LCA | Coveralls

EPFL EssentialTech Centre · ICRC · Climate Action Accelerator · LEURE

Description of Items

Single-use Coverall
- Lifespan: 1 use
- Materials: Virgin Polyester, Polypropylene, Rubber, PET

SmartPPE
- Lifespan: 100 uses
- Materials: Virgin Polyester, Polypropylene, Rubber, PET

Functional unit

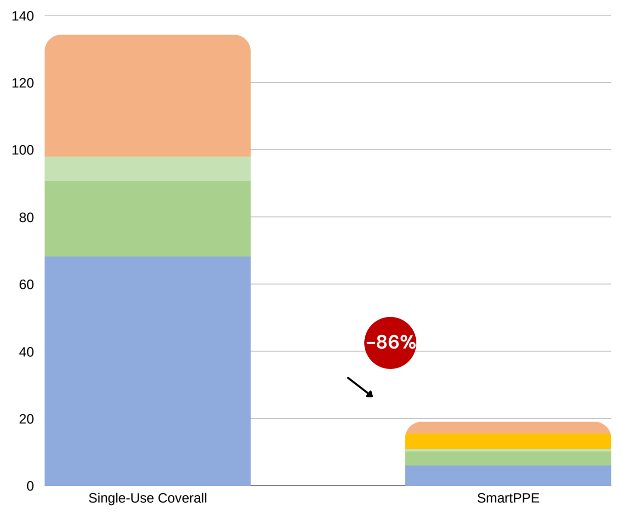
100 uses of a coverall (EBOLA)

Item	Use life	Reference Flows
Single-Use	1	100
SmartPPE	100	1

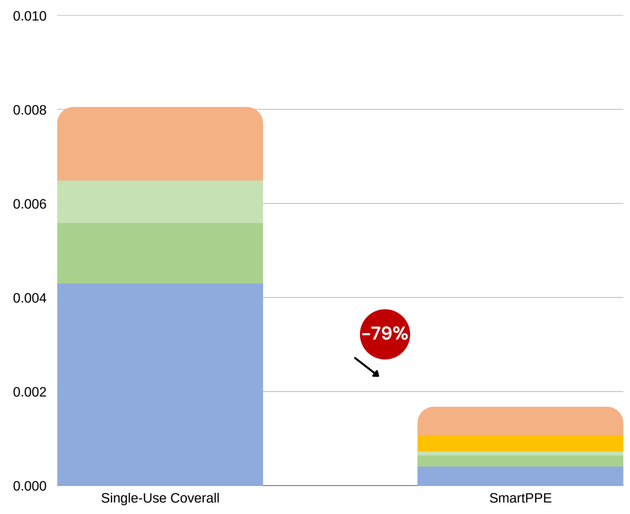
Assumptions

Both products are manufactured from locally sourced materials in China and transported to the field by ship. SmartPPE is assumed to be washed after every use with tap water, chlorine and soap. Open burning in considered as end of life.

Results of the computation



Stage		kgCO₂e Single Use	SmartPPE
Raw Material		68.28	6.10
Production		22.44	4.08
Transportation		7.33	0.74
Use		0.00	4.61
End-of-Life		36.15	3.47



Stage		Human Health Single Use	SmartPPE
Raw Material		4.30E-03	4.09E-04
Production		1.29E-03	2.34E-04
Transportation		9.01E-04	9.08E-05
Use		0.00E+00	3.52E-04
End-of-Life		1.56E-03	5.92E-04

Variations (% from baseline figures presented above)

To use recycled materials
Computation made by considering 100% recycled raw materials for products

	Single-Use	SmartPPE
kgCO2e	-25%	-87%
Human Health	-26%	-80%

To use renewable energy for production
Computation made by considering 100% of renewable energy in factory mix

	Single-Use	SmartPPE
kgCO2e	-14%	-88%
Human Health	-11%	-81%

To ship via air freight
Computation made by considering overseas shipping by air

	Single-Use	SmartPPE
kgCO2e	+37%	-82%
Human Health	+23%	-76%

To dispose via recycling
Computation made by considering waste sent to recycling facilities

	Single-Use	SmartPPE
kgCO2e	-15%	-86%
Human Health	-11%	-86%

Best Possible Scenario
Recycled + Renewable + Collected for Recycling

	Single-Use	SmartPPE
kgCO2e	-39%	-90%
Human Health	-37%	-89%

Analyses

To reduce the environmental impact of single-use coveralls, significant improvements can be made by focusing on raw materials and the energy used during manufacturing. However, the greatest reductions are possible by switching from single-use to reusable coveralls.

Tlt is important to highlight that this study focuses on two main indicators: climate change and human health. Other impact categories, such as ecosystem quality and water usage, are not covered. For example, the reusable coverall requires approximately 1,000 litres of water for cleaning over its lifespan.

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	kgCO2e/unit Single-Use	SmartPPE
Cradle-to-grave	N/A	1.34	19.0
Cradle-to-gate	3.1 Purchased Goods	0.92	10.3

References

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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.

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