

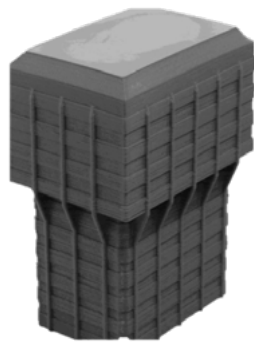
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ONE-PAGER LCA REPORT

THE PROJECT

The **recovery and recycling process** by partners [Humana People to People Italia](#), [Casati Flock & Fibers](#) and [SuperForma](#) represents an example of industrial symbiosis by **transforming post-consumer textile waste** (otherwise landfilled or incinerated) **into valuable resources**. The LCA conducted in 2025 on the production of a **Velaskello, made with 85% recovered PLA and 15% recovered textiles**, in collaboration with Humana People to People Italia, Casati Flock & Fibers, and SuperForma, was carried out using the Environmental Footprint (EF) 3.1 methodology and a cradle-to-gate system boundary. **The resulting impact for the climate change category is 9.1 kg CO₂-equivalents. 97% of this impact is associated with the phases of PLA and compound preparation and product manufacturing using 3D printing technology.** Notably, 86% of the total impact is attributed to electricity consumption.

METHODOLOGICAL ELEMENTS



Functional Unit:
15% recycled textiles and recycled PLA Velaskello

System Boundary:
From cradle to gate

Impact Categories:
Climate Change

Methods:
EF 3.1

Background Datasets:
Ecoinvent ver 3.10



Methodology:

The textile waste and the PLA waste have zero impact, since it was donated, in accordance with internationally recognized LCA standards*

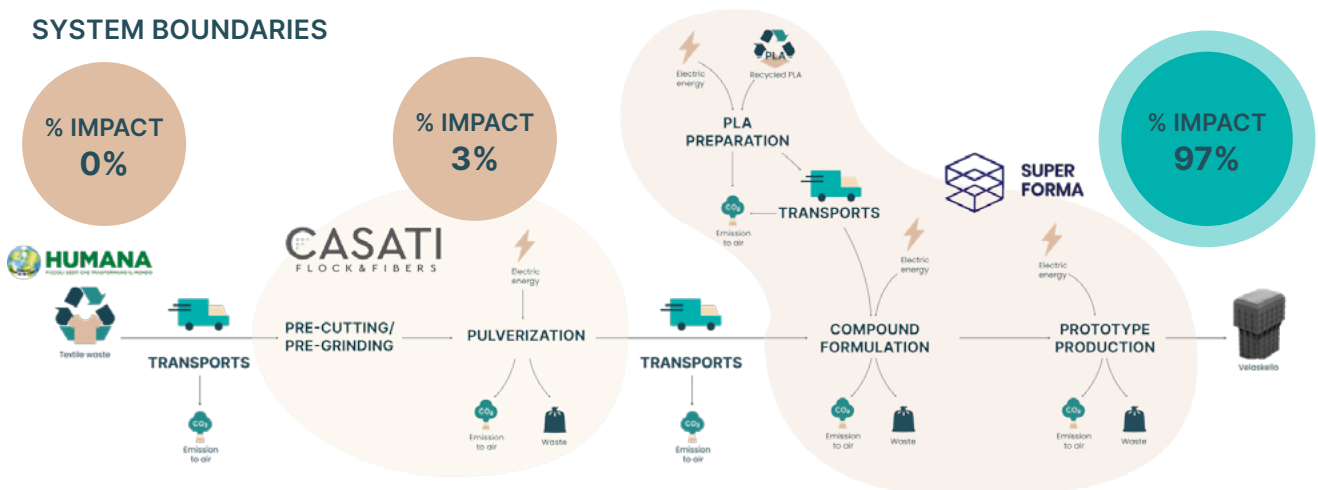


Assumptions and limitations:

Packaging of the materials transported from one site to the other were included, assuming the ones from Humana People to People Italia, Casati Flock & Fibers, and SuperForma, was carried out using the Environmental Footprint (EF) 3.1 method to Casati Flock & Fibers since no data were available. For the waste destination, plastic components were considered recycled, while cardboard boxes used for PLA were assumed to be reused.

*ILCD Handbook (International Reference Life Cycle Data System)

SYSTEM BOUNDARIES



PARTNERS ROLE

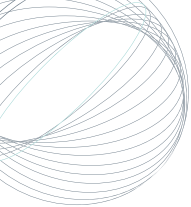
MUSA Spoke 5 Bocconi researchers:
project initiator and coordinator

Humana People to People Italia:
Supply of non-recyclable textile waste.

Casati Flock & Fibers:
Pulverization of non recyclable textile fibers

SuperForma:
3D printing of the Velaskello, using the textile powder received from Casati Flock & Fibers and recovered PLA

A 3rd party has not reviewed this result according to ISO 14040 and 14044 standards. It should therefore not be used for public disclosure of comparative assertions



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The amount of textiles recovered in each Velaskello (1,11kg of textiles) corresponds to around 6 sport polyester blend T-Shirts

1,11 kg textiles:



6 sport T-shirts*
(weight of 1 t-shirt: 186 g)

The amount of electric energy employed in the production of a Velaskello (21,02 kWh) made with recovered materials corresponds to the use of a TV for 170 hours

21,02 kWh of electric energy:



Use hours of a TV**

(electricity consumptions per 1 hour: 0,1235kWh)

* Stevens, Don. (1983). Effect of the weight of athletic clothing in distance running by amateur athletes. The Journal of sports medicine and physical fitness. 23. 185-90.

** Ruggieri, G., Zangheri, P., Bulgarelli, M., & Pistochini, P. (2019). Monitoring a Sample of Main Televisions and Connected Entertainment Systems in Northern Italy. Energies, 12(9), 1741. <https://doi.org/10.3390/en12091741>

LCA RESULTS (KIMPI - KEY IMPACT INDICATORS) AND HOTSPOTS

KIMPI	UOM	PRE-CUTTING/ PRE-GRINDING	PULVERIZATION	PLA PREPARATION	COMPOUND FORMULATION	PROTOTYPE PRODUCTION	TOTAL
TEXTILE WASTE	%						
RECYCLED PLA	%						
PACKAGING	%			12%			13%*
ALLOCATED WATER	%						
THERMAL ENERGY	%						
ELECTRIC ENERGY	%		2%	6%	16%	62%	86%*
TRANSPORTS	%						
EMISSIONS TO AIR	%						
EMISSIONS TO WATER	%						
WASTE PRODUCED	%						
WASTEWATER	%						
TOTAL	%		3%*	19%*	16%*	62%*	

*Due to rounding to the nearest unit, the sum of individual items may not exactly match the reported total.

9,1

KgCO₂eq/unit

POSSIBLE IMPROVEMENTS

ELECTRIC ENERGY:

Use of a certified renewable energy mix

DURATION OF PROCESSES:

Minimize the duration of pulverization processes, to reduce electric energy consumption

PACKAGING:

Avoid the use of unnecessary packaging. Reuse or recycle packaging, instead of sending it at disposal

INPUT MATERIALS:

Reduce the quantity of material used for the production of the object. As a consequence, the electricity consumption will decrease

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