ENVIRONMENTAL PRODUCT DECLARATION

LASER PRINTER MB2236ADW

According to ISO 14025

Lexmark's innovative imaging solutions and technologies help customers worldwide print, secure and manage information with ease, efficiency and unmatched value. Lexmark simplifies the complex intersection of digital and printed information.

As part of the commitment to our customers, Lexmark performs Life Cycle Analysis on our products. The results of the LCA analysis continues to assist Lexmark in reducing the environmental impact of the hardware, software and services offered to our customers.

With monochrome output up to 34 pages per minute* and two-sided printing, the Lexmark MB2236adw offers both impressive performance and affordability. Standard Wi-Fi enhances connectivity and support for mobile users, while both its included fax and scanning are backed up by a 1-GHz processor and 512 MB of memory.

UL CERTIFIED ENVIRONMENTAL PRODUCT DECLARATION UL.COM/EPD

ENVIRONMENTAL PRODUCT DECLARATION

Lexmark

Laser Printer MB2236adw

Printers and multi-functional printing units

According to ISO 14025

This declaration is an environmental product declaration (EPD) in accordance with ISO 14025. EPDs rely on Life Cycle Assessment (LCA) to provide information on a number of environmental impacts of products over their life cycle. Exclusions: EPDs do not indicate that any environmental or social performance benchmarks are met, and there may be impacts that they do not encompass. LCAs do not typically address the site-specific environmental impacts of raw material extraction, nor are they meant to assess human health toxicity.

EPDs can complement but cannot replace tools and certifications that are designed to address these impacts and/or set performance thresholds – e.g. Type 1 certifications, health assessments and declarations, environmental impact assessments, etc. Accuracy of Results: EPDs regularly rely on estimations of impacts, and the level of accuracy in estimation of effect differs for any particular product line and reported impact. Comparability: EPDs are not comparative assertions and are either not comparable or have limited comparability when they cover different life cycle stages, are based on different product category rules or ar missing relevant environmental impacts. EPDs from different programs may not be comparable.

PROGRAM OPERATOR	UL Environment
DECLARATION HOLDER	Lexmark
DECLARATION NUMBER	4790060659.103.1
DECLARED PRODUCT	Laser Printer MB2236adw
REFERENCE PCR	ULE (2018) Product Category Rules for preparing an environmental product declaration (EPD) for printers and multi-function printing units (v2.0). UL Environment
DATE OF ISSUE	December 15, 2021
PERIOD OF VALIDITY	5 Years
CONTENTS OF THE DECLARATION	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 Life cycle assessment results Testing results and verifications
The PCR review was conducted by:	UL Environment Review Panel Lise Laurin (Chairperson) 31 Leach Road; Kittery, Maine 03904; lise@earthshift.com
This declaration was independently verified in accordance with ISO 14025 by Underwriters Laboratories ☐ INTERNAL ☒ EXTERNAL	CooperMcC Cooper McCollum, UL Environment
This life cycle assessment was independently verified in accordance with ISO 14044 and the reference PCR by:	Thomas S Gloria Thomas Gloria, Indust. Ecology Consultants

ENVIRONMENTAL PRODUCT DECLARATION

Lexmark

Laser Printer MB2236adw

Printers and multi-functional printing units

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Product Description

Product Type	Mono Laser Printer
Printer Model	MB2236adw
Maximum Print Speed	36 pages per minute
Intended use	primarily office
Range of applications	print images or text in mono onto paper or paper-like media
Product Lifetime	5 years
Introduction Date	1/29/2019
Product Specifications	https://www.lexmark.com/en_in/printer/14205/Lexmark-MB2236adwe
Functional Unit	The functional unit has been defined as a 1,000 page simplex job in accordance with the Energy Star Typical Energy Consumption test procedure and the reference Product Category Rule (PCR).
Scope of Validity / Applicability	The EPD is representative for the printer model MB2236adw sold as a stand-alone unit. This EPD and the reference PCR are applicable for printer sale and use in the North American market. Lexmark cannot guarantee that comparisons with EPDs of competitive products will be valid.
Product Characterization	With monochrome output up to 36 [34] pages per minute*, the compact, high-performance and affordable Lexmark MB2236adw MFP also includes Wi-Fi, two-sided printing, scanning and fax. The printer product delivered to the customer consists of the printer, a power cord, printed setup instructions, a CD/DVD that includes the User Guide and Printer Drivers 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, imaging kits and the fusing mechanism. 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.

System Boundary

The study considers all phases of the life cycle, as shown below.

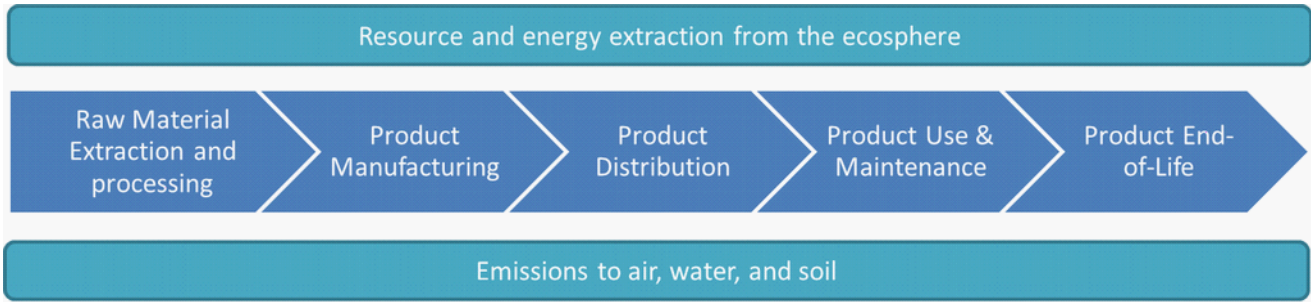

Figure 1: System Boundaries

Declaration of Basic Materials

The printer consist 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)	5.98
Plastics (non-recyclable)	0.0826
Ferrous Metals	3.76
Aluminum	0.0497
Copper	0
Glass	0.707
Electronics	0.743
Other Materials	0.0508

Table 1: Basic Material Declaration

Product Supply Chain

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

Life Cycle Assessment Results

The following sections describe the printer's potential environmental impacts over the full printer life cycle. These represent the typical impacts for an average system sold in the North American market. All impacts are presented per functional unit of printing 1,000 images of the reference standard.

Manufacturing Material and Resources Inventory

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 life cycle 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	653
Renewable (excl. water)	1.02E003
Water	1.85E013
Use of Non-Renewable Primary Energy [MJ]	
Crude Oil	314
Hard Coal	650
Lignite	27.4
Natural Gas	554
Uranium	80.2
Use of Renewable Primary Energy [MJ]	
Biomass	2.72E-005
Geothermal	0.972
Solar	80.2
Wind	42.7
Hydropower	67.9

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

Energy Consumption During Utilization

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

	Per 1,000 page	Per product lifetime
Energy Consumption During Utilization [kWh]	0.175	146

Table 3: At-wall power consumption during utilization

Life Cycle Impact Assessment

The following provides an overview of the potential printer life cycle impacts with emissions classified and characterized to standard environmental impact metrics using the ReCiPe 2016 Hierarchist (H) midpoint characterization factors (v1.1).

Note that the mineral resource depletion results do not include any contributions from the paper life cycle as the AF&PA report does not allow for the conversion to ReCiPe 2016.

Ecotoxicity and human health are not included in this study, as per the PCR, 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
Global Warming Potential [kg CO2 eq.]	9.67E00	3.29E00	8.04E03	2.74E03
Ozone Depletion Potential [kg CFC-11 eq.]	1.21E-06	1.21E-06	1.01E-03	1.01E-03
Acidification Potential [kg SO2 eq.]	6.35E-03	6.35E-03	5.29E00	5.29E00
Eutrophication Potential [kg P eq.]	3.43E-05	3.43E-05	2.86E-02	2.86E-02
Fossil Fuel Depletion Potential [kg oil eq.]	1.07E00	1.07E00	8.91E02	8.91E02
Mineral Resource Depletion Potential [kg Cu eq.]	2.06E-02	2.06E-02	1.71E01	1.71E01

Table 3: Summary of Life Cycle Impact Assessment Results

Interpretation of Results

Dominance Analysis

Due to the 5 year lifetime and the number of pages printed per day as established by the Energy Star Typical Energy Consumption test procedure, the use phase heavily dominates the life cycle impacts. The below tables and charts display the results of the dominance analysis for each impact category addressed in Table 3.

Global Warming Potential

	per 1000 pages including paper	per 1000 pages excluding paper	per printer lifetime including paper	per printer lifetime excluding paper
Printer	1.29E-01	1.29E-01	1.07E02	1.07E02
Lexmark use phase <LC>	9.54E00	3.16E00	7.94E03	2.63E03
Lexmark EoL phase <LC>	1.15E-03	1.15E-03	9.58E-01	9.58E-01

Table 4: Fossil GWP100 dominance analysis [kg CO2 equiv]

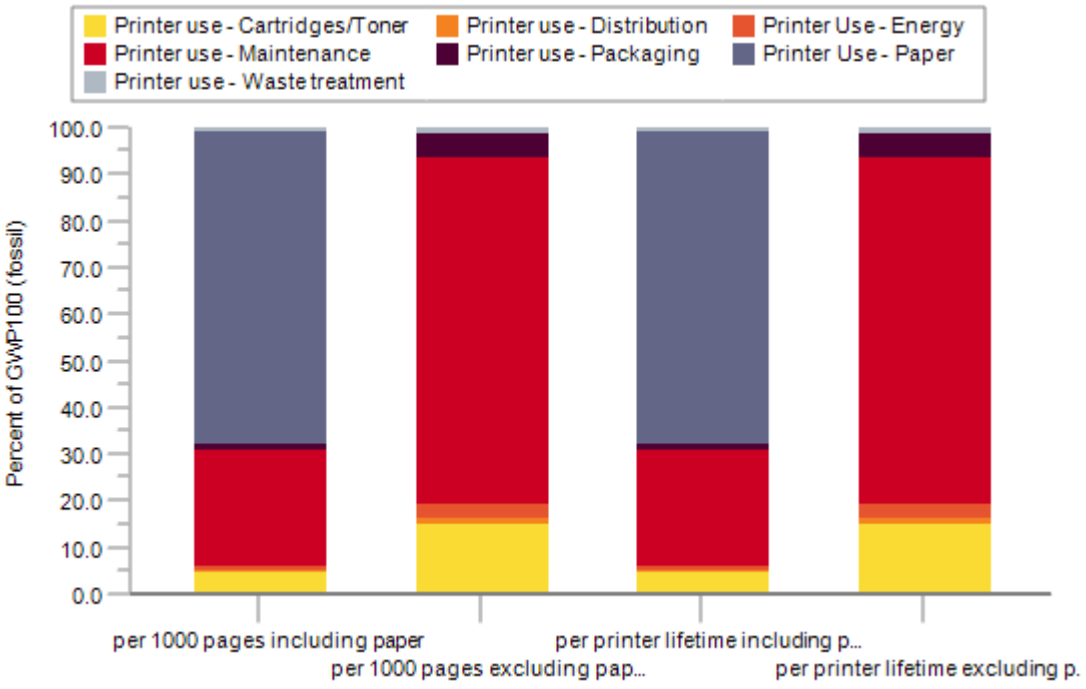

Figure 1: Fossil GWP100 dominance analysis of the use phase

Ozone Depletion Potential

	per 1000 pages including paper	per 1000 pages excluding paper	per printer lifetime including paper	per printer lifetime excluding paper
Printer	2.95E-08	2.95E-08	2.45E-05	2.45E-05
Lexmark use phase <LC>	1.18E-06	1.18E-06	9.85E-04	9.85E-04
Lexmark EoL phase <LC>	1.28E-10	1.28E-10	1.07E-07	1.07E-07

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

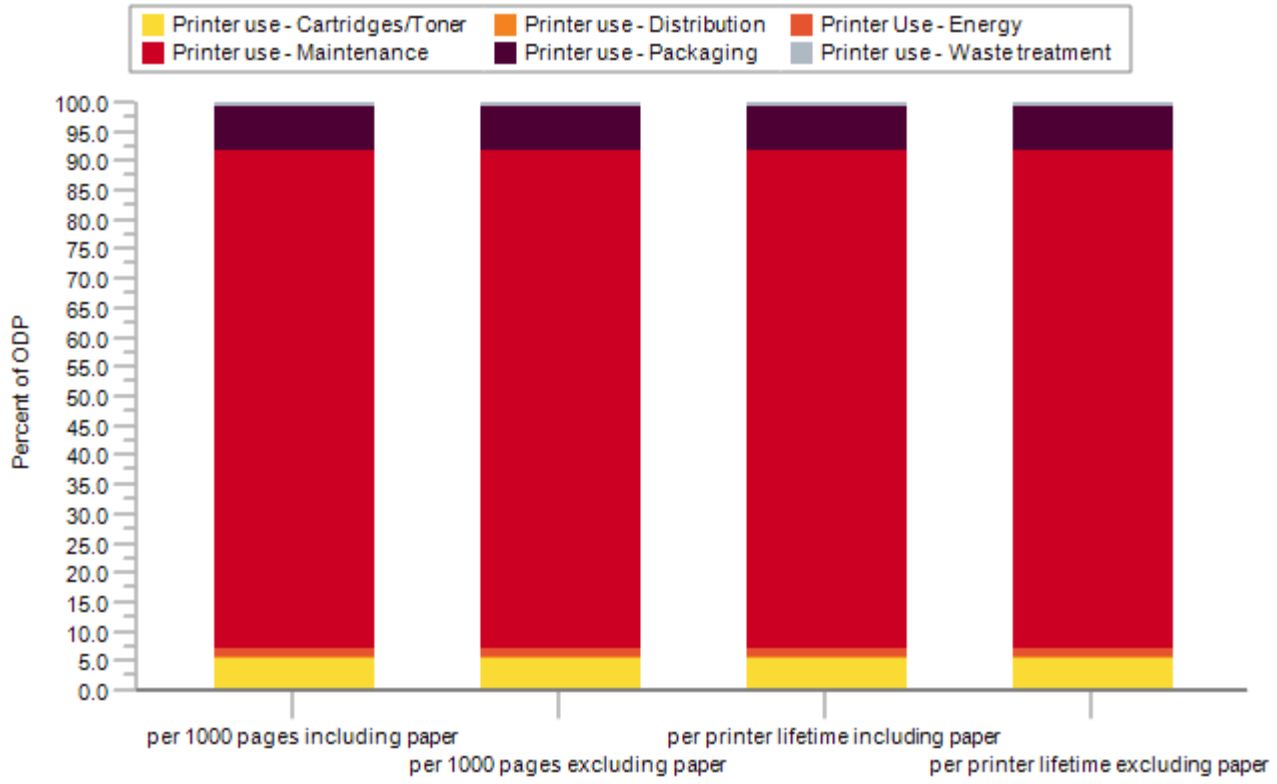

Figure 2: ODP dominance analysis of the use phase

Acidification Potential

	per 1000 pages including paper	per 1000 pages excluding paper	per printer lifetime including paper	per printer lifetime excluding paper
Printer	7.79E-04	7.79E-04	6.48E-01	6.48E-01
Lexmark use phase <LC>	5.57E-03	5.57E-03	4.64E00	4.64E00
Lexmark EoL phase <LC>	2.83E-06	2.83E-06	2.36E-03	2.36E-03

Table 6: AP dominance analysis [kg SO_2 equiv]

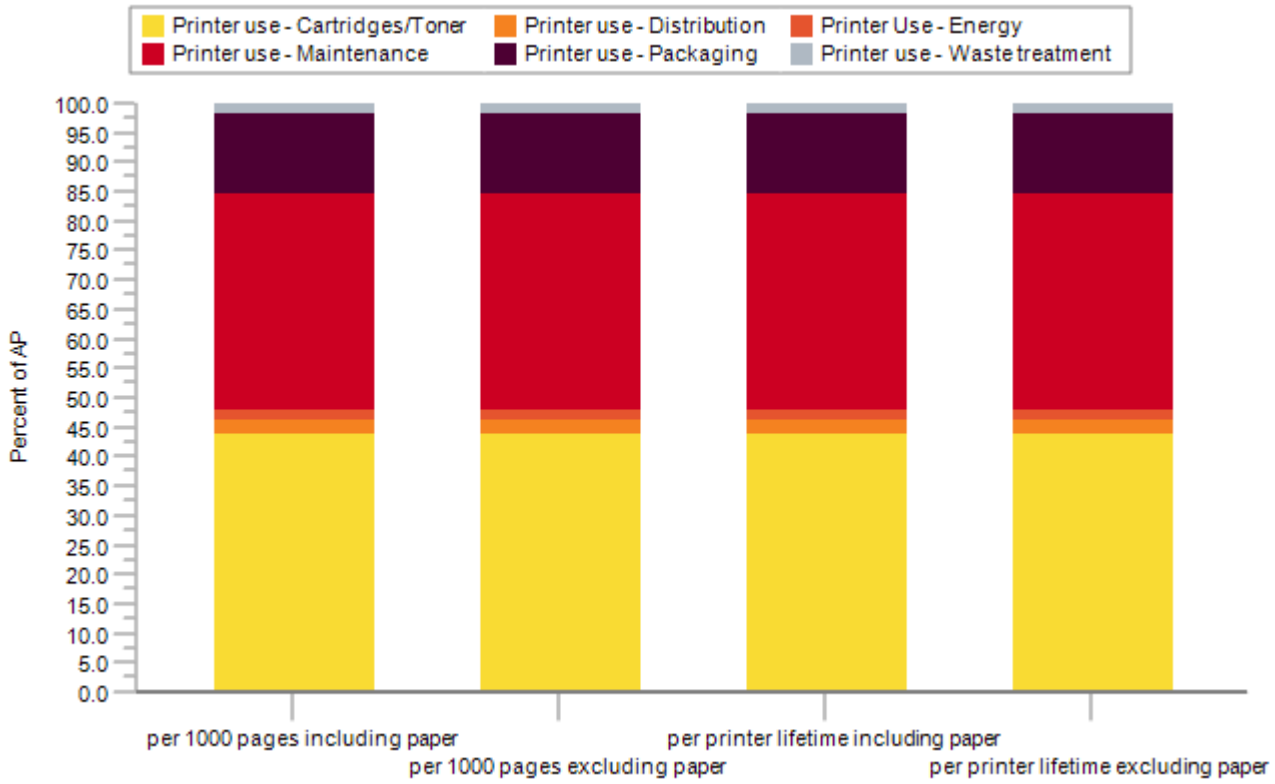

Figure 3: AP dominance analysis of the use phase

Eutrophication Potential

	per 1000 pages including paper	per 1000 pages excluding paper	per printer lifetime including paper	per printer lifetime excluding paper
Printer	5.63E-07	5.63E-07	4.68E-04	4.68E-04
Lexmark use phase <LC>	3.38E-05	3.38E-05	2.81E-02	2.81E-02
Lexmark EoL phase <LC>	5.97E-09	5.97E-09	4.97E-06	4.97E-06

Table 8: EP dominance analysis [kg P equiv]

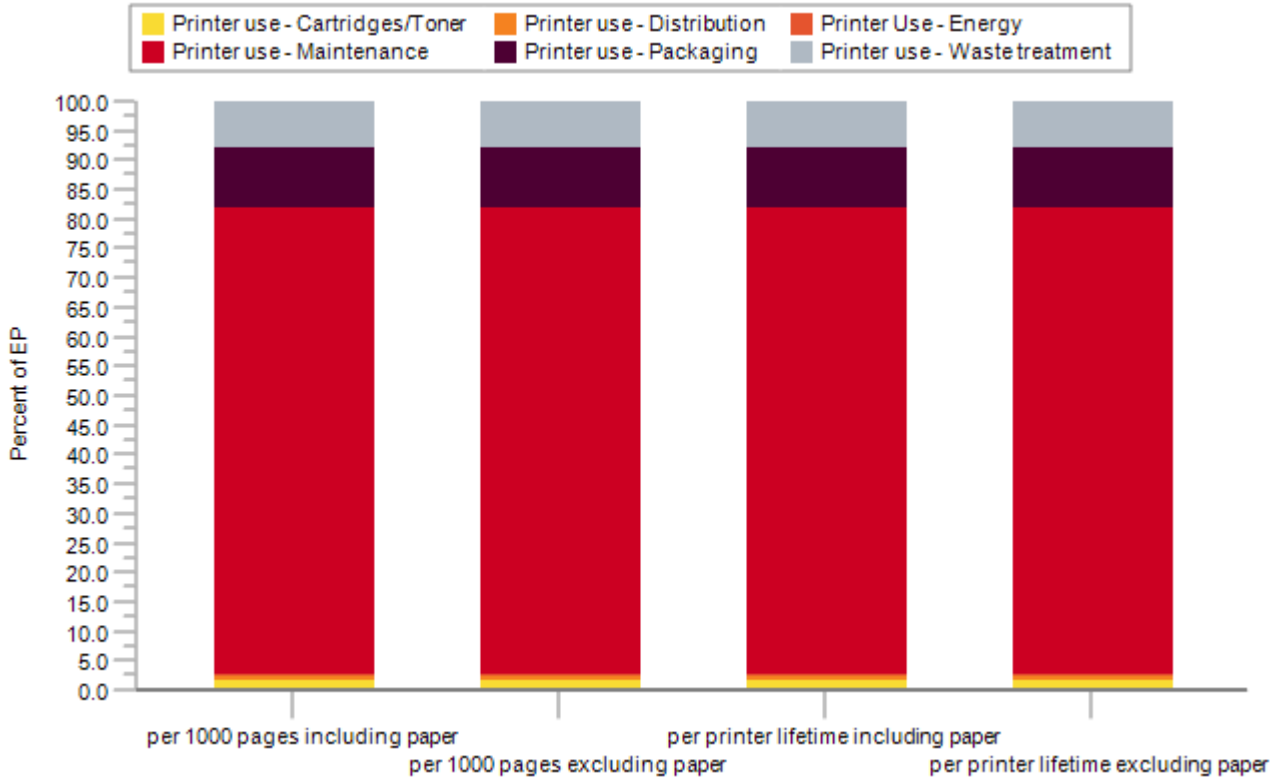

Figure 4: EP dominance analysis of the use phase

Fossil Fuel Depletion Potential

	per 1000 pages including paper	per 1000 pages excluding paper	per printer lifetime including paper	per printer lifetime excluding paper
Printer	4.56E-02	4.56E-02	3.79E01	3.79E01
Lexmark use phase <LC>	1.03E00	1.03E00	8.53E02	8.53E02
Lexmark EoL phase <LC>	3.87E-04	3.87E-04	3.22E-01	3.22E-01

Table 9: Fossil fuel depletion dominance analysis [kg oil equiv]

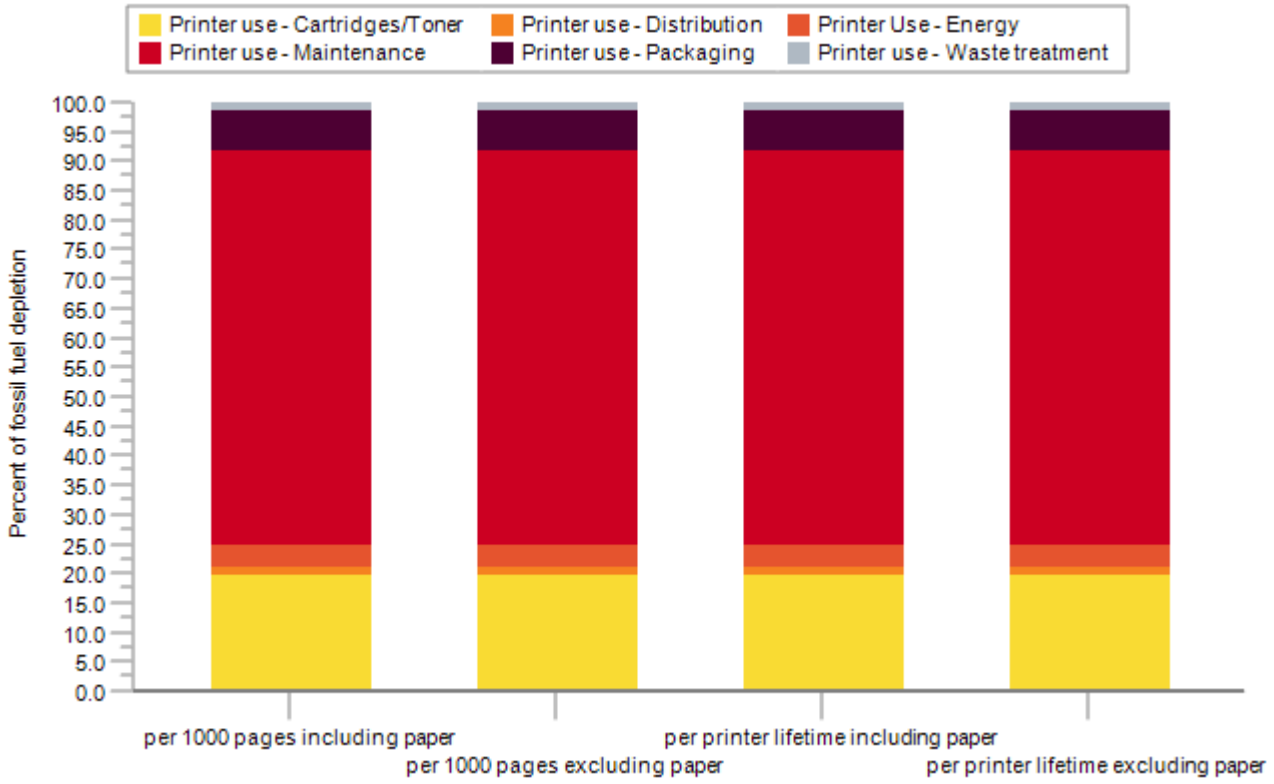

Figure 5: Fossil resource depletion dominance analysis of the use phase

Mineral Resource Depletion Potential

	per 1000 pages including paper	per 1000 pages excluding paper	per printer lifetime including paper	per printer lifetime excluding paper
Printer	7.17E-03	7.17E-03	5.96E00	5.96E00
Lexmark use phase <LC>	1.34E-02	1.34E-02	1.12E01	1.12E01
Lexmark EoL phase <LC>	1.24E-05	1.24E-05	1.03E-02	1.03E-02

Table 10: Mineral resource depletion dominance analysis [MJ surplus]

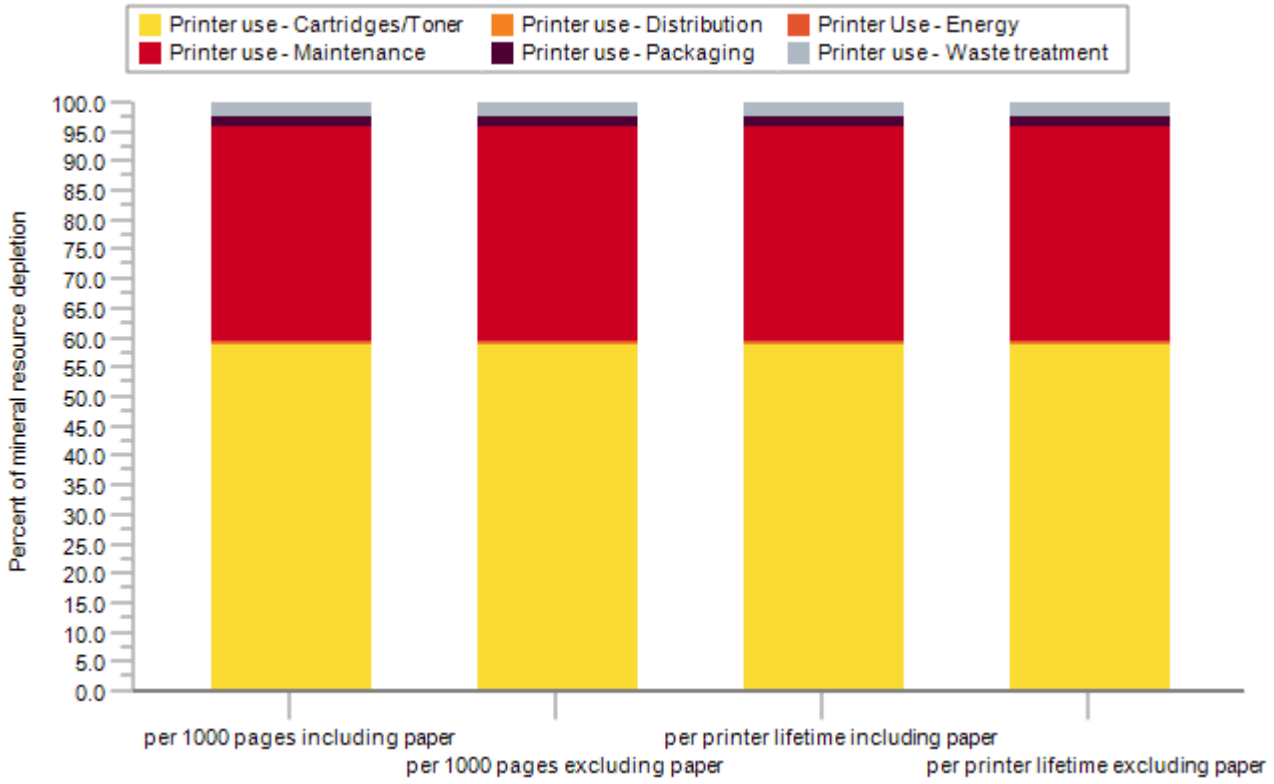

Figure 6: Mineral resource depletion dominance analysis of the use phase

Primary Energy Demand from Renewable and Non-renewable Resources

	per 1000 pages including paper	per 1000 pages excluding paper	per printer lifetime including paper	per printer lifetime excluding paper
Printer	2.18E00	2.18E00	1.82E03	1.82E03
Lexmark use phase <LC>	9.34E01	4.70E01	7.77E04	3.91E04
Lexmark EoL phase <LC>	1.76E-02	1.76E-02	1.46E01	1.46E01

Table 11: PED dominance analysis [MJ]

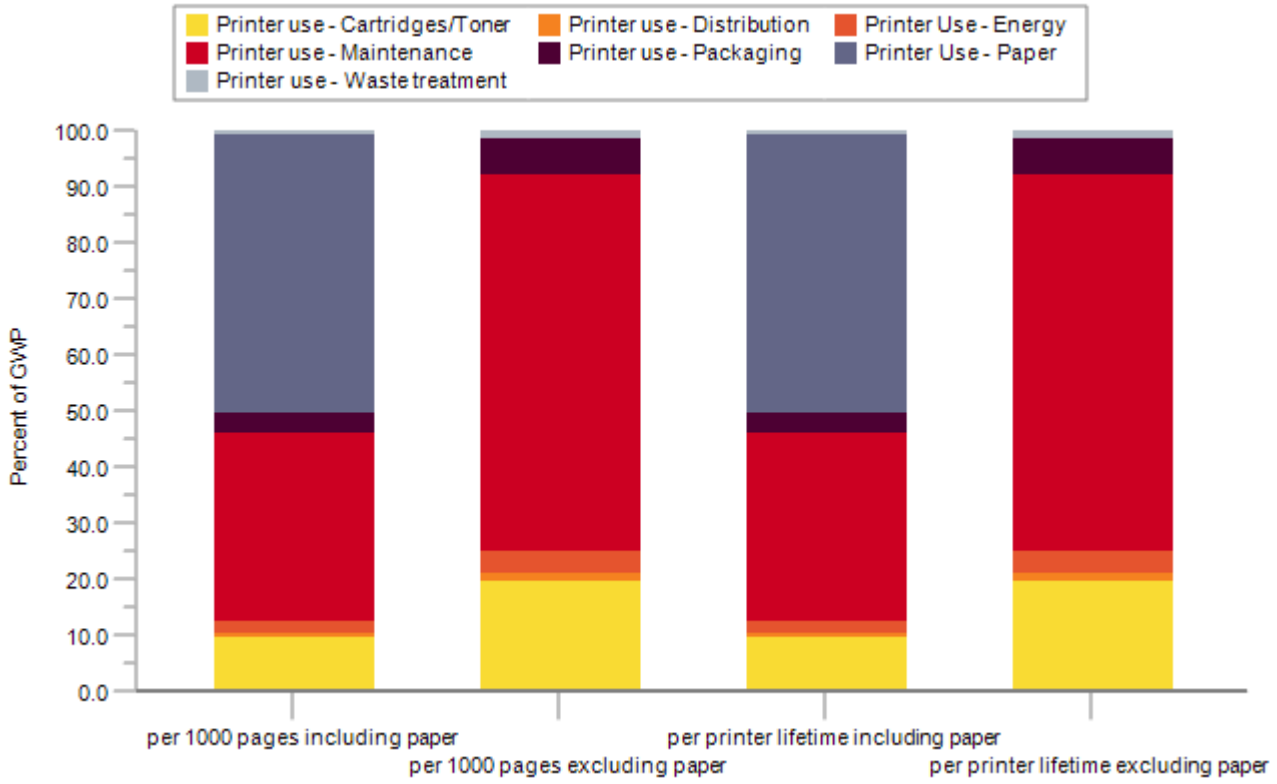

Figure 7: PED dominance analysis of the use phase

Assumptions and Estimations

Assumptions and estimations follow the governing PCR on printing equipment. Full details are documented in the EPD's background report, which was provided for verification purposes alongside the EPD. The LCA results represent the specific printer model as sold in the North American market.

In line with the PCR, the model assumes a printer lifetime of five (5) years. The printer is modeled to print an average of 640 pages per day based on a maximum print speed of 36 images per minute. The printer further possesses an automatic mechanic duplexing feature.

Power consumption figures are based on Energy Star testing of the printer using the average job load described above. Consumables 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 2010 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 Memphis, TN, while the cartridges and the imaging unit are shipped from Ciudad Juarez, MX.

The LCI data for office paper is adopted from the uncoated, free sheet paper inventory developed by the American Forest & Paper Association (AF&PA). This paper dataset assumes that average office paper contains 4% recycled content. The mass of consumed paper is based on the US letter format and a surface weight of 75 g/m^2. The AF&PA data includes paper production, transportation, and End-of-Life treatment (72% recycling, 23% landfill, 5% incineration).

The End-of-Life treatment for the printer is based on the assumption that 66.7 % of the printers are returned to Lexmark for recycling, 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 go to remanufacturing, recycling, and landfill in equal shares.

In accordance with the cut-off methodology prescribed by the governing PCR, 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 2021. All background data is taken from the GaBi 2021-10.5.1.124 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 Lexmark 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 in accordance with the use scenario outlined in the reference PCR and is of high quality and moderate uncertainty; actual print loads may differ. 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 Lexmark. 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 the GaBi 2021-10.5.1.124 Databases.

The data used for office paper is based on the data developed for the American Forest & Paper Association (AF&PA) and is representative for average North American office paper production in 2010.

The additional use of third-party background data from industry associations (e.g., worldsteel) is documented in the background report. They represent the latest LCI data as available in the GaBi 2021-10.5.1.124 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 life cycle 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 EPD, in accordance with the cut-off methodology required by the governing PCR.

A description of all of the methodological decisions made in modeling the life cycle impacts of office paper, including descriptions of the approach to modeling carbon sequestration and paper recycling, are described in the American Forestry & Paper Association's LCA report on printing and writing papers.

Additional Environmental Information

As required by the governing PCR, the assessment of human toxicity and ecotoxicity shall be included in this additional information section. The following metrics, which are based on the scenario 'per printer lifetime including paper' can help identify toxicity hot spots, but decision-making should also consider an exposure assessment.

	USEtox - Ecotoxicity [CTUe]	USEtox - Human toxicity (cancer) [CTUh]	USEtox - Human toxicity (non-cancer) [CTUh]
Printer use - Cartridges/Toner	4.89E-01	3.59E-08	3.82E-09
Printer use - Distribution	1.19E-01	2.05E-10	4.97E-11
Printer Use - Energy	4.34E-02	4.57E-09	9.06E-11
Printer use - Maintenance	4.90E00	2.41E-08	7.29E-09
Printer use - Packaging	2.60E-01	1.87E-08	1.46E-07
Printer use - Waste treatment	8.07E-02	1.76E-10	3.54E-11

References and Standards

EPA (2013) ENERGY STAR Program Requirements for Imaging Equipment – Test Method (Rev. Jun-2013) https://www.energystar.gov/sites/default/files/FINAL%20Version%202.0%20Imaging%20Equipment%20Program%20Requirements%20%28Rev%20Oct-2014%29_0.pdf

ISO (2006a) ISO 14025: Environmental labels and declarations – Type III environmental declarations – Principles and procedures. International Organization for Standardization. Geneva.

ISO (2006b) ISO 14040: Environmental management - Life cycle assessment – Principles and framework. International Organization for Standardization. Geneva.

ISO (2006c) ISO 14044: Environmental management - Life cycle assessment – Requirements and guidelines. International Organization for Standardization. Geneva.

NCASI (2010) Life Cycle Assessment of North American Printing and Writing Paper Products – Final Report. Prepared for the American Forest and Paper Association (AF&PA) and the Forest Products Association of Canada (FPAC) by the National Council for Air and Stream Improvement, Inc. Research Triangle Park, NC

thinkstep (2018) GaBi ts Product Sustainability Software. thinkstep AG, Leinfelden-Echterdingen. http://www.gabi-software.com

ReCiPe (2016) *ReCiPe* methodology for Life Cycle Impact Assessment, version 1.1. Available at www.lcia-recipe.net

ULE (2018) Product Category Rules for preparing an environmental product declaration (EPD) for printers and multi-function printing units (v2.0). UL Environment. Washington, DC.

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Printers and multi-functional printing units

According to ISO 14025

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Lexmark

Laser Printer MB2236adw

Printers and multi-functional printing units

According to ISO 14025

LCA/EPD Verifier:

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Dr. Gloria is a certified Life Cycle Professional (LCACP) through the American Center for Life Cycle Assessment.

EU REACH (EC1907/2006) Substances of Very High Concern Disclosure

Lexmark

As a producer and supplier of articles Lexmark International, Inc. (Lexmark) has an obligation under Article 33 of the REACH Regulation (EC 1907/2006) to communicate information on Substances of Very High Concern (SVHC) present in a concentration greater than 0.1% weight by weight of that article.

A complete list of the candidate list of Substances of Very High Concern is found on the European Chemicals Agency web site: https://echa.europa.eu/candidate-list-table

Company:
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Millennium Tower III
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Contact: Sustainability@lexmark.com

Lexmark declares that the products listed below are free of substances listed on the Candidate List of Substances of Very High Concern in a concentration above 0.1% weight by weight of that article as of the date of this disclosure except as listed below. Any substances listed below may be contained in articles above the threshold level. None are expected to be released from the component parts identified or to result in exposure during normal and expected use of Lexmark Imaging Equipment.

Scope of Disclosure:
All Printing and Imaging Equipment under the Lexmark Brand, including options and service parts

Substance Name	EC Number	CAS Number	Additional Information
1,2-dimethoxyethane	203-794-9	110-71-4	Coin cell battery electrolyte. Coin cell Battery found on main printed circuit board
Lead	231-100-4	7649-92-1	Found in some high temperature solder, some machining steels (shafts/roller), some Brass parts
2-(2H-benzotriazol-2-yl)-4,6-ditertpentylphenol (UV-328)	247-384-8	25973-55-1	found in the Display (Operator Panel)
Lead monoxide (lead oxide)	215-267-0	1317-36-8	leaded glass used in circuit boards, capacitors and ceramic heaters
Diboron trioxide	215-125-8	1303-86-2	found in ceramic heaters
Hexahydromethylphthalic anhydride	247-094-1	25550-51-0	Laser printhead adhesive
Cyclohexane-1,2-dicarboxylic anhydride	201-604-9	85-42-7	Laser printhead adhesive
1,3,5-Tris(oxiran-2-ylmethyl)-1,3,5-triazinane-2,4,6-trione (TGIC)	219-514-3	2451-62-9	Laser printhead adhesive

Lexmark includes requirements for the disclosure of substances on the Candidate List of Substances of Very High Concern in agreements with our supply chain.

The statements in this disclosure are declared to be true and accurate to the knowledge of Lexmark as of the date of this disclosure. This disclosure is subject to change based on Lexmark receiving updated information from suppliers, changes to the product or the addition of new substances on the Candidate List of Substances of Very High Concern.

Christina Cullins

Christina Cullins
WW Materials Compliance Manager
Corporate Sustainability Group
Lexmark International Inc.

Date of Disclosure: 31 December 2020