

Life Cycle Analyses

CLIPON



Summary



01 | Methodology



02 | Results

01

Methodology

Environmental Impact Assessment

Functional unit

The functional unit is a quantified performance of a product system for use as a reference unit. One of the primary purposes of a functional unit is to provide a reference to which the input and output data are normalized (in a mathematical sense). Therefore, the functional unit shall be clearly defined and measurable.

Impact Indicator

The impact is measured through the "IPCC 2021 GWP100" method

Electricity impact calculation method

Following guidelines from the GHG Protocol, the impact of electricity is calculated using the location-based approach. This means that the emission factors used represent the average annual carbon intensity of the power grid in the country the processes take place in.

Life Cycle Analyses

Cradle to grave

Emission Factor Inventory

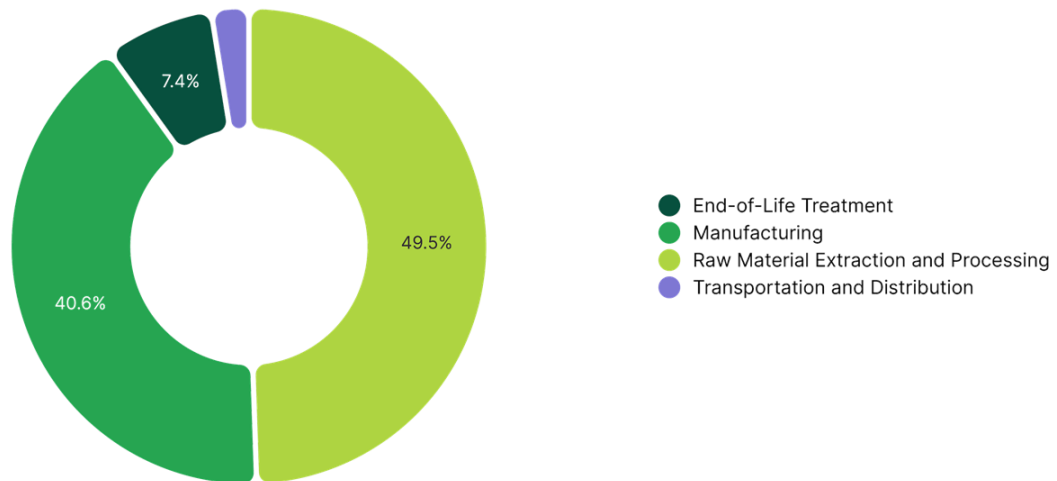
Num	Emission Factor	Source	Value	Unit
1	market for polystyrene, extruded	ECOINVENT 3.10	10.57	kg
2	Acrylonitrile–butadiene–styrene copolymer Ordinary transforming activity	ECOINVENT 3.10	4.53	kg
3	Steel, low-alloyed Ordinary transforming activity	ECOINVENT 3.10	2.20	kg
4	Electricity Total (Scope 2 & 3) People's Republic of China	IEA 2023	0.72	kWh
5	Freight Boat From CN to FR	WELOW EXPERTS 1.0	0.25	kg
6	Waste reinforcement steel Ordinary transforming activity	ECOINVENT 3.10	0.06	kg
7	Waste Incineration – Plastics PE PPI PB PS RER	BASE EMPREINTE ADEME 3.0	3.05	kg
8	Residues, MSWI, waste plastic, consumer electronics Ordinary transforming activity	ECOINVENT 3.10	0.36	kg

02

Results

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Climate Change

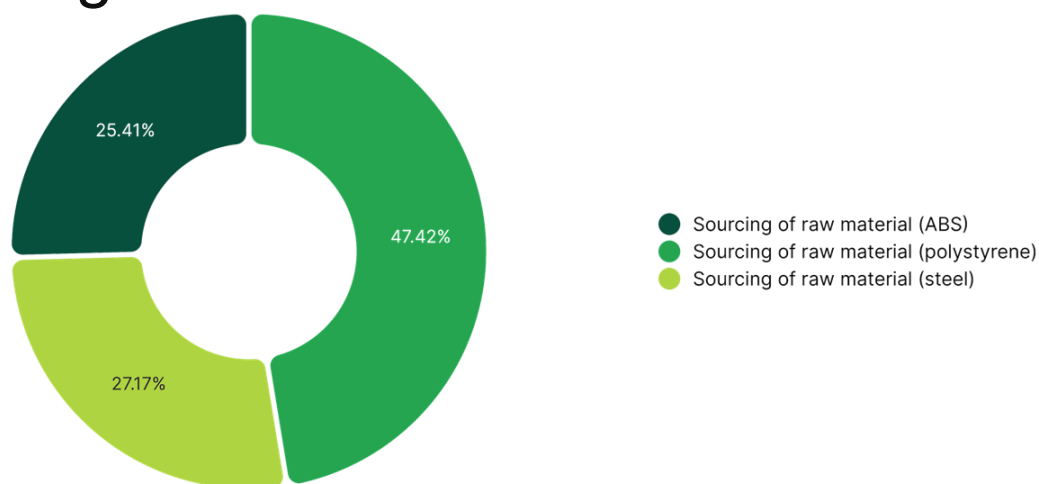


- End-of-Life Treatment
- Manufacturing
- Raw Material Extraction and Processing
- Transportation and Distribution

Step	Impact (g CO ₂ eq)	Percentage (%)
Raw Material Extraction and Processing	392.49	49.48 %
Manufacturing	321.82	40.57 %
End-of-Life Treatment	58.75	7.41 %
Transportation and Distribution	20.18	2.54 %
TOTAL	793.24	100.00 %

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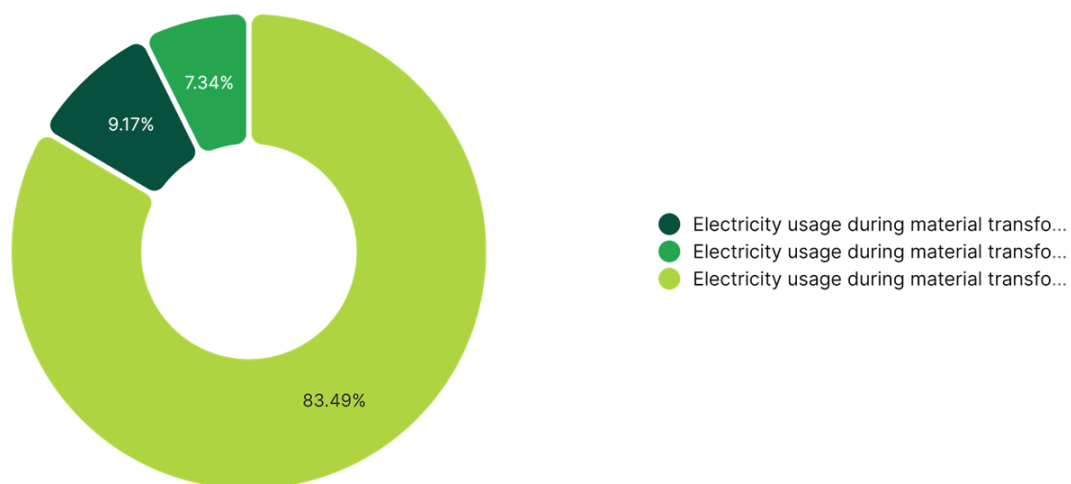
Climate Change - Raw Material Extraction and Processing



Activity	Emission Factor Num	Quantity	Unité	Impact (g CO ₂ eq)	Percentage (%)
Sourcing of raw material (polystyrene)	1	0.02	kg	186.11	47.42 %
Sourcing of raw material (steel)	3	0.05	kg	106.64	27.17 %
Sourcing of raw material (ABS)	2	0.02	kg	99.74	25.41 %
TOTAL				392.49	100.00 %

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Climate Change - Manufacturing

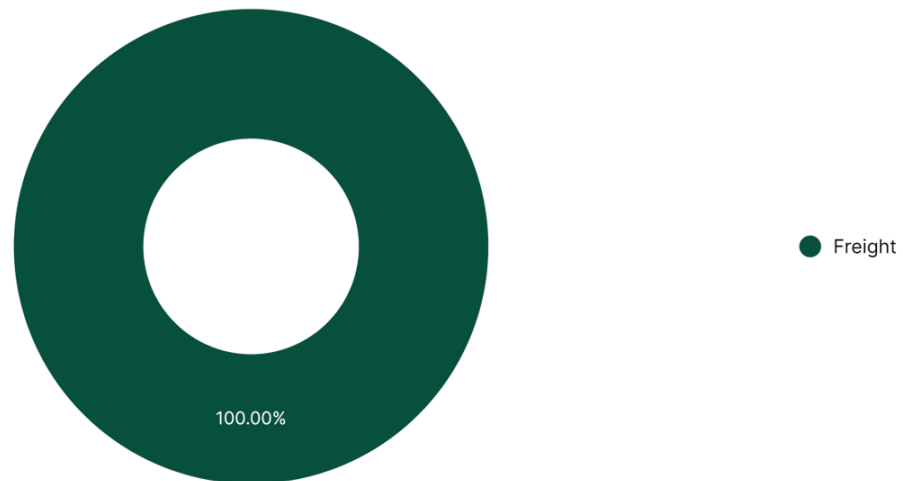


Activity	Emission Factor Num	Quantity	Unité	Impact (g CO ₂ eq)	Percentage (%)
Electricity usage during material transformation (steel)	4	0.37	kWh	268.67	83.49 %
Electricity usage during material transformation (ABS)	4	0.04	kWh	29.53	9.17 %
Electricity usage during material transformation (polystyrene)	4	0.03	kWh	23.62	7.34 %

TOTAL	321.82	100.00 %
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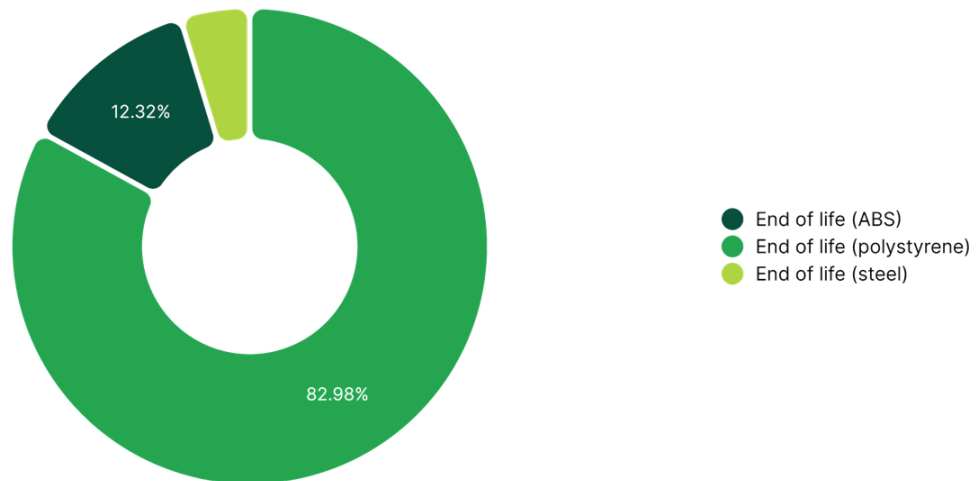
Climate Change - Transportation and Distribution



Activity	Emission Factor Num	Quantity	Unité	Impact (g CO ₂ eq)	Percentage (%)
Freight	5	0.08	kg	20.18	100.00 %
TOTAL				20.18	100.00 %

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Climate Change - End-of-Life Treatment



Activity	Emission Factor Num	Quantity	Unité	Impact (g CO ₂ eq)	Percentage (%)
End of life (polystyrene)	7	0.02	kg	48.75	82.98 %
End of life (ABS)	8	0.02	kg	7.24	12.32 %
End of life (steel)	6	0.04	kg	2.76	4.70 %

TOTAL

58.75

100.00 %

