LCA report Happy Coco

Coco Yoghi, Oat Yoghi, Coco Icecream, Raw Coco Water

Base products and flavouring

Ecochain

Content

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Summary

In this study, an environmental assessment has been conducted based on the ISO standardized method of 'Life Cycle Assessment (LCA)'. The study focused on Coco Icecream (125 ml / 350 ml), Coco Yoghi (125 ml / 330 ml), Oat Yoghi (125 ml / 330 ml), Coco Water (250 ml) and flavouring (Vanilla, Cocoa and Caramel syrup). Sauces have been calculated in the process model but have only been marginally included in this report. Further details can be found in the Mobius application that is used for the calculations.

Results are presented for:

1. **Climate Change (kg CO_2 eq., GWP100)**
2. **Terrestrial Ecotoxicity**
3. **Water Consumption**

Results on 15 other environmental indicators can be found in the Mobius application.

Standing out is that the growing of coconuts, Happy Coco's most used ingredient, is scoring low in all the three impact categories in this report. This is because Happy Coco sources from only one plantation in Sri Lanka where low-impact practices are used. These include organic garden-forestry farming, using mostly rainwater for watering, no use of chemical pesticides or chemical fertilizers and no land use change (i.e. no rainforest destruction).
From the fact that all ingredients used are organic we can estimate that these products generally score lower on terrestrial ecotoxicity and water consumption.
Another factor in the score of Happy Coco is that the vegan nature of all products lowers the effect on climate compared to animal products.
Further, cacao and vanilla that according to standard data have high impacts on climate change because of land use change, are responsibly sourced from certified suppliers in the case of Happy Coco Icecream and therefore do not contribute to land use change and its related impacts.
Regarding packaging, from the data we can estimate that the combined use of PE and recycled carton has a lower impact then if the packaging was made fully of PE. We can also see that the recycled carton cup used for 330 ML icecream have lower impacts then when virgin paper is used.

The study showed significant contribution of various input parameters for different impact categories;

- Coconuts do not appear to be a hotspot in the coconut base products. Their impacts are caused by compost use, dolomite use and diesel use but appear to be relatively low.
- Electricity use, guargum and yoghurt cultures appear to have a low contribution to the environmental impacts.
- Transport appears to have a significant contribution to the environmental impacts, especially terrestrial ecotoxicity. Sea transport has a high contribution to climate change. Truck transport has a high contribution to terrestrial ecotoxicity.
- The PLA bottle of the Happy Coco water has a very high contribution to water consumption.
- Paper packaging has a high contribution to water consumption.
- Polypropylene packaging has a high contribution to climate change.
- The aluminium lid has a high contribution to climate change and water consumption.
- The PE / carton cup and lid have a high contribution to water consumption.

1. Introduction

1.1. Background

Happy Coco is a company with headquarters in Amsterdam (NL) and Munich (DE). Happy Coco produces a variety of vegan yoghurt and ice products that are largely based on coconut ingredients. Coconuts are grown in Sri Lanka on an organic farm and processed into organic coconut products. These coconut products are sold on the European market. Sustainability and Responsible business are key values to Happy Coco and Happy Coco is committed to aiding society and mother Earth.
In this study, environmental impacts are calculated of Happy Coco products using Life Cycle Assessment (LCA). Life Cycle Assessment is the most widely accepted methodology for calculation of environmental impacts and has been standardized in a series of International standards and protocols:
NEN-EN ISO 14040 [1], NEN-EN ISO 14044 [2], NEN-EN 15804 [3] and NEN-EN ISO 14025 [4]. These standards are followed in this study. According to these standards, there are four phases in an LCA study:

a) Goal and scope definition
b) Inventory analysis
c) Impact assessment
d) Life cycle interpretation.

In the goal and scope definition, the purpose of the LCA is defined, as well as the system boundary and the level of detail (which environmental impacts are taken into account). The life cycle inventory analysis is the second phase of LCA. It is an inventory of input/output data with regard to the system being studied. It involves the collection of the data necessary to meet the goals of the defined study. The impact assessment contains the results (environmental impacts) of the analysis. The life cycle interpretation is the final phase of the LCA procedure, in which the results are summarized and discussed as a basis for conclusions, recommendations and decision-making in accordance with the goal and scope definition.

Paragraph 1.2 contains the goal and scope definition. Chapter 2 contains the inventory analysis. Chapter 3 is the impact assessment and chapter 4 is the life cycle interpretation.

1.2. Goal and scope

The study will focus on a set of base products produced by Happy Coco that are sold with different kinds of packaging and various types of flavouring. The analysis includes the production and transport of the ingredients and packaging materials, the production of the products and flavors and transport to a Happy Coco distribution center (Roelofarendsveen or Raalte).
The goal of the study is to gain insight in environmental impacts of all materials and processes in the lifecycle of the (base) products and to provide tools for optimization of the environmental performance of the (base) products. Results will be used for R&D by Happy Coco and in communication with stakeholders.
The Life cycle impact assessment method that is used is ReCiPe [5] which is the most widely accepted and up-to-date impact assessment method.

NB: This report only contains a subset of products and results. The entire productportfolio and results for all environmental impact categories can be found in the online process model 'Mobius'.

The following products are investigated in this report:

- 1 unit of Coco Yoghi 330 ml
- 1 unit of Oat Yoghi 330 ml
- 1 unit of Coco Yoghi 125 ml
- 1 unit of Oat Yoghi 125 ml
- 1 Cup of Coco Icecream 350 ml
- 1 Cup of Coco Icecream 125 ml
- 1 Bottle of Coco water 250 ml

- Vanilla - 1 kg
- Cocoa - 1 kg
- Caramel Syrup - 1 kg

- Vanilla sauce – 1 kg
- Mango sauce – 1 kg
- Raspberry sauce – 1 kg
- Straciatella sauce – 1 kg
- Mango Passion sauce – 1 kg
- Forest fruits sauce – 1 kg
- Banana Maple sauce – 1 kg
- Peach sauce – 1 kg
- Blueberry Cassis sauce – 1 kg

The LCA model allows calculating all environmental impact indicators from the ReCiPe method. In this study, the results are presented for Global Warming Potential in the next 100 years (GWP100) and additionally for Terrestrial Ecotoxicity and Water use. Global Warming Potential is considered a very important environmental indicator for sustainability given the concerns regarding climate change. Terrestrial Ecotoxicity and Water use are of particular interest for Happy Coco.

2. Life cycle inventory analysis

The life cycle inventory analysis contains a description of all information and input data required to calculate the environmental impacts of the products in the impact assessment. In Paragraph 2.1, the production process is described including a process diagram. Paragraph 2.2 gives an overview of the process data. Database references that were used for the environmental assessment are listed in Paragraph 2.3.

2.1. Process description

Figure 1 shows a flowchart of the base products of Happy Coco. For coconuts it starts at the plantation in Sri Lanka. For oat it starts at the plantation in Finland. The coconut water is bottled in Barcelona and then transported to Raalte (NL) where it is stored before it is sent to a retailer. Coconut milk/cream 24% is transported either to Gorredijk (Friesland – NL) where it is used for Coco Icecream production or it is transported to Well (N-Brabant – NL) where it is used for Coco Yoghi production. Organic oat milk is transported to Well for Oat Yoghi production. Coco Yoghi and Oat Yoghi are stored in Raalte before they are sent to a retailer. Coco Icecream is stored in Roelofarendsveen.

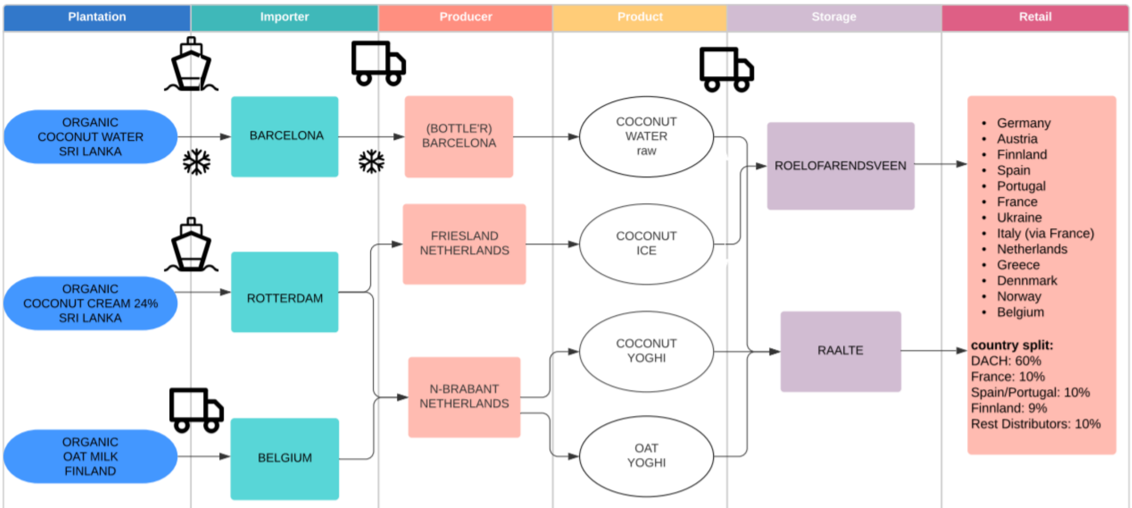

Figure 1: Flowchart Happy Coco base products

2.2. Process data

An overview of all process data that are used for the calculations of the environmental impacts is found in Appendix A. Data are listed for the base products, packaging materials, flavouring sauces and transport distances. Data have been provided by Happy Coco.

2.3. Reference datasets

A table with all reference datasets that are used for impact calculations is found in Appendix B. Data are based on Ecoinvent version 3.5 and in case of HDPE parts on the Dutch Environmental Database ('Nationale Milieu Database') version 3.1.

3. Life cycle impacts results

3.1. Main results base products

In this chapter an overview is given of life cycle impact results of the various base products of Happy Coco. It shows that for climate change (GWP100) results are similar for Coco Icecream, Coco Yoghi and Oat Yoghi. Impacts of Happy Coco's raw Coco Water are clearly higher. For terrestrial ecotoxicity, a similar picture is observed. In case of water consumption, impacts of Oat Yoghi are higher compared to Coco Yoghi. In Chapter 4 these results are further analysed. An estimate for organic farming has been assumed for oat, both for terrestrial ecotoxicity and for water consumption. This estimate is based on average impact reduction of organic farming of comparable products (Chapter 5).

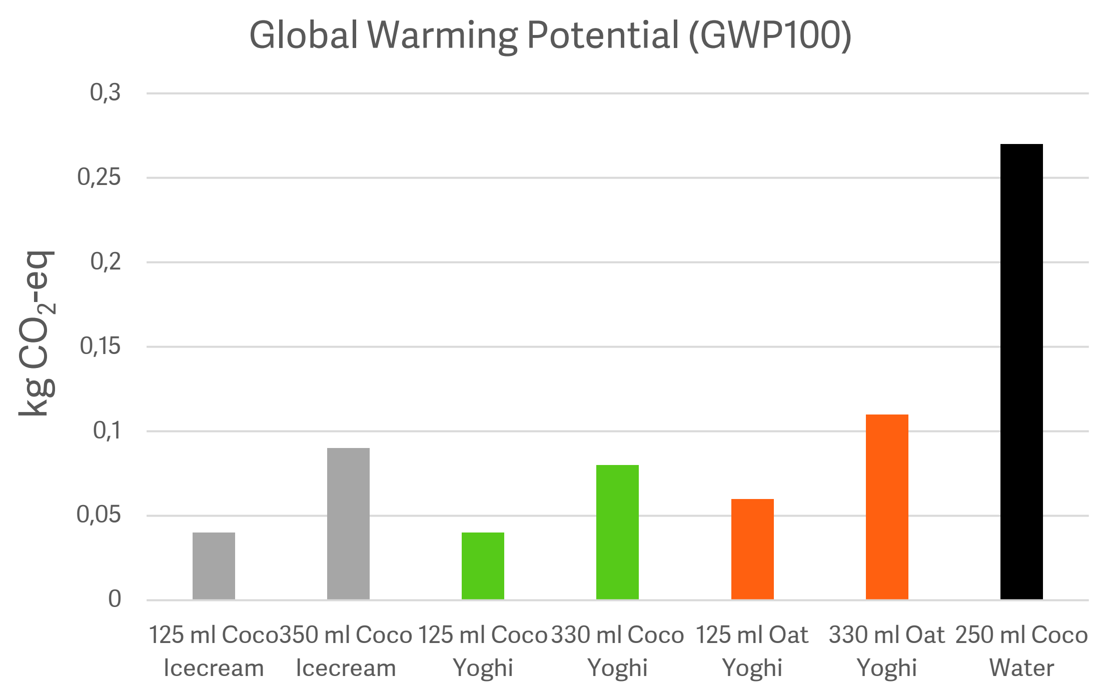

Figure 2: Base product impacts on Global Warming Potential (GWP100)

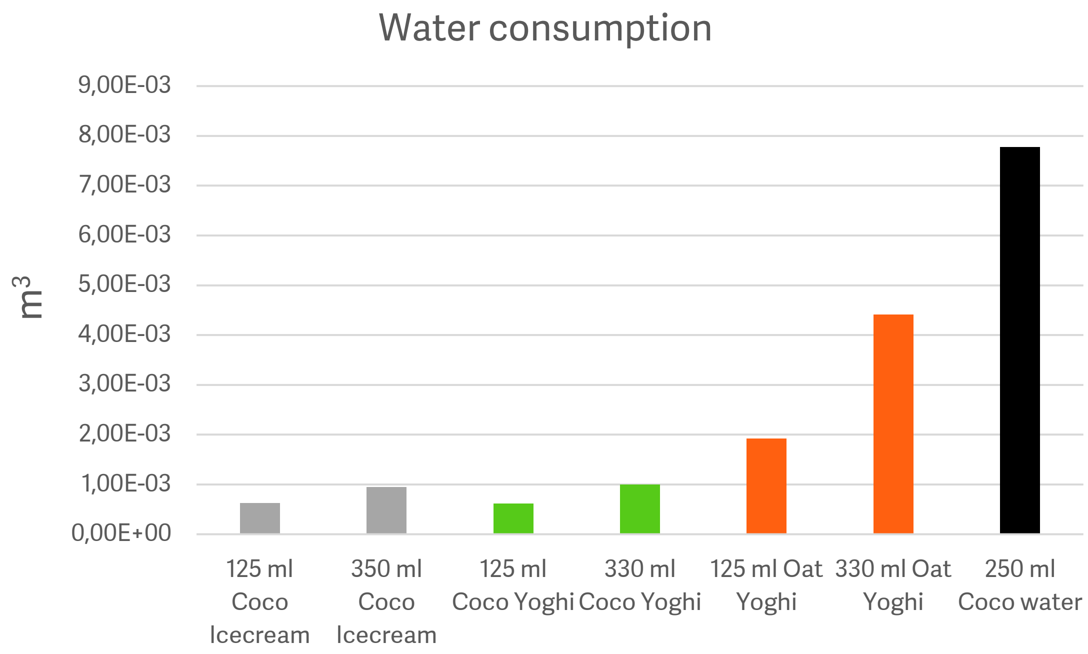

Figure 3: Base product impacts on water consumption

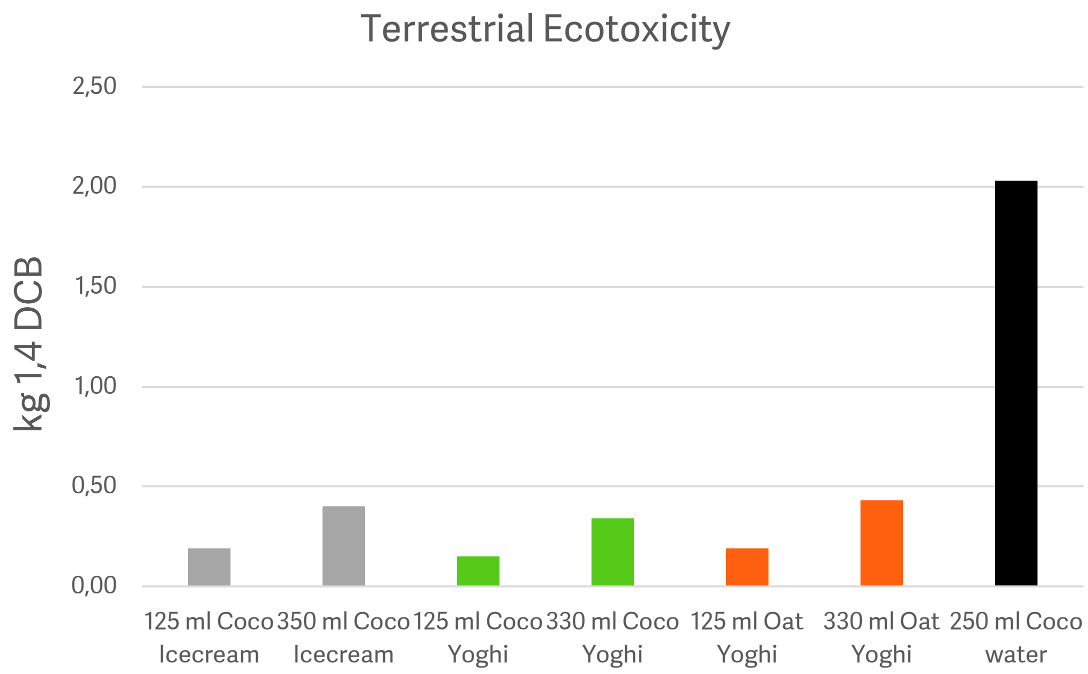

Figure 4: Base product impacts on terrestrial ecotoxicity.

3.2. Main results sauces and flavouring

Figures 5-7 show the results of the various sauces for the impacts categories climate change, terrestrial ecotoxicity and water use. As is obvious in Figure 5 for climate change, especially stracciatella sauce and vanilla sauce have a high impact for climate change. This is due to the impacts of cocoa in stracciatella and cane sugar in vanilla sauce.

Figure 8 shows the climate impacts of different types of flavouring, i.e. vanilla, cocoa and caramel syrup. It shows that especially vanilla and cocoa have a high impact. This is a result of land use change; Forests are cut to provide agricultural land. The loss of biomass and related carbon storage is valued as a carbon emission that explains the high impact on climate change. However, this holds for the reference situation in the background Ecoinvent datasets. Happy Coco produces at a different location where no rainforests are cut. Vanilla and cocoa used in Happy Coco icecream are responsibly produced. Therefore, the high climate impacts due to landuse change do not apply to the vanilla and cocoa that is used in Happy Coco icecream.

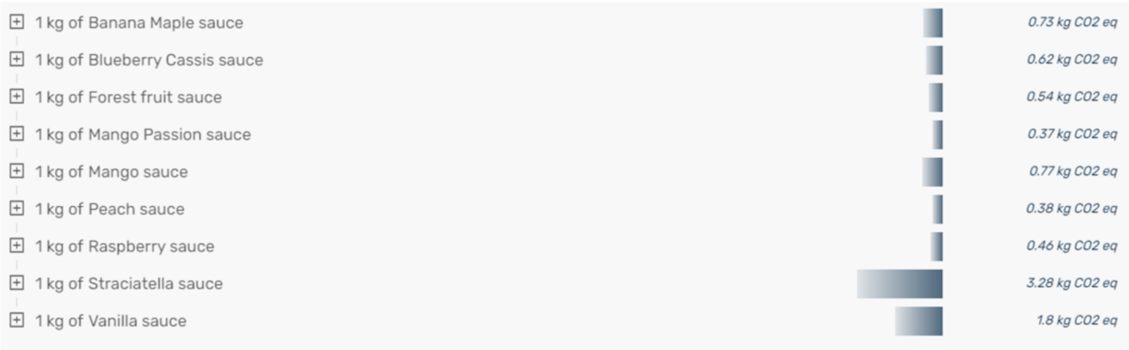

Figure 5: Sauce impacts for climate change (GWP100)

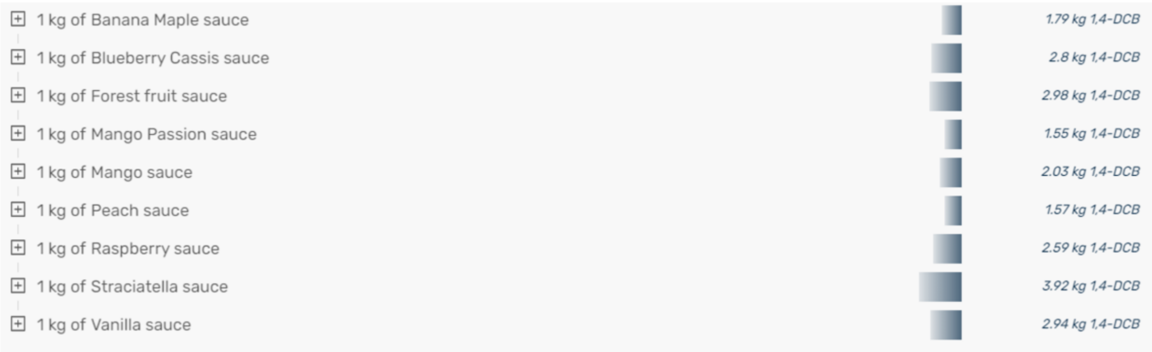

Figure 6: Sauce impacts for terrestrial ecotoxicity

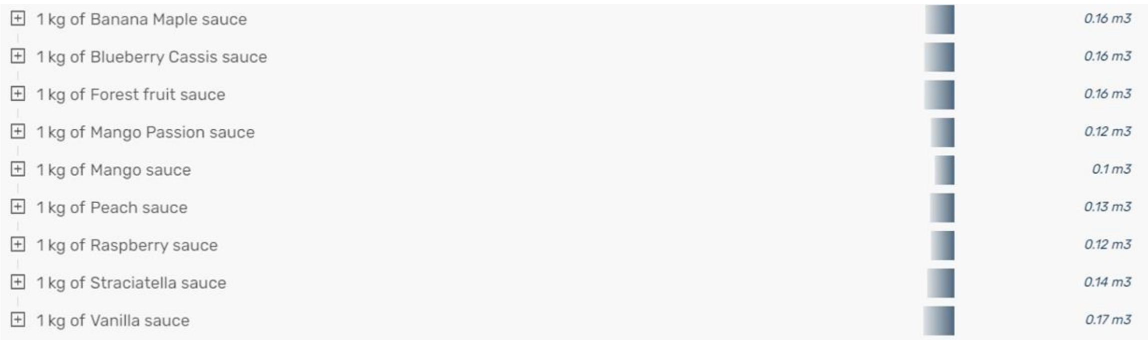

Figure 7: Sauce impacts for water use.

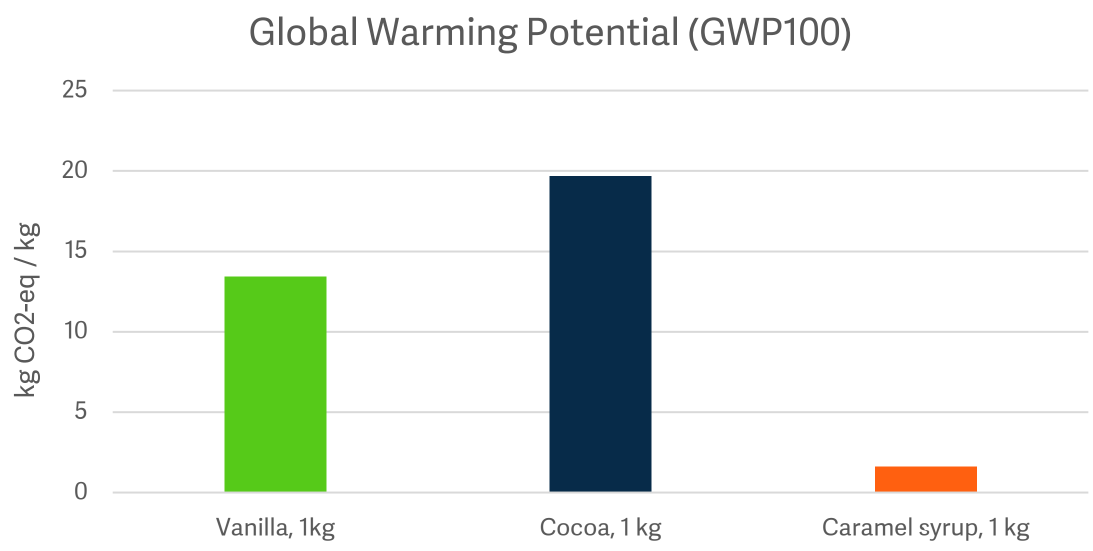

Figure 8: Impacts of different flavouring ingredients for climate change (GWP100).

4. Life cycle interpretation

In the following section the results are analysed using a 'contribution analysis'. A contribution analysis shows which elements of the life cycle contribute to the life cycle impacts. The analysis is conducted for global warming potential, terrestrial ecotoxicity and water use for each of the base products.

<u>125 ml Coco Icecream</u>

The contribution analysis show that the sea transport and paper use have a high contribution to climate change. All transport operations have a high contribution to terrestrial ecotoxicity, as well as solar energy and paper. Paper has a particularly high contribution to water consumption.

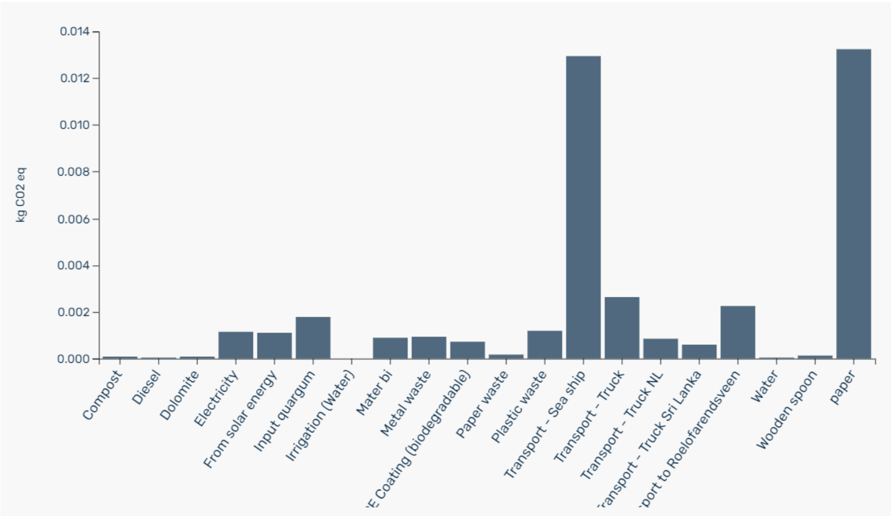

Figure 9: Global Warming Potential – contribution

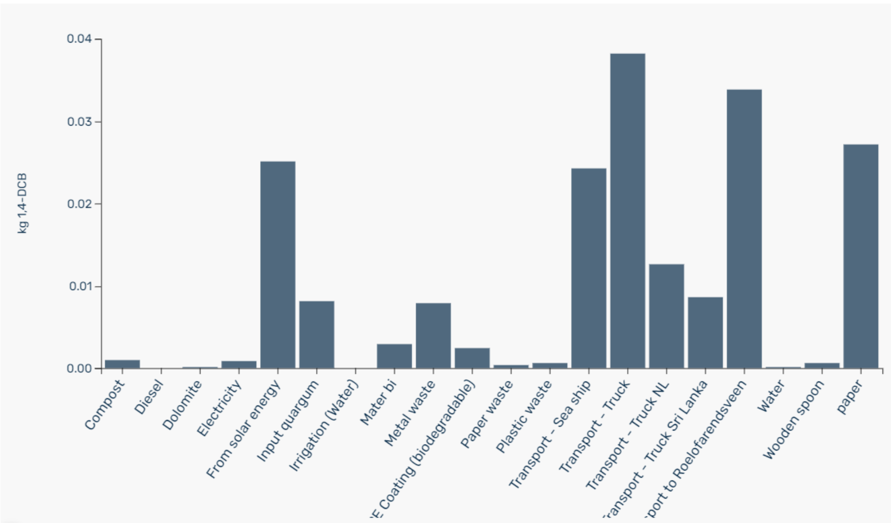

Figure 10: Terrestrial Ecotoxicity – contribution

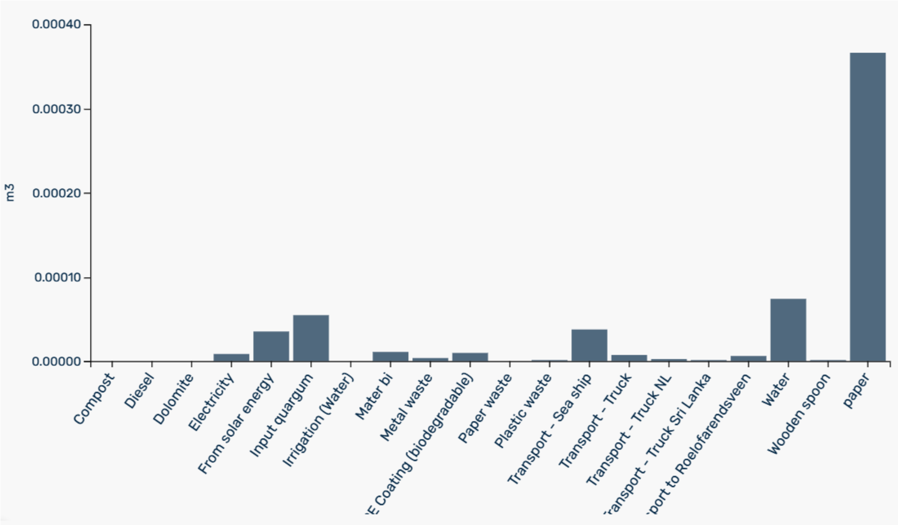

Figure 11: Water consumption – contribution

<u>350 ml Coco Icecream</u>

Results are similar for 350 ml Coco Icecream compared to 125 ml Coco Icecream, except that no paper is used but a cup and lid of polyethylene and carton. The cup and lid have lower impacts than the paper.

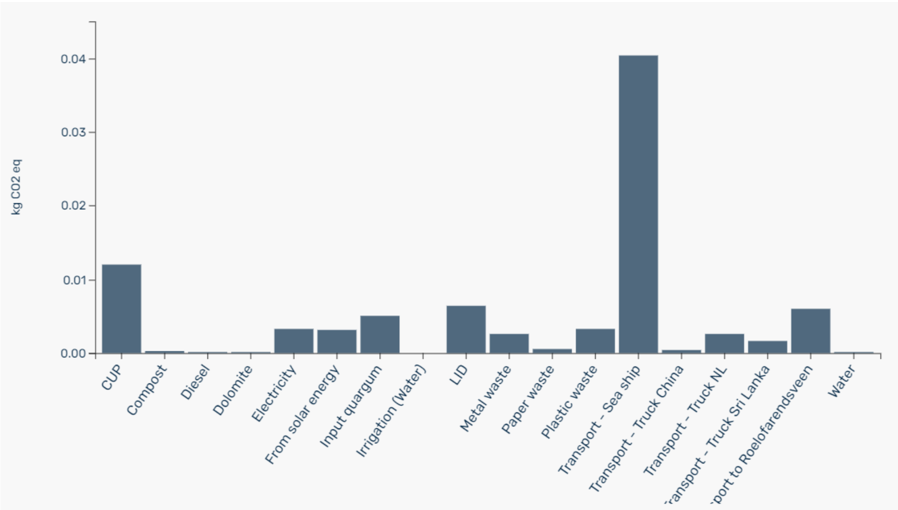

Figure 12: Global Warming Potential – contribution

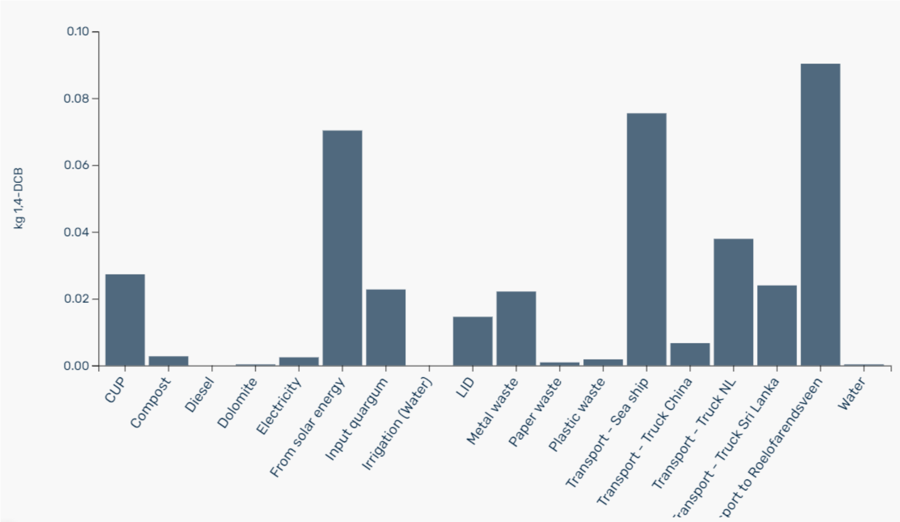

Figure 13: Terrestrial Ecotoxicity – contribution

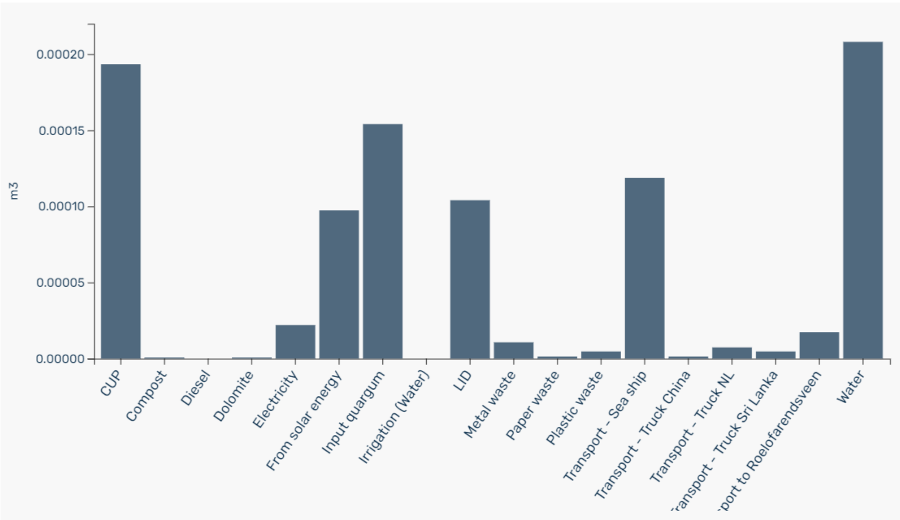

Figure 14: Water consumption – contribution

125 ml Coco Yoghi

The contribution analyses show that the aluminium lid, the polypropylene part, thermoforming and the sea transport have a high contribution to climate change. Transport and tapioca have a high contribution to terrestrial ecotoxicity. The aluminium lid has a particularly high contribution to water consumption. There is also a negative value for water consumption. This is actually a water 'yield' and results from recovered waste water after waste water treatment. This is the green bar in de diagrams (Fig 17 and 20).

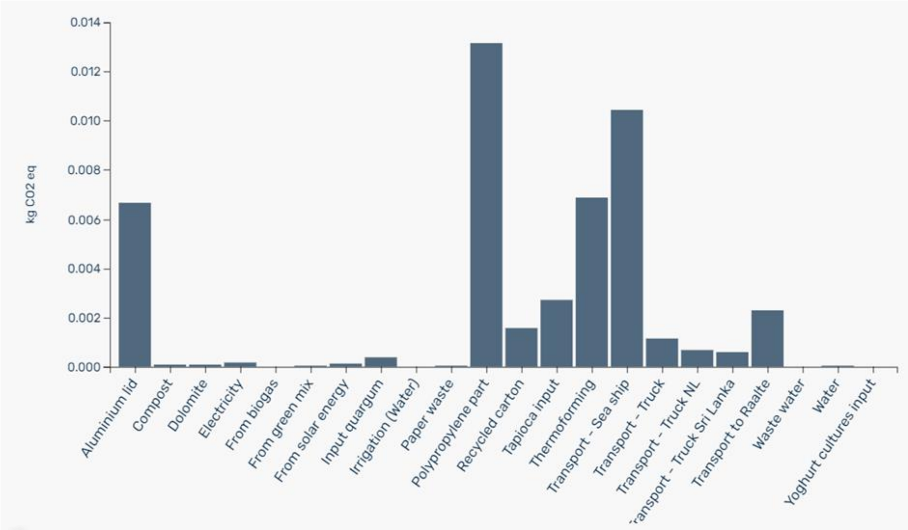

Figure 15: Global Warming Potential – contribution

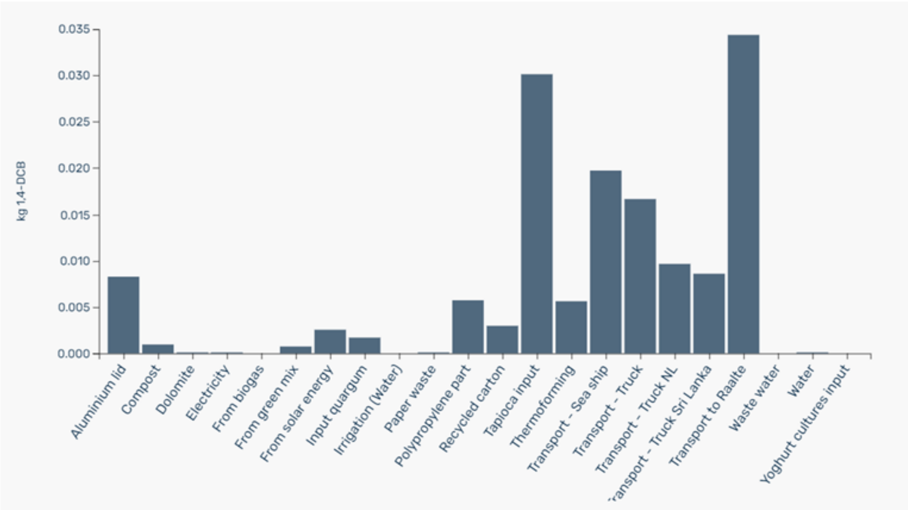

Figure 16: Terrestrial Ecotoxicity – contribution

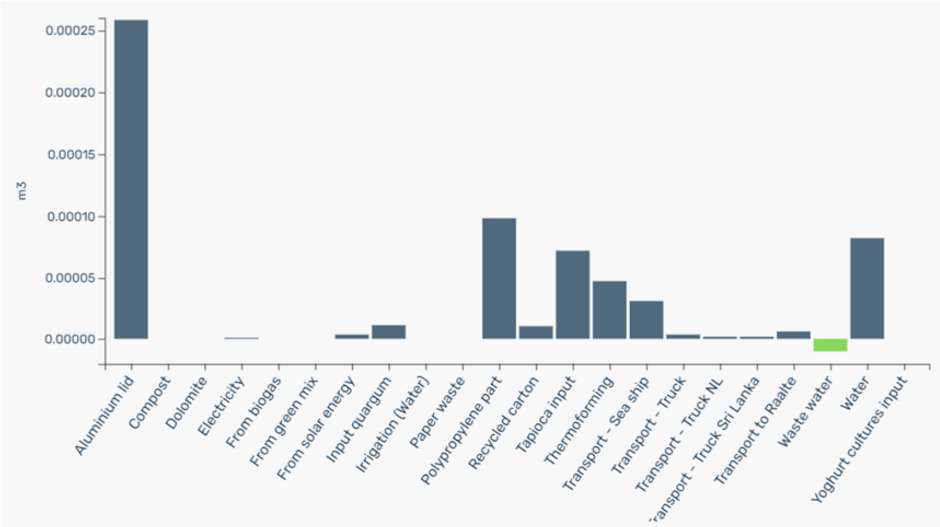

Figure 17: Water consumption – contribution

330 ml Coco Yoghi

The contribution analyses show that especially the sea transport has a high contribution to climate change, as well as the polypropylene part. Tapioca and transport operations have a high contribution to terrestrial ecotoxicity. The aluminium lid, water use, tapioca input and the polypropylene part have a high contribution to water use.

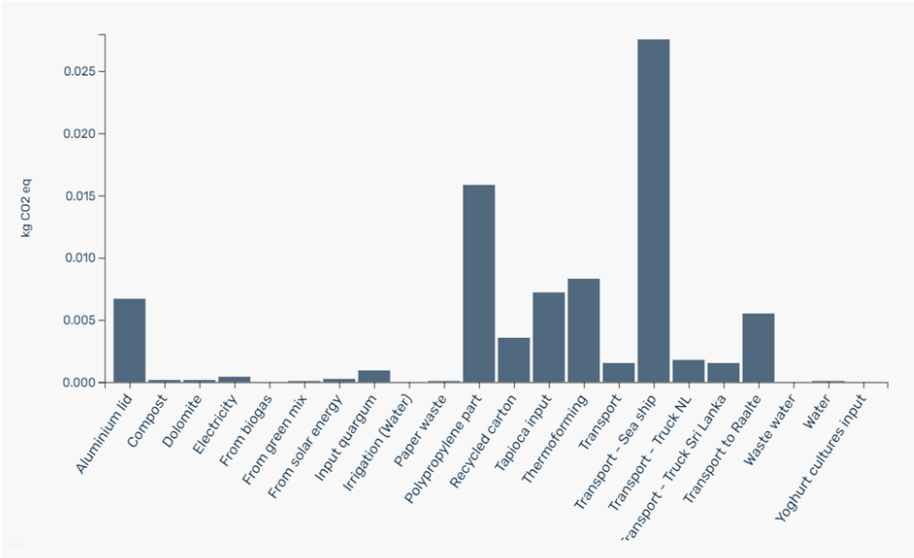

Figure 18: Global Warming Potential – contribution

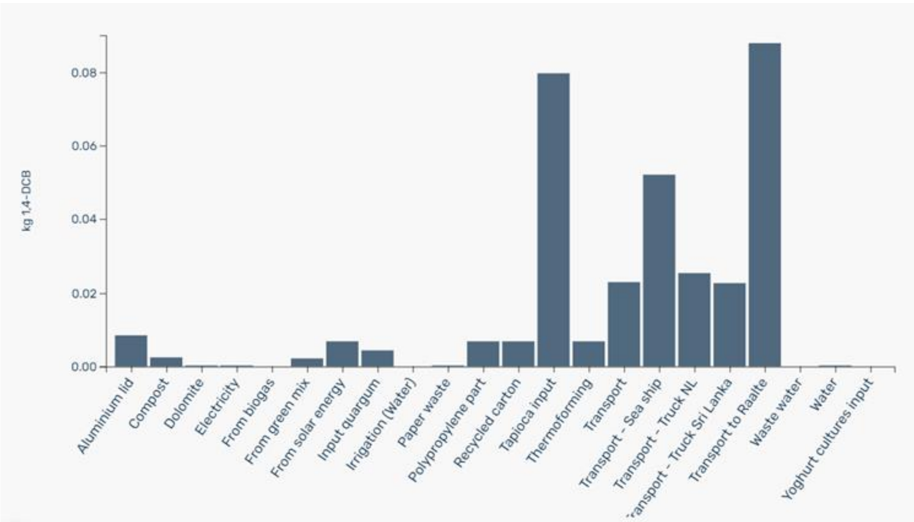

Figure 19: Terrestrial Ecotoxicity – contribution

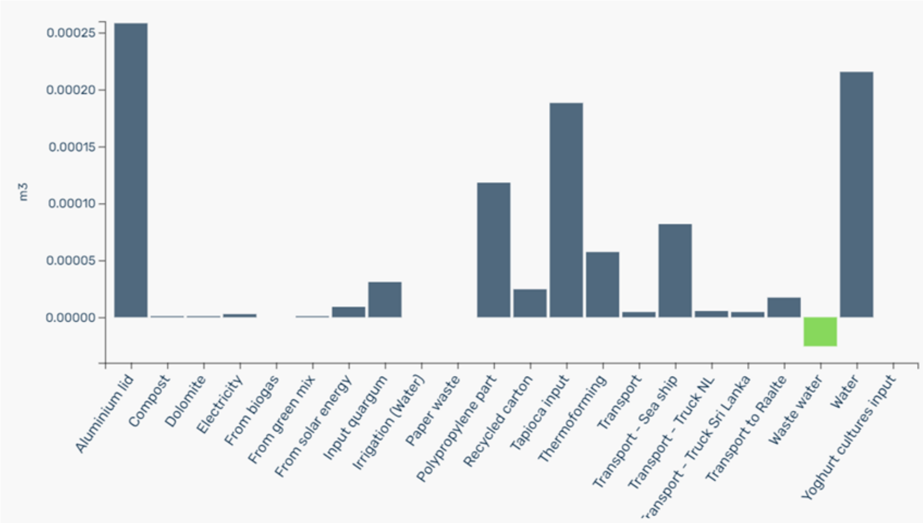

Figure 20: Water consumption – contribution

<u>125 ml Oat Yoghi</u>

The contribution analyses show that especially the polypropylene part has a high contribution to climate change. Transport has a high contribution to terrestrial ecotoxicity. Coconut oil that is used in Oat Yoghi has a very high contribution to water consumption and climate change, and explains the high(er) impact of the Oat Yoghi on water consumption. Note: however, the coconut oil data used here are standard data and not based on the actual data of coconuts used by Happy Coco, which show a much lower impact and water consumption than the standard data.

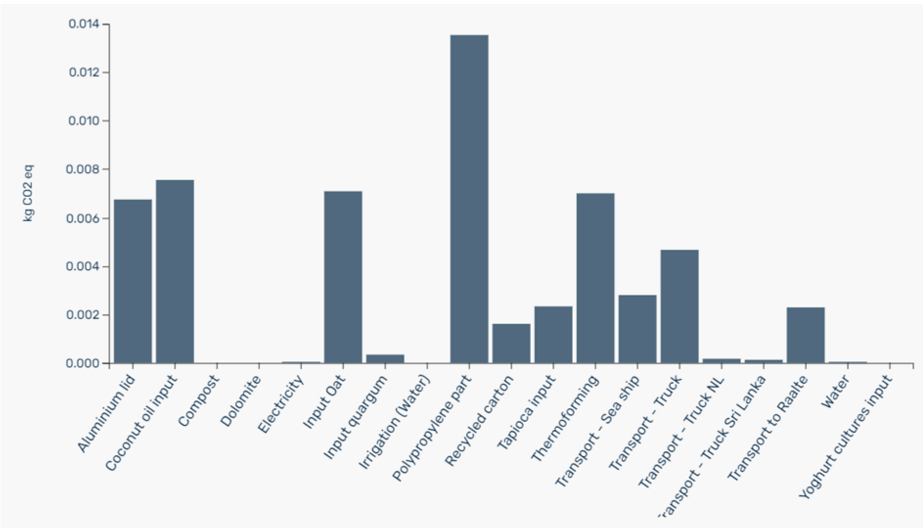

Figure 21: Global Warming Potential – contribution

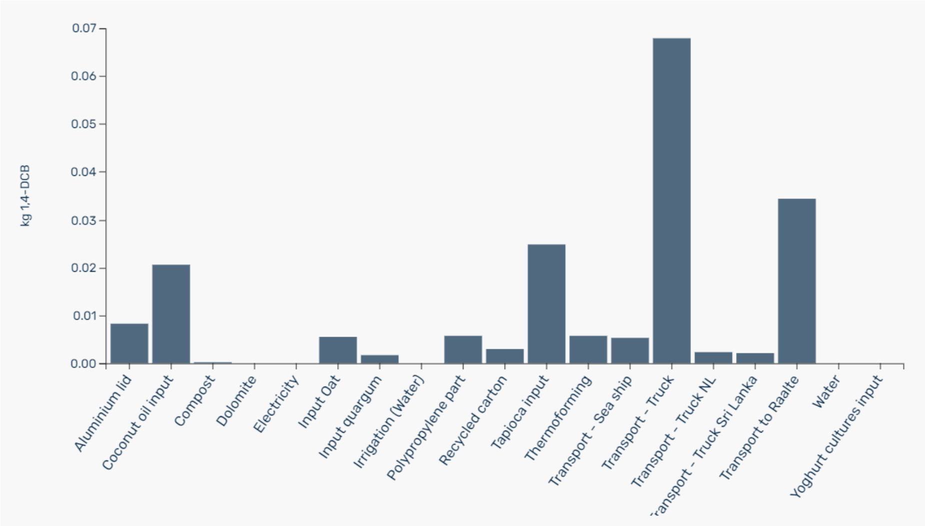

Figure 22: Terrestrial Ecotoxicity – contribution

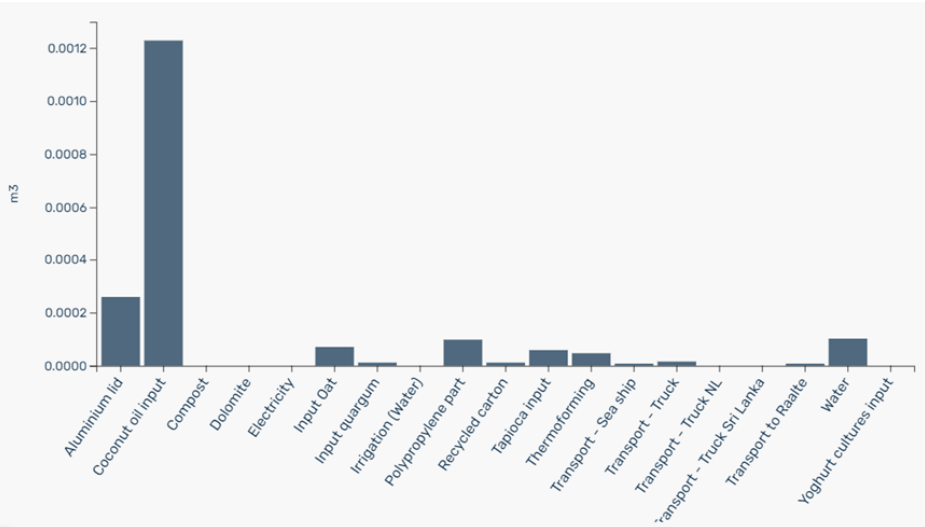

Figure 23: Water consumption – contribution

<u>330 ml Oat Yoghi</u>

The contribution analyses show that the contribution of the polypropylene to climate change is smaller in the 330 ml cup compared to the 125 ml cup. In the 330 ml cup also coconut oil and oat are more significant. Especially transport has a high contribution to terrestrial ecotoxicity. To a lesser extend also coconut oil and tapioca contribute to this impact category. Coconut oil has a high contribution to water consumption.

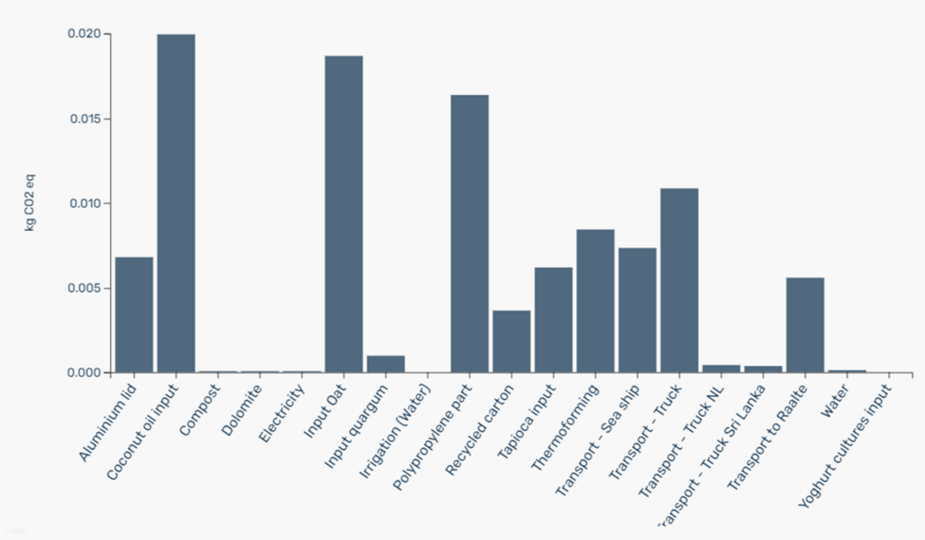

Figure 24: Global Warming Potential – contribution

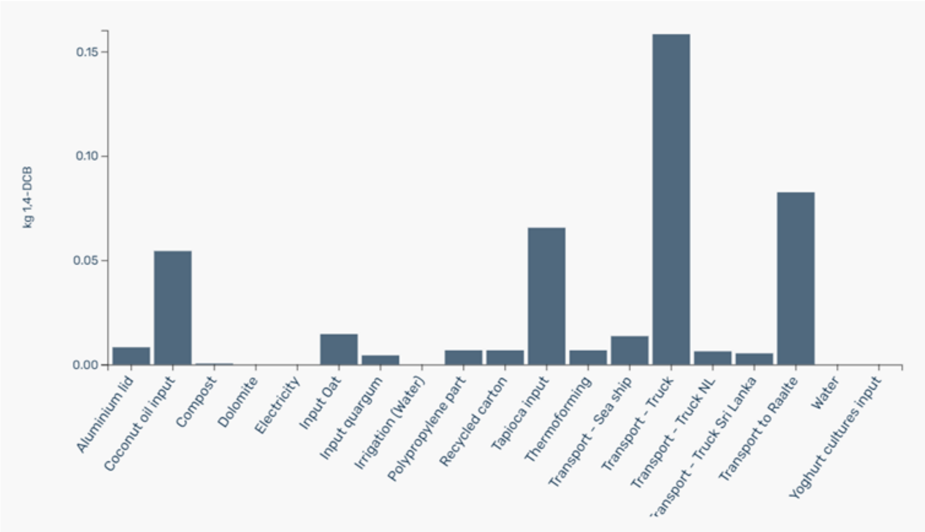

Figure 25: Terrestrial Ecotoxicity – contribution

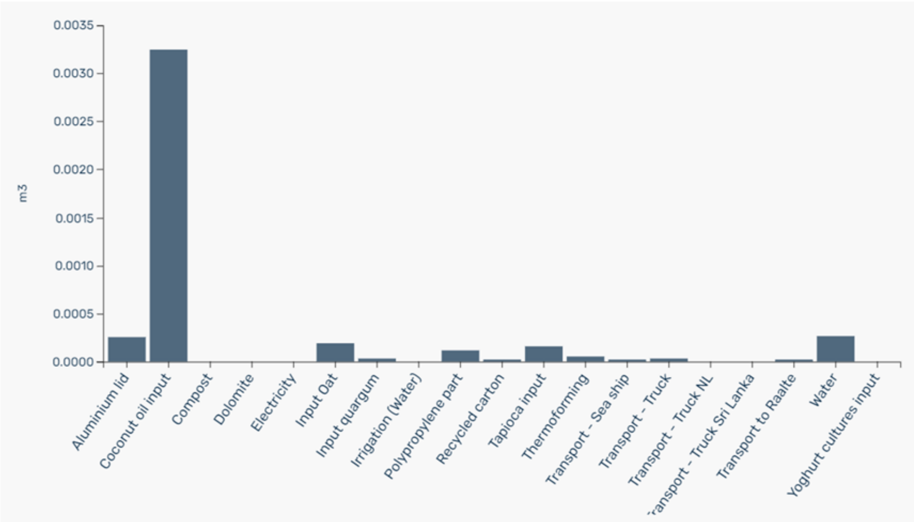

Figure 26: Water consumption – contribution

250 ml Coco Water

The contribution analyses show that transport, Dutch grid electricity and the PLA bottle have a high contribution to climate change. Truck transport particularly has a very high contribution to terrestrial ecotoxicity. The PLA bottle is the main contributor to the impacts on water consumption.

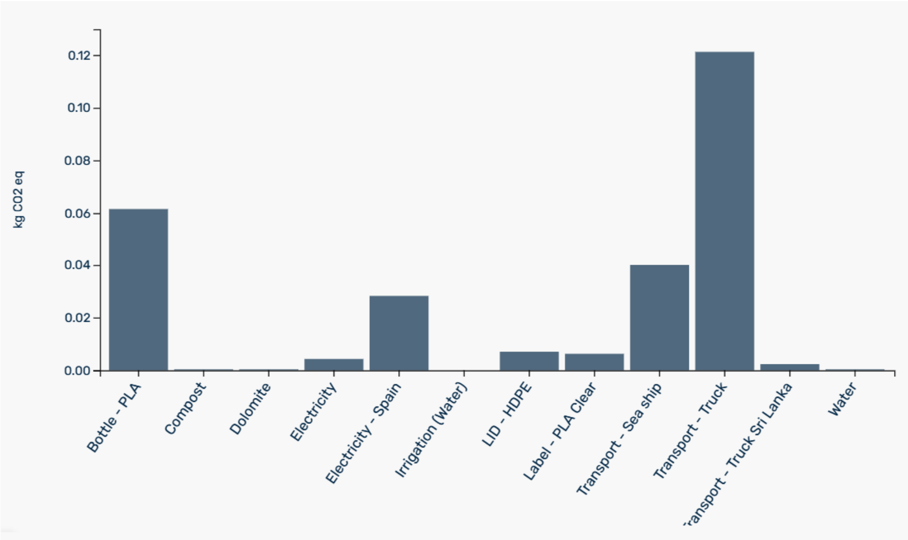

Figure 27: Global Warming Potential – contribution

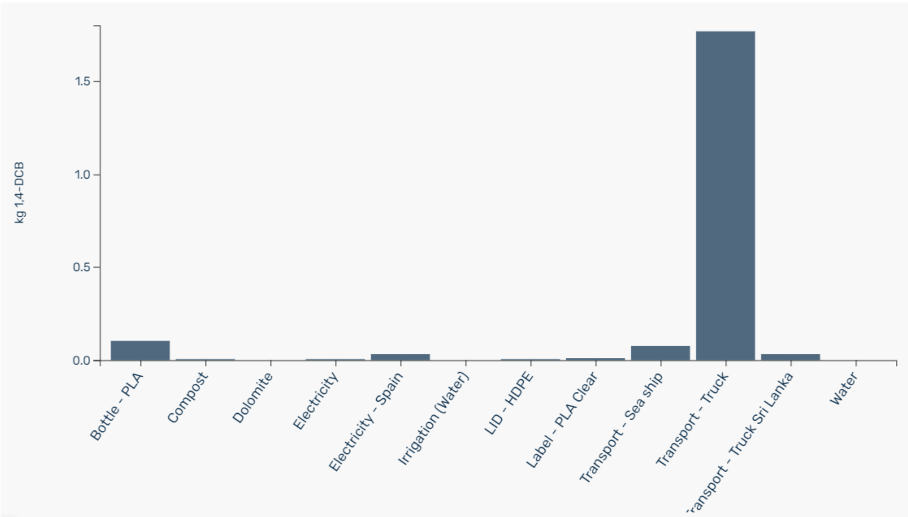

Figure 28: Terrestrial Ecotoxicity – contribution

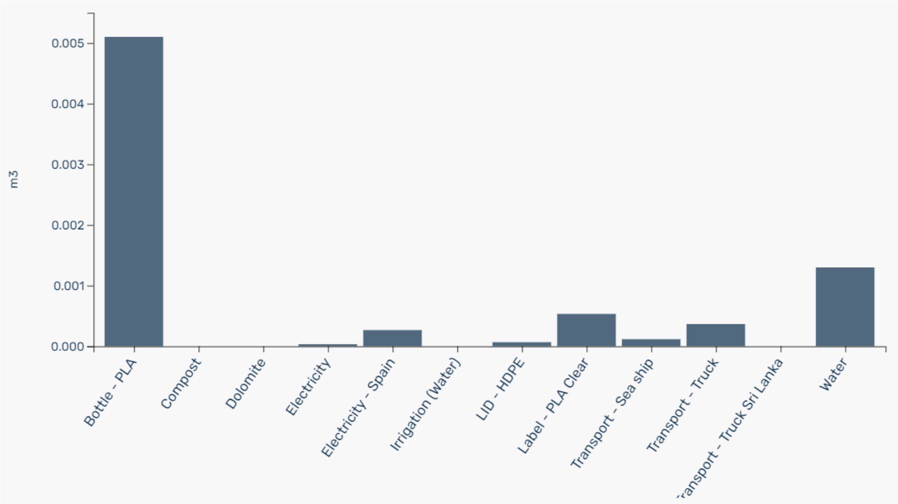

Figure 29: Water consumption – contribution

5. Organic farming

In this study, the LCA modelling is based on Ecoinvent datasets for sauce ingredients and flavouring (see Appendix B). Happy Coco uses ingredients from organic farming only. Organic farming means that no insecticides/pesticides are used and irrigation is limited. Neither is there use of artificial fertilizers. These measures are not reflected in the conventional Ecoinvent datasets for the ingredients that are used in this study. However, for other crops – not used in this study-, the Ecoinvent database provides datasets for organic farming. In order to estimate the environmental benefits of organic farming, these datasets have been used for an environmental assessment addressing three impact categories, i.e. climate change, water use and terrestrial ecotoxicity. The results can be found in Figure 30-32.

It shows that organic farming has lower impacts on 'water consumption' and 'terrestrial ecotoxicity' for all crops studied by Ecoinvent. For 'climate change ' – reflected by the Global Warming Potential (GWP100) in some cases the impacts of organic farming are higher compared to conventional farming. Yields of organic farming sometimes are lower compared to conventional farming and as a result land use is higher. This can cause higher environmental impacts for some indicators (e.g. due to increased machinery use on the field).

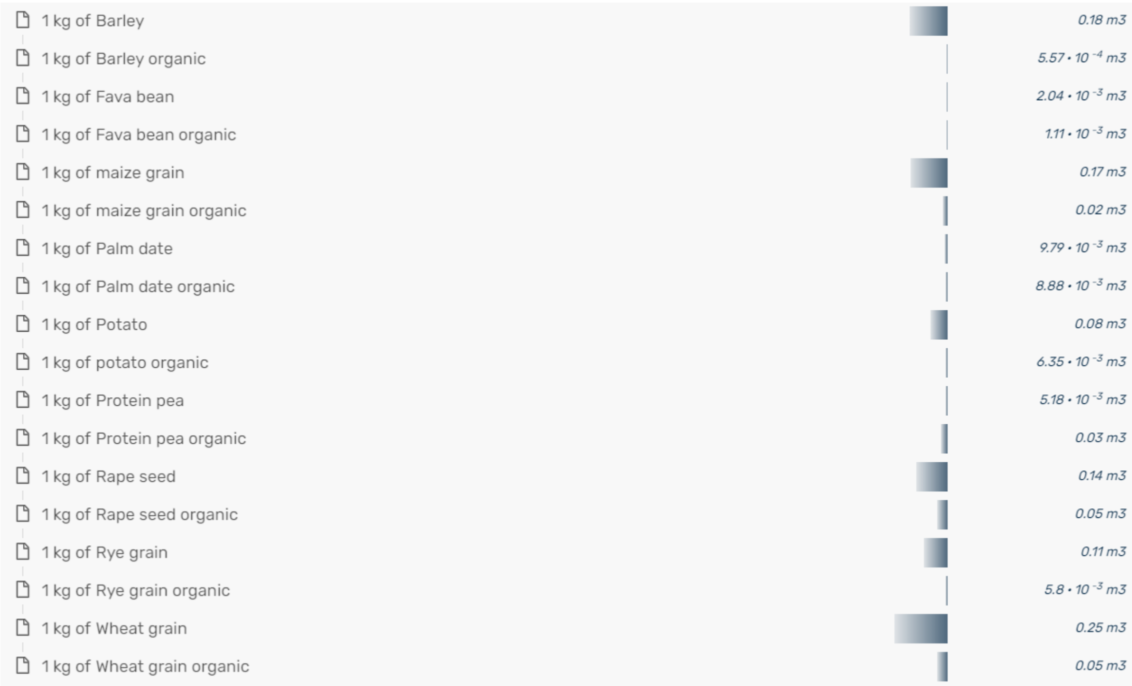

Figure 30: Comparing organic versus non-organic crops – Water consumption in m^3.

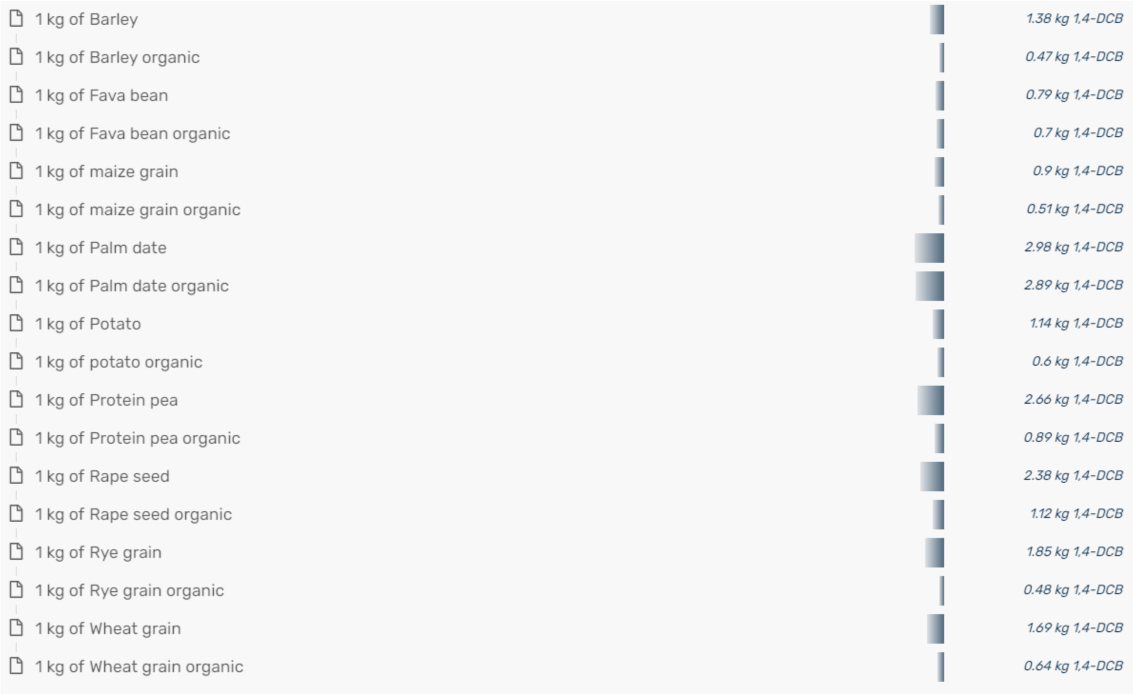

Figure 31: Comparing organic versus non-organic crops – Terrestrial Ecotoxicity in 1,4-DCB

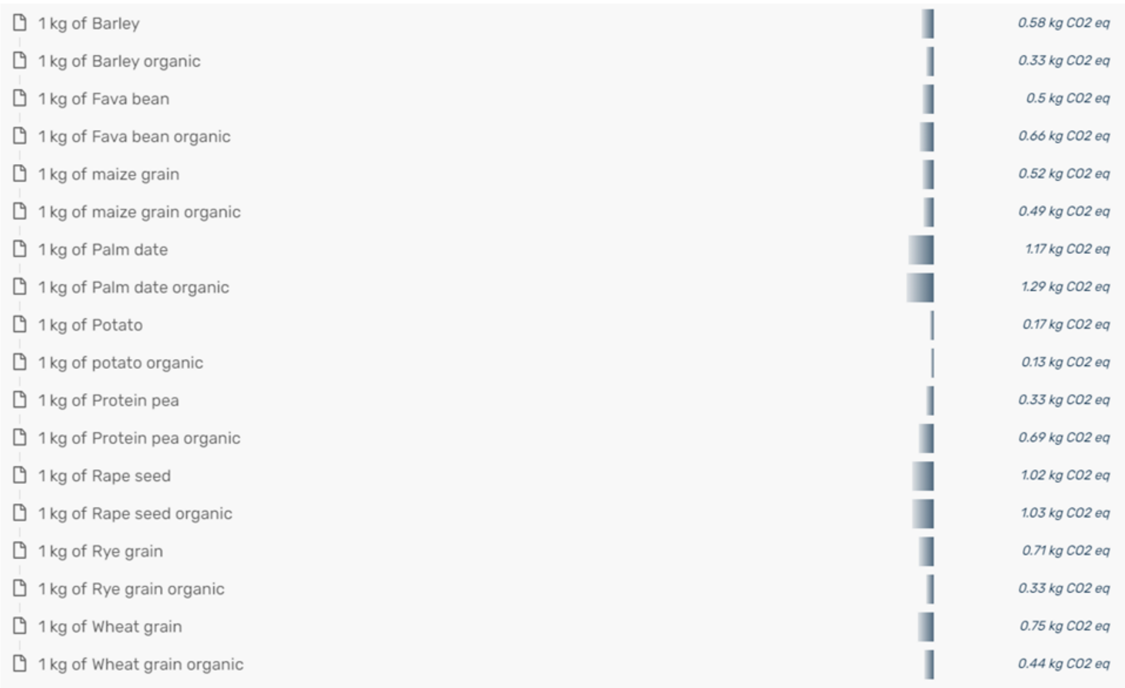

Figure 32: Comparing organic versus non-organic crops – Climate change in kg CO_2-eq

6. Benchmarking

One of the base products that has been analysed in this study is Coco Yoghi. This product is based on 'Coconut milk 24% fat'. However, the question is how this product compares to alternatives based on different ingredients or even to conventional dairy yoghurt. Figure 33 gives an overview of climate change results (impact on GWP100) of a few alternatives. In 'Coco Yoghi – soy', the coconut milk has been replaced by soy yoghurt, containing 11% soy. In 'Coco Yoghi – almond', the coconut milk has been replaced by almond yoghurt containing 15% almonds. Finally a comparison has been made with conventional 'dairy' yoghurt. All quantities are expressed per Liter. Packaging is not included.

It must be noted that the almond, soy and dairy seen here are non-organic and conventionally farmed. For the coconut the organic plantation data are used that apply to Happy Coco's sourcing of coconuts.

It shows that Coco Yoghi has clearly lower impacts compared to the non-organic alternatives. Especially conventional dairy yoghurt has very high impacts. The impacts of the dairy yoghurt can to a large extent be explained by the impacts of farming and feed of the cows.

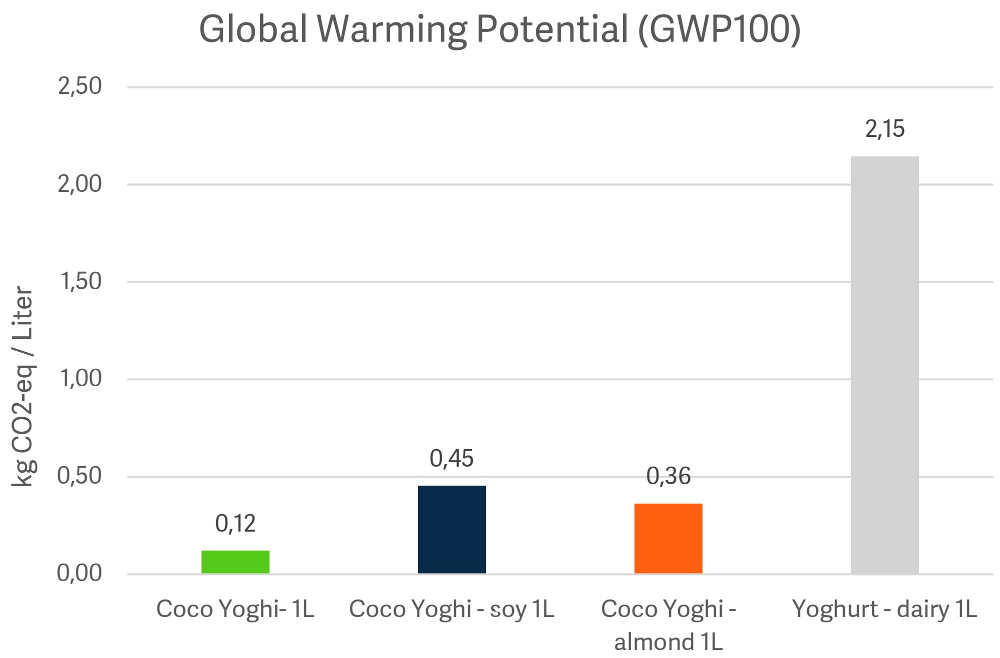

Figure 33: Coco Yoghi compared to different alternatives for the impact on GWP100.

7. Best case scenario

7.1. Approach

Alternative scenario's have been defined for three base products to estimate improvement potentials. The base products studied are 125 ml Coco Yoghi, 125 ml Oat Yoghi and 125 ml Coco Icecream.
The 'best-case' analysis was conducted for the following alternative scenario's:

Coco Yoghi 125 ML

Aluminium Lid	replaced by:	Recycled PET lid
PP cup	replaced by:	Recycled PET
Thermoforming	replaced by:	Injection moulding

Oat Yoghi 125 ML

Coconut oil	replaced by:	Rapeseed oil (Europe)
Aluminium Lid	replaced by:	Recycled PET lid
PP cup	replaced by:	Recycled PET
Thermoforming	replaced by:	Injection moulding

Coco Icecream 125 ML

Paper	replaced by:	'recycled carton"

7.2. Results

Figures 34-36 show the differences between the original value and the best case (b.c.) value. Figures 37-45 show the different interpretations of the life cycles for climate change, terrestrial ecotoxicity and water consumption, represented by the contributions of ingredients, materials and processes.

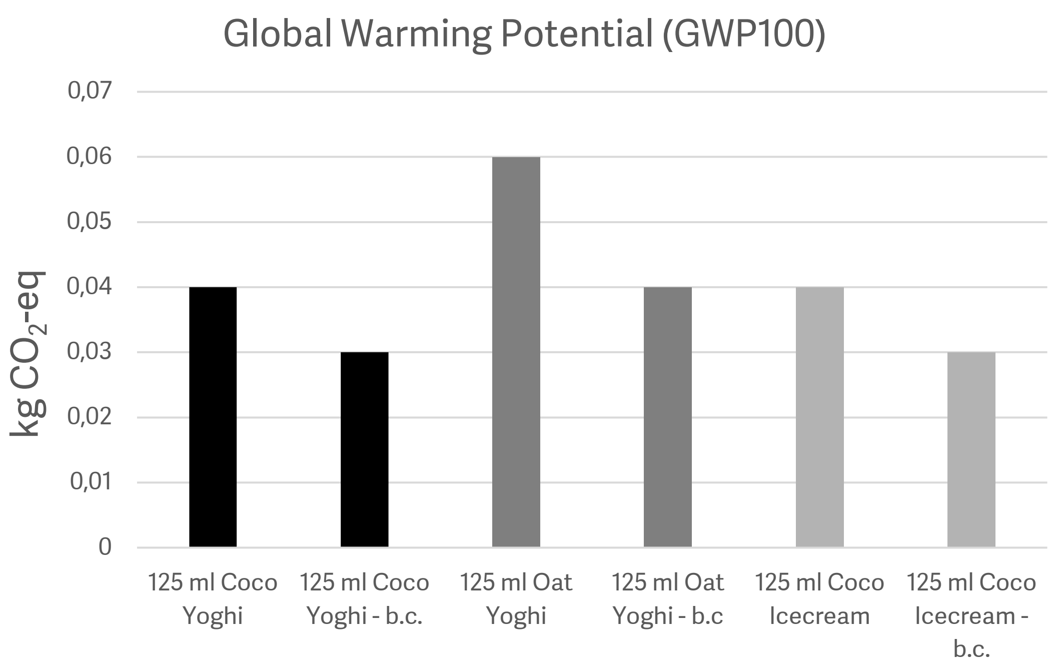

Figure 34: Global warming potential of 'best-case' estimates

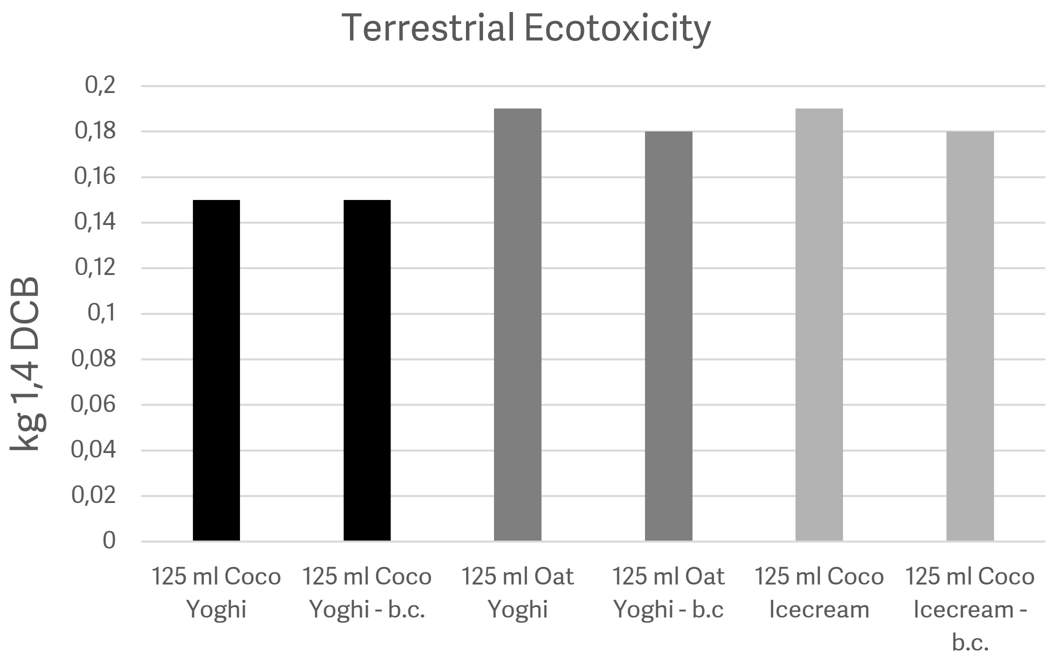

Figure 35: Terrestrial Ecotoxicity of 'best-case' estimates

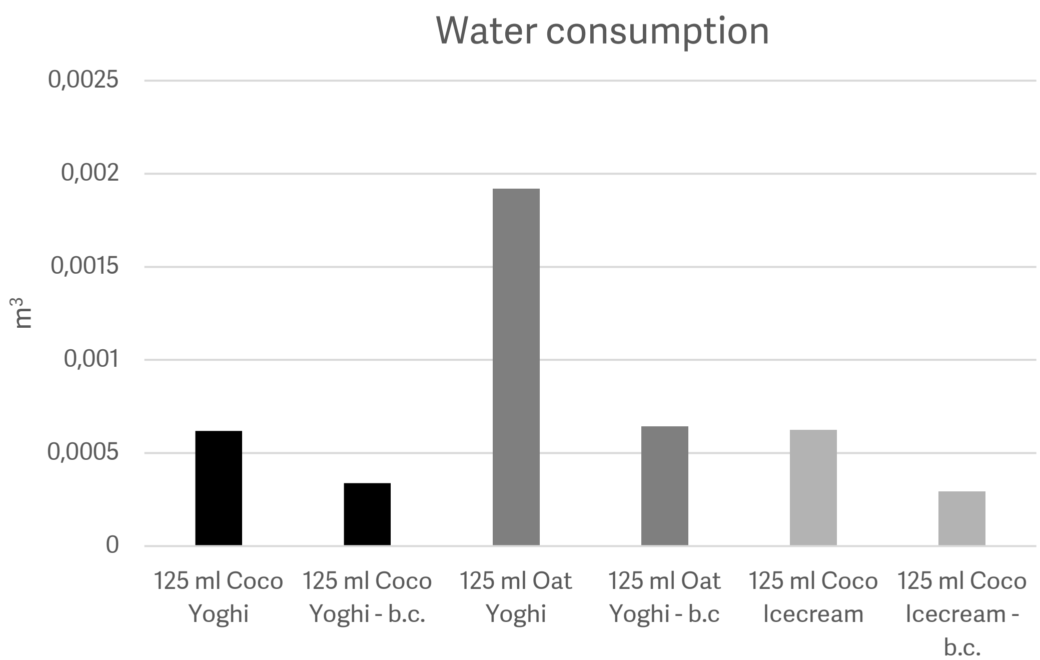

Figure 36: Impact on water consumption of 'best-case' estimates.

7.2.1 Coco Yoghi 125 ml

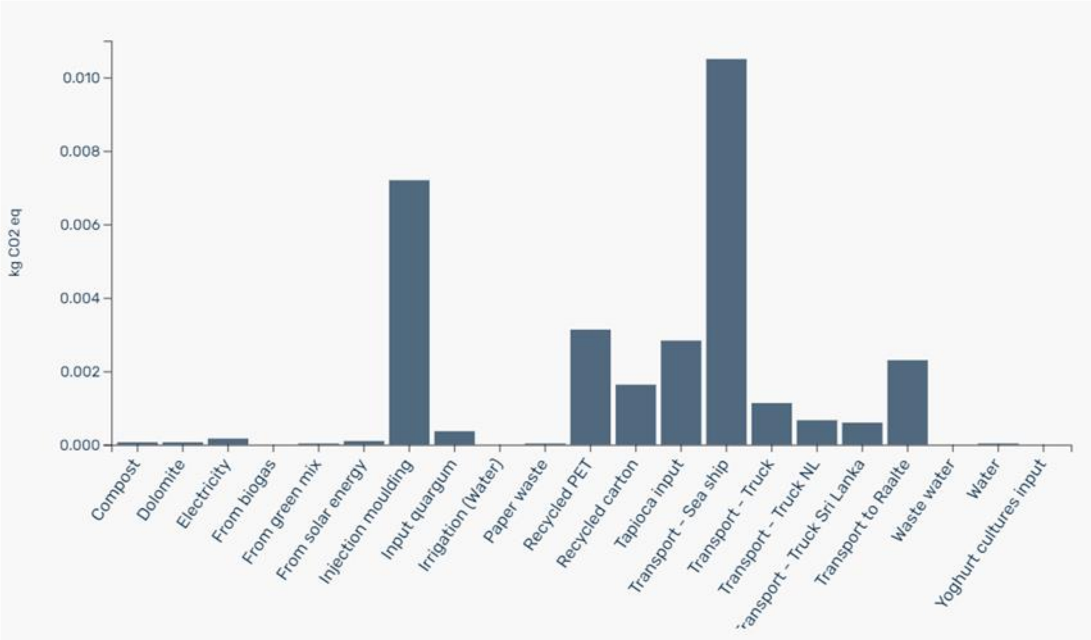

Figure 37: Climate change impacts of 'best case' Coco Yoghi 125 ml

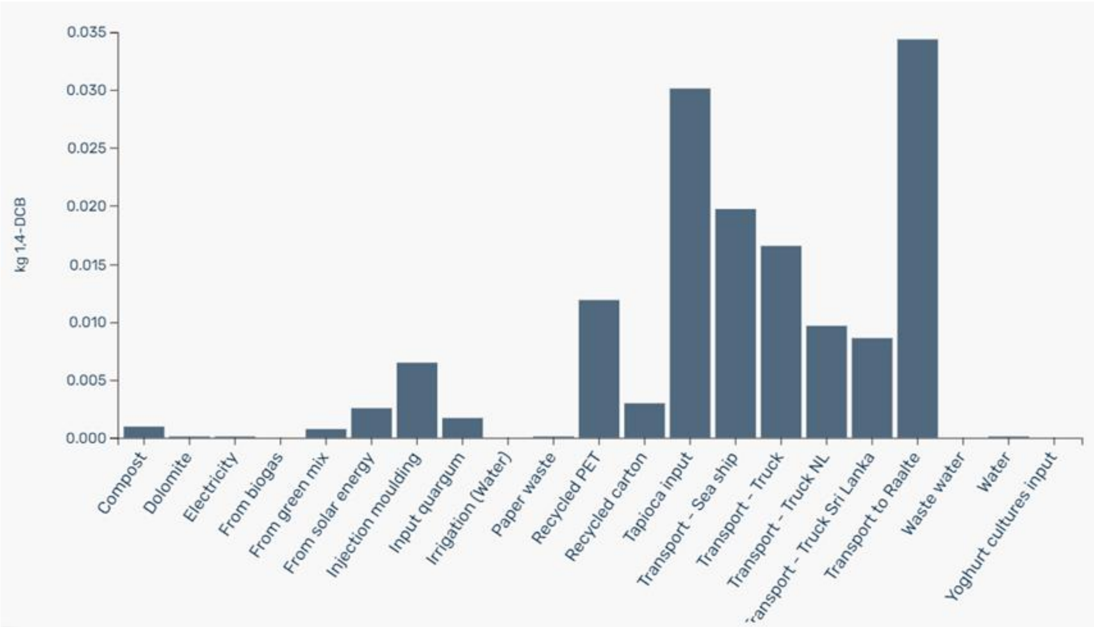

Figure 38: Terrestrial Ecotoxicity impacts of 'best case' Coco Yoghi 125 ml

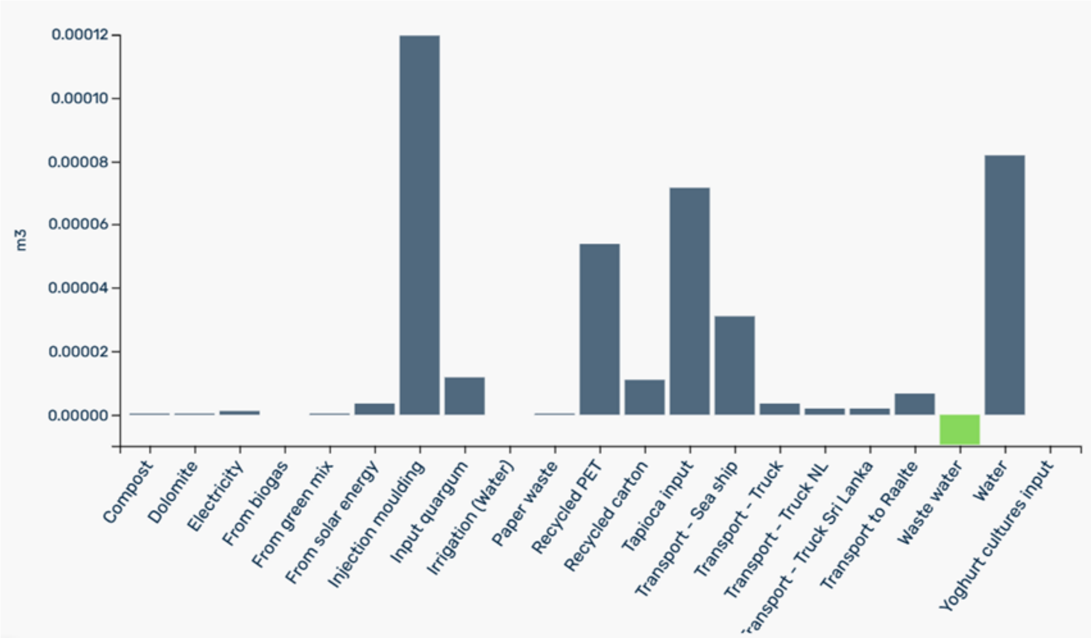

Figure 39: Water consumption impacts of 'best case' Coco Yoghi 125 ml

7.2.2 Oat Yoghi 125 ml

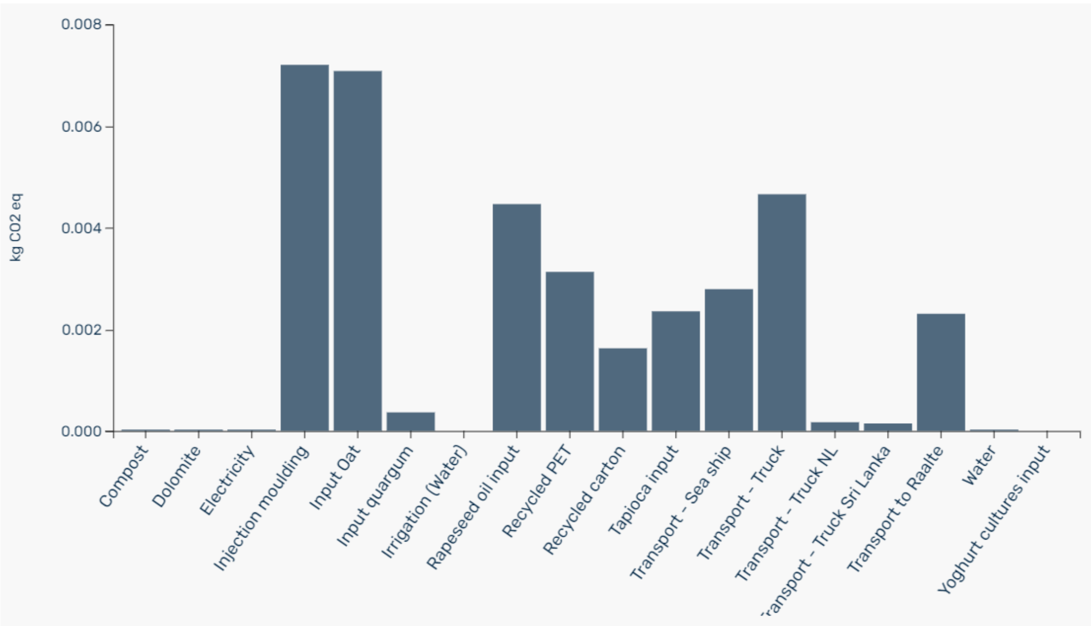

Figure 40: Climate change impacts of 'best case' Oat Yoghi 125 ml

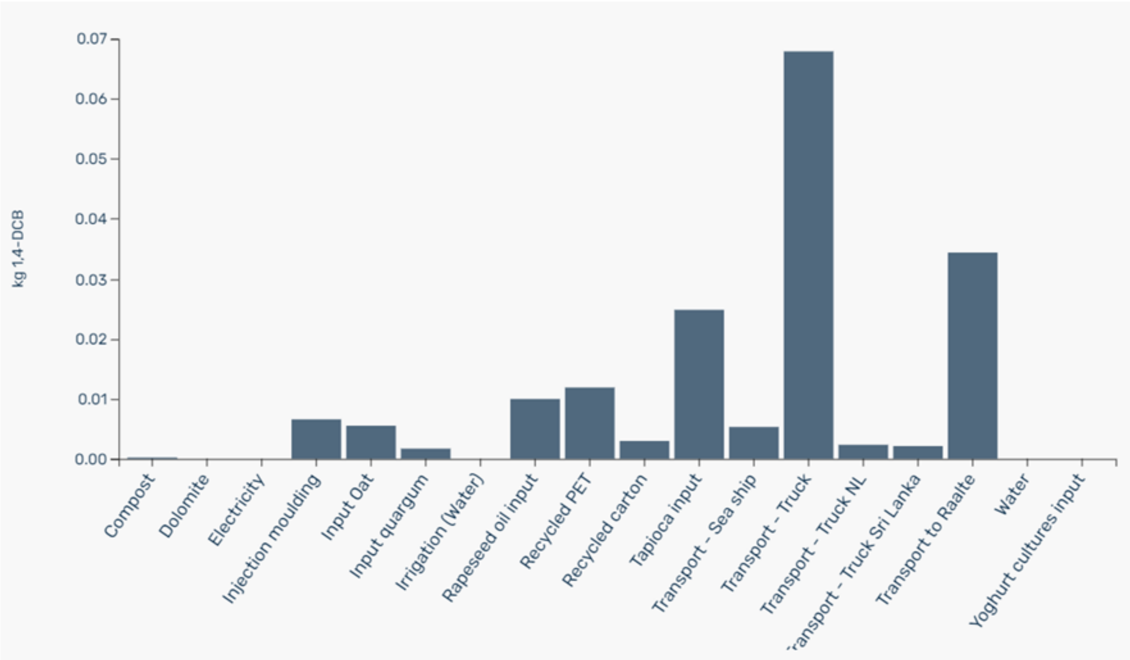

Figure 41: Terrestrial Ecotoxicity impacts of 'best case' Oat Yoghi 125 ml

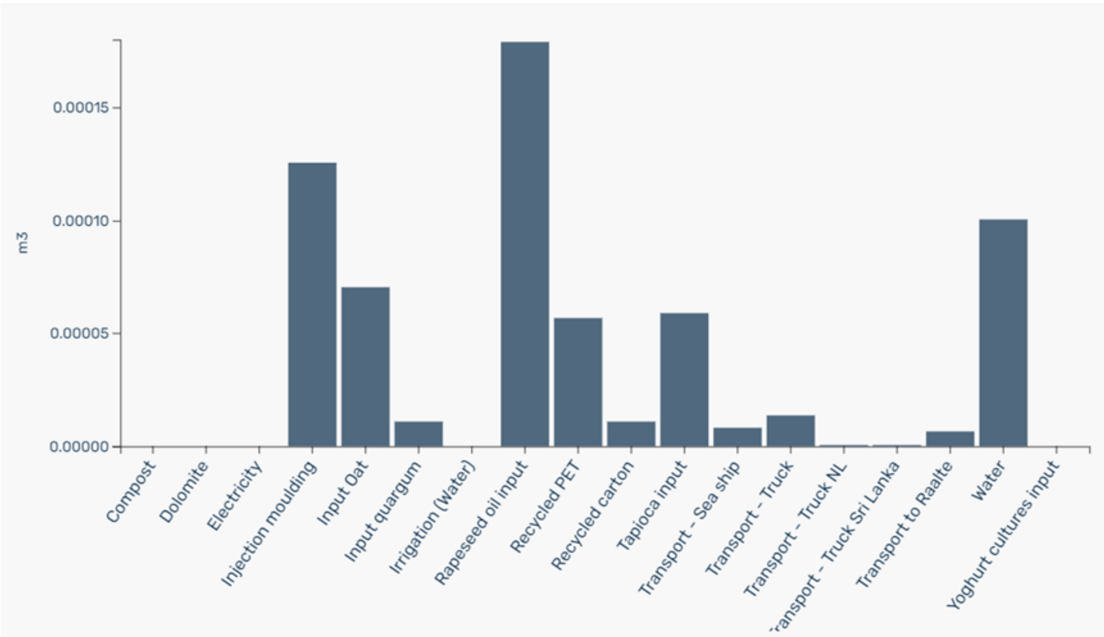

Figure 42: Water consumption impacts of 'best case' Oat Yoghi 125 ml

7.2.3 Coco Icecream 125 ml

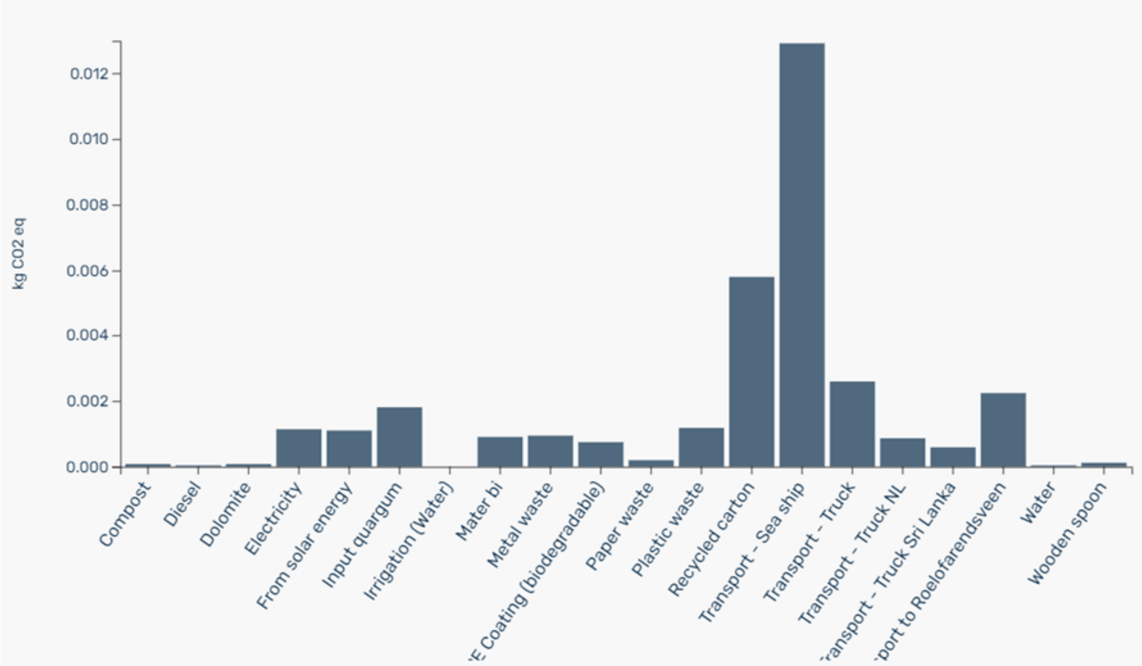

Figure 43: Climate change impacts of 'best case' Coco Icecream 125 ml

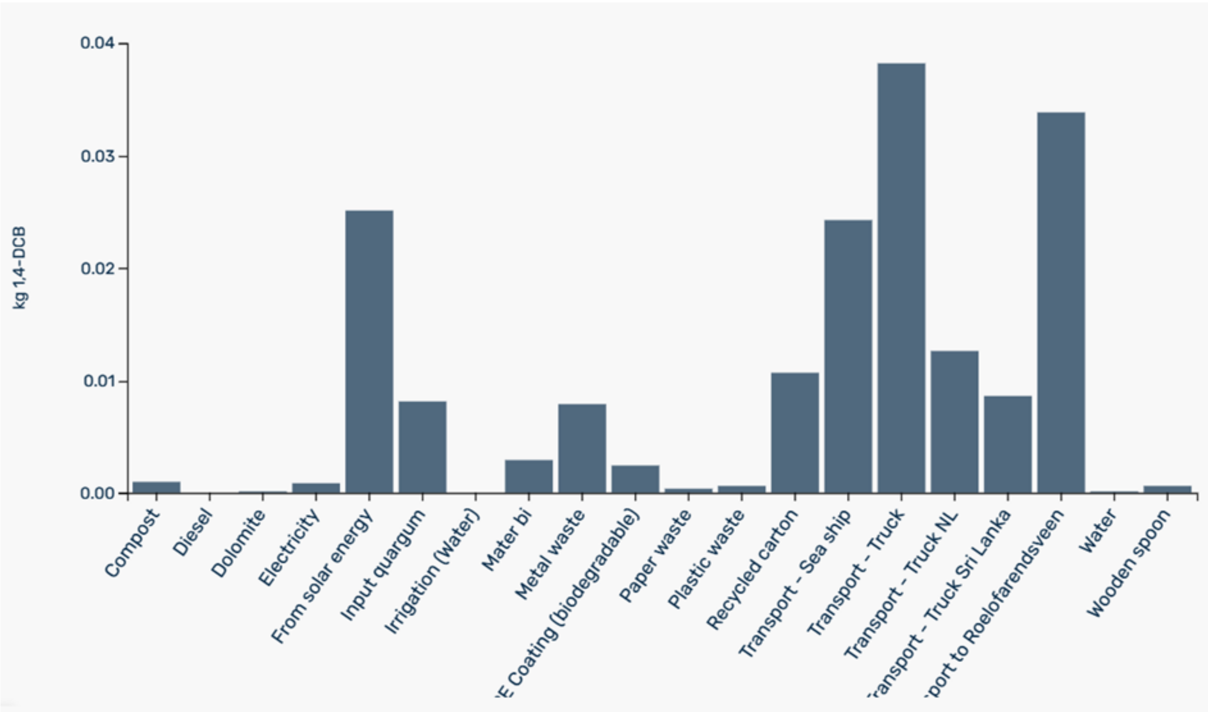

Figure 44: Terrestrial Ecotoxicity impacts of 'best case' Coco Icecream 125 ml

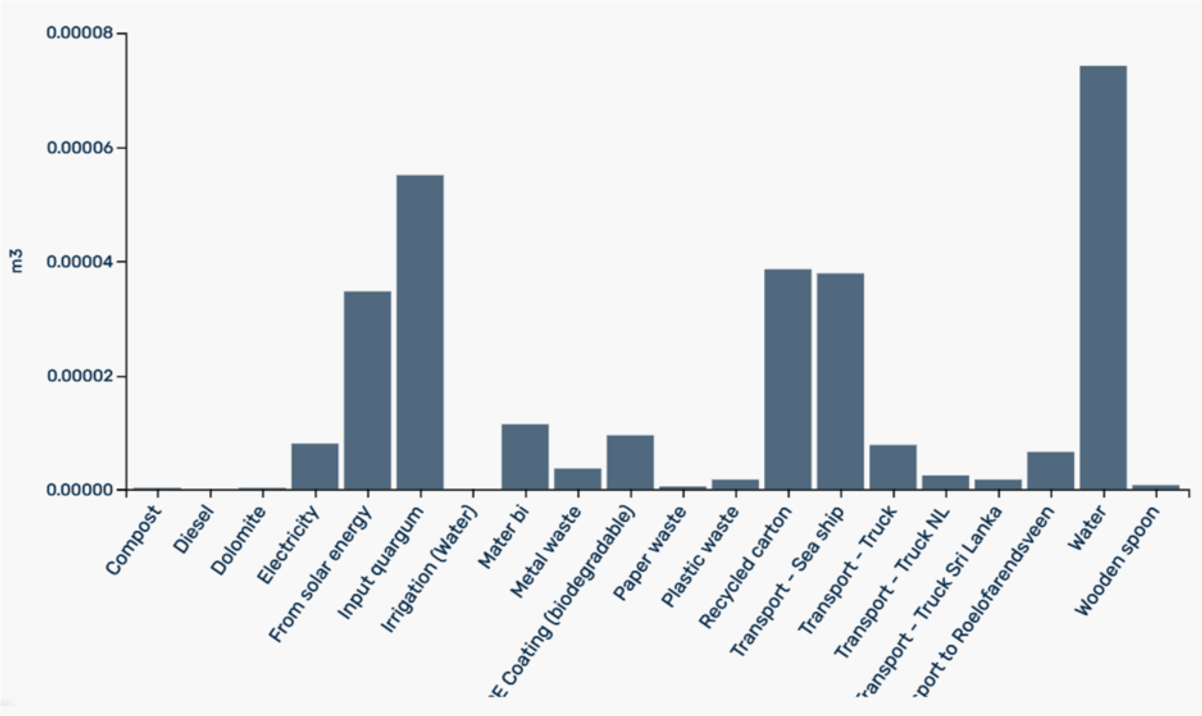

Figure 45: Water consumption impacts of 'best case' Coco Icecream 125 ml

References

[1] 'ISO 14040: Environmental management – Life cycle assessment – Principles and Framework', International Organization for Standardization, ISO14040:2006.

[2] 'ISO 14044: Environmental management – Life cycle assessment – Requirements and guidelines', International Organization for Standardization, ISO14044:2006.

[3] 'NEN-EN 15804: Duurzaamheid van bouwwerken – Milieuverklaringen van producten – Basisregels voor de productgroep bouwproducten', NEN-EN 15804:2012+A1:2013.

[4] 'ISO 14025: Environmental labels and declarations – Type III environmental declarations – Principles and procedures', International Organization for Standardization, ISO14025:2006.

[5] Mark A.J. Huijbregts, Zoran J.N. Steinmann, Pieter M.F. Elshout, Gea Stam, Francesca Verones, Marisa Vieira, Michiel Zijp, Anne Hollander, Rosalie van Zelm. ReCiPe2016: a harmonized life cycle impact assessment method at midpoint and endpoint level. International Journal of LCA, DOI 10.1007/s11367-016-1246-y.

Appendix A

Input	Amount	Unit
Coconut milk 24% fat	0,5	kg
Tapioca	0,036	kg
Guargum	0,002	kg
Water	0,5	kg
Yoghurt cultures	0,0001	kg
Electricity (green / grey)	0,031	kwh
Output	**Amount**	**Unit**
Coco Yoghi	1	l
Waste water	0,09	l
Waste paper	3,6	g

Table 1: Process data for the production of Coco Yoghi

Input	Amount	Unit
Water	0,77	kg
Oat	0,08	kg
Coconut milk 24% fat	0,1	kg
Tapioca	0,03	kg
Coconut oil	0,02	kg
Guargum	0,002	kg
Vegan yoghurt cultures	0,0001	kg
Electricity (green / grey)	0,03	kwh
Output	**Amount**	**Unit**
Oat Yoghi	1	l
Waste water	0,33	l
Paper	13,3	g

Table 2: Process data for the production of Oat Yoghi

Input	Amount	Unit
Polypropylene	7,5	gram
Recycled carton	5,4	gram
Aluminium lid	0,84	gram
Output	**Amount**	**Unit**
330 ml Yoghi cup	1	Cup

Table 3: Process data for the production of a 330 ml Yoghi Cup

Input	Amount	Unit
Polypropylene	6,2	gram
Recycled carton	2,4	gram
Aluminium lid	0,84	gram
Output	**Amount**	**Unit**
125 ml Yoghi cup	1	Cup

Table 4: Process data for the production of a 125 ml Yoghi Cup

Input	Amount	Unit
Coconut milk 24% fat	0,5	kg
water	0,25	kg
agave syrup	0,2	kg
guargum/Locust bean gum/sunflower lecithine	0,01	kg
Electricity: Solar from own panals	0,092	kWh
Output	**Amount**	**Unit**
Coconut Ice	1	kg
Product waste	0,02	kg
paper waste	0,02	kg
Metal waste	0,025	kg
Plastic waste	0,004	kg

Table 5: Process data for the production of 1 kg Coconut Ice

Input	Amount	Unit
Paper (FCS standard virgin cellulose)	8,59	gram
mater bi	0,58	gram
polyethylene coating (biodegradable)	0,48	gram
Wooden spoon	0,7	gram
Output	**Amount**	**Unit**
125 ml Coco Icecream packaging	1	Cup

Table 6: Process data for the production of a 125 ml Coco Icecream Cup

Input	Amount	Unit
CUP: carton + polyethylene coating	12,3	gram
LID: carton + polyethylene coating	6,6	gram
Output	**Amount**	**Unit**
350 ml Coco Icecream packaging	1	Cup

Table 7: Process data for the production of a 350 ml Coco Icecream cup

Input	**Amount**	**Unit**
Coconuts	2,5	Pieces (a 0,25 kg flesh / nut)
	0,625	kg coconut
Water	5,2	l
Electricity – processing	0,0318	kWh
Electricity – Defrosting & Bottling	0,325	kWh
Output	**Amount**	**Unit**
Coco water	1	l

Table 8: Process data for the production of Coco water

Input	**Amount**	**Unit**
Bottle: PLA	19	gram
LID: HDPE	2,7	gram
LABEL: PLA	2	gram
Output	**Amount**	**Unit**
250 ml Coconut water packaging	1	Bottle

Table 9: Process data for the production of Coco water

Input	**Amount**	**Unit**	**Amount**	**Unit**
Compost	5500	kg/ha/yr	0,55	kg
Dolomite	400	kg/ha/yr	0,04	kg
Water (in dry seasons)	33,3	l/plant/day		
	158	plants / ha	0,553	l/kg/day
Output – King Coconut	**Amount**	**Unit**		
Yield coconuts incl husks	16800	kg/ha/yr		
Yield coconuts excl husks	10000	kg/ha/yr	1	kg

Table 10: Process data for the production of King Coconuts

Input	**Amount**	**Unit**
Coconut flesh	0,7	kg
Water	0,3	kg
Electricity	0,0051	kWh
Output	**Amount**	**Unit**
Coconut milk 24% fat	1	kg

Table 11: Process data for the production of Coconut milk 24% fat

Input	Amount	Unit
Compost	0,0375	kg
Diesel	0,0005	l
Electricity	0,075	kWh
Water	0,95	l
Output	**Amount**	**Unit**
Agave Syrup	1	kg

Table 12: Process data for the production of Agave Syrup

Input	Amount	Unit
Vanilla powder	0,004	kg
Cane sugar	0,965	kg
Vanilla flavouring	0,015	kg
Lemon juice concentrate	0,017	kg
Output	**Amount**	**Unit**
Vanilla sauce	1	kg

Table 13: Process data for the production of Vanilla sauce

Input	Amount	Unit
Peach	0,275	kg
Mango	0,275	kg
Passion fruit juice	0,165	kg
Grape juice concentrate	0,264	kg
Lemon juice concentrate	0,022	kg
Output	**Amount**	**Unit**
Mango passion sauce	1	kg

Table 14: Process data for the production of Mango passion sauce

Input	Amount	Unit
Blueberry	0,173	kg
Blueberry juice	0,096	kg
Black currants	0,269	kg
Grape juice concentrate	0,346	kg
Elderflower juice concentrate	0,096	kg
Lemon juice concentrate	0,019	kg
Output	**Amount**	**Unit**
Blueberry Cassis sauce	1	kg

Table 15: Process data for the production of Blueberry cassis sauce

Input	Amount	Unit
Mango	0,645	kg
Cane sugar	0,342	kg
Natural flavouring	0,005	kg
Lemon juice	0,009	kg
Output	**Amount**	**Unit**
Mango sauce	1	kg

Table 16: Process data for the production of Mango sauce

Input	Amount	Unit
Raspberries	0,116	kg
Blackberries	0,233	kg
Blueberries	0,233	kg
Black currents	0,116	kg
Grape juice concentrate	0,279	kg
Lemon juice concentrate	0,023	kg
Output	**Amount**	**Unit**
Forest fruits sauce	1	kg

Table 17: Process data for the production of Forest fruits sauce

Input	Amount	Unit
Raspberry	0,528	kg
Pomegranate juice	0,377	kg
Grape juice concentrate	0,087	kg
Lemon juice concentrate	0,008	kg
Output	**Amount**	**Unit**
Raspberry sauce	1	kg

Table 18: Process data for the production of Raspberry sauce

Input	Amount	Unit
Banana puree	0,522	kg
Maple Syrup	0,130	kg
Raw cane sugar	0,304	kg
Lemon juice concentrate	0,043	kg
Output	**Amount**	**Unit**
Banana Maple sauce	1	kg

Table 19: Process data for the production of Banana maple sauce

Input	Amount	Unit
Chocolate	0,160	kg
Agave syrup	0,819	kg
Vanilla	0,008	kg
Pectine	0,007	kg
Lemon juice concentrate	0,007	kg
Output	**Amount**	**Unit**
Straciatella sauce	1	kg

Table 20: Process data for the production of Straciatella sauce

Input	Amount	Unit
Peach	0,291	kg
Mango	0,291	kg
Passion fruit juice	0,116	kg
Grape juice concentrate	0,279	kg
Lemon juice concentrate	0,023	kg
Output	**Amount**	**Unit**
Peach sauce	1	kg

Table 21: Process data for the production of Peach sauce

	Origin	Truck (GLO)	Boat	Truck (NL)	Truck (GLO)
Coconut milk 24% fat	Sri Lanka	72	14210	75	
Coconut oil	Sri Lanka	72	14210	75	
Coconut water	Sri Lanka	72	14210	73	1665
Tapioca	Nigeria		7725	75	
Guargum	India		11705	75	
Yoghurt cultures	Zaandam, NL			99	
Oat	Finland	2513		172	
Agave syrup	Mexico	276	9423	73	
Packaging – cups Yoghi	Kremsmünster, AT	926			
Packaging unit – ice 125 ml	Salerno, IT	1937			
Packaging – cup +lid 350 ml ice	Shanghai, CN	184	19355	201	
Bottle Coco Water	Almelo, NL to La Selva del Camp, ES	1651			
Label Coco Water	Swindon, UK	1722			
Bottle incl Coco Water	La Selva del Camp, ES	1676			

Table 22: Transport distances of Happy Coco materials and ingredients

Appendix B

Reference	Reference dataset chosen	Region
Almond	market for almond | almond | Cutoff, U	Global
Aluminium lid	aluminium production, primary, ingot | aluminium, primary, ingot | Cutoff, U	Aluminium producing area, EU27 and EFTA countries
Banana	market for banana | banana | Cutoff, U	Global
Banana puree	market for banana | banana | Cutoff, U	Global
Black currants	market for strawberry | strawberry | Cutoff, U	Global
Blackberry	market for strawberry | strawberry | Cutoff, U	Global
Blackcurrant	market for strawberry | strawberry | Cutoff, U	Global
Blueberry	market for strawberry | strawberry | Cutoff, U	Global
Blueberry juice	market for strawberry | strawberry | Cutoff, U	Global
Bottle: PLA	polylactide production, granulate | polylactide, granulate | Cutoff, U	Global
Cane sugar	market for sugar, from sugarcane | sugar, from sugarcane | Cutoff, U	Global
Caramel	market for sugar, from sugarcane | sugar, from sugarcane | Cutoff, U	Global
Chocolate	market for cocoa bean | cocoa bean | Cutoff, U	Global
cocoa	market for cocoa bean | cocoa bean | Cutoff, U	Global
Coconut oil	coconut oil production, crude | coconut oil, crude | Cutoff, U	Rest-of-World
Compost	market for compost | compost | Cutoff, U	Global
CUP: carton + polyethylene coating	liquid packaging board production | liquid packaging board | Cutoff, S	Global
Diesel	Diesel, burned in building machine {GLO}| processing | Cut-off, U	Global
Dolomite	dolomite production | dolomite | Cutoff, U	Rest-of-World
Elderflower	market for sugar, from sugarcane | sugar, from sugarcane | Cutoff, U	Global
Elderflower juice	market for sugar, from sugarcane | sugar, from sugarcane | Cutoff, U	Global
Electricity (green)	electricity production, wind, >3MW turbine, onshore | electricity, high voltage | Cutoff, U	Netherlands
Electricity (grey)	market group for electricity, medium voltage | electricity, medium voltage | Cutoff, U	Global
Electricity (Spain)	market for electricity, medium voltage | electricity, medium voltage | Cutoff, U	Spain
Electricity: Solar from own panals	electricity production, photovoltaic, 570kWp open ground installation, multi-Si | electricity, low voltage | Cutoff, U	Netherlands
Grape	market for grape | grape | Cutoff, U	Global

Grape juice concentrate	market for grape | grape | Cutoff, U	Global
Guargum	market for glucose | glucose | Cutoff, U	Global
LABEL: PLA	polylactide production, granulate | polylactide, granulate | Cutoff, U	Global
Lemon	market for lemon | lemon | Cutoff, U	Global
Lemon juice	market for lemon | lemon | Cutoff, U	Global
Lemon juice concentrate	market for lemon | lemon | Cutoff, U	Global
LID: carton + polyethylene coating	liquid packaging board production | liquid packaging board | Cutoff, S	Global
LID: HDPE	0185-fab&Polyetheen, HDPE, geëxtrudeerd (o.b.v. Polyethylene, high density, granulate {GLO}| market for | Cut-off, U & Extrusion, plastic pipes {GLO}| market for | Cut-off, U)	Global
Mango	market for papaya | papaya | Cutoff, U	Global
Maple Syrup	Data for Agave syrup	This study
mater bi	polyester-complexed starch biopolymer production | polyester-complexed starch biopolymer | Cutoff, U	Europe
Metal waste	treatment of aluminium scrap, post-consumer, by collecting, sorting, cleaning, pressing | aluminium scrap, post-consumer, prepared for melting | Cutoff, U	Europe
Natural flavouring	chemical production, organic | chemical, organic | Cutoff, U	Global
Oat	oat production | oat grain | Cutoff, U	Finland
Papaya	market for papaya | papaya | Cutoff, U	Global
Paper	market for paper, woodcontaining, lightweight coated | paper, woodcontaining, lightweight coated | Cutoff, U	Europe
paper waste	treatment of waste paper, unsorted, sorting | waste paper, sorted | Cutoff, U	Europe without Switzerland
Passion fruit	market for papaya | papaya | Cutoff, U	Global
Passion fruit juice	market for papaya | papaya | Cutoff, U	Global
Peach	market for peach | peach | Cutoff, U	Global
Pectine	market for apple | apple | Cutoff, U	Global
Plastic waste	treatment of waste plastic, mixture, municipal incineration | waste plastic, mixture | Cutoff, U	Rest-of-World
polyethylene coating (biodegradable)	polyester-complexed starch biopolymer production | polyester-complexed starch biopolymer | Cutoff, U	Europe
Polypropylene	market for polypropylene, granulate | polypropylene, granulate | Cutoff, U	Global
Pomegranate	market for orange, processing grade | orange, processing grade | Cutoff, U	Global
Pomegranate juice	market for orange, processing grade | orange, processing grade | Cutoff, U	Global
Raspberry	market for strawberry | strawberry | Cutoff, U	Global
Recycled carton	containerboard production, fluting medium, recycled | containerboard, fluting medium | Cutoff, U	Europe

Soy	market for soybean | soybean | Cutoff, U	Global
Tapioca	potato starch production | potato starch | Cutoff, U	Rest-of-World
Thermoforming	market for extrusion of plastic sheets and thermoforming, inline | extrusion of plastic sheets and thermoforming, inline | Cutoff, U	Global
Transport with cooling	transport, freight, lorry with reefer, cooling | transport, freight, lorry with reefer, cooling | Cutoff, U	Global
Transport with freezing	transport, freight, lorry with reefer, freezing | transport, freight, lorry with reefer, freezing | Cutoff, U	Global
Transport, sea ship	transport, freight, sea, transoceanic ship | transport, freight, sea, transoceanic ship | Cutoff, U	Global
Transport, Truck	market group for transport, freight, lorry, unspecified | transport, freight, lorry, unspecified | Cutoff, U	Global
Vanilla	market for vanilla | vanilla | Cutoff, U	Global
Waste water	treatment of wastewater, average, capacity 1E9l/year | wastewater, average | Cutoff, U	Europe without Switzerland
Water	market for tap water | tap water | Cutoff, U	Europe without Switzerland
Water (in dry seasons)	market group for tap water | tap water | Cutoff, U	Global
Wooden spoon	market for sawnwood, softwood, raw, dried (u=10%) | sawnwood, softwood, raw, dried (u=10%) | Cutoff, U	Europe
Yoghurt cultures	market for whey | whey | Cutoff, U	Global
Yoghurt, dairy	market for yogurt, from cow milk | yogurt, from cow milk | Cutoff, U	Global

Table 23: References used in this LCA

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