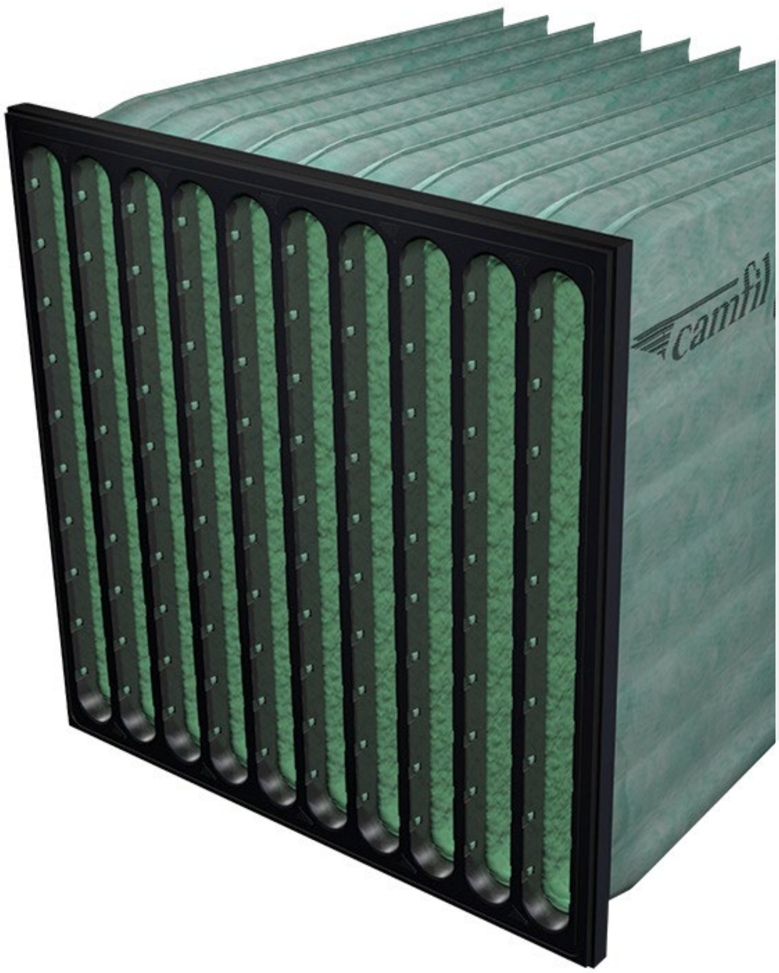

Declaration Owner

Camfil USA Inc
1 North Corporate Dr.
Riverdale, NJ, 07457
Joe.Gorman@camfil.com | (888) 599-6620
www.camfil.us

Product:

Hi-Flo ES MERV 14

Declared Unit

One (1) filter, with packaging

EPD Number and Period of Validity

SCS-EPD-10283

Valid October 25, 2024 through October 24, 2029

Product Category Rule

ISO 21930:2017 Sustainability in buildings and civil engineering works – Core rules for environmental product declarations of construction products and services

Program Operator

SCS Global Services
2000 Powell Street, Ste. 600, Emeryville, CA 94608
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Declaration owner:	Camfil USA Inc
Address:	1 North Corporate Dr. Riverdale, NJ, 07457
Declaration Number:	SCS-EPD-10283
Date of Issue:	*October 25, 2024*
Declaration Validity Period:	*October 25, 2024 through October 24, 2029*
Program Operator:	SCS Global Services, 2000 Powell Street, Ste. 600, Emeryville, CA 94608 USA
Declaration URL Link:	https://www.scsglobalservices.com/certified-green-products-guide
General Program Instructions:	SCS Type III Environmental Declaration Program: Program Operator Manual. V12.0
Product(s):	Hi-Flo ES MERV 14
Declared Unit or Functional Unit:	One (1) filter, with packaging
Product's Intended Application and Use:	Removes unwanted particles and dust from indoor air
Product RSL (if applicable):	N/A
Markets of Applicability:	North America
EPD Type:	Product specific
EPD Scope:	Cradle-to-gate
Year(s) of Reported Manufacturer Primary Data:	2023
LCA Software & Version Number:	OpenLCA v2.1.0
LCI Database(s) & Version Number:	Ecoinvent v 3.10
LCIA Methodology & Version Number:	TRACI 2.1 and CML-IA Baseline
Reference PCR:	ISO 21930:2017 Sustainability in buildings and civil engineering works – Core rules for environmental product declarations of construction products and services
PCR review:	ISO Technical Committee
LCA Practitioner:	Lucas Wathen, SCS Global Services
Independent critical review of the LCA and data, according to ISO 14044 and the PCR:	☐ internal ☒ external
LCA Reviewer:	Lindita Bushi Lindita Bushi, Ph.D., Athena Sustainable Materials Institute
Independent verification of the declaration and data, according to ISO 14025 and the PCR:	☐ internal ☒ external
EPD Verifier:	Lindita Bushi Lindita Bushi, Ph.D., Athena Sustainable Materials Institute
Declaration Contents:	

Disclaimers: *An EPD should provide current information and may be updated if conditions change. The stated validity is therefore subject to the continued registration and publication.*

Conformity: *This EPD conforms to ISO 14025:2006, and ISO 21930:2017.*

Ownership: *The EPD owner has the sole ownership, liability, and responsibility of the EPD.*

Accuracy of Results: *Due to PCR constraints, this EPD provides estimations of potential impacts that are inherently limited in terms of accuracy.*

Comparability: *The PCR this EPD was based on was not written to support comparative assertions. EPDs based on different PCRs, or different calculation models, may not be comparable. When attempting to compare EPDs or life cycle impacts of products from different companies, the user should be aware of the uncertainty in the final results, due to and not limited to, the practitioner's assumptions, the source of the data used in the study, and the specifics of the product modeled.*

In accordance with ISO 21930:2017, EPDs are comparable only if they comply with the core PCR, use the same sub-category PCR where applicable, include all relevant information modules and are based on equivalent scenarios with respect to the context of construction works.

1. Camfil USA Inc

For more than half a century, Camfil has been helping people breathe cleaner air. As a leading manufacturer of premium clean air solutions, we provide commercial and industrial systems for air filtration and air pollution control that improve worker and equipment productivity, minimize energy use, and benefit human health and the environment. We firmly believe that the best solutions for our customers are the best solutions for our planet, too. That's why every step of the way – from design to delivery and across the product life cycle – we consider the impact of what we do on people and on the world around us. Through a fresh approach to problem-solving, innovative design, precise process control and a strong customer focus we aim to conserve more, use less and find better ways – so we can all breathe easier.

2. Product

2.1 PRODUCT DESCRIPTION

The Hi-Flo ES MERV 14/14A, produced by Camfil USA, is a bag filter designed for general air ventilation applications. It meets ASHRAE 52.2 performance specifications and is rated ePM1 70% according to ISO 16890. Constructed with an aerodynamic plastic frame and glass fiber media, it effectively filters air particles. Bag filters, or pocket filters, serve as final filters in HVAC systems across industrial, commercial, and residential settings. They also act as prefilters in HEPA installations, enhancing indoor air quality.

These filters are used in supply air systems as primary and secondary filters, providing comprehensive filtration solutions or acting as prefilters in cleanrooms. They are also employed in exhaust or recirculation systems to safeguard air handling units. Bag filters offer high dust holding capacity and longer lifespans compared to alternatives. Their service life averages around one year, influenced by dust accumulation and resulting pressure drop increases, which impact energy consumption.

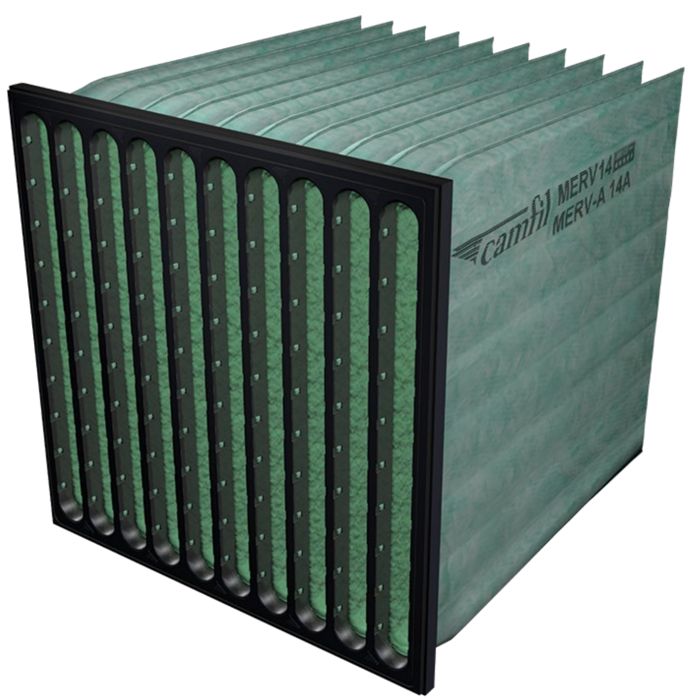

Figure 1. *Product image of Camfil Hi-Flo ES Filter.*

2.2 TECHNICAL SPECIFICATION

Table 1. *specification of the Camfil Hi-Flo ES MERV 14 filter properties.*

Technical Data/Test Method	Unit	Value
Minimum Effective Reporting Value (MERV)	#	14
Weight	kg	1.88 – 2.44
Length	cm	60.1
Width	cm	60.1
Depth	cm	30.5 - 76.2

2.3 FLOW DIAGRAM

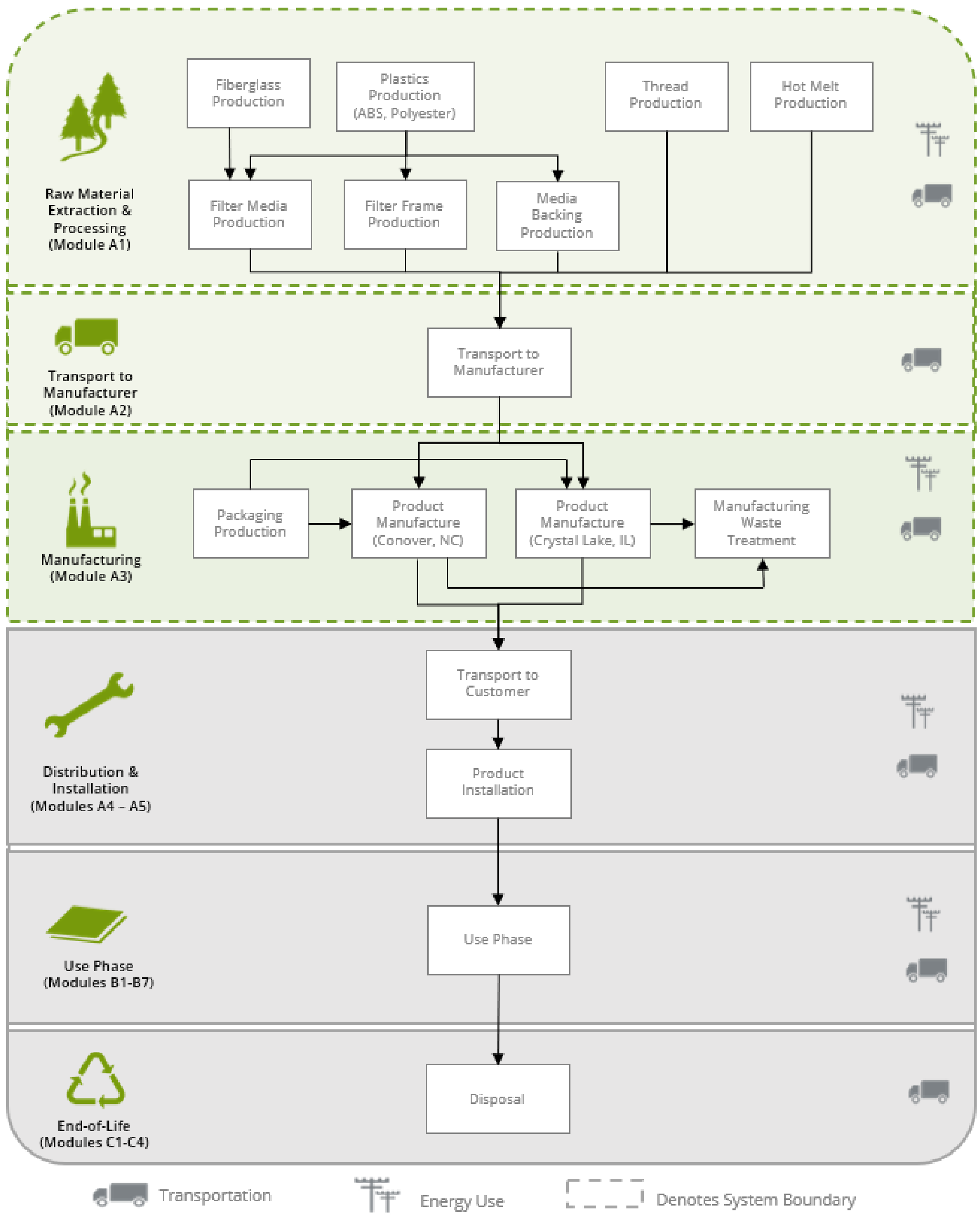

Figure 2. *Flow diagram illustrating the life cycle of Camfil air filters.*

2.4 APPLICATION

Bag filters are intended to remove unwanted particles and dust from indoor spaces.

2.5 DECLARATION OF METHODOLOGICAL FRAMEWORK

The scope of the EPD is cradle-to-gate, including raw material extraction and processing; raw material transportation; and product manufacture.

This LCA follows the attributional approach. Manufacturing resource use was allocated to the products based on mass. Impacts from transportation were allocated based on the mass of material and distance transported.

Processes contributing greater than 1% of the total environmental impact indicator for each impact are included in the inventory. No known flows were deliberately excluded from this EPD.

2.6 MATERIAL COMPOSITION

Table 2. *Material composition summary for one (1) Hi-Flo ES MERV 14 filter produced at two Camfil facilities.*

Raw Materials	Crystal Lake, IL			Conover, NC		
	Mass Input (kg)	Mass Final Product (kg)	% Mass Final Product	Mass Input (kg)	Mass Final Product (kg)	% Mass Final Product
ABS	1.51	1.51	71.9%	1.51	1.51	72.9%
Fiberglass	0.337	0.298	14.2%	0.321	0.284	13.7%
Polyester	0.132	0.133	6.33%	0.125	0.126	6.08%
Holt Melt Adhesive	0.165	0.157	7.47%	0.157	0.149	7.19%
Total:	**2.14**	**2.10**	**100%**	**2.11**	**2.07**	**100%**
Packaging Materials	**Mass (kg)**	**% Mass**	**% Recycled Content**	**Mass (kg)**	**% Mass**	**% Recycled Content**
Carton	0.45	100%	40%	0.45	100%	40%
Total:	**0.45**	**100%**	**40%**	**0.45**	**100%**	**40%**

Note: raw material masses are based on production weighted averages at each facility.

2.7 TRANSPORTATION

The polyester thread used in the Hi-Flo ES filter is purchased from an international supplier and requires ocean freight to be delivered to Camfil's facilities in Crystal Lake, IL and Conover, NC. All other raw material and packaging inputs are sources within North American and delivered to Camfil via truck.

2.8 MANUFACTURE

This module includes the manufacturing and assembly of the Hi-Flo ES bag filter at two Camfil facilities located in Crystal Lake, IL and Conover, NC. At these facilities, bag filters are produced in two steps: (1) pocket sewing, and (2) filter assembly. During pocket sewing, rolls of filter media are fed through an industrial Symer sewing machine to produce pockets of the appropriate size and depth. During filter assembly, the pockets are cinched into the bottom half of a frame by hand, and then the remaining half of the frame is place on top to complete the filter.

2.9 PACKAGING

Camfil Hi-Flo ES filters are packaged for distribution in cardboard boxes.

3. Methodological Framework

3.1 DECLARED/FUNCTIONAL UNIT

The declared unit used in this study is one (1) bag filter, complete with packaging, ready to ship from Camfil's facilities. Product masses were calculated to model a representative production from a range of filter depths using a production weighted average. Variations in weight between facilities is thus based on differences in production volumes.

Table 3. *Declared unit and mass for the Camfil Hi-Flo ES MERV 14 Filter product system.*

Property	Unit	Crystal Lake, IL	Conover, NC
Functional Unit	One (1) packaged, installed filter		
Mass	kg	2.10	2.07

3.2 SYSTEM BOUNDARY

Table 4. *Camfil Hi-Flo ES filter system boundary.*

Product			Construction		Use							End-of-life				Benefits and loads beyond the system boundary
A1	A2	A3	A4	A5	B1	B1	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Raw material extraction and processing	Transport to manufacturer	Manufacturing	Transport	Construction - installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstruction demolition	Transport	Waste processing	Disposal	Reuse, recovery and/or recycling potential
X	X	X	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND

X = Module Included | MND = Module Not Declared

3.3 ALLOCATION

Manufacturing resource use was allocated to the products based on mass. Impacts from transportation were allocated based on the mass of material and distance transported.

3.4 CUT-OFF RULES

According to the PCR, processes contributing greater than 1% of the total environmental impact indicator for each impact are included in the inventory. No data gaps were allowed which were expected to significantly affect the outcome of the indicator results.

3.5 DATA SOURCES

Primary data were provided by Camfil for their manufacturing facilities in Crystal Lake, IL and Conover, NC. The principal source of secondary LCI data is the Ecoinvent 3.10 database, with additional secondary electricity generation data from the US EPA's eGRID database.

Table 5. *LCI datasets and associated databases used to model the Camfil Hi-Flo ES filter*.

Component	Dataset	Geography	Data Source	Publication Date
Raw Materials				
Filter Frame	market for acrylonitrile-butadiene-styrene copolymer | acrylonitrile-butadiene-styrene copolymer | Cutoff, U	GLO	EI v3.10	2023
	market for injection moulding | injection moulding | Cutoff, U	GLO	EI v3.10	2023
Filter Media	market for glass fibre | glass fibre | Cutoff, U	GLO	EI v3.10	2023
	market for thermoforming of plastic sheets | thermoforming of plastic sheets | Cutoff, U	GLO	EI v3.10	2023
Media Backing	market for fibre, polyester | fibre, polyester | Cutoff, U	GLO	EI v3.10	2023
	market for thermoforming of plastic sheets | thermoforming of plastic sheets | Cutoff, U	GLO	EI v3.10	2023
Thread	market for polyester resin, unsaturated | polyester resin, unsaturated | Cutoff, U	RoW*	EI v3.10	2023
	market for weaving, synthetic fibre | weaving, synthetic fibre | Cutoff, U	GLO	EI v3.10	2023
Holt Melt Adhesive	market for ethylene vinyl acetate copolymer | ethylene vinyl acetate copolymer | Cutoff, U	RoW	EI v3.10	2023
	market for paraffin | paraffin | Cutoff, U	GLO	EI v3.10	2023
Packaging				
Carton	market for corrugated board box | corrugated board box | Cutoff, U	US	EI v3.10	2023
Transport				
Truck	market for transport, freight, lorry 16-32 metric ton, EURO4 | transport, freight, lorry 16-32 metric ton, EURO4 | Cutoff, U	RoW	EI v3.10	2023
Train	market for transport, freight train | transport, freight train | Cutoff, U	US	EI v3.10	2023
Ship	market for transport, freight, sea, container ship | transport, freight, sea, container ship | Cutoff, U	GLO	EI v3.10	2023
Manufacture Inputs				
Electricity	market for electricity, medium voltage | electricity, medium voltage | Cutoff, U	RFCW**	eGRID	2022
	market for electricity, medium voltage | electricity, medium voltage | Cutoff, U	SRVC***	eGRID	2022
Natural Gas	market for heat, district or industrial, natural gas | heat, district or industrial, natural gas | Cutoff, U	RoW	EI v3.10	2023
Waste Outputs				
Facility Waste	market for hazardous waste, for incineration | hazardous waste, for incineration | Cutoff, U	RoW	EI v3.10	2023
	market for inert waste, for final disposal | inert waste, for final disposal | Cutoff, U	RoW	EI v3.10	2023

**RoW: Rest of World*
***RFCW: Crystal Lake, IL regional electricity grid as defined by the US EPA*
****SRVC: Conover, NC regional electricity grid as defined by the US EPA*

3.6. DATA QUALITY

The data quality assessment addressed the following parameters: time-related coverage, geographical coverage, technological coverage, precision, completeness, representativeness, consistency, reproducibility, sources of data, and uncertainty.

Table 6. *Data quality assessment.*

Data Quality Parameter	Data Quality Discussion
Time-Related Coverage: Age of data and the minimum length of time over which data is collected	The manufacturer provided primary data on product manufacturing for both the Crystal Lake, IL and Conover, NC facilities on annual production for the calendar year 2023. Representative datasets (secondary data) for upstream and background processes are generally less than 5 years old.
Geographical Coverage: Geographical area from which data for unit processes is collected to satisfy the goal of the study	The data used in the analysis provide the best possible representation available with current data. Electricity use for product manufacture is modeled using representative data modelled for the specific electricity grids represented in this study. Surrogate data used in the assessment are representative of global or European operations and are considered sufficiently similar to actual processes.
Technology Coverage: Specific technology or technology mix	For the most part, data are representative of the actual technologies used for processing, transportation, and manufacturing operations. Representative component datasets, specific to the type of material, are used to represent the actual processes, as appropriate.
Precision: Measure of the variability of the data values for each data expressed	Precision of results are not quantified due to a lack of data. Data collected for operations were typically averaged for one year and over multiple operations, which is expected to reduce the variability of results.
Completeness: Percentage of flow that is measured or estimated	The LCA model included all known mass and energy flows for production of the air filters. In some instances, surrogate data used to represent upstream and downstream operations. No known processes or activities contributing to more than 1% of the total environmental impact for each indicator are excluded.
Representativeness: Qualitative assessment of the degree to which the data set reflects the true population of interest	Data used in the assessment represents typical or average processes as currently reported from multiple data sources and are therefore generally representative of the range of actual processes and technologies for production of these materials. Considerable deviation may exist among actual processes on a site-specific basis; however, such a determination would require detailed data collection throughout the supply chain back to resource extraction.
Consistency: Qualitative assessment of whether the study methodology is applied uniformly to the various components of the analysis	The consistency of the assessment is considered to be high. Data sources of similar quality and age are used; with a bias towards Ecoinvent v3.10 data where available. Different portions of the product life cycle are equally considered.
Reproducibility: Qualitative assessment of the extent to which information about the methodology and data values would allow an independent practitioner to reproduce the results reported in the study	Based on the description of the data and assumptions used, this assessment would be reproducible by other practitioners. All assumptions, models, and data sources are documented.
Sources of the Data: Description of all primary and secondary data sources	Data representing energy use at the both the Crystal Lake, IL and Conover, NC facilities represent a 12-month average and are considered of high quality due to the length of time over which these data are collected, as compared to a snapshot that may not accurately reflect fluctuations in production. For secondary LCI data, Ecoinvent v3.10 data are used.
Uncertainty of the Information: Uncertainty related to data, models, and assumptions	Uncertainty related to materials in the products and packaging is low. Actual supplier data for upstream operations was not available for all suppliers and the study relied upon the use of existing representative datasets. These datasets contained relatively recent data (<10 years) but lacked geographical representativeness. Uncertainty related to the impact assessment methods used in the study are high. The impact assessment methodology includes impact potentials, which lack characterization of providing and receiving environments or tipping points.

3.7 PERIOD UNDER REVIEW

The period of review is based on a 12-month period from January 2023 through December 2023.

3.8 COMPARABILITY AND BENCHMARKING

The PCR this EPD was based on was not written to support comparative assertions. EPDs based on different PCRs, or different calculation models, may not be comparable. When attempting to compare EPDs or life cycle impacts of products from different companies, the user should be aware of the uncertainty in the final results, due to and not limited to, the practitioner's assumptions, the source of the data used in the study, and the specifics of the product modeled.

3.9 ESTIMATES AND ASSUMPTIONS

- Specific data were not available on borosilicate micro fiberglass in the product recipe. Secondary datasets for fiberglass were used from the Ecoinvent database to represent the filter media in the LCA model.
- Specific data were not available on filter media processing upstream of Camfil's facilities. Secondary datasets for thermoforming were used from the Ecoinvent database to represent these processing steps in the LCA model.
- Transportation of all wastes to the appropriate waste treatment facility is assumed to be 32 km by truck per the EPA WARM model.
- In addition to air filters, steel wire is also produced at the Crystal Lake, IL facility. As such, primary data on reported natural gas consumption at Crystal Lake is significantly larger (~4x) than that of its counterpart facility in Conover, NC. In the absence of submeters, calculations were performed to remove natural gas consumed during steel wire production from the H-Flo ES product system.
- In order to capture four filter depths produced for each MERV level filter at both facilities, production weighted averages across varying depths were used to quantify final filter mass and the mass of raw material inputs.

4. LCA: Results

Results of the Life Cycle Assessment are presented below. It is noted that LCA results are relative expressions and do not predict impacts on category endpoints, the exceeding of thresholds, safety margins or risks.

The following environmental impact category indicators are reported using characterization factors based on the TRACI 2.1 and CML-IA impact assessment methods. Note that the TRACI 2.1 global warming potential is based on IPCC 2007 and does not include biogenic carbon uptake or biomass CO_2 emissions. Based on the component materials of the product and production processes, there are no impacts associated with land-use changes, nor are environmental impacts associated with carbonation relevant for the product system. Results reported in MJ are calculated using lower heating values. All values are rounded to three significant digits.

Table 7. *Mandatory environmental impact assessment categories.*

Impact Category	LCIA Method	Unit
GWP: Global Warming Potential	TRACI 2.1	kg CO_2 eq.
ODP: Depletion potential of the stratospheric ozone layer	TRACI 2.1	kg CFC 11 eq.
AP: Acidification Potential of soil and water	TRACI 2.1	kg SO_2 eq.
EP: Eutrophication Potential	TRACI 2.1	kg N eq.
SFP: Smog Formation Potential	TRACI 2.1	kg O_3 eq.
ADP_F: Abiotic Depletion Potential, fossil fuels	CML-IA Baseline	MJ, LHV

These impact categories are globally deemed mature enough to be included in Type III environmental declarations. Other categories are being developed and defined and LCA should continue making advances in their development. However, the EPD users shall not use additional measures for comparative purposes. The following inventory parameters, specified by the PCR, are also reported.

Table 8. *Additional transparency categories.*

Resource Use Indicators	Unit	Waste and Output Indicators	Unit
RPR_E: Renewable primary resources used as energy carrier (fuel)	MJ, LHV	**HWD:** Hazardous waste disposed	kg
RPR_M: Renewable primary resources with energy content used as material	MJ, LHV	**NHWD:** Non-hazardous waste disposed	kg
$NRPR_E$: Non-renewable primary resources used as an energy carrier (fuel)	MJ, LHV	**RWD:** Radioactive waste, conditioned, to final repository	kg
$NRPR_M$: Non-renewable primary resources with energy content used as material	MJ, LHV	**CRU:** Components for re-use	kg
SM: Secondary materials	kg	**MR:** Materials for recycling	kg
RSF: Renewable secondary fuels	MJ, LHV	**MER:** Materials for energy recovery	kg
NRSF: Non-renewable secondary fuels	MJ, LHV	**EE:** Recovered energy exported from the product system	kg
RE: Recovered energy	MJ, LHV	**EE:** Recovered energy exported from the product system	MJ, LHV
FW: Use of new freshwater resources	m^3		

All LCA results are stated to three significant figures in agreement with the PCR for this product and therefore the sum of the total values may not exactly equal 100%.

Table 9. *LCIA indicator results for the Camfil Hi-Flo ES MERV 14 air filter by life cycle stage at each facility*

Impact Category	Unit	A1	A2	A3	A1-A3 Total
Crystal Lake, IL					
GWP	kg CO_2 eq	10.9	0.506	1.43	**12.8**
ODP	kg CFC-11 eq	1.91×10^{-6}	8.28×10^{-9}	2.34×10^{-8}	**1.94×10^{-6}**
AP	Kg SO_2 eq	3.79×10^{-2}	1.97×10^{-3}	3.97×10^{-3}	**4.39×10^{-2}**
EP	kg N eq	2.47×10^{-2}	5.60×10^{-4}	4.79×10^{-3}	**3.00×10^{-2}**
SFP	kg O_3 eq	0.488	4.98×10^{-2}	3.97×10^{-2}	**0.577**
ADPf	MJ, LHV	196	7.09	16.1	**219**
Conover, NC					
GWP	kg CO_2 eq	10.8	0.449	1.42	**12.7**
ODP	kg CFC-11 eq	1.81×10^{-6}	7.35×10^{-9}	5.37×10^{-8}	**1.87×10^{-6}**
AP	Kg SO_2 eq	3.74×10^{-2}	1.75×10^{-3}	4.19×10^{-3}	**4.34×10^{-2}**
EP	kg N eq	2.42×10^{-2}	5.00×10^{-4}	5.04×10^{-3}	**2.97×10^{-2}**
SFP	kg O_3 eq	0.481	4.43×10^{-2}	6.40×10^{-2}	**0.589**
ADPf	MJ, LHV	194	6.30	17.2	**218**

Table 10. *Resource use indicator results for the Camfil Hi-Flo ES MERV 14air filter by life cycle stage at each facility*

Resource Use Indicator	Unit	A1	A2	A3	A1-A3 Total
Crystal Lake, IL					
RPR_E	MJ, LHV	7.24	9.50×10^{-2}	8.96×10^{-3}	**7.35**
RPR_M	MJ, LHV	0.00	0.00	0.00	**0.00**
$NRPR_E$	MJ, LHV	210	7.19	3.14	**220**
$NRPR_M$	MJ, LHV	0.00	0.00	0.00	**0.00**
SM	kg	1.60×10^{-2}	0.00	0.179	**0.195**
RSF	MJ, LHV	0.00	0.00	0.00	**0.00**
NRSF	MJ, LHV	0.00	0.00	0.00	**0.00**
RE	MJ, LHV	0.00	0.00	0.00	**0.00**
FW	m^3	0.121	9.80×10^{-4}	3.80×10^{-4}	**0.122**
Conover, NC					
RPR_E	MJ, LHV	7.14	8.44×10^{-2}	9.50	**16.7**
RPR_M	MJ, LHV	0.00	0.00	0.00	**0.00**
$NRPR_E$	MJ, LHV	208	6.39	27.2	**241**
$NRPR_M$	MJ, LHV	0.00	0.00	0.00	**0.00**
SM	kg	1.50×10^{-2}	0.00	0.179	**0.194**
RSF	MJ, LHV	0.00	0.00	0.00	**0.00**
NRSF	MJ, LHV	0.00	0.00	0.00	**0.00**
RE	MJ, LHV	0.00	0.00	0.00	**0.00**
FW	m^3	0.120	8.70×10^{-4}	8.40×10^{-3}	**0.130**

Table 11. *Waste and output flow indicator results for the Camfil Hi-Flo ES MERV 14 air filter by life cycle stage at each facility*

Waste Indicator	Unit	A1	A2	A3	A1-A3 Total
Crystal Lake, IL					
HWD	kg	0.00	0.00	0.00	**0.00**
NHWD	kg	0.00	0.00	0.399	**0.399**
HLRW/ILLRW	kg	0.00	0.00	0.00	**0.00**
CRU	kg	0.00	0.00	0.00	**0.00**
MR	kg	0.00	0.00	0.00	**0.00**
MER	kg	0.00	0.00	0.00	**0.00**
EE	MJ, LHV	0.00	0.00	0.00	**0.00**
Conover, NC					
HWD	kg	0.00	0.00	0.00	**0.00**
NHWD	kg	0.00	0.00	0.232	**0.232**
HLRW/ILLRW	kg	0.00	0.00	0.00	**0.00**
CRU	kg	0.00	0.00	0.00	**0.00**
MR	kg	0.00	0.00	0.00	**0.00**
MER	kg	0.00	0.00	0.00	**0.00**
EE	MJ, LHV	0.00	0.00	0.00	**0.00**

5. LCA: Interpretation

A contribution analysis for the MERV 14 Camfil bag filter show that the raw material extraction and processing life cycle stage (A1) is the dominant contributor to all LCIA indicators assessed, contributing between 82% and 98% of impact The second most impactful life cycle stage was manufacturing (A3), which contributes between 1% and 17% of impact, followed by transport of raw materials, which contributes between 0% and 9% of impact across all categories.

Figure 3. *Contribution analysis of the Camfil Hi-Flo ES MERV 14 filter.*

6. Additional Environmental Information

6.1 FURTHER INFORMATION

Further information on the product can be found on the manufacturer's website at http://www.camfil.us

7. References

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3. ISO 14040: 2006/Amd1 2020 Environmental Management – Life cycle assessment – Principles and Framework
4. ISO 14044: 2006/Amd1 2017/Amd2 2020 Environmental Management – Life cycle assessment – Requirements and Guidelines.
5. ISO 21930: 2017 Sustainability in buildings and civil engineering works – Core rules for environmental product declarations of construction products and services.
6.
7. SCS Type III Environmental Declaration Program: Program Operator Manual. V12.0 December 2023. SCS Global Services.
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9. CML-IA Characterization Factors. Leiden University, Institute of Environmental Sciences. April 2013. https://www.universiteitleiden.nl/en/research/research-output/science/cml-ia-characterisation-factors
10. U.S. EPA. Tool for the Reduction and Assessment of Chemical and Other Environmental Impacts (TRACI).
11. U.S. EPA. Waste Reduction Model. v16. https://www.epa.gov/warm/versions-waste-reduction-model

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