

Executive Summary: Medicus Caps LCA For Plain Caps

The LCA aims to analyze the environmental impacts of producing a Medicus Cotton Scrub Cap. The study found that the production stage contributes significantly to the overall carbon footprint, primarily due to energy-intensive cotton cultivation and dyeing processes. However compared to current disposable scrub caps ends up reducing overall emissions by 99%.

Introduction

Background

Caps made from cotton fabric are widely used and quality and production is well researched, unlike its counterparts like polycotton. These are chosen for comfort, hypoallergenic properties and due to wide supply cost effectiveness.

Objectives

To assess the environmental impacts of a cotton scrub cap throughout its lifecycle and comparing it to its disposable counterparts.

Scope

The study will cover the entire life cycle of the cap: raw material acquisition, production, transportation, use, and end-of-life.

Methodology

Functional Unit

One Medicus Scrub Cap.

System Boundaries

From raw material extraction to end-of-life (cradle-to-grave).

Data Sources

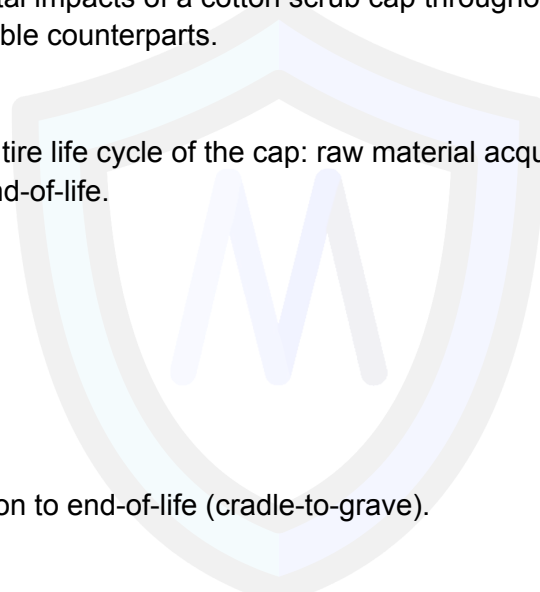
Data were collected from industry reports, academic papers, and company-specific information.

Assumptions and Limitations

Assumes average usage and washing frequency
Does not account for potential recycling or reusing of the cap

Impact Assessment Method

Considered impact categories such as Global Warming Potential (GWP), water use, and eutrophication.



Inventory Analysis

Raw Material Acquisition + Production

Cotton cultivation: Requires substantial water and energy. The global average water footprint for 1kg of cotton is 10,000 liters [[Source](#)] This varies with some citing up to 125 liters of water per kilogram of cotton fiber [[Source](#)]. The energy needed for an average KG of cotton is 147MJ or 40.83 Kwh [[Source](#)].

Our caps have a GSM Rating of 156g/m so out of 1kg of fabric you can get about 25 caps when you round down. That means roughly 400 liters of water and 1.633 Kwh for the material to make 1 Medicus Scrub Cap.

The estimated global warming impact of 1 kg of cotton is 9.3 kg CO₂eq. Translated into scrub caps would be: 372g [[Source](#)].

Dye: The dyeing process also has a strong environmental impact because it is water-intensive: large quantities of water are used which can become dangerous, especially when disposed of, as they come into contact with a series of chemical substances (including various types of dyes, microfibres, mordants, etc...)

Finishing Product

Now we have the base material we make them to order into the sizes and styles that fit teams the best. We do not pre-make scrub caps to avoid waste and so we can maximize fabric use.

Electric sewing machines and overlockers are used along with embroidery machines if needed. These machines consume 25 watts to make a scrub cap. This in CO₂ is about 0.0058 Kg of CO₂e based on government guides for CO₂ per KWH [[Source](#)].

Transportation

Shipping from finished cotton to us in the UK is via boat. Shipping 1kg of fabric would be 0.14kg Co₂e via boat. That ends up being 5.6g per scrub cap made. In terms of the transport to you it would vary depending on the amount of caps needed. In the UK Royal Mail's average parcel size accounts for 205g CO₂e per parcel.

Use

Washing: Assumes weekly washing using a 7KG washing machine. The average for 7kg washing machines is 58 kWh in energy per 100 washes [[Source](#)].

UK CO₂(eq) emissions due to electricity generation are 0.23314 kg CO₂e per kWh [[Source](#)]. Meaning each wash per week would be 0.135kg CO₂e per wash. The weight of a scrub cap is around 30g for the largest sizes and you could get 233 scrub caps in at one time.

Washing weekly is recommended with then having enough caps to rotate through the week. This reduces unnecessary washing just for scrub caps which makes it more inefficient.

End-of-Life

Landfill: Assumes the cap is not recycled or composted. It can be recycled in textiles recycling if not soiled to be respun into other fibers.

Impact Assessment

Global Warming Potential: Highest in the cotton cultivation and production stages.

Water Use: Cotton cultivation is the primary contributor.

Eutrophication: Significant in cotton cultivation due to fertilizer use.

Interpretation

- The majority of environmental impacts occur at the production stage, specifically in cotton cultivation and dyeing.
- Transportation and end-of-life stages have relatively lower impacts.

Sensitivity Analysis

Variations in washing frequency and methods could change the environmental impacts during the usage stage.

Conclusions and Recommendations

Though as a company we are looking at other alternatives like organic cotton and hemp fabrics which have better environmental credentials they are cost prohibitive for larger organizations to adopt.

The recommendation would be 1 cap per day of working week to make sure there are always enough on rotation and no excess washes just for scrub caps on their own, as this would undermine the sustainability objective.

Overall from what is outlined above a Medicus Scrub Cap to bring to you would be estimated at 0.3834 kg CO₂e.

Washing

Efficient washing plays a massive role in how sustainable the scrub caps are. Washing just 1 scrub cap on it's own would be 0.135kg CO₂e per wash per cap whereas filling a 7KG washing machine to max capacity would be 0.00058Kg CO₂e per wash per cap. A half load would be 0.00115KG CO₂e per wash per cap.

Assuming half load minimums and washing once per week would be 0.0601KG CO₂ per year. This would be the same as it would take to make 2.86 disposable scrub caps.

Disposable Comparisons

There is no research currently on the CO₂e of SMS fabric used in Scrub caps so I have compared to data I could find for disposable gowns made of the same SMS fabric.

One study found a single layer SMS gown had an impact of 0.1426kg CO₂e [\[Source\]](#) and which takes about 1.9m to make of fabric [\[Source\]](#) meaning you could get 7 disposable scrub caps out of that same material. Using the same data would mean 0.021KG CO₂e per scrub cap.

This would mean using your reusable scrub cap 19 times would be slightly more than the carbon footprint as the disposable version. No accounting for washing and waste disposal of either.

Blended Cotton Versions.

The most common workwear fabric is Polycotton which is usually 65% polyester and 35% cotton. It's important to note that though these are slightly cheaper overall to 100% cotton they do not carry the same depth of research into water usage and oil used.

