

Lifecycle Assessment

Xerox® C303a Color MFP

According to ISO 14040 and ISO 14044



Introduction

This document is the summary of an LCA study aiming to represent the product properties, related assumption, impact categories and potential environmental impact results of Xerox Corporation's C303a printer product. Xerox Corporation generates LCAs for a series of printers and multi-functional devices. The LCAs are critically reviewed by an independent expert. Each LCA is created using the same software model and workflows while changing only printer-specific data points via parameter settings. Each LCA submitted for critical review will then be accompanied by a brief technical summary of the relevant data points, as well as a methodology report.

This LCA study is carried out based on ISO 14040 and ISO 14044, and generally follows the requirements of the Product Category Rules (PCR) Guidance for the product category printers and multi-function printing units, version 2, published by UL Environment (ULE) in April 2018. This LCA study has a few deviations from the PCR, including the following:

The PCR bases the images per day calculation on the Version 2.0 of the Imaging Equipment ENERGY STAR® Program Requirements. However, using this estimation method results in a calculated printing volume that greatly exceeds actual customer usage. In this study, the images per day calculation has been replaced by actual customer printing data, Average Monthly Print Volumes (AMPV), per product family. The new methodology aligns with realistic customer printing.

The PCR requires using ReCiPe 2016 or TRACI 2.1 as the impact assessment methodology. This study selects TRACI 2.1 as it is currently the only impact assessment methodology framework that incorporates US average conditions to establish characterization factors (Bare, 2012) (EPA, 2012). For global warming potential, the TRACI characterization factors are not the most current, therefore it is assessed based on the current IPCC characterization factors taken from the 6th Assessment Report (IPCC, 2021) for a 100-year timeframe (GWP100) as this is currently the most commonly used metric.

Sphera updated paper dataset is selected to replace dataset developed based on information from the American Forest and Paper Association (NCASI, 2010).

COMPANY	Xerox Corporation	
PRODUCT SYSTEM	Laser Printer C303a	
REFERENCE STANDARD	<i>ISO 14044: Environmental management – lifecycle assessment – Requirements and guidelines</i> . Geneva: International Organization for Standardization.	
DATE OF ISSUE	5/20/2026	
CONTENTS OF THE REPORT	Product definition Information about basic material and the material's origin Description of the product's manufacture Indication of product processing Information about the in-use conditions lifecycle assessment results Testing results and critical review	
This lifecycle assessment was independently reviewed in accordance with ISO 14044 by:		
		Thomas Gloria, Indust. Ecology Consultants

Product Description

Product Type	Color Laser Printer
Printer Model	C303a
Maximum Print Speed	32 pages per minute
Intended use	primarily office
Range of applications	print images or text in mono or color onto paper or paper-like media
Product Lifetime	5 years
Introduction Date	6/23/2026
Product Specifications	https://www.xerox.com/en-us/printing-equipment
Functional Unit	The functional units has been defined as (1) a 1,000 page simplex job; (2) lifetime page simplex job
Product Characterization	The Xerox C303a Color Multifunction Printers deliver compact, reliable, and intelligently secure performance for small teams and professionals. With fast setup, an easy-to-navigate 2.8-inch (7.2 cm) color touchscreen, print speeds of up to 32 pages per minute letter (30 ppm A4), and support for wireless and mobile printing, teams stay productive without disruption. The printer product delivered to the customer consists of the printer, a power cord, printed setup instructions, and an initial set of product supplies. The printer is delivered in packaging that can be recycled locally and is not needed for product operation. Product supplies include toner cartridges. The power supply is internal to the product and the imaging kit and fusing mechanism are installed at the factory. Only the toner cartridges must be installed by the customer. The printer can be setup by the customer without outside assistance.

Technical Data

Xerox® C300 Color Printer and Xerox® C303a/C305ae Color Multifunction Printers*

DEVICE SPECIFICATIONS		XEROX® C300	XEROX® C303a	XEROX® C305ae
Speed (Up to) ¹		32 ppm Letter Color/B&W; 30 ppm A4 Color/B&W		
Scan Speed		N/A	Simplex: 48/46 ppm Letter/A4 B&W; 21/20 ppm Letter/A4 Color; Duplex: 96/92 ipm Letter/A4 B&W; 42/40 ipm Letter/A4 Color	
Duty Cycle ²		Up to 75,000 pages/month		
Processor Speed		1 GHz	1 GHz	1.2 GHz
Memory/Storage		1 GB RAM/Optional 128 GB Intelligent Storage Drive (ISD)	1 GB RAM/Optional 128 GB Intelligent Storage Drive (ISD)	2 GB RAM/Optional 128 GB Intelligent Storage Drive (ISD)
Connectivity		Hi-Speed USB 2.0 (Type B rear), Gigabit Ethernet, Wireless 802.11a/b/g/n/ac + Apple iBeacon	Hi-Speed USB 2.0 (Type B rear; Type A front), Gigabit Ethernet, Wireless 802.11a/b/g/n/ac + Apple iBeacon	Hi-Speed USB 2.0 (Type B rear; Type A front & rear), Gigabit Ethernet, Wireless 802.11a/b/g/n/ac + Apple iBeacon
Weights and Dimensions (unpacked) (HxWxD)		9.6x16.2x15.7 in/36.5 lb 244x411x400 mm/16.6 kg.	13.6x16.2x15.7 in/43.6 lb 345x411x400 mm/19.8 kg.	13.6x16.2x15.7 in/44.6 lb 345x411x400 mm/20.2 kg.
Copy and Print Resolution		Print Only: 4800 Color Quality (2400x600 dpi)	Copy: 600x600 dpi (Max) Print: 4800 Color Quality (2400x600 dpi)	Copy: 600x600 dpi (Max) Print: 4800 Color Quality (2400x600 dpi) 1200x1200 dpi (Max)
First-copy-out Time (As fast As)		N/A	8.1 seconds B&W/8.5 seconds color	
First-print-out Time (As fast As)		8.3 seconds B&W/8.6 seconds color		
Page Description Languages		PostScript® 3 Emulation, PCL® 6 Emulation, PCL® 5 Emulation, PCL® m, and PDF		
Print Features		One Touch UI, Print Quality, Normal, Secure, Saved and Sample Set Job Types, Duplex, Orientation, Collation, Print Job ID in Margins, Draft Mode, N-up, Booklet Layout, Watermark, Tray and Toner Status, Rotate Image 180 Degrees, Saved Settings, Earth Smart Settings		
Mobile Printing		Apple AirPrint®, Mopria® Print Service, Chromebook, Wi-Fi Direct®		
Scan		N/A	Scan Destinations: Email, front-side USB drive, FTP, Network or USB connected computer, Windows Network folder. Scan Formats: PDF (Searchable PDF available via Xerox® Print and Scan Experience App), TIFF, JPEG, PNG	
Fax		N/A	MH/MR/MMR/JBIG/JPEG Compression Auto Answer, Auto Redial, Auto Reduction, Broadcast Send, Junk Fax Filter, Fax Address Book, Fax Forward includes: Fax, Email, FTP, Network Folder, Called Number	
Security		Hardware-enabled Post-Quantum Cryptography, Digitally Signed Firmware Updates, Trusted Platform Module (TPM 2.0) (C305ae only), WPA3, TLS 1.3, OpenSSL cryptographic module validated to FIPS 140-3, Certificate Management, Secure Password Reset, TCP Connection Filtering, Port Filtering, Access Controls, Confidential Print, Non-Volatile Memory Wipe, Fax/Network Separation, Protected USB Ports, Auto-insertion of Sender's Email Address, Login Restrictions, Audit Log, Syslog		
Print Drivers		Windows® 11, Windows® 10, Windows® Server 2025, Windows® Server 2022, Windows® Server 2019, Windows® Server 2016 macOS 26, macOS 15, macOS 14, Microsoft Universal Print with Print Support Application. For the latest information about supported Operating Systems, please visit our Drivers & Downloads page and specify your device at support.xerox.com		
Optional Cloud Services		N/A	Do more with Xerox® Workflow Central Platform	
MEDIA HANDLING				
Main Tray		Up to 250 sheets of 20 lb bond/75 gsm; Custom sizes: 3.7x5.83 in to 8.5x14 in/94x148 mm to 216x356 mm		
Manual Feed Slot		1 sheet; Custom sizes: 3.7x5.83 in to 8.5x14 in/94x148 mm to 216x356 mm		
Optional 250-Sheet Tray (Up to 2x)		Up to 250 sheets of 20 lb bond/75 gsm; Custom sizes: 3.7x5.83 in to 8.5x14 in/94x148 mm to 216x356 mm		
Paper Output		Up to 100 sheets of 20 lb bond/75 gsm paper, face down		
Media Types		Plain Paper, Light Paper, Heavy Paper, Card Stock, Labels (Paper Labels), Envelope, Colored Paper, Letterhead, Preprinted, Bond, Glossy, Rough/Cotton, Recycled		
Single-Pass Duplex Automatic Document Feeder (DADF)		N/A	Up to 50 sheets of 20 lb bond/75 gsm; Custom sizes: 4.13x5.83 in to 8.5x14 in/105x148 mm to 216x356 mm	
Media Weights	Main Tray	Simplex: 60–162 gsm; Duplex: 60–105 gsm		
	Manual Feed Slot 250-Sheet Tray	Simplex: 60–200 gsm; Duplex: 60–105 gsm		
	Single-Pass Duplex Automatic Document Feeder (DADF)	N/A	60–90 gsm	
Device Management		Xerox® Embedded Web Server, Xerox® CentreWare® Web Software, Email Alerts, Apple Bonjour®, Xerox® Easy Assist App , Xerox® Print and Scan Experience App , Xerox® Workflow Central Platform		

Declaration of Basic Materials

The printer consists of mechanical, electromechanical, and electronic components. Its material composition can be described using the basic material fractions given below. Please note that the category 'Electronics' also includes all wiring.

Material	Mass (kg)
Plastics (recyclable)	5.95
Plastics (non-recyclable)	1.44
Ferrous Metals	10.4
Aluminum	0.261
Copper	0
Glass	0.785
Electronics	1.06
Other Materials	0.131
Total	20

Table 1: Basic Material Declaration

Product Supply Chain

The printer is manufactured and assembled in China. The cartridges for the North American market are manufactured and assembled in Juarez, Mexico.

Lifecycle Assessment Results

The following sections describe the printer's cradle-to-gate resource use and potential environmental impacts over the full printer lifecycle. These represent the typical impacts for an average system sold in the North American market. All impacts are presented per functional units.

Printer Manufacturing Resources Use

Table 2 displays the use of material resources (kg) and of non-renewable as well as renewable primary energy demand necessary for printer manufacturing, but excludes other lifecycle stages of the printer (cradle-to-gate). Likewise, material and energy consumption associated with printer packaging, cartridges, and paper is excluded here.

Use of Material Resources [kg]	
Non-Renewable	899
Renewable (excl. water)	1.66E003
Water	1.54E009
Use of Non-Renewable Primary Energy [MJ]	
Crude Oil	321
Hard Coal	1.07E003
Lignite	40.7
Natural Gas	587
Uranium	145
Use of Renewable Primary Energy [MJ]	
Biomass	3.51E-005
Geothermal	5.28
Solar	252
Wind	122
Hydropower	101

Table 2: Use of Material and Energy Resources for
Printer Manufacturing (Cradle-to-Gate)

Energy Consumption During Utilization

Based on the ENERGY STAR® Typical Energy Consumption (TEC) test methodology, the printer is expected to have the following power consumption for an assumed average job load.

At-wall power consumption during utilization	Per 1,000 page	Per product lifetime
Energy Consumption During Utilization [kWh]	2.05	91

Lifecycle Impact Assessment

The following provides an overview of the potential printer lifecycle impacts with emissions classified and characterized to standard environmental impact metrics based on TRACI 2.1 method. Global warming potential is evaluated based on IPCC AR6. Ecotoxicity and human toxicity are not included in this study, due to their respective uncertainties.

LCIA results are relative expressions and do not predict impacts on category endpoints, the exceeding of thresholds, safety margins or risks.

	per 1000 pages including paper	per 1000 pages excluding paper	per printer lifetime including paper	per printer lifetime excluding paper
IPCC AR6 GWP 100, excl biogenic CO2 [kg CO2 eq.]	1.21E01	8.97E00	5.38E02	3.98E02
AP [kg SO2 eq.]	7.18E-02	5.66E-02	3.18E00	2.51E00
EP [kg N eq.]	9.77E-03	2.25E-03	4.33E-01	9.96E-02
ODP [kg CFC 11 eq.]	2.17E-08	2.15E-08	9.60E-07	9.52E-07
RDP [MJ surplus energy]	1.49E01	1.08E01	6.61E02	4.79E02
SFP [kg O3 eq.]	8.05E-01	5.17E-01	3.57E01	2.29E01

Table 3: Summary of lifecycle Impact Assessment Results

Interpretation of Results

Impact Dominance Analysis

Due to the 5 year lifetime and the number of pages printed per day based on the actual customer printing information, the use phase with paper heavily dominates the lifecycle impacts. The below tables and charts display the results of the dominance analysis for each impact category addressed in Table 3. The first row in each table, labeled Printer, is the printer manufacturing phase which includes raw material extraction and manufacturing.

Global Warming Potential

	per 1000 pages including paper	per 1000 pages excluding paper	per printer lifetime including paper	per printer lifetime excluding paper
Printer	3.70E00	3.70E00	1.64E02	1.64E02
Use phase <LC>	8.41E00	5.23E00	3.73E02	2.32E02
EoL phase <LC>	4.07E-02	4.07E-02	1.80E00	1.80E00

Table 4: GWP100 dominance analysis [kg CO2 equiv]

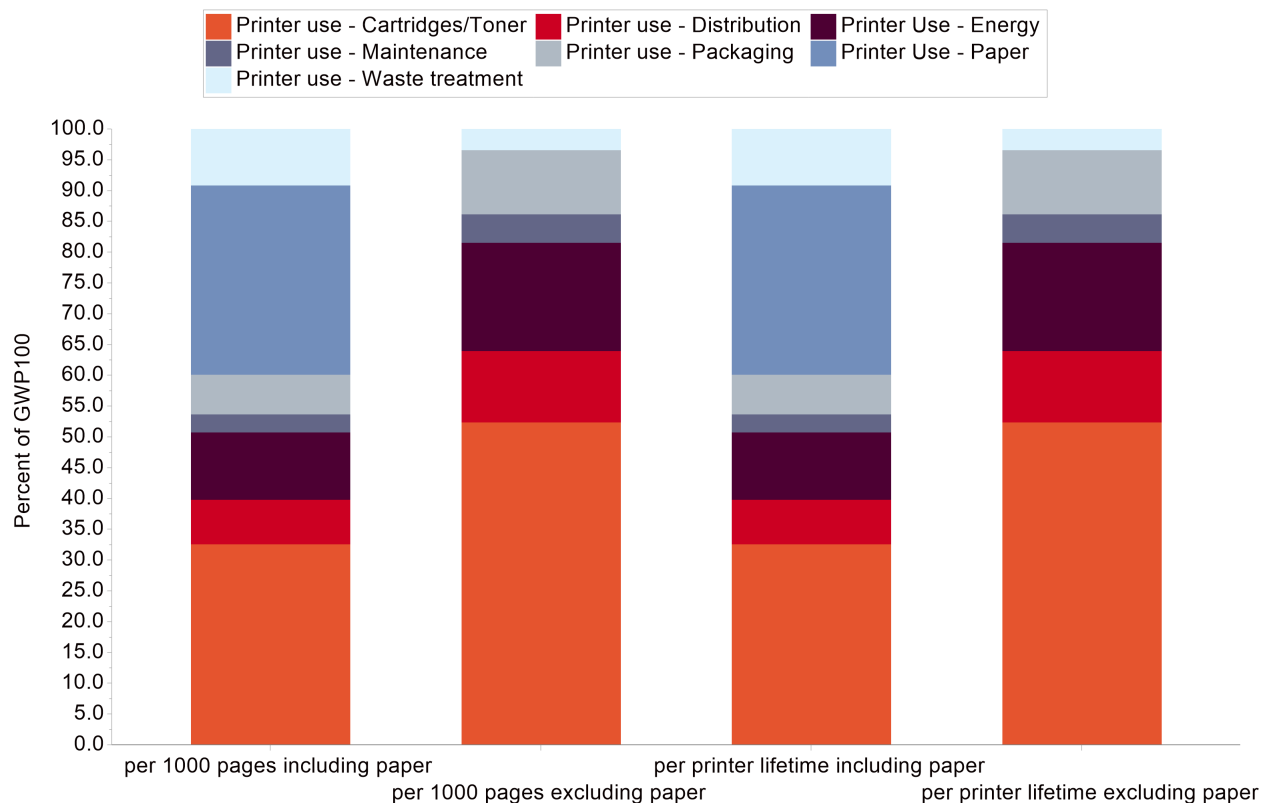


Figure 1: GWP100 dominance analysis of the lifecycle stage

Total lifetime distribution: 47.32 kg CO2 eq

Ozone Depletion Potential

	per 1000 pages including paper	per 1000 pages excluding paper	per printer lifetime including paper	per printer lifetime excluding paper
Printer	1.63E-09	1.63E-09	7.20E-08	7.20E-08
Use phase <LC>	2.00E-08	1.98E-08	8.88E-07	8.80E-07
EoL phase <LC>	5.27E-15	5.27E-15	2.34E-13	2.34E-13

Table 5: ODP dominance analysis [kg CFC-11 equiv]

Acidification Potential

	per 1000 pages including paper	per 1000 pages excluding paper	per printer lifetime including paper	per printer lifetime excluding paper
Printer	3.30E-02	3.30E-02	1.46E00	1.46E00
Use phase <LC>	3.86E-02	2.34E-02	1.71E00	1.04E00
EoL phase <LC>	1.91E-04	1.91E-04	8.46E-03	8.46E-03

Table 6: AP dominance analysis [kg SO₂ equiv]

Eutrophication Potential

	per 1000 pages including paper	per 1000 pages excluding paper	per printer lifetime including paper	per printer lifetime excluding paper
Printer	9.88E-04	9.88E-04	4.38E-02	4.38E-02
Use phase <LC>	8.77E-03	1.24E-03	3.89E-01	5.52E-02
EoL phase <LC>	1.42E-05	1.42E-05	6.31E-04	6.31E-04

Table 7: EP dominance analysis [kg N equiv]

Resource Depletion Potential (fossil fuel)

	per 1000 pages including paper	per 1000 pages excluding paper	per printer lifetime including paper	per printer lifetime excluding paper
Printer	3.27E00	3.27E00	1.45E02	1.45E02
Use phase <LC>	1.16E01	7.47E00	5.13E02	3.31E02
EoL phase <LC>	7.00E-02	7.00E-02	3.10E00	3.10E00

Table 8: RDP dominance analysis [MJ surplus energy]

Smog Formation Potential

	per 1000 pages including paper	per 1000 pages excluding paper	per printer lifetime including paper	per printer lifetime excluding paper
Printer	1.71E-01	1.71E-01	7.56E00	7.56E00
Use phase <LC>	6.30E-01	3.42E-01	2.79E01	1.52E01
EoL phase <LC>	4.34E-03	4.34E-03	1.92E-01	1.92E-01

Table 9: SFP dominance analysis [kg O₃ equiv]

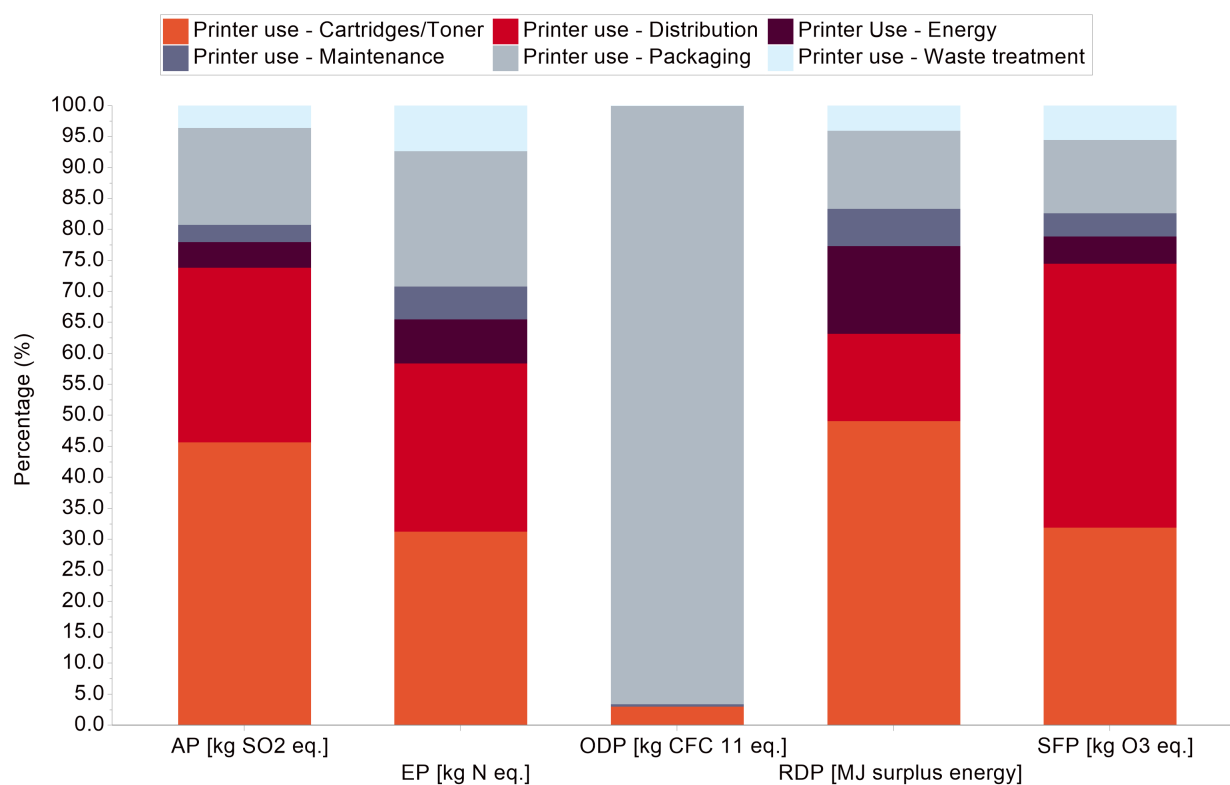


Figure 2: Contribution analysis of the use phase (per 1000 pages excluding paper)

Assumptions and Estimations

Assumptions and estimations are documented in the methodology report, which was provided for critical review purposes alongside this document. The LCA results represent the specific printer model as sold in the North American market.

The model assumes a printer lifetime of five (5) years. The printer is modeled to print an average pages per day based on actual customer printing information. The printer further possesses an automatic mechanical duplexing feature.

Power consumption figures are based on Energy Star testing of the printer using the average job load described above. Consumables rate of consumption is based on the market-average yield across all available cartridge capacities. In addition, market-average use of remanufactured cartridges is taken into account, as applicable.

Transportation distances to the end consumer are based on their points of origin and the population-weighted average distance to the 100 most populous cities in the continental US based on 2020 census data. The printer as well as replacement fuser kits and waste toner bottles are manufactured in China and shipped to the point of use from the distribution center near Jeffersonville, IN, while the cartridges and the imaging unit are shipped from Ciudad Juarez, MX to Jeffersonville, IN.

The paper dataset developed by Sphera represents European and used as proxy in lieu of current US data.

The End-of-Life treatment for the printer is based on the assumption that 90 % of the printers are either recycled or remanufactured, while the remainder is disposed of through local waste streams, where the metal fractions are assumed to be recycled and the remainder landfilled. The EoL cartridges are assumed to be split as such: 80% to remanufacturing or recycling, and 20% landfill.

In accordance with the cut-off methodology, materials sent to End-of-Life recycling are considered to cross the system boundary without any further transformation. Only the impacts associated with waste transportation and disposal are included in the results.

Description of Data and Period Under Consideration

All primary data is based on technical documentation and sales data accessed in 2026. All background data is taken from the MLC 2026-10.9.6.1 Databases. No primary data is collected from the Original Equipment Manufacturer's manufacturing plant.

Data Quality

Manufacturing data of printers and consumables is based on a combination of Bills of Material and teardown analyses and is considered to be of overall high quality with low uncertainty. Distribution from printer manufacturing to the end consumer is representative of logistical data from Xerox Corporation and best estimates of US average shipping distances, and is of moderate quality and high uncertainty.

Printer power consumption represents measured power consumed during printer operation. The electricity consumed is calculated based on TEC specification, and is of high quality and moderate uncertainty. Toner cartridge use is based on expected yields based on the ISO test standards for cartridge use, and is of high quality and low uncertainty. Replacement rate for consumable parts is based on part design specifications, and is of high quality and moderate uncertainty.

The disposition of the printer and consumables at End-of-Life is based on best-available information by the respective experts at Xerox Corporation. This data is of average quality and moderate uncertainty.

Background Data

All background datasets relevant to production, power generation, transportation, and material disposal were taken from Sphera's MLC 2026-10.9.6.1 Databases.

The additional use of third-party background data from industry associations (e.g., worldsteel) is documented in the methodology report. They represent the latest LCI data as available in the MLC 2026-10.9.6.1 Databases.

Allocation and Methodological Principles

No significant allocations have been considered for the production of the printer. Allocation of production or use impacts across the various functions of a multi-function system is not included (i.e., allocation of production impacts to the provision of scanning services) and the impacts from all lifecycle stages are considered within the system boundaries for the printing system.

Treatment of recycled or resold material is not considered in the body of the LCA, in accordance with the cut-off methodology.

References and Standards

Bare, J. (2012). Tool for the Reduction and Assessment of Chemical and other Environmental Impacts (TRACI) - Software Name and Version Number: TRACI version 2.1 - User's Manual. Washington, D.C.: U.S. EPA.

EPA (2021) ENERGY STAR® Program Requirements for Imaging Equipment – Test Method (Rev. Nov-2021) <https://www.energystar.gov/sites/default/files/asset/document/ENERGY%20STAR%20Imaging%20Equipment%20Version%203.2%20Final%20Specification.pdf>

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Lifecycle Assessment

Laser Printer C303a

Printers and multi-functional printing units

According to ISO 14040 and ISO 14044

LCA Verifier Information

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