

Description of Item



Geodesic Tent

- Mass: 46.75kg
- Main materials: Polyethylene tarpaulin, polyester, aluminium and steel
- Packaging material: LDPE film (primary packaging), fibreboard and steel (secondary packaging)

Functional unit

Use of 1 tent for a family of 5 persons for 4 years

Assumptions

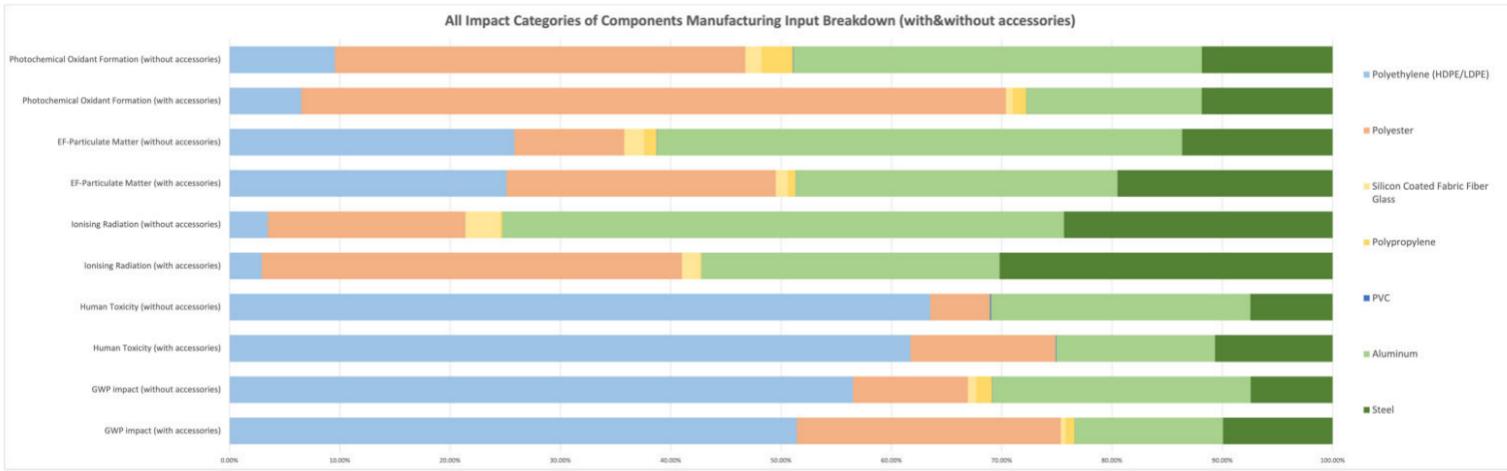
- **Geographical scope:** Manufacture in **China** → shipment to **Gaza**.
- **Electricity mix:** China grid average (2018).
- **End-of-life (EoL):** 50% **tarpaulin reuse**, 80% **aluminium reuse**, remainder to landfill.
- **Transport:** Truck (7.5–16t & 16–32t, China domestic), Sea freight (Shanghai → Aqaba ≈ 13,000 km), Truck (Aqaba → Gaza ≈ 550 km).
- **Data source:** Ecoinvent 3.11 (Alloc Def) + ICRC/RISE LCA for tarpaulin.

Results of the computation



| Stage | kgCO ₂ e |
|-------------------------|---------------------|
| Component Manufacturing | 173.78 |
| Assembly | 40.05 |
| Transportation | 31.91 |
| End-of-Life | -50.19 |

| Stage | Human Health |
|-------------------------|--------------|
| Component Manufacturing | 16.30 |
| Assembly | 1.61 |
| Transportation | 2.60 |
| End-of-Life | -2.87 |



Variations - in GWP

To use recycled materials

Computation made by considering recycled polyester and recycled aluminium/steel

| Material | kgCO ₂ e |
|--------------------|---------------------|
| Recycled Polyester | -7.12% |
| Recycled Aluminium | -16.31% |
| Steel | -9.82% |

To extend the lifespan

Computation made by considering double the lifespan of a tent (4 years to 8 years)

| Category | kgCO ₂ e |
|--------------------|---------------------|
| Lifespan extension | -50% |

To increase reuse rate of tarpaulin and aluminium

Computation made by considering increase the reuse rate of tarpaulin and aluminium by 30% and 35%

| Category | kgCO ₂ e |
|------------------------------|---------------------|
| Both tarpaulin and aluminium | -9.42% |

To transport by air

Computation made by considering air freight for international transportation instead of maritime shipping (emergencies)

| Category | kgCO ₂ e |
|-------------|---------------------|
| Air Freight | +208.34% |

To dispose all waste through landfill and no credits reclaimed

Computation made by considering all EoL via landfill and no credits for reuse

| Category | kgCO ₂ e |
|------------------|---------------------|
| All via landfill | +27.34% |
| No reclaimed | +26.59% |

Analyses

- **Extending lifespan** and **recycled aluminium** deliver the greatest benefits (>50%), while **recycled polyester** and **increasing material reuse rate** further lower manufacturing impacts.
- **Logistics** changes such as port relocation or transport mode shifts have very limited influence, and **air freight** would sharply increase emissions and should be avoided.
- Combining **lifespan extension + reuse + recycled aluminium** could reduce total GWP by ~75%, emphasising that durability and circularity interventions represent the most effective strategies for climate mitigation.
- Future work should focus on **validating field reuse rates and improving component manufacturing data**.

Emission factors

The values displayed here are not per functional unit but per item. These values can be used to compute a carbon footprint of an organisation and can be adapted to a specific case using the tool

| Name | GHG Protocol Categories | kgCO ₂ e/unit |
|------------------------|---|--------------------------|
| Cradle-to-grave | N/A | 195.55 |
| Cradle-to-gate | 3.1 Purchased Goods | 173.78 |
| Distribution freight | 3.4 and/or 3.9 Transportation | 40.05 |
| Assembly | N/A | 31.91 |
| Use phase | 3.11 Use of distributed product | Neglected |
| End-of life | 3.12 End of life of distributed product | -50.19 |

References

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Rajput, A., Tobin Greene, C. and Schmid, S. (no date) 'Life Cycle Assessment (LCA) Methodology'. Available at: https://climateactionaccelerator.org/wpcontent/uploads/2025/06/EPFL_LCA_methodology_v1.0.pdf.

Repository of life cycle assessments - Climate Action Accelerator (2025). Available at: <https://climateactionaccelerator.org/repository-offlifecycle-assessments/>.

About this project

Designing methodologies and performing life cycle analyses of high-impact items to build a GHG emission factor and environmental impact database adapted to the humanitarian sector with the goal of identifying key strategies to reduce environmental impacts.

This specific study was conducted as part of a joint MSc research project between the IOM and UCL

University College London (UCL):
Yuyan Mao, Prof. Aiduan Borrión

International Organization for Migration (IOM):
Adam Ostaszewski, Taylor Raeburn-Gibson