

ENVIRONMENTAL PRODUCT DECLARATION

TRISTONE™ (ACRYLIC SOLID SURFACES)



TriStone™

Functional unit is 1 m² (10.8 ft²) of product for a period of 10 years in use.



TriStone™ (Acrylic Solid Surfaces) is a man-made material usually composed of a combination of Alumina Trihydrate (ATH), acrylic, epoxy or polyester resins and pigments with Lion Chemtech's own technology.

TriStone™ has great durability with quality materials and excellent technology. TriStone™ is superior to natural marble in impact resistance and scratch resistance and free from bacteria, blotch, and contamination.

TriStone™ can be fabricated in a way similar to wood processes. TriStone™ can be thermoformed and used for various life style applications to fulfill the customer's needs. With TriStone™, you can enjoy limitless styles with a wide range of seamless processes.

TriStone™ offers various collections from simple white colors to high quality intricate patterns. TriStone™ produces beautiful and practical space having various colors and textures with influenced designs from normal life motifs and nature's inspirations..



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According to ISO 14025,
ISO21930:2017

EPD PROGRAM AND PROGRAM OPERATOR NAME, ADDRESS, LOGO, AND WEBSITE	UL Solutions 333 Pfingsten Dr. Northbrook IL, 60062 www.ul.com www.spot.ul.com
GENERAL PROGRAM INSTRUCTIONS AND VERSION NUMBER	UL Solutions Program Operator Rules v.2.7 2022
MANUFACTURER NAME AND ADDRESS	Lion Chemtech 1277 beon-gil 36, Daedeokdae-ro, Daedeok-gu, Daejeon-si, Republic of Korea
DECLARATION NUMBER	4791560001.101.1
DECLARED PRODUCT & FUNCTIONAL UNIT OR DECLARED UNIT	One (1) m ² of TriStone™ countertop surface used for a period of 75 years
REFERENCE PCR AND VERSION NUMBER	- Core PCR: ISO 21930-Sustainability in buildings and civil engineering works -Core rules for environmental product declarations of construction and services (ISO, 2017) - Product Category Rules for Building-Related Products and Services Part A Life Cycle Assessment Calculation Rules and Report Requirements - Guidance: PCR for Residential Countertops, NSF Sustainability, 2018
DESCRIPTION OF PRODUCT APPLICATION/USE	TriStone™ (12mm thickness)
PRODUCT RSL DESCRIPTION (IF APPL.)	10 years
MARKETS OF APPLICABILITY	North America
DATE OF ISSUE	January 21 st , 2026
PERIOD OF VALIDITY	5 Years
EPD TYPE	Product-specific
RANGE OF DATASET VARIABILITY	Mean
EPD SCOPE	Cradle to grave
YEAR(S) OF REPORTED PRIMARY DATA	2024
LCA SOFTWARE & VERSION NUMBER	SimaPro 10.2.0.0
LCI DATABASE(S) & VERSION NUMBER	Ecoinvent v3.11
LCIA METHODOLOGY & VERSION NUMBER	TRACI v2.2, IPCC 2013 AR5

The PCR review was conducted by:	International Standards Organization – ISO
	UL Solutions
	epd@ul.com
This declaration was independently verified in accordance with ISO 14025: 2006. ☐ INTERNAL ☒ EXTERNAL	Cooper McCollum, UL Solutions 
This life cycle assessment was conducted in accordance with ISO 14044 and the reference PCR by:	H.I.P. Inc.
This life cycle assessment was independently verified in accordance with ISO 14044 and the reference PCR by:	Ik-Kim, Smart Eco 

LIMITATIONS

Exclusions: EPDs do not indicate that any environmental or social performance benchmarks are met, and there may be impacts that they do not encompass. LCAs do not typically address the site-specific environmental impacts of raw material extraction, nor are they meant to assess human health toxicity. EPDs can complement but cannot replace tools and certifications that are designed to address these impacts and/or set performance thresholds – e.g. Type 1 certifications, health assessments and declarations, environmental impact assessments, etc.

Accuracy of Results: EPDs regularly rely on estimations of impacts; the level of accuracy in estimation of effect differs for any particular product line and reported impact.

Comparability: EPDs from different programs may not be comparable. Full conformance with a PCR allows EPD comparability only when all stages of a life cycle have been considered. However, variations and deviations are possible". Example of variations: Different LCA software and background LCI datasets may lead to differences results for upstream or downstream of the life cycle stages declared.

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1. Product Definition and Information

1.1. Description of Company/Organization

Communicating with nature, life & art and Creating human space by adding the history which has been accumulated over billions of years, this is the philosophy and future of Lion Chemtech.

Lion Chemtech is the only manufacturer that professionally produces Quartz and Acrylic Solid Surface in Korea. Established in 1973, with certified technology and beautiful design, Lion Chemtech is leading the industry and endeavoring globalization. Through continuous R&D for elegant Quartz and Solid Surface enables Lion Chemtech products to have excellent durability and luxury. The value of Lion Chemtech's products will never change in spite of change of several generations.

LionChemteck operates a factory located in **Daejeon** (36, Daedeok-daero 1277beon-gil, Daedeok-gu, Daejeon, Republic of Korea).

1.2. Product Description

TriStone™ (Acrylic Solid Surfaces) is man-made material usually composed of a combination of Alumina Trihydrate (ATH), acrylic, epoxy or polyester resins and pigments with Lion Chemtech own technology.

Excellent Durability

TriStone™ has great durability through the use of quality materials and advanced technology. TriStone™ is superior to natural marble in impact and scratch resistance and free from bacteria, blotch, and contamination.

Home space production by excellent fabrication ability

TriStone™ can be fabricated in a way similar to wood processes. TriStone™ can be thermoformed and used for various life style applications to fulfill customer's needs. With TriStone™, you can enjoy limitless styles with a wide range of seamless process.

Various color and patterns

TriStone™ offers various collections from simple white colors to high quality intricate patterns. TriStone™ produces beautiful and practical space having various colors and textures with influenced designs out of normal life motifs and nature's inspirations.

Superior Hi-tech and environment-friendly material

TriStone™ uses non-hazardous materials and seeks to excel in the category of environmental friendliness and lead this category in the industry. TriStone™ considers the environment, nature, and humanism as the most precious values, therefore is certificated by NSF, Green Guard, etc.

1.3. Application

TriStone™ can be used in residential applications, including kitchens and bathrooms, as well as in commercial applications for both horizontal and vertical installations.

- Residential: Kitchen Top, Sink Bowl for home, Bathtub (Wash Basin), Living Space, Furniture
- Commercial: Public Building and Office, Facades and Wall cladding, Shops and Exhibitions, Healthcare and Hospital, Educational institutions, and others (Hotel, Marine industry, Airport, etc.)



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1.4. Declaration of Methodological Framework

This LCA study follows an attributional approach.

1.5. Technical Requirements

Technical data that describe the assessed product are presented in Table 1.

Table 1 Technical data for TriStone™

CHARACTERISTIC	NOMINAL VALUE	UNIT
Primary material thickness	12 (1/2)	mm (inch)
Sheet/slab length	368 (144)	cm (inch)
Sheet/slab width	76 (30)	cm (inch)
Primary material weight	21,450	g/m ² (lbs/ft ²)
Underlayment included	None	-
Underlayment type	None	-
VOC emissions test method	EPA Compendium Method TO-17 Determination of Volatile Organic Compounds in Ambient Air Using Active Sampling onto Sorbent Tubes ASTM D 6196 Standard Practice for Choosing Sorbents, Sampling Parameters and Thermal Desorption Analytical Conditions for Monitoring Volatile Organic Chemicals in Air EPA Compendium Method TO-11A Determination of Formaldehyde in Ambient Air Using Adsorbent Cartridge Followed by High Performance Liquid Chromatography (HPLC) [Active Sampling Methodology] ASTM D 5197 Standard Test Method for Determination of Formaldehyde and Other Carbonyl Compounds in Air (Active Sampler Methodology)	
Other characteristics	GREENGUARD and GREENGUARD GOLD certification	
Additional Characteristics	Nominal Value	Test Method
Specific gravity	1.749	ASTM D792
Water absorption	0.03%	ASTM D570
Fungal resistance	ASTM rating of 0	ASTM G21
Bacterial resistance		ASTM G22
Light resistance/color stability	No effect (blisters, crazing, cracking, dulling) Moderate effect (color change)	NEMA LD3
Cleanability/stain resistance	PASS	IAPMO/ANSI124.1.2
Light resistance	No effect (blisters, crazing, cracking) Moderate effect (dulling) Slight effect (color change)	NEMA LD3
Boiling water resistance	No effect	NEMA LD3
High temperature resistance	No effect (crazing, color change, cracking) Moderate effect (blisters) Slight effect (dulling)	NEMA LD3
Carbon Arc Exposure	No effect (blisters, crazing, cracking) Slight effect (color change, dulling)	ASTM D1499-99
Boiling water resistance	No effect	NEMA LD3
Ball impact resistance	> 95	NEMA LD3

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Specular gloss, 60° (average)	77	NEMA LD3
Izod impact strength	16J/m	ASTM D648-07
Flexural strength	62.8Mpa	ASTM D790 - Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials
Flexural modulus	10.0Gpa	ASTM D790 - Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials
Hardness, Rockwell M scale	90	ASTM D785
Hardness, Barcol	63	ASTM D2583
Elongation at break point	0.73%	ASTM D638
Tensile strength	31.6Mpa	ASTM D638-14
Tensile modules of elasticity	9.93Gpa	
Impact resistance	No visible cracks	PS 18:1966 International Association of Plumbing and Mechanical Officials – Material and Property Standard for Cultured Marble Lavatory
Flame spread index (FSI)	20	ANSI UL 723 (ASTM E84)
Smoke developed index	5	

1.6. Properties of Declared Product as Delivered

TriStone™ is shipped in box packaging.

1.7. Material Composition

The material composition of the product are represented in Table 2.

Table 2 Material Composition for TriStone™

MATERIAL	TRIStone™
Alumina Trihydrate (ATH)	63.70%
Methyl Methacrylate (MMA)	27.81%
Poly Methyl Methacrylate (PMMA)	7.19%
Other ingredients	1.30%

1.8. Manufacturing

TriStone™ is produced in Daejoen, Rep. of Korea. At the production facilities, the raw materials are molded into slabs.

1.9. Packaging

The packaging used in the shipment of this product is described in Table 3.

Table 3 Packaging Composition for TriStone™

MATERIAL	TRIStone™
Cardboard	0.06257 kg/m ²

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2. Life Cycle Assessment Background Information

2.1. Functional or Declared Unit

The functional unit according to the guidance PCR is 1 square meter (10.76 sq. ft.) of countertop surface used for an estimated service life (ELS) of 75 years. The products under study have a reference service life (RSL) of 10 years.

Table 4 Functional unit for TriStone™

CONTENT	TRISTONE™	UNIT
Reference Flow	21.54	kg
Mass of units for replacement (6.5 units of the product)	140.01	kg

2.2. System Boundary

The entire life cycle of TriStone is to be covered including all industrial processes from raw material acquisition and pre-processing into a countertop pre-form, construction of the countertop, distribution, transportation and installation in end user location, use/maintenance, and end-of-life.

Table 5. Description of the system boundary modules

	PRODUCT STAGE			CONSTRUCTION PROCESS STAGE		USE STAGE							END OF LIFE STAGE				BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARY
	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
	Raw material supply	Transport	Manufacturing	Transport from gate to site	Assembly/Install				Replacement	Refurbishment	Building Operational Energy Use During Product Use	Building Operational Water Use During Product Use	Deconstruction	Transport	Waste processing	Disposal	Reuse, Recovery, Recycling Potential
EPD Type	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	MND

MND = Module Not Declared

Raw material supply (A1)

Lion Chemtech manages the amount of input materials through standardized input material recipe. Both raw material inputs and product outputs are currently monitored. Although waste data is also recorded, discrepancies in the mass balance necessitated calculating waste generation based on the raw material inputs and product outputs. However, waste treatment methods were determined using the disposal ratios derived from the actual waste management data.

Raw material transportation (A2)

ATH is produced in China. ATH is transported from ATH production site to Lianyungang harbor by truck. Afterwards,





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ATH is transported from Lianyungang harbor to Busan by ship and then move to Lion Chemtech by truck.

All other materials are produced in domestic and transported by truck.

Manufacturing (A3)

Lion Chemtech operates a process for the production of Tristone and the process diagram is shown in Figure 1.

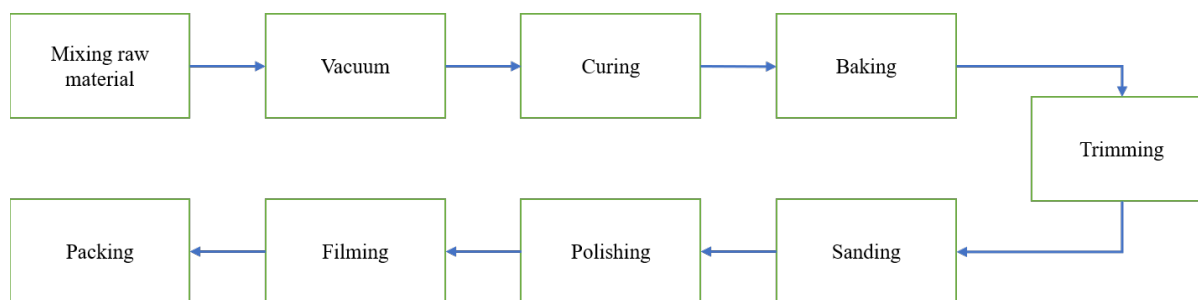


Figure 1 Tristone™ manufacturing process

The mixing process is the most basic and important process to satisfy the desired properties of Tristone. It is a step of blending the raw material so that the product has a uniform physical property and the surface pattern is determined.

Vacuum process is the step of compressing the mixture made in the mixing process in vacuum to increase the product density. This process increases durability by increasing the density and strength of the product.

Curing process and baking process are hardening of the slab from the vacuum process. After the slab is cooled, it is baked in the oven to prevent deformation such as warping and shrinkage during the further processing, and the basic physical properties of the final shipment product are completed.

Trimming process is a step to remove irregular texture on the edge of the slab produced through the curing process to increase the commerciality, and the sanding process is to flatten the slab surface.

Polishing is the process of creating a smooth and shiny surface by rubbing it, leaving a surface with a significant specular reflection. Through this process, Lion Chemtech is producing products that can give a more luxurious appearance by giving gloss.

The filming process is a step of laminating a thin film on the finished product surface to the polishing process. Through this step, the end product can be improved in durability and hygiene by adding functions such as antibacterial and denaturation.

Product distribution (A4)

Products manufactured by Lion Chemtech are exported through the Port of Busan. The environmental impact assessment includes maritime transportation from Busan to each port and inland transportation from each port to an inland warehouse. It also included the transportation of particleboard and adhesives required for the installation of the countertop products.

Installation (A5)

The front edge and backsplash of the countertop produced by Tristone is made by processing Tristone.

Attach the particle board to the bottom of the countertop during construction of the countertop. The thickness of the particle board attached to the bottom is 18T and the area is the same as that of the countertop.



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In addition, epoxy adhesive and silicon sealant are used in the installation process. It also consumes electricity from the use of grinders for adhesive removal and surface sanding, and the use of jig saws for making cutouts for sinks or range tops.

Maintenance (B2)

The period of use of Tristone is 10 years. Tristone is a durable product that you can keep for a long time the luxury of artificial marble with the simple care of wiping it with bleach that is diluted with water once a month.

Replacement (B4)

The target product has an ESL of 75 years and a RSL of 10 years, so the environmental impact was calculated assuming that 6.5 replacements will be performed after the initial installation.

Transportation of waste (C2)

Transportation to waste processing or disposal, which includes the transportation of the discarded construction product as part of the waste processing, for example to a recycling site and transportation of waste, for example to final disposal.

Tristone cannot be used for countertops applied to various buildings, and it is impossible to obtain the primary data for the disposal process. Data was collected by applying the waste stage scenario presented in PCR*.

Waste processing (C3)

Tristone cannot be used for countertops applied to various buildings, and it is impossible to obtain the primary data for the disposal process. Accordingly, the environmental impact of the waste sorting process for discarded products was calculated through the LCI database.

Disposal of waste (C4)

Tristone cannot be used for countertops applied to various buildings, and it is impossible to obtain the primary data for the disposal process. Data was collected by applying the waste stage scenario presented in PCR*.

* Product Category Rule for Environmental Product Declarations for Residential Countertops, NSF Sustainability, 2018

2.3. Estimates and Assumptions

Due to data limitations, waste and wastewater generation during the manufacturing stage was calculated using the mass balance principle. For the End-of-Life (EoL) stage, impacts were modeled based on scenarios rather than actual data.

2.4. Cut-off Criteria

Material inputs greater than 1% (based on total mass of the material input for final product production) were included within the scope of analysis. Material input less than 1% were included if sufficient data was available to warrant inclusion and/or the material input was thought to have significant environmental impact. Cumulative excluded material inputs and environmental impacts are less than 1.5% based on total weight of the functional unit.

2.5. Data Sources

Primary data were collected by facility and from utility bills and was used for all manufacturing processes, excluding waste and wastewater data. When primary data did not exist, secondary data for raw material production was utilized from SimaPro 10.2.0.0, Ecoinvent version 3.11.



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2.6. Data Quality

Temporal: All primary data were collected for a twelve-month period during 2024 calendar years. Secondary data come from Ecoinvent v3.11 are representative of the years 2024. As the study intended to communicate the environmental impact of TriStone™ to stakeholders for the reference year 2024, temporal representativeness is considered to be high.

Geographical: All primary and secondary data were collected specific to the countries or regions under study. Where country-specific or region-specific data were unavailable, proxy data were used. Geographical representativeness is considered to be high.

Technological: All primary and secondary data were modeled to be specific to the technologies or technology mixes under study. Where technology-specific data were unavailable, proxy data were used. Technological representativeness is considered to be high. Data was collected from the Lion Chemtech which producer of TriStone™.

2.7. Period under Review

The period under review is calendar year 2024.

2.8. Allocation

No other co-product allocation occurs in the product foreground system. No multi-input allocation occurs in the product system.

3. Life Cycle Assessment Scenarios

Table 6 Transport to the building site (A4)

CONTENT	DISTANCE (KM)	DISTRIBUTION RATIO	TRANSPORT PERFORMANCE (TON·KM)	METHOD	ROUTE
Product	253.4	100%	5.46	Road (domestic)	Lion Chemtech→Busan harbor
	9,724.9	30%	62.84	Ship	Busan harbor→LA
	8,578.5	70%	129.35	Ship	Busan harbor→Seattle
	68.0	30%	0.44	Road (USA)	LA→8969 Bradley Ave, Sun Valley, CA 91352
	3,871.0	70%	58.37	Road (USA)	Seattle→1405 Heil Quaker Blvd, La Vergne, TN 37086
Particle board/adhesive	534.3	100%	4.03	Road (USA)	PCR for Residential Countertops, NSF Sustainability

Table 7. Installation into the building (A5)

NAME	VALUE	UNIT
Volume of 1m² Particle board(18T)	0.018	m³
Density of 1m² Particle board(18T)	660	kg/m³
Mass of 1m² Particle board(18T)	11.88	kg
Epoxy adhesive	0.2	kg



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Silicon sealant	0.05	kg
Electricity	8.40E-02	kWh
Waste from fabricated product	6.462E+00	kg
Waste form particle board	3.564E+00	kg
Waste package (cardboard)	6.257E-02	kg
Biogenic carbon contained in packaging ¹	9.177E-03	kg CO ₂

Table 8. Reference Service Life

NAME	VALUE	UNIT
RSL	10	years
Maintenance	Wiping it with bleach that is diluted with water once a month	-

¹ Cartonboard packaging’s approach to fossil and biogenic carbon, Pro Carton



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Table 9. Maintenance (B2)

NAME	VALUE	UNIT
Maintenance process information (cite source in report)	LionChemtech's maintenance guidelines	
Maintenance cycle	120	Number/ RSL
Maintenance cycle	900	Number/ ESL
Water consumption: tap water	1.08E-03	m ³
Bleaching agent	0.12	kg

Table 10 Replacement (B4)

NAME	VALUE	UNIT
Replacement cycle	1	Number/ RSL
Replacement cycle	6.5	Number/ ESL

Table 11. End of life (C1-C4)

NAME		VALUE	UNIT
Assumptions for scenario development		Manual deconstruction: 80% landfill: 20% incineration	
Collection process (specified by type)	Collected separately	1.508E1	kg
	Collected with mixed construction waste	-	kg
Recovery (specified by type)	Reuse	-	kg
	Recycling	3.563E+00	kg
	Landfill	9.212E+00	kg
	Incineration	2.303E+00	kg
	Incineration with energy recovery	-	kg
	Energy conversion efficiency rate	-	-
Disposal (specified by type)	Product or material for final deposition	9.212E+00	kg
Removals of biogenic carbon (excluding packaging)		0	kg CO ₂

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4. Life Cycle Assessment Results

4.1. Life Cycle Impact Assessment Results

Table 12. North American Impact Assessment Results

TRACI v2.1	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4
GWP 100 [kg CO ₂ eq]	8.95E+01	4.30E+01	9.30E+00	0.00E+00	1.62E+00	0.00E+00	9.52E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.69E+00	2.94E-01	2.66E+00
ODP [kg CFC-11 eq]	1.23E-06	6.34E-07	1.10E-05	0.00E+00	4.03E-08	0.00E+00	8.40E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.79E-08	5.92E-09	1.46E-09
AP [kg SO ₂ eq]	4.01E-01	1.38E-01	4.31E-02	0.00E+00	6.34E-03	0.00E+00	3.85E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.17E-03	1.48E-03	9.30E-04
EP [kg N eq]	3.23E-01	6.18E-02	3.00E-01	0.00E+00	5.36E-03	0.00E+00	7.92E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.39E-04	4.51E-03	5.29E-01
POCP [kg O ₃ eq]	4.06E+00	2.20E+00	7.37E-01	0.00E+00	9.47E-02	0.00E+00	4.75E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.48E-01	3.60E-02	2.46E-02
ADP _{fossil} [MJ, LHV]	1.45E+02	7.42E+01	1.25E+01	0.00E+00	2.25E+00	0.00E+00	1.53E+03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.13E+00	6.18E-01	1.14E-01
IPCC AR5 GWP [kg CO ₂ eq]	9.13E+01	4.36E+01	9.54E+00	0.00E+00	1.64E+00	0.00E+00	9.71E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.71E+00	3.00E-01	2.87E+00

4.2. Life Cycle Inventory Results

Table 13. Resource Use

PARAMETER	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4
RPR _E [MJ, LHV]	2.21E+01	7.29E+00	4.67E+00	0.00E+00	1.06E+00	0.00E+00	2.23E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.48E-02	1.15E-01	2.22E-02
RPR _M [MJ, LHV]	1.03E+01	2.85E+00	9.01E+01	0.00E+00	3.24E-01	0.00E+00	6.71E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.13E-02	2.33E-02	9.67E-03
RPR _T [MJ, LHV]	3.23E+01	1.01E+01	9.48E+01	0.00E+00	1.39E+00	0.00E+00	8.94E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.61E-02	1.38E-01	3.19E-02
NRPR _E [MJ, LHV]	1.44E+03	6.23E+02	1.36E+02	0.00E+00	2.37E+01	0.00E+00	1.45E+04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.36E+01	5.28E+00	1.06E+00
NRPR _M [MJ, LHV]	3.17E-02	2.29E-02	1.37E-02	0.00E+00	9.24E-04	0.00E+00	4.71E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.09E-04	3.75E-03	2.88E-04
NRPR _T [MJ, LHV]	1.44E+03	6.23E+02	1.36E+02	0.00E+00	2.37E+01	0.00E+00	1.45E+04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.36E+01	5.28E+00	1.06E+00
SM [kg]	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	0.00E+00	0.00E+00	0.00E+00
RSF [MJ, LHV]	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	0.00E+00	0.00E+00	0.00E+00
NRSF [MJ, LHV]	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	0.00E+00	0.00E+00	0.00E+00
FW [m ³]	4.18E-01	8.52E-02	1.25E-01	0.00E+00	4.35E-02	0.00E+00	4.07E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.16E-03	-6.28E-03	3.22E-03

Table 14. Output Flows and Waste Categories

PARAMETER	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4
HWD [kg]	1.04E-02	3.95E-03	8.91E-04	0.00E+00	2.03E-04	0.00E+00	1.00E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.55E-04	3.11E-05	9.47E-06
NHWD [kg]	6.76E+00	1.68E+01	1.04E+00	0.00E+00	9.68E-02	0.00E+00	2.45E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.05E-01	1.30E+01	8.92E-02
RW [kg] or [m ³]	6.13E-04	1.33E-04	8.43E-05	0.00E+00	1.99E-05	0.00E+00	5.42E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.55E-06	2.14E-06	3.52E-07
CRU [kg]	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	0.00E+00	0.00E+00	0.00E+00
R [kg]	3.80E+00	0.00E+00	2.37E+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	3.56E+00
MER [kg]	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	0.00E+00	0.00E+00	0.00E+00
EE [MJ, LHV]	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	0.00E+00	0.00E+00	0.00E+00



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TriStone™
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According to ISO 14025,
ISO 21930:2017

Table 15. Carbon Emissions and Removals

PARAMETER	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4
BCRP [kg CO2]	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	0.00E+00	0.00E+00	0.00E+00
BCEP [kg CO2]	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	0.00E+00	0.00E+00	0.00E+00
BCRK [kg CO2]	9.18E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.18E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BCEK [kg CO2]	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	0.00E+00	0.00E+00	0.00E+00
BCEW [kg CO2]	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	0.00E+00	0.00E+00	0.00E+00
CCE [kg CO2]	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	0.00E+00	0.00E+00	0.00E+00
CCR [kg CO2]	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	0.00E+00	0.00E+00	0.00E+00
CWNR [kg CO2]	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	0.00E+00	0.00E+00	0.00E+00

5. LCA Interpretation

Figure 2 presents the detailed results of the TriStone production process. It can be seen that the primary drivers of burden are the inputs of methyl methacrylate, ATH and poly methyl methacrylate, the output of air emission from transportation of raw materials and product.

The inputs of methyl methacrylate, ATH and poly methyl methacrylate are significant drivers in all impact categories. The environmental impact of A1 to A3 contribution by the inputs is between 83.1% and 91.4% for each environmental impact category.

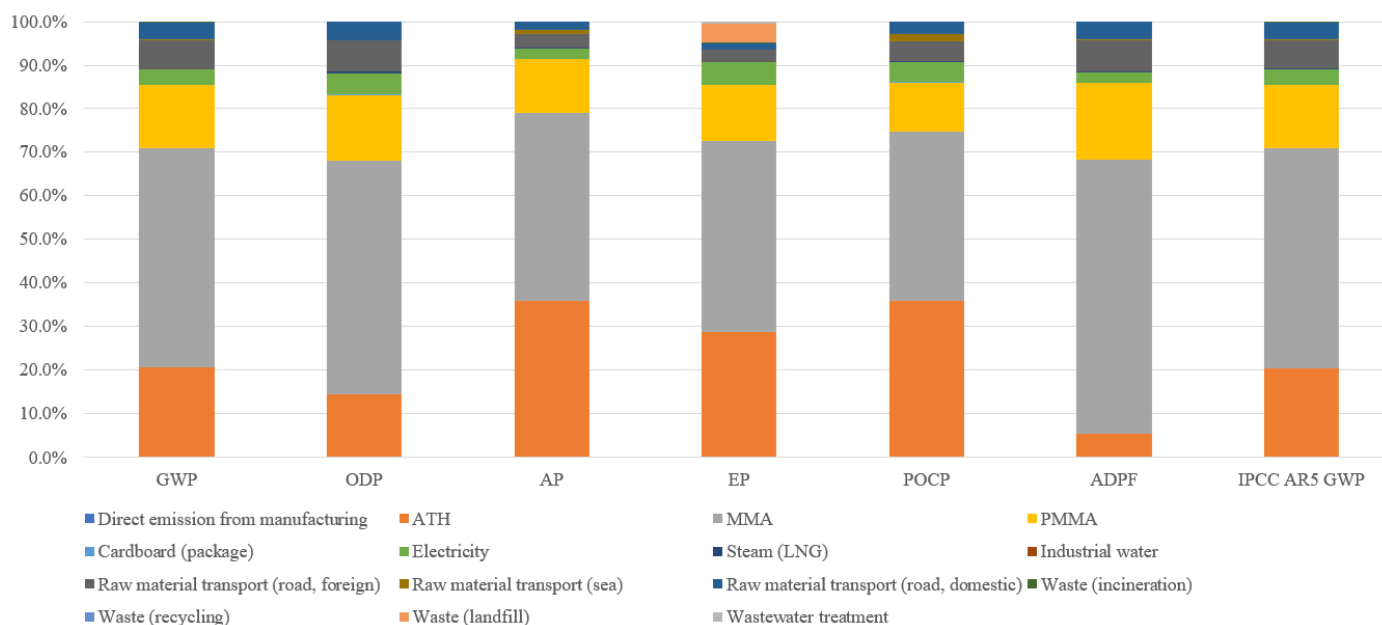


Figure 2 Relative TriStone™ production impacts (A1 to A3)

ENVIRONMENTAL PRODUCT DECLARATION



TriStone™
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According to ISO 14025,
ISO 21930:2017

6. References

- ISO 21930-Sustainability in buildings and civil engineering works -Core rules for environmental product declarations of construction and services (ISO, 2017)
- UL. (2022) Product Category Rules for Building-Related Products and Services Part A Life Cycle Assessment Calculation Rules and Report Requirements
- NSF Sustainability. (2018). PCR for Residential Countertops.
- ISO 14040:2006, Environmental management -- Life cycle assessment -- Principles and framework
- ISO 14044:2006, Environmental management -- Life cycle assessment -- Requirements and guidelines
- ISO 14025:2006, Environmental labels and declarations -- Type III environmental declarations -- Principles and procedures
- EN 15804:2012+A2:2019. Sustainability of construction works – Environmental product declarations – Core rules for the product category of construction products