

LCA results & interpretation

EcoPower® Toilet Flush Valve TET1UA

Life cycle assessment

Material health

Scope and summary

- Cradle to gate Cradle to gate with options Cradle to grave

Functional unit

Reference service life: 10 years. One flush valve for toilets in an average U.S. commercial environment for 10 years. The period of 10 years is modeled as the period of application based on the average technical lifespan for commercial applications. The economical lifespan of commercial applications can be longer or shorter due to aesthetic replacements or more intense use. The implication is that the LCA model assumes that the application ends at year 10 and that the materials will be treated in an end-of-life scenario.

Data reporting period: 2016

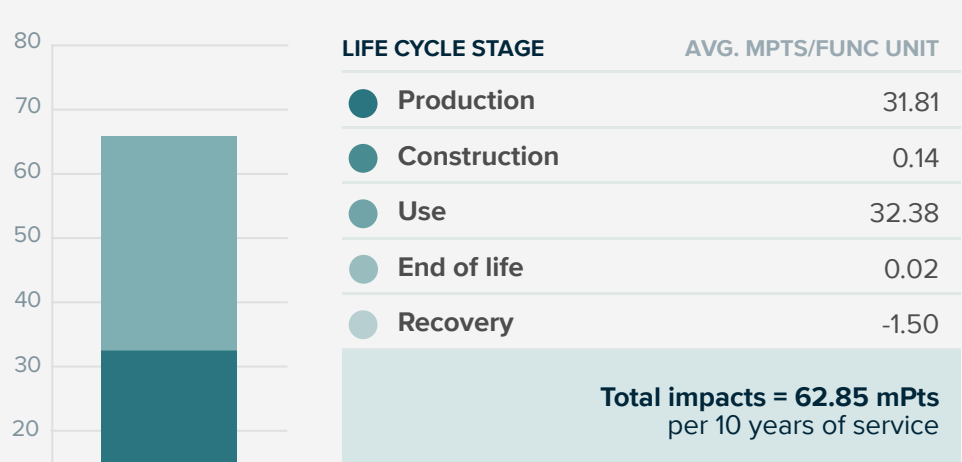
Default use phase scenario

10 years of service in an average U.S. commercial environment in combination with a toilet with 1.0 gallon/use, 51 uses/day, and 260 days/year resulting in 132,600 gallons of water.

Material composition greater than 1% by weight

PART	MATERIAL	AVG. % WT.
Valve body	Bronze (C83600)	32.0%
Bottom cover	Zinc die cast	16.0%
Top cover	Zinc die cast	14.4%
Packaging	Cardboard	13.8%
Valve cap	Bronze (C83600)	7.2%
Valve tailpiece	Bronze (C83600)	3.2%
Tailpiece nut	Brass	1.2%
Manuals	Paper	1.1%
Generator coil	Copper	1.0%
	Other	10.0%

Total impacts by life cycle stages [mPts/func unit]



What's causing the greatest impacts

All life cycle stages

The use and production stages are both important and dominate the results for all impact categories. The impact of the use stage is mostly due to the embedded energy arising from acquisition, treatment and distribution of the water used during the use of the toilet for which the valves are installed. The production stage itself has a significant contribution to eutrophication (mostly from emissions from copper mining), non-carcinogens (emissions from the production of coal, copper and zinc) and ecotoxicity (mostly from the disposal of steel slags and bottom ashes, as well as from barium emissions to water due to the extraction processes of natural gas).

The recovery stage includes recycling processes and benefits by preventing the need to produce primary materials. Recycling is a relevant factor for some of the impact categories, offsetting a portion of the impacts caused by production. Additionally, the delivery of the product to the construction/installation site, the construction/installation processes, the processes for dismantling the product and final waste treatment during the end of life stage do not have a significant impact.

Production stage

Bronze and zinc parts, together with the printed wiring board, have significant contributions to the impact categories. The stainless steel material is relevant to the carcinogenics category. The electroplating process is a major contributor to the ozone depletion category while the die casting process is relevant to the ecotoxicity and non-carcinogenics categories. Additionally, polishing and potting have a somewhat significant processing contribution to the results. Transport via oceanic freighter appears as a relevant contributor to the fossil fuel depletion and smog categories. The remaining parts and processes contribute between 3% and 15% to the overall impacts in the rest of the categories.

Sensitivity analysis

There are no sensitivity results that lead to variations greater than 10% in the LCA results.

TOTO PeoplePlanetWater. programs improving environmental performance

- TOTO's EcoPower® products are powered by the force of running water.
- The electronic and mechanical components are programmed and designed to allow water flow and accurate flush volume only when needed.
- Water consumption is reduced in the use phase due to superior flushing performance.

[See how we make it greener](#)

LCA results

LIFE CYCLE STAGE	PRODUCTION	CONSTRUCTION	USE	END OF LIFE	RECOVERY
Information modules: Included Excluded	A1 Raw Materials	A4 Transportation/Delivery	B1 Use	C1 Deconstruction/Demolition	D Reuse, recovery and/or recycling
*Installation and deconstruction/demolition are mostly manual. The sanitary fittings should not need repair, maintenance or replacement during the modeled life time.	A2 Transportation	A5 Construction/Installation	B2 Maintenance	C2 Transportation	
Reuse and energy recovery are not modeled for sanitary fittings.	A3 Manufacturing		B3 Repair	C3 Waste processing	
			B4 Replacement	C4 Disposal	
			B5 Refurbishment		
			B6 Operational energy use		
			B7 Operational water use		

SM 2013 Learn about SM Single Score results

Impacts per 10 years of service	31.81 mPts	0.14 mPts	32.38 mPts	0.02 mPts	-1.50 mPts
Materials or processes contributing >20% to total impacts in each life cycle stage	Bronze and zinc parts together with the printed wiring board in addition to manufacturing processes such as die casting and electroplating.	Transportation of the product to the installation site or consumer and disposal of packaging.	Volume of water use during the operation of the product and the embedded energy use in the water used.	Transport to waste processing, waste processing and disposal of material flows transported to a landfill.	Plastic and metal components' recycling processes.

TRACI v2.1 results per one flush valve

LIFE CYCLE STAGE	PRODUCTION	CONSTRUCTION	USE	END OF LIFE	RECOVERY	
Ecological damage						
Impact Category	Unit					
Acidification	kg SO ₂ eq	1.65E+00	1.46E-02	2.34E+00	2.17E-03	-8.72E-02
Eutrophication	kg N eq	1.10E+00	1.45E-03	2.57E-01	2.28E-04	-2.09E-02
Global warming	kg CO ₂ eq	8.72E+01	1.63E+00	4.49E+02	2.70E-01	-5.50E+00
Ozone depletion	kg CFC-11 eq	6.34E-06	3.59E-09	2.03E-05	3.22E-08	-3.89E-07
Human health damage						
Impact Category	Unit					
Carcinogenics	CTU _h	2.45E-06	1.83E-08	9.22E-06	2.52E-09	-1.75E-07
Non-carcinogenics	CTU _h	2.87E-04	1.71E-07	3.80E-05	1.78E-08	-1.27E-05
Respiratory effects	kg PM _{2.5} eq	2.10E-01	2.60E-04	1.58E-01	2.32E-04	-1.29E-02
Smog	kg O ₃ eq	1.05E+01	4.67E-01	2.14E+01	5.82E-02	-9.74E-01
Additional environmental information						
Impact Category	Unit					
Ecotoxicity	CTU _e	4.73E+02	3.23E+00	1.55E+02	2.18E-01	-1.83E+01
Fossil fuel depletion	MJ surplus	4.67E+01	2.33E+00	2.07E+02	4.52E-01	-4.57E+00

References

LCA Background Report

TOTO Sanitary Fittings Products LCA Background Report (public version), September 2017

SM Transparency Report Framework

Part A: LCA Calculation Rules and Background Report Requirements v2017 (compliant with ISO14040-44 and ISO14025)

Part B: Product Group Definition – [Commercial Flushometer Valves](#)

Transparency Reports™ / environmental product declarations 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. TRs/EPDs 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 defined in ISO 14025 Section 6.7.2. 'Requirements for Comparability' are satisfied.

Rating systems

The intent is to reward project teams for selecting products from manufacturers who have verified improved life-cycle environmental performance.

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

Building product disclosure and optimization

Environmental product declarations

- Industry-wide (generic) EPD 1/2 product
- Product-specific Type III EPD 1 product

Green Globes for New Construction and Sustainable Interiors

- NC 3.5.1.2 Path B: Prescriptive Path for Building Core and Shell
- C 3.5.2.2 and SI 4.1.2 Path B: Prescriptive Path for Interior Fit-outs

Collaborative for High Performance Schools National Criteria

- Third-party certified type III EPD 2 points

SM Transparency Report™ + Material Health Overview™

VERIFICATION	LCA
3rd party reviewed	<input checked="" type="checkbox"/> NSF
Transparency Report	
Verified	<input checked="" type="checkbox"/> NSF
Material Health Evaluation	
Self-declared	<input checked="" type="checkbox"/>

Validity: 10/16/2017 – 10/16/2022
TOT – 10/16/2017 – 027

The LCA and Report are independently reviewed and verified to the SM Transparency Report Framework and ISO 14025.

NSF International
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The material health evaluation is self-declared and done in accordance with the Manufacturers Guide to Declare.

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Contact us

LCA & material health results & interpretation

EcoPower® Toilet Flush Valve TET1UA

Life cycle assessment

Material health

Evaluation program: 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 (ILFI).

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 then 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

Inventory threshold: 100 ppm

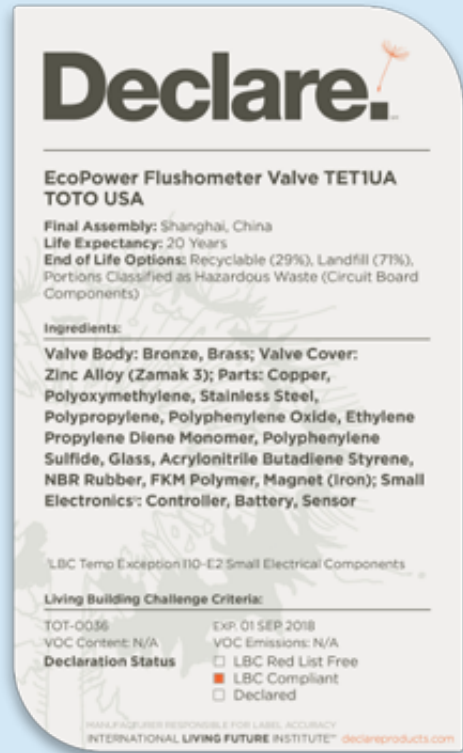
Declaration status:

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- LBC Red List Free [?](#)
- LBC Compliant [?](#)
- Declared [?](#)

Click the label to see the full declaration.

● EcoPower® 1.0 gpf Toilet Flush Valve TET1UA



How this rating was achieved

Declare level

'Living Building Challenge Compliant' is achieved when the product contains Red List ingredients that have been given a temporary exception by the Living Building Challenge due to current market limitations.

What's in the product and why

The flush valve cover is plated with chrome (Hexavalent Chromium VI). Chromium material is used as a decorative finish in applications where corrosion-resistance and durability are required. During the chrome plating process health hazards have been identified and are managed. Process controls are used to protect the environment and the production workers wear personal protection equipment. After the plating process the chrome surface is inert and does not pose any health risks. The cover 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 parts. Contact your local municipality for recycling programs.

How we're making it healthier

The EcoPower technology enables the flush valve 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

Declare

EcoPower® 1.0 gpf Toilet Flush Valve TET1UA

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 product each

1. Reporting 2. Optimization 3. Supply chain optimization

Living Building Challenge 3.0

Materials petals imperatives

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

WELL Building Standard®

Air and Mind Features

- Air** 26. Enhanced Material Safety
- Mind** 97. Material Transparency **Mind** 98. Organizational Transparency

Collaborative for High Performance Schools National Criteria

MW 10.1 – Building Product Health Related Information Reporting

- Product Health Related Information Report 1 point

SM Transparency Report™ + Material Health Overview™

VERIFICATION

LCA

3rd party reviewed NSF

Transparency Report

Verified NSF

Material Health Evaluation

Self-declared

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How we make it greener

EcoPower® Toilet Flush Valve TET1UA

Collapse all

See LCA results by life cycle stage

CONSTRUCTION

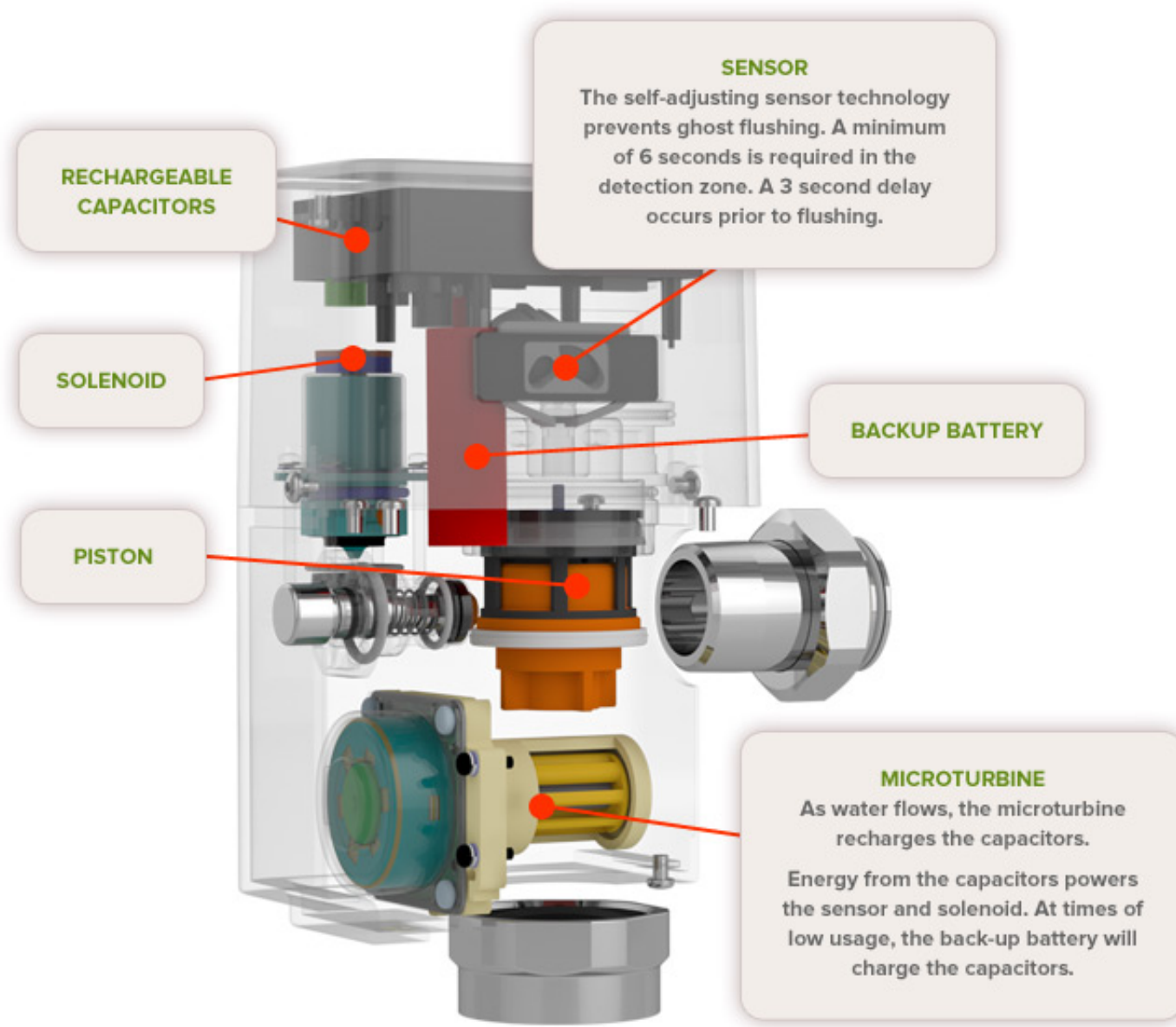


TOTO participates in the UPS Carbon Neutral program. TOTO is a certified SmartWay partner.

USE



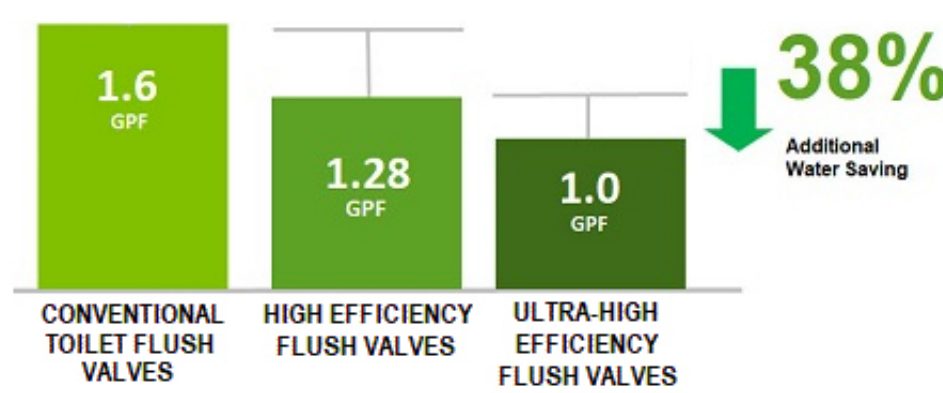
TOTO's EcoPower® Toilet Flush Valves feature the highly regarded EcoPower technology. Engineered to reduce environmental impacts, TOTO's EcoPower products offer water and energy savings without sacrificing performance. Below are some of the features of TOTO's EcoPower technology.



SENSOR:
Ensuring that water flows only when needed, the self-adjusting EcoPower sensor eliminates "ghost" flushing that wastes water. A minimum of six seconds in front of the sensor is required to get its acknowledgement, and a three second flush delay after stepping away from the sensing zone prevents excessive flushing.

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

PISTON AND SOLENOID:
The piston and solenoid mechanism, a marked improvement over traditional rubber diaphragm type valves, maintains consistent flush volume under a range of supply pressures.



Using the same proven engineering as our legendary EcoPower conventional and high-efficiency toilet flush valves, the ultra-high efficiency flush valve reinforces TOTO's performance reputation while offering an additional water savings of 20% and 38%, respectively.

END OF LIFE



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

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