed and checked whether they are in line with the goal and scope definition. Data quality aspects, significance and sensitivity analyses as well as completeness checks are subject to the critical review too.
- It was not in the responsibility of the reviewer to check the report for formatting, layout, grammar and spelling issues.
- This critical review statement is only valid for the full LCA report as it was provided for final review.
- No additional abstracts or summaries of this report have been reviewed in its final version.

5 Critical review report according to ISO 14040ff

5.1 Consistency of the methods with the ISO standards

The functional unit and reference flow are considered appropriate for the goal and scope of this study.

For the impact assessment a list of mid-point indicators has been chosen following to the standard applied.

5.2 Scientific and technical validity of the methods applied

In general, the inventory models established are scientifically and technically valid.

There are some limitations about the life cycle impact assessment methods applied. The implementation of the characterisation factors for water use neglects most of the water used in the life cycle because this is inventoried in the ecoinvent v3.3 data with regionalized water flows which were not yet implemented in the method used by the authors. Thus, impacts of water consumption are clearly underestimated. During the review it was recommended to revise the method according to the background data applied in this study. This limitation is also pointed out in the study.

5.3 Appropriateness of data

All foreground data, including the whole modelling and calculations, were presented for the first draft version to the reviewer in SimaPro format. This facilitated the review considerably and is highly acknowledged.

The use of SimaPro 8.3 and ecoinvent v3.3 is slightly outdated at the time of the first review when SimaPro 8.5 and ecoinvent v3.4 were available.

Three different background databases with different modelling ideas are mixed in the project as described by the authors. This causes certain problems for the interpretation of results which are pointed out later.

During the calculation of impacts, the influence of infrastructure has been ruled out as described by the authors. The reasoning for this was debated in the review process and the reviewer would have recommended to include also infrastructure processes in the calculations as they are not negligible (as shown e.g. in Tab. 36 of the report). Thus, results presented in the report do underestimate the environmental impacts to a certain extent.

So-called “market processes” in ecoinvent v3 include already the transport of the raw material to the first processing stage. The authors also added transports in their assessment and thus in some cases there might be an overestimation of such transports. But, this should be in the range of uncertainty of total environmental impacts.

The data used in the foreground and in the background can be justified in view of the goal and scope of the study. But, several limitations must be considered while looking and interpreting the results.

For the reviewer, it is not possible to fully ensure the correctness and validity of all calculations within such a review process.

5.4 Assessment of the interpretation in view of limitations and goal and scope

The report shows the results for a range of different products without comparing the results in detail nor interpreting such a comparison. As such the results presented in the report are well justified.

But, the reader might try to do this comparison on their own. Therefore, the limitations e.g. due to the mix of different background databases must be considered. Such possible limitations for a comparison of products investigated have not been highlighted in the study.

One issue that should be considered is the calculation of transport impacts for which it is assumed that impacts of a truck are directly related to the weight of the product. This favours lightweight products. But, it must be considered that the fuel consumption of a fully loaded truck is not reduced as much as expected if the volume of products is the same. Thus, for a comparison of the different products investigated in this study a better interpretation of such critical issues would be necessary. At least it can be said that the impacts of transport are not very dominant.

The Monte-Carlo analysis made by the authors relies on information to be provided with the life cycle inventories. Such information is not available for the ELCD database and for most of the foreground data. Thus, this part of uncertainties is missing in the analysis as mentioned by the authors.

Results for abiotic depletion, resources are very different for different products depending if Zinc coating is applied or not. It would be recommended to critically discuss if such a difference

due to a small amount of material used really make sense. This might be an issue of underlying background data or the LCIA method.

There is a huge impact from fine sand dataset present in the ELCD database for results concerning “Use of net fresh water”. This seems to be a result of underestimating the impacts of this indicator while using ecoinvent v3 datasets.

For POCP and ADPF there are huge impacts from fine sand dataset present in the ELCD database. Here it can be assumed that modelling is not consistent with the modelling in ecoinvent.

The non-hazardous waste disposal indicator is very much influenced by black chrome coating which is used here as a proxy. This type of coating is normally used for solar collectors to make the surface black. Also, here results should be interpreted carefully.

Such limitations due to the choice and combination of data and impact assessment methods are not always mentioned in the interpretation of results in this report.

Otherwise, the interpretation considers the limitations due to the goal and scope of this study.

5.5 Transparency and consistency of study report

All relevant information could be found in the report (or the electronic data). The report is clearly structured and well-readable. With the information, the report is acknowledged as transparent .

5.6 Self-declaration of reviewer independence & competencies

(According to ISO/PDTS 14071, Annex B)

I (Niels Jungbluth), hereby declare that:

- I am not a full- or part-time employee of the study’s commissioner or practitioner.
- I have not been involved in scoping or carrying out any of the work to conduct the LCA study at hand, i.e. I have not been part of the commissioner’s or practitioner’s project team(s).
- I do not have vested financial, political, or other interests in the outcome of the study.

My competencies relevant to the Critical Review at hand include knowledge of and proficiency in:

- ISO 14040 and ISO 14044.
- LCA methodology and practice, particularly in the context of LCI, (including data set generation and data set review, if applicable).
- Critical Review practice.
- The scientific disciplines relevant to the important impact categories of the study.
- Environmental, technical, and other relevant performance aspects of the product system(s) assessed.
- Language used for the study.

A short CV and a list of relevant references are part of the review report.

I assure that the above statements are truthful and complete.

5.7 Conclusions

The reviewed LCA study as outlined in Tab. 2.1 complies with the requirements of the ISO standards 14040 and 14044. The goal and scope are appropriately defined. The methods used are scientifically and technically valid. The data used are appropriate and reasonable in view of the goal and scope of the study. The report is complete, clearly structured and well-readable.

Some limitations concerning data and interpretation are mentioned in this critical review statement.

I recommend submitting the entire LCA report including this review report to the commissioner.



Dr. sc. tech. ETH, Niels Jungbluth

Chief Executive Officer ESU-services Ltd.

Schaffhausen, Friday, 04 May 2018

6 References

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7 The reviewers experience and company

7.1 Dr. Niels Jungbluth, Chief Executive Officer (CEO)

7.1.1 Philosophy of [ESU-services Ltd.](http://www.esu-services.com)

ESU-services Ltd. was founded in 1998. Its core business is research, consulting, review and training in the field of Life Cycle Assessment (LCA). This methodology aims to investigate

environmental aspects of products and services from cradle to grave, from resource extraction to manufacture, use and end of life treatment. We also work with related methods such as carbon footprinting and Substance Flow Analysis (SFA).

Fairness, independence and transparency are the main characteristics of our consulting philosophy. We work issue-related and accomplish our analyses without prejudice. We document our studies and our work in a transparent and comprehensible manner. We offer a fair and competent consultation, which enables our clients to control and continuously improve their environmental performance.

ESU-services covers several economic sectors such as energy, basic minerals, metals and chemicals, biomass, transportation, waste management, information technology, food and lifestyles. ESU-services also contributes to the development of impact assessment methods such as ecological scarcity 2006. Since 2007, ESU-services runs the Regional SimaPro Competence Centre of Switzerland, Liechtenstein and Austria.

7.1.2 CV

Dr. Niels Jungbluth studied Environmental Engineering at the Technical University of Berlin. He made his diploma thesis during a six month stay at the TATA Energy Research Institute in New Delhi, where he prepared a life cycle inventory for cooking fuels in India. Between 1996 and 2000 he worked on a Ph.D. Project at the Swiss Federal Institute of Technology (ETH) in Zurich at the chair of Natural and Social Science Interface. His Ph. D. thesis on the environmental consequences of food consumption has been awarded with the Greenhirm Price 2000 by the German Öko-Institut. In this thesis he investigated food consumption patterns by means of life cycle assessment.



He started working with ESU-service in 2000. Between 2006-2012 he was managing partner together with Rolf Frischknecht. Since 2012 he acts as a managing director. His main working areas are food, biomass, energy systems, input-output-analysis and sustainable consumption. He is responsible for the SimaPro centre and the data-on-demand service of ESU.

Dr. Niels Jungbluth is in the editorial board of the “Int. Journal of LCA” and works as reviewer for several other scientific journals. He works as a special expert for several organisations as e.g. Deutsche Bundesstiftung Umwelt, United Nations Framework Convention on Climate Change UNFCCC, CEN TC 383 standard (GHG accounting on biofuels), UNEP-SETAC life cycle initiative, Swiss law on tax exemption for biofuels.

7.1.3 References (selection)

ESU-services has conducted more than 300 projects related to LCA in the past 20 years. See below for a short list of the most recent and relevant projects involving a review. A full description of the company including a list of several hundred project references can be found on the Internet (www.esu-services.ch/projects/fulllist/). The full list of papers peer-reviewed by Niels Jungbluth can be found on publons.com/author/488732/niels-jungbluth#profile.

Year	Project title	Commissioned by
Since 1999	Peer Reviews of papers	The International Journal of LCA, the Journal for Cleaner Production, the Journal of Industrial Ecology and the Environmental Impact Assessment Review
Since 2001	Subject Editor "LCA for Energy Systems and Food Products"	The International Journal of LCA
Since 2014	Individual verifier for the international EPD® System	On request
2018	Update Critical review of an LCA study on transport packages for vegetables and fruits	Fraunhofer-Institut für Umwelt-, Sicherheits- und Energietechnik
2017-18	Critical Review: Comparative LCA between bio-isobutene (produced from sugar beet) and fossil propane/butane for gas cooker application	Butagaz, FR
2017-18	Critical Review: LCA of mono propylene glycol	Oleon, FR
2017	Validation of company specific LCA guidelines	Nestec Ltd. Nestlé Research Center
2016-17	Critical Review of developments for the Product Biodiversity Footprint	i care & consult
2016	Critical review of an LCA study on transport packages for vegetables and fruits	Fraunhofer-Institut für Umwelt-, Sicherheits- und Energietechnik
2015	Critical review of an LCA study on cotton recycling	H & M
2014	Critical review of an LCA study on coffee	Luigi Lavazza S.p.A.
2014	Critical review of the GreenCALC web tool	NEFAB
2014	Critical review of an LCA for bread baking	FP7 Low Energy Ovens (LEO) project
2014	Critical review of an LCA and ILCD dataset for global organic cotton production	TEXTILEEXCHANGE
Since 2011	Editorial Boardecoinvent for the themes: 06 Extraction of crude petroleum and natural gas, 19 Coke and refined petroleum products, 27 Electrical equipment and several other themes	ecoinvent Centre
2013	Critical Review of an LCA of a water consumption device	Itron
2013	Review of research proposals	The European Commission, 7th Framework Programme
2012, 2013	Review of project proposals FNR	Fonds National de la Recherche, Luxembourg
2012	Critical Review "Life Cycle Assessment of Toray Film Europe's PET and OPP films"	Toray Film Europe
2012	Critical Review of a study on the carbon footprint and energy use for unconventional natural gas from fractionating	International Institute for Sustainability Analysis and Strategy (IINAS)
2011	Critical Review life cycle inventory of bitumen products	Eurobitume, BE
2010	Critical review of an EPD for agricultural biogas	AXPO AG
2010	Critical Review of an LCA study of bio-ethylene vs. ethylene	The Procter and Gamble Co., US
2010	Review of the ecological footprint calculator	WWF Switzerland
2009	SimaPro coaching and development of agricultural calculation models	Agroscope Reckenholz-Tänikon Research Station ART
2009	Review of project proposals for the French Food Research Programme ALIA	INRA support Unit of ANR, FR
2009	Review study "sustainable construction with steel"	Stahlbau Zentrum Schweiz
2008	Review of primary energy factors	Amt für Hochbauten der Stadt Zürich
2008	Background review of consumer information	Coop
2008	Critical review of an LCA of green waste disposal and utilization in Basel	ERZ Entsorgung und Recycling Zürich
2008	Review of LCA studies	Geberit International AG
2008	Review openLCA data converter	GreenDeltaTC GmbH
2007	Review building products database by Empa	Amt für Hochbauten der Stadt Zürich
2007	Review of CO2-intensities used by EnvImpact	Centre Info
2007	Critical Review of an LCA for hand drying systems	HTS Suisse SA
2006	Review New CHP Energy Systems	Swiss Federal Office of Energy (SFOE)