LightSpray™ Technology: Innovating Athletic Footwear

Life Cycle Assessment Analysis verified by Vaayu

July 2024

What is LightSpray™ technology?

On has dedicated the past five years to developing LightSpray™, a new manufacturing technique created to revolutionize the footwear industry and the production of athletic footwear.

This first-of-its-kind technology fabricates an ultralight, single-piece shoe upper through a streamlined singular process. It eliminates the need for the stitching and bonding typically required in traditional shoe production.

How does LightSpray™ technology work?

Produces 1.5 kilometres of a continuous thread

Wraps around a rotating shoe last

A robotic arm layers the material

Creates a shoe upper in approximately three minutes

The innovation of LightSpray™ technology

LightSpray™ was developed to revolutionize On's production technique, reducing environmental impact while enhancing athletic performance.

1. **Simplified supply chain**
2. **Streamlined manufacturing**
3. **Eliminated assembly processes**
4. **Reduced waste**
5. **Optimized high-performance running shoes**

Each of these improvements helps reduce the carbon footprint of footwear.

Key Findings

Compared to a pair of athletic shoes made using standard production methods, LightSpray™ technology could reduce:

4.6 CO_2e ↓

compared to conventional production

76% ↓

of production emissions, without using renewable energy

78% ↓

of production emissions if renewable energy is used, which On is dedicated to fully adopting as it scales its use of LightSpray™ technology

These results don't include the production of the shoe bottom unit, packaging, and product use because their impacts are assumed to be the same for both LightSpray™ technology and conventional technology.

The most significant carbon emissions reduction potential comes from using raw materials more efficiently, cutting energy use, and reducing transportation emissions. LightSpray™ technology also considerably lowers material and energy consumption and most significantly minimizes waste during production.

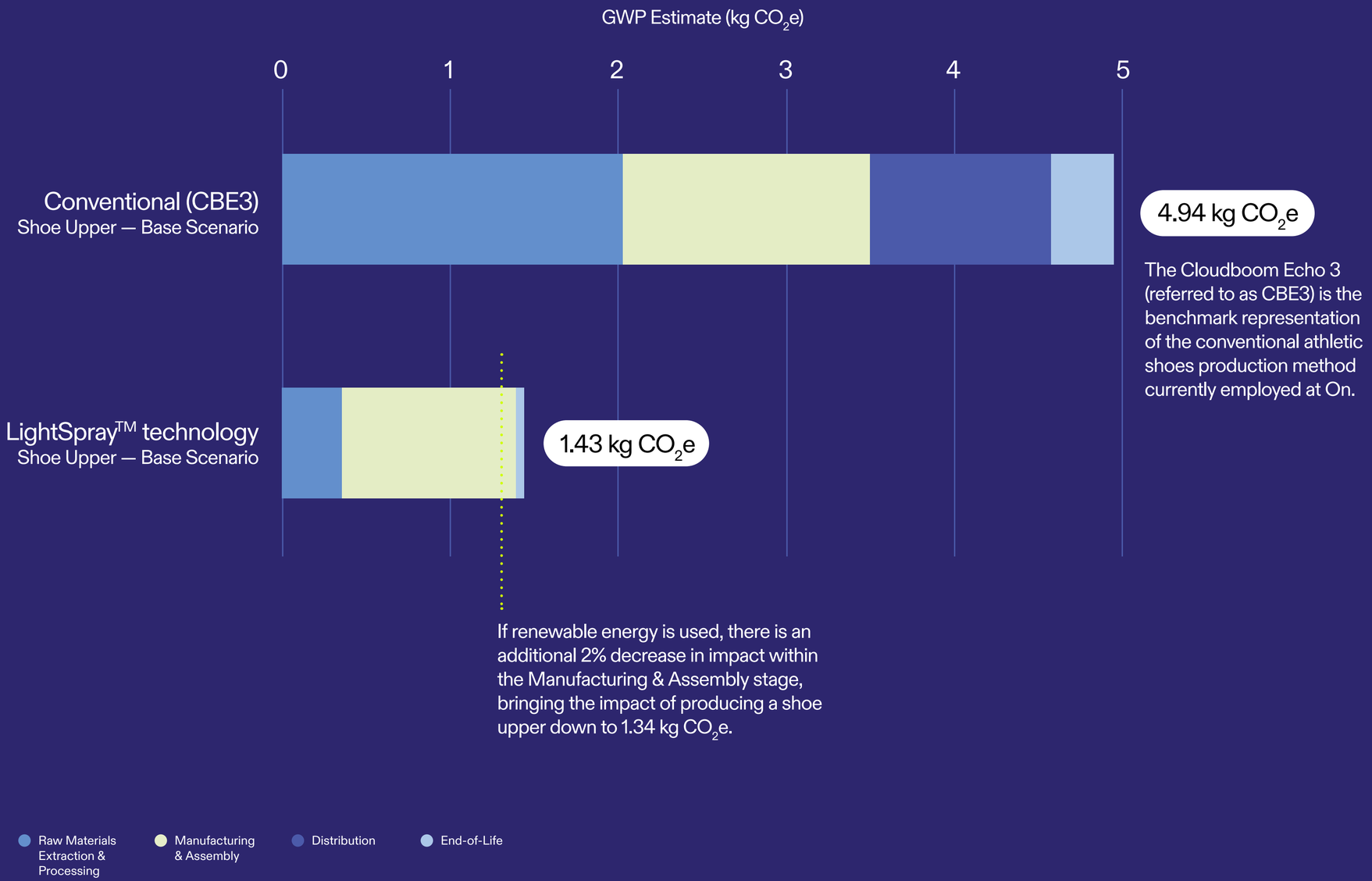
The electricity grid mix in Switzerland is already relatively green and low in carbon emissions. This is why using renewable energy decreases the total impact of producing a shoe upper by just 2%.

To be conservative, and considering all scenarios investigated, On is communicating a carbon emissions reduction of 75%.

-75%

carbon emissions compared to other On racing shoes

GWP Comparison: Conventional upper making and LightSpray™ technology Product Systems



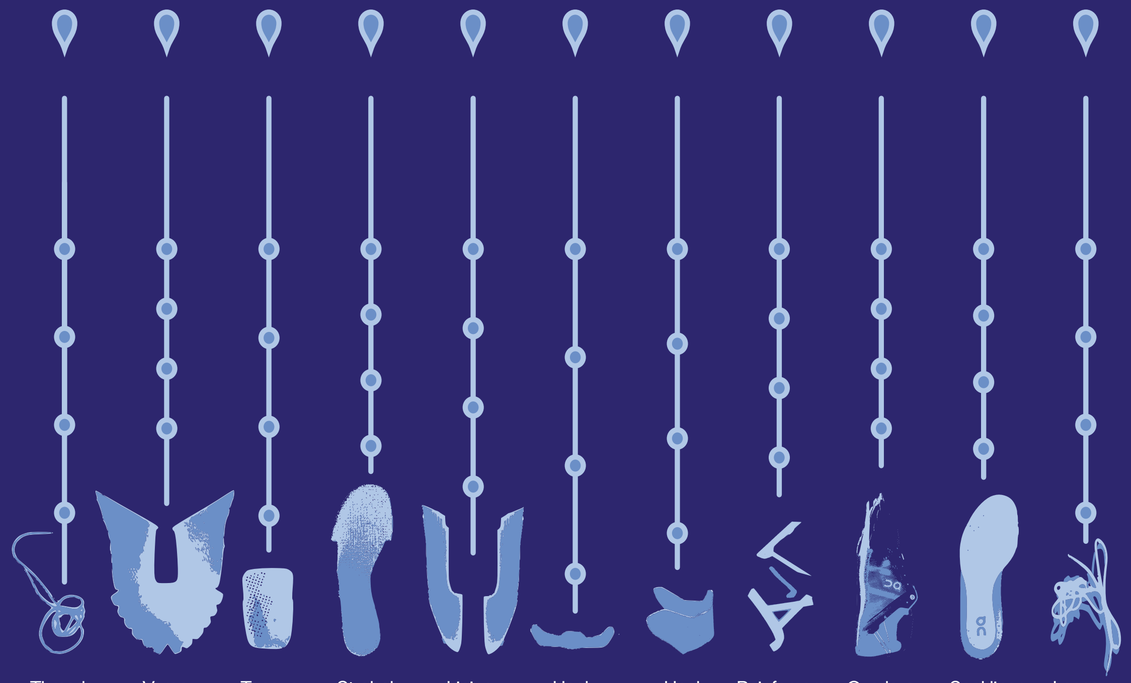
The Cloudboom Echo 3 (referred to as CBE3) is the benchmark representation of the conventional athletic shoes production method currently employed at On.

If renewable energy is used, there is an additional 2% decrease in impact within the Manufacturing & Assembly stage, bringing the impact of producing a shoe upper down to 1.34 kg CO_2e.

Conventional footwear making vs. LightSpray™

BASE MATERIALS

T2 / T3 FACTORIES



T1 FACTORY

APPROX.
200
ASSEMBLY STEPS

FINAL SHOE

ONE MATERIAL
ONE PROCESS*
ONE LOCATION

*This solely refer to the upper manufacturing and final assembly process.

Calculating the potential impact of LightSpray™ technology

On worked with Vaayu to verify our internal life cycle assessment (LCA) findings by focusing on the potential of the LightSpray™ upper technology to reduce the carbon footprint of our athletic shoes.

Vaayu quantified the potential reduction in carbon footprint (in CO_2e), delving deeper into the environmental benefits of adopting this technology in the footwear industry.

What was calculated?

- A **prospective attributional LCA** for LightSpray™ technology applied to a specific shoe model
- A **conventional attributional LCA** for the existing (non-LightSpray™) technology used in the same shoe model
- A **comparative analysis** between LightSpray™ technology and the existing approach considering eight different scenarios

The findings shared here focus on two LightSpray™ energy scenarios compared with the existing technology:

1. Comparing LightSpray™ technology with the **existing technology** for athletic footwear used by On while using **Switzerland's electricity grid mix**

Assumptions:

- The location-based emission factor for the upper manufacturing (and consequently, shoe assembly) is in Switzerland
- Transportation of the shoe bottom unit in the LightSpray™ system and the boxed shoe pair in the conventional system from the manufacturing facility in Vietnam to the warehouse in Switzerland occurs with:
  - A 12% probability of the shoe being transported by air
  - An 88% probability of being transported by sea from Vietnam to the Netherlands
- The transportation from the Netherlands to Switzerland is through heavy goods vehicle

2. Comparing LightSpray™ technology with the **existing technology** for athletic footwear used by On while **using 100% renewable energy**, reflecting On's ambition to use 100% renewable energy in later commercialisation

Assumptions:

- Renewable energy will be used for the LightSpray™ scenario
- Other previous assumptions remain true

See Vaayu's full technical report and methodology here.

vaayu

Through this project, On is experimenting with a brand new way of looking at manufacturing in the footwear industry, and will use the learnings to work towards making significant reductions in our environmental impact.

Additionally, On commits to updating the study once entering a wider commercialization phase to ensure the continued relevance and effectiveness of our strategies.

Dream On.