Product Life Cycle Assessment Report

2023

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BACKGROUND

CONTACT

Baser ApS is a family-owned company, established in 2015. Baser is devoted to making high quality and long-lasting parasol bases. Compared to the old-school granite baser, Baser is lightweight, easy movable and sustainable solution to every need – without compromising the design. Baser is always using the most durable, sustainable materials and we even help you recycle your product when it's time – whether it is sorted locally or reused in our production.

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PRACTISIONER

Green Survey performs life cycle assessments and is an independent consultant company located in Aarhus, Denmark. Green Survey specializes in helping companies document the environmental footprints of a product or service and create transparency by verifying and validating production and services based on well-documented climate calculations. Green Survey is driven and motivated by creating a transparent and well-documented green transition for small, medium, and large companies

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INTRODUCTION

What is Life Cycle Assessment?

A Life Cycle Assessment, or LCA, is a tool used to evaluate the environmental impact of a product or process throughout its entire life cycle, from the extraction of raw materials to its disposal. It is a comprehensive approach that considers various environmental impacts such as resource depletion, climate change, air and water pollution, and waste generation.

The LCA process typically involves four main stages: goal and scope definition, inventory analysis, impact assessment, and interpretation.

First, in the goal and scope definition stage, the purpose of the study is defined, along with the boundaries, assumptions, and limitations.

Second, the inventory analysis stage involves gathering data on the inputs and outputs of the product or process, including raw materials, energy consumption, and waste generation.

Third, the impact assessment stage evaluates the potential environmental impacts of the product or process, including global warming potential, acidification potential, and eutrophication potential.

Fourth and finally, in the interpretation stage, the results of the study are analysed, and conclusions are drawn about the environmental performance of the product or process.

LCA can be used to identify areas of improvement in a product or process, and to compare the environmental performance of different products or processes. It is a valuable tool for businesses, governments, and consumers who are looking to reduce their environmental impact and make more sustainable choices.

INTRODUCTION

Why Life Cycle Assessment?

Due to our still-growing population, global production is reaching new heights every year. As a result, we use and consume more resources than our planet can replenish, and we must restructure our consumption, production, and way of life to reverse this trend. Therefore, life cycle assessment is now essential if we want to exploit our resources responsibly, as it is a powerful tool to support sustainable development, production and decisions. It can be difficult for the individual consumer to weigh the actual environmental impacts of a product or service. Therefore, by applying the assessment and quantifying inputs and outputs in a product system, the life cycle assessment method will allow us to make better decisions based on actual environmental impacts.

By utilizing life cycle assessment as a business, you can begin to understand your production and supply chain processes better. You may be comparing different ways of creating products or providing services and are thereby able to see if changes need to be made to improve overall results. Your goal can also be to achieve total transparency in your production and let your consumers know that you are obtaining more knowledge and taking steps in a green transition to becoming more sustainable.

1 GOAL AND SCOPE

This assessment is a cradle to gate LCA, done accordingly with ISO standards 14044 (Environmental Management-Life cycle assessment-Requirements and guidelines, 2008). Therefore, the study includes the definition of objectives and scope, life cycle impact inventory, and impact assessment followed by an interpretation of the results. The results of the LCA will be accurately reported with the intensions to both be used in Baser ApS internal and external communication. The results, data, methods, assumptions, and limitations will be transparent and presented in sufficient detail to allow the reader to understand any limitations and trade-offs inherent in the LCA study.

1.1 GOAL

The aim of the LCA of the product system is to create transparency and knowledge about the production of Baser ApS parasol bases, as well as to assess, provide detailed information about the environmental impact of the different footings: Original Base, Baser Spacesaver & Baser Heavy Duty - three bases for different user needs, but all made from the same materials and with the same easy assembly if components (components vary in quantity).

The intended applications of the study are:

- Internal communication
- External communication (like B2B or B2C)
- To be transparent about the existing products, and to apply information to possible future product designs

1.2 SCOPE

The research considers the life cycle, from cradle to gate, of the three Baser parasol footings, including sandbags and packaging. The research considers different phases from raw material extraction and device manufacturing, to transportation and packaging.

The data inventory is based on the bill-of-materials (BoM), a product tear-down. Suppliers were also asked for primary data regarding production processes - energy and material consumption in production, direct emissions, transportation etc. All data has been received from the suppliers, and from Baser ApS.

2 SOURCES OF GENERIC DATA

2.1 LIBRARIES AND METHODS

For this report, we utilized the Ecoinvent version 3.8 library to conduct a comprehensive life cycle assessment (LCA) of the different footing products.
The Ecoinvent version 3.8 is a well-established and reliable database that contains data on a wide range of materials, energy sources, and environmental impacts.
By using the Ecoinvent version 3.8 library, we were able to collect and analyze data on the life cycle assessment of the products, from raw material to manufacturing/storage (cradle to gate).

In this report, the IPCC 2021 GWP 100 method is used to evaluate the emissions of GHGs (Greenhouse Gases), from the Life Cycle Analysis of the different Baser parasol bases, and to assess their impact on the Earth's climate. GWP 100 (Global Warming Potential, 100 years) is the characterization factor of climate change is the global warming potential, based on IPCC 2021 report.
The GWP 100 method is widely used in environmental assessments, corporate sustainability reporting, and policy development, and it provides a standardized way to compare the climate impacts of different GHGs.
The GWP 100 method is also used to evaluate the effectiveness of different mitigation strategies in reducing greenhouse gas emissions.

2.2 TREATMENT OF MISSING DATA

Handling missing data is a critical step in data analysis, as the presence of missing data can lead to biased or inaccurate results. In this case, when data was missing from the dataset, default generic data from libraries was used to plot in the values for each missing data point.

3 SYSTEM BOUNDARIES

A production and life cycle assessment system boundaries determine what processes and inputs are included in the assessment. In *figure 1*, the system boundaries for the directly involved processes in the life cycle of the Baser footings are illustrated.

The life cycle assessment for the Baser parasol footing is based on a cradle-to-gate LCA.

Therefore, all relevant processes during the product's life cycle, within the boundary, have been accounted for, and no stages have been omitted, in which significant environmental impacts are taking place

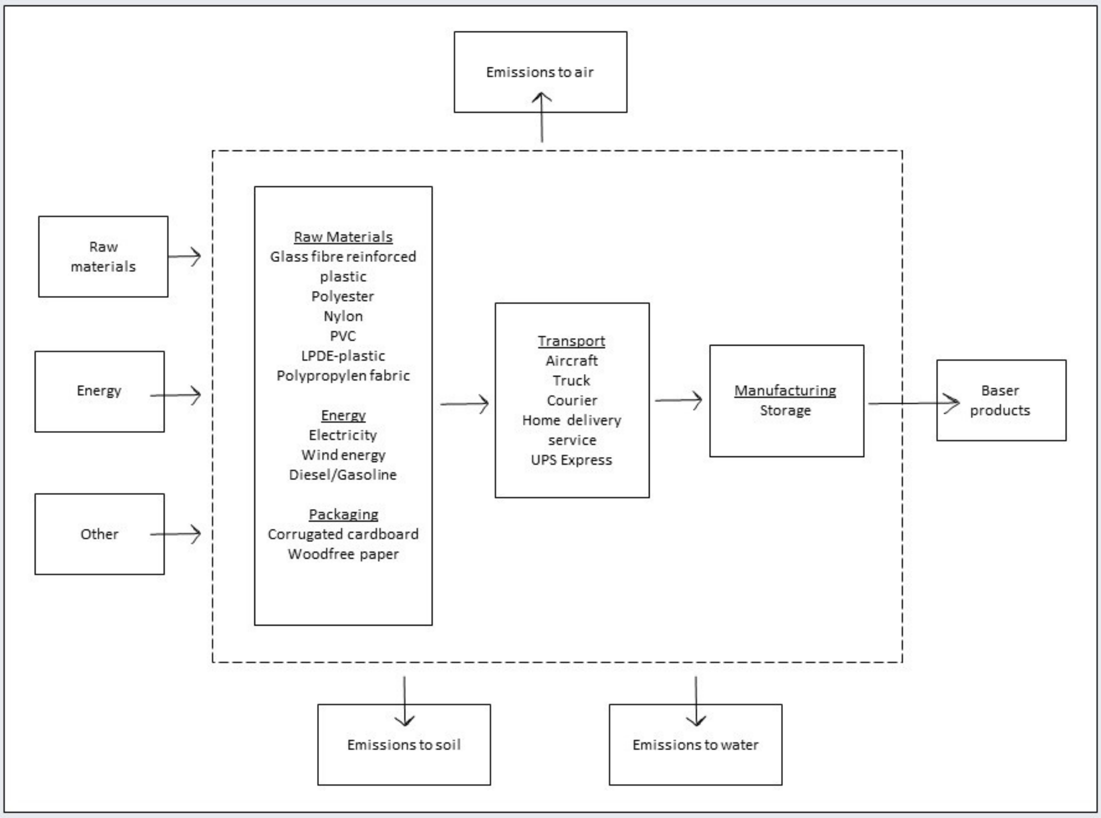

Figure 1 Baser system boundaries

4 LIFE CYCLE INVENTORY

In this report we are examining the three different kinds of Baser parasol bases. The Heavy Duty Baser, the Baser Spacesaver and the Original Baser 30kg. All three bases are made from the same materials, and have the same components - however they may vary in quantity of raw material, and/or quantity of some components.
The additional Baser sandbags and the associated plastic bags, as well as the packaging, stays the same for all products.

The products can be divided into three categories: the base, the bags and the packaging.
The base consists of a base plate, a top ring + a bottom ring and the L-shaped legs. All components consists only of Ravago Ravamid Eco plastic (a glass fibre reinforced plastic).
The bags, and the different components, are made from a combination of polyester and nylon. The Baser logos on the bags are made from polyvinylchlorid (PVC plastic), and the plastic bags are from low density polyethhylene.
The packaging consists of corrugated cardboard and a EAN-sticker made from wood-free self-adhesive paper.

4.1 PRODUCT INFORMATION

Product and materials **Percentage** **Unit** **CO2-eq./material**

Base	%	Kg	C02-eq.
Heavy duty baser Ravamid Eco	100	2	17.46
Original baser Ravamid Eco	100	1.19	10.39
Spacesaver baser Ravamid Eco	100	1.31	11.43

Table 1 Baser product information

Sandbags	%	Kg	C02-eq.
Velcro straps	11	0.00987	0.067
Plastic bags	3.8	0.00348	0.0108
EAN stickers	0.95	0.00086	0.0013
Logo labels	3.3	0.003	0.0076
Dabond thread	5.4	0.0049	0.020
Etisilk Polypropylenstof	75.6	0.0684	0.582

Table 2 Sandbags product information

Packaging	%	Kg	C02-eq.
Corrugated cardboard	100	0.78	0.858

Table 3 Packaging product information

4.2 PRODUCTION AND PROCESSING OF RAW MATERIALS

All the elements have been modelled based on the bill of materials provided by Baser ApS and suppliers.

4.3 TRANSPORTATION

Transportation includes transport to, within, and from the main and smaller production sites. The main manufacturing of the Baser parasol bases takes place in Galten, Denmark. The material is firstly shipped to Denmark from Belgium. The main production of the Baser bags takes place in Poland, the different materials are shipped from Spain, Turkey and internally in Poland. From Poland the product is send to Galten, Denmark.

Activity	Distance	Type	Location
Washing labels to Galten	8711 + 30 = 8741 km	Aircraft	China - Denmark
Logo labels to Galten	8711 + 1 = 8712 km	Aircraft	China - Denmark
From Connect to Cuttingpartner	1.122 km	Road (Truck)	Denmark - Poland
From COATS to Cuttingpartner	2.986 km	Road (Truck)	Turkey - Poland
From Etisilk to Cuttingpartner	2.231 km	Road (Truck)	Spain - Poland
EAN stickers to Cuttingpartner	270 km	Road (Truck)	Poland - Poland
Velcro straps to Cuttingpartner	10 km	Road (Truck)	Poland - Poland
Plastic bags to Cuttingpartner	11 km	Road (Truck)	Poland - Poland
From Cuttingpartner to storage in Galten, Denmark	1.093 km	Road (Truck)	Poland - Denmark
From Ravago to manufacturer in Galten, Denmark	957 km	Road (Truck)	Belgium - Denmark
From Risskov to Galten, Denmark	25 km	Road (Truck)	Risskov (Denmark) - Galten (Denmark)

Table 4 Transportation activities and distances

5 LIFE CYCLE IMPACT ASSESSMENT

The impact categories presented in this study have been chosen in agreement with Baser ApS, in order to only focus on global warming potential (kg CO2-eq.), and Cradle to Gate.

5.1 RESULTS

The results presented in the following section are based on the functional unit (presented in Chapter 1.2) and limited to the defined system boundaries (Chapter 3). In this chapter we present the Global Warming Potential for all three examined Baser products. The following bar graphs displays the total impact for all categories, for the different Baser product. All impact categories have been calculated using SimaPro (v. 9.4.0.1)
In this chapter we will examine all three different Baser ApS products individually, in order to get as accurate results as possible.

5.1.1 HEAVY DUTY

In this chapter we will examine the Baser ApS product Heavy Duty, and look closer into the emissions of this product - how much CO2-eq. the product emits and where in the life cycle it emits the most.
The results will be presented in different tables and figures, using the damage category: GWP 100 (global warming potential). The unit used for describing the results Kg CO2-eq.

In the figure below (*Figure 1*) we can see the different input categories that were used for the Heavy Duty products (described further in chapter 3). In this case we can see from the column chart that the four detachable L-legs have the biggest emission, followed by the transportation from China to Denmark.

This subchapter only shows the results for the Heavy Duty baser, as the other Baser ApS products are described later in this report.

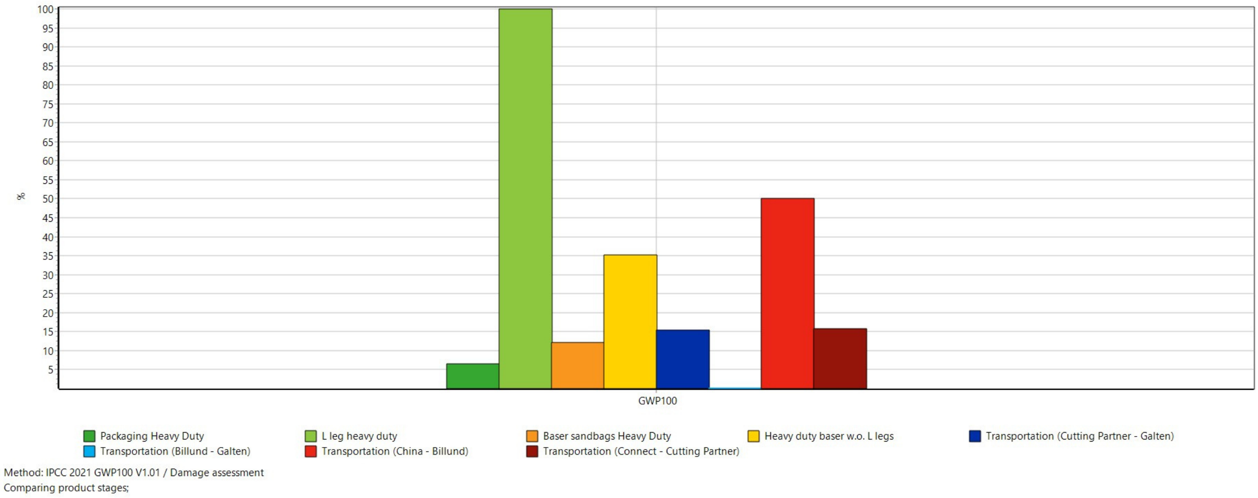

Figure 2 Column Chart from SImaPro, GWP 100 impact categories for Heavy Duty

The table below (*Table 5*) provides a more detailed overview of the different impact categories, than *figure 2* did, as we here get to read the actual Kg CO2-eq per category, and we get to see how much each category effects the total impact category of the product.

We will once again take a look at the four detachable L-legs. If we look at the table, under the category "L legs" we will find, that the four L-legs emits 13 Kg CO2-eq, out of the total amount of 30.5 Kg. Once again it is confirmed that the four L-legs have the highest emission.

Damage Category	Unit	Total	Packaging	L legs	Heavy Duty baser	Sandbags	Transport (Cutting Partner – Galten)	Transport (Connect – Cutting Partner)	Transport (China – Billund)	Transport (Billund – Galten)
GWP 100	Kg CO_2-eq	30.5	0.856	13	4.55	1.57	2	2.05	6.48	0.0153

Table 5 Heavy Duty , Results from SimaPro

After we have seen the results, and concluded that the Ravamid plastic used for the baser and the L-legs have the highest emission of CO2-eq., we can look a bit deeper into those numbers. For the moulding of one L-leg we see, from the recieved data, that 0.64 kWh of energy is used, which means that 2.56 kWh is used to produce all four legs pr. one Heavy Duty base. For the base itself 0.78 kWh of energy is used. This adds up to a total of 3.34 kWh used for the moulding of the Heavy Duty plastic components - this of course has a big impact on the emission results for the product.

All electricity production is by Danish wind-power and is happening in Denmark. All energy data is received from Baser ApS. During the moulding process the energy consumption varies from 0.9 to 1.5 kWh. It was decided to take an conservative approach and use 1.5 kWh per kg of plastic, this number is used for all three products in this report.

Not in every process the energy consumption data was available, to fill that gap the processes from Dataset Ecoinvent was used.

In the below pie chart we have gathered all the categories into the two main emission-categories: Transportations and Material processing.

The pie chart therefor shows the percentage distribution of the GWP 100 (global warming potential) divided into the two main categories.

The graph shows that the transportation combined accounts for about 34% of the total emissions, where the materials here accounts for the largest emission of about 66%.

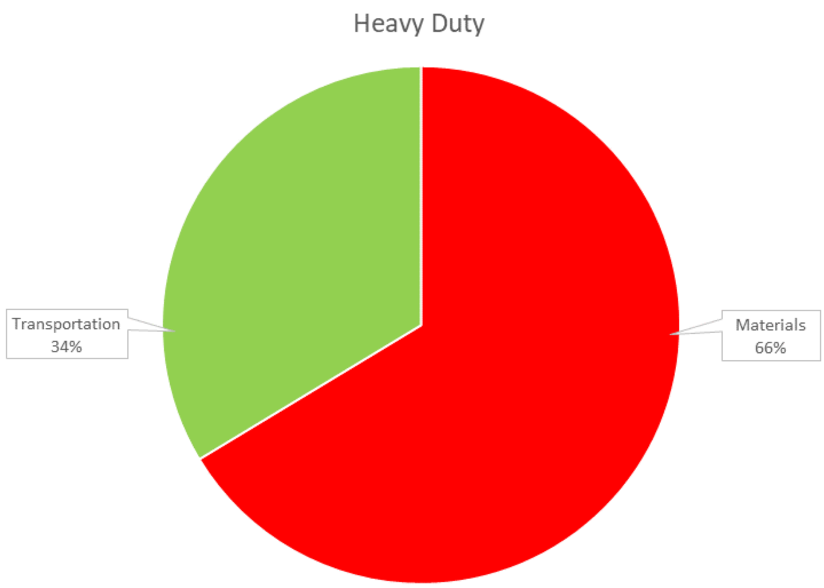

Figure 3 Pie Chart, Emissions in percentage for Heavy Duty when divided into two main categories

5.1.2 ORIGINAL 30 KG

In this chapter we will examine the Baser ApS product Original 30 kg, and look closer into the emissions of this product - how much CO2-eq. the product emits and where in the life cycle it emits the most.
The results will be presented in different tables and figures, using the damage category: GWP 100 (global warming potential). The unit used for describing the results Kg CO2-eq.

In the figure below (*Figure 3*) we can see the different input categories that were used for the Original 30 kg products (described further in chapter 3). In this case we can see from the column chart that the four detachable L-legs have the biggest emission, closely followed by the transportation from China to Denmark. If we look the green column for the L-legs and the red column for aircraft transportation are significantly closer to each other compared to the columns in *Figure 1 (Heavy Duty baser)*. The reason for this is that L-legs weigh significantly more per piece for the Heavy Duty baser, than for the Original 30 kg baser. The emissions from transportation by aircraft stays the same.

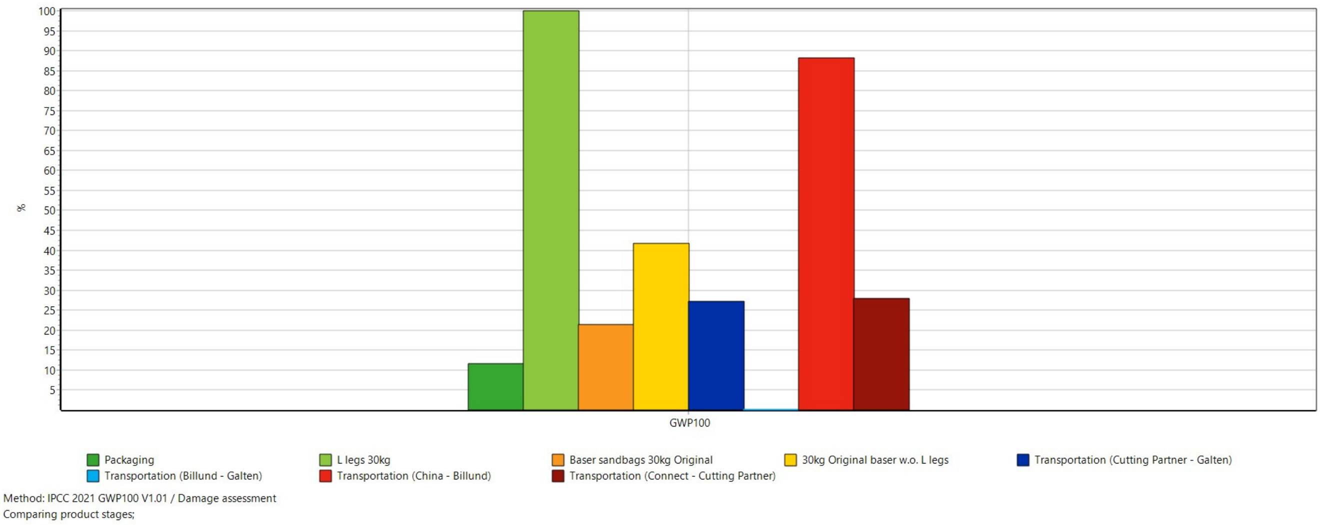

Figure 4 Column Chart from SImaPro, GWP 100 impact categories for Original 30 kg

The table below (*Table 6*) provides a more detailed overview of the different impact categories, than *figure 4* did, as we here get to read the actual Kg CO2-eq per category, and we get to see how much each category effects the total impact category of the product.
We will once again take a look at the four detachable L-legs. If we look at the table, under the category "L legs" we will find, that the four L-legs emits 7.35 Kg CO2-eq, out of the total amount of 23.4 Kg. Once again it is confirmed that the four L-legs have the highest emissions of CO2-eq pr. Kg.

Damage Category	Unit	Total	Packaging	L legs	Original 30kg baser	Sandbags	Transport (Cutting Partner – Galten)	Transport (Connect – Cutting Partner)	Transport (China – Billund)	Transport (Billund – Galten)
GWP 100	Kg CO_2-eq	23.4	0.856	7.35	3.06	1.57	2	2.05	6.48	0.0153

Table 6 Original 30 kg , Damage Category: GWP100 (Global Warming Potential)

After we have seen the results, and concluded that the Ravamid plastic used for the baser and the L-legs have the highest emission of CO2-eq., we can look a bit deeper into those numbers. For the moulding of one L-leg we see, from the recieved data, that 0.31 kWh of energy is used, which means that 1.24 kWh is used to produce all four legs pr. one 30 kg Original base. For the base itself 0.52 kWh of energy is used. This adds up to a total of 1.76 kWh used for the moulding of the 30 kg Original plastic components - this of course has a big impact on the emission results for the product.

In the below pie chart we have gathered all the categories into the two main emission-categories: Transportations and Material processing.
The pie chart therefor shows the percentage distribution of the GWP 100 (global warming potential) divided into the two main categories.
The graph shows that the transportation combined accounts for about 43% of the total emissions, where the materials here accounts for the largest emission of about 57%.

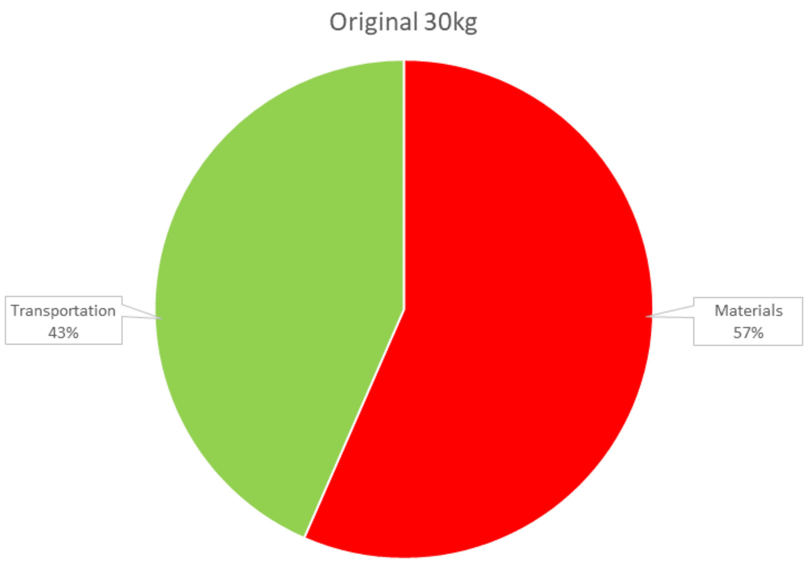

Figure 5 Pie Chart, Emissions in percentage for Original 30 kg when divided into two main categories

5.1.3 SPACESAVER

In this chapter we will examine the Baser ApS product Spacesaver, and look closer into the emissions of this product - how much CO2-eq. the product emits and where in the life cycle it emits the most.
The results will be presented in different tables and figures, using the damage category: GWP 100 (global warming potential). The unit used for describing the results Kg CO2-eq.

In the figure below (*Figure 5*) we can see the different input categories that were used for the Spacesaver product (described further in chapter 3). If we look at the the detachable L-legs in this case we will see from the columns that they, in this case, don't have the highest emissions. The main reason for that would be, that there is only two L-leg used for the Spacesaver product. The Spacesaver is made to save space, and two of the four L-legs are therefor made into a shorter leg instead. Here the transportation from China to Denmark is the biggest emission. In this case the L-legs emit so little, that they are almost even with the rest of the product.

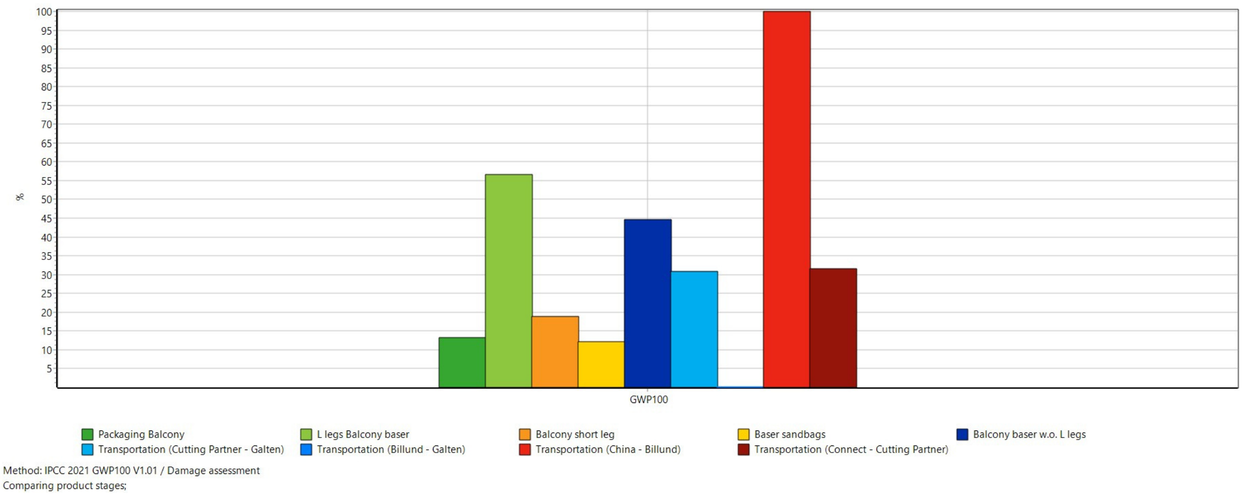

Figure 6 Column Chart from SImaPro, GWP 100 impact categories for Spacesaver

The table below (*table 7*) provides a more detailed overview of the different impact categories, than *figure 6* did, as we here get to read the actual Kg CO2-eq per category, and we get to see how much each category effects the total impact category of the product.
If we look at the table, under the category "L legs" we will find, that the four L-legs emits 3.67 Kg CO2-eq. Whereas the transportation from China to Denmark emits 6.48 Kg, out of the total amount of 20 Kg CO2-eq, and are therefore the biggest emission in this case.
The Spacesaver is therefore also the Baser product that emits the least CO2-eq., from Cradle to Gate. It is important keep in mind, that all the different products use the same materials - they just vary in size and weight.

Damage Category	Unit	Total	Packaging	L legs	Short leg	Spacesaver baser	Sandbag	Transport (Cutting Partner – Galten)	Transport (Connect – Cutting Partner)	Transport (China – Billund)	Transport (Billund – Galten)
GWP 100	Kg CO_2-eq	20	0.856	3.67	1.22	2.89	0.787	2	2.05	6.48	0.0153

Table 7 Spacesaver , Damage Category: GWP100 (Global Warming Potential)

Even though the plastic do not have the highest emission of CO2-eq. in this case, we will still have a look at the energy usage for moulding of the plastic components, as it still have a big impact on the results (and also why they are lower in this case). For the moulding of one L-leg we see, from the received data, that 0.31 kWh of energy is used just like with the 30 kg Original base, in this case there is only used two L-legs which means that 0.62 kWh is used for the moulding of L-legs. The Spacesaver have, as the only product, a short extra leg. For the moulding of the short leg 0.21 kWh is used. That means that 0.83 kWh is used for the moulding of all three legs combined. For the base itself 0.49 kWh of energy is used. This adds up to a total of 1.32 kWh used for the moulding of the Spacesaver plastic components, by far the lowest usage of energy.

In the below pie chart we have gathered all the categories into the two main emission-categories: Transportations and Material processing.
The pie chart therefore shows the percentage distribution of the GWP 100 (global warming potential) divided into the two main categories.
The graph shows that the transportation combined accounts for about 52% of the total emissions, where the materials accounts for about 48%.
In the other two cases we saw that the materials had the biggest emissions, but for the Spacesaver it is actually the transportation category. The reason we see this difference in the Spacesaver product, compared to the other products, is probably due to the L-legs - as we know they have a big emission.

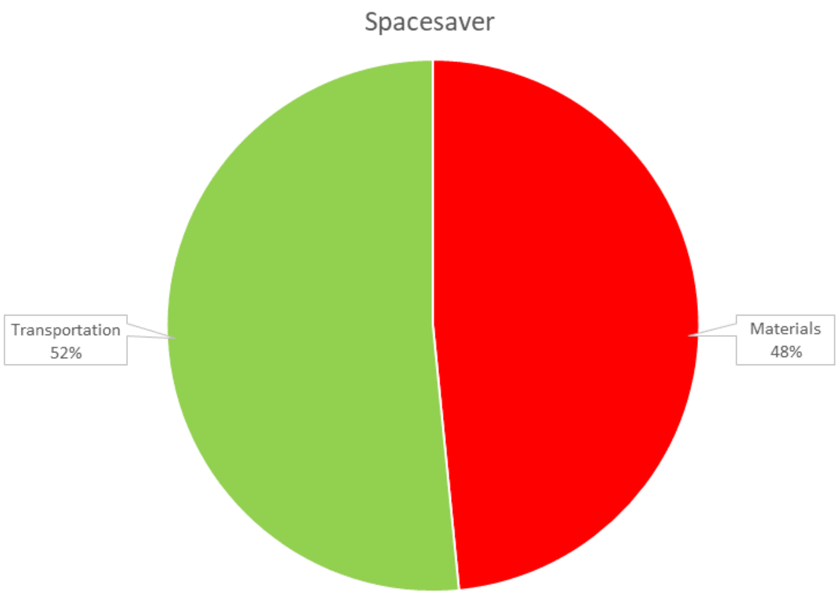

Figure 7 Pie Chart, Emissions in percentage for Spacesaver when divided into two main categories

But what does it mean?

31 KG CO2-EQ MEAT
Equivalent to eating 200 grams of beef

30.5 KG CO2-EQ BASIC PLASTIC BAG (REUSABLE)
Equivalent to using 4.4 basic shopping bags

ONE BASER APS HEAVY DUTY BASE?
30.5 kg co2-eq

CONCLUSION

The overall aim of this environmental impact assessment is to assess and monitor significant environmental impacts and to ensure full transparency in the production of the different Baser ApS parasol bases. An life cycle assessment were made on the three different Baser parasol bases, and was set only to include Cradle to Gate in the results.

The Baser parasol bases are relative simple products, with few material components. But the base is made from 100% plastic and are therefore the most significant influence on the environmental impact, as we could see from the results of the life cycle assessment. The plastic emission is closely followed by the emission made from the transportation of all the components - this specific impact is mainly high due to the aircraft-transportation from China to Denmark. This is a general conclusion on the product, as you noticed in the report it varies from product to product. For the Spacesaver it was not the plastic that had the biggest environmental impact, it was the transportation. That is due to a smaller amount of plastic used for that product specifically. It is therefore also important to keep the unit in mind, and look at the materials individually if you want to compare materials to each other.

LIST OF TABLES AND FIGURES

FIGURES

TABLES

REFERENCES

STANDARDS

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Miljøledelse – Livscyklusvurdering – Krav og vejledning

DS/EN ISO 14040:2008
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PROGRAM

SimaPro release 9.4.0.3

DATABASE

Ecoinvent v3 database, version 3.8

REPORTS

Life cycle assessment of supermarket carrier bags
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