

# L I F E   C Y C L E A N A L Y S I S   R E S U L T S

0 4 . 1 0 . 2 0 2 3



# WASTE A



**Table 1** Life Cycle Stages

Raw Material	Transportation	Production	Transportation to the user	Product Implementation	Phase of use	Care	Repair	Replacement	Renewal	Operational Energy Use	Operational Water Use	Demolition	Waste Transportation	Waste Assessment	Disposal
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4
X	X	X	X	-	-	-	-	-	-	-	-	-	X	X	X

## LIFE CYCLE INVENTORY

### Production Stage (A1-A3)

The production of materials used in the production phase is included in the calculation. The list of materials used is as given below:

**Table 2** Raw Material Type

Material Type
Recycled Fabric
Biopolyurethane
Tea Pulp
DMF

### Shipping to User (A4)

The shipment of the product to the user is included in the calculation. It is assumed that the product will travel 200 km.

### Waste Transportation (C2)

It is included in the calculation by assuming that the product will travel 50 km to the disposal facility.

### Waste Disposal(C4)

It is assumed that the product will go to landfill and included in the calculation.



**Table 3** Production Activity Data- Inputs

INPUTS (A1-A3)		
Raw material (A1)		
Resource Flow	Activity Data	Unit
Recycled Fabric	1	m <sup>2</sup> /m <sup>2</sup> product
Biopolyurethane	0,5056	kg/ m <sup>2</sup> product
Tea Pulp	0,0655	kg/ m <sup>2</sup> product
DMF	0,0187	kg/ m <sup>2</sup> product
Raw Material Transfer to Plant (A2)		
by road	0,2229	ton x km
Production (A3)		
Water	4,629	Litre/m <sup>2</sup> product
Electricity	38,87	W/ m <sup>2</sup> product
Natural Gas	0,122	m <sup>3</sup> / m <sup>2</sup> product

## LIFE CYCLE ANALYSIS RESULTS

### PRODUCT CARBON FOOTPRINT - GWP

The 4 categories and total global warming potential (GWP) results for the product are given in Table 5 below. GWP values were calculated in SimaPro software using IPCC 2021 GWP100 (incl. CO<sub>2</sub> uptake) V1.00 method.

**Table 4** Product KIP100 Results

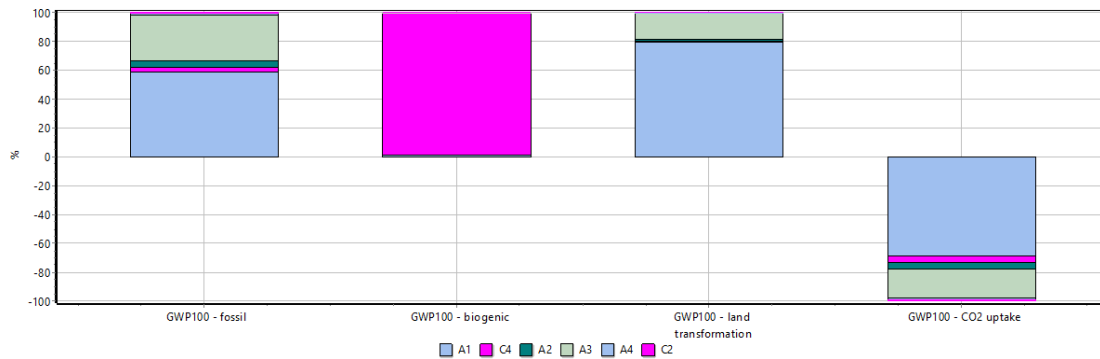
Impact category	Unit	Total	A1	A2	A3	A4	C2	C4
GWP100 - fossil	kg CO <sub>2</sub> -eq	9,70E-01	5,68E-01	4,03E-02	3,04E-01	1,73E-02	4,33E-03	3,61E-02
GWP100 - biogenic	kg CO <sub>2</sub> -eq	5,08E-01	5,31E-03	2,38E-04	1,47E-03	1,02E-04	2,56E-05	5,01E-01
GWP100 - land transformation	kg CO <sub>2</sub> -eq	1,90E-03	1,51E-03	2,12E-05	3,48E-04	9,13E-06	2,28E-06	1,45E-05
GWP100 - CO <sub>2</sub> uptake	kg CO <sub>2</sub> -eq	-5,06E-03	-3,51E-03	-2,24E-04	-1,01E-03	-9,62E-05	-2,41E-05	-1,99E-04
GWP 100-TOTAL	kg CO <sub>2</sub> -eq	1,48E+00	5,71E-01	4,03E-02	3,05E-01	1,73E-02	4,34E-03	5,37E-01

→ The total 100-year global warming potential was calculated as 1.48 kg CO<sub>2</sub>-e.

→ Global warming potential as a result of fossil-based processes was found to be 0.97 kg CO<sub>2</sub>-e.

→ Biogenic global warming potential was found to be 0.508 kg CO<sub>2</sub>-e.

→ Global warming potential of land conversion was found to be 0,00190 kg CO<sub>2</sub>-e.



Method: IPCC 2021 GWP100 (incl. CO2 uptake) V1.02 / Characterization / Excluding long-term emissions  
Analyzing 1 p "Wastea";

Figure 1 GWP Characterization(%)

**LIFE CYCLE IMPACT ASSESSMENT**

The results of the life cycle impact assessment for the product are calculated in 10 categories and presented in Table 6 below. Values were calculated in SimaPro software using the ReCiPe 2016 EndPoint (H) method.

Table 5. Results of the Life Cycle Impact Assessment

Impact category	Unit	Total	A1	A2	A3	A4	C2	C4
Global warming, Human health	DALY	1,35E-06	5,42E-07	3,81E-08	2,89E-07	1,64E-08	4,10E-09	4,61E-07
Global warming, Terrestrial ecosystems	species.yr	4,07E-09	1,64E-09	1,15E-10	8,72E-10	4,95E-11	1,24E-11	1,39E-09
Global warming, Freshwater ecosystems	species.yr	1,11E-13	4,47E-14	3,14E-15	2,38E-14	1,35E-15	3,38E-16	3,79E-14
Stratospheric ozone depletion	DALY	1,14E-09	1,07E-09	9,95E-12	3,87E-11	4,28E-12	1,07E-12	1,72E-11
Ionizing radiation	DALY	6,21E-12	2,88E-12	2,88E-13	2,39E-12	1,24E-13	3,10E-14	5,03E-13
Ozone formation, Human health	DALY	2,06E-09	1,54E-09	6,29E-11	3,57E-10	2,71E-11	6,77E-12	6,93E-11
Fine particulate matter formation	DALY	1,41E-06	1,16E-06	2,05E-08	1,97E-07	8,81E-09	2,20E-09	2,12E-08
Ozone formation, Terrestrial ecosystems	species.yr	4,32E-10	3,51E-10	9,90E-12	5,57E-11	4,26E-12	1,07E-12	1,01E-11



Impact category	Unit	Total	A1	A2	A3	A4	C2	C4
Terrestrial acidification	species.yr	7,99E-10	6,90E-10	1,36E-11	7,25E-11	5,87E-12	1,47E-12	1,53E-11
Freshwater eutrophication	species.yr	1,65E-10	1,56E-11	3,10E-13	1,42E-10	1,34E-13	3,34E-14	6,77E-12
Marine eutrophication	species.yr	6,25E-13	1,62E-13	1,29E-15	4,96E-14	5,56E-16	1,39E-16	4,11E-13
Terrestrial ecotoxicity	species.yr	1,98E-11	5,80E-12	7,37E-12	2,21E-12	3,17E-12	7,93E-13	4,52E-13
Freshwater ecotoxicity	species.yr	2,04E-12	1,75E-12	8,17E-14	4,81E-14	3,52E-14	8,79E-15	1,13E-13
Marine ecotoxicity	species.yr	2,96E-13	1,67E-13	5,30E-14	2,14E-14	2,28E-14	5,71E-15	2,61E-14
Human carcinogenic toxicity	DALY	1,91E-08	5,84E-09	1,68E-09	7,19E-09	7,22E-10	1,80E-10	3,51E-09
Human non-carcinogenic toxicity	DALY	2,85E-08	1,78E-08	2,85E-09	4,38E-09	1,23E-09	3,07E-10	1,89E-09
Land use	species.yr	1,75E-08	1,74E-08	1,46E-11	1,56E-11	6,30E-12	1,58E-12	7,13E-12
Mineral resource scarcity	USD2013	5,00E-03	4,88E-03	2,51E-05	7,28E-05	1,08E-05	2,70E-06	8,08E-06
Fossil resource scarcity	USD2013	8,84E-02	4,34E-02	5,42E-03	3,49E-02	2,33E-03	5,83E-04	1,80E-03
Water consumption, Human health	DALY	6,36E-08	5,78E-08	8,96E-11	5,25E-09	3,86E-11	9,64E-12	3,82E-10
Water consumption, Terrestrial ecosystem	species.yr	4,00E-10	3,59E-10	7,57E-13	3,76E-11	3,26E-13	8,15E-14	2,41E-12
Water consumption, Aquatic ecosystems	species.yr	2,28E-14	1,85E-14	1,06E-16	3,94E-15	4,56E-17	1,14E-17	1,70E-16