Reusable vs. Disposable Surgical Textiles

An Environmental & Economic Life Cycle Assessment

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BACKGROUND AND OBJECTIVES

Operating rooms generate significant amounts of waste due to the widespread use of disposable surgical textiles.
This study compares the environmental impacts and life cycle costs (LCC) of **reusable (TTR)** and **disposable (TNT)** surgical gowns and drapes through a combined Life Cycle Assessment (LCA) and Life Cycle Costing (LCC) approach.

METHODOLOGY

Comparative LCA + LCC:
A combined environmental and economic assessment of surgical gowns and drapes.

ISO 14040–14044 | PEF:
Study conducted in accordance with ISO 14040–14044 standards and the Product Environmental Footprint (PEF) method, as set out in Commission Recommendation (EU) 2021/2279.

Cradle-to-grave approach:
From raw material extraction to end-of-life treatment, including all relevant life cycle stages.

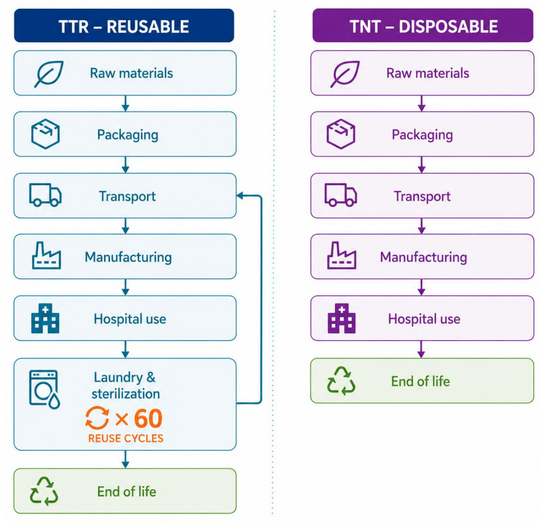
Functional unit:
1 surgical textile item (gown or drape) providing the required protective function.

TTR service life:
60 reuse cycles, based on industrial laundry and sterilization data.

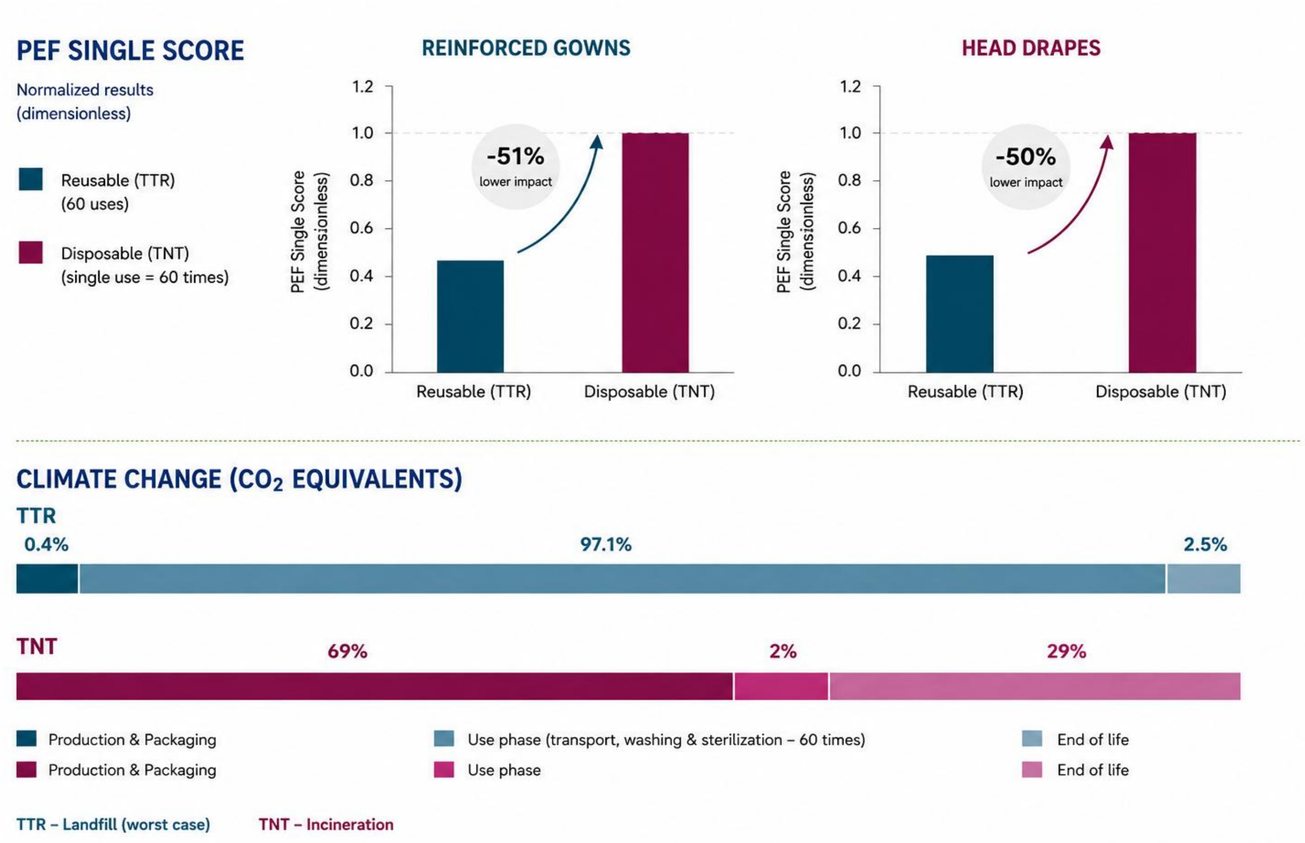
SimaPro 9.6.0.1 | Ecoinvent 3.10:
LCA modeling performed using SimaPro software and Ecoinvent 3.10 database.

**These are the most up-to-date versions at the time of the study.*

SYSTEM BOUNDARY



LCA KEY FINDINGS



DISCUSSION & CONCLUSION

- **Lower environmental impacts**
  Reusable (TTR) surgical textiles showed 48–51% lower PEF Single Score impacts for gowns and 45–55% lower impacts for surgical drapes, even under the conservative landfill scenario.
- **Lower climate change impact**
  The climate change impact of **TTR** was mainly associated with the **use phase**, including transport, laundering and sterilization over 60 reuse cycles.
- **Lower life cycle costs**
  TTR showed **lower life cycle costs across the analysed product categories**, with savings of up to **50%** compared with **TNT**.

Overall benefit

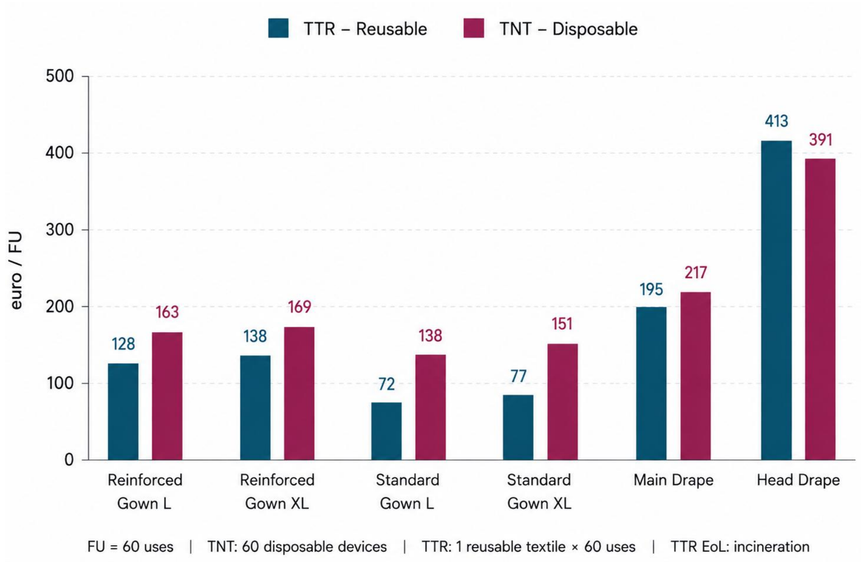
The results indicate that reusable surgical textiles can provide **both environmental and economic advantages** compared with disposable alternatives.

LCC KEY FINDINGS

Reusable (TTR) surgical textiles show lower life cycle costs than disposable (TNT) alternatives across most product categories.

Cost savings range from **18–20%** up to **48–50%**, depending on the product category, with the largest reductions observed for gowns and major surgical drapes.

Up to 50% cost savings, depending on product category.



FU = 60 uses | TNT: 60 disposable devices | TTR: 1 reusable textile × 60 uses | TTR EoL: incineration

ESTIMATED CLIMATE EXTERNALITY of TNT compared with TTR

14.5 kg CO_2eq/tonne	×	€0.06 – €0.09 /kg CO_2eq	=	€0.87 – €1.30 /tonne	= 30–50% of the TNT gross price (€2.43/tonne)
Additional climate impact of TNT		Monetary value of 1 kg CO_2eq		Estimated climate external cost attributable to TNT	

€0.06 source: Avg. CO_2 price on EU ETS market (2022)*
€0.09 source: EC – CBA Guide for Investment Projects (2021)**

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