

Boox, PBC

Carbon Footprinting Methodology Disclosure

Dec 4, 2020

Prepared by Third Partners LLC

Background

Boox hired Third Partners LLC – a firm with expertise in carbon footprinting and sustainability strategy for leading responsible brands – to assess its carbon footprint and provide assurance for its impact claims. This document discloses the data sources, methodology and business activity inputs used to calculate Boox’s carbon footprint.

About Carbon Footprinting

Measuring the carbon footprint of business activities is straightforward in concept. First, measure the amount of an activity over a period of time. Second, identify the carbon impact of that activity using a reliable academic or professional data source. Third, multiply the first two numbers.

Building off of the Life Cycle Analysis work performed by EcoChain, a globally leading LCA provider, Third Partners created a use model for Boox products versus the industry incumbent corrugated cardboard box. Below is a summary of the methodology.

Data Sources

EcoChain worked with Boox to identify and provide carbon footprint coefficients (“emissions factors” or “EFs”) from the leading global source, EcoInvent 2.0. These coefficients provide the foundation of the carbon footprint assessments and the claims made.

Third Partners developed a scorecard tool to quantify the typical lifecycle of a Boox, compared to the typical lifecycle of a cardboard box. By comparing the two, we can produce a summary of the impact of the Boox business model.

For product activity calculations, the following data sources were used in order of priority:

- Primary data from manufacturers, where available
- Industry-level or other academic sources
- Material-specific emissions factors from third party LCAs and other reputable sources to estimate impact

When primary data is not available, we use reliable secondary data from top industry and academic sources. This increases the potential margin of error; accordingly, we use the most conservative values available to ensure the overall impact is not underestimated.

Activities Measured

Activity	Boox	Cardboard Box
Production	Raw material inputs Extrusion	Raw material inputs
Transportation	Producer to Distributor Distributor to Retailer Retailer to Consumer Consumer to Boox Consumer to disposal	Producer to Distributor Distributor to Retailer Retailer to Consumer Consumer to disposal
End of Life	Booxes disposed of by consumers Booxes returned by consumers and reused Booxes retired by Boox after useful life Disposal / Recycling / Incineration	Cardboard Boxes disposed of by consumers Disposal / Recycling / Incineration

Key Assumptions

Input Type	Boox	Cardboard Box
Product weight	255.1 g, crush strength & dimensions equal to Cardboard Box	453.6 g, crush strength & dimensions equal to Boox
Recycled content	50%, primary data from manufacturer	50%, conservative estimate representing the typical maximum for corrugated box
Return rate	85%, primary data from Boox	0%
Number of uses	12 uses, primary data from Boox	Single-use
Transportation	Estimated transportation distance by leg, all transportation distances held equal between the two scenarios, with additional transportation distances present in Boox use scenarios for Boox return, reprocessing, and distribution	
End of Life	USA recycling, disposal, and incineration rates for plastic, corrugated cardboard; emissions factors for each	

Findings

To quantify and compare the carbon footprint of Boox products versus a comparable Cardboard Box product, Third Partners developed five Business Scenarios. In each scenario, due diligence was taken to provide an “equal footing” comparison between Boox and Cardboard Box.

Business Scenarios and Carbon Footprint Summary

Business Scenarios *	Boox kg CO ₂ e	Cardboard Box kg CO ₂ e	Boox vs Cardboard Box **
A. Production impact of 1000 Boox vs. 1000 cardboard box	522	295	177%
B. Use impact of 1000 Boox vs. 1000 cardboard box (waste stream) Assumes 100% of Booxes and 100% of cardboard boxes are disposed of in the United States, at the US average recycling / landfill / incinerator rates per material	768	842	91%
C. Use impact of 1000 Boox vs. 1850 cardboard box (boox returned)	851	1,360	63%
D. Impact of a single Boox used 10 times (vs 10 boxes) Assumes a single Boox is shipped returned 10 times compared to 10 cardboard boxes	2.44	8.42	29%
E. Use impact of 1,000 Shipments (175 booxes vs 1000 cardboard) Assumes that 175 Booxes used for 1,000 shipments at a return rate of 85%, with 12 uses maximum, versus 1,000 cardboard boxes	276.5	842.7	33%

* Data sources for this scenario analysis are documented in the previous page; the primary source is the EcoChain LCA,

** When this number is above 100%, Boox has a higher footprint. When this number is below 100%, Cardboard has a higher footprint

Waste Summary

Waste Material Destination *	Boox Total kg	Cardboard Box Total kg	Boox vs Cardboard Box **
Landfilled	28.99	124.30	23.3%
Recycled	9.64	299.20	3.2%
Incinerated	6.01	30.42	19.8%
Total weight	44.64	453.92	9.8%

* Destination is determined by the Business Scenario E, coupled with EPA data on waste destination for plastics and cardboard.

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Comparison Summary

Comparison Result	Source
Booxes are 44% lighter than a comparable cardboard box, resulting in 44% lower transport emissions	Product weight measurements
The manufacturing footprint of a brand new, reusable Boox is less than two single-use cardboard boxes	Scenario A
A Boox breaks even on the first use, whether the customer returns it or not, due to the lower transport emissions and lower waste/recycling emissions of Booxes	Scenario B
After 10 shipments, a single Boox has 70% lower impact compared to cardboard	Scenario D
Boox's business model reduces carbon footprint by 67% (two-thirds) compared to cardboard boxes	Scenario E
Boox's business model reduces packaging waste to landfill by 76%	Scenario E & Waste Destination Analysis
Boox's business model reduces overall packaging material discarded into municipal and commercial waste streams by 90%	Scenario E & Waste Destination Analysis
Booxes are made from 50% post-consumer material; average cardboard box is only 25-40% post-consumer recycled material	Market research by Third Partners LLC

About Third Partners

Third Partners is a management consulting firm that specializes in sustainability strategy. Third Partners works with leadership teams at responsible brands and helps design innovative solutions that achieve business growth, positive external impact and world-class operations. As third party sustainability advisors, Third Partners brings a multifaceted perspective grounded in resource management best practice, data science and business performance. Solutions help leaders align commercial growth with specific environmental and social impact goals.