Declaration Owner
Zurn
511 W Freshwater Way
Milwaukee, WI 53204
United States
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Product
Zurn Vitreous China Urinal

Functional Unit
One commercial urinal in an average commercial environment, with a Reference Service Life of 30 years in a building with an Estimated Service Life of 75 years

EPD Number and Period of Validity
SCS-EPD-10170
EPD Valid May 29, 2024 through May 28, 2029

Product Category Rule
ISO 21930: 2017. Core rules for environmental product declarations of construction products and services

Program Operator
SCS Global Services
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Declaration Validity Period:	EPD Valid May 29, 2024 through May 28, 2029
Program Operator:	SCS Global Services
Declaration URL Link:	https://www.scsglobalservices.com/certified-green-products-guide
LCA Practitioner:	Lila Taheraly, Cicy Geng
LCA Software and LCI database:	OpenLCA 2.0.4 software and the Ecoinvent v3.9.1 database
Product's Intended Application:	For use with plumbing systems to deliver and drain water.
Product RSL:	30 Years (ESL 75 Years)
Markets of Applicability:	North America
EPD Type:	Product-Specific
EPD Scope:	Cradle-to-Grave
LCIA Method and Version:	CML-IA and TRACI 2.1
Independent critical review of the LCA and data, according to ISO 14044 and ISO 14071	☐ internal ☒external
LCA Reviewer:	Lindita Bushi, Ph.D., Athena Sustainable Materials Institute
Product Category Rule:	ISO 21930:2017 Sustainability in buildings and civil engineering works – Core rules for environmental product declarations of construction products and services SM Part B: Commercial urinals | Part B #23-004: 2024. SM Part A: LCA calculation rules and report requirements, version 2023.
PCR Review conducted by:	ISO Technical Committee
Independent verification of the declaration and data, according to ISO 14025, ISO 21930 and the PCR	☐ internal ☒external
EPD Verifier:	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.

1. ABOUT Zurn

Zurn Elkay Water Solutions supplies the industry's widest range of clean water solutions for drinking water, hygiene, and sustainable water management. Headquartered in Milwaukee, Wisconsin, Zurn Elkay Water Solutions works with customers around the globe to deliver products and systems that enhance and ensure water quality, safety, hygiene, flow control, and conservation.

2. PRODUCT

2.1 Product Description

Zurn manufactures a full line of vitreous China urinals which adapt to multiple flow rates and have a standard footprint for new construction and retrofit applications. These fixtures belong to the CSI MasterFormat® # 22 42 13.16, and are designed to pair with their flush valves for consistent and reliable performance. Zurn offers a waterless urinal model and models as low as 0.125 gallons per flush (gpf), which is well below the WaterSense maximum flow rate of 0.5 gpf when paired with the proper flush valve.

Product Features:

- Maximum flow rate: 18 gpm
- Maximum static pressure: 80 psi
- Minimum flowing pressure: 25 psi
- Dimensions can vary within the tolerances established in the governing ASME A112.19/CSA B45.1 Standard
- IAPMO certified listed by EPA
- Meets ADA guidelines and ANSI A117.1 requirements
- White vitreous china
- Washdown design
- Designed to maximize and complement Zurn flushometers
- Universal high efficiency works with 0.125 to 0.5 gpf/0.5 to 1.9 Lpf
- Thorough washdown flushing action
- Vandal resistant stainless steel strainer included

2.2 Product Average

An average of the product line chosen as the representative product for this study. Results for each product model within the product line are grouped together by mass and presented in the Appendix.

Table 1. *Zurn Vitreous China Urinals represented in this EPD.*

Model	Mass (kg)
Omni-Flo	24.08
Retrofit Pint	28.11
Nano Pint	10.29
Retrofit 0.125 gpf	17.6
Siphon Jet	18.57
Waterless	29.07
Average:	**21.3**

2.3 Flow Diagram

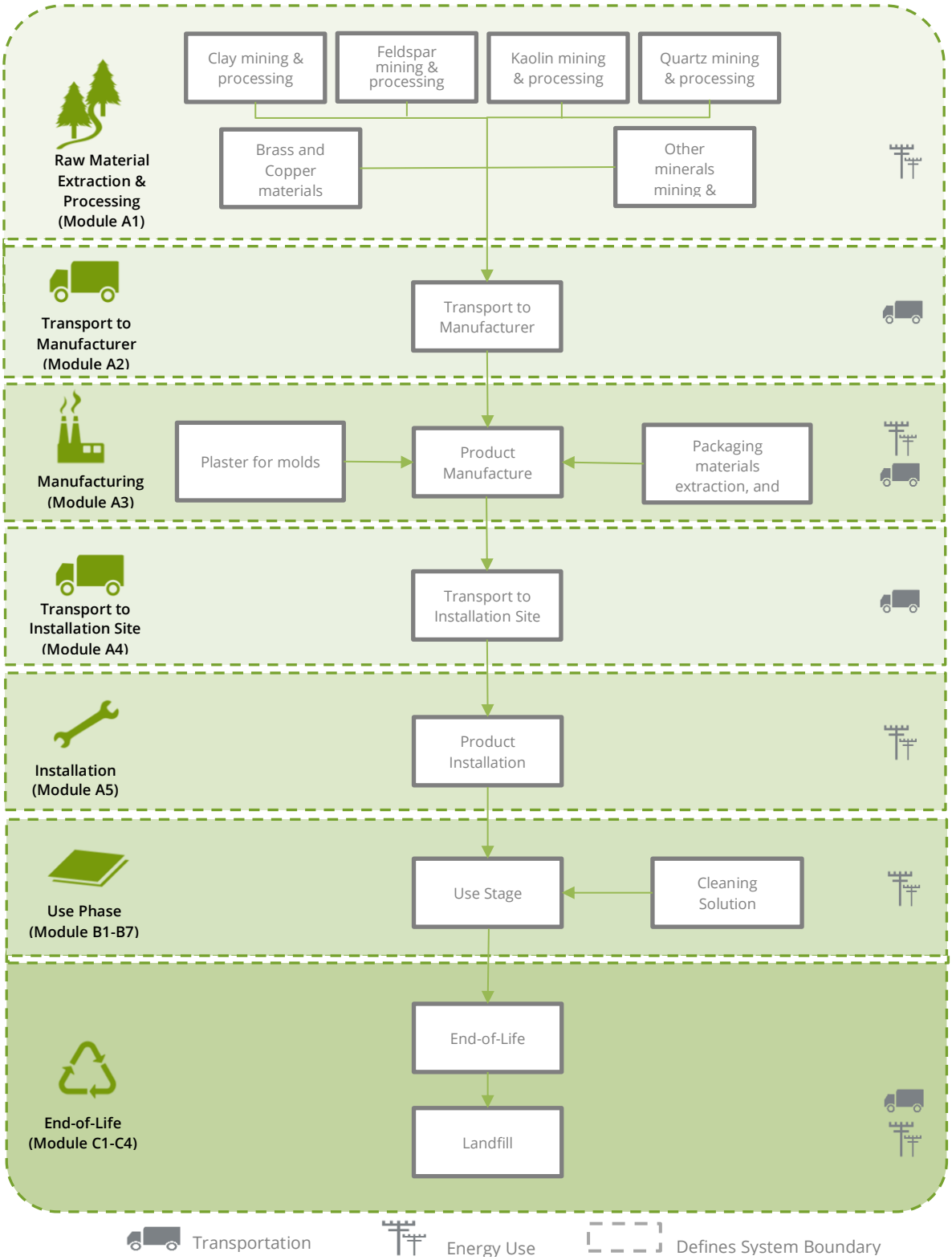

Figure 1. *Flow diagram for the Zurn vitreous china urinals.*

2.4 Application

Zurn vitreous china urinals are designed for use with plumbing systems to deliver and drain water. The vitreous china urinals are installed in commercial, industrial, and institutional markets worldwide.

2.5 Declaration of Methodological Framework

This EPD is based on an LCA following the attributional approach. 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.

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.

According to the PCR, 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 Technical Requirements

Table 2. *An average Zurn Vitreous China Urinal Technical Requirements.*

Property	Unit	Value
Width	mm	362
Length	mm	428
Height	mm	623
Minimum flow rate	GPM	2.25
Maximum static pressure	PSI	80
Minimum flowing pressure	PSI	25

2.7 Market Placement/Application Rules

The products declared in this document comply with the following codes or regulations:

- IAPMO certified to meet or exceed the ASME A112.19.2 standards – Ceramic Plumbing Fixtures
- ANSI A117.1 – Accessible and Usable Buildings and Facilities

2.8 Properties of Declared Product as Delivered

Zurn vitreous china urinals are delivered by truck to the installation site. The total nominal weight of product with packaging delivered is 23.5 kg (24.6kg with packaging and hardware). The nominal dimensions of the representative product are: **Height** 14.25" (362 mm), **Width** 16.85" (428 mm), **Length** 24.52" (623 mm).

2.9 Material Composition

The main product materials for the average product are presented in Table 3. Product materials were reviewed for the presence of any toxic or hazardous chemicals. Based on a review of the product components provided by the manufacturer, no regulated chemicals were identified in the product or product components.

Table 3. *Zurn Vitreous china Urinal Material Components.*

Product	Urinal	
Fixture Materials	**Mass (kg)**	**% Mass**
Feldspar	4.48	24%
Kaolin	4.29	21%
Quartz	4.48	21%
Clay	5.04	20%
Calcite	1.12	5%
Wollastonite	0.75	5%
Zirconium silicate	1.12	4%
Total:	**21.3**	**100%**
Hardware	**Mass (kg)**	**% Mass**
57% post-recycled copper	0.079	7%
100% virgin copper	0.248	22%
57% post recycled stainless steel	0.007	1%
58% post recycled stainless steel	0.713	63%
61% post recycled stainless steel	0.030	3%
100% virgin stainless steel	0.020	2%
rubber	0.043	4%
Total:	**1.14**	**100%**
Packaging	**Mass (kg)**	**% Mass**
Cardboard	2.14	100%
Total:	**2.14**	**100%**

*May not sum due to rounding

2.10 Manufacturing

The Zurn vitreous china urinals are manufactured in Tangshan City, China at the Tangshan Monopy Ceramic facility. Raw materials, including feldspar, kaolin, clay, quartz, and other minerals are mixed with water and ground thoroughly. The blend is cast in plaster molds and then dried before a glazing process. After glazing, the fixture is sent for drying and firing. The final products are then inspected, sorted, and packaged for distribution. The manufacturer provided primary data for twelve months of data including production, resource use and electricity consumption, and waste generation at the facility.

2.11 Transportation

Transportation distance and mode from the manufacturing facility to the Zurn distribution center in Simpsonville, SC was provided by the manufacturer. Transportation from the Simpsonville distribution center to sales and installation locations followed SM Part B PCR, assuming 800 km transport distance by truck. Modeling parameters for product distribution, by transport mode and distance, are summarized in Section 4.1.

2.12 Installation

Installation of the product is included in the life cycle of the vitreous china urinal products . The installation of the urinals is completed using manual labor and does not require additional ancillary materials. Waste is generated from the disposal of the packaging material.

2.13 Packaging

Table 4. *Zurn Vitreous China Urinal Packaging Components.*

Material	Mass (kg)	Percentage of Total Mass
Cardboard	2.14	100%
Total	**2.14**	**100%**

2.14 Use Conditions

It is important to note that water use impacts are assigned to the device that controls water flow to avoid double counting (e.g., flushometer), which is outside the scope of the Environmental Product Declaration. Modules B3 (Repair), B5 (Refurbishment), B6 (Operational Energy Use) and B7 (Operational Water Use) are also assumed to have no impacts as the there are no resource use or waste outputs required in these modules.

Module B2 includes the impacts of maintenance. Beside the typical commercial cleaning for plumbing fixtures, no specific maintenance is required for Zurn's urinals. Typical maintenance for urinal fixture and flushing mechanism includes daily cleaning with 50 mL (1.69 fl oz) of a 1% sodium lauryl sulfate solution for 260 days per year. The assumption is aligned with the Part B PCR. Relevant information for the maintenance (Module B2) over the RSL can be found in Section 4.3.

2.15 Product Reference Service Life and Building Estimated Service Life

A Reference Service Life for urinals of 30 years is used. The Part B PCR establishes an Estimated Service Life of the building to be 75 years, for use in the use phase modelling to fulfill the required performance and functionality over the construction works. The replacement summary for the vitreous china urinals is listed in Section 4.3.

2.16 Re-Use Phase

Re-use at end-of-life via collection and processing of vitreous china urinals is possible but not widely available. It is assumed that no materials are recovered and processed for these purposes.

2.17 Disposal

It is assumed that vitreous china urinals at end-of-life are disposed of in a landfill. Transportation of vitreous china urinals assumes a 100-kilometer distance to disposal via diesel-powered truck.

3. LCA Calculation Rules

3.1 Functional Unit

The functional unit used in the study is one (1) commercial urinal in an average commercial environment with a reference service life (RSL) of 30 years in a building with an estimated service life (ESL) of 75-years.

Table 5. *Zurn Vitreous China Urinal Functional Unit Properties.*

Property	Unit	Value
Functional Unit	One (1) commercial urinal	
RSL	Years	30
ESL	Years	75
Average Mass	kg	21.3
Conversion factor to 1 kg	kg	0.047
Flush rate	m^3/sec	N/A
Flow rate	m^3/sec	N/A

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 6. *Zurn Vitreous china Urinal 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 Product Specific Calculations for Use Phase (Modules B1-B7)

Zurn vitreous china urinals are assumed to require daily cleaning with 50 mL (1.69 fl oz) of a 1% sodium lauryl sulfate solution for 260 days per year.

3.4 Estimates and Assumptions

- Specific data were not available on quartz in the product recipe. A secondary dataset for silica sand was used from the Ecoinvent database.
- Specific data were not available on calcite and wollastonite in the product recipe. Secondary dataset for calcium carbonate and was used from the Ecoinvent database for both of these components.
- Based on information provided by the manufacturer, internal recycling was reflected in the facility waste output. The ceramics inputs were assumed to include 4% of the materials from internal recycling, with the remaining 96% from virgin sources.
- The portion corresponding to internal recycling was not modeled as facility waste, whereas the remainder was disposed in landfill.
- Transport of the manufacturing waste was assumed to be 100 km.
- Product transport from the Zurn distribution center in Simpsonville, SC to points of purchase in the United States was assumed to be 800 km by truck, consistent with the Part B PCR.
- Installation of the products was assumed to be manual, requiring no additional materials or energy use.
- Transport of the packaging waste at installation was assumed to be 32 km (20 mi), consistent with the Part A and Part B PCR and EPA WARM Model.
- Transport of the product at end-of-life to waste processing and disposal was assumed to be 100 km by truck.
- The Reference Service Life (RSL) of the products was modeled as 30 years.
- The Estimated Service Life (ESL) of the building construction works was assumed to be 75 years.
- The maintenance of the products was assumed to include daily cleaning with a cleaning solution of 50 ml of 1% sodium lauryl sulfate solution for vitreous china urinals, performed 260 days per year.
- The products were assumed to require no replacement during the prescribed RSL, but requires replacement over the 75-year ESL (1.5 times).
- The use phase modules B1 (use), B3 (Repair), B5 (Refurbishment), B6 (Operational Energy Use) and B7 (Operational Water Use) were assumed to have no impacts, as there was no resource or energy use associated with these modules.
- The use phase modules B2 (Maintenance) and B4 (Replacement) were modeled for the building construction works ESL of 75 years.

- For the product end-of-life, disposal of product was assumed to 100% disposal in landfill.
- All transport included an empty return trip, which was built into the Ecoinvent dataset.

3.5 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.

3.6 Data Sources

Primary data were provided by Zurn for the manufacturing process in Tangshan City, China . The principal source of secondary LCI data is the Ecoinvent 3.9.1 database.

Table 7. *LCI datasets and associated databases used to model the Zurn vitreous china urinal products.*

Component	Dataset	Geographic Coverage	Data Source	Publication Date
Product				
Kaolin	market for kaolin | kaolin | Cutoff, U - GLO	Global	Ecoinvent 3.9.1	2022
Clay	market for clay | clay | Cutoff, U - RoW	RoW	Ecoinvent 3.9.1	2022
Feldspar	market for feldspar | feldspar | Cutoff, U - GLO	Global	Ecoinvent 3.9.1	2022
Quartz	market for silica sand | silica sand | Cutoff, U - GLO	Global	Ecoinvent 3.9.1	2022
Calcite	market for calcium carbonate, precipitated | calcium carbonate, precipitated | Cutoff, U - RoW	RoW	Ecoinvent 3.9.1	2022
Zirconium silicate	market for zircon | zircon | Cutoff, U - GLO	Global	Ecoinvent 3.9.1	2022
Wollastonite	market for calcium carbonate, precipitated | calcium carbonate, precipitated | Cutoff, U - RoW	RoW	Ecoinvent 3.9.1	2022
Copper	bronze scrap, post-consumer, Recycled Content cut-off | bronze scrap, post-consumer | Cutoff, U - GLO	Global	Ecoinvent 3.9.1	2022
	bronze production | bronze | Cutoff, U - RoW	RoW	Ecoinvent 3.9.1	2022
	market for metal working, average for copper product manufacturing | metal working, average for copper product manufacturing | Cutoff, U - RoW	RoW	Ecoinvent 3.9.1	2022
Stainless Steel	steel production, chromium steel 18/8, hot rolled | steel, chromium steel 18/8, hot rolled | Cutoff, U - RoW	RoW	Ecoinvent 3.9.1	2022
	steel production, converter, low-alloyed | steel, low-alloyed | Cutoff, U - RoW	RoW	Ecoinvent 3.9.1	2022
	market for metal working, average for metal product manufacturing | metal working, average for metal product manufacturing | Cutoff, U - GLO	Global	Ecoinvent 3.9.1	2022
Rubber	market for synthetic rubber | synthetic rubber | Cutoff, U - GLO	Global	Ecoinvent 3.9.1	2022
Packaging				
Corrugated	market for corrugated board box | corrugated board box | Cutoff, U - RoW	RoW	Ecoinvent 3.9.1	2022
Transport				
Truck	market for transport, freight, lorry 16-32 metric ton, EURO4 | transport, freight, lorry 16-32 metric ton, EURO4 | Cutoff, U - RoW	RoW	Ecoinvent 3.9.1	2022
Ship	market for transport, freight, sea, container ship | transport, freight, sea, container ship | Cutoff, U - GLO	Global	Ecoinvent 3.9.1	2022
Manufacturing				
Plaster	market for base plaster | base plaster | Cutoff, U - GLO	Global	Ecoinvent 3.9.1	2022
Electricity	market for electricity, medium voltage | electricity, medium voltage | Cutoff, U - CN-NCGC	China NCGC	Ecoinvent 3.9.1	2022
Natural Gas	market for heat, district or industrial, natural gas | heat, district or industrial, natural gas | Cutoff, U - RoW	RoW	Ecoinvent 3.9.1	2022
Water	market for tap water | tap water | Cutoff, U - RoW	RoW	Ecoinvent 3.9.1	2022
Waste	market for inert waste | inert waste | Cutoff, U - RoW	RoW	Ecoinvent 3.9.1	2022
Use				
Fatty alcohol sulfate	market for fatty alcohol sulfate | fatty alcohol sulfate | Cutoff, U – GLO	Global	Ecoinvent 3.9.1	2022
water	market for tap water | tap water | Cutoff, U - RoW	RoW	Ecoinvent 3.9.1	2022
Waste				
Landfill	treatment of inert waste, inert material landfill | inert waste, for final disposal | Cutoff, U – RoW	RoW	Ecoinvent 3.9.1	2022

3.7 Data Quality

Table 8. *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 Tangshan Monopy Ceramic facility in Tangshan City, China on annual production for 2022. 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 State Grid Corporation in China represented in this study. Surrogate data used in the assessment are representative of global or Rest of the world 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 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 v3.9.1 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 represents a 12-month average and is 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 v3.9.1 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.

3.8 Period under review

The period of review is based on a 12-month period from January 2022 through December 2022.

3.9 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.

3.10 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.

4. LCA: TECHNICAL INFORMATION AND SCENARIOS

4.1 Transport to the Building Site (A4)

Table 9. *Distribution transportation summary for Zurn plumbing fixture products.*

Name	Unit	Value
Fuel type	-	Diesel
Liters of fuel	l/100 km	25.5
Vehicle Type	-	Freight Truck
Transport Distance	km	1,270
Capacity utilization	%	37
Vehicle Type	-	Ocean Freight
Transport Distance	km	19,975
Capacity utilization	%	70
Gross mass of products transported including packaging	kg	24.6

4.2 Installation into the Building (A5)

Table 10. *Zurn vitreous china urinal installation summary.*

Name	Unit	Value
Ancillary materials	kg	0
Net freshwater consumption specified by water source and fate	m^3	0
Other resources	kg	0
Electricity consumption	kwh	0
Other energy carriers	MJ	0
Product loss per functional unit	kg	0
Waste materials at the construction site before waste processing, generated by product installation	kg	0
Output materials resulting from on-site waste processing	kg	0
Mass of packaging waste specified by type	kg	2.14
Recycle	Kg	1.46
Landfill	kg	0.548
Incineration	kg	0.133
Biogenic carbon contained in packaging	kg CO_2	3.15
Direct emissions to ambient air, soil, and water	kg	0

4.3 Use

Maintenance (B2)

Table 11. *Zurn vitreous china urinal maintenance summary.*

Maintenance	Unit	Value
Description of process	-	50 ml of 1% sodium lauryl sulfate solution, 260 days/year
Maintenance cycle	Cycles/RSL	7,800
Maintenance cycle	Cycles/ESL	19,500
Net freshwater consumption		
City water disposed to sewer	m^3/RSL	0.390
Ancillary materials		
Sodium lauryl sulfate	kg/RSL	3.90
Other resources	kg	0
Electricity consumption	kWh	0
Other energy carriers	kWh	0
Power output of equipment	kW	0
Material loss	kg	0
Direct emissions to ambient air, soil, and water	kg	0
Further assumptions for scenario development	-	-

Repair (B3)

No repair is required with the use of the product over the reference service lifetime.

Replacement (B4)

Table 12. *Zurn Vitreous China Urinal Replacement Summary.*

Replacement	Unit	Value
Replacement cycle (RSL)	years	30
Replacement cycle (ESL/RSL)-1	-	1.5
Electricity consumption	kWh	0
Net freshwater consumption	m^3	0
Ancillary materials	kg	0
Replacement of worn parts	kg	0
Direct emissions to ambient air, soil, and water	kg	0
Further assumptions for scenario development	-	-

Refurbishment (B5)

No refurbishment is required with the use of the product over the reference service lifetime.

Operational Energy and Water Use (B6 – B7)

There is no operational energy or water use associated with the use of the product over the reference service lifetime.

4.4 End-of-Life

Table 13. *Zurn Vitreous china Urinal End-of-Life Summary.*

End-of-life		Unit	Value
Assumptions for scenario development			Manual deconstruction, followed by 100 km truck transport to final disposal in landfill
Collection process	Collected separately	kg	0
	Collected with mixed construction waste	kg	22.4
Recovery	Reuse	kg	0
	Recycling	kg	0
	Energy recovery	kg	0
	Landfill	kg	22.4

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. The following environmental impact category indicators are reported using characterization factors using the CML-IA impact assessment method and the TRACI 2.1 impact assessment method.

Table 14. *Mandatory Environmental Impact Assessment Categories.*

CML-IA Impact Category	Unit	TRACI 2.1 Impact Category	Unit
GWP: Global Warming Potential	kg CO_2 eq.	**GWP:** Global Warming Potential	kg CO_2 eq.
ODP: Depletion potential of the stratospheric ozone layer	kg CFC 11 eq.	**ODP:** Depletion potential of the stratospheric ozone layer	kg CFC 11 eq.
AP: Acidification Potential of soil and water	kg SO_2 eq.	**AP:** Acidification Potential of soil and water	kg SO_2 eq.
EP: Eutrophication Potential	kg PO_4^{3-} eq.	**EP:** Eutrophication Potential	kg N eq.
POCP: Photochemical Oxidant Creation Potential	kg C_2H_4 eq.	**SFP:** Smog Formation Potential	kg O_3 eq.
ADPE: Abiotic Depletion Potential, elements	kg Sb eq	**FFD:** Fossil Fuel Depletion	MJ Surplus
ADPF: Abiotic Depletion Potential, fossil fuels	MJ		

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 15. *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
$NRPR_E$: 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 and therefore the sum of the total values may not exactly equal 100%. Modules with zero (0) impacts: B1, B3, B5, B6, B7, C1, and C3 are omitted from the results tables to conserve space.

Table 16. *Environmental Impact Results for Zurn vitreous china average urinal product.*

CML-IA Impact Method	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	12.1	$1.82x10^{-7}$	0.189	0.0708	0.00799	0.00315	133
A2	1.05	$1.39x10^{-8}$	0.00481	$9.80x10^{-4}$	$2.00x10^{-4}$	$3.24x10^{-6}$	14.6
A3	19.0	$1.74x10^{-7}$	0.0616	0.0184	0.00313	$2.01x10^{-5}$	205
A1-A3	**32.2**	**$3.70x10^{-7}$**	**0.256**	**0.0902**	**0.0113**	**0.00317**	**353**
A4	10.9	$1.40x10^{-7}$	0.138	0.0182	0.00415	$2.40x10^{-5}$	143.8
A5	0.426	$5.00x10^{-10}$	$1.40x10^{-4}$	0.00145	$7.68x10^{-5}$	$8.62x10^{-8}$	0.400
B2	27.7	$1.53x10^{-6}$	0.160	0.103	0.0107	$2.40x10^{-4}$	390
B4	66.0	$7.76x10^{-7}$	0.593	0.165	0.0235	0.00480	759
C2	0.425	$5.63x10^{-9}$	0.00138	$3.50x10^{-4}$	$6.69x10^{-5}$	$1.37x10^{-6}$	5.97
C4	0.135	$3.19x10^{-9}$	$7.50x10^{-4}$	$1.70x10^{-4}$	$4.19x10^{-5}$	$1.89x10^{-7}$	3.36

TRACI Impact Method	GWP	ODP	AP	EP	SFP	FFD
	kg CO_2 eq	kg CFC-11 eq	kg SO_2 eq	kg N eq	kg O_3 eq	MJ Surplus
A1	12.0	$2.35x10^{-7}$	0.175	0.153	1.20	12.1
A2	1.04	$1.83x10^{-8}$	0.00551	0.00100	0.126	2.08
A3	18.7	$3.23x10^{-7}$	0.0685	0.0313	1.07	19.4
A1-A3	**31.8**	**$5.77x10^{-7}$**	**0.249**	**0.186**	**2.40**	**33.5**
A4	10.8	$1.85x10^{-7}$	0.149	0.0117	2.94	20.8
A5	0.360	$6.31x10^{-10}$	$1.80x10^{-4}$	0.00380	0.00383	0.0531
B2	27.6	$1.60x10^{-6}$	0.163	0.220	1.57	49.5
B4	65.2	$1.16x10^{-6}$	0.601	0.303	8.11	83.6
C2	0.422	$7.43x10^{-9}$	0.00166	$4.00x10^{-4}$	0.0423	0.848
C4	0.133	$4.24x10^{-9}$	$9.10x10^{-4}$	$1.60x10^{-4}$	0.0243	0.493

Table 17. *Additional Resource Use and Waste indicators for the Zurn average urinal products. Results reported in MJ are calculated using lower heating values (LHV).*

N/A = Indicator not applicable

Resource Use	RPR_E	RPR_M	$NRPR_E$	$NRPR_M$	SM	RSF	NRSF	RE	FW
	MJ, LHV	MJ, LHV	MJ, LHV	MJ, LHV	kg	MJ, LHV	MJ, LHV	MJ, LHV	m^3
A1	25.0	0.00	148	0.00	0.488	N/A	N/A	N/A	0.187
A2	0.184	N/A	14.8	N/A	N/A	N/A	N/A	N/A	0.00181
A3	35.0	N/A	210	N/A	0.00	0.00	0.00	0.00	0.0621
A1-A3 Total:	**60.1**	**0.00**	**373**	**0.00**	**0.488**	**0.00**	**0.00**	**0.00**	**0.251**
A4	1.50	N/A	145	N/A	N/A	N/A	N/A	N/A	0.0144
A5	0.0126	0.00	0.415	0.00	0.00	0.00	0.00	0.00	$3.40x10^{-4}$
B2	324	0	421	0	0	0	0	0	0.463
B4	92.6	0	792	0	0.732	0	0	0	0.418
C2	0.0770	N/A	6.05	N/A	N/A	N/A	N/A	N/A	$7.60x10^{-4}$
C4	0.0287	N/A	3.39	N/A	N/A	N/A	N/A	N/A	0.00354

Waste & Output	HWD	NHWD	HLRW/ILLRW	CRU	MR	MER	EE
	kg	kg	kg	kg	kg	kg	MJ, LHV
A1	N/A	N/A	0.00	0.00	N/A	N/A	N/A
A2	N/A	N/A	0.00	0.00	N/A	N/A	N/A
A3	0.00	2.01	0.00	0.00	N/A	0.00	0.00
A1-A3 Total:	**0.00**	**2.01**	**0.00**	**0.00**	**N/A**	**0.00**	**0.00**
A4	N/A	N/A	0.00	0.00	N/A	N/A	N/A
A5	0.00	0.680	0.00	0.00	N/A	1.46	0.00
B2	0	0	0	0	0	0	0
B4	0	37.7	0	0	0	2.19	0
C2	N/A	N/A	0	0	N/A	N/A	N/A
C4	0	22.4	0	0	N/A	N/A	N/A

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.

Results were summarized by life cycle phase for a cradle-to-grave assessment of the Zurn vitreous china urinal products over the specified reference service life and a 75-year building estimated service life. With the exception of the Ozone Depletion indicator, the use phase replacement module (B4) and the use phase maintenance module (B2) both dominate the impact results. The ozone depletion impact results are dominated by the use phase maintenance module alone (B2). Examining results outside of the use phase, the results are dominated by the manufacturing module (A3), product transportation module (A4), and raw material module (A1) impacts.

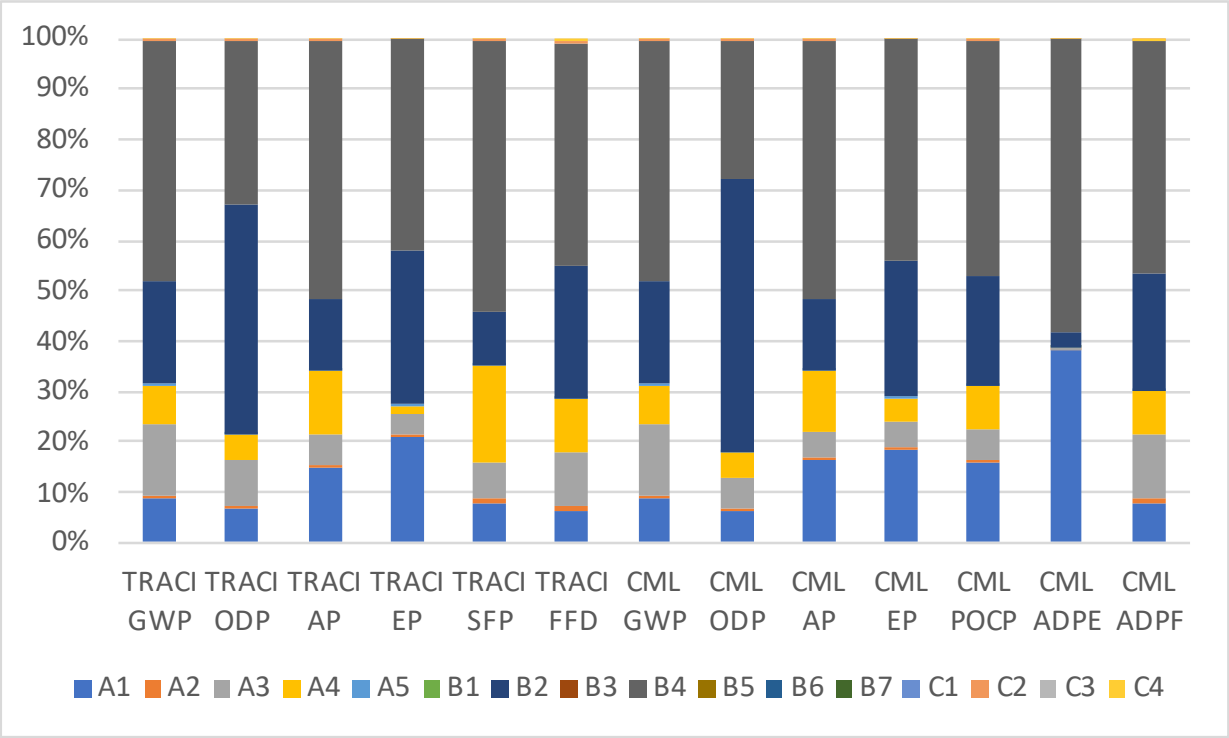

Figure 2. *Contribution analysis for the average Zurn vitreous china urinal products.*

7. ADDITIONAL ENVIRONMENTAL INFORMATION

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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- ISO 14025:2006 Environmental labels and declarations – Type III environmental declarations – Principles and Procedures.
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- Sustainable Minds Transparency Report™ / EPD Framework, Part A: LCA calculation rules and report requirements, version 2023. August 2023.
- "*WARM Model Transportation Research - Draft*." Memorandum from ICF Consulting to United States Environmental Protection Agency. September 7, 2004. http://epa.gov/epawaste/conserve/tools/warm/SWMGHGreport.html#background.
- ACLCA Guidance to Calculating Non-LCIA Inventory Metrics in Accordance with ISO 21930:2017. May 2019.

APPENDIX: INDIVIDUAL MODEL COMPONENTS AND RESULTS

Table 18. *Material component summary for the six ceramic urinals.*

Product	Omni-Flo	Retrofit-Pint	Nano Pint	Retrofit Pint 0.125 gpf	Siphon Jet	Waterless	AVERAGE URINAL
Urinal Materials	**Mass (kg)**						
Feldspar	6.02	7.03	2.57	4.40	4.64	7.27	5.32
Kaolin	4.82	5.62	2.06	3.52	3.71	5.81	4.26
Quartz	5.30	6.18	2.26	3.87	4.09	6.40	4.68
Clay	5.06	5.90	2.16	3.70	3.90	6.10	4.47
Calcite	0.722	0.843	0.309	0.528	0.557	0.872	0.639
Wollastonite	1.20	1.41	0.515	0.880	0.929	1.45	1.06
Zirconium silicate	0.963	1.124	0.412	0.704	0.743	1.16	0.851
Total:	**24.08**	**28.11**	**10.29**	**17.6**	**18.57**	**29.07**	**21.3**
Hardware	**Mass (kg)**						
57% post-recycled copper	0.0950	0.0950	0.0950	0.0950	0.0950	-	0.0950
100% virgin copper	0.248	0.248	0.248	0.248	0.248	0.248	0.248
57% post recycled stainless steel	0.00800	0.00800	0.00800	0.00800	0.00800	-	0.00800
58% post recycled stainless steel	0.937	0.937	0.937	0.937	0.266	0.265	0.713
61% post recycled stainless steel	0.0450	0.0450	0.0450	0.0450	-	-	0.0450
100% virgin stainless steel	0.0200	0.0200	0.0200	0.0200	0.0200	0.0200	0.0200
Rubber	0.0460	0.0460	0.0460	0.0460	0.0460	0.0280	0.0430
Total:	**1.40**	**1.40**	**1.40**	**1.40**	**0.683**	**0.561**	**1.14**
Packaging	**Mass (kg)**						
Cardboard	3.06	2.72	1.29	1.20	1.55	3.01	2.14
Total:	**3.06**	**2.72**	**1.29**	**1.20**	**1.55**	**3.01**	**2.14**

Modules B1, B3, B5, B6, B7, C1, and C3 all have zero impacts and are omitted from the tables below in order to conserve space.

Table 19. *Urinal Plumbing Fixture Model: Omni-Flo (mass = 24.08 kg).*

Module		A1	A2	A3	Total A1-A3	A4	A5	B2	B4	C2	C4
CML-IA Environmental Impact Results											
GWP	kg CO_2 eq	14.5	1.21	22.0	**37.6**	12.6	0.610	27.7	77.3	0.484	0.154
ODP	kg CFC-11 eq	$2.15x10^{-7}$	$1.60x10^{-8}$	$2.19x10^{-7}$	**$4.50x10^{-7}$**	$1.63x10^{-7}$	$7.16x10^{-10}$	$1.53x10^{-6}$	$9.30x10^{-7}$	$6.41x10^{-9}$	$3.63x10^{-9}$
AP	kg SO_2 eq	0.206	0.00552	0.0714	**0.283**	0.160	$2.10x10^{-4}$	0.160	0.668	0.00157	$8.50x10^{-4}$
EP	kg PO_4^{3-} eq	0.0769	$1.13x10^{-3}$	0.0225	**0.101**	0.0211	0.00207	0.103	0.187	$4.00x10^{-4}$	$2.00x10^{-4}$
POCP	kg C_2H_4 eq	0.00880	$2.30x10^{-4}$	0.00373	**0.0128**	0.00482	$1.10x10^{-4}$	0.0107	0.0267	$7.61x10^{-5}$	$4.77x10^{-5}$
ADPE	kg Sb eq	0.00332	$3.74x10^{-6}$	$2.46x10^{-5}$	**0.00335**	$2.78x10^{-5}$	$1.23x10^{-7}$	$2.40x10^{-4}$	0.00507	$1.57x10^{-6}$	$2.15x10^{-7}$
ADPF	MJ	158	16.8	239	**413**	166.9	0.572	390	887	6.79	3.82
TRACI Environmental Impact Results											
GWP	kg CO_2 eq	14.3	1.20	21.6	**37.2**	12.6	0.515	27.6	76.3	0.480	0.151
ODP	kg CFC-11 eq	$2.78x10^{-7}$	$2.11x10^{-8}$	$4.02x10^{-7}$	**$7.01x10^{-7}$**	$2.14x10^{-7}$	$9.03x10^{-10}$	$1.60x10^{-6}$	$1.39x10^{-6}$	$8.45x10^{-9}$	$4.83x10^{-9}$
AP	kg SO_2 eq	0.191	0.00633	0.0799	**0.278**	0.173	$2.60x10^{-4}$	0.163	0.681	0.00188	$1.03x10^{-3}$
EP	kg N eq	0.166	0.00115	0.0388	**0.206**	0.0135	0.00544	0.220	0.339	$4.50x10^{-4}$	$1.80x10^{-4}$
SFP	kg O_3 eq	1.36	0.145	1.25	**2.76**	3.41	0.00548	1.57	9.37	0.0481	0.0276
FFD	MJ Surplus	14.2	2.40	22.8	**39.4**	24.2	0.0759	49.5	97.8	0.965	0.561
Resource Use Indicator Results											
RPR_E	MJ, LHV	29.7	0.213	48.2	**78.1**	1.75	0.0180	324	119.9	0.0876	0.0327
RPR_M	MJ, LHV	0	N/A	N/A	**0**	N/A	0	0	0	N/A	N/A
$NRPR_E$	MJ, LHV	176	17.1	245	**438**	169	0.593	421	927	6.88	3.86
$NRPR_M$	MJ, LHV	0	N/A	N/A	**0**	N/A	0	0	0	N/A	N/A
SM	kg	0.640	N/A	0	**0.640**	N/A	0	0	0.960	N/A	N/A
RSF	MJ, LHV	N/A	N/A	0	**0**	N/A	0	0	0	N/A	N/A
NRSF	MJ, LHV	N/A	N/A	0	**0**	N/A	0	0	0	N/A	N/A
RE	MJ, LHV	N/A	N/A	0	**0**	N/A	0	0	0	N/A	N/A
FW	m^3	0.213	0.00209	0.0760	**0.291**	0.0168	$4.90x10^{-4}$	0.463	0.484	$8.70x10^{-4}$	0.00403
Waste and Output Indicator Results											
HWD	kg	N/A	N/A	0	**0**	N/A	0	0	0	N/A	0
NHWD	kg	N/A	N/A	2.28	**2.28**	N/A	0.973	0	43.1	N/A	25.5
HLRW	kg	0	0	0	**0**	0	0	0	0	0	0
ILLRW	kg	0	0	0	**0**	0	0	0	0	0	0
CRU	kg	N/A	N/A	N/A	**N/A**	N/A	N/A	0	0	N/A	N/A
MR	kg	N/A	N/A	0	**0**	N/A	2.09	0	3.13	N/A	N/A
MER	kg	N/A	N/A	0	**0**	N/A	0	0	0	N/A	N/A
EE	MJ, LHV	N/A	N/A	0	**0**	N/A	0	0	0	N/A	0

N/A = Not Applicable (as recommended by ACLCA)

Table 20. *Urinal Plumbing Fixture Model: Retrofit Pint (mass = 28.11 kg).*

Module		A1	A2	A3	A1-A3	A4	A5	B2	B4	C2	C4
CML-IA Environmental Impact Results											
GWP	kg CO_2 eq	15.1	1.34	24.5	**41.0**	14.3	0.542	27.7	84.8	0.560	0.178
ODP	kg CFC-11 eq	$2.30x10^{-7}$	$1.77x10^{-8}$	$2.25x10^{-7}$	**$4.72x10^{-7}$**	$1.84x10^{-7}$	$6.36x10^{-10}$	$1.53x10^{-6}$	$9.98x10^{-7}$	$7.42x10^{-9}$	$4.20x10^{-9}$
AP	kg SO_2 eq	0.209	0.00620	0.0799	**0.295**	0.181	$1.80x10^{-4}$	0.160	0.718	0.00182	$9.90x10^{-4}$
EP	kg PO_4^{3-} eq	0.0780	$1.26x10^{-3}$	0.0236	**0.1029**	0.0239	0.00184	0.103	0.194	$4.70x10^{-4}$	$2.30x10^{-4}$
POCP	kg C_2H_4 eq	0.00900	$2.60x10^{-4}$	0.00403	**0.0133**	0.00544	$9.76x10^{-5}$	0.0107	0.0285	$8.81x10^{-5}$	$5.52x10^{-5}$
ADPE	kg Sb eq	0.00333	$4.13x10^{-6}$	$2.52x10^{-5}$	**0.00336**	$3.14x10^{-5}$	$1.10x10^{-7}$	$2.40x10^{-4}$	0.00509	$1.81x10^{-6}$	$2.49x10^{-7}$
ADPF	MJ	165	18.6	267	**451**	189	0.508	390	978	7.86	4.42
TRACI Environmental Impact Results											
GWP	kg CO_2 eq	14.9	1.33	24.2	**40.5**	14.2	0.458	27.6	83.7	0.555	0.175
ODP	kg CFC-11 eq	$2.96x10^{-7}$	$2.33x10^{-8}$	$4.17x10^{-7}$	**$7.37x10^{-7}$**	$2.42x10^{-7}$	$8.02x10^{-10}$	$1.60x10^{-6}$	$1.49x10^{-6}$	$9.78x10^{-9}$	$5.58x10^{-9}$
AP	kg SO_2 eq	0.195	0.00710	0.0887	**0.291**	0.195	$2.30x10^{-4}$	0.163	0.734	0.00218	$1.20x10^{-3}$
EP	kg N eq	0.168	0.00128	0.0401	**0.210**	0.0153	0.00484	0.220	0.346	$5.20x10^{-4}$	$2.10x10^{-4}$
SFP	kg O_3 eq	1.41	0.162	1.39	**2.96**	3.85	0.00487	1.57	10.4	0.0557	0.0320
FFD	MJ Surplus	15.0	2.65	25.1	**42.8**	27.3	0.0675	49.5	108	1.12	0.649
Resource Use Indicator Results											
RPR_E	MJ, LHV	30.3	0.235	44.4	**74.9**	1.97	0.0160	324	116	0.101	0.0378
RPR_M	MJ, LHV	0	N/A	N/A	**0**	N/A	0	0	0	N/A	N/A
$NRPR_E$	MJ, LHV	184	18.9	273	**476**	191	0.527	421	1020	7.96	4.47
$NRPR_M$	MJ, LHV	0	N/A	N/A	**0**	N/A	0	0	0	N/A	N/A
SM	kg	0.640	N/A	0	**0.640**	N/A	0	0	0.960	N/A	N/A
RSF	MJ, LHV	N/A	N/A	0	**0**	N/A	0	0	0	N/A	N/A
NRSF	MJ, LHV	N/A	N/A	0	**0**	N/A	0	0	0	N/A	N/A
RE	MJ, LHV	N/A	N/A	0	**0**	N/A	0	0	0	N/A	N/A
FW	m^3	0.228	0.00231	0.0788	**0.309**	0.0189	$4.30x10^{-4}$	0.463	0.517	$1.00x10^{-3}$	0.00467
Waste and Output Indicator Results											
HWD	kg	N/A	N/A	0	**0**	N/A	0	0	0	N/A	0
NHWD	kg	N/A	N/A	2.65	**2.65**	N/A	0.865	0	49.5	N/A	29.5
HLRW	kg	0	0	0	**0**	0	0	0	0	0	0
ILLRW	kg	0	0	0	**0**	0	0	0	0	0	0
CRU	kg	N/A	N/A	N/A	**N/A**	N/A	N/A	0	0	N/A	N/A
MR	kg	N/A	N/A	0	**0**	N/A	1.86	0	2.78	N/A	N/A
MER	kg	N/A	N/A	0	**0**	N/A	0	0	0	N/A	N/A
EE	MJ, LHV	N/A	N/A	0	**0**	N/A	0	0	0	NA	0

N/A = Not Applicable (as recommended by ACLCA)

Table 21. *Urinal Plumbing Fixture Model: Nano Pint (mass = 10.29 kg).*

Module		A1	A2	A3	A1-A3	A4	A5	B2	B4	C2	C4
CML-IA Environmental Impact Results											
GWP	kg CO_2 eq	12.3	0.771	9.70	**22.8**	5.75	0.257	27.7	43.6	0.222	0.0705
ODP	kg CFC-11 eq	$1.64x10^{-7}$	$1.02x10^{-8}$	$9.41x10^{-8}$	**$2.68x10^{-7}$**	$7.40x10^{-8}$	$3.02x10^{-10}$	$1.53x10^{-6}$	$5.19x10^{-7}$	$2.94x10^{-9}$	$1.66x10^{-9}$
AP	kg SO_2 eq	0.194	0.00318	0.0313	**0.229**	0.0727	$8.69x10^{-5}$	0.160	0.454	$7.20x10^{-4}$	$3.90x10^{-4}$
EP	kg PO_4^{3-} eq	0.0732	$6.90x10^{-4}$	0.00988	**0.0838**	0.00961	$8.70x10^{-4}$	0.103	0.142	$1.90x10^{-4}$	$9.06x10^{-5}$
POCP	kg C_2H_4 eq	0.00811	$1.40x10^{-4}$	0.00163	**0.00988**	0.00219	$4.63x10^{-5}$	0.0107	0.0183	$3.49x10^{-5}$	$2.19x10^{-5}$
ADPE	kg Sb eq	0.00330	$2.42x10^{-6}$	$1.12x10^{-5}$	**0.00331**	$1.27x10^{-5}$	$5.20x10^{-8}$	$2.40x10^{-4}$	0.00499	$7.18x10^{-7}$	$9.88x10^{-8}$
ADPF	MJ	132	10.7	104	**247**	75.9	0.241	390	492	3.12	1.75
TRACI Environmental Impact Results											
GWP	kg CO_2 eq	12.2	0.765	9.56	**22.5**	5.71	0.217	27.6	43.1	0.220	0.0695
ODP	kg CFC-11 eq	$2.17x10^{-7}$	$1.34x10^{-8}$	$1.73x10^{-7}$	**$4.03x10^{-7}$**	$9.75x10^{-8}$	$3.80x10^{-10}$	$1.60x10^{-6}$	$7.59x10^{-7}$	$3.88x10^{-9}$	$2.21x10^{-9}$
AP	kg SO_2 eq	0.179	0.00369	0.0351	**0.218**	0.0787	$1.10x10^{-4}$	0.163	0.447	$8.60x10^{-4}$	$4.70x10^{-4}$
EP	kg N eq	0.160	$7.30x10^{-4}$	0.0170	**0.177**	0.00616	0.00229	0.220	0.279	$2.10x10^{-4}$	$8.22x10^{-5}$
SFP	kg O_3 eq	1.18	0.0872	0.552	**1.82**	1.55	0.00231	1.57	5.11	0.0221	0.0127
FFD	MJ Surplus	11.7	1.53	9.90	**23.1**	11.0	0.0320	49.5	52.2	0.443	0.258
Resource Use Indicator Results											
RPR_E	MJ, LHV	27.5	0.137	20.6	**48.2**	0.795	0.00759	324	73.6	0.0402	0.0150
RPR_M	MJ, LHV	0	N/A	N/A	**0**	N/A	0	0	0	N/A	N/A
$NRPR_E$	MJ, LHV	148	10.9	107	**265**	76.7	0.250	421	521	3.16	1.77
$NRPR_M$	MJ, LHV	0	N/A	N/A	**0**	N/A	0	0	0	N/A	N/A
SM	kg	0.640	N/A	0	**0.640**	N/A	0	0	0.960	N/A	N/A
RSF	MJ, LHV	N/A	N/A	0	**0**	N/A	0	0	0	N/A	N/A
NRSF	MJ, LHV	N/A	N/A	0	**0**	N/A	0	0	0	N/A	N/A
RE	MJ, LHV	N/A	N/A	0	**0**	N/A	0	0	0	N/A	N/A
FW	m^3	0.162	0.00135	0.0340	**0.197**	0.00762	$2.10x10^{-4}$	0.463	0.317	$4.00x10^{-4}$	0.00185
Waste and Output Indicator Results											
HWD	kg	N/A	N/A	0	**0**	N/A	0	0	0	N/A	0
NHWD	kg	N/A	N/A	0.970	**0.970**	N/A	0.410	0	19.6	N/A	11.7
HLRW	kg	0	0	0	**0**	0	0	0	0	0	0
ILLRW	kg	0	0	0	**0**	0	0	0	0	0	0
CRU	kg	N/A	N/A	N/A	**N/A**	N/A	N/A	0	0	N/A	N/A
MR	kg	N/A	N/A	0	**0**	N/A	0.880	0	1.32	N/A	N/A
MER	kg	N/A	N/A	0	**0**	N/A	0	0	0	N/A	N/A
EE	MJ, LHV	N/A	N/A	0	**0**	N/A	0	0	0	NA	0

N/A = Not Applicable (as recommended by ACLCA)

Table 22. *Urinal Plumbing Fixture Model: Retrofit Pint 0.125 gpf (mass = 17.60 kg).*

Module		A1	A2	A3	A1-A3	A4	A5	B2	B4	C2	C4
CML-IA Environmental Impact Results											
GWP	kg CO_2 eq	13.4	1.00	15.4	**29.8**	8.95	0.239	27.7	59.2	0.361	0.114
ODP	kg CFC-11 eq	$1.91x10^{-7}$	$1.33x10^{-8}$	$1.25x10^{-7}$	**$3.30x10^{-7}$**	$1.15x10^{-7}$	$2.81x10^{-10}$	$1.53x10^{-6}$	$6.76x10^{-7}$	$4.78x10^{-9}$	$2.70x10^{-9}$
AP	kg SO_2 eq	0.200	0.00442	0.0497	**0.254**	0.113	$8.08x10^{-5}$	0.160	0.554	0.00117	$6.40x10^{-4}$
EP	kg PO_4^{3-} eq	0.0752	$9.30x10^{-4}$	0.0138	**0.0900**	0.0150	$8.10x10^{-4}$	0.103	0.159	$3.00x10^{-4}$	$1.50x10^{-4}$
POCP	kg C_2H_4 eq	0.00848	$1.90x10^{-4}$	0.00243	**0.0111**	0.00341	$4.31x10^{-5}$	0.0107	0.0220	$5.67x10^{-5}$	$3.55x10^{-5}$
ADPE	kg Sb eq	0.00331	$3.12x10^{-6}$	$1.51x10^{-5}$	**0.00333**	$1.97x10^{-5}$	$4.83x10^{-8}$	$2.40x10^{-4}$	0.00503	$1.17x10^{-6}$	$1.60x10^{-7}$
ADPF	MJ	146	14.0	164	**323**	118	0.224	390	674	5.06	2.85
TRACI Environmental Impact Results											
GWP	kg CO_2 eq	13.3	1.00	15.2	**29.5**	8.89	0.202	27.6	58.6	0.358	0.113
ODP	kg CFC-11 eq	$2.49x10^{-7}$	$1.75x10^{-8}$	$2.34x10^{-7}$	**$5.01x10^{-7}$**	$1.52x10^{-7}$	$3.54x10^{-10}$	$1.60x10^{-6}$	$9.91x10^{-7}$	$6.30x10^{-9}$	$3.60x10^{-9}$
AP	kg SO_2 eq	0.186	0.00509	0.0548	**0.245**	0.122	$1.00x10^{-4}$	0.163	0.555	0.00140	$7.70x10^{-4}$
EP	kg N eq	0.163	$9.50x10^{-4}$	0.0231	**0.187**	0.00958	0.00213	0.220	0.299	$3.40x10^{-4}$	$1.30x10^{-4}$
SFP	kg O_3 eq	1.28	0.118	0.860	**2.26**	2.41	0.00215	1.57	7.09	0.0358	0.0206
FFD	MJ Surplus	13.0	1.99	15.2	**30.2**	17.1	0.0298	49.5	72.8	0.719	0.418
Resource Use Indicator Results											
RPR_E	MJ, LHV	28.6	0.177	21.3	**50.1**	1.24	0.00705	324	77.1	0.0653	0.0244
RPR_M	MJ, LHV	0	N/A	N/A	**0**	N/A	0	0	0	N/A	N/A
$NRPR_E$	MJ, LHV	163	14.2	167	**344**	119	0.233	421	707	5.13	2.88
$NRPR_M$	MJ, LHV	0	N/A	N/A	**0**	N/A	0	0	0	N/A	N/A
SM	kg	0.640	N/A	0	**0.640**	N/A	0	0	0.960	N/A	N/A
RSF	MJ, LHV	N/A	N/A	0	**0**	N/A	0	0	0	N/A	N/A
NRSF	MJ, LHV	N/A	N/A	0	**0**	N/A	0	0	0	N/A	N/A
RE	MJ, LHV	N/A	N/A	0	**0**	N/A	0	0	0	N/A	N/A
FW	m^3	0.189	0.00174	0.0468	**0.238**	0.0119	$1.90x10^{-4}$	0.463	0.390	$6.50x10^{-4}$	0.00301
Waste and Output Indicator Results											
HWD	kg	N/A	N/A	0	**0**	N/A	0	0	0	N/A	0
NHWD	kg	N/A	N/A	1.65	**1.65**	N/A	0.382	0	31.5	N/A	19.0
HLRW	kg	0	0	0	**0**	0	0	0	0	0	0
ILLRW	kg	0	0	0	**0**	0	0	0	0	0	0
CRU	kg	N/A	N/A	N/A	**N/A**	N/A	N/A	0	0	N/A	N/A
MR	kg	N/A	N/A	0	**0**	N/A	0.818	0	1.23	N/A	N/A
MER	kg	N/A	N/A	0	**0**	N/A	0	0	0	N/A	N/A
EE	MJ, LHV	N/A	N/A	0	**0**	N/A	0	0	0	NA	0

N/A = Not Applicable (as recommended by ACLCA)

Table 23. *Urinal Plumbing Fixture Model: Siphon Jet (mass = 18.57 kg).*

Module		A1	A2	A3	A1-A3	A4	A5	B2	B4	C2	C4
CML-IA Environmental Impact Results											
GWP	kg CO_2 eq	8.27	0.834	16.3	**25.4**	9.22	0.309	27.7	53.0	0.366	0.116
ODP	kg CFC-11 eq	$1.31x10^{-7}$	$1.10x10^{-8}$	$1.41x10^{-7}$	**$2.83x10^{-7}$**	$1.19x10^{-7}$	$3.63x10^{-10}$	$1.53x10^{-6}$	$6.12x10^{-7}$	$4.85x10^{-9}$	$2.75x10^{-9}$
AP	kg SO_2 eq	0.172	0.00393	0.0527	**0.229**	0.117	$1.00x10^{-4}$	0.160	0.521	0.00119	$6.50x10^{-4}$
EP	kg PO_4^{3-} eq	0.0640	$7.90x10^{-4}$	0.0152	**0.0799**	0.0154	0.00105	0.103	0.145	$3.10x10^{-4}$	$1.50x10^{-4}$
POCP	kg C_2H_4 eq	0.00701	$1.60x10^{-4}$	0.00262	**0.00979**	0.00351	$5.56x10^{-5}$	0.0107	0.0202	$5.76x10^{-5}$	$3.61x10^{-5}$
ADPE	kg Sb eq	0.00307	$2.56x10^{-6}$	$1.64x10^{-5}$	**0.00309**	$2.03x10^{-5}$	$6.24x10^{-8}$	$2.40x10^{-4}$	0.00467	$1.18x10^{-6}$	$1.63x10^{-7}$
ADPF	MJ	92.8	11.6	175	**279**	122	0.290	390	614	5.14	2.89
TRACI Environmental Impact Results											
GWP	kg CO_2 eq	8.20	0.828	16.0	**25.0**	9.15	0.261	27.6	52.4	0.363	0.115
ODP	kg CFC-11 eq	$1.69x10^{-7}$	$1.45x10^{-8}$	$2.63x10^{-7}$	**$4.46x10^{-7}$**	$1.56x10^{-7}$	$4.57x10^{-10}$	$1.60x10^{-6}$	$9.16x10^{-7}$	$6.40x10^{-9}$	$3.65x10^{-9}$
AP	kg SO_2 eq	0.157	0.00449	0.0583	**0.220**	0.126	$1.30x10^{-4}$	0.163	0.523	0.00143	$7.80x10^{-4}$
EP	kg N eq	0.140	$7.90x10^{-4}$	0.0255	**0.166**	0.00987	0.00276	0.220	0.269	$3.40x10^{-4}$	$1.40x10^{-4}$
SFP	kg O_3 eq	0.977	0.102	0.915	**1.99**	2.48	0.00277	1.57	6.81	0.0364	0.0209
FFD	MJ Surplus	8.71	1.65	16.4	**26.8**	17.6	0.0385	49.5	68.4	0.731	0.425
Resource Use Indicator Results											
RPR_E	MJ, LHV	17.0	0.146	26.2	**43.4**	1.27	0.00912	324	67.1	0.0663	0.0247
RPR_M	MJ, LHV	0	N/A	N/A	**0**	N/A	0	0	0	N/A	N/A
$NRPR_E$	MJ, LHV	104	11.7	179	**295**	123	0.300	421	639	5.21	2.92
$NRPR_M$	MJ, LHV	0	N/A	N/A	**0**	N/A	0	0	0	N/A	N/A
SM	kg	0.223	N/A	0	**0.223**	N/A	0	0	0.335	N/A	N/A
RSF	MJ, LHV	N/A	N/A	0	**0**	N/A	0	0	0	N/A	N/A
NRSF	MJ, LHV	N/A	N/A	0	**0**	N/A	0	0	0	N/A	N/A
RE	MJ, LHV	N/A	N/A	0	**0**	N/A	0	0	0	N/A	N/A
FW	m^3	0.153	0.00144	0.0509	**0.206**	0.0122	$2.50x10^{-4}$	0.463	0.343	$6.60x10^{-4}$	0.00305
Waste and Output Indicator Results											
HWD	kg	N/A	N/A	0	**0**	N/A	0	0	0	N/A	0
NHWD	kg	N/A	N/A	1.75	**1.75**	N/A	0.493	0	32.2	N/A	19.3
HLRW	kg	0	0	0	**0**	0	0	0	0	0	0
ILLRW	kg	0	0	0	**0**	0	0	0	0	0	0
CRU	kg	N/A	N/A	N/A	**N/A**	N/A	N/A	0	0	N/A	N/A
MR	kg	N/A	N/A	0	**0**	N/A	1.06	0	1.59	N/A	N/A
MER	kg	N/A	N/A	0	**0**	N/A	0	0	0	N/A	N/A
EE	MJ, LHV	N/A	N/A	0	**0**	N/A	0	0	0	NA	0

N/A = Not Applicable (as recommended by ACLCA)

Table 24. *Urinal Plumbing Fixture Model: Waterless (mass = 29.07 kg).*

Module		A1	A2	A3	A1-A3	A4	A5	B2	B4	C2	C4
CML-IA Environmental Impact Results											
GWP	kg CO_2 eq	8.47	1.14	25.8	**35.4**	14.5	0.600	27.7	76.7	0.562	0.178
ODP	kg CFC-11 eq	$1.51x10^{-7}$	$1.50x10^{-8}$	$2.40x10^{-7}$	**$4.06x10^{-7}$**	$1.86x10^{-7}$	$7.04x10^{-10}$	$1.53x10^{-6}$	$9.02x10^{-7}$	$7.44x10^{-9}$	$4.21x10^{-9}$
AP	kg SO_2 eq	0.149	0.00560	0.0837	**0.238**	0.183	$2.00x10^{-4}$	0.160	0.636	0.00182	$9.90x10^{-4}$
EP	kg PO_4^{3-} eq	0.0548	$1.09x10^{-3}$	0.0252	**0.0810**	0.02416	0.00204	0.103	0.162	$4.70x10^{-4}$	$2.30x10^{-4}$
POCP	kg C_2H_4 eq	0.00634	$2.30x10^{-4}$	0.00426	**0.0108**	0.00551	$1.10x10^{-4}$	0.0107	0.0249	$8.83x10^{-5}$	$5.54x10^{-5}$
ADPE	kg Sb eq	0.00259	$3.46x10^{-6}$	$2.71x10^{-5}$	**0.00262**	$3.18x10^{-5}$	$1.21x10^{-7}$	$2.40x10^{-4}$	0.00398	$1.82x10^{-6}$	$2.50x10^{-7}$
ADPF	MJ	94.1	15.7	279	**389**	191	0.562	390	889	7.88	4.43
TRACI Environmental Impact Results											
GWP	kg CO_2 eq	8.39	1.13	25.4	**34.9**	14.4	0.507	27.6	75.7	0.557	0.176
ODP	kg CFC-11 eq	$1.89x10^{-7}$	$1.97x10^{-8}$	$4.44x10^{-7}$	**$6.53x10^{-7}$**	$2.45x10^{-7}$	$8.88x10^{-10}$	$1.60x10^{-6}$	$1.37x10^{-6}$	$9.81x10^{-9}$	$5.60x10^{-9}$
AP	kg SO_2 eq	0.137	0.00637	0.0932	**0.237**	0.198	$2.50x10^{-4}$	0.163	0.657	0.00219	$1.20x10^{-3}$
EP	kg N eq	0.119	0.00109	0.0428	**0.163**	0.0155	0.00535	0.220	0.276	$5.30x10^{-4}$	$2.10x10^{-4}$
SFP	kg O_3 eq	0.908	0.143	1.46	**2.51**	3.90	0.00539	1.57	9.75	0.0558	0.0321
FFD	MJ Surplus	9.16	2.25	26.4	**37.8**	27.6	0.0747	49.5	101	1.12	0.652
Resource Use Indicator Results											
RPR_E	MJ, LHV	15.9	0.198	48.7	**64.8**	2.00	0.0177	324	100	0.102	0.0380
RPR_M	MJ, LHV	0	N/A	N/A	**0**	N/A	0	0	0	N/A	N/A
$NRPR_E$	MJ, LHV	104	16.0	287	**407**	193	0.584	421	919	7.99	4.48
$NRPR_M$	MJ, LHV	0	N/A	N/A	**0**	N/A	0	0	0	N/A	N/A
SM	kg	0.144	N/A	0	**0.144**	N/A	0	0	0.216	N/A	N/A
RSF	MJ, LHV	N/A	N/A	0	**0**	N/A	0	0	0	N/A	N/A
NRSF	MJ, LHV	N/A	N/A	0	**0**	N/A	0	0	0	N/A	N/A
RE	MJ, LHV	N/A	N/A	0	**0**	N/A	0	0	0	N/A	N/A
FW	m^3	0.180	0.00194	0.0844	**0.266**	0.0192	$4.80x10^{-4}$	0.463	0.454	0.00101	0.00468
Waste and Output Indicator Results											
HWD	kg	N/A	N/A	0	**0**	N/A	0	0	0	N/A	0
NHWD	kg	N/A	N/A	2.74	**2.74**	N/A	0.957	0	50.0	N/A	29.6
HLRW	kg	0	0	0	**0**	0	0	0	0	0	0
ILLRW	kg	0	0	0	**0**	0	0	0	0	0	0
CRU	kg	N/A	N/A	N/A	**N/A**	N/A	N/A	0	0	N/A	N/A
MR	kg	N/A	N/A	0	**0**	N/A	2.05	0	3.08	N/A	N/A
MER	kg	N/A	N/A	0	**0**	N/A	0	0	0	N/A	N/A
EE	MJ, LHV	N/A	N/A	0	**0**	N/A	0	0	0	NA	0

N/A = Not Applicable (as recommended by ACLCA)

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