



# **Raymond Private Limited**

## **Environmental Product Declaration (EPD)**

July 12, 2025

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## 1. Executive Summary

This Environmental Product Declaration (EPD) provides transparent, verified information about the environmental impacts associated with the production of denim fabric by Raymond Private Limited. The results are based on a cradle-to-gate Life Cycle Assessment (LCA) performed using the ReCiPe 2016 Midpoint (H) methodology. The EPD is intended for use by customers, designers, regulators, and stakeholders interested in the sustainability performance of textile products.



## 2. Product Description

### 2.1 Product Definition

Denim fabric is a robust, woven cotton textile widely used in jeans, jackets, and various apparel. Its signature twill weave provides durability and a distinct diagonal pattern.

## 2.2 Product Composition

Component	Percentage by Weight	Origin
Cotton (main fiber)	98–99%	India/Imported
Polyester	0–2%	India/Imported
Dyes & Chemicals	<1%	India/Imported

## 2.3 Applications

- Apparel (jeans, jackets, shirts)
- Upholstery and home textiles
- Accessories (bags, hats, etc.)

## 2.4 Technical Data

Property	Value/Range	Test Method
Weight	250–450 g/m <sup>2</sup>	ISO 3801
Width	140–160 cm	ISO 22198
Color Fastness	4–5 (good)	ISO 105
Shrinkage	<3%	ISO 5077

### 3. LCA Methodology

#### 3.1 Standards and Principles

- ISO 14040/44: Life Cycle Assessment Principles and Framework
- ISO 14025: Environmental labels and declarations
- EN 15804: Sustainability of construction works

#### 3.2 Goal and Scope Definition

The goal is to quantify the environmental impacts for 1 kg of finished denim fabric at the factory gate. The scope is cradle-to-gate, including raw material extraction, processing, manufacturing, and packaging.

#### 3.3 Data Sources and Quality

- Primary Data: Raymond Private Limited (2024–2025)

- Secondary Data: Ecoinvent v3.9, GaBi
- Data representativeness: Indian grid mix, average cotton yields

### 3.4 Impact Assessment Method

- ReCiPe 2016 Midpoint (H) methodology, covering a broad range of environmental impact categories

## 4. System Boundaries and Functional Unit

- Functional Unit: 1 kg of finished denim fabric at the factory gate
- System Boundaries: Cradle-to-gate (raw material extraction, processing, manufacturing, packaging; excludes distribution, use, end-of-life)

## 5. Life Cycle Inventory

### 5.1 Inputs

Input	Quantity per kg fabric	Unit
Cotton fiber	1.05	kg
Polyester fiber	0.01	kg
Water (process + cooling)	80	liters

Electricity	2.5	kWh
Natural gas (steam)	0.2	Nm <sup>3</sup>
Dyes and chemicals	0.03	kg
Packaging (cardboard, LDPE)	0.02	kg

## 5.2 Outputs

Output	Quantity per kg fabric	Unit
Denim fabric (product)	1.0	kg
Wastewater	60	liters
Solid waste (sludge, trimmings)	0.04	kg

## 6. Life Cycle Impact Assessment (LCIA) Results

### 6.1 Impact Categories

Impact Category	Result	Unit
Global warming (GWP)	10.99	kg CO <sub>2</sub> eq
Fossil resource scarcity	2.77	kg oil eq
Water consumption	0.0138	m <sup>3</sup>
Fine particulate matter formation	0.0136	kg PM2.5 eq
Freshwater ecotoxicity	0.0141	kg 1,4-DCB
Terrestrial ecotoxicity	28.51	kg 1,4-DCB
Freshwater eutrophication	$3.57 \times 10^{-5}$	kg P eq
Marine ecotoxicity	0.00791	kg 1,4-DCB
Marine eutrophication	$1.78 \times 10^{-4}$	kg N eq
Terrestrial acidification	0.0511	kg SO <sub>2</sub> eq

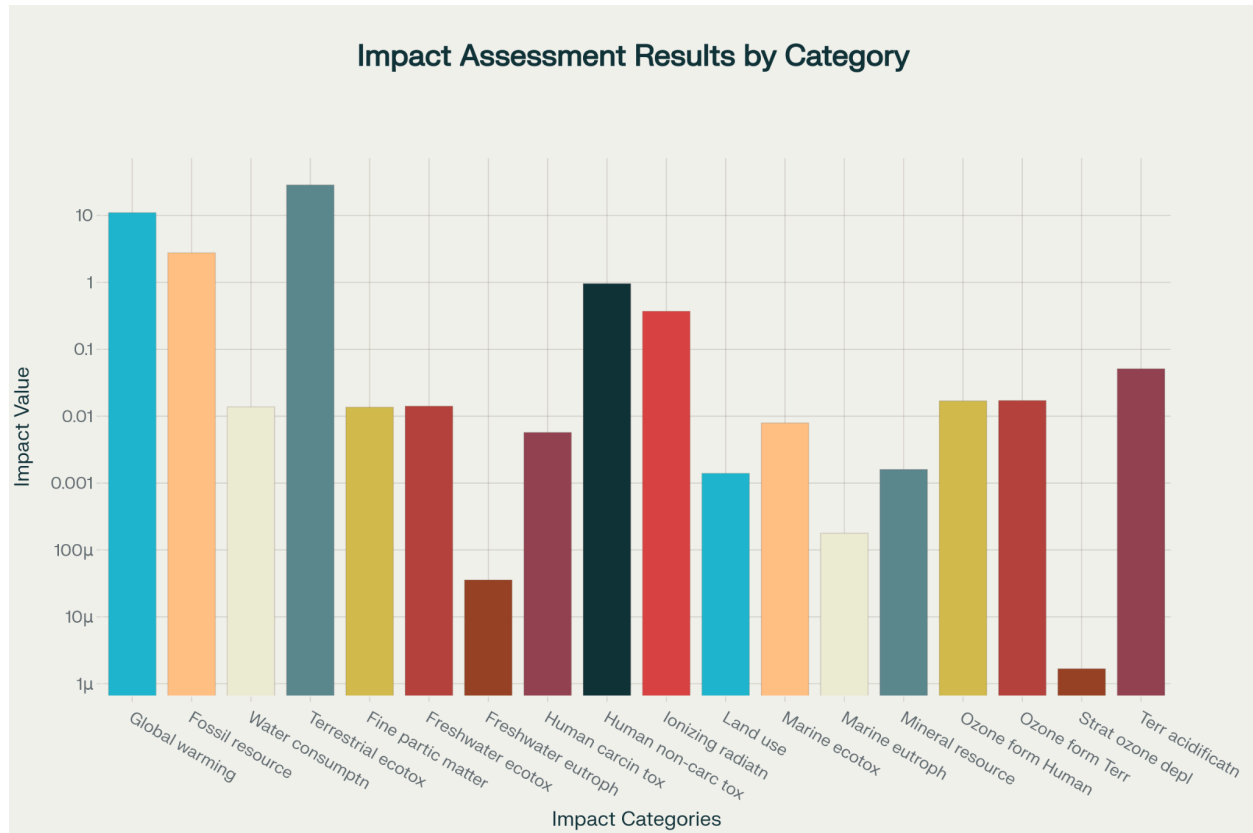
Human carcinogenic toxicity	0.00569	kg 1,4-DCB
Human non-carcinogenic toxicity	0.958	kg 1,4-DCB
Ozone formation, Human health	0.0169	kg NOx eq
Ozone formation, Terrestrial ecosystems	0.0171	kg NOx eq
Stratospheric ozone depletion	$1.68 \times 10^{-6}$	kg CFC11 eq
Ionizing radiation	0.370	kBq Co-60 eq
Land use	0.00137	m <sup>2</sup> a crop eq
Mineral resource scarcity	0.00163	kg Cu eq

## 7. Visual Representation of Results

### 7.1 Environmental Impact Categories (Bar Chart)



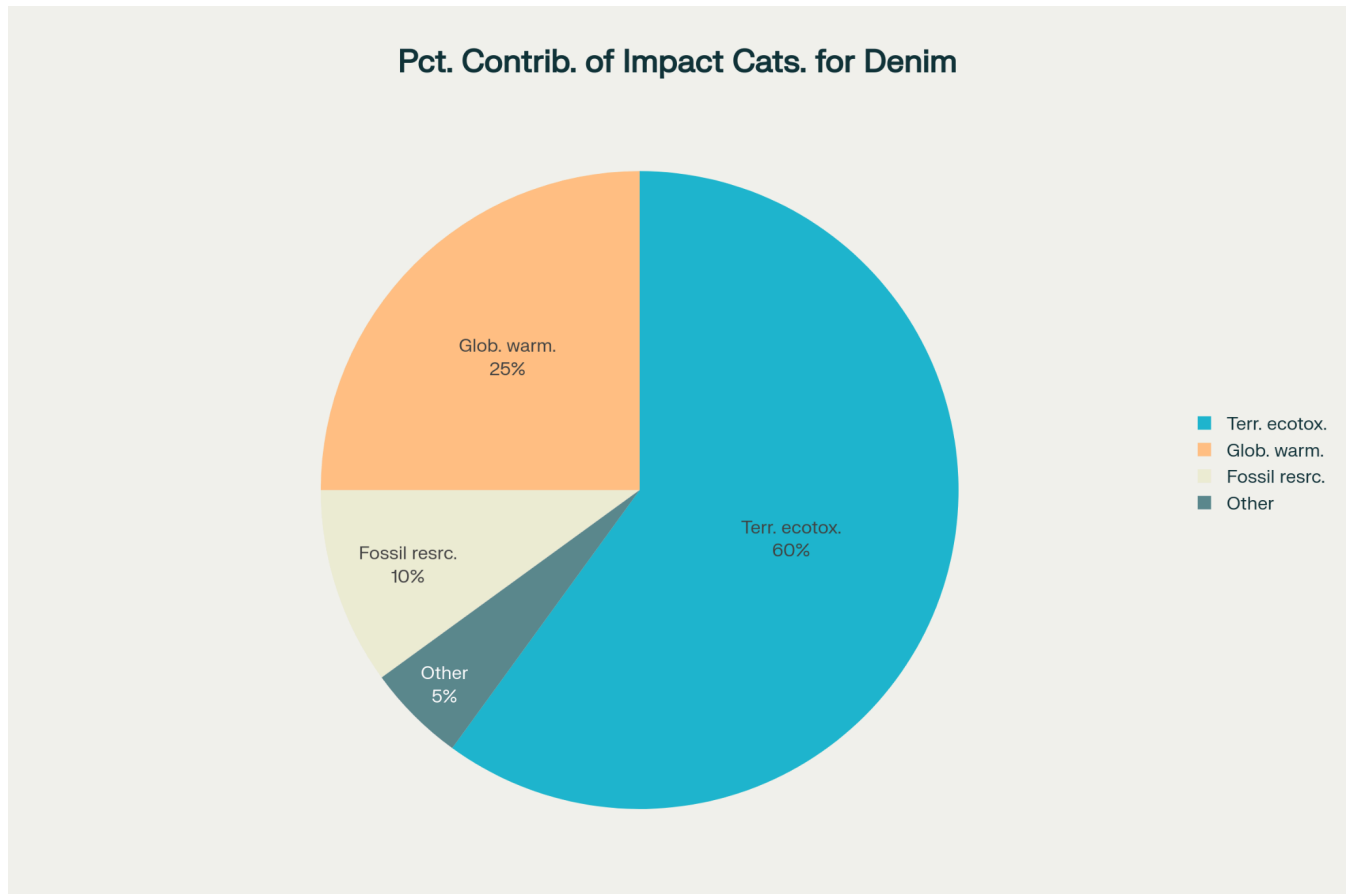
This chart visually compares the magnitude of key environmental impacts per kg of denim fabric, highlighting the most significant categories.



Bar chart showing environmental impact categories for denim fabric

## 7.2 Major Environmental Impact Contributions (Pie Chart)

This pie chart illustrates the proportional contribution of the three most significant impact categories: terrestrial ecotoxicity, global warming, and fossil resource scarcity.



Pie chart showing major environmental impact contributions for denim fabric

## 8. Interpretation and Discussion

- Global Warming Potential: 10.99 kg CO<sub>2</sub> eq per kg, primarily from electricity and cotton cultivation.
- Terrestrial Ecotoxicity: 28.51 kg 1,4-DCB eq, driven by pesticide use and chemical effluents.
- Fossil Resource Scarcity: 2.77 kg oil eq, reflecting energy and transport reliance.

- Water Consumption: 0.0138 m<sup>3</sup> per kg, mainly from cotton farming and dyeing.

### **Hotspots & Opportunities**

- Transitioning to renewable energy and sustainable cotton can significantly reduce impacts.
- Advanced wastewater treatment and chemical management can lower ecotoxicity.

### **9. Additional Environmental Information**

- Water Recycling: 60% process water recycled.
- Renewable Energy: 10% of electricity from solar (target: 30% by 2030).
- Certifications: OEKO-TEX® Standard 100, GOTS (for select lines), ISO 14001.

### **10. Data Quality, Assumptions & Limitations**

- Primary Data: Raymond's Private Limited (2024–2025).
- Secondary Data: Ecoinvent v3.9.
- Assumptions: Indian grid mix, average cotton yields, cradle-to-gate boundary.
- Limitations: Excludes downstream impacts, some proprietary chemical data estimated.

### **11. Certification and Verification**

Prepared in accordance with ISO 14025 and EN 15804.

**Third-party verification:** [To be completed]

**EPD owner:** Raymond's Private Limited

## **12. References & Glossary**

- ISO 14025, ISO 14040/44, EN 15804, Ecoinvent v3.9, ReCiPe 2016 Methodology Documentation.
- CO<sub>2</sub> eq: Carbon dioxide equivalent (climate impact)
- 1,4-DCB eq: 1,4-dichlorobenzene equivalent (ecotoxicity)
- GWP: Global Warming Potential