

Life Cycle Analyses

PLAQUE



Summary



01 | Methodology



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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. The functional unit of this analysis is "1 clipboard(s) holding paper document for entire functional lifespan until disposal or recycling"

Impact Indicator

The impact is measured through the "IPCC 2013 GWP 100a" 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.

Hypothesis

The Product's material composition is supplemented by secondary information, if necessary, as shown in the list below.

- board: MDF board, plastic, aluminium, 95%
- clip: Aluminium, plastic: 5%

Manufacturing Processes and associated loss percentages are assumed based on materials in the product.

The electricity is based on the average in the country of manufacturing.

Transportation is based on the common routes between the country of manufacturing and the country of sale.

No replacements during the lifetime, therefore there are no emissions corresponding to the usage phase of the clipboard.

The End of Life is based on the average waste management process of the materials in the product.

Environmental Impact Assessment

System Boundaries

The scope of this research includes the complete lifecycle of a clipboard from raw material extraction to disposal options for each material, which is the cradle-to-grave perspective.

Exclusions

Secondary packaging impact is excluded from this assessment.

Emission Factor Inventory

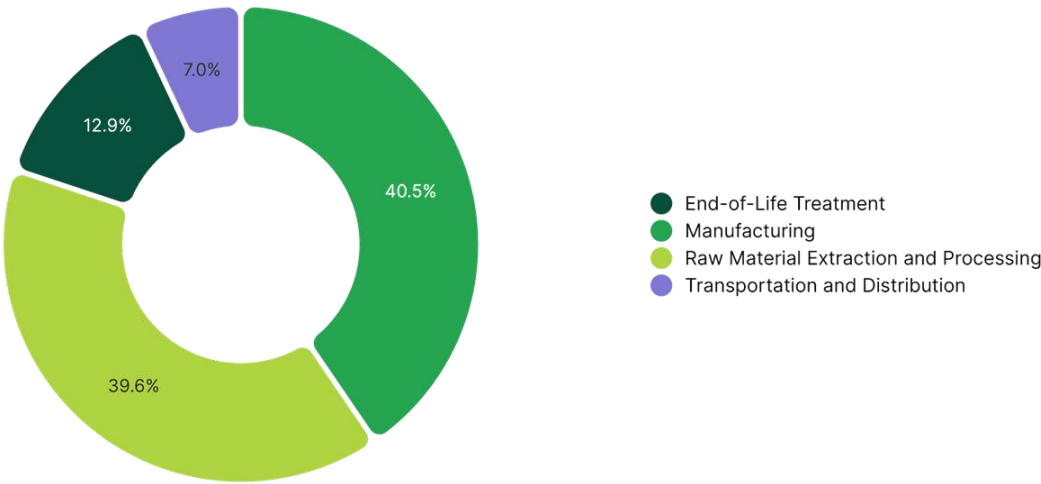
Num	Emission Factor	Source	Value	Unit
1	Medium density fibreboard, RER	BASE IMPACTS ADEME 2.02	0.52	kg
2	Polyvinylchloride, emulsion polymerised Ordinary transforming activity	ECOINVENT 3.10	2.63	kg
3	Steel, low-alloyed Ordinary transforming activity	ECOINVENT 3.10	2.20	kg
4	Electricity Total (Scope 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 polyvinylchloride product Ordinary transforming activity	ECOINVENT 3.10	1.21	kg
8	Packaging – Wood – Average end of life in the EPR scheme – Impacts	BASE CARBONE ADEME 22.0	0.27	kg

02

Results

Clipboard

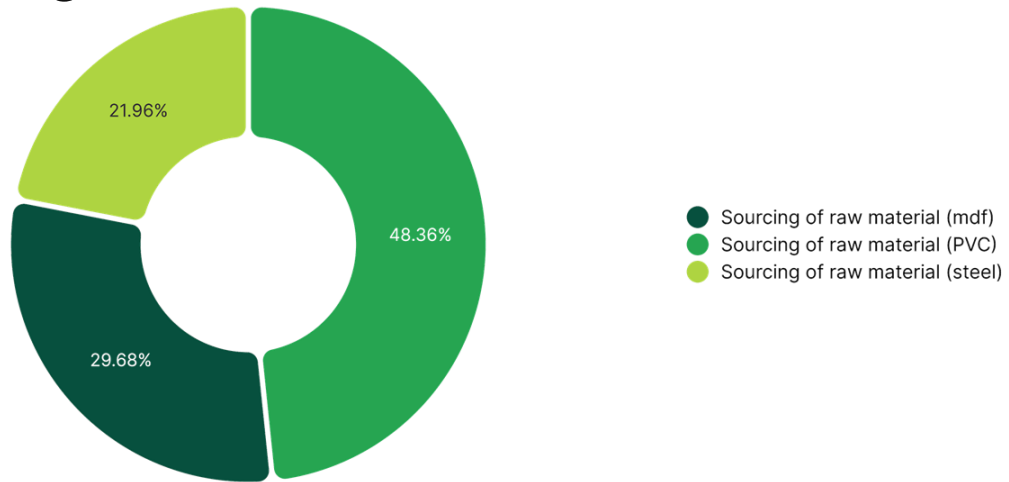
Climate Change



Step	Impact (g CO ₂ eq)	Percentage (%)
Manufacturing	278.46	40.47 %
Raw Material Extraction and Processing	272.62	39.62 %
End-of-Life Treatment	89.07	12.94 %
Transportation and Distribution	47.93	6.97 %
TOTAL	688.08	100.00 %

Clipboard

Climate Change - Raw Material Extraction and Processing



Activity	Emission Factor Num	Quantity	Unité	Impact (g CO ₂ eq)	Percentage (%)
Sourcing of raw material (PVC)	2	0.05	kg	131.84	48.36 %
Sourcing of raw material (mdf)	1	0.16	kg	80.92	29.68 %
Sourcing of raw material (steel)	3	0.03	kg	59.86	21.96 %

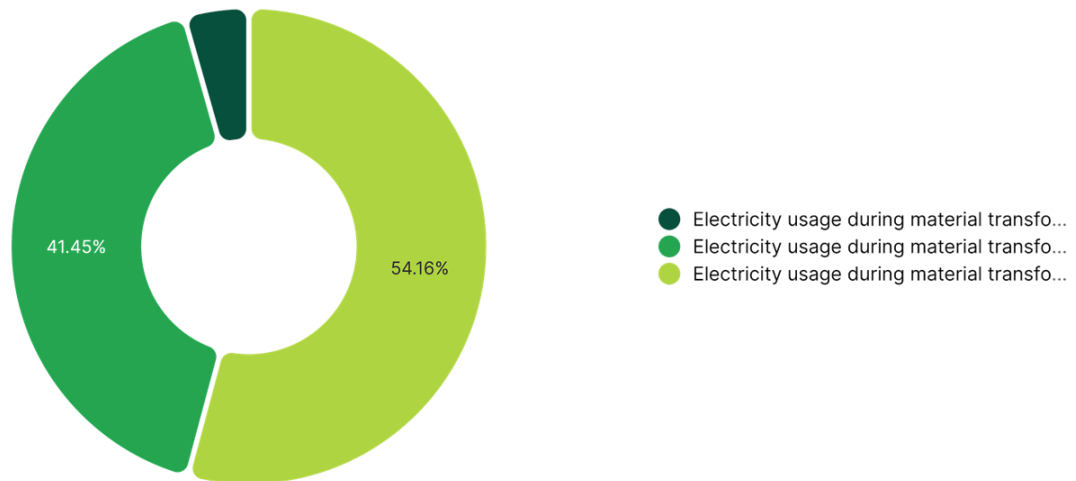
TOTAL

272.62

100.00 %

Clipboard

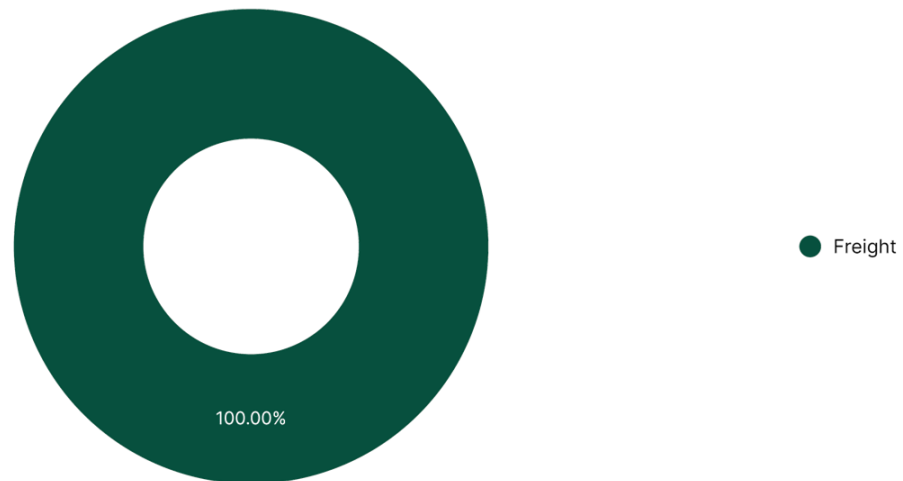
Climate Change - Manufacturing



Activity	Emission Factor Num	Quantity	Unité	Impact (g CO ₂ eq)	Percentage (%)
Electricity usage during material transformation (steel)	4	0.21	kWh	150.82	54.16 %
Electricity usage during material transformation (PVC)	4	0.16	kWh	115.41	41.45 %
Electricity usage during material transformation (mdf)	4	0.02	kWh	12.23	4.39 %
TOTAL				278.46	100.00 %

Clipboard

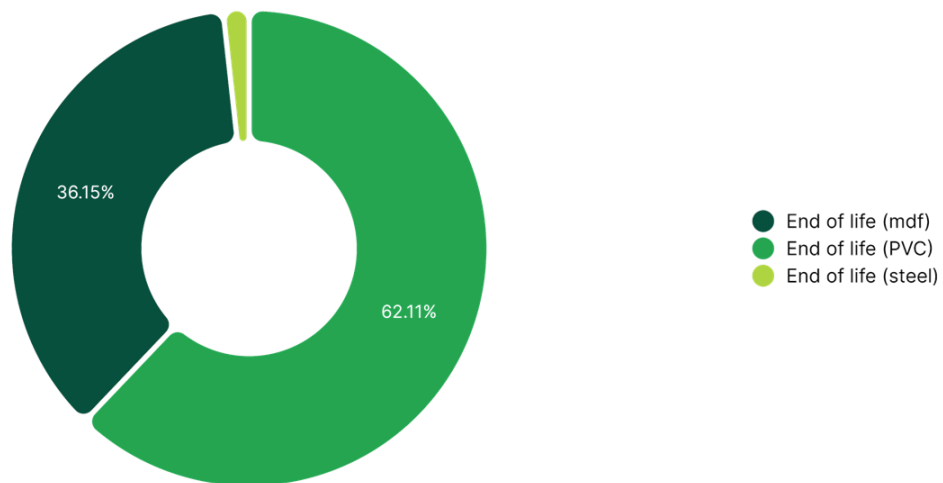
Climate Change - Transportation and Distribution



Activity	Emission Factor Num	Quantity	Unité	Impact (g CO ₂ eq)	Percentage (%)
Freight	5	0.19	kg	47.93	100.00 %
TOTAL				47.93	100.00 %

Clipboard

Climate Change - End-of-Life Treatment



Activity	Emission Factor Num	Quantity	Unité	Impact (g CO ₂ eq)	Percentage (%)
End of life (PVC)	7	0.05	kg	55.32	62.11 %
End of life (mdf)	8	0.12	kg	32.2	36.15 %
End of life (steel)	6	0.02	kg	1.55	1.74 %
TOTAL				89.07	100.00 %

