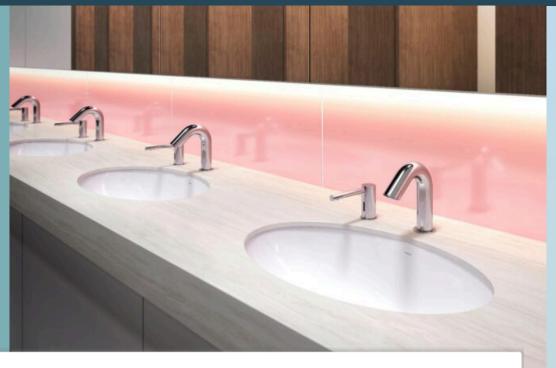
SM Transparency Catalog F TOTO Showroom Standard-R and Standard-S Faucets with Mixing Valves

TOTO_®

Standard R & S Touchless Faucets – 0.35 GPM/0.12 GPC

TOTO Standard EcoPower sensor faucets provide an elegant water conservation solution for LEED option. Powered by water, current that is stored in rechargeable cells to power the Smart Sensor System of the faucet.



Performance dashboard



Hydropower self generating system

No minimum daily usage requirement

Micro-sensor positioned underneath the spout head for accurate hand detection ensuring smooth and consistent water distribution

Durable chrome plated spout body

Single-hole mount

Kit includes spout body, controller box, and mounting hardware – less supply lines

Equipped with 0.35gpm flow control

Mixing valve options available

Visit TOTO for more product specifications:

Standard-R Touchless Faucet Series Standard-S Touchless Faucet Series

MasterFormat® #22 42 39

Environment & materials

Improved by:

Powered by the sheer force of running water

See How we make it greener for water savings

Metal parts and electric components are able to be recycled at the end of service

Certifications, rating systems & disclosures:

30% below LEED® v4.1's Indoor Water Use Reduction baseline with its 0.35gpm flow volume

Contributes to earning credits in LEED®

CALGreen® compliant

Declare™ label



ECO-POWER® SELF-SUSTAINING FAUCETS
Powered by water to create an electrical current
that is stored in rechargeable cells to power the
Smart Sensor System of the faucet or valve.

Reduces electricity use, lower maintenance cost and hands-free, automatic-shut-off functionality

See LCA, interpretation & rating systems

See materials, interpretation & rating systems





SM Transparency Report (EPD)™ + Material Health Overview™

EPD

LCA

3rd-party reviewed

⋘ NSI

Transparency Report (EPD)

3rd-party verified

✓ NSE Validity: 08/31/2024 - 08/30/2029

TOTO - 20240831 - 006

evaluation

MATERIAL HEALTH

Self-declared

Ø

This environmental product declaration (EPD) was externally verified by Jack Geibig (Ecoform) on behalf of NSF according to ISO 14044; ISO 21930:2017; SM Part A: LCA calculation rules and report requirements, 2023; the reference PCR; and ISO 14025:2006.

Ecoform, LLC

Knoxville, TN 37932 (865) 850-1883

NSF International

P.O Box 130140, 789 N.Dixboro Road, Ann Arbor, MI 48105, USA

734 769 8010



Certified Environmental **Product Declaration** www.nsf.org

SUMMARY

Reference PCR

SM Part B: Commercial/public metered and manual lavatory faucets, v3.0

Regions; system boundaries North America; Cradle-to-grave

Functional unit

One metered lavatory faucet in an average commercial environment over the estimated service life of the building

LCIA methodology; LCA software; LCI database

TRACI 2.1; SimaPro Analyst 9.5; ecoinvent and USLCI databases

In accordance with ISO 14044 and the referenced PCR, the life cycle assessment was conducted by Sustainable Minds and critically reviewed by Jack Geibig (Ecoform) on hehalf of NSF

Public LCA

LCA background report of TOTO Faucets, Flush Valves, and Reside Toilets, 2024

TOTO USA 1155 Southern Road Morrow, GA 30260

LCA results & interpretation

Standard-R (no mix valve)

SM Transparency Catalog ► TOTO Showroom ► Standard-R and Standard-S Faucets with Mixing Valves

Standard-R and Standard-S Faucet Series

Scope and summary

○ Cradle to gate ○ Cradle to gate with options **② Cradle to grave Functional unit**

One metered lavatory faucet in an average commercial environment over the

estimated service life of the building. The expected service life (ESL) of a building is 75 years, and all use stage activity and impacts are accounted for in that full ESL period. The reference service life (RSL) of the faucet is 10 years, which is an industry-accepted average lifespan based on the economic lifespan of the product. T28S32E does not include a mixing valve. Maintenance

solution daily in a commercial setting for 75 years, which is the building estimated service life. The use of 10mL/clean over 260days/year for 75 years gives a total of 195L of solution. Using a density of 1.01kg/L for a 1% SLS solution, 195kg of solution will be needed over the course of 75 years. Therefore, 2kg of SLS plus 195kg of water were included in the model. Replacement

Regular cleaning is assumed to use 10mL of a 1% sodium lauryl sulfate (SLS)

At the end of its RSL, the faucet is assumed to be replaced. Therefore, an additional 6.5 products are included as replacements, with all life cycle

modules considered, over the building's ESL of 75 years. Manufacturing data Manufacturing data has been collected and compiled for TOTO Vietnam. Data

reporting period: 2023.

Spout body, nozzle key, mounting nut,

Material composition greater than 1% by weight MATERIAL AVG. % WT

generator coil cover, controller adapter				
Controller mounting bracket, spout mounting bracket & rod	Stainles steel	14.3%		
Packaging	Cardboard and	paper 11.7%		
Controller cover	ABS	10.8%		
Hose	PVC	4.62%		
Connector	Polypropylene	2.85%		
Generator and solenoid coils	Copper	2.11%		
Hose clip	Steel	2.08%		
Spout aerator gasket	NBR	1.42%		
Board	Electronics	1.27%		
Generator base	PPO	1.10%		
Other	Other	6.63%		
Total impacts by life cycle stage [mPts/decl unit]				
9.00E+02 LIFE CYCLE STAGE MPTS/FUNC. UNIT				

Production



(X) A1 Raw materials

Brass parts together with

the printed wiring board in

addition to manufacturing

processes such as brass

0

kg SO₂ eq

kg N eq

Unit

kg O₃ eq

kg PM_{2.5} eq

8.00E-01

4.21E-01

6.11E+00

9.63E-02

All life cycle stages

What's causing the greatest impacts

The use stage [B1-B7] dominates the results for all impact categories. The

replacements and operational water use modules are highly dominant in all categories because of the amount of water consumed during operation and the necessity to consider an additional 6.5 products as replacements. All life cycle modules are considered throughout the estimated service life (ESL) of the building, which is 75 years. The production stage [A1-A3] itself is slightly significant but does not dominate in any impact category. Additionally, the processes associated with dismantling the product and final waste treatment during the end-of-life stage do not have a significant impact. Production stage [A1-A3]

Brass and the turning brass process, together with the printed wiring

board, have significant material contributions to the production stage.

Stainless steel materials and the turning steel process are relevant to the carcinogenics category. The electroplating process along with injection molding are major contributors to the ozone depletion category. Furthermore, polishing has a somewhat significant processing contribution to the results. Because these products are manufactured in Vietnam but sold in the US market, the transportation via oceanic freighter appears as a relevant contributor to the fossil fuel depletion and smog categories. The other parts and processes contribute between 5% and 20% of the overall impacts in the remaining categories. Construction stage [A4-A5] Installation of the product dominates impacts in the construction stage.

potential impacts throughout the product's life cycle.

Use stage [B1-B7] Product replacements dominate impacts in the use stage. The use stage itself dominates all impact categories (>95%) due to the consideration of an additional 6.5 products as replacements. The water consumed during use and

embedded electricity used for the water supply are also contributors in this

Transportation by truck for delivery to the installation site contributes the most, and this stage contributes less than 1% of the total global warming

End-of-life stage [C1-C4]

stage.

41.1%

14.3

The transportation to landfill dominates impacts in the end-of-life stage. Transportation and the processes for dismantling the product contribute to a relatively low portion (<1%) of total results for all impact categories.

The amount of water used by the 0.35gpm faucet during each 15sec use is 0.0875 gallons. It is assumed to be used 90 times per day in a commercial

liter of water is used to represent energy for upstream municipal water

collection, treatment, supply, and downstream management.

environment assuming 260 days per year over 75 years, resulting in 153,563 gallons of water over its lifetime. An electricity factor of 0.000961 kWh per

consumption in the use phase

Operational energy and water use

A mix of 70% hot water and 30% cold water is assumed to be used by the faucet, with water heating consuming a blend of 67% natural gas and 33% electricity. A natural gas factor of 0.8784 Mcf of natural gas per 1,000 gallons of water and an electricity factor of 0.1765 kWh per gallon of water were used to calculate total energy needed for water heating. Use stage electricity was modeled using a United States grid mix.

How we're making it greener TOTO PeoplePlanetWater™ programs improving environmental Dual-Max®, E-Max®, Tornado Flush™, 1G®, and EcoPower® reduce water

Modular packing methods increase the fill rate of a trailer, cutting down on the number of trips needed 100% of post-industrial ceramic waste is recycled

Energy efficiency programs optimize the firing process

See how we make it greener

Volume of water used

during the operation of

number of replacements

the product and the

required over the

building's lifetime.

3.59E+01

7.70E+00

2.69E+02

2.93E+00

(X) C1 Deconstruction/

Transport to waste

processing, waste

of material flows

1.05E-03

1.97E-04

2.20E-02

1/2 product

1 product

1 product

2 points

.5 points

.75 points

1 point

1.5 products

1.11E-04

processing and disposal

transported to a landfill.

Demolition

(X) A4 Transportation/ (X) B1 Use

SM Single Score					
CM C'as la Casa					
				(X) B7 Operational water use	
Information modules: Included (X) Exclude	*			(X) B6 Operational energy use	
				(X) B5 Refurbishment	
				(X) B4 Replacement	(X) C4 Disposal
		(X) A3 Manufacturing		(X) B3 Repair	(X) C3 Waste processing
		(X) A2 Transportation	(X) A5 Construction/ Installation	(X) B2 Maintenance	(X) C2 Transportation

Delivery

Acidification

Eutrophication

Impact category

Respiratory effects

Smoa

stage

Materials or processes contributing

>20% to total impacts in each life cycle

Standard-R Faucet Series (no mixing valve) - TRACI v2.1 results per functional unit								
LIFE CYCLE STAGE			PRODUCTION	CONSTRUCTION	USE	END OF LIFE		
Ecological damage								
Impact category	Unit							
Global warming	kg CO ₂ eq	•	6.28E+01	7.85E-01	5.43E+03	1.85E-01		
Ozone depletion	kg CFC-11 eq	0	4.11E-06	1.70E-09	2.57E-04	1.66E-08		

7.04E-03

6.88E-04

2.24E-01

1.25E-04

Transportation of the

of packaging.

product to installation site

or consumer and disposal

Additional environmental information

Human health damage

Impact category	Unit				
Carcinogenics	CTU _h	2.81E-06	8.88E-09	1.18E-04	2.32E-09
Non-carcinogenics	CTU _h	7.82E-05	8.29E-08	1.33E-03	7.32E-08
Ecotoxicity	CTU _e	2.24E+02	1.58E+00	4.99E+03	1.96E-01
Fossil fuel depletion	MJ surplus	4.04E+01	1.14E+00	4.55E+03	2.18E-01

ISO 21930:2017, "Sustainability in Building Construction — Environmental Declaration of Building Products" serves as the core PCR along with Sustainable Minds Part A.

services"

References

LCA Background Report

SM Part A: LCA calculation rules and report requirements, version 2023 August, 2023. PCR review conducted by the Sustainable Minds TAB, tab@sustainableminds.com.

Download PDF SM Transparency Report/EPD

SM Part B: Commercial/public metered and manual lavatory faucets, v3.0 March, 2024. PCR review conducted by Hugues Imbeault-Tétreault, ing., M.Sc.A., Chair (Groupe AGÉCO) hugues.i-tetreault@groupeageco.ca; Rebe

Feraldi, LCACP, CLAR (TranSustainable Enterprises, LLC); Rifat Karim (Sphera).

A background report of TOTO Faucets, Flush Valves, and Residential Toilets

2024; SimaPro Analyst 9.5; ecoinvent and USLCI databases; TRACI 2.1.

ISO 14025, "Sustainability in buildings and civil engineering works -- Core

rules for environmental product declarations of construction products and

SM Transparency Reports (TR) are ISO 14025 Type III environmental declarations (EPD) that enable purchasers and users to compare the potential environmental performance of products on a life cycle basis. They are designed to present information transparently to make the limitations of comparability more understandable. Environmental declarations of products that conform to the same PCR and include the same life cycle stages, but are made by different $\,$ $manufacturers, may \ not \ sufficiently \ align \ to \ support \ direct \ comparisons. \ They \ therefore \ cannot \ be$ used as comparative assertions unless the conditions as defined in ISO 14025 Section 6.7.2

'Requirements for Comparability' are satisfied. In order to support comparative assertions, this

applying a functional unit, and be based on equivalent scenarios with respect to the context of

construction works. Some LCA impact categories and inventory items are still under development

EPD meets all comparability requirements stated in ISO 14025:2006. However, differences $certain\ assumptions,\ data\ quality,\ and\ variability\ between\ LCA\ data\ sets\ may\ still\ exist.\ Any\ EPD$ comparison must be carried out at the building level per ISO 21930 guidelines, use the same sub-category PCR where applicable, include all relevant information modules, be limited to EPDs

and can have high levels of uncertainty. To promote uniform guidance on the data collection, calculation, and reporting of results, the ACLCA methodology (ACLCA 2019) was used.

LEED BD+C: New Construction | v4.1 - LEED v4.1 Building product disclosure and optimization

Rating systems

performance.

Environmental product declarations

The intent is to reward project teams for selecting products from

LEED BD+C: New Construction | v4 - LEED v4

Building product disclosure and optimization

Environmental product declarations

Industry-wide (generic) EPD

Product-specific Type III EPD

manufacturers who have verified improved life-cycle environmental

Collaborative for High Performance Schools National Criteria **MW C5.1 – Environmental Product Declarations**

Materials and resources

Interiors

Industry-wide (generic) EPD

▼ Product-specific Type III EPD

▼ Third-party certified type III EPD **Green Globes for New Construction and Sustainable**

NC 3.5.1.2 Path B: Prescriptive Path for Building Core and Shell

Mat 02 - Environmental impacts from construction products

NC 3.5.2.2 and SI 4.1.2 Path B: Prescriptive Path for Interior Fit-outs

BREEAM New Construction 2018

Environmental Product Declarations (EPD)

Industry-average EPD

Multi-product specific EPD

Product-specific EPD

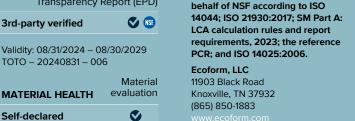
TOTO USA 1155 Southern Road

Contact us

Morrow, GA 30260

LCA SUMMARY This environmental product Reference PCR **✓** NSE 3rd-party reviewed SM Part B: Commercial/public metered and manual lavatory faucets, v3.0 declaration (EPD) was externally verified by Jack Geibig (Ecoform) on Transparency Report (EPD)

SM Transparency Report (EPD)™ + Material Health Overview™



NSF International

Regions; system boundaries North America; Cradle-to-grave **Functional unit**

One metered lavatory faucet in an average commercial environment over the estimated service life of the

LCIA methodology; LCA software; LCI database

TRACI 2.1; SimaPro Analyst 9.5; ecoinvent and USLCI databases In accordance with ISO 14044 and the referenced PCR, the life cycle

reviewed by Jack Geibig (Ecoform) on

Public LCA LCA background report of TOTO Faucets, Flush Valves, and Reside

Certified Environmental Product Declaration

P.O Box 130140, 789 N.Dixboro Road,

Ann Arbor, MI 48105, USA

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734 769 8010

assessment was conducted by Sustainable Minds and critically

SM Transparency Catalog F TOTO Showroom F Standard-R and Standard-S Faucets with Mixing Valves

LCA results & interpretation

Standard-R and Standard-S Faucet Series

Standard-R (w/ mix valve)

○ Cradle to gate ○ Cradle to gate with options **② Cradle to grave**

Functional unit

Scope and summary

estimated service life of the building. The expected service life (ESL) of a building is 75 years, and all use stage activity and impacts are accounted for in that full ESL period. The reference service life (RSL) of the faucet is 10 years, which is an industry-accepted average lifespan based on the economic lifespan of the product. T28S32EM includes a mixing valve.

One metered lavatory faucet in an average commercial environment over the

Maintenance Regular cleaning is assumed to use 10mL of a 1% sodium lauryl sulfate (SLS) solution daily in a commercial setting for 75 years, which is the building estimated service life. The use of 10mL/clean over 260days/year for 75 years

solution, 195kg of solution will be needed over the course of 75 years. Therefore, 2kg of SLS plus 195kg of water were included in the model. Replacement At the end of its RSL, the faucet is assumed to be replaced. Therefore, an additional 6.5 products are included as replacements, with all life cycle

modules considered, over the building's ESL of 75 years.

gives a total of 195L of solution. Using a density of 1.01kg/L for a 1% SLS

Manufacturing data

reporting period: 2023.

Material composition greater than 1% by weight

PART MATERIAL

AVG. % WT

MPTS/FUNC. UNIT

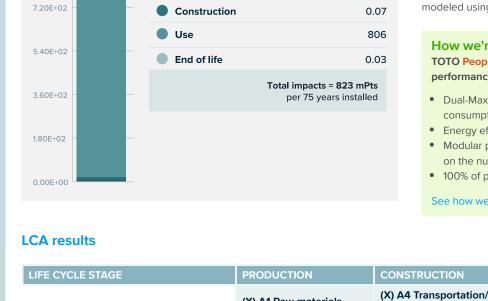
17.2

Manufacturing data has been collected and compiled for TOTO Vietnam. Data

Spout body, nozzle key, mounting nut, generator coil cover, controller adapter	Brass	41.1%		
Controller mounting bracket, spout mounting bracket & rod	Stainles steel	14.3%		
Packaging	Cardboard and paper	11.7%		
Controller cover	ABS	10.8%		
Hose	PVC	4.62%		
Connector	Polypropylene	2.85%		
Generator and solenoid coils	Copper	2.11%		
Hose clip	Steel	2.08%		
Spout aerator gasket	NBR	1.42%		
Board	Electronics	1.27%		
Generator base	PPO	1.10%		
Other	Other	6.63%		
Total impacts by life cycle stage [mPts/decl unit]				

LIFE CYCLE STAGE

Production



(X) A1 Raw materials

Brass parts together with

the printed wiring board in

addition to manufacturing

processes such as brass

turning.

4.54E-06

8.90E-01

5.00E-01

6.67E+00

1.08E-01

0

All life cycle stages

What's causing the greatest impacts

The use stage [B1-B7] dominates the results for all impact categories. The

replacements and operational water use modules are highly dominant in all categories because of the amount of water consumed during operation and the necessity to consider an additional 6.5 products as replacements. All life cycle modules are considered throughout the estimated service life (ESL) of the building, which is 75 years. The production stage [A1-A3] itself is slightly significant but does not dominate in any impact category. Additionally, the processes associated with dismantling the product and final waste treatment during the end-of-life stage do not have a significant impact. Production stage [A1-A3]

Brass and the turning brass process, together with the printed wiring

board, have significant material contributions to the production stage.

Stainless steel materials and the turning steel process are relevant to the carcinogenics category. The electroplating process along with injection molding are major contributors to the ozone depletion category. Furthermore, polishing has a somewhat significant processing contribution to the results. Because these products are manufactured in Vietnam but sold in the US market, the transportation via oceanic freighter appears as a relevant contributor to the fossil fuel depletion and smog categories. The other parts and processes contribute between 5% and 20% of the overall impacts in the remaining categories. Construction stage [A4-A5] Installation of the product dominates impacts in the construction stage.

most, and this stage contributes less than 1% of the total global warming

potential impacts throughout the product's life cycle. Use stage [B1-B7] Product replacements dominate impacts in the use stage. The use stage itself dominates all impact categories (>95%) due to the consideration of an

Transportation by truck for delivery to the installation site contributes the

stage.

End-of-life stage [C1-C4] The transportation to landfill dominates impacts in the end-of-life stage. Transportation and the processes for dismantling the product contribute to a relatively low portion (<1%) of total results for all impact categories.

additional 6.5 products as replacements. The water consumed during use and embedded electricity used for the water supply are also contributors in this

Operational energy and water use The amount of water used by the 0.35gpm faucet during each 15sec use is 0.0875 gallons. It is assumed to be used 90 times per day in a commercial

gallons of water over its lifetime. An electricity factor of 0.000961 kWh per liter of water is used to represent energy for upstream municipal water collection, treatment, supply, and downstream management. A mix of 70% hot water and 30% cold water is assumed to be used by the faucet, with water heating consuming a blend of 67% natural gas and 33%

electricity. A natural gas factor of 0.8784 Mcf of natural gas per 1,000 gallons

of water and an electricity factor of 0.1765 kWh per gallon of water were used

environment assuming 260 days per year over 75 years, resulting in 153,563

to calculate total energy needed for water heating. Use stage electricity was modeled using a United States grid mix. How we're making it greener TOTO PeoplePlanetWater™ programs improving environmental Dual-Max®, E-Max®, Tornado Flush™, 1G®, and EcoPower® reduce water

Energy efficiency programs optimize the firing process Modular packing methods increase the fill rate of a trailer, cutting down on the number of trips needed 100% of post-industrial ceramic waste is recycled

See how we make it greener

during the operation of

number of replacements

the product and the

required over the

building's lifetime.

4.41E-04

7.38E+01

9.09E+00

3.18E+02

5.36E+00

(X) C1 Deconstruction/

Transport to waste

processing, waste

of material flows

2.31E-08

1.49E-03

2.63E-04

3.18E-02

1.61E-04

½ product

1 product

1.5 products

2 points

.5 points

.75 points

1 point

processing and disposal

transported to a landfill.

Demolition

(X) B1 Use

consumption in the use phase

9.00E+02

		(X) A2 Transportation	(X) A5 Construction/ Installation	(X) B2 Maintenance	(X) C2 Transportation
		(X) A3 Manufacturing		(X) B3 Repair	(X) C3 Waste processing
				(X) B4 Replacement	(X) C4 Disposal
				(X) B5 Refurbishment	
Information modules: Included (X) Excluded (MND)*				(X) B6 Operational energy use	
				(X) B7 Operational water use	
SM Single Score					
Impa	cts per faucet	14.3 mPts	0.07 mPts	509 mPts	0.02 mPts
		Brass parts together with		Volume of water used	Transport to waste

Delivery

Ozone depletion

Acidification

Eutrophication

Impact category

Smog

stage

Materials or processes contributing

>20% to total impacts in each life cycle

kg CFC-11 eq

kg SO, eq

kg N eq

kg O₃ eq

Standard-R Faucet Series (with mixing valve) - TRACI v2.1 results per functional unit								
LIFE CYCLE STAGE			PRODUCTION	CONSTRUCTION	USE	END OF LIFE		
Ecological dam	nage							
Impact category	Unit							
Global warming	kg CO₂ eq	0	6.67E+01	8.94E-01	1.02E+04	2.49E-01		

1.97E-09

7.88E-03

8.00E-04

2.52E-01

1.41E-04

Transportation of the

of packaging.

product to installation site

or consumer and disposal

kg PM_{2.5} eq Respiratory effects Additional environmental information

Human health damage

Impact category	Unit				
Carcinogenics	CTU _h	3.01E-06	9.95E-09	1.48E-04	3.40E-09
Non-carcinogenics	CTU _h	9.98E-05	9.29E-08	1.83E-03	1.28E-07
Ecotoxicity	CTU _e	2.56E+02	1.76E+00	1.07E+04	3.01E-01
Fossil fuel depletion	MJ surplus	4.38E+01	1.27E+00	1.40E+04	3.12E-01

Declaration of Building Products" serves as the core PCR along with Sustainable Minds Part A.

services"

References

LCA Background Report

August, 2023. PCR review conducted by the Sustainable Minds TAB, tab@sustainableminds.com.

SM Part B: Commercial/public metered and manual lavatory faucets, v3.0 March, 2024. PCR review conducted by Hugues Imbeault-Tétreault, ing., M.Sc.A., Chair (Groupe AGÉCO) hugues.i-tetreault@groupeageco.ca; Rebe

Feraldi, LCACP, CLAR (TranSustainable Enterprises, LLC); Rifat Karim (Sphera).

LCA background report of TOTO Faucets, Flush Valves, and Residential Toilets

ISO 14025, "Sustainability in buildings and civil engineering works -- Core

rules for environmental product declarations of construction products and

ISO 21930:2017, "Sustainability in Building Construction — Environmental

SM Part A: LCA calculation rules and report requirements, version 2023

2024; SimaPro Analyst 9.5; ecoinvent and USLCI databases; TRACI 2.1.

SM Transparency Reports (TR) are ISO 14025 Type III environmental declarations (EPD) that enable purchasers and users to compare the potential environmental performance of products on a life cycle basis. They are designed to present information transparently to make the limitations of comparability more understandable. Environmental declarations of products that conform to the same PCR and include the same life cycle stages, but are made by different $\,$ manufacturers, may not sufficiently align to support direct comparisons. They therefore cannot be

used as comparative assertions unless the conditions as defined in ISO 14025 Section 6.7.2 'Requirements for Comparability' are satisfied. In order to support comparative assertions, this

 $\hbox{EPD meets all comparability requirements stated in ISO 14025:} 2006. \ However, \ differences$ certain assumptions, data quality, and variability between LCA data sets may still exist. Any EPD comparison must be carried out at the building level per ISO 21930 guidelines, use the same subcategory PCR where applicable, include all relevant information modules, be limited to EPDs

applying a functional unit, and be based on equivalent scenarios with respect to the context of

and can have high levels of uncertainty. To promote uniform guidance on the data collection,

construction works. Some LCA impact categories and inventory items are still under development

calculation, and reporting of results, the ACLCA methodology (ACLCA 2019) was used.

Download PDF SM Transparency Report/EPD

LCA

⊘ NSF

Material

evaluation

Ø

Transparency Report (EPD)

Validity: 08/31/2024 - 08/30/2029

LEED BD+C: New Construction | v4.1 - LEED v4.1 Building product disclosure and optimization

Rating systems

performance.

Environmental product declarations () Industry-wide (generic) EPD 1 product

Collaborative for High Performance Schools National

The intent is to reward project teams for selecting products from

LEED BD+C: New Construction | v4 - LEED v4

Building product disclosure and optimization

Environmental product declarations

Industry-wide (generic) EPD

Product-specific Type III EPD

manufacturers who have verified improved life-cycle environmental

Criteria **MW C5.1 – Environmental Product Declarations**

▼ Third-party certified type III EPD

Materials and resources

✓ Product-specific Type III EPD

Green Globes for New Construction and Sustainable Interiors

BREEAM New Construction 2018 Mat 02 - Environmental impacts from construction products

Environmental Product Declarations (EPD)

NC 3.5.1.2 Path B: Prescriptive Path for Building Core and Shell

NC 3.5.2.2 and SI 4.1.2 Path B: Prescriptive Path for Interior Fit-outs

Industry-average EPD

Multi-product specific EPD

Product-specific EPD

SM Transparency Report (EPD)™ + Material Health Overview™

SM Part B: Commercial/public metered and manual lavatory faucets, v3.0 Morrow, GA 30260 verified by Jack Geibig (Ecoform) on behalf of NSF according to ISO 14044; ISO 21930:2017; SM Part A: Regions; system boundaries Contact us

> One metered lavatory faucet in an average commercial environment over the estimated service life of the

SUMMARY

Reference PCR

LCIA methodology; LCA software; LCI database TRACI 2.1; SimaPro Analyst 9.5; ecoinvent and USLCI databases In accordance with ISO 14044 and the referenced PCR, the life cycle

assessment was conducted by Sustainable Minds and critically

reviewed by Jack Geibig (Ecoform) on Public LCA

LCA background report of TOTO Faucets, Flush Valves, and Reside

TOTO USA

1155 Southern Road

TOTO - 20240831 - 006 **MATERIAL HEALTH**

3rd-party reviewed

3rd-party verified

Self-declared

LCA calculation rules and report requirements, 2023; the reference PCR; and ISO 14025:2006.

This environmental product

declaration (EPD) was externally

Knoxville, TN 37932 (865) 850-1883 **NSF** International Ann Arbor, MI 48105, USA

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Ecoform, LLC 11903 Black Road P.O Box 130140, 789 N.Dixboro Road,

734 769 8010

Certified **Environmental**

Product Declaration

SM Transparency Catalog > TOTO Showroom > Standard-R and Standard-S Faucets with Mixing Valves

LCA results & interpretation

Standard-R and Standard-S Faucet Series

Standard-R (w/ thermo mix valve)

Scope and summary

Functional unit

○ Cradle to gate ○ Cradle to gate with options **② Cradle to grave**

One metered lavatory faucet in an average commercial environment over the

estimated service life of the building. The expected service life (ESL) of a building is 75 years, and all use stage activity and impacts are accounted for in that full ESL period. The reference service life (RSL) of the faucet is 10 years, which is an industry-accepted average lifespan based on the economic lifespan of the product. T28S32ET includes a thermostatic mixing valve. Maintenance

solution daily in a commercial setting for 75 years, which is the building estimated service life. The use of 10mL/clean over 260days/year for 75 years gives a total of 195L of solution. Using a density of 1.01kg/L for a 1% SLS solution, 195kg of solution will be needed over the course of 75 years. Therefore, 2kg of SLS plus 195kg of water were included in the model. Replacement

Regular cleaning is assumed to use 10mL of a 1% sodium lauryl sulfate (SLS)

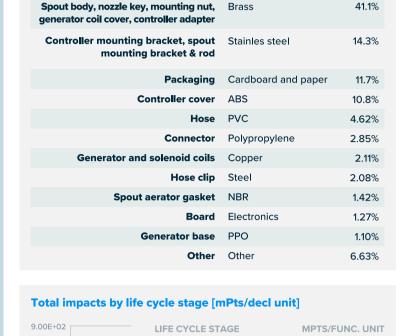
At the end of its RSL, the faucet is assumed to be replaced. Therefore, an

additional 6.5 products are included as replacements, with all life cycle modules considered, over the building's ESL of 75 years. Manufacturing data

reporting period: 2023.

Material composition greater than 1% by weight MATERIAL AVG. % WT

Manufacturing data has been collected and compiled for TOTO Vietnam. Data



Production

Construction

Use



(X) A1 Raw materials

Brass parts together with

the printed wiring board in

addition to manufacturing

processes such as brass

turning.

4.60E-06

8.85E-01

4.77E-01

6.55E+00

1.06E-01

4.34E+01

around report of TOTO Faucets, Flush Valves, and Residential Toilets,

2024; SimaPro Analyst 9.5; ecoinvent and USLCI databases; TRACI 2.1.

ISO 14025, "Sustainability in buildings and civil engineering works -- Core

rules for environmental product declarations of construction products and

0

All life cycle stages

What's causing the greatest impacts

The use stage [B1-B7] dominates the results for all impact categories. The

replacements and operational water use modules are highly dominant in all categories because of the amount of water consumed during operation and the necessity to consider an additional 6.5 products as replacements. All life cycle modules are considered throughout the estimated service life (ESL) of the building, which is 75 years. The production stage [A1-A3] itself is slightly significant but does not dominate in any impact category. Additionally, the processes associated with dismantling the product and final waste treatment during the end-of-life stage do not have a significant impact. Production stage [A1-A3]

Brass and the turning brass process, together with the printed wiring

board, have significant material contributions to the production stage.

Stainless steel materials and the turning steel process are relevant to the

carcinogenics category. The electroplating process along with injection molding are major contributors to the ozone depletion category. Furthermore, polishing has a somewhat significant processing contribution to the results. Because these products are manufactured in Vietnam but sold in the US market, the transportation via oceanic freighter appears as a relevant contributor to the fossil fuel depletion and smog categories. The other parts and processes contribute between 5% and 20% of the overall impacts in the remaining categories. Construction stage [A4-A5] Installation of the product dominates impacts in the construction stage.

potential impacts throughout the product's life cycle.

Use stage [B1-B7] Product replacements dominate impacts in the use stage. The use stage itself dominates all impact categories (>95%) due to the consideration of an additional 6.5 products as replacements. The water consumed during use and

Transportation by truck for delivery to the installation site contributes the most, and this stage contributes less than 1% of the total global warming

End-of-life stage [C1-C4] The transportation to landfill dominates impacts in the end-of-life stage. Transportation and the processes for dismantling the product contribute to a relatively low portion (<1%) of total results for all impact categories.

embedded electricity used for the water supply are also contributors in this

The amount of water used by the 0.35gpm faucet during each 15sec use is 0.0875 gallons. It is assumed to be used 90 times per day in a commercial

Operational energy and water use

A mix of 70% hot water and 30% cold water is assumed to be used by the faucet, with water heating consuming a blend of 67% natural gas and 33% electricity. A natural gas factor of 0.8784 Mcf of natural gas per 1,000 gallons of water and an electricity factor of 0.1765 kWh per gallon of water were used to calculate total energy needed for water heating. Use stage electricity was

environment assuming 260 days per year over 75 years, resulting in 153,563

gallons of water over its lifetime. An electricity factor of 0.000961 kWh per liter of water is used to represent energy for upstream municipal water

collection, treatment, supply, and downstream management.

modeled using a United States grid mix. How we're making it greener TOTO PeoplePlanetWater™ programs improving environmental Dual-Max®, E-Max®, Tornado Flush™, 1G®, and EcoPower® reduce water

Energy efficiency programs optimize the firing process Modular packing methods increase the fill rate of a trailer, cutting down on the number of trips needed 100% of post-industrial ceramic waste is recycled

See how we make it greener

during the operation of

number of replacements

the product and the

required over the

building's lifetime.

4.41E-04

7.37E+01

8.79E+00

3.16E+02

5.33E+00

1.40E+04

Building product disclosure and optimization

Environmental product declarations

Industry-wide (generic) EPD

Product-specific Type III EPD

END OF LIFE

Demolition

(X) C1 Deconstruction/

Transport to waste

processing, waste

of material flows

2.18E-08

1.36E-03

2.55E-04

2.78E-02

1.49E-04

2.81E-01

½ product

1 product

1 product

1.5 products

2 points

.5 points

.75 points

1 point

processing and disposal

transported to a landfill.

(X) A4 Transportation/ (X) B1 Use

consumption in the use phase

7.20E+02

			(X) A5 Construction/ Installation	(X) B2 Maintenance	(X) C2 Transportation
		(X) A3 Manufacturing		(X) B3 Repair	(X) C3 Waste processing
				(X) B4 Replacement	(X) C4 Disposal
				(X) B5 Refurbishment	
Information modules: Included (X) Excluded	d (MND)*			(X) B6 Operational energy use	
				(X) B7 Operational water use	
SM Single Score					
	Impacts per faucet	14.3 mPts	0.07 mPts	509 mPts	0.02 mPts
		Brass parts together with		Volume of water used	Transport to waste

Delivery

16.7

0.07

Ozone depletion

Acidification

Eutrophication

Impact category

Respiratory effects

Fossil fuel depletion

LCA Background Report

References

Smoa

stage

Materials or processes contributing

>20% to total impacts in each life cycle

kg CFC-11 eq

kg SO₂ eq

kg N eg

kg O₃ eq

kg PM_{2.5} eq

MJ surplus

Standard-R Faucet Series (with thermostatic mixing valve) - TRACI v2.1 results per functional unit								
LIFE CYCLE STAGE		PRODUCTION	CONSTRUCTION	USE	END OF LIFE			
Ecological dama	age							
Impact category	Unit							
Global warming	kg CO₂ eq	@ 6.56E+01	7.97E-01	1.02E+04	2.37E-01			

1.70E-09

7.04E-03

6.97E-04

2.24E-01

1.25E-04

Transportation of the

of packaging.

product to installation site

or consumer and disposal

Human health damage

Additional environmental information							
Impact category	Unit						
Carcinogenics	CTU _h	•	2.95E-06	8.88E-09	1.47E-04	3.24E-09	
Non-carcinogenics	CTU _h	0	9.40E-05	8.30E-08	1.75E-03	1.30E-07	
Ecotoxicity	CTU	0	2.48E+02	1.57E+00	1.06E+04	2.86E-01	

1.14E+00

ISO 21930:2017, "Sustainability in Building Construction — Environmental Declaration of Building Products" serves as the core PCR along with Sustainable Minds Part A.

services"

SM Part A: LCA calculation rules and report requirements, version 2023 August, 2023. PCR review conducted by the Sustainable Minds TAB, tab@sustainableminds.com.

Download PDF SM Transparency Report/EPD

SM Part B: Commercial/public metered and manual lavatory faucets, v3.0 March, 2024. PCR review conducted by Hugues Imbeault-Tétreault, ing.,

M.Sc.A., Chair (Groupe AGÉCO) hugues.i-tetreault@groupeageco.ca; Rebe Feraldi, LCACP, CLAR (TranSustainable Enterprises, LLC); Rifat Karim (Sphera).

enable purchasers and users to compare the potential environmental performance of products on a life cycle basis. They are designed to present information transparently to make the limitations of comparability more understandable. Environmental declarations of products that conform to the same PCR and include the same life cycle stages, but are made by different $\,$ $manufacturers, may \ not \ sufficiently \ align \ to \ support \ direct \ comparisons. \ They \ therefore \ cannot \ be$ used as comparative assertions unless the conditions as defined in ISO 14025 Section 6.7.2. 'Requirements for Comparability' are satisfied. In order to support comparative assertions, this

EPD meets all comparability requirements stated in ISO 14025:2006. However, differences $certain\ assumptions,\ data\ quality,\ and\ variability\ between\ LCA\ data\ sets\ may\ still\ exist.\ Any\ EPD$ comparison must be carried out at the building level per ISO 21930 guidelines, use the same sub-

category PCR where applicable, include all relevant information modules, be limited to EPDs applying a functional unit, and be based on equivalent scenarios with respect to the context of

calculation, and reporting of results, the ACLCA methodology (ACLCA 2019) was used.

construction works. Some LCA impact categories and inventory items are still under development and can have high levels of uncertainty. To promote uniform guidance on the data collection,

SM Transparency Reports (TR) are ISO 14025 Type III environmental declarations (EPD) that

LEED BD+C: New Construction | v4.1 - LEED v4.1 Building product disclosure and optimization

Rating systems

performance.

Environmental product declarations

The intent is to reward project teams for selecting products from

LEED BD+C: New Construction | v4 - LEED v4

manufacturers who have verified improved life-cycle environmental

Collaborative for High Performance Schools National Criteria **MW C5.1 – Environmental Product Declarations**

Third-party certified type III EPD

Materials and resources

☐ Industry-wide (generic) EPD

♥ Product-specific Type III EPD

Green Globes for New Construction and Sustainable Interiors

BREEAM New Construction 2018 Mat 02 - Environmental impacts from construction products

NC 3.5.1.2 Path B: Prescriptive Path for Building Core and Shell

NC 3.5.2.2 and SI 4.1.2 Path B: Prescriptive Path for Interior Fit-outs

Multi-product specific EPD

Industry-average EPD

Product-specific EPD

Environmental Product Declarations (EPD)

TOTO USA Reference PCR 1155 Southern Road SM Part B: Commercial/public metered and manual lavatory faucets, v3,0 Morrow, GA 30260

Regions; system boundaries Contact us North America; Cradle-to-grave

S I	M Transparency Report	t (EPD)™ + Material H	ealth Overview

This environmental product

declaration (EPD) was externally

verified by Jack Geibig (Ecoform) on



LCA

✓ NSF

3rd-party reviewed

NSF International P.O Box 130140, 789 N.Dixboro Road, Ann Arbor, MI 48105, USA 734 769 8010

Functional unit One metered lavatory faucet in an average commercial environment over the estimated service life of the

SUMMARY

LCIA methodology; LCA software; LCI database TRACI 2.1; SimaPro Analyst 9.5;

ecoinvent and USLCI databases

Sustainable Minds and critically

In accordance with ISO 14044 and the referenced PCR, the life cycle assessment was conducted by

reviewed by Jack Geibig (Ecoform) on Public LCA LCA background report of TOTO Faucets, Flush Valves, and Reside

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Certified Environmental Product Declaration SM Transparency Catalog > TOTO Showroom > Standard-R and Standard-S Faucets with Mixing Valves

LCA results & interpretation

Standard-R and Standard-S Faucet Series

Standard-S (no mix valve)

Scope and summary

○ Cradle to gate ○ Cradle to gate with options **② Cradle to grave**

Functional unit One metered lavatory faucet in an average commercial environment over the

estimated service life of the building. The expected service life (ESL) of a building is 75 years, and all use stage activity and impacts are accounted for in that full ESL period. The reference service life (RSL) of the faucet is 10 years, which is an industry-accepted average lifespan based on the economic lifespan of the product. T27S32E does not include a mixing valve.

Maintenance

Regular cleaning is assumed to use 10mL of a 1% sodium lauryl sulfate (SLS) solution daily in a commercial setting for 75 years, which is the building estimated service life. The use of 10mL/clean over 260days/year for 75 years gives a total of 195L of solution. Using a density of 1.01kg/L for a 1% SLS solution, 195kg of solution will be needed over the course of 75 years. Therefore, 2kg of SLS plus 195kg of water were included in the model.

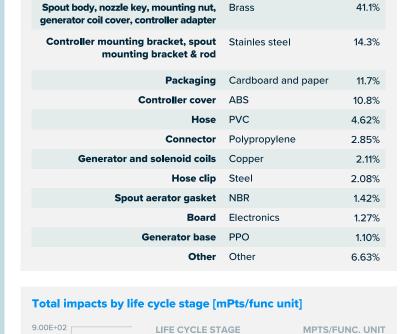
Replacement

At the end of its RSL, the faucet is assumed to be replaced. Therefore, an additional 6.5 products are included as replacements, with all life cycle modules considered, over the building's ESL of 75 years. Manufacturing data

reporting period: 2023.

Material composition greater than 1% by weight MATERIAL AVG. % WT

Manufacturing data has been collected and compiled for TOTO Vietnam. Data





(X) A1 Raw materials

Brass parts together with

the printed wiring board in

addition to manufacturing

6.48E+01

4.17E-06

8.45E-01

4.56E-01

2.88E-06

8.78E-05

2.38E+02

4.16E+01

0

0

All life cycle stages The use stage [B1-B7] dominates the results for all impact categories. The

What's causing the greatest impacts

replacements and operational water use modules are highly dominant in all categories because of the amount of water consumed during operation and the necessity to consider an additional 6.5 products as replacements. All life cycle modules are considered throughout the estimated service life (ESL) of the building, which is 75 years. The production stage [A1-A3] itself is slightly significant but does not dominate in any impact category. Additionally, the processes associated with dismantling the product and final waste treatment during the end-of-life stage do not have a significant impact. Production stage [A1-A3]

Brass and the turning brass process, together with the printed wiring

board, have significant material contributions to the production stage.

Stainless steel materials and the turning steel process are relevant to the

carcinogenics category. The electroplating process along with injection molding are major contributors to the ozone depletion category. Furthermore, polishing has a somewhat significant processing contribution to the results. Because these products are manufactured in Vietnam but sold in the US market, the transportation via oceanic freighter appears as a relevant contributor to the fossil fuel depletion and smog categories. The other parts and processes contribute between 5% and 20% of the overall impacts in the remaining categories. Construction stage [A4-A5] Installation of the product dominates impacts in the construction stage.

potential impacts throughout the product's life cycle.

Use stage [B1-B7] Product replacements dominate impacts in the use stage. The use stage itself dominates all impact categories (>95%) due to the consideration of an additional 6.5 products as replacements. The water consumed during use and

embedded electricity used for the water supply are also contributors in this

Transportation by truck for delivery to the installation site contributes the most, and this stage contributes less than 1% of the total global warming

End-of-life stage [C1-C4] The transportation to landfill dominates impacts in the end-of-life stage. Transportation and the processes for dismantling the product contribute to a relatively low portion (<1%) of total results for all impact categories.

Operational energy and water use The amount of water used by the 0.35gpm faucet during each 15sec use is

flushing performance.

environment assuming 260 days per year over 75 years, resulting in 153,563 gallons of water over its lifetime. An electricity factor of 0.000961 kWh per liter of water is used to represent energy for upstream municipal water collection, treatment, supply, and downstream management. A mix of 70% hot water and 30% cold water is assumed to be used by the

faucet, with water heating consuming a blend of 67% natural gas and 33% electricity. A natural gas factor of 0.8784 Mcf of natural gas per 1,000 gallons

of water and an electricity factor of 0.1765 kWh per gallon of water were used

0.0875 gallons. It is assumed to be used 90 times per day in a commercial

to calculate total energy needed for water heating. Use stage electricity was modeled using a United States grid mix. How we're making it greener TOTO PeoplePlanetWater™ programs improving environmental

The electronic and mechanical components are programmed and designed to allow water flow and accurate flush volume only when

TOTO's EcoPower® products are powered by the force of running

See how we make it greener

(X) C1 Deconstruction/

Transport to waste

processing, waste

1.85E-01

1.66E-08

1.05E-03

1.97E-04

2.32E-09

7.32E-08

1.96E-01

2.18E-01

processing and disposal

Demolition

Water consumption is reduced in the use phase due to superior

END OF LIFE

during the operation of

number of replacements

the product and the

1.02E+04

4.36E-04

7.32E+01

8.53E+00

1.46E-04

1.69E-03

1.05E+04

1.39E+04

Building product disclosure and optimization

Building product disclosure and optimization

Environmental product declarations

☐ Industry-wide (generic) EPD

Industry-wide (generic) EPD

Product-specific Type III EPD

(X) B1 Use

			100	
			(X) B7 Operational water use	
d (MND)*			(X) B6 Operational energy use	
			(X) B5 Refurbishment	
			(X) B4 Replacement	(X) C4 Disposal
	(X) A3 Manufacturing		(X) B3 Repair	(X) C3 Waste processing
	(X) A2 Transportation	(X) A5 Construction/ Installation	(X) B2 Maintenance	(X) C2 Transportation
		(X) A3 Manufacturing	(X) A3 Manufacturing Installation	(X) A2 Transportation (X) B2 Maintenance (X) B3 Repair (X) B4 Replacement (X) B5 Refurbishment (X) B6 Operational energy use (X) B7 Operational water

(X) A4 Transportation/

Global warming

Ozone depletion

Acidification

Eutrophication

Carcinogenics

Ecotoxicity

Non-carcinogenics

Fossil fuel depletion

Materials or processes contributing

>20% to total impacts in each life cycle

kg CO₂ eq kg CFC-11 eq

kg SO₂ eq

kg N eq

CTU_h

CTU_h

CTU

MJ surplus

stage	turning.	of packaging.	required over the building's lifetime.	transported to a landfill.			
Standard-S Faucet Series (no mixing vlave) - TRACI v2.1 results per functional unit							
LIFE CYCLE STAGE	PRODUCTION	CONSTRUCTION	USE	END OF LIFE			
● Ecological damage							
Impact category Unit							

7.85E-01

1.70E-09

7.04E-03

6.88E-04

Transportation of the

product to installation site

or consumer and disposal

Human health damage

Impact category	Unit					
Additional environmental information						
Respiratory effects	kg PM _{2.5} eq	0	1.02E-01	1.25E-04	5.28E+00	1.11E-04
Smog	kg O₃ eq	•	6.38E+00	2.24E-01	3.15E+02	2.20E-02
Impact category	Unit					

8.88E-09

8.29E-08

1.58E+00

1.14E+00

References

ISO 21930:2017, "Sustainability in Building Construction — Environmental Declaration of Building Products" serves as the core PCR along with Sustainable Minds Part A.

August, 2023. PCR review conducted by the Sustainable Minds TAB,

metered and manual lavatory faucets, v3.0

SM Part A: LCA calculation rules and report requirements, version 2023

LCA background report of TOTO Faucets, Flush Valves, and Residential Toilets,

ISO 14025, "Sustainability in buildings and civil engineering works -- Core

rules for environmental product declarations of construction products and

2024; SimaPro Analyst 9.5; ecoinvent and USLCI databases; TRACI 2.1.

SM Transparency Reports (TR) are ISO 14025 Type III environmental declarations (EPD) that enable purchasers and users to compare the potential environmental performance of products on a life cycle basis. They are designed to present information transparently to make the limitations of comparability more understandable. Environmental declarations of products that conform to the same PCR and include the same life cycle stages, but are made by different manufacturers, may not sufficiently align to support direct comparisons. They therefore cannot be

used as comparative assertions unless the conditions as defined in ISO 14025 Section 6.7. 'Requirements for Comparability' are satisfied. In order to support comparative assertions, this

EPD meets all comparability requirements stated in ISO 14025:2006. However, differences in

category PCR where applicable, include all relevant information modules, be limited to EPDs applying a functional unit, and be based on equivalent scenarios with respect to the context of construction works. Some LCA impact categories and inventory items are still under development and can have high levels of uncertainty. To promote uniform guidance on the data collection, calculation, and reporting of results, the ACLCA methodology (ACLCA 2019) was used.

Product-specific Type III EPD

Rating systems

performance.

Environmental product declarations

LEED BD+C: New Construction | v4.1 - LEED v4.1

The intent is to reward project teams for selecting products from

LEED BD+C: New Construction | v4 - LEED v4

manufacturers who have verified improved life-cycle environmental

Collaborative for High Performance Schools National Criteria

NC 3.5.1.2 Path B: Prescriptive Path for Building Core and Shell

NC 3.5.2.2 and SI 4.1.2 Path B: Prescriptive Path for Interior Fit-outs

Mat 02 - Environmental impacts from construction products

MW C5.1 - Environmental Product Declarations

Green Globes for New Construction and Sustainable Interiors

Third-party certified type III EPD

Materials and resources

.5 points

.75 points

1 point

½ product

1 product

1 product

2 points

1.5 products

Industry-average EPD

Multi-product specific EPD

Product-specific EPD

BREEAM New Construction 2018

Environmental Product Declarations (EPD)

1155 Southern Road SM Part B: Commercial/public metered and manual lavatory faucets, v3.0 Morrow, GA 30260

Contact us

TOTO USA

SM Part B: Commercial/public

Download PDF SM Transparency Report/EPD

March, 2024. PCR review conducted by Hugues Imbeault-Tétreault, ing., M.Sc.A., Chair (Groupe AGÉCO) hugues.i-tetreault@groupeageco.ca; Rebe Feraldi, LCACP, CLAR (TranSustainable Enterprises, LLC); Rifat Karim (Sphera).

certain assumptions, data quality, and variability between LCA data sets may still exist. Any EPD comparison must be carried out at the building level per ISO 21930 guidelines, use the same sub-

SM Transparency Report (EPD)™ + Material Health Overview™ **EPD** LCA This environmental product

⋘ NSE

Ø

Transparency Report (EPD)

3rd-party reviewed

3rd-party verified

TOTO - 20240831 - 006

MATERIAL HEALTH

Self-declared

✓ NSF LCA calculation rules and report requirements, 2023; the reference Validity: 08/31/2024 - 08/30/2029 PCR; and ISO 14025:2006. Ecoform, LLC Material 11903 Black Road evaluation Knoxville, TN 37932

declaration (EPD) was externally

behalf of NSF according to ISO 14044; ISO 21930:2017; SM Part A:

verified by Jack Geibig (Ecoform) on

(865) 850-1883 **NSF** International P.O Box 130140, 789 N.Dixboro Road, Ann Arbor, MI 48105, USA

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734 769 8010 Certified Environmental

North America; Cradle-to-grave **Functional unit** One metered lavatory faucet in an

LCI database

SUMMARY

Reference PCR

average commercial environment over the estimated service life of the LCIA methodology; LCA software;

Regions; system boundaries

TRACI 2.1; SimaPro Analyst 9.5; ecoinvent and USLCI databases In accordance with ISO 14044 and the referenced PCR, the life cycle

assessment was conducted by Sustainable Minds and critically reviewed by Jack Geibig (Ecoform) on behalf of NSF.

LCA background report of TOTO Faucets, Flush Valves, and Residentia Toilets, 2024

www.nsf.org

Product Declaration

SM Transparency Catalog ► TOTO Showroom ► Standard-R and Standard-S Faucets with Mixing Valves

LCA results & interpretation

Standard-R and Standard-S Faucet Series

Standard-S (w/ mix valve)

Scope and summary

○ Cradle to gate ○ Cradle to gate with options **② Cradle to grave**

Functional unit One metered lavatory faucet in an average commercial environment over the

estimated service life of the building. The expected service life (ESL) of a building is 75 years, and all use stage activity and impacts are accounted for in that full ESL period. The reference service life (RSL) of the faucet is 10 years, which is an industry-accepted average lifespan based on the economic lifespan of the product. T27S32EM includes a mixing valve.

Maintenance

Regular cleaning is assumed to use 10mL of a 1% sodium lauryl sulfate (SLS) solution daily in a commercial setting for 75 years, which is the building estimated service life. The use of 10mL/clean over 260days/year for 75 years gives a total of 195L of solution. Using a density of 1.01kg/L for a 1% SLS solution, 195kg of solution will be needed over the course of 75 years. Therefore, 2kg of SLS plus 195kg of water were included in the model.

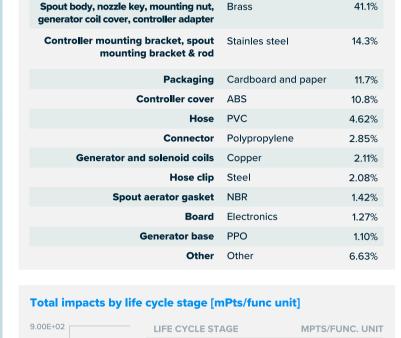
Replacement At the end of its RSL, the faucet is assumed to be replaced. Therefore, an

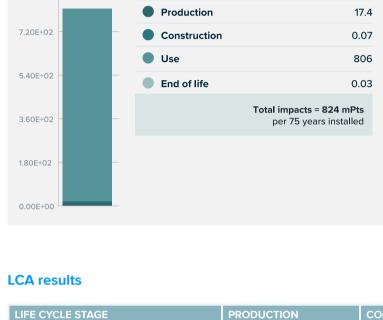
additional 6.5 products are included as replacements, with all life cycle modules considered, over the building's ESL of 75 years. Manufacturing data

reporting period: 2023.

Material composition greater than 1% by weight MATERIAL AVG. % WT

Manufacturing data has been collected and compiled for TOTO Vietnam. Data





(X) A1 Raw materials

All life cycle stages The use stage [B1-B7] dominates the results for all impact categories. The

What's causing the greatest impacts

replacements and operational water use modules are highly dominant in all categories because of the amount of water consumed during operation and the necessity to consider an additional 6.5 products as replacements. All life cycle modules are considered throughout the estimated service life (ESL) of the building, which is 75 years. The production stage [A1-A3] itself is slightly significant but does not dominate in any impact category. Additionally, the processes associated with dismantling the product and final waste treatment during the end-of-life stage do not have a significant impact. Production stage [A1-A3]

Brass and the turning brass process, together with the printed wiring

board, have significant material contributions to the production stage.

Stainless steel materials and the turning steel process are relevant to the

carcinogenics category. The electroplating process along with injection molding are major contributors to the ozone depletion category. Furthermore, polishing has a somewhat significant processing contribution to the results. Because these products are manufactured in Vietnam but sold in the US market, the transportation via oceanic freighter appears as a relevant contributor to the fossil fuel depletion and smog categories. The other parts and processes contribute between 5% and 20% of the overall impacts in the remaining categories. Construction stage [A4-A5] Installation of the product dominates impacts in the construction stage.

potential impacts throughout the product's life cycle.

Use stage [B1-B7] Product replacements dominate impacts in the use stage. The use stage itself dominates all impact categories (>95%) due to the consideration of an

Transportation by truck for delivery to the installation site contributes the most, and this stage contributes less than 1% of the total global warming

embedded electricity used for the water supply are also contributors in this stage. End-of-life stage [C1-C4] The transportation to landfill dominates impacts in the end-of-life stage. Transportation and the processes for dismantling the product contribute to a

relatively low portion (<1%) of total results for all impact categories.

additional 6.5 products as replacements. The water consumed during use and

Operational energy and water use

environment assuming 260 days per year over 75 years, resulting in 153,563 gallons of water over its lifetime. An electricity factor of 0.000961 kWh per liter of water is used to represent energy for upstream municipal water collection, treatment, supply, and downstream management. A mix of 70% hot water and 30% cold water is assumed to be used by the

faucet, with water heating consuming a blend of 67% natural gas and 33% electricity. A natural gas factor of 0.8784 Mcf of natural gas per 1,000 gallons

of water and an electricity factor of 0.1765 kWh per gallon of water were used

The amount of water used by the 0.35gpm faucet during each 15sec use is

0.0875 gallons. It is assumed to be used 90 times per day in a commercial

to calculate total energy needed for water heating. Use stage electricity was modeled using a United States grid mix. How we're making it greener TOTO PeoplePlanetWater™ programs improving environmental TOTO's EcoPower® products are powered by the force of running

The electronic and mechanical components are programmed and designed to allow water flow and accurate flush volume only when

flushing performance. See how we make it greener

Water consumption is reduced in the use phase due to superior

END OF LIFE

during the operation of

1.02E+04

4.41E-04

7.38E+01

9.09E+00

1.48E-04

1.83E-03

1.07E+04

1.40E+04

Building product disclosure and optimization

Environmental product declarations

Industry-wide (generic) EPD

Product-specific Type III EPD

Industry-wide (generic) EPD

Product-specific Type III EPD

Third-party certified type III EPD

Materials and resources

(X) **B1** Use

(X) C1 Deconstruction/

Transport to waste

processing, waste

2.49E-01

2.31E-08

1.49E-03

2.63E-04

3.40E-09

1.28E-07 3.01E-01

3.12E-01

Demolition

	(X) A2 Transportation	(X) A5 Construction/ Installation	(X) B2 Maintenance	(X) C2 Transportation
Information modules: Included (X) Excluded (MND)*	(X) A3 Manufacturing		(X) B3 Repair	(X) C3 Waste processing
			(X) B4 Replacement	(X) C4 Disposal
			(X) B5 Refurbishment	
			(X) B6 Operational energy use	
			(X) B7 Operational water use	
SM Single Score				
Impacts per faucet	15.3 mPts	0.07 mPts	789 mPts	0.02 mPts
			Volume of water used	

(X) A4 Transportation/

Impact category

Global warming

Ozone depletion

Acidification

Eutrophication

Carcinogenics

Ecotoxicity

Non-carcinogenics

Fossil fuel depletion

Materials or processes contributing

Unit

kg CO₂ eq kg CFC-11 eq

kg SO₂ eq

kg N eq

CTU_h

CTU_h

CTU

MJ surplus

2024; SimaPro Analyst 9.5; ecoinvent and USLCI databases; TRACI 2.1.

ISO 14025, "Sustainability in buildings and civil engineering works -- Core

rules for environmental product declarations of construction products and

ISO 21930:2017, "Sustainability in Building Construction — Environmental Declaration of Building Products" serves as the core PCR along with

LIFE CYCLE STAGE	PRODUCTION	CONSTRUCTION	USE	END OF LIFE	
Standard-S Faucet Series (with n	nixing valve) - TRACI v	2.1 results per function	onal unit		
>20% to total impacts in each life cycle stage	addition to manufacturing processes such as brass turning.	product to installation site or consumer and disposal of packaging.	the product and the number of replacements required over the building's lifetime.	processing, waste processing and disposal of material flows transported to a landfill.	

8.94E-01

1.97E-09

7.88E-03

8.00E-04

Transportation of the

luman health damage	

6.67E+01

4.54E-06

8.90E-01

5.00E-01

3.01E-06

9.98E-05

2.56E+02

4.38E+01

0

0

Brass parts together with

the printed wiring board in

Impact category	Unit					
Smog	kg O₃ eq	0	6.67E+00	2.52E-01	3.18E+02	3.18E-02
Respiratory effects	kg PM _{2.5} eq	•	1.08E-01	1.41E-04	5.36E+00	1.61E-04
Additional environmental information						
Impact category	Unit					

9.95E-09

9.29E-08

1.76E+00

1.27E+00

References LCA background report of TOTO Faucets, Flush Valves, and Residential Toilets,

Download PDF SM Transparency Report/EPD

Sustainable Minds Part A. SM Part A: LCA calculation rules and report requirements, version 2023 August, 2023. PCR review conducted by the Sustainable Minds TAB,

tab@sustainableminds.com. SM Part B: Commercial/public metered and manual lavatory faucets, v3.0

March, 2024. PCR review conducted by Hugues Imbeault-Tétreault, ing.,

M.Sc.A., Chair (Groupe AGÉCO) hugues.i-tetreault@groupeageco.ca; Rebe Feraldi, LCACP, CLAR (TranSustainable Enterprises, LLC); Rifat Karim (Sphera).

enable purchasers and users to compare the potential environmental performance of products on a life cycle basis. They are designed to present information transparently to make the limitations of comparability more understandable. Environmental declarations of products that conform to the same PCR and include the same life cycle stages, but are made by different manufacturers, may not sufficiently align to support direct comparisons. They therefore cannot be

used as comparative assertions unless the conditions as defined in ISO 14025 Section 6.7.2 'Requirements for Comparability' are satisfied. In order to support comparative assertions, this

 $\hbox{EPD meets all comparability requirements stated in ISO 14025:} 2006. \ However, differences$

SM Transparency Reports (TR) are ISO 14025 Type III environmental declarations (EPD) that

 $certain\ assumptions,\ data\ quality,\ and\ variability\ between\ LCA\ data\ sets\ may\ still\ exist.\ Any\ EPD$ comparison must be carried out at the building level per ISO 21930 guidelines, use the same subcategory PCR where applicable, include all relevant information modules, be limited to EPDs applying a functional unit, and be based on equivalent scenarios with respect to the context of $construction\ works.\ Some\ LCA\ impact\ categories\ and\ inventory\ items\ are\ still\ under\ development$

and can have high levels of uncertainty. To promote uniform guidance on the data collection, calculation, and reporting of results, the ACLCA methodology (ACLCA 2019) was used.

LEED BD+C: New Construction | v4.1 - LEED v4.1 Building product disclosure and optimization

Rating systems

performance.

Environmental product declarations

The intent is to reward project teams for selecting products from

LEED BD+C: New Construction | v4 - LEED v4

manufacturers who have verified improved life-cycle environmental

Collaborative for High Performance Schools National Criteria

Green Globes for New Construction and Sustainable **Interiors**

BREEAM New Construction 2018

Environmental Product Declarations (EPD)

MW C5.1 – Environmental Product Declarations

NC 3.5.1.2 Path B: Prescriptive Path for Building Core and Shell

NC 3.5.2.2 and SI 4.1.2 Path B: Prescriptive Path for Interior Fit-outs

Mat 02 - Environmental impacts from construction products

.5 points

.75 points

1 point

½ product

1 product

1 product

1.5 products

2 points

 Industry-average EPD Multi-product specific EPD

Product-specific EPD

SUMMARY TOTO USA Reference PCR 1155 Southern Road SM Part B: Commercial/public metered and manual lavatory faucets, v3.0

Regions; system boundaries

LCIA methodology; LCA software;

In accordance with ISO 14044 and the referenced PCR, the life cycle assessment was conducted by

Public LCA

Certified **Environmental Product Declaration**

Contact us **Functional unit**

Morrow, GA 30260

Validity: 08/31/2024 - 08/30/2029 TOTO - 20240831 - 006 **MATERIAL HEALTH**

Self-declared

EPD

▼ NSF 3rd-party reviewed declaration (EPD) was externally verified by Jack Geibig (Ecoform) on Transparency Report (EPD) behalf of NSF according to ISO 14044; ISO 21930:2017; SM Part A: 3rd-party verified **⋘** NSI

LCA

Material

evaluation

Ø

SM Transparency Report (EPD)™ + Material Health Overview™

This environmental product

requirements, 2023; the reference PCR; and ISO 14025:2006. Ecoform, LLC 11903 Black Road Knoxville, TN 37932 (865) 850-1883 **NSF** International

P.O Box 130140, 789 N.Dixboro Road,

Ann Arbor, MI 48105, USA

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734 769 8010

LCA calculation rules and report

One metered lavatory faucet in an

average commercial environment over the estimated service life of the

LCI database TRACI 2.1; SimaPro Analyst 9.5; ecoinvent and USLCI databases

Sustainable Minds and critically reviewed by Jack Geibig (Ecoform) on

ECA background report of TOTO Faucets, Flush Valves, and Residen Toilets, 2024

SM Transparency Catalog ▶ TOTO Showroom ▶ Standard-R and Standard-S Faucets with Mixing Valves

LCA results & interpretation

Standard-R and Standard-S Faucet Series

Standard-S (w/ thermo mix valve)

Scope and summary

○ Cradle to gate ○ Cradle to gate with options **② Cradle to grave Functional unit**

One metered lavatory faucet in an average commercial environment over the

estimated service life of the building. The expected service life (ESL) of a building is 75 years, and all use stage activity and impacts are accounted for in that full ESL period. The reference service life (RSL) of the faucet is 10 years, which is an industry-accepted average lifespan based on the economic lifespan of the product. T27S32ET includes a thermostatic mixing valve. Maintenance

Regular cleaning is assumed to use 10mL of a 1% sodium lauryl sulfate (SLS) solution daily in a commercial setting for 75 years, which is the building estimated service life. The use of 10mL/clean over 260days/year for 75 years gives a total of 195L of solution. Using a density of 1.01kg/L for a 1% SLS solution, 195kg of solution will be needed over the course of 75 years. Therefore, 2kg of SLS plus 195kg of water were included in the model.

Replacement At the end of its RSL, the faucet is assumed to be replaced. Therefore, an additional 6.5 products are included as replacements, with all life cycle

modules considered, over the building's ESL of 75 years. Manufacturing data Manufacturing data has been collected and compiled for TOTO Vietnam. Data

reporting period: 2023.

Spout body, nozzle key, mounting nut,

Material composition greater than 1% by weight AVG. % WT PART MATERIAL

Brass

generator coil cover, controller adapter				
Controller mounting bracket, spout mounting bracket & rod	Stainles steel	14.3%		
Packaging	Cardboard and p	paper 11.7%		
Controller cover	ABS	10.8%		
Hose	PVC	4.62%		
Connector	Polypropylene	2.85%		
Generator and solenoid coils	Copper	2.11%		
Hose clip	Steel	2.08%		
Spout aerator gasket	NBR	1.42%		
Board	Electronics	1.27%		
Generator base	PPO	1.10%		
Other	Other	6.63%		
Total impacts by life cycle stage [mPts/func unit]				
9.00E+02 LIFE CYCLE STA	AGE I	MPTS/FUNC. UNIT		



PRODUCTION

(X) A1 Raw materials

(X) A2 Transportation

the printed wiring board in

addition to manufacturing

6.73E+01

4.67E-06

9.26E-01

5.12E-01

3.02E-06

1.04E-04

2.61E+02

4.47E+01

0

All life cycle stages The use stage [B1-B7] dominates the results for all impact categories. The

What's causing the greatest impacts

replacements and operational water use modules are highly dominant in all

categories because of the amount of water consumed during operation and the necessity to consider an additional 6.5 products as replacements. All life cycle modules are considered throughout the estimated service life (ESL) of the building, which is 75 years. The production stage [A1-A3] itself is slightly significant but does not dominate in any impact category. Additionally, the processes associated with dismantling the product and final waste treatment during the end-of-life stage do not have a significant impact. Production stage [A1-A3]

Brass and the turning brass process, together with the printed wiring

board, have significant material contributions to the production stage.

Stainless steel materials and the turning steel process are relevant to the

carcinogenics category. The electroplating process along with injection molding are major contributors to the ozone depletion category. Furthermore, polishing has a somewhat significant processing contribution to the results. Because these products are manufactured in Vietnam but sold in the US market, the transportation via oceanic freighter appears as a relevant contributor to the fossil fuel depletion and smog categories. The other parts and processes contribute between 5% and 20% of the overall impacts in the remaining categories. Construction stage [A4-A5] Installation of the product dominates impacts in the construction stage.

potential impacts throughout the product's life cycle.

Use stage [B1-B7] Product replacements dominate impacts in the use stage. The use stage itself dominates all impact categories (>95%) due to the consideration of an additional 6.5 products as replacements. The water consumed during use and

Transportation by truck for delivery to the installation site contributes the most, and this stage contributes less than 1% of the total global warming

embedded electricity used for the water supply are also contributors in this

41.1%

stage. End-of-life stage [C1-C4] The transportation to landfill dominates impacts in the end-of-life stage. Transportation and the processes for dismantling the product contribute to a relatively low portion (<1%) of total results for all impact categories.

Operational energy and water use The amount of water used by the 0.35gpm faucet during each 15sec use is 0.0875 gallons. It is assumed to be used 90 times per day in a commercial

liter of water is used to represent energy for upstream municipal water collection, treatment, supply, and downstream management. A mix of 70% hot water and 30% cold water is assumed to be used by the faucet, with water heating consuming a blend of 67% natural gas and 33% electricity. A natural gas factor of 0.8784 Mcf of natural gas per 1,000 gallons of water and an electricity factor of 0.1765 kWh per gallon of water were used

to calculate total energy needed for water heating. Use stage electricity was

environment assuming 260 days per year over 75 years, resulting in 153,563 gallons of water over its lifetime. An electricity factor of 0.000961 kWh per

modeled using a United States grid mix. How we're making it greener TOTO PeoplePlanetWater™ programs improving environmental performance • TOTO's EcoPower® products are powered by the force of running

designed to allow water flow and accurate flush volume only when • Water consumption is reduced in the use phase due to superior

The electronic and mechanical components are programmed and

- flushing performance. See how we make it greener
- END OF LIFE

(X) B2 Maintenance

during the operation of

the product and the

1.02E+04

4.42E-04

7.42E+01

9.24E+00

1.48E-04

1.87E-03

1.08E+04

1.40E+04

Building product disclosure and optimization

Environmental product declarations

(X) C1 Deconstruction/

(X) C2 Transportation

processing, waste

2.37E-01

2.18E-08

1.36E-03

2.55E-04

3.24E-09

1.30E-07

2.86E-01 2.81E-01

processing and disposal

Demolition

(X) B1 Use

(X) A4 Transportation/

(X) A5 Construction/

Delivery

LIFE CYCLE STAGE

	() · · · · · · · · · · · · · · · · · ·	Installation	(-,	() C manapartanan
	(X) A3 Manufacturing		(X) B3 Repair	(X) C3 Waste processing
Information modules: Included (X) Excluded (MND)*			(X) B4 Replacement	(X) C4 Disposal
			(X) B5 Refurbishment	
			(X) B6 Operational energy use	
			(X) B7 Operational water use	
SM Single Score				
Impacts per faucet	15.3 mPts	0.07 mPts	789 mPts	0.02 mPts
	Brass parts together with	Transportation of the	Volume of water used	Transport to waste

stage	processes such as brass turning.	or consumer and disposal of packaging.	number of replacements required over the building's lifetime.	of material flows transported to a landfill.			
Standard-S Faucet Series (with thermostatic mixing valve) - TRACI v2.1 results per functional unit							
LIFE CYCLE STAGE	PRODUCTION	CONSTRUCTION	USE	END OF LIFE			
Ecological damage							

9.43E-01

1.96E-09

8.90E-03

8.17E-04

Transportation of the

product to installation site

Impact category Unit

Human health damage

Impact category **Global warming**

Ozone depletion

Acidification

Eutrophication

Carcinogenics

Ecotoxicity

services"

Non-carcinogenics

Fossil fuel depletion

Materials or processes contributing

>20% to total impacts in each life cycle

kg CO₂ eq

kg SO₂ eq

kg N eq

CTU_h

CTU_h

CTU

MJ surplus

kg CFC-11 eq

impact category	Offic					
Smog	kg O₃ eq	0	6.80E+00	2.85E-01	3.20E+02	2.78E-02
Respiratory effects	kg PM _{2.5} eq	0	1.12E-01	1.58E-04	5.40E+00	1.49E-04
Additional environmental information						
Impact category	Unit					

1.09E-08

1.02E-07

1.93E+00

1.39E+00

References

LCA Background Report

tab@sustainableminds.com.

Sustainable Minds Part A. SM Part A: LCA calculation rules and report requirements, version 2023

August, 2023. PCR review conducted by the Sustainable Minds TAB,

LCA background report of TOTO Faucets, Flush Valves, and Residential Toilets,

ISO 14025, "Sustainability in buildings and civil engineering works -- Core

rules for environmental product declarations of construction products and

ISO 21930:2017, "Sustainability in Building Construction — Environmental Declaration of Building Products" serves as the core PCR along with

2024; SimaPro Analyst 9.5; ecoinvent and USLCI databases; TRACI 2.1.

Download PDF SM Transparency Report/EPD SM Transparency Reports (TR) are ISO 14025 Type III environmental declarations (EPD) that

on a life cycle basis. They are designed to present information transparently to make the

limitations of comparability more understandable. Environmental declarations of products that conform to the same PCR and include the same life cycle stages, but are made by different

enable purchasers and users to compare the potential environmental performance of products

manufacturers, may not sufficiently align to support direct comparisons. They therefore cannot be used as comparative assertions unless the conditions as defined in ISO 14025 Section 6.7.2 'Requirements for Comparability' are satisfied. In order to support comparative assertions, this

SM Part B: Commercial/public metered and manual lavatory faucets, v3.0 March, 2024. PCR review conducted by Hugues Imbeault-Tétreault, ing.,

M.Sc.A., Chair (Groupe AGÉCO) hugues.i-tetreault@groupeageco.ca; Rebe Feraldi, LCACP, CLAR (TranSustainable Enterprises, LLC); Rifat Karim (Sphera).

EPD meets all comparability requirements stated in ISO 14025:2006. However, differences certain assumptions, data quality, and variability between LCA data sets may still exist. Any EPD comparison must be carried out at the building level per ISO 21930 guidelines, use the same su category PCR where applicable, include all relevant information modules, be limited to EPDs

calculation, and reporting of results, the ACLCA methodology (ACLCA 2019) was used.

applying a functional unit, and be based on equivalent scenarios with respect to the context of construction works. Some LCA impact categories and inventory items are still under development and can have high levels of uncertainty. To promote uniform guidance on the data collection,

LEED BD+C: New Construction | v4.1 - LEED v4.1

☐ Industry-wide (generic) EPD

Product-specific Type III EPD

Industry-wide (generic) EPD

Product-specific Type III EPD

Third-party certified type III EPD

Rating systems

Building product disclosure and optimization **Environmental product declarations**

Collaborative for High Performance Schools National

Green Globes for New Construction and Sustainable

NC 3.5.1.2 Path B: Prescriptive Path for Building Core and Shell

NC 3.5.2.2 and SI 4.1.2 Path B: Prescriptive Path for Interior Fit-outs

The intent is to reward project teams for selecting products from

LEED BD+C: New Construction | v4 - LEED v4

manufacturers who have verified improved life-cycle environmental

Criteria **MW C5.1 – Environmental Product Declarations**

Materials and resources

Mat 02 - Environmental impacts from construction products

.5 points

.75 points

1 point

½ product

1 product

1 product

1.5 products

2 points

Environmental Product Declarations (EPD) ☐ Industry-average EPD

Multi-product specific EPD

Product-specific EPD

BREEAM New Construction 2018

TOTO USA 1155 Southern Road Morrow, GA 30260

Contact us

EPD	LCA		SUMMARY
3rd-party reviewed	⊘ (S)	This environmental product declaration (EPD) was externally	Reference PC SM Part B: Co
		verified by Jack Geibig (Ecoform) on	motored and

SM Transparency Report (EPD)™ + Material Health Overview™

behalf of NSF according to ISO

14044: ISO 21930:2017; SM Part A: 3rd-party verified LCA calculation rules and report requirements, 2023; the reference PCR; and ISO 14025:2006. Validity: 08/31/2024 - 08/30/2029 TOTO - 20240831 - 006 Ecoform, LLC 11903 Black Road Material MATERIAL HEALTH evaluation Knoxville, TN 37932 (865) 850-1883 Self-declared **NSF** International

Transparency Report (EPD)

North America; Cradle-to-grave **Functional unit**

Regions; system boundaries

One metered lavatory faucet in an average commercial environment over the estimated service life of the building

LCIA methodology; LCA software; LCI database TRACI 2.1; SimaPro Analyst 9.5; ecoinvent and USLCI databases

In accordance with ISO 14044 and the referenced PCR, the life cycle assessment was conducted by Sustainable Minds and critically reviewed by Jack Geibig (Ecoform) on

behalf of NSF.

Public LCA LCA background report of TOTO Faucets, Flush Valves, and Residential Toilets, 2024

Certified Environmental **Product Declaration**

P.O Box 130140, 789 N.Dixboro Road.

Ann Arbor, MI 48105, USA

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insparency Report (EPD)

EPD additional content

EPD additional content

Background This product-specific plant-specific declaration was created by

collecting production data from the Vietnam location. All unit processes were

to complete the inventory. In the manufacturing of the products, secondary

materials such as scrap metals and metal bars used to hold the primary products in place were partially incorporated in the manufacturing of the

modeled using primary data. Secondary data sources include those available in ecoinvent and USLCI databases. Literature data was used to fill any data gaps

primary products but were not considered due to a lack of background data in

Cut-off criteria for the inclusion of mass and energy flows are 1% of renewable

primary resource (energy) usage, 1% nonrenewable primary resource (energy) usage, 1% of the total mass input of that unit process, and 1% of environmental

impacts. The total of neglected input flows per module does not exceed 5% of

energy usage, mass, and environmental impacts. The only exceptions to these criteria are substances with hazardous and toxic properties, which must be

listed even when the given process unit is under the cut-off criterion of 1% of

Faucets include a lithium-ion battery which contains 1, 2-Dimethoxyethane

(CAS# 110-71-4), a substance added to the SVHC Candidate List per the EU

REACH Regulation. Because the battery is sealed, 100% of this hazardous

Data sets contributing 5% or more to any environmental impact category

Software

SimaPro

Analyst

SimaPro

Analyst

SimaPro

Analyst

SimaPro

Analyst

Analyst

SimaPro

Analyst

SimaPro

Analyst

SimaPro

Analyst

SimaPro

Analyst

Analyst

9.5

9.5

9.5

9.5 SimaPro

9.5

9.5

9.5

9.5

9.5

9.5

China

China

China

United

States

Vietnam

Global

United

States

Vietnam

Vietnam

Global

Waste

disposal

Emissions

Wastewater

Wastewater

End of life C1-C4

3.76E-01

4.95E-07

4.83E-03

4.33E-02

3.73E-03

7.79E+00

2.27E+01

3.82E+00

1.59E-07

1.56E-06

9.45E+00

5.30E+00

147F+01

2.02E+02

3.05E+00

2.05E+02

0.00E+00

0.00E+00

0.00E+00

0.00E+00

1.70E-04

1.88E+02

2.93E+01

7.76E-04

1.80E-06

2.93E+01

0

0

0

0

0

0.00E+00

0

0

0

0

0.00E+00 0.00E+00

0

0

0

0

0

0.00E+00

0.00E+00 0

0

0.00E+00

0

0

0

By mass

after cut-off, including the faucet and packaging materials.

ecoinvent

ecoinvent

ecoinvent

US-EI 2.2

US-EI 2.2

US-EI 2.2

US-EI 2.2

US-EI 2.2

ecoinvent

ecoinvent

Raw materials [A1]

Transportation [A2]

Core injection & ction molding or zinc die-casting

Assembling, labe

Final product

Transportation [A4]

Installation [A5]

Maintenance (cleaning) B2

Product replaceme after RSL [B4]

Operational energy & water use [B6, B7]

Transportation [C2]

Use B1-B7

The reported values for all indicators in the below tables for B1, B5, and C1 are zero.

4.32E-04

5.84E-10

2.39E-04

3.60E-05

2.98E-06

1.48E-01

6.56E-03

5.05E-03

7.31E-11

7.26E-10

-5.30E+00

5.30E+00

1.28E-03

-2.99E+00

3.05E+00

6.41E-02

0

0

0

0

1.03E-02

5.46E-02

1.43E+00

1.19E-07

1.03E-09

0

0

0

0

0

0

0

0

0

0

0

3.04E-01

0

Disposal [C4]

2.24E-01

1.12E-09

4.49E-04

7.00E-03

1.22E-04

6.37E-01

1.13E+00

1.57E+00

8.81E-09

8.22E-08

-5.28E+00

5.30E+00

1.83E-02

5.53E+00

3.05E+00

8.59E+00

0

0

0

0

7.54E-04

8.47E+00

1.20E+00

1.67E-06

1.60E-08

0

0

0

0

0

0

0

0

0

0

0

0

0

Use [B1-B7]

ling, and

_ _ _ _ 1

v3.10

v3.10

Manufacture [A3]

v3.10

v3.10

v3.10

substance is confined in the battery. A check was performed to ensure that the completeness of the overall material use is >99.0wt% of the finished product

Sustainable Minds

Data

the LCA model.

the total mass.

Stainless steel,

9% Ni 18% Cr

Stainless steel.

8% Ni 18% Cr

Bronze, C83600

Brass, at plant

average

Turning, brass, CNC,

Printed wiring board,

surface mounted,

containing, at plant

Tap water, at user

Electricity, low

Vietnam

<100kW

refinery

Flow diagram

voltage, at grid,

Heat, natural gas, at

boiler modulating

Copper, primary, at

natural gas

Water

Ancillary materials

Packaging

SLS

Electricity, natural gas

Water

A1-A3

LCIA results Smog (kg O3

CFC-11 eq) Eutrophication

(kg N eq) Acidification

(kg SO2 eq) Respiratory

effects (kg

PM2.5 eq) Global

warming (kg

CO2 eq)

Fossil fuel

surplus) **Ecotoxicity**

(CTUe) Carcinogenics

(CTUh) Non

(CTUh)

Renewable primary energy used

as energy carrier (fuel) (MJ, LHV) Renewable primary

carcinogenics

Resource use indicators

depletion (MJ

eq) Ozone depletion (kg

removals per functional unit

6.11E+00

4.11E-06

4.21E-01

8.00E-01

9.63E-02

6.28E+01

4.04E+01

2.24E+02

2.81E-06

7.82E-05

-7.65E+01

128F+02

5.18E+01

6.47E+02

1.57E+01

6.63E+02

0

0

0

8.23E-04

6.45E+02

Output flows and waste category indicators

3.38E-03

2.99E+01

2.34E-03

1.87E-06

0

0

0

0

0

0

0

0

0

3.04E-01

Additional environmental information

unspec., Pb

SUS303 (austenitic)

SUS304 (austenitic)

1010 Showloom	•	Standard-It and Standard-ST addets with Mixing I	va

PERFORMANCE DASHBOARD

Distribution	[A4]

Plant location

i idiit iocation
Distance (port of Savannah to plant)
Vehicle type

In 2023, outbound shipments of faucets from Fairburn were transported an
average of 947 miles (1,524 km) by diesel truck and an average of 1,114 miles
(1,793 km) by rail. The quantity transported by truck is 83%, and by rail 17%.
End of life [C1-C4]

2 LCA & MATERIAL RESULTS & INTERPRETATION

Scenarios and additional technical information

Standard-R and Standard-S Faucet Series

Fairburn, GA

Diesel truck

Potential waste

Commercial faucet

406 km

3 HOW WE MAKE IT GREENER

The model reflects the assumptions that toilets are 100% landfilled. The product is assumed to be transported 100 km via truck to final disposal. However, it should be noted that many of the associated metal and plastic components follow the waste scenarios as listed in the table below. TOTO

ceramic materials can be recycled as aggregate in several applications,

that case, and no credits for material recovery are given.

although this is not currently common practice. Secondary materials, including shredded and sorted metal waste, are valuable goods that lose their status as waste after the sorting process. No additional waste processing is needed in

Material

Produ

scenario - Recycling scenario - Landfill 70.5% Brass, zinc, steel, copper 29.5% 33.5% Corrugated board, paper 66.5%

Potential waste

Product code	ASTM or ANSI product	Physical prope and technical
Product information		
ABS, EPDM, rubber, PP, PVC	15.0%	85.0%

ASME A112.18.1, CSA

the unit processes modeled. Allocation approaches in the background data

follow the ecoinvent methodology. No co-product allocations were made in

B125.1

Maintenance and operation of support equipment

• Building operational energy and water use

Major assumptions and limitations

on rail lines and port information.

Data quality assessment

and reported pallet quantity of specific models.

IAPMO(cUPC)

Allocation Allocations of multi-input and multi-output processes follow a
mass-based approach in the collected data, which is the most appropriate for

Major system boundary exclusions

T28S32E, T28S32EM

T27S32E, T27S32EM

& T28S32ET;

& T27S32ET

the model.

Human labor and employee transport
Manufacture & transport of packaging materials not associated w/ final product
Energy consumption in warehouses, distribution centers, and retail facilities during the course of transport to the final customer

Disposal of packaging materials not associated with final product

Transportation of all raw materials with the mass above 1% of the

cumulative mass of the model, products from vendors, is estimated based

Pallet use is assumed based on the average numbers per unit of product

Precision: The precision of the data is considered high. Product engineers

information for the manufacturing facilities. The raw material transportation distances were calculated based on the raw material manufacturers'

provided detailed bills of materials, and facility managers provided utility

Construction of major capital equipment, water & wastewater infrastructure

Proxy datasets were utilized in the LCA model when secondary data were not available, as shown in Appendix A in the published LCA background report.

addresses, extracted from the relevant SDSs.

included all known material and energy flows. As pointed out in that section, no known flows above 1% were excluded and the sum of all excluded flows totals less than 5%, whether evaluated by mass, energy, or potential environmental impact.

Consistency: The consistency of the model is considered high. The bills of

materials provided by the product engineers were developed for multiple

The LCA practitioner also cross-referenced the installation documents and

other relevant information to ensure consistency. Furthermore, modeling assumptions were consistent across the model, with preference given

internal departments use and are maintained regularly.

4.08E+00

3.91E-06

2.91E-02

3.79E-02

6.87E+01

towards SimaPro data, where available.

Completeness: The data included is considered complete. The LCA model

Standard-R Faucet Series (no mixing valve) - LCIA results, resource use, output and waste flows, and carbon emissions &

3.69E-03

4.07E-11

8.32E-06

1.28E-04

2.00E-06

2.31E-02

4.09E-02

5.69E-02

3.20E-10

2.98E-09

-5.25E+00

5.25E+00

6.63F-04

-2.74E+00

3.05E+00

3.12E-01

0.00E+00

0.00E+00

0.00E+00

0.00E+00

2.74E-05

3.07E-01

5.40E-01

6.06E-08

5.80E-10

2.37E+00

0

0

0

0

0

0

0

0

0

0

0

0

1.44E-02

1.11E-08

9.81E-05

6.17E-04

8.50E-05

7.86E-02

1.18E-01

9.81E-02

1.54E-09

6.62E-08

-1.37E+01

1.39E+01

1.66E-01

1.13E+00

0.00E+00

1.13E+00

0.00E+00

0.00E+00

0.00E+00

0.00E+00

1.12E-02

1.04E+00

0.034

0.00E+00

1.98E-05

3.01E-08

2.37E+00

0

0

0

0

0

0

0

0

0

0

0

3.90E-03

5.44E-09

9.09E-05

3.08E-04

2.36E-05

8.32E-02

5.92E-02

4.08E-02

4.64E-10

4.03E-09

-5.28E+00

5.30E+00

1.36E-02

-2.45E+00

3.05E+00

6.06E-01

0.00E+00

0.00E+00

0.00E+00

0.00E+00

1.18E-03

5.16E-01

0.034

0.00E+00

1.58E-06

1.02E-08

2.37E+00

0

0

0

0

0

0

0

0

0

0

0

2.76E+02

2.61E-04

8.12E+00

3.68E+01

3.03E+00

5.49E+03

4.60E+03

5.22E+03

1.21E-04

1.41E-03

-8.71E+01

139F+02

5.18E+01

6.50E+02

2.18E+01

6 71F+02

0.00E+00

0.00E+00

0.00E+00

0.00E+00

1.19E-02

6.54E+02

3.38E-03

3.26E+01

2.34E-03

1.89E-06

0.00E+00

0

0

0

0

0

3.04E-01

3.04E-01

0

0

0

0

1.03E-04

8.01E+00

2.06E-04 4.66E-05

2.65E+01

2.38E+02

7.35E+00 3.20E-01 2.60E-01

2.76E+01

2.40E+00 4.90E-01

4.18E+03 1.17E+03

3.99E+03

9.40E+02

1.25E-03

1.06E-05

5.71E+01

1.70E+03 2.77E+03 6.22E+01

3.82E+03

2.53E+02

4.07E+03

6.24E+04

4.65E+01

6.24E+04

0.00E+00

0.00E+00

0.00E+00

0.00E+00

1.63E-02

4.71E+04

9.35E+01

2.48E-01

2.04E-03

5.45E+01

0

0

0

0

0.00E+00 0

4.56E-01

4.56E-01

0

0

0

0

6.29E-05

3.48E+02

0.00E+00

3.48E+02

1.81E+04

0.00E+00

1.81E+04

0.00E+00

0.00E+00

0.00E+00

0.00E+00

6.25E-03

1.59E+04

0.00E+00

3.53E-02

3.10E-04

0.00E+00

0

0

0

0

0

0

0

0

0

0.00E+00 0

0

1.74E-05

2.07E+02

0.00E+00

2.07E+02

8.14E+02

0.00E+00

8.14E+02

0.00E+00

0.00E+00

0.00E+00

0.00E+00

9.99E-03

6.76E+02

0.00E+00

5.11E-03

1.88E-05

0.00E+00

0

0

0

0

0

0

0

0

0

0

0

0

4.30E-06

- resources with energy content used as material (MJ, LHV)
- Total use of primary
 - renewable resources with energy content (MJ, LHV)
 - Nonrenewable primary resources

used as an energy carrier (fuel) (MJ, LHV) Nonrenewable primary resources

with energy content used as material (MJ, LHV) Total use of nonrenewable primary

resources with energy content (MJ, LHV) Secondary

materials (kg) Renewable secondary

fuels (MJ, LHV) Nonrenewable

secondary fuels (MJ, LHV) Recovered

energy (MJ,

resources (m3)Abiotic depletion

potential, fossil (MJ)

Hazardous

waste disposed (kg)

Nonhazardous

waste disposed (kg) High-level radioactive waste,

conditioned, to final repository (kg) Intermediateand low-level radioactive

waste. conditioned to final repository (kg) Components

for re-use (kg) Materials for

recycling (kg) Materials for

energy (MJ, LHV) Carbon emissions and removals Biogenic Carbon

Removal from Product (kg CO2) Biogenic Carbon Emission from

Product (kg CO2) Biogenic Carbon

Removal from Packaging (kg CO2) Biogenic Carbon

Emission from

Packaging (kg CO2)

Biogenic Carbon Emission from Combustion of Waste from

Renewable Sources Used in Production Processes (kg CO2)

Calcination Carbon

Emissions (kg CO2)

Carbonation Carbon

Removals (kg CO2) Carbon

Emissions from Combustion

energy recovery (kg) Exported

LHV) Use of net fresh water

Standard-R Fa emovals per												
	functional	unit										
Parameter LCIA results Smog (kg O3 eq)	A1-A3 6.67E+00	A4 2.51E-01	5.35E-04	3.76E-01	0.00E+00	2.87E+02	2.65E+01	4.08E+00	C2 5.59E-03	C3 2.21E-02	C4 4.12E-03	3.25E+02
Ozone depletion (kg CFC-11 eq)	4.54E-06	1.25E-09	7.22E-10	4.95E-07	0.00E+00	3.90E-04	4.66E-05	3.91E-06	6.17E-11	1.74E-08	5.68E-09	4.45E-04
Eutrophication (kg N eq) Acidification (kg SO2 eq)	5.00E-01 8.90E-01	5.03E-04 7.84E-03	2.97E-04 4.40E-05	4.83E-03 4.33E-02	0.00E+00 0.00E+00	8.74E+00 6.55E+01	3.20E-01 8.01E+00	2.91E-02 2.60E-01	1.26E-05 1.94E-04	1.53E-04 9.76E-04	9.70E-05 3.16E-04	9.60E+00 7.47E+01
Respiratory effects (kg PM2.5 eq) Global	1.08E-01 6.67E+01	1.37E-04 7.12E-01	3.68E-06 1.82E-01	3.73E-03 7.79E+00	0.00E+00	4.83E+00 8.94E+03	4.90E-01 1.17E+03	3.79E-02 6.87E+01	3.03E-06 3.51E-02	1.33E-04 1.27E-01	2.45E-05 8.73E-02	5.47E+00 1.02E+04
warming (kg CO2 eq) Additional enviro Fossil fuel	onmental info	ormation										
depletion (MJ surplus) Ecotoxicity (CTUe)	4.38E+01 2.56E+02	1.26E+00 1.75E+00	8.14E-03 6.22E-03	2.27E+01 3.82E+00	0.00E+00 0.00E+00	9.70E+03	1.70E+03 9.40E+02	6.22E+01 5.71E+01	6.20E-02 8.63E-02	1.88E-01 1.70E-01	6.17E-02 4.51E-02	1.40E+04 1.10E+04
Carcinogenics (CTUh) Non carcinogenics (CTUh) Resource use in	3.01E-06 9.98E-05	9.86E-09 9.20E-08	9.09E-11 8.94E-10	1.59E-07 1.56E-06	0.00E+00 0.00E+00	1.33E-04 1.75E-03	1.06E-05 6.29E-05	4.30E-06 1.74E-05	4.85E-10 4.53E-09	2.44E-09 1.19E-07	4.75E-10 4.09E-09	1.51E-04 1.93E-03
Renewable primary energy used as energy carrier (fuel) (MJ, LHV)	-6.84E+01	-5.28E+00	-5.30E+00	9.45E+00	0.00E+00	3.90E+03	3.48E+02	2.07E+02	-5.25E+00	-1.36E+01	-5.28E+00	-7.90E+01
primary resources with energy content used as material (MJ, LHV) Total use of	1.28E+02	5.30E+00	5.30E+00	5.30E+00	0.00E+00	2.53E+02	0.00E+00	0.00E+00	5.25E+00	1.39E+01	5.30E+00	1.39E+02
renewable primary resources with energy content (MJ, LHV)	5.99E+01	2.05E-02	1.60E-03	1.47E+01	0.00E+00	4.16E+03	3.48E+02	2.07E+02	1.01E-03	2.98E-01	1.37E-02	5.99E+01
renewable primary resources used as an energy carrier fuel) (MJ, LHV)	6.77E+02	6.51E+00	-3.02E+00	2.02E+02	0.00E+00	6.27E+04	1.81E+04	8.14E+02	-2.62E+00	1.83E+00	-2.47E+00	6.81E+02
venewable primary sesources with energy content used as material MJ, LHV)	1.59E+01	3.10E+00	3.10E+00	3.10E+00	0.00E+00	4.72E+01	0.00E+00	0.00E+00	3.10E+00	0.00E+00	3.10E+00	2.21E+01
Total use of mon- renewable orimary resources with energy content (MJ,	6.93E+02	9.61E+00	7.95E-02	2.05E+02	0.00E+00	6.28E+04	1.81E+04	8.14E+02	4.73E-01	1.83E+00	6.26E-01	7.03E+02
LHV) Secondary materials (kg) Renewable secondary ruels (MJ, LHV)	0	0	0	0.00E+00	0.00E+00	0.00E+00 0.00E+00	0.00E+00	0.00E+00	0.00E+00 0.00E+00	0.00E+00	0.00E+00	0.00E+00
Non- renewable secondary ruels (MJ,	0	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
LHV) Recovered energy (MJ, LHV)	0	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Jse of net fresh water resources m3)	9.14E-04	8.43E-04	1.04E-02	1.70E-04	0.00E+00	1.76E-02	6.25E-03	9.99E-03	4.15E-05	1.32E-02	1.20E-03	1.21E-02
Abiotic depletion potential, fossil (MJ) Dutput flows and	6.71E+02	9.48E+00	6.76E-02	1.88E+02	0.00E+00	1.17E+05	1.59E+04	6.76E+02	4.66E-01	1.68E+00	5.36E-01	6.81E+02
Output flows and Hazardous waste disposed (kg)	d waste cate 3.38E-03	gory indicato	o O	0	0	0	0	0	0	0.034	0.034	3.38E-03
Non- nazardous waste disposed (kg)	2.99E+01	1.20E+00	1.43E+00	2.93E+01	0.00E+00	9.35E+01	0.00E+00	0.00E+00	5.40E-01	0.00E+00	0.00E+00	3.26E+01
High-level radioactive waste, conditioned, to final repository (kg)	7.76E-03	1.87E-06	1.48E-07	7.76E-04	0.00E+00	3.16E-01	3.53E-02	5.11E-03	9.20E-08	3.45E-05	1.59E-06	7.76E-03
and low-level adioactive waste, conditioned, o final epository (kg)	2.72E-06	1.79E-08	1.28E-09 0	1.80E-06	0.00E+00	2.05E-03	3.10E-04 0	1.88E-05	8.80E-10	5.08E-08	1.03E-08	2.74E-06
or re-use (kg) Materials for ecycling (kg) Materials for	0	0	0	0 2.93E+01	0 0.00E+00	0 5.58E+01	0 0.00E+00	0 0.00E+00	0 2.66E+00	0 2.66E+00	0 2.66E+00	0 0.00E+00
energy recovery (kg) Exported energy (MJ,	0	0	0	0	0	0	0	0	0	0	0	0
Carbon emissions and removals												
Biogenic Carbon Removal from Product (kg CO2) Biogenic Carbon	0	0	0	0	0	0	0	0	0	0	0	0
Carbon Emission from Product (kg CO2) Biogenic Carbon	0	0	0	0.00E+00	0.00E+00	0.00E+00	0	0	0	0	0	0
Removal from Packaging (kg CO2) Biogenic Carbon Emission from	3.04E-01 0	0	0 3.04E-01	0.00E+00	0	4.56E-01	0	0	0	0	0	3.04E-01
Packaging (kg CO2)												
Carbon Emission from Combustion of Waste from Renewable Sources Used	0	0	0	0	0	0	0	0	0	0	0	0
Carbon Emission from Combustion of Waste from Renewable Sources Used on Production Processes (kg CO2) Calcination Carbon Emissions (kg	0	0	0		0	0 0.00E+00		0	0	0	0	0
Carbon Emission from Combustion of Waste from Renewable Sources Used in Production Processes (kg CO2) Calcination Carbon Emissions (kg CO2) Carbonation Carbon Removals (kg CO2) Carbon Emissions												
Carbon Emission from Combustion of Waste from Renewable Sources Used in Production Processes (kg CO2) Calcination Carbon Emissions (kg CO2) Carbonation Carbon Removals (kg CO2) Carbon Emissions from Combustion of Waste from Renewable and Non- Renewable Sources used in Production Processes (kg	0	0	0	0.00E+00	0	0.00E+00	0	0	0	0	0	0
Carbon Emission from Combustion of Waste from Renewable Sources Used in Production Processes (kg CO2) Calcination Carbon Emissions (kg CO2) Carbonation Carbon Emissions from Combustion of Waste from Renewable and Non- Renewable Sources used in Production Processes (kg CO2) tandard-R Fa	0 0	O O o	0 0	0.00E+00 0	0	0.00E+00 0	0	0	0	0	0	0
Carbon Emission from Combustion of Waste from Renewable Sources Used in Production Processes (kg CO2) Calcination Carbon Emissions (kg CO2) Carbonation Carbon Removals (kg CO2) Carbon Emissions from Combustion of Waste from Renewable and Non- Renewable and Non- Renewable sources used in Production Processes (kg CO2) tandard-R Famissions & re Parameter LCIA results	0 0 0 aucet Serie emovals p	0 0 0 es (with the er function	0 0 ormostatic	0.00E+00 0 mixing va	O O lve) - LCIA	0.00E+00 0 results, re	O O Source us	O O Se, output	0 0 and waste	O O flows, and	0 0 0 carbon	O O Total
Carbon Emission from Combustion of Waste from Renewable Sources Used in Production Processes (kg CO2) Calcination Carbon Emissions (kg CO2) Carbonation Carbon Emissions (kg CO2) Carbone Emissions from Combustion of Waste from Renewable and Non- Renewable sources used in Production Processes (kg CO2) tandard-R Fa missions & re Parameter LCIA results Smog (kg O3 eq) Ozone depletion (kg	0 0 aucet Serie	0 0 0 es (with the er function	0 0 oermostatic	0.00E+00 0 mixing va	O O lve) - LCIA	0.00E+00 0 results, re	O O	O O Se, output a	0 0	0 0 flows, and	0 0	0 0 0 Total
Carbon Emission from Combustion of Waste from Renewable Sources Used in Production Processes (kg CO2) Calcination Carbon Emissions (kg CO2) Carbonation Carbon Removals (kg CO2) Carbone Emissions from Combustion of Waste from Renewable and Non- Renewable sources used in Production Processes (kg CO2) tandard-R Famissions & ro Parameter LCIA results Smog (kg O3 eq) Ozone depletion (kg CFC-11 eq) Eutrophication (kg N eq) Acidification	0 0 0 aucet Serie emovals p A1-A3 6.55E+00	0 0 0 0 as (with the er function A4 2.24E-01	0 0 0 ermostatic nal unit A5 4.34E-04	0.00E+00 0 mixing va B2 3.76E-01	0 0 0 lve) - LCIA B3 0.00E+00	0.00E+00 0 results,	0 0 0 0 8 86 2.65E+01	0 0 0 8e, output a 4.08E+00	0 0 0 and waste C2 4.29E-03	0 0 0 flows, and c3	0 0 0 carbon C4 4.14E-03	0 0 0 Total 3.23E+02 4.46E-04
Carbon Emission from Combustion of Waste from Renewable Sources Used in Production Processes (kg CO2) Calcination Carbon Emissions (kg CO2) Carbonation Carbon Removals (kg CO2) Carbone Emissions From Combustion of Waste from Renewable End Non- Renewable and Non- Renewable Sources used in Production Processes (kg CO2) Landard-R Famissions Emissions From Combustion of Waste from Renewable End Non- Renewable Sources used in Production Processes (kg CO2) Landard-R Famissions Emissions Emiss	0 0 0 0 aucet Serie emovals p A1-A3 6.55E+00 4.60E-06 4.77E-01	0 0 0 0 0 0 0 2.24E-01 1.12E-09 4.49E-04	0 0 0 0 ermostatic nal unit A5 4.34E-04 5.83E-10 2.48E-04	0.00E+00 0 mixing va B2 3.76E-01 4.95E-07 4.83E-03	0 0 0 lve) - LCIA B3 0.00E+00 0.00E+00	0.00E+00 0 results,	0 0 0 0 0 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8	0 0 0 6e, output 3 4.08E+00 3.91E-06 2.91E-02	0 0 0 and waste C2 4.29E-03 4.73E-11 9.68E-06	0 0 0 flows, and C3 1.94E-02 1.60E-08 1.46E-04	0 0 0 carbon C4 4.14E-03 5.75E-09 9.95E-05	0 0 0 0 3.23E+02 4.46E-04 9.27E+00 7.46E+01
Carbon Emission from Combustion of Waste from Renewable Sources Used in Production Processes (kg CO2) Calcination Carbon Emissions (kg CO2) Carbonation Carbon Removals (kg CO2) Carbone Emissions from Combustion of Waste from Renewable and Non- Renewable and Non- Renewable sources used in Production Processes (kg CO2) tandard-R Famissions & rel Parameter LCIA results Smog (kg O3 eq) Ozone depletion (kg CFC-11 eq) Eutrophication (kg N eq) Acidification (kg SO2 eq) Respiratory effects (kg PM2.5 eq) Global warming (kg CO2 eq) Additional environ	0 0 0 0 0 0 0 0 0 4.60E-06 4.77E-01 8.85E-01 1.06E-01 6.56E+01	0 0 0 0 0 0 0 0 1.12E-09 4.49E-04 7.00E-03 1.22E-04 6.37E-01	0 0 0 0 0 0 0 4.34E-04 5.83E-10 2.48E-04 3.83E-05	0.00E+00 0 mixing va B2 3.76E-01 4.95E-07 4.83E-03 4.33E-02	0 0 0 lve) - LCIA B3 0.00E+00 0.00E+00 0.00E+00	0.00E+00 0 results,	0 0 0 0 0 8 8 8 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 8e, output a 87 4.08E+00 3.91E-06 2.91E-02 2.60E-01	0 0 0 0 4.29E-03 4.73E-11 9.68E-06 1.49E-04	0 0 0 flows, and C3 1.94E-02 1.60E-08 1.46E-04 8.95E-04	0 0 0 carbon C4 4.14E-03 5.75E-09 9.95E-05 3.17E-04	0 0 0 1 Total 3.23E+02 4.46E-04 9.27E+00 7.46E+01 5.43E+00
Carbon Emission from Combustion of Waste from Renewable Sources Used in Production Processes (kg CO2) Calcination Carbon Emissions (kg CO2) Carbonation Carbon Emissions (kg CO2) Carbonation Carbon Emissions from Combustion of Waste from Renewable and Non- Renewable and Non- Renewable Sources used in Production Processes (kg CO2) tandard-R Fa missions & ro Parameter LCIA results Smog (kg O3 eq) Ozone depletion (kg CFC-11 eq) Eutrophication (kg SO2 eq) Respiratory effects (kg PM2.5 eq) Global warming (kg CO2 eq) Additional environ Fossil fuel deurelius Ecotoxicity Ecotoxicity	0 0 0 0 0 0 0 0 0 A1-A3 6.55E+00 4.60E-06 4.77E-01 8.85E-01 1.06E-01 6.56E+01	0 0 0 0 0 0 0 0 1.12E-09 4.49E-04 7.00E-03 1.22E-04 6.37E-01	0 0 0 0 0 0 4.34E-04 5.83E-10 2.48E-04 3.83E-05 3.11E-06	0.00E+00 0 mixing va B2 3.76E-01 4.95E-07 4.83E-03 4.33E-02 3.73E-03	0 0 0 lve) - LCIA B3 0.00E+00 0.00E+00 0.00E+00 0.00E+00	0.00E+00 0 results,	0 0 0 0 0 8 8 8 8 2.65E+01 4.66E-05 3.20E-01 8.01E+00 4.90E-01	0 0 0 0 8e, output a 87 4.08E+00 3.91E-06 2.91E-02 2.60E-01 3.79E-02	0 0 0 0 4.29E-03 4.73E-11 9.68E-06 1.49E-04 2.32E-06	0 0 0 flows, and 1.94E-02 1.60E-08 1.46E-04 8.95E-04 1.22E-04	0 0 0 carbon C4 4.14E-03 5.75E-09 9.95E-05 3.17E-04 2.46E-05	0 0 0 1 Total 3.23E+02 4.46E-04 9.27E+00 7.46E+01 5.43E+00 1.02E+04
Carbon Emission from Combustion of Waste from Renewable Sources Used in Production Processes (kg CO2) Calcination Carbon Emissions (kg CO2) Carbonation Carbon Emissions from Combustion of Waste from Renewable and Non- Renewable and Non- Renewable sources used in Production Processes (kg CO2) tandard-R Famissions & renewable Cources used in Production Processes (kg CO2) tandard-R Famissions & renewable Cources used in Production Processes (kg CO2) depletion (kg CO2) Carbon Emissions Renewable Sources used in Production Processes (kg CO2) depletion Cobal (kg CO2) Acidification (kg CFC-11 eq) Eutrophication (kg CFC-11 eq) Eutrophication (kg CFC-11 eq) Eutrophication (kg CO2 eq) Acidification (kg CO2 eq) Carcinopenics (cTUe) Carcinopenics (cTUe) Carcinopenics (cTUh) Non	0 0 0 0 0 0 0 0 0 0 0 0 0 4.60E-06 4.77E-01 8.85E-01 1.06E-01 6.56E+01 0nmental info 4.34E+01 2.48E+02 2.95E-06	0 0 0 0 0 0 0 0 0 0 0 1.12E-09 4.49E-04 7.00E-03 1.22E-04 6.37E-01 0rmation 1.13E+00 1.57E+00 8.81E-09	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0.00E+00 0 mixing va B2 3.76E-01 4.95E-07 4.83E-03 4.33E-02 3.73E-03 7.79E+00 2.27E+01 3.82E+00 1.59E-07	0 0 0 0 lve) - LCIA B3 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00	0.00E+00 0 results,	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 3.91E-06 2.91E-02 2.60E-01 3.79E-02 6.87E+01 5.71E+01 4.30E-06	0 0 0 0 0 4.73E-11 9.68E-06 1.49E-04 2.32E-06 2.69E-02 4.76E-02 3.72E-10	0 0 flows, and C3 1.94E-02 1.60E-08 1.46E-04 8.95E-04 1.22E-04 1.22E-01 1.71E-01 1.73E-01 2.39E-09	0 0 0 1 Carbon C4 4.14E-03 5.75E-09 9.95E-05 3.17E-04 2.46E-05 8.97E-02 4.69E-02 4.80E-10	0 0 1 Total 3.23E+02 4.46E-04 9.27E+00 7.46E+01 5.43E+00 1.02E+04 1.40E+04 1.50E-04
Carbon Emission from Combustion of Waste from Renewable Sources Used in Production Processes (kg CO2) Calcination Carbon Emissions (kg CO2) Carbonation Carbon Emissions from Combustion of Waste from Renewable and Non- Respiratory and	0 0 0 0 0 0 0 0 0 0 0 0 0 4.60E-06 4.77E-01 8.85E-01 1.06E-01 6.56E+01 0nmental info 4.34E+01 2.48E+02 2.95E-06 9.40E-05	0 0 0 0 0 0 0 0 1.12E-09 4.49E-04 7.00E-03 1.22E-04 6.37E-01 0rmation 1.13E+00 1.57E+00	0 0 0 0 0 0 0 0 0 0 0 0 0 0 4.34E-04 5.83E-10 2.48E-04 3.83E-05 3.11E-06 1.60E-01 6.59E-03 3.88E-03	0.00E+00 0 mixing va B2 3.76E-01 4.95E-07 4.83E-03 4.33E-02 3.73E-03 7.79E+00 2.27E+01 3.82E+00	0 0 0 lve) - LCIA B3 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00	0.00E+00 0 results,	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 8e, output a 87 4.08E+00 3.91E-06 2.91E-02 2.60E-01 3.79E-02 6.87E+01 6.22E+01 5.71E+01	0 0 0 0 4.73E-11 9.68E-06 1.49E-04 2.32E-06 2.69E-02 4.76E-02 6.62E-02	0 0 flows, and 1.94E-02 1.60E-08 1.46E-04 8.95E-04 1.22E-04 1.20E-01 1.71E-01 1.73E-01	0 Carbon C4 4.14E-03 5.75E-09 9.95E-05 3.17E-04 2.46E-05 8.97E-02 4.69E-02	0 0 0 1 1 3.23E+02 4.46E-04 9.27E+00 7.46E+01 5.43E+00 1.02E+04 1.08E+04 1.50E-04 1.84E-03
Carbon Emission from Combustion of Waste from Renewable Sources Used in Production Processes (kg CO2) Calcination Carbon Emissions (kg CO2) Carbonation Carbon Emissions from Combustion of Waste from Renewable and Non- Respiratory and Renewable and Non- Respiratory and Respiratory	0 0 0 0 0 0 0 0 0 0 0 0 4.60E-06 4.77E-01 8.85E-01 1.06E-01 6.56E+01 0nmental info 4.34E+01 2.48E+02 2.95E-06 9.40E-05 dicators	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 4.34E-04 5.83E-10 2.48E-04 3.83E-05 3.11E-06 1.60E-01 6.59E-03 3.88E-03 7.46E-11 7.59E-10	0.00E+00 0 mixing va B2 3.76E-01 4.95E-07 4.83E-03 4.33E-02 3.73E-03 7.79E+00 2.27E+01 3.82E+00 1.59E-07 1.56E-06	0 0 0 0 lve) - LCIA B3 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00	0.00E+00 0 results,	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 3.91E-06 2.91E-02 2.60E-01 3.79E-02 6.87E+01 5.71E+01 4.30E-06 1.74E-05	0 0 0 0 4.73E-11 9.68E-06 1.49E-04 2.32E-06 2.69E-02 4.76E-02 6.62E-02 3.72E-10 3.47E-09	0 flows, and C3 1.94E-02 1.60E-08 1.46E-04 8.95E-04 1.22E-04 1.20E-01 1.71E-01 1.73E-01 2.39E-09 1.22E-07	0 Carbon C4 4.14E-03 5.75E-09 9.95E-05 3.17E-04 2.46E-05 8.97E-02 4.69E-02 4.80E-10 4.12E-09	0 0 1.40E+04 1.40E+04 1.50E-04 1.84E-03
Carbon Emission from Combustion of Waste from Renewable Sources Used in Production Processes (kg CO2) Calcination Carbon Emissions (kg CO2) Carbonation Carbon Emissions from Combustion of Waste from Renewable End Non- Respiratory End CO2) Additional environ Extensive the depletion (MJ Europhication Respiratory End CO2 eq) Additional environ Extensive the depletion (MJ Europhication Respiratory End CO2 eq) Additional environ Extensive the depletion (MJ Europhication Respiratory Extensive the depletion (MJ Europhication Extensive the depletion (MJ Europhication Extensive the depletion (MJ Eu	0 0 0 0 0 0 0 A1-A3 6.55E+00 4.60E-06 4.77E-01 8.85E-01 1.06E-01 6.56E+01 conmental info 4.34E+01 2.48E+02 2.95E-06 9.40E-05 dicators -6.76E+01	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 4.34E-04 5.83E-10 2.48E-04 3.83E-05 3.11E-06 1.60E-01 6.59E-03 3.88E-03 7.46E-11 7.59E-10	0.00E+00 0 mixing va B2 3.76E-01 4.95E-07 4.83E-03 4.33E-02 3.73E-03 7.79E+00 2.27E+01 3.82E+00 1.59E-07 1.56E-06	0 0 0 0 lve) - LCIA B3 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00	0.00E+00 0 results,	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 6e, output a 87 4.08E+00 3.91E-06 2.91E-02 2.60E-01 3.79E-02 6.87E+01 5.71E+01 4.30E-06 1.74E-05	0 0 0 0 and waste C2 4.29E-03 4.73E-11 9.68E-06 1.49E-04 2.32E-06 2.69E-02 4.76E-02 6.62E-02 3.72E-10 3.47E-09	0 flows, and C3 1.94E-02 1.60E-08 1.46E-04 8.95E-04 1.22E-04 1.20E-01 1.71E-01 1.73E-01 2.39E-09 1.22E-07	0 Carbon C4 4.14E-03 5.75E-09 9.95E-05 3.17E-04 2.46E-05 8.97E-02 4.69E-02 4.80E-10 4.12E-09	0 0 0 1 1 1.40E+04 1.40E+04 1.50E-04 1.84E-03 1.39E+02
Carbon Emission from Combustion of Waste from Renewable Sources Used in Production Processes (kg CO2) Calcination Carbon Emissions (kg CO2) Carbonation Carbon Removals (kg CO2) Carbone Emissions from Combustion of Waste from Renewable and Non- Renewable and Non- Renewable Sources used in Production Processes (kg CO2) tandard-R Famissions & rel Parameter LCIA results Smog (kg O3 eq) Ozone depletion (kg CFC-11 eq) Eutrophication (kg N eq) Acidification (kg SO2 eq) Respiratory effects (kg PM2.5 eq) Global warming (kg CO2 eq) Additional envire Fossil fuel depletion (MJ surplus) Ecotoxicity (CTUe) Carcinogenics (CTUh) Non carcinogenics (CTUh) Renewable primary energy used as energy carrier (fuel) (MJ, LHV) Renewable primary resources with energy content used as material (MJ, LHV) Total use of renewable primary resources with energy content (MJ, LHV) Non- renewable primary resources with energy content (MJ, LHV) Non- renewable primary resources with energy content (MJ, LHV) Non- renewable primary resources with energy content (MJ, LHV) Non- renewable primary resources used as an energy carrier	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0.00E+00 0 mixing va B2 3.76E-01 4.95E-07 4.83E-03 7.79E+00 2.27E+01 3.82E+00 1.59E-07 1.56E-06 9.45E+00 1.47E+01	0 0 0 0 lve) - LCIA B3 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00	0.00E+00 0 results,	0 0 0 0 0 0 0 0 8 SOURCE US B6 2.65E+01 4.66E-05 3.20E-01 8.01E+00 4.90E-01 1.17E+03 9.40E+02 1.06E-05 6.29E-05 3.48E+02 0.00E+00 3.48E+02	0 0 0 0 0 0 0 3.91E-06 2.91E-02 2.60E-01 3.79E-02 6.87E+01 5.71E+01 4.30E-06 1.74E-05 2.07E+02	0 0 0 0 0 4.29E-03 4.73E-11 9.68E-06 1.49E-04 2.32E-06 2.69E-02 4.76E-02 6.62E-02 3.72E-10 3.47E-09 5.25E+00	0 0 10 0 1.94E-02 1.60E-08 1.46E-04 1.22E-04 1.22E-04 1.22E-01 1.73E-01 2.39E-09 1.22E-07 1.36E+01 3.07E-01	0 0 0 0 carbon C4 4.14E-03 5.75E-09 9.95E-05 3.17E-04 2.46E-05 8.97E-02 4.69E-02 4.80E-10 4.12E-09 5.30E+00	0 0 0 1 1 1.40E+04 1.40E+04 1.50E-04 1.84E-03 1.39E+02
Carbon Emission from Combustion of Waste from Renewable Sources Used in Production Processes (kg CO2) Calcination Carbon Emissions (kg CO2) Carbonation Carbon Emissions Removals (kg CO2) Carbonation Carbon Emissions from Combustion of Waste from Renewable and Non- Renewable and Non- Renewable Sources used in Production Processes (kg CO2) tandard-R Fa missions & ro Parameter LCIA results Smog (kg O3 eq) Ozone depletion (kg CFC-11 eq) Eutrophication (kg N eq) Acidification (kg SO2 eq) Respiratory effects (kg PM2.5 eq) Global warming (kg CO2 eq) Additional enviro Fossil fuel depletion (MJ surplus) Ecotoxicity (CTUe) Carcinogenics (CTUh) Non carcinogenics (CTUh) Renewable primary resources with energy content used as material (MJ, LHV) Renewable primary resources with energy content used as material (MJ, LHV) Total use of renewable primary resources with energy content used as material (MJ, LHV) Renewable primary resources with energy content used as material (MJ, LHV) Renewable primary resources with energy content used as material (MJ, LHV) Ron- renewable primary resources with energy content used as material (MJ, LHV) Ron- renewable primary resources with energy content used as material (MJ, LHV) Ron- renewable primary resources with energy content used as material (MJ, LHV) Ron- renewable primary resources with energy content used as material (MJ, LHV) Ron- renewable primary resources with energy content used	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0.00E+00 0 mixing va B2 3.76E-01 4.95E-07 4.83E-03 7.79E+00 2.27E+01 3.82E+00 1.59E-07 1.56E-06 9.45E+00 1.47E+01	0 0 0 0 lve) - LCIA B3 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00	0.00E+00 0 results,	0 0 0 0 0 0 0 0 8 SOURCE US B6 2.65E+01 4.66E-05 3.20E-01 8.01E+00 4.90E-01 1.17E+03 9.40E+02 1.06E-05 6.29E-05 3.48E+02 0.00E+00 3.48E+02	0 0 0 0 0 3.91E-06 2.91E-02 2.60E-01 3.79E-02 6.87E+01 5.71E+01 4.30E-06 1.74E-05 2.07E+02	0 0 0 0 0 4.29E-03 4.73E-11 9.68E-06 1.49E-04 2.32E-06 2.69E-02 4.76E-02 6.62E-02 3.72E-10 3.47E-09 5.25E+00 7.72E-04	0 0 10 0 1.94E-02 1.60E-08 1.46E-04 1.22E-04 1.22E-04 1.22E-01 1.73E-01 2.39E-09 1.22E-07 1.36E+01 3.07E-01	0 0 0 0 carbon C4 4.14E-03 5.75E-09 9.95E-05 3.17E-04 2.46E-05 8.97E-02 4.69E-02 4.80E-10 4.12E-09 5.30E+00 1.38E-02	0 0 0 1 0 1 3.23E+02 4.46E-04 9.27E+00 7.46E+01 5.43E+04 1.02E+04 1.50E-04 1.84E-03 -7.81E+01 1.39E+02
Carbon Emission from Combustion of Waste from Renewable Sources Used in Production Processes (kg CO2) Calcination Carbon Emissions (kg CO2) Carbonation Carbon Emissions From Combustion of Waste from Removals (kg CO2) Carbonation Carbon Emissions from Combustion of Waste from Renewable and Non- Renewable and Non- Renewable Sources used in Production Processes (kg CO2) tandard-R Fa missions & ro Parameter LCIA results Smog (kg O3 eq) Ozone depletion (kg CFC-11 eq) Eutrophication (kg N eq) Acidification (kg SO2 eq) Respiratory effects (kg PM2.5 eq) Global warming (kg CO2 eq) Additional environ Fossil fuel depletion (MJ surplus) Ectoxicity (CTUe) Carcinogenics (CTUh) Resource use in Renewable primary resources (CTUh) Resource use in Renewable primary resources with energy carrier (fuel) (MJ, LHV) Renewable primary resources with energy content used as Ma, LHV) Total use of renewable primary resources with energy content (MJ, LHV) Total use of renewable primary resources with energy content (MJ, LHV) Non- renewable primary resources with energy content (MJ, LHV) Total use of renewable primary resources with energy content (MJ, LHV) Total use of renewable primary resources with energy content (MJ, LHV) Total use of renewable primary resources with energy content (MJ, LHV) Non- renewable primary resources with energy content used as MJ, LHV) Total use of renewable primary resources with energy content (MJ, LHV) Total use of renewable primary resources with energy content (MJ, LHV) Total use of renewable primary resources with energy content used as MJ, LHV) Total use of renewable primary resources with energy content used as MJ, LHV) Total use of renewable primary resources with energy content (MJ, LHV) Total use of renewable primary resources with energy content used as MJ, LHV)	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0.00E+00 0 mixing va B2 3.76E-01 4.95E-07 4.83E-03 7.79E+00 2.27E+01 3.82E+00 1.59E-07 1.56E-06 9.45E+00 1.47E+01	0 0 0 0 lve) - LCIA B3 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00	0.00E+00 0 results,	0 0 0 0 0 0 0 8 8 8 8 8 8 8 8 8 8 8 8 8	0 0 0 0 6e, output a B7 4.08E+00 3.91E-06 2.91E-02 2.60E-01 3.79E-02 6.87E+01 5.71E+01 4.30E-06 1.74E-05 2.07E+02 8.14E+02	0 0 0 0 and waste C2 4.29E-03 4.73E-11 9.68E-06 1.49E-04 2.32E-06 2.69E-02 4.76E-02 6.62E-02 3.72E-10 3.47E-09 5.25E+00 7.72E-04	0 0 1.94E-02 1.60E-08 1.46E-04 1.22E-04 1.20E-01 1.71E-01 1.73E-01 2.39E-09 1.22E-07 1.36E+01 1.71E+00	0 0 0 1 Carbon C4 4.14E-03 5.75E-09 9.95E-05 3.17E-04 2.46E-05 8.97E-02 4.69E-02 4.80E-10 4.12E-09 1.38E-02 -2.47E+00	0 0 0 1 1 1.40E+04 1.40E+04 1.50E-04 1.39E+02 6.91E+02
Carbon Emission from Combustion of Waste from Renewable Sources Used in Production Processes (kg CO2) Calcination Carbon Emissions (kg CO2) Carbonation Carbon Emissions Remevable Removals (kg CO2) Carbonation Carbon Emissions from Combustion of Waste from Renewable and Non- Renewable and Non- Renewable Sources used in Production Processes (kg CO2) tandard-R Fa missions & re Parameter LCIA results Smog (kg O3 eq) Cozone depletion (kg CFC-11 eq) Eutrophication (kg N eq) Acidification (kg SO2 eq) Respiratory effects (kg PM2.5 eq) Global warming (kg CO2 eq) Respiratory effects (kg PM2.5 eq) Global warming (kg CO2 eq) Respiratory effects (kg PM2.5 eq) Global warming (kg CO2 eq) Respiratory effects (kg PM2.5 eq) Global warming (kg CO2 eq) Respiratory effects (kg PM2.5 eq) Global warming (kg CO2 eq) Respiratory effects (kg PM2.5 eq) Global warming (kg CO2 eq) Respiratory effects (kg PM2.5 eq) Global warming (kg CO2 eq) Respiratory effects (kg PM2.5 eq) Global warming (kg CO2 eq) Respiratory effects (kg PM2.5 eq) Global warming (kg CO2 eq) Respiratory effects (kg PM2.5 eq) Global warming (kg CO2 eq) Respiratory effects (kg PM2.5 eq) Global warming (kg CO2 eq) Respiratory effects (kg PM2.5 eq) Global warming (kg CO2 eq) Respiratory effects (kg PM2.5 eq) Global warming (kg CO2 eq) Respiratory effects (kg PM2.5 eq) Global warming (kg CO2 eq) Respiratory effects (kg PM2.5 eq) Global warming (kg CO2 eq) Respiratory effects (kg PM2.5 eq) Global warming (kg CO2 eq) Respiratory effects (kg PM2.5 eq) Global warming (kg CO2 eq) Respiratory effects (kg PM2.5 eq) Global warming (kg CO2 eq) Respiratory effects (kg PM2.5 eq) Global warming (kg CO2 eq) Respiratory effects (kg PM2.5 eq) Global warming (kg CO2 eq) Respiratory effects (kg PM2.5 eq) Global warming (kg CO2 eq) Respiratory effects (kg PM2.5 eq) Global warming (kg CO2 eq) Respiratory effects (kg PM2.5 eq) Global warming (kg CO2 eq) Respiratory effects (kg PM2.5 eq) Global warming (kg CO2 eq) Respiratory effects (kg PM2	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 4.34E-04 5.83E-10 2.48E-04 3.83E-05 3.11E-06 1.60E-01 6.59E-03 3.88E-03 7.46E-11 7.59E-10 1.32E-03 3.10E+00	0.00E+00 0 mixing va B2 3.76E-01 4.95E-07 4.83E-03 4.33E-02 3.73E-03 7.79E+00 1.59E-07 1.56E-06 9.45E+00 1.47E+01 2.02E+02	0 0 0 0 1ve) - LCIA B3 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00	0.00E+00 0 results,	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 3.91E-06 2.91E-02 2.60E-01 3.79E-02 6.87E+01 5.71E+01 4.30E-06 1.74E-05 2.07E+02 0.00E+00	0 0 0 0 0 4.29E-03 4.73E-11 9.68E-06 1.49E-04 2.32E-06 2.69E-02 6.62E-02 3.72E-10 3.47E-09 5.25E+00 7.72E-04 3.10E+00	0 flows, and C3 1.94E-02 1.60E-08 1.46E-04 8.95E-04 1.22E-04 1.20E-01 1.71E-01 1.73E-01 2.39E-09 1.22E-07 -1.36E+01 1.71E+00 0.00E+00	0 Carbon C4 4.14E-03 5.75E-09 9.95E-05 3.17E-04 2.46E-05 8.97E-02 4.69E-02 4.80E-10 4.12E-09 1.38E-02 -2.47E+00	0 0 0 0 1 1 3.23E+02 4.46E-04 9.27E+00 7.46E+01 5.43E+00 1.02E+04 1.84E-03 -7.81E+01 1.39E+02 6.08E+01 7.13E+02
Biogenic Carbon Emission from Combustion of Waste from Renewable Sources Used in Production Processes (kg CO2) Calcination Carbon Emissions (kg CO2) Carbonation Carbon Removals (kg CO2) Carbonation Carbon Removals (kg CO2) Carbon Emissions from Combustion of Waste from Renewable and Non- Renewable and Non- Renewable sources used in Production Processes (kg CO2) tandard-R Fa missions & re Parameter LCIA results Smog (kg O3 eq) Ozone depletion (kg CFC-11 eq) Eutrophication (kg N eq) Acidification (kg SO2 eq) Respiratory effects (kg PM2.5 eq) Global warming (kg CO2 eq) Additional envire Fospiratory effects (kg PM2.5 eq) Global warming (kg CO2 eq) Additional envire Fospiratory effects (kg PM2.5 eq) Global warming (kg CO2 eq) Acidification (kg N eq	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0.00E+00 0 mixing va B2 3.76E-01 4.95E-07 4.83E-03 7.79E+00 2.27E+01 3.82E+00 1.59E-07 1.56E-06 9.45E+00 1.47E+01 2.02E+02	0 0 0 1ve) - LCIA B3 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00	0.00E+00 0 results,	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 6e, output a B7 4.08E+00 3.91E-06 2.91E-02 2.60E-01 3.79E-02 6.87E+01 5.71E+01 4.30E-06 1.74E-05 2.07E+02 0.00E+00 8.14E+02	0 0 0 0 0 4.29E-03 4.73E-11 9.68E-06 1.49E-04 2.32E-06 2.69E-02 6.62E-02 3.72E-10 3.47E-09 5.25E+00 7.72E-04 3.10E+00	0 flows, and C3 1.94E-02 1.60E-08 1.46E-04 8.95E-04 1.22E-04 1.20E-01 1.71E-01 1.73E-01 2.39E-09 1.22E-07 -1.36E+01 1.71E+00 0.00E+00	0 Carbon C4 4.14E-03 5.75E-09 9.95E-05 3.17E-04 2.46E-05 8.97E-02 4.69E-02 4.80E-10 4.12E-09 5.30E+00 1.38E-02 -2.47E+00	0 0 0 0 1 3.23E+02 4.46E-04 9.27E+00 7.46E+01 5.43E+04 1.02E+04 1.50E-04 1.84E-03 -7.81E+01 1.39E+02
Carbon Emission from Combustion of Waste from Renewable Sources Used in Production Processes (kg CO2) Calcination Carbon Emissions (kg CO2) Calcination Carbon Emissions (kg CO2) Carbonation Carbon Emissions (kg CO2) Carbon Emissions from Combustion of Waste from Renewable and Non- Renewable and Non- Renewable Sources used in Production Processes (kg CO2) Carbon Emissions from Combustion of Waste from Renewable Sources used in Production Processes (kg CO2) Carbon Emissions & ro Parameter LCIA results Smog (kg O3 eq) Ozone depletion (kg CFC-11 eq) Eutrophication (kg N eq) Acidification (kg SO2 eq) Respiratory effects (kg PM2.5 eq) Global warming (kg CO2 eq) Respiratory effects (kg PM2.5 eq) Global warming (kg CO2 eq) Respiratory effects (kg PM2.5 eq) Global warming (kg CO2 eq) Respiratory effects (kg PM2.5 eq) Global warming (kg CO2 eq) Respiratory effects (kg PM2.5 eq) Global warming (kg CO2 eq) Respiratory effects (kg PM2.5 eq) Global warming (kg CO2 eq) Respiratory effects (kg PM2.5 eq) Global warming (kg CO2 eq) Respiratory effects (kg PM2.5 eq) Global warming (kg CO2 eq) Respiratory effects (kg PM2.5 eq) Global warming (kg CO2 eq) Respiratory effects (kg PM2.5 eq) Global warming (kg CO2 eq) Respiratory effects (kg PM2.5 eq) Global warming (kg CO2 eq) Respiratory effects (kg PM2.5 eq) Global warming (kg CO2 eq) Respiratory effects (kg PM2.5 eq) Global warming (kg CO2 eq) Respiratory effects (kg PM2.5 eq) Global warming (kg CO2 eq) Respiratory effects (kg PM2.5 eq) Global warming (kg CO2 eq) Respiratory effects (kg PM2.5 eq) Global warming (kg CO2 eq) Respiratory effects (kg PM2.5 eq) Global warming (kg CO2 eq) Respiratory effects (kg PM2.5 eq) Global warming (kg CO2 eq) Respiratory effects (kg PM2.5 eq) Global warming (kg CO2 eq) Respiratory effects (kg PM2.5 eq) Respiratory effects (kg P	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 4.60E-06 4.77E-01 8.85E-01 1.06E-01 6.56E+01 0nmental info 4.34E+01 2.48E+02 2.95E-06 9.40E-05 dicators -6.76E+01 1.28E+02 1.28E+02	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1.12E-09 4.49E-04 7.00E-03 1.22E-04 6.37E-01 0 0 1.57E+00 8.81E-09 8.22E-08 -5.27E+00 2.25E-02 7.46E+00 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0.00E+00 0.00E+00 0.00E+00 mixing va B2 3.76E-01 4.95E-07 4.83E-03 4.33E-02 3.73E-03 7.79E+00 1.56E-06 9.45E+00 1.59E-07 1.56E-06 1.47E+01 2.02E+02 0.00E+00 0.00E+00	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0.00E+00 0.00E+00 0.00E+00 results,	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 1 0 1 1 1 1 1 1 1 1 1 1 1 1 1	0 0 1.0 1.94E-02 1.60E-08 1.46E-04 8.95E-04 1.22E-04 1.20E-01 1.71E-01 1.73E-01 2.39E-09 1.22E-07 1.39E+01 1.71E+00 0.00E+00 0.00E+00	0 Carbon C4 4.14E-03 5.75E-09 9.95E-05 3.17E-04 2.46E-05 8.97E-02 4.69E-02 4.80E-10 4.12E-09 5.30E+00 1.38E-02 -2.47E+00 0.00E+00 0.00E+00	0 0 0 0 1.02E+02 4.46E-04 9.27E+00 7.46E+01 5.43E+00 1.02E+04 1.50E-04 1.50E-04 1.39E+02 6.08E+01 7.13E+02
Carbon Emission from Combustion of Waste from Renewable Sources Used in Production Processes (kg CO2) Calcination Carbon Emissions (kg CO2) Carbonation Carbon Emissions Remevable Sources Used in Production Processes (kg CO2) Carbonation Carbon Emissions from Combustion of Waste from Renewable and Non- Renewable and Non- Renewable sources used in Production Processes (kg CO2) tandard-R Fa missions & re Parameter LCIA results Smog (kg O3 eq) Ozone depletion (kg CFC-11 eq) Eutrophication (kg N eq) Acidification (kg SO2 eq) Respiratory effects (kg PM2.5 eq) Global warming (kg CO2 eq) Additional envire Fossil fuel depletion (MJ surpolation (kg N eq) Acidification (kg SO2 eq) Respiratory effects (kg PM2.5 eq) Global warming (kg CO2 eq) Additional envire Fossil fuel depletion (MJ surpolation (kg N eq) Acidification (kg N eq)	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1.12E-09 1.22E-04 7.00E-03 1.22E-04 6.37E-01 0 0 1.57E+00 8.81E-09 8.22E-08 -5.27E+00 2.25E-02 7.46E+00 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0.00E+00 0.00E+00 mixing va B2 3.76E-01 4.95E-07 4.83E-03 4.33E-02 3.73E-03 7.79E+00 1.59E-07 1.56E-06 9.45E+00 1.47E+01 2.02E+02 0.00E+00 0.00E+00	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0.00E+00 0.00E+00 results, r	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 6e, output a B7 4.08E+00 3.91E-06 2.91E-02 2.60E-01 3.79E-02 6.87E+01 5.71E+01 4.30E-06 1.74E-05 2.07E+02 0.00E+00 0.00E+00 0.00E+00	0 0 0 0 0 and waste C2 4.29E-03 4.73E-11 9.68E-06 1.49E-04 2.32E-06 2.69E-02 3.72E-10 3.47E-09 5.25E+00 7.72E-04 3.10E+00 0.00E+00 0.00E+00	0 0 0 10 0 10 0 10 0 10 10 10 10 10 10 1	0 0 0 0 Carbon C4 4.14E-03 5.75E-09 9.95E-05 3.17E-04 2.46E-05 8.97E-02 4.69E-02 4.80E-10 4.12E-09 1.38E-02 -2.47E+00 0.00E+00 0.00E+00 0.00E+00	0 0 0 0 0 0 1 3.23E+02 4.46E-04 9.27E+00 7.46E+01 5.43E+00 1.02E+04 1.50E-04 1.84E-03 -7.81E+01 1.39E+02 0.00E+00 0.00E+00

waste	3.38E-03	0	0	0	0	0	0	0	0	0.034	0.034	3.38E-03
disposed (kg) Non- hazardous	2.99E+01	1.20E+00	1.43E+00	2.93E+01	0.00E+00	9.35E+01	0.00E+00	0.00E+00	5.40E-01	0.00E+00	0.00E+00	3.26E+01
waste disposed (kg) High-level radioactive												
waste, conditioned, to final repository (kg)	7.87E-03	2.05E-06	1.22E-07	7.76E-04	0.00E+00	3.13E-01	3.53E-02	5.11E-03	7.06E-08	3.54E-05	1.60E-06	7.87E-03
Intermediate- and low-level radioactive waste,	2.79E-06	1.97E-08	1.06E-09	1.80E-06	0.00E+00	2.05E-03	3.10E-04	1.88E-05	6.75E-10	5.14E-08	1.04E-08	2.81E-06
conditioned, to final repository (kg)												
for re-use (kg) Materials for recycling (kg)	0	0	0	0 2.93E+01	0 0.00E+00	0 5.71E+01	0 0.00E+00	0 0.00E+00	0 2.94E+00	0 2.94E+00	0 2.94E+00	0 0.00E+00
Materials for energy recovery (kg)	0	0	0	0	0	0	0	0	0	0	0	0
energy (MJ, LHV)	0	0	0	0	0	0	0	0	0	0	0	0
emissions and removals Biogenic Carbon												
Removal from Product (kg CO2)	0	0	0	0	0	0	0	0	0	0	0	0
Biogenic Carbon Emission from Product (kg	0	0	0	0.00E+00	0.00E+00	0.00E+00	0	0	0	0	0	0
CO2) Biogenic Carbon Removal from	3.04E-01	0	0	0.00E+00	0	4.56E-01	0	0	0	0	0	3.04E-01
Packaging (kg CO2) Biogenic												
Carbon Emission from Packaging (kg CO2)	0	0	3.04E-01	0.00E+00	0	4.56E-01	0	0	0	0	0	3.04E-01
Biogenic Carbon Emission from Combustion of Waste from Renewable Sources Used in Production	0	0	0	0	0	0	0	0	0	0	0	0
Processes (kg CO2) Calcination Carbon												
Emissions (kg CO2) Carbonation	0	0	0	0.00E+00	0	0.00E+00	0	0	0	0	0	0
Carbon Removals (kg CO2) Carbon	0	0	0	0	0	0	0	0	0	0	0	0
Emissions from Combustion of Waste from Renewable and Non-	0	0	0	0	0	0	0	0	0	0	0	0
Renewable Sources used in Production Processes (kg CO2)												
Standard-S Faremovals per			ng valve) -	LCIA resu	lts, resour	ce use, ou	tput and w	aste flows	s, and carb	on emissio	ons &	
Parameter LCIA results	A1-A3	A4	A5	B2	B3	B4	B6	В7	C2	C3	C4	Total
Smog (kg O3 eq) Ozone depletion (kg	6.38E+00 4.17E-06	2.24E-01 1.12E-09	4.32E-04 5.84E-10	3.76E-01 4.95E-07	0.00E+00 0.00E+00	2.84E+02 3.85E-04	2.65E+01 4.66E-05	4.08E+00 3.91E-06	3.69E-03 4.07E-11	1.44E-02 1.11E-08	3.90E-03 5.44E-09	3.21E+02 4.40E-04
CFC-11 eq) Eutrophication (kg N eq)	4.17E-06 4.56E-01	1.12E-09 4.49E-04	5.84E-10 2.39E-04	4.95E-07 4.83E-03	0.00E+00 0.00E+00	3.85E-04 8.18E+00	4.66E-05 3.20E-01	3.91E-06 2.91E-02	4.07E-11 8.32E-06	1.11E-08 9.81E-05	5.44E-09 9.09E-05	4.40E-04 8.99E+00
Acidification (kg SO2 eq) Respiratory effects (kg	8.45E-01 1.02E-01	7.00E-03 1.22E-04	3.60E-05 2.98E-06	4.33E-02 3.73E-03	0.00E+00 0.00E+00	6.49E+01 4.75E+00	8.01E+00 4.90E-01	2.60E-01 3.79E-02	1.28E-04 2.00E-06	6.17E-04 8.50E-05	3.08E-04 2.36E-05	7.41E+01 5.38E+00
PM2.5 eq) Global warming (kg	1.02E-01 6.48E+01	1.22E-04 6.37E-01	2.98E-06 1.48E-01	7.79E+00	0.00E+00	4.75E+00 8.91E+03	4.90E-01 1.17E+03	3.79E-02 6.87E+01	2.00E-06 2.31E-02	7.86E-02	2.36E-05 8.32E-02	1.02E+04
CO2 eq) Additional environment Fossil fuel depletion (MJ	onmental info	ormation 1.13E+00	6.56E-03	2.27E+01	0.00E+00	1.21E+04	1.70E+03	6.22E+01	4.09E-02	1.18E-01	5.92E-02	1.40E+04
surplus) Ecotoxicity (CTUe)	2.38E+02	1.57E+00	5.05E-03	3.82E+00	0.00E+00	9.49E+03	9.40E+02	5.71E+01	5.69E-02	9.81E-02	4.08E-02	1.07E+04
Carcinogenics (CTUh) Non carcinogenics	2.88E-06 8.78E-05	8.81E-09 8.22E-08	7.31E-11 7.26E-10	1.59E-07 1.56E-06	0.00E+00 0.00E+00	1.31E-04 1.61E-03	1.06E-05 6.29E-05	4.30E-06 1.74E-05	3.20E-10 2.98E-09	1.54E-09 6.62E-08	4.64E-10 4.03E-09	1.49E-04 1.78E-03
(CTUh) Resource use in Renewable	ndicators											
energy used as energy carrier (fuel) (MJ, LHV) Renewable primary	-7.47E+01	-5.28E+00	-5.30E+00	9.45E+00	0.00E+00	3.84E+03	3.48E+02	2.07E+02	-5.25E+00	-1.37E+01	-5.28E+00	-8.53E+01
resources with energy content used as material (MJ, LHV) Total use of renewable primary	1.28E+02	5.30E+00	5.30E+00	5.30E+00	0.00E+00	2.53E+02	0.00E+00	0.00E+00	5.25E+00	1.39E+01	5.30E+00	1.39E+02
resources with energy content (MJ, LHV) Non- renewable	5.36E+01	1.83E-02	1.28E-03	1.47E+01	0.00E+00	4.09E+03	3.48E+02	2.07E+02	6.63E-04	1.66E-01	1.36E-02	5.36E+01
primary resources used as an energy carrier (fuel) (MJ, LHV) Non- renewable	6.67E+02	5.53E+00	-2.99E+00	2.02E+02	0.00E+00	6.26E+04	1.81E+04	8.14E+02	-2.74E+00	1.13E+00	-2.45E+00	6.70E+02
primary resources with energy content used as material (MJ, LHV) Total use of non- renewable	1.57E+01	3.05E+00	3.05E+00	3.05E+00	0.00E+00	4.65E+01	0.00E+00	0.00E+00	3.05E+00	0.00E+00	3.05E+00	2.18E+01
primary resources with energy content (MJ, LHV) Secondary materials (kg)	6.83E+02 0	8.59E+00 0	6.41E-02	2.05E+02 0.00E+00	0.00E+00 0.00E+00	6.27E+04 0.00E+00	1.81E+04 0.00E+00	8.14E+02 0.00E+00	3.12E-01 0.00E+00	1.13E+00 0.00E+00	6.06E-01 0.00E+00	6.91E+02 0.00E+00
Renewable secondary fuels (MJ, LHV)	0	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
renewable secondary fuels (MJ, LHV) Recovered	0	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
energy (MJ, LHV) Use of net	0	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
fresh water resources (m3) Abiotic	8.26E-04	7.54E-04	1.03E-02	1.70E-04	0.00E+00	1.63E-02	6.25E-03	9.99E-03	2.74E-05	1.12E-02	1.18E-03	1.19E-02
depletion potential, fossil (MJ) Output flows and	6.65E+02		5.46E-02	1.88E+02	0.00E+00	1.17E+05	1.59E+04	6.76E+02	3.07E-01	1.04E+00	5.16E-01	6.73E+02
Hazardous waste disposed (kg)		gorv indicato										
Non- hazardous	3.38E-03	gory indicato	0	0	0	0	0	0	0	0.034	0.034	3.38E-03
waste disposed (kg)	3.38E-03 2.99E+01		0 1.43E+00	0 2.93E+01	0 0.00E+00	0 9.35E+01	0 0.00E+00	0 0.00E+00	0 5.40E-01	0.034 0.00E+00	0.034 0.00E+00	3.38E-03 3.26E+01
waste disposed (kg) High-level radioactive waste, conditioned, to final repository (kg)		0										
waste disposed (kg) High-level radioactive waste, conditioned, to final repository (kg) Intermediate- and low-level radioactive waste, conditioned, to final repository (kg)	2.99E+01	0 1.20E+00	1.43E+00	2.93E+01	0.00E+00	9.35E+01	0.00E+00	0.00E+00	5.40E-01	0.00E+00	0.00E+00	3.26E+01
waste disposed (kg) High-level radioactive waste, conditioned, to final repository (kg) Intermediate- and low-level radioactive waste, conditioned, to final	2.99E+01 2.38E-03	0 1.20E+00 1.67E-06	1.43E+00 1.19E-07	2.93E+01 7.76E-04	0.00E+00	9.35E+01 2.48E-01	0.00E+00 3.53E-02	0.00E+00 5.11E-03	5.40E-01 6.06E-08	0.00E+00 1.98E-05	0.00E+00 1.58E-06	3.26E+01 2.38E-03
waste disposed (kg) High-level radioactive waste, conditioned, to final repository (kg) Intermediate- and low-level radioactive waste, conditioned, to final repository (kg) Components for re-use (kg) Materials for recycling (kg) Materials for energy recovery (kg)	2.99E+01 2.38E-03 1.92E-06	0 1.20E+00 1.67E-06 1.60E-08	1.43E+00 1.19E-07 1.03E-09	2.93E+01 7.76E-04 1.80E-06	0.00E+00 0.00E+00 0	9.35E+01 2.48E-01 2.04E-03	0.00E+00 3.53E-02 3.10E-04	0.00E+00 5.11E-03 1.88E-05	5.40E-01 6.06E-08 5.80E-10	0.00E+00 1.98E-05 3.01E-08	0.00E+00 1.58E-06 1.02E-08	3.26E+01 2.38E-03 1.94E-06
waste disposed (kg) High-level radioactive waste, conditioned, to final repository (kg) Intermediate- and low-level radioactive waste, conditioned, to final repository (kg) Components for re-use (kg) Materials for recycling (kg) Materials for energy	2.99E+01 2.38E-03 1.92E-06 0	0 1.20E+00 1.67E-06 1.60E-08 0	1.43E+00 1.19E-07 1.03E-09 0	2.93E+01 7.76E-04 1.80E-06 0 2.93E+01	0.00E+00 0.00E+00 0.00E+00	9.35E+01 2.48E-01 2.04E-03 0 5.49E+01	0.00E+00 3.53E-02 3.10E-04 0 0.00E+00	0.00E+00 5.11E-03 1.88E-05 0 0.00E+00	5.40E-01 6.06E-08 5.80E-10 0 2.44E+00	0.00E+00 1.98E-05 3.01E-08 0 2.44E+00	0.00E+00 1.58E-06 1.02E-08 0 2.44E+00	3.26E+01 2.38E-03 1.94E-06 0 0.00E+00
waste disposed (kg) High-level radioactive waste, conditioned, to final repository (kg) Intermediate-and low-level radioactive waste, conditioned, to final repository (kg) Components for re-use (kg) Materials for recycling (kg) Materials for energy recovery (kg) Exported energy (MJ, LHV) Carbon emissions and removals Biogenic	2.99E+01 2.38E-03 1.92E-06 0 0	0 1.20E+00 1.67E-06 1.60E-08 0 0	1.43E+00 1.19E-07 1.03E-09 0 0	2.93E+01 7.76E-04 1.80E-06 0 2.93E+01 0	0.00E+00 0.00E+00 0.00E+00 0	9.35E+01 2.48E-01 2.04E-03 0 5.49E+01 0	0.00E+00 3.53E-02 3.10E-04 0 0.00E+00 0	0.00E+00 5.11E-03 1.88E-05 0 0.00E+00 0	5.40E-01 6.06E-08 5.80E-10 0 2.44E+00	0.00E+00 1.98E-05 3.01E-08 0 2.44E+00	0.00E+00 1.58E-06 1.02E-08 0 2.44E+00 0	3.26E+01 2.38E-03 1.94E-06 0 0.00E+00
waste disposed (kg) High-level radioactive waste, conditioned, to final repository (kg) Intermediate-and low-level radioactive waste, conditioned, to final repository (kg) Components for re-use (kg) Materials for recycling (kg) Materials for energy recovery (kg) Exported energy (MJ, LHV) Carbon emissions and removals Biogenic Carbon Removal from Product (kg CO2) Biogenic	2.99E+01 2.38E-03 1.92E-06 0 0	0 1.20E+00 1.67E-06 1.60E-08 0 0	1.43E+00 1.19E-07 1.03E-09 0 0	2.93E+01 7.76E-04 1.80E-06 0 2.93E+01 0	0.00E+00 0.00E+00 0.00E+00 0	9.35E+01 2.48E-01 2.04E-03 0 5.49E+01 0	0.00E+00 3.53E-02 3.10E-04 0 0.00E+00 0	0.00E+00 5.11E-03 1.88E-05 0 0.00E+00 0	5.40E-01 6.06E-08 5.80E-10 0 2.44E+00	0.00E+00 1.98E-05 3.01E-08 0 2.44E+00	0.00E+00 1.58E-06 1.02E-08 0 2.44E+00 0	3.26E+01 2.38E-03 1.94E-06 0 0.00E+00
waste disposed (kg) High-level radioactive waste, conditioned, to final repository (kg) Intermediate-and low-level radioactive waste, conditioned, to final repository (kg) Components for re-use (kg) Materials for recycling (kg) Materials for energy recovery (kg) Exported energy (MJ, LHV) Carbon emissions and removals Biogenic Carbon Removal from Product (kg CO2) Biogenic Carbon Emission from Product (kg CO2) Biogenic Carbon	2.99E+01 2.38E-03 1.92E-06 0 0 0 0	0 1.20E+00 1.67E-06 1.60E-08 0 0 0 0 0	1.43E+00 1.19E-07 1.03E-09 0 0 0 0	2.93E+01 7.76E-04 1.80E-06 0 2.93E+01 0 0 0 0 0	0.00E+00 0.00E+00 0 0.00E+00 0 0 0 0	9.35E+01 2.48E-01 2.04E-03 0 5.49E+01 0 0 0 0	0.00E+00 3.53E-02 3.10E-04 0 0.00E+00 0 0	0.00E+00 5.11E-03 1.88E-05 0 0.00E+00 0 0	5.40E-01 6.06E-08 5.80E-10 0 2.44E+00 0 0	0.00E+00 1.98E-05 3.01E-08 0 2.44E+00 0 0	0.00E+00 1.58E-06 1.02E-08 0 2.44E+00 0 0	3.26E+01 2.38E-03 1.94E-06 0 0.00E+00 0 0
waste disposed (kg) High-level radioactive waste, conditioned, to final repository (kg) Intermediate-and low-level radioactive waste, conditioned, to final repository (kg) Components for re-use (kg) Materials for recycling (kg) Materials for energy recovery (kg) Exported energy (MJ, LHV) Carbon emissions and removals Biogenic Carbon Removal from Product (kg CO2) Biogenic Carbon Emission from Product (kg CO2) Biogenic Carbon Removal from Product (kg CO2) Biogenic Carbon Removal from Product (kg CO2) Biogenic Carbon Removal from Packaging (kg CO2) Biogenic Carbon Removal from Packaging (kg CO2)	2.99E+01 2.38E-03 1.92E-06 0 0 0 0 3.04E-01	0 1.20E+00 1.67E-06 1.60E-08 0 0 0 0 0 0	1.43E+00 1.19E-07 1.03E-09 0 0 0 0 0	2.93E+01 7.76E-04 1.80E-06 0 2.93E+01 0 0 0 0 0 0 0.00E+00	0.00E+00 0.00E+00 0 0.00E+00 0 0 0 0 0 0 0	9.35E+01 2.48E-01 2.04E-03 0 5.49E+01 0 0 0 4.56E-01	0.00E+00 3.53E-02 3.10E-04 0 0 0 0 0 0	0.00E+00 5.11E-03 1.88E-05 0 0.00E+00 0 0 0	5.40E-01 6.06E-08 5.80E-10 0 2.44E+00 0 0 0	0.00E+00 1.98E-05 3.01E-08 0 2.44E+00 0 0 0	0.00E+00 1.58E-06 1.02E-08 0 2.44E+00 0 0 0	3.26E+01 2.38E-03 1.94E-06 0 0.00E+00 0 0 3.04E-01
waste disposed (kg) High-level radioactive waste, conditioned, to final repository (kg) Intermediate-and low-level radioactive waste, conditioned, to final repository (kg) Components for re-use (kg) Materials for recycling (kg) Materials for energy recovery (kg) Exported energy (MJ, LHV) Carbon emissions and removals Biogenic Carbon Removal from Product (kg CO2) Biogenic Carbon Emission from Product (kg CO2) Biogenic Carbon Emission from Packaging (kg CO2)	2.99E+01 2.38E-03 1.92E-06 0 0 0 0	0 1.20E+00 1.67E-06 1.60E-08 0 0 0 0 0	1.43E+00 1.19E-07 1.03E-09 0 0 0 0	2.93E+01 7.76E-04 1.80E-06 0 2.93E+01 0 0 0 0 0	0.00E+00 0.00E+00 0 0.00E+00 0 0 0 0 0 0 0	9.35E+01 2.48E-01 2.04E-03 0 5.49E+01 0 0 0 0	0.00E+00 3.53E-02 3.10E-04 0 0.00E+00 0 0	0.00E+00 5.11E-03 1.88E-05 0 0.00E+00 0 0	5.40E-01 6.06E-08 5.80E-10 0 2.44E+00 0 0	0.00E+00 1.98E-05 3.01E-08 0 2.44E+00 0 0	0.00E+00 1.58E-06 1.02E-08 0 2.44E+00 0 0	3.26E+01 2.38E-03 1.94E-06 0 0.00E+00 0 0
waste disposed (kg) High-level radioactive waste, conditioned, to final repository (kg) Intermediate-and low-level radioactive waste, conditioned, to final repository (kg) Components for re-use (kg) Materials for recycling (kg) Materials for recycling (kg) Exported energy (MJ, LHV) Carbon emissions and removals Biogenic Carbon Removal from Product (kg CO2) Biogenic Carbon Emission from Packaging (kg CO2) Biogenic Carbon Emission from Packaging (kg CO2)	2.99E+01 2.38E-03 1.92E-06 0 0 0 0 3.04E-01	0 1.20E+00 1.67E-06 1.60E-08 0 0 0 0 0 0	1.43E+00 1.19E-07 1.03E-09 0 0 0 0 0	2.93E+01 7.76E-04 1.80E-06 0 2.93E+01 0 0 0 0 0 0 0.00E+00	0.00E+00 0.00E+00 0 0.00E+00 0 0 0 0 0 0 0	9.35E+01 2.48E-01 2.04E-03 0 5.49E+01 0 0 0 4.56E-01	0.00E+00 3.53E-02 3.10E-04 0 0 0 0 0 0	0.00E+00 5.11E-03 1.88E-05 0 0.00E+00 0 0 0	5.40E-01 6.06E-08 5.80E-10 0 2.44E+00 0 0 0	0.00E+00 1.98E-05 3.01E-08 0 2.44E+00 0 0 0	0.00E+00 1.58E-06 1.02E-08 0 2.44E+00 0 0 0	3.26E+01 2.38E-03 1.94E-06 0 0.00E+00 0 0 3.04E-01
waste disposed (kg) High-level radioactive waste, conditioned, to final repository (kg) Intermediate-and low-level radioactive waste, conditioned, to final repository (kg) Components for re-use (kg) Materials for recycling (kg) Materials for energy recovery (kg) Exported energy (MJ, LHV) Carbon emissions and removals Biogenic Carbon Removal from Product (kg CO2) Biogenic Carbon Emission from Product (kg CO2) Biogenic Carbon Emission from Packaging (kg CO2) Biogenic Carbon Emission from Packaging (kg CO2) Carbon Emission from Combustion of Waste from Renewable Sources Used in Production Processes (kg CO2) Calcination Carbon Emission (kg CO2)	2.99E+01 2.38E-03 1.92E-06 0 0 0 0 3.04E-01	0 1.20E+00 1.67E-06 1.60E-08 0 0 0 0 0 0 0	1.43E+00 1.19E-07 1.03E-09 0 0 0 0 0 3.04E-01	2.93E+01 7.76E-04 1.80E-06 0 2.93E+01 0 0 0 0 0 0 0.00E+00	0.00E+00 0.00E+00 0 0.00E+00 0 0 0 0 0 0 0 0 0	9.35E+01 2.48E-01 2.04E-03 0 5.49E+01 0 0 0 4.56E-01	0.00E+00 3.53E-02 3.10E-04 0 0 0 0 0 0 0 0	0.00E+00 5.11E-03 1.88E-05 0 0.00E+00 0 0 0 0	5.40E-01 6.06E-08 5.80E-10 0 2.44E+00 0 0 0 0	0.00E+00 1.98E-05 3.01E-08 0 2.44E+00 0 0 0	0.00E+00 1.58E-06 1.02E-08 0 2.44E+00 0 0 0 0	3.26E+01 2.38E-03 1.94E-06 0 0 0 0 3.04E-01
waste disposed (kg) High-level radioactive waste, conditioned, to final repository (kg) Intermediate-and low-level radioactive waste, conditioned, to final repository (kg) Components for re-use (kg) Materials for recycling (kg) Materials for energy recovery (kg) Exported energy (MJ, LHV) Carbon emissions and removals Biogenic Carbon Removal from Product (kg CO2) Biogenic Carbon Emission from Product (kg CO2) Biogenic Carbon Emission from Product (kg CO2) Biogenic Carbon Emission from Product (kg CO2) Calcination Carbon Emission from Packaging (kg CO2) Calcination Carbon Emission from Renewable Sources (kg CO2) Calcination Carbon Emissions (kg CO2)	2.99E+01 2.38E-03 1.92E-06 0 0 0 3.04E-01	0 1.20E+00 1.67E-06 1.60E-08 0 0 0 0 0 0 0 0	1.43E+00 1.19E-07 1.03E-09 0 0 0 0 3.04E-01	2.93E+01 7.76E-04 1.80E-06 0 2.93E+01 0 0 0 0 0 0 0 0 0 0 0 0	0.00E+00 0.00E+00 0 0.00E+00 0 0 0 0 0 0 0 0 0	9.35E+01 2.48E-01 2.04E-03 0 5.49E+01 0 0 0 4.56E-01 4.56E-01	0.00E+00 3.53E-02 3.10E-04 0 0 0 0 0 0 0 0	0.00E+00 5.11E-03 1.88E-05 0 0 0 0 0 0 0	5.40E-01 6.06E-08 5.80E-10 0 2.44E+00 0 0 0 0 0	0.00E+00 1.98E-05 3.01E-08 0 2.44E+00 0 0 0 0	0.00E+00 1.58E-06 1.02E-08 0 2.44E+00 0 0 0 0	3.26E+01 2.38E-03 1.94E-06 0 0 0 3.04E-01 0
waste disposed (kg) High-level radioactive waste, conditioned, to final repository (kg) Intermediate-and low-level radioactive waste, conditioned, to final repository (kg) Components for re-use (kg) Materials for recycling (kg) Materials for energy recovery (kg) Exported energy (MJ, LHV) Carbon emissions and removals Biogenic Carbon Removal from Product (kg CO2) Biogenic Carbon Emission from Product (kg CO2) Biogenic Carbon Emission from Product (kg CO2) Biogenic Carbon Emission from Product (kg CO2) Carbon Emission from Packaging (kg CO2) Carbon Emission from Combustion of Waste from Renewable Sources Used in Production Processes (kg CO2) Carbon Emissions from Combustion of Waste from Renewable Sources Used in Production Processes (kg CO2) Carbon Emissions from Combustion of Waste from Renewable Sources Used in Production Processes (kg CO2) Carbon Emissions from Combustion of Waste from Renewable Sources Used in Production Processes (kg CO2)	2.99E+01 2.38E-03 1.92E-06 0 0 0 0 3.04E-01 0	0 1.20E+00 1.67E-06 1.60E-08 0 0 0 0 0 0 0 0 0	1.43E+00 1.19E-07 1.03E-09 0 0 0 0 3.04E-01	2.93E+01 7.76E-04 1.80E-06 0 2.93E+01 0 0 0 0 0 0 0 0 0 0 0 0	0.00E+00 0.00E+00 0 0.00E+00 0 0 0 0 0 0 0 0 0 0	9.35E+01 2.48E-01 2.04E-03 0 5.49E+01 0 0 0 4.56E-01 4.56E-01 0 0.00E+00	0.00E+00 3.53E-02 0 0 0 0 0 0 0 0 0 0	0.00E+00 5.11E-03 1.88E-05 0 0.00E+00 0 0 0 0 0	5.40E-01 6.06E-08 5.80E-10 0 2.44E+00 0 0 0 0 0 0	0.00E+00 1.98E-05 3.01E-08 0 2.44E+00 0 0 0 0	0.00E+00 1.58E-06 1.02E-08 0 2.44E+00 0 0 0 0 0	3.26E+01 2.38E-03 1.94E-06 0 0 0 3.04E-01 0
waste disposed (kg) High-level radioactive waste, conditioned, to final repository (kg) Intermediate-and low-level radioactive waste, conditioned, to final repository (kg) Components for re-use (kg) Materials for recycling (kg) Materials for energy recovery (kg) Exported energy (MJ, LHV) Carbon emissions and removals Biogenic Carbon Removal from Product (kg CO2) Biogenic Carbon Emission from Product (kg CO2) Biogenic Carbon Emission from Packaging (kg CO2) Biogenic Carbon Emission from Packaging (kg CO2) Carbon Emission from Renewable Sources (kg CO2) Carbon Emissions (kg CO2) Carbon Emissions (kg CO2)	2.99E+01 2.38E-03 1.92E-06 0 0 0 3.04E-01 0 0 0	0 1.20E+00 1.67E-06 1.60E-08 0 0 0 0 0 0 0 0 0 0 0	1.43E+00 1.19E-07 1.03E-09 0 0 0 0 3.04E-01 0 0	2.93E+01 7.76E-04 1.80E-06 0 2.93E+01 0 0 0 0 0 0 0 0 0 0 0 0	0.00E+00 0.00E+00 0	9.35E+01 2.48E-01 2.04E-03 0 5.49E+01 0 0 0.00E+00 1.56E-01 0 0 0 0 0 0 0 0 0 0 0 0	0.00E+00 3.53E-02 3.10E-04 0 0 0 0 0 0 0 0 0 0 0 0	0.00E+00 5.11E-03 1.88E-05 0 0 0 0 0 0 0 0 0 0	5.40E-01 6.06E-08 5.80E-10 0 2.44E+00 0 0 0 0 0 0 0 0	0.00E+00 1.98E-05 3.01E-08 0 2.44E+00 0 0 0 0 0	0.00E+00 1.58E-06 1.02E-08 0 2.44E+00 0 0 0 0 0 0	3.26E+01 2.38E-03 1.94E-06 0 0 0 3.04E-01 0 0
waste disposed (kg) High-level radioactive waste, conditioned, to final repository (kg) Intermediate-and low-level radioactive waste, conditioned, to final repository (kg) Components for re-use (kg) Materials for recycling (kg) Materials for recycling (kg) Exported energy (MJ, LHV) Carbon emissions and removals Biogenic Carbon Removal from Product (kg CO2) Biogenic Carbon Emission from Product (kg CO2) Biogenic Carbon Removal from Product (kg CO2) Biogenic Carbon Emission from Product (kg CO2) Carbon Emission from Packaging (kg CO2) Co2) Carbon Emission from Combustion of Waste from Renewable Sources Used in Production Processes (kg CO2) Carbon Emissions (kg CO2) Carbon Emission from Combustion of Waste from Renewable Sources Used in Production Processes (kg CO2) Carbon Emissions (kg CO2)	2.99E+01 2.38E-03 1.92E-06 0 0 0 0 3.04E-01 0 0 0 0 0 0 0 0 0 0	0 1.20E+00 1.67E-06 1.60E-08 0 0 0 0 0 0 0 0 0 0	1.43E+00 1.19E-07 1.03E-09 0 0 0 0 3.04E-01 0 0	2.93E+01 7.76E-04 1.80E-06 0 2.93E+01 0 0 0 0 0 0 0 0 0 0 0 0	0.00E+00 0.00E+00 0	9.35E+01 2.48E-01 2.04E-03 0 5.49E+01 0 0 0.00E+00 1.56E-01 0 0 0 0 0 0 0 0 0 0 0 0	0.00E+00 3.53E-02 3.10E-04 0 0 0 0 0 0 0 0 0 0 0 0	0.00E+00 5.11E-03 1.88E-05 0 0 0 0 0 0 0 0 0 0	5.40E-01 6.06E-08 5.80E-10 0 2.44E+00 0 0 0 0 0 0 0 0	0.00E+00 1.98E-05 3.01E-08 0 2.44E+00 0 0 0 0 0	0.00E+00 1.58E-06 1.02E-08 0 2.44E+00 0 0 0 0 0 0	3.26E+01 2.38E-03 1.94E-06 0 0 0 3.04E-01 0 0
waste disposed (kg) High-level radioactive waste, conditioned, to final repository (kg) Intermediate-and low-level radioactive waste, conditioned, to final repository (kg) Components for re-use (kg) Materials for recycling (kg) Materials for energy recovery (kg) Exported energy (MJ, LHV) Carbon emissions and removals Biogenic Carbon Removal from Product (kg CO2) Biogenic Carbon Emission from Product (kg CO2) Biogenic Carbon Emission from Product (kg CO2) Biogenic Carbon Emission from Packaging (kg CO2) Biogenic Carbon Emission from Packaging (kg CO2) Carbon Emission from Packaging (kg CO2) Carbon Emission from Combustion of Waste from Renewable Sources Used in Production Processes (kg CO2) Carbon Emissions from Combustion of Waste from Renewable Sources Used in Production Processes (kg CO2) Carbon Emissions from Combustion of Waste from Renewable Sources Used in Production Processes (kg CO2) Carbon Emissions from Combustion of Waste from Renewable and Non-Renewable and Non-Renewable Sources used in Production Processes (kg CO2) Standard-S Faremovals per Standard-S Faremovals	2.99E+01 2.38E-03 1.92E-06 0 0 0 0 0 0 0 0 0 0 0 0	0 1.20E+00 1.67E-06 1.60E-08 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	1.43E+00 1.19E-07 1.03E-09 0 0 0 0 0 0 0 xing valve)	2.93E+01 7.76E-04 1.80E-06 0 2.93E+01 0 0 0 0 0 0 0.00E+00 0 0 1.80E-06	0.00E+00 0.00E+00 0 0.00E+00 0 0 0 0 0 0 0 0 0 0	9.35E+01 2.48E-01 2.04E-03 0 5.49E+01 0 0 0 0.00E+00 0 0 0 0 0 0 0 0 0 0 0 0	0.00E+00 3.53E-02 3.10E-04 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0.00E+00 5.11E-03 1.88E-05 0 0 0 0 0 0 waste floaters	5.40E-01 6.06E-08 5.80E-10 0 2.44E+00 0 0 0 0 0 0 0 ws, and cal	0.00E+00 1.98E-05 3.01E-08 0 2.44E+00 0 0 0 0 0 0 0 o o o o	0.00E+00 1.58E-06 1.02E-08 0 2.44E+00 0 0 0 0 0 0	3.26E+01 2.38E-03 1.94E-06 0 0 0 3.04E-01 0 0 0
waste disposed (kg) High-level radioactive waste, conditioned, to final repository (kg) Intermediate-and low-level radioactive waste, conditioned, to final repository (kg) Components for re-use (kg) Materials for recycling (kg) Materials for energy recovery (kg) Exported energy (MJ, LHV) Carbon emissions and removals Biogenic Carbon Removal from Product (kg CO2) Biogenic Carbon Emission from Product (kg CO2) Biogenic Carbon Emission from Product (kg CO2) Biogenic Carbon Emission from Packaging (kg CO2) Biogenic Carbon Emission from Packaging (kg CO2) Carbon Emission from Packaging (kg CO2) Carbon Emission from Production Processes (kg CO2) Carbon Emission from Combustion of Waste from Renewable Sources Used in Production Processes (kg CO2) Carbon Emissions from Combustion of Waste from Renewable Sources Used in Production Processes (kg CO2) Carbon Emissions from Combustion of Waste from Renewable Sources Used in Production Processes (kg CO2) Carbon Emissions from Combustion of Waste from Renewable Sources used in Production Processes (kg CO2) Carbon Emission from Combustion of Waste from Renewable Sources Used in Production Processes (kg CO2) Carbon Emission from Combustion of Waste from Renewable Sources Used in Production Processes (kg CO2) Carbon Emission from Combustion of Waste from Renewable Sources Used in Production Processes (kg CO2) Carbon Emission from Combustion of Waste from Renewable Sources Used in Production Processes (kg CO2) Carbon Emission from Combustion of Waste from Renewable Sources Used in Production Processes (kg CO2) Carbon Emission from Combustion of Waste from Renewable Sources Used in Production Processes (kg CO2)	2.99E+01 2.38E-03 1.92E-06 0 0 0 0 3.04E-01 0 0 aucet Serie functional	0 1.20E+00 1.67E-06 1.60E-08 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	1.43E+00 1.19E-07 1.03E-09 0 0 0 0 3.04E-01 0 axing valve)	2.93E+01 7.76E-04 1.80E-06 0 2.93E+01 0 0 0 0 0 0 0.00E+00 0 0 1 1 1 1 1 1 1 1 1 1	0.00E+00 0.00E+00 0 0.00E+00 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	9.35E+01 2.48E-01 2.04E-03 0 5.49E+01 0 0 0 0.00E+00 0 0 0 0 0 0 0 0 0 0 0 0	0.00E+00 3.53E-02 3.10E-04 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0.00E+00 5.11E-03 1.88E-05 0 0 0 0 0 0 waste flow	5.40E-01 6.06E-08 5.80E-10 0 2.44E+00 0 0 0 0 0 0 0 0 ws, and call	0.00E+00 1.98E-05 3.01E-08 0 2.44E+00 0 0 0 0 0 0 case of the content	0.00E+00 1.58E-06 1.02E-08 0 2.44E+00 0 0 0 0 0 0 0 o calcalate a series a serie	3.26E+01 2.38E-03 1.94E-06 0 0 0 3.04E-01 0 0 Total
waste disposed (kg) High-level radioactive waste, conditioned, to final repository (kg) Intermediate-and low-level radioactive waste, conditioned, to final repository (kg) Components for recycling (kg) Materials for recycling (kg) Materials for recycling (kg) Exported energy (MJ, LHV) Carbon emissions and removals Biogenic Carbon Removal from Product (kg CO2) Biogenic Carbon Removal from Product (kg CO2) Biogenic Carbon Removal from Product (kg CO2) Biogenic Carbon Emission from Packaging (kg CO2) Biogenic Carbon Emission from Packaging (kg CO2) Carbon Emission from Packaging (kg CO2) Carbon Emission from Combustion of Waste from Renewable Sources Used in Production Processes (kg CO2) Carbon Emissions (kg CO2) Carbon Emissions (kg CO2) Standard-S Faremovals per	2.99E+01 2.38E-03 1.92E-06 0 0 0 0 3.04E-01 0 0 0 0 0 0 0 0 0 0 0 0	0 1.20E+00 1.67E-06 1.60E-08 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	1.43E+00 1.19E-07 1.03E-09 0 0 0 0 3.04E-01 0 xing valve)	2.93E+01 1.80E-06 0 2.93E+01 0 0 0 0 0 0.00E+00 0 0.00E+00 0 - LCIA res	0.00E+00 0.00E+00 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	9.35E+01 2.48E-01 2.04E-03 0 5.49E+01 0 0 0 0.00E+00 0 0 0 0 0 0 0 0 0 0 0 0	0.00E+00 3.53E-02 0 0.00E+00 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0.00E+00 1.88E-05 0 0.00E+00 0 0 0 0 waste flow	5.40E-01 6.06E-08 5.80E-10 0 2.44E+00 0 0 0 0 0 0 0 0 ws, and call	0.00E+00 1.98E-05 3.01E-08 0 2.44E+00 0 0 0 0 0 0 0 o o o o o	0.00E+00 1.58E-06 1.02E-08 0 2.44E+00 0 0 0 0 0 0 0 0 sions &	3.26E+01 2.38E-03 1.94E-06 0 0 0 3.04E-01 7 1 1 1 1 1 1 1 1 1 1 1 1
waste disposed (kg) High-level radioactive waste, conditioned, to final repository (kg) Intermediate- and low-level radioactive waste, conditioned, to final repository (kg) Components for re-use (kg) Materials for recycling (kg) Materials for energy recovery (kg) Exported energy (MJ, LHV) Carbon emissions and removals Biogenic Carbon Removal from Product (kg CO2) Biogenic Carbon Emission from Product (kg CO2) Biogenic Carbon Emission from Product (kg CO2) Biogenic Carbon Emission from Product (kg CO2) Co2) Biogenic Carbon Emission from Product (kg CO2) Siogenic Carbon Emission from Packaging (kg CO2) Co2) Biogenic Carbon Emission from Packaging (kg CO2) Siogenic Carbon Emission from Combustion of Waste from Renewable Sources Used in Production Processes (kg CO2) Carbonation Carbon Emissions from Combustion of Waste from Renewable Sources Used in Production Processes (kg CO2) Carbon Emissions from Combustion of Waste from Renewable sources Used in Production Processes (kg CO2) Carbon Emissions from Combustion of Waste from Renewable sources Used in Production Processes (kg CO2) Carbon Emission from Combustion of Waste from Renewable Sources Used in Production Processes (kg CO2) Carbon Emission from Combustion of Waste from Renewable Sources Used in Production Processes (kg CO2) Carbon Emission from Combustion Of Waste from Renewable Sources Used in Production Processes (kg CO2) Carbon Emission from Combustion Of Waste from Renewable Sources Used in Production Processes (kg CO2) Carbon Emission from Combustion Of Waste from Renewable Sources Used in Production Processes (kg CO2) Carbon Emission from Product (kg CO2) Biogenic Carbon Emission from Produ	2.99E+01 2.38E-03 1.92E-06 0 0 0 0 3.04E-01 0 0 0 0 0 0 0 0 0 0 0 0	0 1.20E+00 1.67E-06 1.60E-08 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	1.43E+00 1.19E-07 1.03E-09 0 0 0 0 0 0 3.04E-01 0 0 xing valve) A5 5.35E-04 7.22E-10 2.97E-04	2.93E+01 7.76E-04 1.80E-06 0 2.93E+01 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0.00E+00 0.00E+00 0.00E+00 0 0 0 0 0 0 0 0 0 0 0 0	9.35E+01 2.48E-01 2.04E-03 0 5.49E+01 0 0 0 0.00E+00 0 0.00E+00 0 0 0 0 0 0 0 0 0 0 0 0	0.00E+00 3.53E-02 3.10E-04 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0.00E+00 1.88E-05 0 0.00E+00 0 0 0 0 0 0 waste flow 3.91E-06 2.91E-02	5.40E-01 6.06E-08 5.80E-10 0 2.44E+00 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0.00E+00 1.98E-05 3.01E-08 0 2.44E+00 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0.00E+00 1.58E-06 1.02E-08 0 2.44E+00 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	3.26E+01 2.38E-03 1.94E-06 0 0 0 0 3.04E-01 3.04E-01 0 0 0 0 1 1 1 1 1 1 1 1
waste disposed (kg) High-level radioactive waste, conditioned, to final repository (kg) Intermediate-and low-level radioactive waste, conditioned, to final repository (kg) Components for re-use (kg) Materials for recycling (kg) Materials for recycling (kg) Exported energy (MJ, LHV) Carbon emissions and removals Biogenic Carbon Removal from Product (kg CO2) Biogenic Carbon Emission from Product (kg CO2) Biogenic Carbon Emission from Product (kg CO2) Biogenic Carbon Emission from Product (kg CO2) Carbon Emission from Product (kg CO2) Carbon Emission from Packaging (kg CO2) Carbon Emission from Packaging (kg CO2) Carbon Emission from Combustion of Waste from Renewable Sources Used in Production Processes (kg CO2) Carbon Emissions from Combustion of Waste from Renewable Sources Used in Production Processes (kg CO2) Carbonation Carbon Emissions (kg CO2) Carbonation Carbon Emission (kg CO2) Carbon Emission from Packaging (kg CO2) Respiratory effects (kg CO2)	2.99E+01 2.38E-03 1.92E-06 0 0 0 0 3.04E-01 0 0 0 0 0 0 1.08E-01 1.08E-01 1.08E-01 1.08E-01 1.08E-01	0 1.20E+00 1.67E-06 1.60E-08 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	1.43E+00 1.19E-07 1.03E-09 0 0 0 0 0 0 3.04E-01 0 xing valve 2.97E-04 4.40E-05	2.93E+01 7.76E-04 1.80E-06 0 2.93E+01 0 0 0 0 0 0 0 0 0 0 0 0	0.00E+00 0.00E+00 0 0.00E+00 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	9.35E+01 2.48E+01 2.04E-03 0 5.49E+01 0 0 0 0.00E+00 4.56E-01 0 0 0 0 0 0 0 0 0 0 0 0	0.00E+00 3.53E-02 3.10E-04 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0.00E+00 5.11E-03 1.88E-05 0 0.00E+00 0 0 0 0 0 0 0 waste flox 1.91E-02 2.60E-01	5.40E-01 6.06E-08 5.80E-10 0 2.44E+00 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0.00E+00 1.98E-05 3.01E-08 0 2.44E+00 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0.00E+00 1.58E-06 1.02E-08 0 2.44E+00 0 0 0 0 0 0 0 0 0 0 0 0 0 sions & C4 4.12E-03 5.68E-09 9.70E-05 3.16E-04	3.26E+01 2.38E-03 1.94E-06 0 0 0.00E+00 0 0 3.04E-01 3.04E-01 0 0 7.47E+01

Mathematical	Ecotoxicity (CTUe) Carcinogenics (CTUh) Non carcinogenics	2.56E+02 3.01E-06 9.98E-05	1.75E+00 9.86E-09 9.20E-08	6.22E-03 9.09E-11 8.94E-10	3.82E+00 1.59E-07	0.00E+00 0.00E+00	9.70E+03 1.33E-04 1.75E-03	9.40E+02 1.06E-05 6.29E-05	5.71E+01 4.30E-06	8.63E-02 4.85E-10 4.53E-09	1.70E-01 2.44E-09	4.51E-02 4.75E-10 4.09E-09	1.10E+04 1.51E-04 1.93E-03
Chart Color State 1	(CTUh) Resource use in Renewable												
	energy used as energy carrier (fuel) (MJ, LHV) Renewable primary	-6.63E+01	-5.28E+00	-5.30E+00	9.45E+00	0.00E+00	3.93E+03	3.48E+02	2.07E+02	-5.25E+00	-1.36E+01	-5.28E+00	-7.69E+01
	content used as material (MJ, LHV)	1.28E+02	5.30E+00	5.30E+00	5.30E+00	0.00E+00	2.53E+02	0.00E+00	0.00E+00	5.25E+00	1.39E+01	5.30E+00	1.39E+02
	renewable primary resources with energy content (MJ, LHV)	6.20E+01	2.05E-02	1.60E-03	1.47E+01	0.00E+00	4.18E+03	3.48E+02	2.07E+02	1.01E-03	2.98E-01	1.37E-02	6.20E+01
Columb	renewable primary resources used as an energy carrier (fuel) (MJ, LHV)	6.96E+02	6.51E+00	-3.02E+00	2.02E+02	0.00E+00	6.30E+04	1.81E+04	8.14E+02	-2.62E+00	1.83E+00	-2.47E+00	7.00E+02
Mathematical Property of the color of the	resources with energy content used as material (MJ, LHV) Total use of non-	1.59E+01	3.10E+00	3.10E+00	3.10E+00	0.00E+00	4.72E+01	0.00E+00	0.00E+00	3.10E+00	0.00E+00	3.10E+00	2.21E+01
	primary resources with energy content (MJ, LHV) Secondary												
WAND STATE OF THE STA	secondary fuels (MJ, LHV)	0	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Series of the se	renewable secondary fuels (MJ, LHV)	0	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Series	energy (MJ, LHV) Use of net												
Columbia	(m3) Abiotic depletion												
The series of th	fossil (MJ) Output flows and Hazardous	d waste cate	gory indicato								0.024	0.004	2 205 02
Series	disposed (kg) Non- hazardous												
Column	High-level radioactive waste, conditioned, to final	9.12E-03	1.87E-06	1.48E-07	7.76E-04	0.00E+00	3.31E-01	3.53E-02	5.11E-03	1.08E-07	3.45E-05	1.59E-06	9.12E-03
Mathematical Content	Intermediate- and low-level radioactive waste, conditioned, to final	2.97E-06	1.79E-08	1.28E-09	1.80E-06	0.00E+00	2.06E-03	3.10E-04	1.88E-05	8.80E-10	5.08E-08	1.03E-08	2.99E-06
Company	Components for re-use (kg) Materials for												
Mathematical	Materials for energy recovery (kg)												
The content of the	energy (MJ, LHV) Carbon emissions and	0	0	0	0	0	0	0	0	0	0	0	0
Mathematical Math	removals Biogenic Carbon Removal from	0	0	0	0	0	0	0	0	0	0	0	0
Property state	CO2) Biogenic Carbon	0	0	0	0.00E+00	0.00E+00	0.00E+00	0	0	0	0	0	0
Part	Product (kg CO2) Biogenic	O	O	0			0.002+00	O	O	O	U	O	0
Record of the property of the	Packaging (kg CO2) Biogenic	3.04E-01	0	0	0.00E+00	0	4.56E-01	0	0	0	0	0	3.04E-01
Service of the servic	Emission from Packaging (kg CO2) Biogenic Carbon Emission from	0	0	3.04E-01	0.00E+00	0	4.56E-01	0	0	0	0	0	3.04E-01
Company	of Waste from Renewable Sources Used in Production Processes (kg CO2)	0	0	0	0	0	0	0	0	0	0	0	0
Record of Series	Carbon Emissions (kg CO2) Carbonation	0	0	0	0.00E+00	0	0.00E+00	0	0	0	0	0	0
The control of the co	Removals (kg CO2) Carbon	0	0	0	0	0	0	0	0	0	0	0	0
March Marc	from Combustion of Waste from Renewable and Non- Renewable Sources used in Production Processes (kg	0	0	0	0	0	0	0	0	0	0	0	0
Mathematical Personal Person	emissions & ro	emovals p	er function	nal unit									Total
Selection of Selectic 1 2 1 2 1 2 1 2 1 2 1 2 1 2 1 2 1 2 1	LCIA results Smog (kg O3 eq)												
According to the control of the cont	depletion (kg CFC-11 eq) Eutrophication												
Marchan Marc	Acidification (kg SO2 eq) Respiratory												
Fielding 19	PM2.5 eq) Global warming (kg												
Columbia	Fossil fuel depletion (MJ			6.59E-03	2.27E+01	0.00E+00	1.22E+04	1.70E+03	6.22E+01	4.76E-02	1.71E-01	6.24E-02	1.40E+04
Company Comp	(CTUe) Carcinogenics												
Seminary Property Control of Cont	carcinogenics (CTUh) Resource use in Renewable primary		1.01E-07	7.59E-10	1.56E-06	0.00E+00	1.79E-03	6.29E-05	1.74E-05	3.47E-09	1.22E-07	4.12E-09	1.97E-03
Seminated Services Se	as energy carrier (fuel) (MJ, LHV) Renewable primary resources												
with motions of the control of the c	content used as material (MJ, LHV) Total use of renewable primary resources												
Section Sect	with energy content (MJ, LHV) Non- renewable primary resources												
with nerroy of the control of the co	energy carrier (fuel) (MJ, LHV) Non- renewable primary resources	1.59E+01	3.10E+00	3.10E+00	3.10E+00	0.00E+00	4.72E+01	0.00E+00	0.00E+00	3.10E+00	0.00E+00	3.10E+00	2.21E+01
resources with nerety content (ML). Secondary Secondary O O O O O O O O O O O O O O O O O O O	content used as material (MJ, LHV) Total use of non- renewable primary												
Receivable secondary class Remerable secondary class Remerable secondary class RM. Receivable	resources with energy content (MJ, LHV) Secondary												
Non-revealed secondary Sec	Renewable secondary fuels (MJ,												
Recovered energy ML,	Non- renewable secondary fuels (MJ,	0	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
fresh water resources (m3) ablotic depletion resources (m3) and services (m3) ablotic depletion resources (m3) ablotic depletion of the resources (m3) ablotic depletion resources (m3) ablotic deplet	Recovered energy (MJ, LHV)	0	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Description	fresh water resources (m3) Abiotic	8.88E-04	9.27E-04	2.90E-03	1.70E-04	0.00E+00	1.81E-02	6.25E-03	9.99E-03	3.18E-05	1.35E-02	1.21E-03	4.71E-03
waste (disposed (kg)) 3.38E-03 0 0 0 0 0 0.034 0.34 3.38E-03 Non-hazardous waste disposed (kg) 2.99E+01 1.20E+00 1.43E+00 2.93E+01 0.00E+00 9.35E+01 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 3.26E+01 High-level radioactive waste, conditioned, to final repository (kg) 9.23E-03 2.05E-06 1.22E-07 7.76E-04 0.00E+00 3.30E-01 3.53E-02 5.11E-03 7.06E-08 3.54E-05 1.60E-06 9.23E-03 Intermediate- and love-level radioactive waste, conditioned, to final repository (kg) 3.04E-06 1.97E-08 1.06E-09 1.80E-06 0.00E+00 2.06E-03 3.10E-04 1.88E-05 6.75E-10 5.14E-08 1.04E-08 3.06E-06 Components for re-use (kg) 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	depletion potential, fossil (MJ) Output flows and				1.88E+02	0.00E+00	1.18E+05	1.59E+04	6.76E+02	3.58E-01	1.56E+00	5.41E-01	7.08E+02
waste disposed (kg) 2.99E+01 1.20E+00 1.43E+00 2.93E+01 0.00E+00 9.35E+01 0.00E+00 5.40E+01 0.00E+00 3.26E+01 High-level radioactive waste, conditioned, to final repository (kg) 9.23E-03 2.05E-06 1.22E-07 7.76E-04 0.00E+00 3.30E-01 3.53E-02 5.11E-03 7.06E-08 3.54E-05 1.60E-06 9.23E-03 Intermediate-and low-level radioactive waste, to final repository (kg) 3.04E-06 1.97E-08 1.06E-09 1.80E-06 0.00E+00 2.06E-03 3.10E-04 1.88E-05 6.75E-10 5.14E-08 1.04E-08 3.06E-06 Components for re-use (kg) 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	waste disposed (kg) Non-												
Intermediate-		2.005.04	1.20E+00	1.43E+00	2.93E+01	0.00E+00						0.00E+00	3.26E+01
Components for re-use (kg) 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 </td <td>hazardous waste disposed (kg) High-level radioactive waste, conditioned,</td> <td></td> <td>2.05E-06</td> <td>1.22E-07</td> <td>7.76E-04</td> <td>0.00E+00</td> <td>3.30E-01</td> <td>3.33L 02</td> <td></td> <td>7.00L-08</td> <td>3.54E-05</td> <td>1.60E-06</td> <td>9.23E-03</td>	hazardous waste disposed (kg) High-level radioactive waste, conditioned,		2.05E-06	1.22E-07	7.76E-04	0.00E+00	3.30E-01	3.33L 02		7.00L-08	3.54E-05	1.60E-06	9.23E-03
recycling (kg)	hazardous waste disposed (kg) High-level radioactive waste, conditioned, to final repository (kg) Intermediate- and low-level radioactive waste, conditioned,	9.23E-03							1.88E-05				
Exported energy (MJ, U O O O O O O O O O O O O O O O O O O	hazardous waste disposed (kg) High-level radioactive waste, conditioned, to final repository (kg) Intermediate- and low-level radioactive waste, conditioned, to final repository (kg) Components for re-use (kg)	9.23E-03 3.04E-06	1.97E-08	1.06E-09	1.80E-06	0.00E+00	2.06E-03	3.10E-04	0	6.75E-10	5.14E-08	1.04E-08	3.06E-06
emissions and	hazardous waste disposed (kg) High-level radioactive waste, conditioned, to final repository (kg) Intermediate- and low-level radioactive waste, conditioned, to final repository (kg) Components for re-use (kg) Materials for recycling (kg)	9.23E-03 3.04E-06 0	1.97E-08 0 0	1.06E-09 0	1.80E-06 0 2.93E+01	0.00E+00 0 0.00E+00	2.06E-03 0 5.74E+01	3.10E-04 0 0.00E+00	0 0.00E+00	6.75E-10 0 3.01E+00	5.14E-08 0 3.01E+00	1.04E-08 0 3.01E+00	3.06E-06 0 0.00E+00
Biogenic 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	hazardous waste disposed (kg) High-level radioactive waste, conditioned, to final repository (kg) Intermediate- and low-level radioactive waste, conditioned, to final repository (kg) Components for re-use (kg) Materials for recycling (kg) Materials for energy recovery (kg) Exported energy (MJ, LHV)	9.23E-03 3.04E-06 0 0	1.97E-08 0 0 0	1.06E-09 0 0	1.80E-06 0 2.93E+01	0.00E+00 0 0.00E+00 0	2.06E-03 0 5.74E+01	3.10E-04 0 0.00E+00	0 0.00E+00 0	6.75E-10 0 3.01E+00	5.14E-08 0 3.01E+00	1.04E-08 0 3.01E+00	3.06E-06 0 0.00E+00

Removal from Product (kg CO2)												
Biogenic Carbon Emission from Product (kg CO2)	0	0	0	0.00E+00	0.00E+00	0.00E+00	0	0	0	0	0	0
Biogenic Carbon Removal from Packaging (kg CO2)	3.04E-01	0	0	0.00E+00	0	4.56E-01	0	0	0	0	0	3.04E-01
Biogenic Carbon Emission from Packaging (kg CO2)	0	0	3.04E-01	0.00E+00	0	4.56E-01	0	0	0	0	0	3.04E-01
Biogenic Carbon Emission from Combustion of Waste from Renewable Sources Used in Production Processes (kg CO2)	0	0	0	0	0	0	0	0	0	0	0	0
Calcination Carbon Emissions (kg CO2)	0	0	0	0.00E+00	0	0.00E+00	0	0	0	0	0	0
Carbonation Carbon Removals (kg CO2)	0	0	0	0	0	0	0	0	0	0	0	0
Carbon Emissions from Combustion of Waste from Renewable and Non- Renewable Sources used in Production Processes (kg CO2)	0	0	0	0	0	0	0	0	0	0	0	0



SM Transparency Report (EPD)™ + Material Health Overview™

This environmental product

declaration (EPD) was externally

verified by Jack Geibig (Ecoform) on

behalf of NSF according to ISO 14044; ISO 21930:2017; SM Part A:

EPD LCA **⊘** NSS 3rd-party reviewed

Transparency Report (EPD)

3rd-party verified

⊘ NSF

Validity: 08/31/2024 – 08/30/2029 TOTO - 20240831 - 006

Material MATERIAL HEALTH evaluation

Self-declared

Ø

NSF International P.O Box 130140, 789 N.Dixboro Road, Ann Arbor, MI 48105, USA 734 769 8010

LCA calculation rules and report requirements, 2023; the reference PCR; and ISO 14025:2006. Ecoform, LLC 11903 Black Road

Knoxville, TN 37932 (865) 850-1883



SUMMARY

Reference PCR

SM Part B: Commercial/public metered and manual lavatory faucets, v3.0

Regions; system boundaries North America; Cradle-to-grave

Functional unit

One metered lavatory faucet in an average commercial environment over the estimated service life of the

LCIA methodology; LCA software; LCI database

TRACI 2.1; SimaPro Analyst 9.5; ecoinvent and USLCI databases

In accordance with ISO 14044 and the referenced PCR, the life cycle assessment was conducted by Sustainable Minds and critically reviewed by Jack Geibig (Ecoform) on behalf of NSF.

Public LCA

LCA background report of TOTO Faucets, Flush Valves, and Residential Toilets, 2024

TOTO USA 1155 Southern Road Morrow, GA 30260

SM Transparency Catalog ► TOTO Showroom ► Standard-R and Standard-S Faucets with Mixing Valves

LCA & material health results & interpretation

Standard-R and Standard-S Faucet Series

Material health

Evaluation programs

Declare

Declare labels are issued to products disclosing ingredient inventory, sourcing, and end of life options. Declare labels are based on the Manufacturers Guide to Declare, administered by the International Living Future Institute.

How it works

Material ingredients are inventoried and screened against the Living Building Challenge (LBC) Red List which represents the 'worst in class' materials, chemicals, and elements known to pose serious risks to human health and the greater ecosystem.

The Declare product database and label are used to select products that meet the Living Building Challenge's stringent materials requirements, streamlining the materials specification and certification process.

Assessment scope and results

Declare™

Inventory threshold: 100 ppm

Declare level:

The Declare product database and label are used to select products that meet the LBC's stringent materials requirements, streamlining the materials specification and certification process.

LBC Red List Free @ LBC Red List Approved @ Declared 🕝

Click the label to see the full declaration.



Standard-S Faucet Series





What's in this product and why

Declare level

'Declared' is awarded to products when all the ingredients name and CAS numbers have been disclosed. 100% disclosure qualifies the product for the LEED v4 building product disclosure and optimization - material ingredients credit option 1.

What's in the product and why

The spout assembly includes polyvinyl chloride (PVC). PVC is used in plumbing applications where corrosion-resistance and durability are required. The spout in its final form does not represent any hazards to the user.

The TOTO facility in which the faucet is manufactured is ISO 14001 certified. This means that the facility has implemented an environmental management system as part of TOTO's commitment to the health of the environment.

Where it goes at the end of its life

TOTO encourages consumers to recycle their used faucet and faucet parts. Contact your local municipality for recycling programs.

How we're making it healthier

The EcoPower technology enables the faucet to operate off the energy grid and requires no routine battery replacement. This technology helps to reduce pollution and hazardous waste, thereby mitigating human health impacts.

See how we make it greener

References

TOTO USA, Declare label for Standard-R Faucet Series TOTO USA, Declare label for Standard-S Faucet Series

Manufacturer's Guide to Declare A comprehensive guide providing information about the program, the

assessment methodology, how to submit material data to obtain a Declare label and how they are used to meet the Health & Happiness and Materials Petals of the Living Building Challenge.

Rating systems

LEED BD+C: New Construction | v4 - LEED v4

Building product disclosure and optimization

Material Ingredients Credit value options

1. Reporting 2. Optimization 3. Supply Chain Optimization

1 product each

1 product each

LEED BD+C: New Construction | v4.1 - LEED v4.1

Materials and resources

Material Ingredients Credit value options

✓ 1. Reporting 3. Supply Chain Optimization 2. Optimization

Living Building Challenge Materials petals imperatives

 \bigcirc 10. Red List Free \bigcirc 12. Responsible Industry \bigcirc 13. Living Economy Sourcing

WELL Building Standard®

Air and Mind Features

X07 Materials Transparency

X08 Materials Optimization

Collaborative for High Performance Schools National

Criteria **EQ C7.1 Material Health Disclosures**

Performance Approach 2 points Prescriptive Approach 2 points



SM Transparency Report (EPD)™ + Material Health Overview™



Material

evaluation

TOTO - 20240831 - 006

MATERIAL HEALTH

Self-declared

This environmental product declaration (EPD) was externally verified by Jack Geibig (Ecoform) on behalf of NSF according to ISO 14044; ISO 21930:2017; SM Part A: LCA calculation rules and report requirements, 2023; the reference PCR; and ISO 14025:2006.

Ecoform, LLC 11903 Black Road (865) 850-1883

Knoxville, TN 37932

NSF International

P.O Box 130140, 789 N.Dixboro Road, Ann Arbor, MI 48105, USA 734 769 8010



SUMMARY

Reference PCR

SM Part B: Commercial/public metered and manual lavatory faucets, v3.0

Regions; system boundaries North America; Cradle-to-grave

Functional unit

One metered lavatory faucet in an average commercial environment

over the estimated service life of the building

LCIA methodology; LCA software;

LCI database TRACI 2.1; SimaPro Analyst 9.5; ecoinvent and USLCI databases

In accordance with ISO 14044 and the referenced PCR, the life cycle assessment was conducted by Sustainable Minds and critically reviewed by Jack Geibig (Ecoform) on behalf of NSF.

Public LCA

1155 Southern Road Morrow, GA 30260

TOTO USA

Standard-R and Standard-S Faucet Series

Sustainable Minds®

Transparency Report (EPD)

How we make it greener

Expand all



CONSTRUCTION



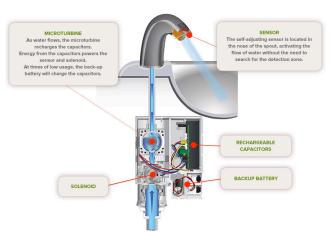


TOTO participates in the UPS Carbon Neutral program. TOTO is a certified SmartWay® Transport Partner.





TOTO's Standard EcoPower® Faucets feature the highly regarded EcoPower technology. Engineered to reduce environmental impacts, TOTO's EcoPower products offer water and energy savings without sacrificing performance. Below are some of the features of TOTO's EcoPower technology.



SENSOR:

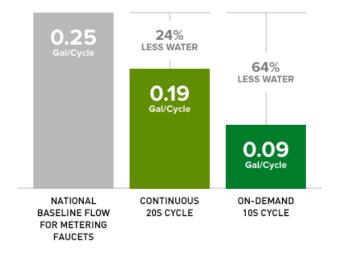
Located in the nose of the faucet, the EcoPower sensor ensures that water flows only when needed. The detection zone is right where you need it, eliminating the need to search with your hands to activate the flow of water. For on-demand versions, the sensor will stop the flow of water upon removal of the hands from the sensing zone, preventing wasted water.

MICROTURBINE:

TOTO's EcoPower technology enables the product to operate 100% off grid. As water flows, the hydro powered microturbine recharges the capacitors for the sensor and solenoid. Less reliance on the back-up battery results in much less battery waste.

SOLENOID:

The solenoid mechanism, a water-saving technology, maintains consistent flow rate under a range of supply pressures.



Using the same proven engineering as our legendary EcoPower TEL3/5G series, the Standard-R and Standard-S Faucet Series reinforces TOTO's performance reputation while offering additional water savings.



Metal and electronic parts can be recycled at the end of life.

SM Transparency Report (EPD)™ + Material Health Overview™

EPD LCA **✓** NSI 3rd-party reviewed

Transparency Report (EPD) 3rd-party verified **✓** NSE

Validity: 08/31/2024 - 08/30/2029 TOTO - 20240831 - 006

Material MATERIAL HEALTH evaluation Self-declared Ø

This environmental product declaration (EPD) was externally verified by Jack Geibig (Ecoform) on behalf of NSF according to ISO 14044; ISO 21930:2017; SM Part A: LCA calculation rules and report requirements, 2023; the reference PCR; and ISO 14025:2006.

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734 769 8010



SUMMARY

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Sustainable Minds and critically reviewed by Jack Geibig (Ecoform) on behalf of NSF. **Public LCA**

TOTO USA 1155 Southern Road Morrow, GA 30260