Declaration Owner

Zurn Elkay Water Solutions
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Product

Zurn Hydro-X Sensor Flush Valves

Functional Unit

One (1) flush valve for toilets (single flush and dual flush) and urinals with a Reference Service Life of 10 years in a building with an Estimated Service Life of 75 years

EPD Number and Period of Validity

SCS-EPD-10657
EPD Valid July 14, 2026 through July 13, 2031

Product Category Rule

Sustainable Minds PCR Part A: Life Cycle Assessment Calculation Rules and Report Requirements. Version 4.0. February 2026.

Sustainable Minds PCR Part B: Product group definition - Commercial flushometer valves. Version 3.0. March 08, 2024.

Program Operator

SCS Global Services
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Declaration owner:	Zurn Elkay Water Solutions
Address:	511 W. Freshwater Way, Milwaukee, WI 53204, USA.
Declaration Number:	SCS-EPD-10657
Declaration Validity Period:	July 14, 2026 through July 13, 2031
Program Operator:	SCS Global Services
Declaration URL Link:	https://www.scsglobalservices.com/certified-green-products-guide
LCA Practitioner:	Asifur Rahman, SCS Consulting Services
LCA Software and LCI database:	OpenLCA 2.5 software and the Ecoinvent v3.12 database
Product's Intended Application:	For use with toilet or urinal fixtures as the dispensing unit for the water supplied.
Product RSL:	10 Years (ESL 75 Years)
Markets of Applicability:	North America
EPD Type:	Product-Specific
EPD Scope:	Cradle-to-Grave
LCIA Method and Version:	CML-IA Baseline and TRACI 2.2
Independent critical review of the LCA and data, according to ISO 14044 and ISO 14071	☐ internal ☒external
LCA Reviewer:	Lindita Bushi Lindita Bushi, Ph.D., Athena Sustainable Materials Institute
Product Category Rule:	Sustainable Minds PCR Part A: Life Cycle Assessment Calculation Rules and Report Requirements. Version 4.0. February 2026. Sustainable Minds PCR Part B: Product group definition - Commercial flushometer valves. Version 3.0. March 08, 2024.
PCR Review conducted by:	Part A: Thomas P. Gloria, Jack Geibig, and Beth Cassese Part B: Hugues Imbeault-Tétreault, Rebe Feraldi, Rifat Karim
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: *This EPD conforms to ISO 14025, 14040, 14044, and ISO 21930.*

Scope of Results Reported: *The PCR requirements limit the scope of the LCA metrics such that the results exclude environmental and social performance benchmarks and thresholds, and exclude impacts from the depletion of natural resources, land use ecological impacts, ocean impacts related to greenhouse gas emissions, risks from hazardous wastes and impacts linked to hazardous chemical emissions.*

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. The owner of the declaration shall be liable for the underlying information and evidence; SCS shall not be liable with respect to manufacturer information, life cycle assessment data, and evidence supplied or made available to SCS.

1. ABOUT Zurn

Zurn Elkay Water Solutions supplies a wide range of clean water solutions for drinking water, hygiene and sustainable water management. Operating for over a century and headquartered in Milwaukee, Wisconsin, Zurn Elkay works to deliver products and systems that enhance and ensure water quality, safety, hygiene, flow control and conservation. The company's wide range of product portfolio includes products, such as flush valves, electronic faucets, sink systems, soap dispensing systems, and vitreous china fixtures for commercial, industrial, and institutional markets worldwide.
The Zurn Hydro-X flush valve products are manufactured for Zurn Elkay Water Solutions in Indonesia. The products consist primarily of brass components with various internal electronics components.

2. PRODUCT

2.1 Product Description

A flush valve mechanism is designed to flush toilets and urinals. Flush valves do not require a storage tank filled with water for flushing. Rather, it conserves more water over time and for every flush through delivery of a metered amount of water at higher pressure compared to that of standard flushing apparatus. Zurn Hydro-X flush valve products belong to the Commercial Plumbing Fixtures specification code, CSI code 22 42 43 and the UNSPSC code 30180000. The products under study include the following shown below.

Hydro-X Models Included	Description
ZER6000AV for Toilet Fixtures: 	■ Hydro-X Power® technology delivers sustainable performance by providing renewable, uninterrupted hydropower designed to last the life expectancy of a commercial restroom ■ Gear-driven ceramic cartridge that is less susceptible to debris and buildup for easy maintenance ■ Automatic touchless sensor activation reduces guest visits without a flush and can help reduce germ transmission ■ True mechanical override button delivers on-demand manual flushing ■ Optional 24-hour line flushing to help minimize stagnation and maintain fixture trap seals to protect against sewer gases during periods of inactivity ■ Dual-flush or single-flush high efficiency option ■ Bluetooth app standard for point-of-use wireless power source stratus, on-demand or automatic line flushing, timeout and sensor sensitivity settings ■ User-in-view LED indicator light
ZER6003 AV for Urinal Fixtures: 	

Table 1. *Zurn Hydro-X Flush Valve models represented in this EPD including flush volume.*

Toilets		Urinal	
Model	Flush Volume	Model	Flush Volume
ZER6000AV-ONE-HYD	1.11 gpf/4.2 Lpf	ZER6003AV-ULF-HYD	0.125 gpf/ 0.5 Lpf
ZER6000AV-HET-HYD	1.28 gpf/4.8 Lpf	ZER6003AV-EWS-HYD	0.125 gpf/ 0.5 Lpf
ZER6000AV-WS1-HYD	1.6 gpf/6.0 Lpf	ZER6003AV-WS1-HYD	0.25 gpf/ 1.0 Lpf
ZER6000AV-WS1-DF*-HYD	1.1/1.6 gpf		
ZER6000AV-HET-DF**-HYD	1.1/1.28 gpf		

*Dual flush, with 1.6/gpf/6.1 Lpf (regular flush) and 1.1 gpf/4.2 Lpf (reduced flush) options.
**Dual flush, with 1.28/gpf/4.8 Lpf (regular flush) and 1.1 gpf/4.2 Lpf (reduced flush) options.

2.2 Application

The Hydro-X flush valves are designed for use with toilet or urinal fixtures as the dispensing unit for the water supplied. The flush valves are primarily installed in commercial, industrial, and institutional markets worldwide.

2.3 Representative Product

One set of results are shown for the Zurn Hydro-X flush valves representing the two flush valve models ZER6000AV-HYD and ZER6003AV-HYD. Although the two models differ in their valve construction, they share almost identical inventory datasets, resulting in negligible difference (less than 0.01%) in their life cycle impacts.

2.4 Material Composition

Table 2. *Zurn Hydro-X Flush Valves Material Components.*

Product	ZER6000AV-HYD		ZER6003AV-HYD	
Component Group	**Mass (kg)**	**% Mass**	**Mass (kg)**	**% Mass**
Brass	2.17	68.9%	2.16	68.7%
Steel	0.194	6.16%	0.194	6.16%
Plastic	0.222	7.04%	0.222	7.04%
Battery	0.211	6.70%	0.211	6.70%
Sensor Electronics	0.195	6.19%	0.195	6.19%
Silicone	2.10×10^{-4}	0.01%	2.10×10^{-4}	0.01%
Rubber	0.123	3.90%	0.123	3.90%
Polymer	3.32×10^{-2}	1.06%	3.32×10^{-2}	1.06%
Copper	5.20×10^{-5}	0.00%	5.20×10^{-5}	0.00%
Adhesive	3.10×10^{-3}	0.10%	3.10×10^{-3}	0.10%
Product Total	**3.15**	**100%**	**3.15**	**100%**

2.5 Technical Requirements

Table 3. *Zurn Hydro-X Flush Valves technical requirements.*

Property	Test Method	Unit	Value
Flow rate		Gallons per flush (gpf) Liters per flush (Lpf)	0.125 – 1.6 0.5 – 6
Operational water pressure	ASSE 1037/ASME A112.1037/CSA B125.37	PSI	static: 80 running: 25

2.6 Flow Diagram

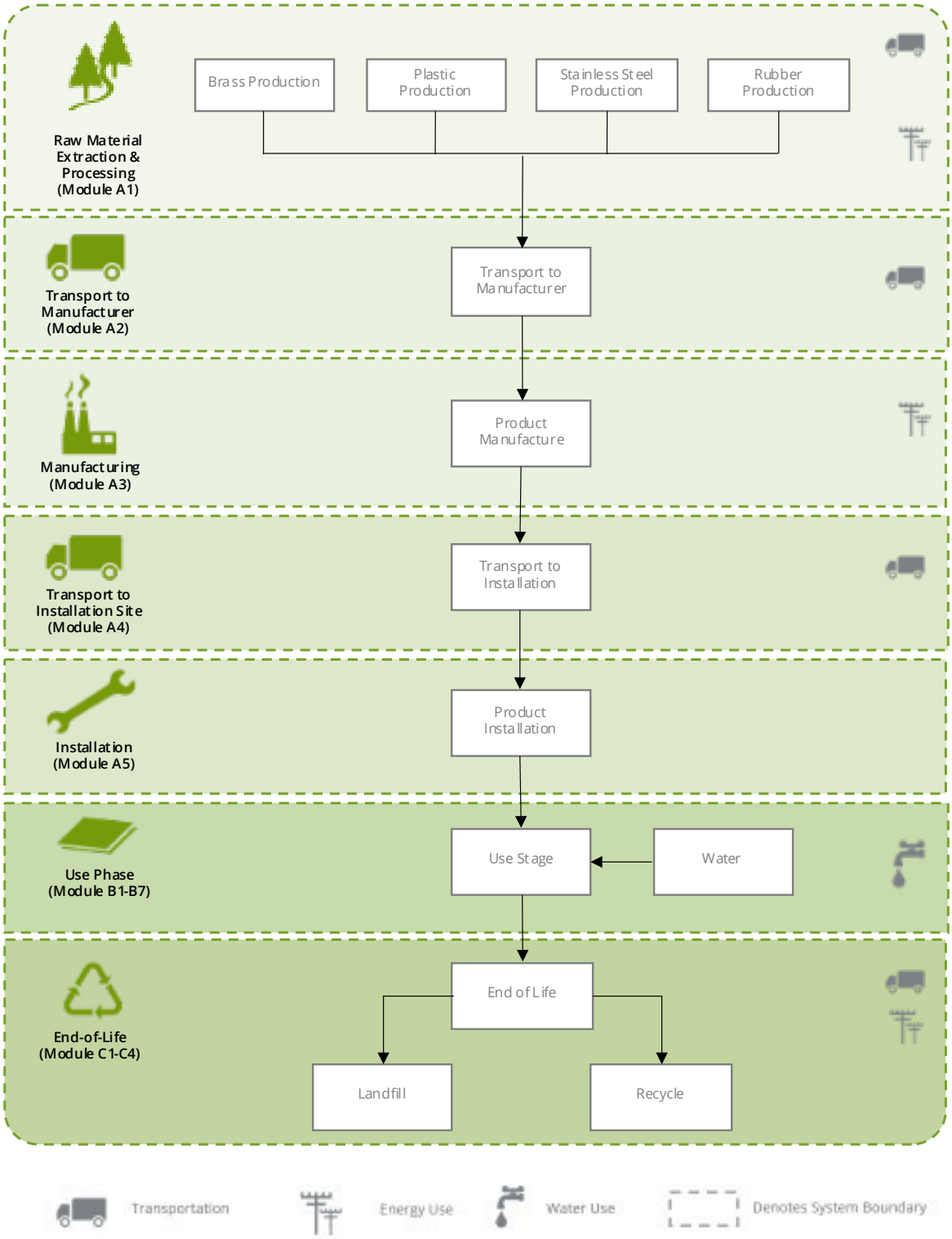

Figure 1. *Flow diagram for the Zurn Hydro-X Flush Valves.*

3. LCA: METHODOLOGICAL FRAMEWORK

3.1 Functional Unit

The functional unit used in the study is one (1) installed unit with a reference service life (RSL) of 10 years. The building estimated service life (ESL) is assumed to be 75-years in order to be consistent with ASHRAE 189.1.

Table 4. *Zurn Hydro-X Flush Valves Functional Unit Properties.*

Property	Unit	Value
Functional Unit	One (1) installed product	
RSL	Years	10
ESL	Years	75
Mass	kg	3.15

3.2 System Boundary

The scope of the EPD is cradle-to-grave, including raw material extraction and processing; raw material transportation; product manufacture, including packaging; product distribution; installation; use; and end-of-life.

Table 5. *Zurn Hydro-X Flush Valves System Boundaries.*

Product			Construction Process		Use							End-of-life				Benefits and loads beyond the system boundary
A1	A2	A3	A4	A5	B1	B2	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	X	X	X	X	X	X	X	X	X	X	X	X	X	MND

X = Included in system boundary
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. No burdens are allocated across the system boundary with secondary material, secondary fuel or recovered energy flows arising from waste.

3.3 Cut-off criteria

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.

3.4 Data Sources

Primary data, including supplier locations, were provided by the manufacturer for its facility in Indonesia. The principal source of secondary LCI data is the Ecoinvent v3.12 database.

Table 6. *LCI datasets and associated databases used to model the Zurn Hydro-X Flush Valves .*

Component	Dataset	Data Source	Publication Date
Product			
Brass	market for brass | brass | Cutoff, U - RoW	Ecoinvent 3.12	2025
	market for casting, brass | casting, brass | Cutoff, U	Ecoinvent 3.12	2025
Steel	market for steel, chromium steel 18/8, hot rolled | steel, chromium steel 18/8, hot rolled | Cutoff, U	Ecoinvent 3.12	2025
	market for metal working, average for chromium steel product manufacturing | metal working, average for chromium steel product manufacturing | Cutoff, U	Ecoinvent 3.12	2025
Plastic	market for glass fibre reinforced plastic, polyamide, injection moulded | glass fibre reinforced plastic, polyamide, injection moulded | Cutoff, U - GLO	Ecoinvent 3.12	2025
	market for acrylonitrile-butadiene-styrene copolymer | acrylonitrile-butadiene-styrene copolymer | Cutoff, U - GLO	Ecoinvent 3.12	2025
	market for nylon 6-6 | nylon 6-6 | Cutoff, U - RoW	Ecoinvent 3.12	2025
	market for polycarbonate | polycarbonate | Cutoff, U - RoW	Ecoinvent 3.12	2025
Battery	market for battery, Li-ion, LFP, rechargeable | battery, Li-ion, LFP, rechargeable | Cutoff, U - GLO	Ecoinvent 3.12	2025
	AA Alkaline Battery, Zn-MnO2, custom dataset developed within Ecoinvent	Ecoinvent 3.12	2025
Sensor Electronics	market for printed wiring board, surface mounted, unspecified, Pb free | printed wiring board, surface mounted, unspecified, Pb free | Cutoff, U - GLO	Ecoinvent 3.12	2025
	market for capacitor, for surface-mounting | capacitor, for surface-mounting | Cutoff, U - GLO	Ecoinvent 3.12	2025
	market for diode, glass-, for surface-mounting | diode, glass-, for surface-mounting | Cutoff, U - GLO	Ecoinvent 3.12	2025
	market for electric connector, peripheral component interconnect buss | electric connector, peripheral component interconnect buss | Cutoff, U - GLO	Ecoinvent 3.12	2025
	market for electronic component, active, unspecified | electronic component, active, unspecified | Cutoff, U - GLO	Ecoinvent 3.12	2025
	market for electronic component, passive, unspecified | electronic component, passive, unspecified | Cutoff, U - GLO	Ecoinvent 3.12	2025
	market for inductor, auxilliaries and energy use | inductor, auxilliaries and energy use | Cutoff, U - GLO	Ecoinvent 3.12	2025
	market for inductor, miniature radio frequency chip | inductor, miniature radio frequency chip | Cutoff, U - GLO	Ecoinvent 3.12	2025
	market for integrated circuit, memory type | integrated circuit, memory type | Cutoff, U - GLO	Ecoinvent 3.12	2025
	market for light emitting diode | light emitting diode | Cutoff, U - GLO	Ecoinvent 3.12	2025
	market for printed wiring board, for surface mounting, Pb free surface | printed wiring board, for surface mounting, Pb free surface | Cutoff, U - GLO	Ecoinvent 3.12	2025
	market for resistor, surface-mounted | resistor, surface-mounted | Cutoff, U - GLO	Ecoinvent 3.12	2025
	switch production, toggle type | switch, toggle type | Cutoff, U - RoW	Ecoinvent 3.12	2025
	market for transistor, surface-mounted | transistor, surface-mounted | Cutoff, U - GLO	Ecoinvent 3.12	2025

Component	Dataset	Data Source	Publication Date
Rubber	market for synthetic rubber | synthetic rubber | Cutoff, U - GLO	Ecoinvent 3.12	2025
polymer	market for ethylene vinyl acetate copolymer | ethylene vinyl acetate copolymer | Cutoff, U - RoW	Ecoinvent 3.12	2025
Silicone	market for silicone product | silicone product | Cutoff, U - RoW	Ecoinvent 3.12	2025
	market for silicon, electronics grade | silicon, electronics grade | Cutoff, U – GLO	Ecoinvent 3.12	2025
Copper	market for cable, unspecified | cable, unspecified | Cutoff, U - GLO	Ecoinvent 3.12	2025
Recycled Brass	market for brass | brass | Cutoff, U	Ecoinvent 3.12	2025
	market for lead smelter slag | lead smelter slag | Cutoff, U	Ecoinvent 3.12	2025
	market for scrap copper | scrap copper | Cutoff, U	Ecoinvent 3.12	2025
	market for casting, brass | casting, brass | Cutoff, U	Ecoinvent 3.12	2025
	market for zinc scrap, post-consumer | zinc scrap, post-consumer | Cutoff, U	Ecoinvent 3.12	2025
Adhesive	market for n-butyl acetate | n-butyl acetate | Cutoff, U - RoW	Ecoinvent 3.12	2025
Packaging			
Cardboard	market for corrugated board box | corrugated board box | Cutoff, U	Ecoinvent 3.12	2025
Plastic	market for glass fibre reinforced plastic, polyamide, injection moulded | glass fibre reinforced plastic, polyamide, injection moulded | Cutoff, U	Ecoinvent 3.12	2025
	market for polyvinylfluoride | polyvinylfluoride | Cutoff, U	Ecoinvent 3.12	2025
Transport			
Truck	market for transport, freight, lorry 16-32 metric ton, EURO4 | transport, freight, lorry 16-32 metric ton, EURO4 | Cutoff, U - RoW	Ecoinvent 3.12	2025
Ship	market for transport, freight, sea, container ship | transport, freight, sea, container ship | Cutoff, U - GLO	Ecoinvent 3.12	2025
Manufacture			
Electricity	market for electricity, medium voltage | electricity, medium voltage | Cutoff, U - Indonesia	Ecoinvent 3.12	2025
Water	market for tap water | tap water | Cutoff, U -RoW	Ecoinvent 3.12	2025
Use Phase			
Electricity for water supply and treatment.	market group for electricity, medium voltage | electricity, medium voltage | Cutoff, U - US	Ecoinvent 3.12	2025
Waste			
Hazardous Waste	market for hazardous waste, for incineration | hazardous waste, for incineration | Cutoff, U	Ecoinvent 3.12	2025
Landfill	market for inert waste, for final disposal | inert waste, for final disposal | Cutoff, U	Ecoinvent 3.12	2025
Wastewater	market for wastewater, average | wastewater, average | Cutoff, U	Ecoinvent 3.12	2025

3.5 Data Quality

Table 7. *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 the Indonesia facility on annual production for July 2024 - June 2025. The manufacturer provided primary data on product manufacturing for the sensor electronics, brass components, and other assembly parts. 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 Ecoinvent grid-mixes dataset for Indonesia in this study. Surrogate data used in the assessment are representative of global or US 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 or more years 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 products. In some instances, surrogate data used to represent upstream and downstream operations may be missing some data which is propagated in the model. 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 represent 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 v3.12 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 manufacturing facility 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 v3.12 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 (<5 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.

3.6 Period under review

The period of review is based on a 12-month period from July 2024 through June 2025.

3.7 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.

3.8 Estimates and Assumptions

- A weighted average recycled brass content of 51% was calculated based on data provided by Zurn suppliers located primarily in China, Vietnam, and Taiwan.
- Ecoinvent electricity dataset for Indonesia was used to estimate resource use and emissions from electricity use at the manufacturing facility.
- Product transport from point of purchase to the building site is assumed to be 800 km as required by the Part B PCR.
- Installation of the products is assumed to be manual, requiring no additional materials or energy use.
- Transport of the packaging waste at installation is assumed to be 100 km as required by the Part B PCR.
- Transport of the product at end-of-life to waste processing and disposal is assumed to be 100 km as required by the Part B PCR.
- The Reference Service Life (RSL) of the products was modeled as 10 years, as required by the Part B PCR.
- The Estimated Service Life (ESL) of the building/construction works was assumed to be 75 years, as required by the Part B PCR, in order to be consistent with ASHRAE 189.1.
- The maintenance of the products is assumed to include daily cleaning with a cleaning solution of 10 ml of 1% sodium lauryl sulfate solution as specified in the Part B PCR.
- The repair of the products consists of the replacement of backup batteries, generally once during the product RSL.
- The products are assumed to require no replacement during the 10-year RSL, but in accordance with the Part A PCR and Part B PCR, requires replacement 6.5 times over the 75-year ESL.
- For the product end-of-life, the recycling and disposal of parts used in the product is based on manufacturer provided information.

4. LCA: TECHNICAL INFORMATION AND SCENARIOS

4.1 Manufacture

The diaphragm, upper and lower valves, and sensor electronics are assembled using parts from suppliers to produce the finished flush valves at a manufacturing facility in Indonesia. This module also includes the packaging for the components as well as the packaging for the final products prior to shipping. The manufacturer provided primary data for twelve months of data including production, resource use and electricity consumption, and waste generation at the facility. Electricity consumption is modeled using Ecoinvent datasets for the country-specific grid-mix for the facility.

4.2 Packaging

Table 8. *Zurn Hydro-X Flush Valves packaging per functional unit.*

Product	ZER6000AV-HYD		ZER6003AV-HYD	
	Mass (kg)	Percentage of Total Mass	Mass (kg)	Percentage of Total Mass
Cardboard	0.327	99.8%	0.327	99.8%
Plastic	$5.60x10^{-4}$	0.17%	$5.60x10^{-4}$	0.17%
Packaging Total	**0.328**	**100%**	**0.328**	**100%**

4.3 Transportation

Transportation for the LCA model is estimated based on the supplier location and transport data provided by the manufacturer for transport from the component manufacturer to the production facility. For multiple suppliers, a weighted average transportation distance was calculated for each mode of transport used. Road transport is assumed to be by diesel truck and ocean transport is assumed to by container ship.

Table 10. *Zurn Hydro-X Flush Valves Transportation (Road and Ship) Summary*

Material	Truck Transport (km)	Train Transport (km)	Ship Transport (km)
Brass	80 - 225	-	384 - 4150
Steel	30 - 225	-	0 - 130
Plastic	-	-	0 - 25
Battery	0 - 10	-	-
Sensor Electronics	0 - 10	-	0 - 1135
Silicone	0 - 10	-	-
Rubber	0 - 17	-	0 - 373
Polymer	0 - 10	-	-
Copper	0 - 10	-	-
Adhesive	0 - 10	-	-
Packaging	**Truck Transport (km)**	**Train Transport (km)**	**Ship Transport (km)**
Cardboard	0 - 17	-	-
Plastic	0 - 22	-	-

Transportation distance and mode from the manufacturing facility to the Zurn distribution center in Los Angeles, CA was provided by the manufacturer. For transportation from the Los Angeles distribution center to sales, an average distance of 2725 km was assumed to represent locations across the United States. In addition, as required by the PCR, a distance of 800 km was assumed with an empty return trip of the same distance to represent the distance from the point of purchase to installation site.

Table 11. *Zurn Hydro-X Flush Valves Transportation (Road and Ship) Summary*

Name	Unit	ZER6000AV-HYD	ZER6003AV-HYD
Fuel type	-	Diesel	Diesel
Liters of fuel	l/100 km	18.7	18.7
Vehicle Type	-	Freight Truck	Freight Truck
Total Transport Distance	km	3,525	3,525
Los Angeles, CA to various US cities (average)	km	*2725*	*2725*
Point of purchase to installation (per PCR)	km	*800*	*800*
Capacity utilization	%	50	50
Gross mass of products transported including packaging	kg	3.43	3.43
Fuel type	-	Heavy Fuel Oil	Heavy Fuel Oil
Liters of fuel	l/100 km	0.41	0.41
Vehicle Type	-	Ocean Freighter	Ocean Freighter
Total Transport Distance	km	14,625	14,625
Indonesia to Los Angeles, CA	km	14,625	14,625
Gross mass of products transported including packaging	kg	3.43	3.43

4.4 Installation

The installation of the flush valves is completed using manual labor and does not require additional ancillary materials. Waste is generated from the disposal of the packaging material and is modeled as required in the Part A PCR.

Table 12. *Zurn Hydro-X Flush Valves installation summary.*

Name	Unit	ZER6000AV-HYD	ZER6003AV-HYD
Ancillary materials	kg	0	0
Net freshwater consumption specified by water source and fate	m^3	0	0
Other resources	kg	0	0
Electricity consumption	kwh	0	0
Other energy carriers	MJ	0	0
Product loss per functional unit	kg	0	0
Waste materials at the construction site before waste processing, generated by product installation	kg	0	0
Output materials resulting from on-site waste processing	kg	0	0
Mass of packaging waste specified by type	kg	0.328	0.328
Recycle	kg	0.223	0.223
Landfill	kg	0.084	0.084
Incineration	kg	0.020	0.020
Biogenic carbon contained in packaging	kg C	0.164	0.164
Direct emissions to ambient air, soil, and water	kg	0	0
VOC emissions	$\mu g/m^3$	0	0

4.5 Use

Table 13. *Zurn Hydro-X Flush Valves maintenance summary.*

Maintenance	Unit	ZER6000AV-HYD	ZER6003AV-HYD
Description of process	-	Daily cleaning with 10 ml 1% sodium lauryl sulfate solution	
Maintenance cycle	Cycles/RSL	2,600	2,600
Maintenance cycle	Cycles/ESL	19,500	19,500
Net freshwater consumption			
City water disposed to sewer	m^3	0.01	0.01
Ancillary materials			
Sodium lauryl sulfate solution	kg	0.365	0.365
Other resources	kg	0	0
Energy and other resources input	kWh	0	0
Power output of equipment	kW	0	0
Waste materials from maintenance	kg	0	0
Direst emissions to ambient air, soil, and water	kg	0	0
Further assumptions for scenario development	-	-	-

Table 14. *Zurn Hydro-X Flush Valves repair summary.*

Repair	Unit	ZER6000AV-HYD	ZER6003AV-HYD
Repair process information	-	Per manufacturer, the backup batteries may need replacement to repair product	
Inspection process information	-	N/A	N/A
Repair cycle	Cycles/RSL	1	1
Repair cycle	Cycles/ESL	7	7
Net freshwater consumption	m^3	0	0
Ancillary materials	kg	0.322	0.322
Backup Battery	kg	0.322	0.322
Energy input	kWh	0	0
Waste materials from repair	kg	0.322	0.322
Landfill	kg	0.322	0.322
Direct emissions to ambient air, soil, and water	kg	0	0
Further assumption for scenario development	-	-	-

Table 15. *Zurn Hydro-X Flush Valves replacement summary.*

Replacement	Unit	ZER6000AV-HYD	ZER6003AV-HYD
Reference Service Life	Years	10	10
Replacement cycle (ESL/RSL)-1	-	6.5	6.5
Energy input	kWh	0	0
Net freshwater consumption	m^3	0	0
Ancillary materials	kg	0	0
Replacement of materials	kg	3.15	3.15
Direct emissions to ambient air, soil, and water	kg	0	0
Further assumptions for scenario development	-	-	-

Table 16. *Zurn Hydro-X Flush Valves refurbishment summary.*

Refurbishment	Unit	ZER6000AV-HYD	ZER6003AV-HYD
Refurbishment process	-	N/A	N/A
Refurbishment cycle	Cycles/RSL	0	0
Refurbishment cycle	Cycles/ESL	0	0
Energy input	kWh	0	0
Net freshwater consumption	m^3	0	0
Material input	kg	0	0
Waste materials	kg	0	0
Direct emissions to ambient air, soil, and water	kg	0	0
Further assumption for scenario development	-	-	-

Table 17. *Use phase operational water use (Module B7) summary for Zurn Hydro-X flush valves (gpf = gallons per flush, Lpf = Liters per flush)*

Operational Water Use	Unit	Toilet Fixtures (Single Flush)			Toilet Fixtures (Dual Flush)		Urinal Fixtures		
		1.11 gpf (4.2 Lpf)	1.28 gpf (4.8 Lpf)	1.6 gpf (6.0 Lpf)	1.1/1.2 gpf	1.1/1.6 gpf	0.125 gpf (0.473 Lpf)	0.5 gpf (1.89 Lpf)	1 gpf (1.89 Lpf)
Net freshwater consumption									
City water to sewer	m^3/RSL	983	1134	1417	1033	1128	74	295	591
	m^3/ESL	7374	8504	10629	7751	8459	554	2214	4429
Ancillary materials	kg	0	0	0	0	0	0	0	0
Energy input	kWh	0	0	0	0	0	0	0	0
Equipment power output	kW	0	0	0	0	0	0	0	0
Characteristic performance	-	-			-		-		
Direct emissions to ambient air, soil, water	kg	0	0	0	0	0	0	0	0
Further assumptions for scenario development (per PCR)	- For dual flushes, 60 flushes per day are reduced flushes (liquid waste) and 30 flushes per day are full flushes (solid waste). - As per PCR part B, a weighted average composite factor of 0.00364 KWh/gallon, or 0.000961 KWh/liter for electricity usage for water distribution and wastewater collection and treatment was used. The weighted average factor is estimated based on data published by the Electric Power Research Institute (EPRI)[1] and weighted average composite factors established by the EPA.[2,3]								
Number of flushes per day	-	90			90		60		
Number of use days per year	-	260			260		260		
Number of flushes per year	-	23400			23400		15600		

4.6 End-of-Life

Table 18. *Zurn Hydro-X Flush Valves End-of-Life Summary.*

End-of-life		Unit	ZER6000AV-HYD	ZER6003AV-HYD
Assumptions for scenario development			Manual deconstruction, followed by 100 km truck transport to final disposal in landfill	
Collection process	Collected separately	kg	0	0
	Collected with mixed construction waste	kg	3.15	3.15
Recovery	Reuse	kg	0	0
	Recycling	kg	2.01	2.00
	Landfill	kg	1.14	1.15
	Incineration	kg	0	0
	Incineration with energy recovery	kg	0	0
	Energy conversion	-	-	-
Disposal	Product of material for final deposition	kg	1.14	1.15
Removals of biogenic carbon (excluding packaging)		kg C	0	0

[1] EPRI, Water & Sustainability (Volume 4): U.S. Electricity Consumption for Water Supply & Treatment -- The Next Half Century, March 2002.
[2] U.S. Environmental Protection Agency (EPA), Office of Water (4606) Drinking Water Treatment, June 2004 https://transparencycatalog.com/assets/uploads/files/2009_08_28_sdwa_fs_30ann_treatment_web.pdf.
[3] U.S. Environmental Protection Agency (EPA), Clean Watersheds Needs Survey 2012 Report to Congress. https://www.epa.gov/sites/default/files/2015-12/documents/cwns_2012_report_to_congress-508-opt.pdf. https://www.safeplumbing.org/files/safeplumbing.org/documents/resources/PMI-Kitchen-and-Bath-Fixture-Fitting-PCR-Guidance-Document.pdf.

5. 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. 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%.

One set of results are shown for the Zurn Hydro-X flush valves representing the two flush valve models ZER6000AV-HYD and ZER6003AV-HYD. Although the two models differ in their valve construction, they share almost identical inventory datasets, resulting in negligible difference (less than 0.01%) in their life cycle impacts. Results for Module B7 (Operational Water Use) are shown separately and reported for the available flush volume applications. The following environmental impact category indicators are reported using characterization factors using the CML-IA impact assessment method and the TRACI 2.2 impact assessment method. Additionally, global warming potentials are reported using the EF 3.1 methodology, based on IPCC 2021 (AR 6), as described in EN 15804.[4]

Table 19. *Mandatory Environmental Impact Assessment Categories.*

CML-IA Impact Category	Unit	TRACI 2.2 Impact Category	Unit
Global Warming Potential (GWP) – IPCC 2013	kg CO_2 eq	Global Warming Potential (GWP) – IPCC 2007	kg CO_2 eq
Depletion potential of the stratospheric ozone layer (ODP)	kg CFC 11 eq	Ozone Depletion Potential (ODP)	kg CFC 11 eq
Acidification Potential of soil and water (AP)	kg SO_2 eq	Acidification Potential (AP)	kg SO_2 eq
Eutrophication Potential (EP)	kg $(PO_4)^{3-}$ eq	Eutrophication Potential: Freshwater (EP: Freshwater)	kg P eq
Photochemical Oxidant Creation Potential (POCP)	kg C_2H_4 eq	Eutrophication Potential: Marine (EP: Marine)	kg N eq
Abiotic depletion potential (ADP-fossil fuels) for fossil resources	MJ, LHV	Smog Formation Potential (SFP)	kg O_3 eq
Global Warming Potential (IPCC AR 6)	**Unit**		
Global Warming Potential (GWP_{total})	kg CO_2 eq		
Global Warming Potential - fossil fuels (GWP_{fossil})	kg CO_2 eq		
Global Warming Potential – ($GWP_{biogenic}$)	kg CO_2 eq		
Global Warming Potential - land use and land use change (GWP_{luluc})	kg CO_2 eq		

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.

[4] CEN (2021): EN 15804:A1:2012+A2:2019/AC:2021, Sustainability of construction works — Environmental product declarations — Core rules for the product category of construction products.

Table 20. *Additional Transparency Categories.*

Resources	Unit	Waste and Outflows	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
RPR_{total}: Total use of renewable Primary Resources with energy content	MJ, LHV	**HLRW:** High-level Radioactive waste, conditioned, to final repository	kg
$NRPR_E$: Non-renewable primary resources used as an energy carrier (fuel)	MJ, LHV	**ILLRW:** Low -level Radioactive waste, conditioned, to final repository	kg
$NRPR_M$: Non-renewable primary resources with energy content used as material[5]	MJ, LHV	**CRU:** Components for re-use	kg
$NRPR_{total}$: Total use of non-renewable Primary Resources with energy content	MJ, LHV	**MR:** Materials for recycling	kg
SM: Secondary materials	kg	**MER:** Materials for energy recovery	kg
RSF: Renewable secondary fuels	MJ, LHV	**EE:** Recovered energy exported from the product system	MJ, LHV
NRSF: Non-renewable secondary fuels	MJ, LHV		
RE: Recovered energy	MJ, LHV		
FW: Use of new freshwater resources	m^3		

Carbon emissions and removals are reported in line with the PCR. The following indicators are assessed for carbon emissions and removals.

Table 21. *Additional carbon emissions and removals indicators.*

Carbon emissions and removals indicators	Unit
BCRP: Biogenic carbon removals from product	kg CO_2
BCEP: Biogenic carbon emissions from product	kg CO_2
BCRK: Biogenic carbon removals from packaging	kg CO_2
BCEK: Biogenic carbon removals from packaging	kg CO_2
CCE: Carbon emissions from calcination	kg CO_2
CCR: Carbon removals from calcination	kg CO_2
CBCEW: Carbon emissions from combustion of waste from renewable sources used in production	kg CO_2
CWNR: Carbon emissions from combustion of waste from non-renewable sources used in production processes	kg CO_2

[5] The $NRPR_M$ values for plastics (petroleum based) and rubber (polyamide based) were calculated using lower heating values (LHVs) of 43.6 MJ/kg for petroleum and 29.2 MJ/kg for polyamides.

Zurn Hydro-X Flush Valve Results

Table 22. *CML-IA environmental impact results for the Zurn Hydro-X Flush Valves (ZER6000AV-HYD and ZER6003AV-HYD).*

Module	GWP	ODP	AP	EP	POCP	ADPE	ADPF
	kg CO_2 eq	kg CFC-11 eq	kg SO_2 eq	kg PO_4^{3-} eq	kg C_2H_4 eq	kg Sb eq	MJ
A1	20.8	$4.89x10^{-7}$	0.528	0.202	$2.20x10^{-2}$	$2.60x10^{-3}$	247
A2	0.285	$3.19x10^{-9}$	$4.40x10^{-3}$	$6.12x10^{-4}$	$1.27x10^{-4}$	$2.47x10^{-7}$	3.64
A3	1.69	$2.77x10^{-8}$	$3.13x10^{-3}$	$3.44x10^{-3}$	$2.00x10^{-4}$	$1.25x10^{-6}$	11.4
A1-A3 Total:	**22.7**	**$5.20x10^{-7}$**	**0.535**	**0.207**	**$2.24x10^{-2}$**	**$2.60x10^{-3}$**	**262**
A4	1.04	$1.16x10^{-8}$	$1.36x10^{-2}$	$2.06x10^{-3}$	$4.06x10^{-4}$	$1.04x10^{-6}$	13.5
A5	0.00	0.00	0.00	0.00	0.00	0.00	0.00
B1	0.00	0.00	0.00	0.00	0.00	0.00	0.00
B2	7.90	$1.05x10^{-7}$	$2.26x10^{-2}$	$3.46x10^{-2}$	$4.45x10^{-3}$	$1.20x10^{-5}$	24.3
B3	1.58	$1.70x10^{-8}$	$1.17x10^{-2}$	$8.25x10^{-3}$	$4.55x10^{-4}$	$2.33x10^{-4}$	17.7
B4	156	$3.47x10^{-6}$	3.57	1.36	0.148	$1.69x10^{-2}$	1,810
B5	0.00	0.00	0.00	0.00	0.00	0.00	0.00
B6	0.00	0.00	0.00	0.00	0.00	0.00	0.00
B7	See Table 28						
C1	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C2	$6.17x10^{-2}$	$6.78x10^{-10}$	$1.97x10^{-4}$	$7.79x10^{-5}$	$9.49x10^{-6}$	$9.48x10^{-8}$	0.848
C3	$8.16x10^{-2}$	$9.83x10^{-10}$	$4.15x10^{-4}$	$1.36x10^{-4}$	$1.62x10^{-5}$	$1.09x10^{-7}$	1.09
C4	$1.98x10^{-2}$	$3.12x10^{-10}$	$8.02x10^{-5}$	$3.37x10^{-5}$	$4.17x10^{-6}$	$2.38x10^{-8}$	0.345

Table 23. *TRACI 2.2 environmental impact results for the Zurn Hydro-X Flush Valves (ZER6000AV-HYD and ZER6003AV-HYD).*

Module	GWP	ODP	AP	EP: Freshwater	EP: Marine	SFP
	kg CO_2 eq	kg CFC-11 eq	kg SO_2 eq	kg P eq	kg N eq	kg O3 eq
A1	20.6	$5.35x10^{-7}$	0.479	$4.34x10^{-2}$	0.111	2.37
A2	0.283	$4.20x10^{-9}$	$4.73x10^{-3}$	$1.75x10^{-5}$	$3.73x10^{-3}$	$9.08x10^{-2}$
A3	1.67	$3.11x10^{-8}$	$3.67x10^{-3}$	$5.78x10^{-4}$	$2.80x10^{-3}$	$6.11x10^{-2}$
A1-A3 Total:	**22.6**	**$5.70x10^{-7}$**	**0.487**	**$4.40x10^{-2}$**	**0.118**	**2.52**
A4	1.03	$1.53x10^{-8}$	$1.47x10^{-2}$	$7.25x10^{-5}$	$1.18x10^{-2}$	0.286
A5	0.00	0.00	0.00	0.00	0.00	0.00
B1	0.00	0.00	0.00	0.00	0.00	0.00
B2	7.95	$1.10x10^{-7}$	$2.57x10^{-2}$	$1.75x10^{-3}$	$3.11x10^{-2}$	0.279
B3	1.57	$2.00x10^{-8}$	$1.14x10^{-2}$	$1.43x10^{-3}$	$5.14x10^{-3}$	0.121
B4	155	$3.82x10^{-6}$	3.27	0.286	0.846	18.4
B5	0.00	0.00	0.00	0.00	0.00	0.00
B6	0.00	0.00	0.00	0.00	0.00	0.00
B7	See Table 28					
C1	0.00	0.00	0.00	0.00	0.00	0.00
C2	$6.12x10^{-2}$	$8.90x10^{-10}$	$2.38x10^{-4}$	$6.38x10^{-6}$	$2.41x10^{-4}$	$5.88x10^{-3}$
C3	$8.09x10^{-2}$	$1.29x10^{-9}$	$4.92x10^{-4}$	$9.03x10^{-6}$	$4.95x10^{-4}$	$1.21x10^{-2}$
C4	$1.96x10^{-2}$	$4.12x10^{-10}$	$9.79x10^{-5}$	$1.92x10^{-6}$	$1.05x10^{-4}$	$2.55x10^{-3}$

Table 24. *Results on GWP indicators (EF 3.1) for the Zurn Hydro-X Flush Valves (ZER6000AV-HYD and ZER6003AV-HYD).*

Module	GWP_{total}	GWP_{fossil}	$GWP_{biogenic}$	GWP_{luluc}
	kg CO_2 eq	kg CO_2 eq	kg CO_2 eq	kg CO_2 eq
A1	20.9	20.8	0.107	$3.74x10^{-2}$
A2	0.286	0.286	$1.14x10^{-5}$	$1.44x10^{-4}$
A3	1.45	1.65	-0.199	$3.02x10^{-3}$
A1-A3 Total:	**22.7**	**22.7**	**$-9.23x10^{-2}$**	**$4.06x10^{-2}$**
A4	1.05	1.05	$1.01x10^{-4}$	$5.18x10^{-4}$
A5	0.00	0.00	0.00	0.00
B1	0.00	0.00	0.00	0.00
B2	3.08	2.66	-4.86	5.28
B3	1.60	1.58	$1.67x10^{-2}$	$2.85x10^{-3}$
B4	155	156	-0.598	0.269
B5	0.00	0.00	0.00	0.00
B6	0.00	0.00	0.00	0.00
B7	See Table 29			
C1	0.00	0.00	0.00	0.00
C2	$6.21x10^{-2}$	$6.21x10^{-2}$	$2.04x10^{-5}$	$2.82x10^{-5}$
C3	$8.22x10^{-2}$	$8.18x10^{-2}$	$1.33x10^{-4}$	$2.26x10^{-4}$
C4	$1.99x10^{-2}$	$1.99x10^{-2}$	$2.74x10^{-5}$	$5.13x10^{-5}$

Table 25. *Results on carbon emissions and removals for the Zurn Hydro-X Flush Valves (ZER6000AV-HYD and ZER6003AV-HYD).*

Module	BCRP	BCEP	BCRK	BCEK	CCE	CCR	CBCEW	CWNR
	kg CO_2 eq	kg CO_2 eq	kg CO_2 eq	kg CO_2 eq	kg CO_2 eq	kg CO_2 eq	kg CO_2 eq	kg CO_2 eq
A1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
A2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
A3	0.00	0.00	-0.60	0.00	0.00	0.00	0.00	0.00
A1-A3 Total:	**0.00**	**0.00**	**-0.60**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
A4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
A5	0.00	0.00	0.00	0.60	0.00	0.00	0.00	0.00
B1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
B2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
B3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
B4	0.00	0.00	-3.91	3.91	0.00	0.00	0.00	0.00
B5	0.00	0.00	0.00	0.60	0.00	0.00	0.00	0.00
B6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
B7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C3	0.00	0.00	0.00	0.60	0.00	0.00	0.00	0.00
C4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table 26. *Additional Resource indicators for the Zurn Hydro-X Flush Valves.*

Module	RPR_E	RPR_M	RPR_{total}	$NRPR_E$	$NRPR_M$	$NRPR_{total}$	SM	RSF	NRSF	RE	FW
	MJ	MJ	MJ	MJ	MJ	MJ	kg	MJ	MJ	MJ	m^3
A1	38.0	0.00	38.0	264	13.3	278	1.10	0.00	0.00	0.00	0.264
A2	$3.82x10^{-2}$	0.00	$3.82x10^{-2}$	3.67	0.00	3.67	0.00	0.00	0.00	0.00	$3.76x10^{-4}$
A3	0.290	0.00	0.290	6.82	$2.44x10^{-2}$	6.85	0.00	0.00	0.00	0.00	$3.30x10^{-3}$
A1-A3 Total:	**38.3**	**0.00**	**38.3**	**275**	**13.3**	**288**	**1.10**	**0.00**	**0.00**	**0.00**	**0.267**
A4	0.152	0.00	0.152	13.6	0.00	13.6	0.00	0.00	0.00	0.00	$1.51x10^{-3}$
A5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
B1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
B2	162	0.00	162	32.3	0.00	32.3	0.00	0.00	0.00	0.00	0.313
B3	3.24	0.00	3.24	21.9	0.00	21.9	0.00	0.00	0.00	0.00	$2.50x10^{-2}$
B4	250	0.00	250	1,890	86.4	1,980	7.18	0.00	0.00	0.00	1.75
B5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
B6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
B7	See Table 30										
C1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C2	$1.20x10^{-2}$	0.00	$1.20x10^{-2}$	0.859	0.00	0.859	0.00	0.00	0.00	0.00	$1.22x10^{-4}$
C3	$2.20x10^{-2}$	0.00	$2.20x10^{-2}$	1.12	0.00	1.12	0.00	0.00	0.00	0.00	$1.86x10^{-4}$
C4	$4.35x10^{-3}$	0.00	$4.35x10^{-3}$	0.349	0.00	0.349	0.00	0.00	0.00	0.00	$2.02x10^{-4}$

Table 27. *Waste and Output indicators for the Zurn Hydro-X Flush Valves*

Module	HWD	NHWD	HLRW	ILLRW	CRU	MR	MER	EE
	kg	kg	kg	kg	kg	kg	kg	MJ, LHV
A1	$5.60x10^{-3}$	2.38	$1.70x10^{-4}$	$3.45x10^{-4}$	0.00	0.00	0.00	0.00
A2	$2.17x10^{-5}$	$7.56x10^{-2}$	$1.58x10^{-7}$	$3.77x10^{-7}$	0.00	0.00	0.00	0.00
A3	$1.68x10^{-4}$	4.21	$2.46x10^{-6}$	$6.64x10^{-6}$	0.00	0.00	0.00	0.00
A1-A3 Total:	**$5.79x10^{-3}$**	**6.66**	**$1.72x10^{-4}$**	**$3.52x10^{-4}$**	**0.00**	**0.00**	**0.00**	**0.00**
A4	$8.32x10^{-5}$	0.355	$6.30x10^{-7}$	$1.51x10^{-6}$	0.00	0.00	0.00	0.00
A5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
B1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
B2	$3.34x10^{-4}$	0.444	$7.13x10^{-6}$	$1.84x10^{-5}$	0.00	0.00	0.00	0.00
B3	$1.26x10^{-3}$	0.487	$1.93x10^{-5}$	$4.67x10^{-5}$	0.00	0.00	0.00	0.00
B4	$3.34x10^{-2}$	51.1	$1.13x10^{-3}$	$2.30x10^{-3}$	0.00	13.7	0.00	0.00
B5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
B6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
B7	See Table 30							
C1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C2	$5.86x10^{-6}$	$4.02x10^{-2}$	$5.00x10^{-8}$	$1.20x10^{-7}$	0.00	0.00	0.00	0.00
C3	$7.34x10^{-6}$	$5.85x10^{-2}$	$9.21x10^{-8}$	$2.31x10^{-7}$	0.00	2.10	0.00	0.00
C4	$2.30x10^{-6}$	1.10	$1.84x10^{-8}$	$4.48x10^{-8}$	0.00	0.00	0.00	0.00

Zurn Hydro-X Flush Valve Results (B7 – Operational Water Use)

Table 28. *CML-IA and TRACI environmental impact results of operational water use for the Zurn Hydro-X Flush Valves (ZER6000AV-HYD and ZER6003AV-HYD).*

Module B7 (CML)		Toilet Fixtures (Single Flush)			Toilet Fixtures (Dual Flush)		Urinal Fixtures		
		1.11 gpf (4.2 Lpf)	1.28 gpf (4.8 Lpf)	1.6 gpf (6.0 Lpf)	1.1/1.28 gpf (4.2/4.8 Lpf)	1.1/1.6 gpf (4.2/6.0 Lpf)	0.125 gpf (0.473 Lpf)	0.5 gpf (1.89 Lpf)	1 gpf (1.89 Lpf)
GWP	kg CO_2 eq	6,940	8,020	10,000	7,310	7,980	522	2,090	4,180
ODP	kg CFC-11 eq	$4.18x10^{-5}$	$4.83x10^{-5}$	$6.04x10^{-5}$	$4.40x10^{-5}$	$4.81x10^{-5}$	$3.15x10^{-6}$	$1.26x10^{-5}$	$2.52x10^{-5}$
AP	kg SO_2 eq	22.8	26.4	33.0	24.0	26.2	1.72	6.86	13.7
EP	kg PO_4^{3-} eq	222	258	322	235	256	16.8	67.1	134
POCP	kg C_2H_4 eq	1.23	1.43	1.78	1.30	1.42	$9.29x10^{-2}$	0.372	0.743
ADPE	kg Sb eq	$1.32x10^{-2}$	$1.53x10^{-2}$	$1.91x10^{-2}$	$1.40x10^{-2}$	$1.52x10^{-2}$	$9.97x10^{-4}$	$3.99x10^{-3}$	$7.98x10^{-3}$
ADPF	MJ	75,800	87,600	110,000	79,800	87,100	5,700	22,800	45,600
Module B7 (TRACI)		**1.11 gpf (4.2 Lpf)**	**1.28 gpf (4.8 Lpf)**	**1.6 gpf (6.0 Lpf)**	**1.1/1.28 gpf (4.2/4.8 Lpf)**	**1.1/1.6 gpf (4.2/6.0 Lpf)**	**0.125 gpf (0.473 Lpf)**	**0.5 gpf (1.89 Lpf)**	**1 gpf (1.89 Lpf)**
GWP	kg CO_2 eq	6,870	7,940	9,920	7,240	7,900	517	2,070	4,140
ODP	kg CFC-11 eq	5.01x10-5	5.80x10-5	7.25x10-5	5.28x10-5	5.77x10-5	3.78x10-6	1.51x10-5	3.02x10-5
AP	kg SO_2 eq	23.8	27.5	34.4	25.1	27.4	1.79	7.17	14.3
EP: Freshwater	kg P eq	26.9	31.2	39.0	28.4	31.0	2.03	8.13	16.3
EP: Marine	kg N eq	72.1	83.8	105	76.3	83.3	5.46	21.8	43.6
SFP	kg O_3 eq	309	357	446	326	355	23.3	93.0	186

Table 29. Results on GWP indicators (EF 3.1) of operational water use for the Zurn Hydro-X Flush Valves (ZER6000AV-HYD and ZER6003AV-HYD).

Module B7 (EF 3.1)		Toilet Fixtures (Single Flush)			Toilet Fixtures (Dual Flush)		Urinal Fixtures		
		1.11 gpf (4.2 Lpf)	1.28 gpf (4.8 Lpf)	1.6 gpf (6.0 Lpf)	1.1/1.28 gpf (4.2/4.8 Lpf)	1.1/1.6 gpf (4.2/6.0 Lpf)	0.125 gpf (0.473 Lpf)	0.5 gpf (1.89 Lpf)	1 gpf (1.89 Lpf)
GWP_{total}	kg CO_2 eq	8,050	9,280	11,600	8,460	9,230	604	2,420	4,830
GWP_{fossil}	kg CO_2 eq	6,750	7,780	9,730	7,090	7,740	507	2,030	4,050
$GWP_{biogenic}$	kg CO_2 eq	1,290	1,490	1,860	1,360	1,480	96.9	387	775
GWP_{luluc}	kg CO_2 eq	5.70	6.57	8.22	5.99	6.54	0.428	1.71	3.42

Table 30. *Additional Resource use and Waste indicators for the Zurn Hydro-X Flush Valves (ZER6000AV-HYD and ZER6003AV-HYD.*

Module B7 (Resource Use Indicators)		Toilet Fixtures (Single Flush)			Toilet Fixtures (Dual Flush)		Urinal Fixtures		
		1.11 gpf (4.2 Lpf)	1.28 gpf (4.8 Lpf)	1.6 gpf (6.0 Lpf)	1.1/1.28 gpf (4.2/4.8 Lpf)	1.1/1.6 gpf (4.2/6.0 Lpf)	0.125 gpf (0.473 Lpf)	0.5 gpf (1.89 Lpf)	1 gpf (1.89 Lpf)
RPR_E	MJ, LHV	9,960	11,500	14,400	10,500	11,400	748	2,990	5,980
RPR_M	MJ, LHV	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
RPR_{total}	MJ, LHV	9,960	11,500	14,400	10,500	11,400	748	2,990	5,980
$NRPR_E$	MJ, LHV	97,400	112,000	140,000	102,000	112,000	7,320	29,300	58,500
$NRPR_M$	MJ, LHV	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
$NRPR_{total}$	MJ, LHV	97,400	112,000	140,000	102,000	112,000	7,320	29,300	58,500
SM	Kg	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
RSF	MJ, LHV	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NRSF	MJ, LHV	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
RE	MJ, LHV	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FW	m^3	47.8	54.5	69.1	50.1	54.7	3.19	14.8	28.5
Module B7 (Waste and Output)		**1.11 gpf (4.2 Lpf)**	**1.28 gpf (4.8 Lpf)**	**1.6 gpf (6.0 Lpf)**	**1.1/1.28 gpf (4.2/4.8 Lpf)**	**1.1/1.6 gpf (4.2/6.0 Lpf)**	**0.125 gpf (0.473 Lpf)**	**0.5 gpf (1.89 Lpf)**	**1 gpf (1.89 Lpf)**
HWD	kg	0.488	0.564	0.705	0.514	0.561	$3.67x10^{-2}$	0.147	0.294
NHWD	kg	1,680	1,950	2,440	1,780	1,940	127	509	1,020
HLRW/	kg	$7.26x10^{-2}$	$8.37x10^{-2}$	0.105	$7.63x10^{-2}$	$8.33x10^{-2}$	$5.45x10^{-3}$	$2.18x10^{-2}$	$4.36x10^{-2}$
ILLRW	kg	0.246	0.284	0.355	0.259	0.282	$1.85x10^{-2}$	$7.39x10^{-2}$	0.148
CRU	kg	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MR	kg	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MER	kg	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
EE	MJ, LHV	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

6. LCA: INTERPRETATION

The interpretation phase conforms to ISO 14044. The interpretation included the use of evaluation and sensitivity checks to steer the iterative process during the assessment, and a final evaluation including completeness, sensitivity, and consistency checks, at the end of the study.

The contributions to total impact indicator results are dominated by the operational water use module (B7) and secondly by the use phase replacement module (B4). When examining the results without the use phase and replacement impacts, the results are dominated by the raw material module (A1) with the manufacturing module (A3), product transportation module (A4), and product repair (B3) also showing significant impacts. Figures 2 shows the contribution analysis of the CML-IA and TRACI 2.2 impact indicator results for the Zurn Hydro-X flush valves without the use phase (B7) and replacement (B4) modules.

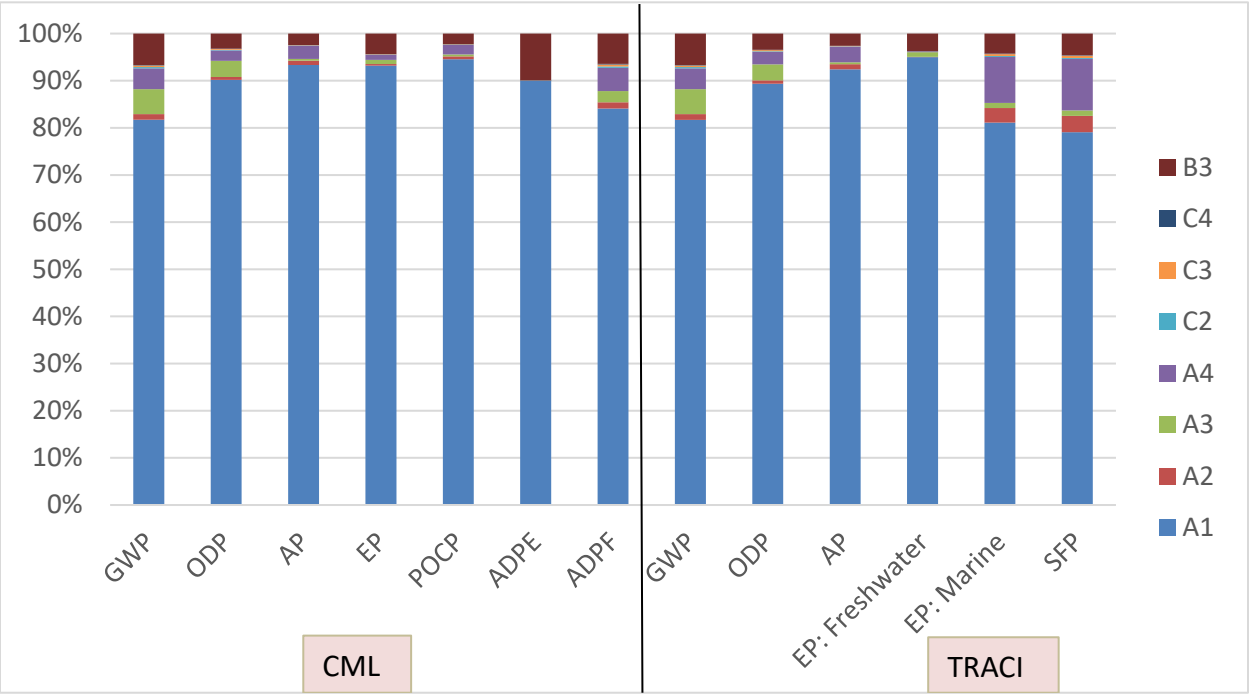

Figure 2. *Contribution analysis for the Zurn Hydro-X Flush Valves (excluding use phase).*

7. ADDITIONAL ENVIRONMENTAL INFORMATION

No environmental or health impacts are expected due to extraordinary effects including fire and/or water damage and product destruction

For more information on Zurn Elkay's sustainability programs, including products and operations, please visit Zurn Elkay Sustainability. zurnelkay.com/sustainability

8. REFERENCES

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