



THE INTERNATIONAL EPD® SYSTEM

ENVIRONMENTAL PRODUCT DECLARATION

In accordance with ISO 14025:2006

Alumina Zirconia AZ25

Programme: The international EPD System, www.environdec.com

Programme operator: EPD International AB

Date of issue: 2022-12-19

Revision date : 2024-02-28

Validity: 5 years

Valid until: 2029-02-27

Version 2



Scope of the EPD®: Global

An EPD should provide current information and may be updated if conditions change.

The stated validity is therefore subject to the continued registration and publication at www.environdec.com.



The **environmental impacts** of this product have been assessed over its **whole life cycle**. Its Environmental Product Declaration has been verified by an **independent third party**.

Registration number

The International EPD® System:

S-P- 07334



GENERAL INFORMATION

PROGRAM OPERATOR AND EPD INFORMATION

EPD® program operator	The International EPD® System EPD International AB Box 210 60 SE-100 31 Stockholm Sweden www.environdec.com info@environdec.com
Product category rules (PCR)	Basic chemicals 2021:03, Version 1.1.1 UN CPC Group: 342 – Basic inorganic chemicals
PCR review was conducted by	Bekir Çetin, Semtrio Sustainability Consulting bekircetin@semtrio.com
EPD® prepared by	Simeng WANG (simeng.wang@saint-gobain.com)
EPD registration number	S-P- 07334
Declaration issued	Date of issue : 2022-12-19 Revision date: 2024-02-28 Valid until: 2029-02-27
Difference versus the previous version of the EPD	This is the second version of the EPD. This new version has been updated : <ul style="list-style-type: none"> • with 2022 production data and 2022 electricity mix • with recycled content calculated based on 2022 production data. In addition, the new recycled content is only calculated based on post-consumer materials. • with a new system boundary including the product downstream transportation and the packaging end-of-life but excluding the product end-of-life. The old version was a cradle-to-gate EPD whereas the new version is a cradle-to-grave EPD, with the exclusion mentioned above. • with a weighted average of packaging results, based on 2022 sales, instead of the results for each packaging configuration • the latest version of background data (Ecoinvent 3.9.1 and MCL 2023) • using EF 3.1 characterization factors
Independent verification of the declaration, according to EN ISO 14025:2006	Internal <input type="checkbox"/> External <input checked="" type="checkbox"/>
Third party verifier	Marcel Gómez Ferrer, https://www.marcelgomez.com/
Accredited or approved by	The International EPD System
Procedure for follow-up of data during EPD validity involves third party verifier :	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>

The EPD owner has the sole ownership, liability, and responsibility for the EPD.
EPDs within the same product category but from different programs may not be comparable.
For further information about comparability, see ISO 14025.

Product information

COMPANY INFORMATION

Owner of the EPD	Saint-Gobain Ceramic Materials (Zhengzhou) Co., Ltd. Gaocheng Town Dengfeng Zhengzhou 450007 China +86 371 6777 0405
Description of the organisation	Saint-Gobain Abrasive Materials is a world's leading manufacturer of specialty grains and powders and is the market leader in premium abrasive grains for Bonded and Coated abrasives. It offers highly engineered abrasive materials for demanding industries such as aerospace, automotive, construction, electronics, energy, semiconductor and steel that maximize performance and promote process efficiencies. Saint-Gobain produces Seeded Gel ceramic grain, Alumina Zirconia grains, and value-added Aluminum Oxide grains. Saint-Gobain also serves blast finishing, lapping and polishing, and other industrial applications with value-added fused and sintered abrasive grains.
Name and location of production site	Saint-Gobain Ceramic Materials (Zhengzhou) Co., Ltd. Gaocheng Town Dengfeng Zhengzhou 450007 China +86 371 6777 0405
Plant certification	ISO 9001 (valid until 2024/10/12) ISO 45001 (valid until 2024/10/12) ISO 14001 (valid until 2024/10/12)
Contact	Simeng WANG (simeng.wang@saint-gobain.com)

PRODUCT DESCRIPTION AND USES:

Trade name	Alumina Zirconia
Product identification	AZ25
UN CPC code	UN CPC Group: 342 – Basic inorganic chemicals Class 3422
Product description	Alumina zirconia abrasive grains. They are produced by fusing zirconia and alumina in an electric arc furnace. After that, the fused material is quenched and crushed to each grit size. After crushing, the product is sieved and packaged.
Potential intended uses	AZ25 is an abrasive grain. It is particularly well suited for tough grinding applications like high-pressure grinding for steel conditioning, foundry, and snagging.

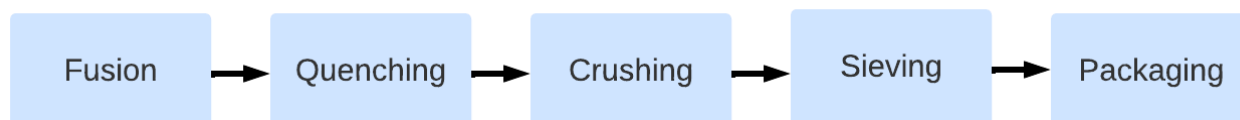


Figure 1 Production processes of AZ25

LCA calculation information

Declared unit	1 kg of AZ25 and its packaging
Reference service life (RSL)	Not applicable for this product
Time representativeness	Data collected representative of 2022 for production data and electricity mix.
Geographical coverage	The geographical scope of this EPD is global. It is valid for product manufactured in Deng Feng plant (China)
Database (s) and LCA software used	Ecoinvent 3.9.1 and GaBi 2023 databases GaBi software version 10.7.1
Calculation methods	Potential environmental impacts are calculated following EN 15804:2012 +A2:2019. The characterization models and factors correspond to the latest update of the default list (EF 3.1), referred to as Version 2.0.
Data quality	Data quality assessment made based on the Product Environmental Footprint Category Rules Through an arithmetic average, the total score of the LCA is 6,3 which is considered good.
Allocation procedures	<p>Mass allocation: Due to the production of various products in the same plant, for certain inputs and outputs, such as water, we allocated the impact based on a homogeneous mass allocation among all the products</p> <p>Economical allocation : Due to the production of several by-product at different stages of AZ25 production, we did an economical allocation of the materials and energy consumption, based on 2 to 5 years average revenue. The economical allocation factors are:</p> <ul style="list-style-type: none"> - For the first by-product : 100% for AZ25 and 0% for the by-product. - For the second by-product : 98% for AZ25 and 2% for the by-product <p>In addition, the polluter pays principle and the modularity principle have been followed.</p>
Cut-off rules	Data for elementary flows to and from the product system contributing to a minimum of 99% of the declared environmental impact have been included.
System boundaries	<p>Cradle-to-grave</p> <p>Upstream processes include raw materials and consumable production as well as distribution packaging's production.</p> <p>Core processes include transportation of the raw materials, consumable and packaging to the plant and the production and consumption of energy during the manufacturing of the product. The CO₂ emissions released by processing of raw materials and consumables are included in the study.</p> <p>Downstream processes include the downstream transportation and the end-of-life of the packaging. For the packaging, we considered a 100% landfilling scenario.</p>

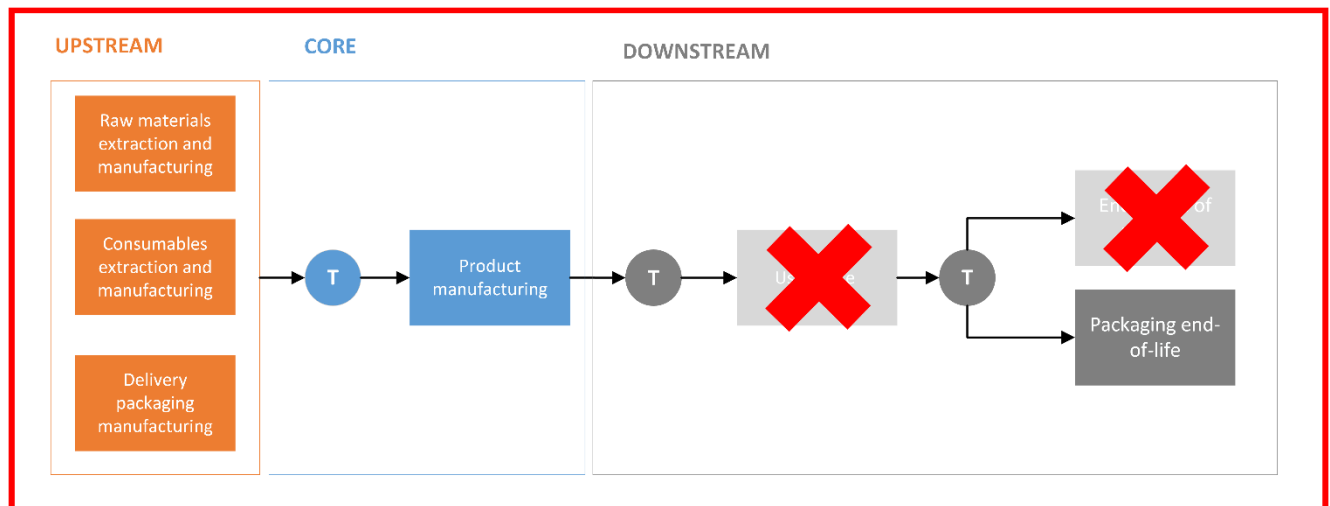
Excluded lifecycles stages

The product fulfills the requirement for excluding the use and end-of-life of the product. Indeed, as per the PCR requirement to exclude the use phase and the end-of-life treatment of the chemical product, the product fulfils the four conditions below:

- The product is physically integrated with other products in subsequent life-cycle process so they cannot be physically separated from them at end of life
- The product or material is no longer identifiable at end-of-life as a result of a physical or chemical transformation process
- The product or material does not contain biogenic carbon, and
- the EPD shall not be used for business-to-consumer communication

AZ25 is intermediate BtB product whose life cycle and disposal depend to a large extent on further processing. Indeed, AZ25 is a raw materials for producing different type of grinding wheels for different application. Thus, it is not possible to make appropriate assumptions for use and end-of-life of the product.

SYSTEM BOUNDARY



Legend



Figure 2 System boundaries

CONTENT DECLARATION

Product composition

DESCRIPTION	%	CAS N°
Aluminium oxide (Al ₂ O ₃)	74%	1344-28-1
Zirconium dioxide (ZrO ₂)	25%	1314-23-4

Table 1 Product composition

AZ25 is not classified as hazardous according to:

- the Globally Harmonized system (GHS)
- OSHA GHS regulations within the United States
- The CPL regulation

AZ25 does not contain any materials / substance hazardous to health and the environment (carcinogenic, mutagenic or toxic to reproduction, allergic, PBT, vPvB)

AZ25 production and product are in line with the Regulation (EC) No 1907/2006 of the European parliament and of the council of 18 December 2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH).

The verifier and the program operator do not make any claim nor have any responsibility of the legality of the product.

Recycled materials

The product uses pre and post-consumer materials in the raw materials mix recipe. The pre-consumer material comes from other industry production waste and the post-consumer material comes from glass furnace demolition.

The quantity of recycled content per DU is 7,11% by only accounting for post-consumer materials (pre-consumer materials are not accounted in the calculation).

Note: The secondary raw materials used (type,sourcing) may change each year depending of availability.

Packaging

Distribution packaging

Packaging designed for the purposes of transport, handling and/or distribution.

The distribution packaging of AZ25 is:

- Big bag (1000kg or 500kg) and paper bags packaging (20kg or 25 kg) materials
- Wooden pallets and PE film for handling of packaged products.

No re-use of the packaging.

The packaging end-of-life scenario is 100% landfilling and 100km of truck transportation.

Consumer packaging

There is no consumer packaging

LCA results

Specific data has been supplied by the plant, and generic data come from GaBi 2023 and Ecoinvent 3.9.1 databases. All emissions to air, water, and soil, and all materials and energy used have been included.

LCA data results are detailed on the following tables, and they refer to a declared unit of **1kg of AZ25 plus its delivery packaging**.

The delivery packaging is a weighted average of all the packaging configuration based on sales volume.

As per the PCR Basic Chemicals 2021:03, version 1.1.1 requirements, the potential environmental impact of the packaging is separated from those of the product.








Estimated impact results are only relative statements that do not indicate impact category endpoints, exceeding threshold values, safety margins, or risks.

Description of the system boundary (X = Included in LCA, MNA = Module Not Assessed)

UPSTREAM	CORE	DOWNSTREAM
Raw material supply Consumable supply Distribution packaging supply	Transportation Manufacturing	Transportation Use End-of-life
A1	A1-A2	B-C-D
X	X	X

Table 2 System boundaries








Environmental Impacts – AZ25 product without packaging¹

	Environmental indicators	UPSTREAM	CORE	DOWNSTREAM	TOTAL
	Climate Change [kg CO2 eq.]	3,68E+00	8,33E-01	1,68E-01	4,68E+00
	Climate Change (fossil) [kg CO2 eq.]	3,68E+00	8,32E-01	1,68E-01	4,68E+00
	Climate Change (biogenic) [kg CO2 eq.]	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	Climate Change (land use change) [kg CO2 eq.]	1,26E-03	9,92E-04	4,98E-06	2,25E-03
	Ozone depletion [kg CFC-11 eq.]	5,29E-08	3,82E-08	1,11E-14	9,11E-08
	Acidification terrestrial and freshwater [Mole of H+ eq.]	2,54E-02	4,51E-03	2,28E-03	3,22E-02
	Eutrophication freshwater [kg P eq.]	9,61E-04	2,89E-04	2,53E-08	1,25E-03
	Eutrophication marine [kg N eq.]	4,18E-03	8,17E-04	8,79E-04	5,88E-03
	Eutrophication terrestrial [Mole of N eq.]	4,48E-02	8,23E-03	9,64E-03	6,27E-02
	Photochemical ozone formation - human health [kg NMVOC eq.]	1,38E-02	3,07E-03	1,89E-03	1,87E-02
	Resource use, mineral and metals [kg Sb eq.] ²	1,33E-06	1,99E-05	2,62E-09	2,12E-05
	Resource use, energy carriers [MJ] ²	4,43E+01	8,97E+00	2,27E+00	5,55E+01
	Water scarcity [m³ world equiv.] ²	1,02E+00	8,38E-01	7,45E-04	1,86E+00

¹ As per the PCR requirement, the results of the packaging are separated from the product results.

² **Disclaimer** : The results of this environmental impact indicator shall be used with care as the uncertainties of these results are high or as there is limited experience with the indicator











Environmental Impacts – Packaging (weighted average) without the product ¹

	Environmental indicators	UPSTREAM	CORE	DOWNSTREAM	TOTAL
	Climate Change [kg CO2 eq.]	1,86E-02	2,26E-03	3,54E-02	5,62E-02
	Climate Change (fossil) [kg CO2 eq.]	5,17E-02	2,26E-03	2,12E-03	5,61E-02
	Climate Change (biogenic) [kg CO2 eq.]	-3,32E-02	0,00E+00	3,32E-02	0,00E+00
	Climate Change (land use change) [kg CO2 eq.]	7,27E-05	6,04E-08	3,27E-07	7,31E-05
	Ozone depletion [kg CFC-11 eq.]	3,49E-10	1,32E-16	3,50E-11	3,84E-10
	Acidification terrestrial and freshwater [Mole of H+ eq.]	2,38E-04	2,07E-05	2,92E-06	2,62E-04
	Eutrophication freshwater [kg P eq.]	1,60E-05	2,82E-10	6,24E-08	1,60E-05
	Eutrophication marine [kg N eq.]	5,30E-05	1,04E-05	1,77E-05	8,10E-05
	Eutrophication terrestrial [Mole of N eq.]	5,20E-04	1,14E-04	9,23E-06	6,44E-04
	Photochemical ozone formation - human health [kg NMVOC eq.]	2,29E-04	1,95E-05	6,09E-06	2,55E-04
	Resource use, mineral and metals [kg Sb eq.] ²	1,83E-07	1,46E-11	8,98E-10	1,84E-07
	Resource use, energy carriers [MJ] ²	1,45E+00	3,15E-02	7,10E-03	1,49E+00
	Water scarcity [m³ world equiv.] ²	1,94E-02	9,86E-06	2,93E-04	1,97E-02

¹ As per the PCR requirement, the results of the packaging are separated from the product results.











² **Disclaimer** : The results of this environmental impact indicator shall be used with care as the uncertainties of these results are high or as there is limited experience with the indicator

Resources Use – AZ25 product without packaging¹

	Resources Use indicators	UPSTREAM	CORE	DOWNSTREAM	TOTAL
	Use of renewable primary energy (PERE) [MJ]	4,39E+00	2,40E+01	1,36E-02	2,84E+01
	Primary energy resources used as raw materials (PERM) [MJ]	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	Total use of renewable primary energy resources (PERT) [MJ]	4,39E+00	2,40E+01	1,36E-02	2,84E+01
	Use of non-renewable primary energy (PENRE) [MJ]	4,36E+01	8,98E+00	2,30E+00	5,49E+01
	Non-renewable primary energy resources used as raw materials (PENRM) [MJ]	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	Total use of non-renewable primary energy resources (PENRT) [MJ]	4,36E+01	8,98E+00	2,30E+00	5,56E+01
	Input of secondary material (SM) [kg]	2,00E-01	0,00E+00	0,00E+00	2,00E-01
	Use of renewable secondary fuels (RSF) [MJ]	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	Use of non-renewable secondary fuels (NRSF) [MJ]	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	Use of net fresh water (FW) [m3]	2,41E-02	1,96E-02	2,21E-05	4,36E-02









¹ As per the PCR requirement, the results of the packaging are separated from the product results.

Resources Use – Packaging without the product ¹

	Resources Use indicators	UPSTREAM	CORE	DOWNSTREAM	TOTAL
	Use of renewable primary energy (PERE) [MJ]	1,40E-01	1,73E-04	1,86E-04	1,40E-01
	Primary energy resources used as raw materials (PERM) [MJ]	1,55E-01	0,00E+00	0,00E+00	1,55E-01
	Total use of renewable primary energy resources (PERT) [MJ]	2,95E-01	1,73E-04	1,86E-04	2,95E-01
	Use of non-renewable primary energy (PENRE) [MJ]	1,44E+00	3,15E-02	7,10E-03	1,48E+00
	Non-renewable primary energy resources used as raw materials (PENRM) [MJ]	1,03E-02	0,00E+00	0,00E+00	1,03E-02
	Total use of non-renewable primary energy resources (PENRT) [MJ]	1,45E+00	3,15E-02	7,10E-03	1,49E+00
	Input of secondary material (SM) [kg]	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	Use of renewable secondary fuels (RSF) [MJ]	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	Use of non-renewable secondary fuels (NRSF) [MJ]	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	Use of net fresh water (FW) [m3]	4,51E-04	2,64E-07	6,81E-06	4,58E-04









¹ As per the PCR requirement, the results of the packaging are separated from the product results.

Waste Category & Output flows – AZ25 product without packaging ¹

Waste Category & Output Flows		UPSTREAM	CORE	DOWNSTREAM	TOTAL
	Hazardous waste disposed (HWD) [kg]	1,65E-05	3,34E-04	1,58E-12	3,51E-04
	Non-hazardous waste disposed (NHWD) [kg]	3,57E+00	8,06E-01	9,18E-05	4,37E+00
	Radioactive waste disposed (RWD) [kg]	3,25E-04	9,84E-06	1,76E-06	3,37E-04
	Components for re-use (CRU) [kg]	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	Materials for Recycling (MFR) [kg]	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	Material for Energy Recovery (MER) [kg]	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	Exported electrical energy (EEE) [MJ]	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	Exported thermal energy (EET) [MJ]	0,00E+00	0,00E+00	0,00E+00	0,00E+00



¹ As per the PCR requirement, the results of the packaging are separated from the product results.

Waste Category & Output flows – Packaging without the product ¹

Waste Category & Output Flows		UPSTREAM	CORE	DOWNSTREAM	TOTAL
	Hazardous waste disposed (HWD) [kg]	8,82E-07	7,83E-15	2,35E-08	9,06E-07
	Non-hazardous waste disposed (NHWD) [kg]	2,67E-02	1,20E-06	2,79E-02	5,46E-02
	Radioactive waste disposed (RWD) [kg]	8,32E-07	1,14E-08	1,65E-08	8,60E-07
	Components for re-use (CRU) [kg]	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	Materials for Recycling (MFR) [kg]	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	Material for Energy Recovery (MER) [kg]	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	Exported electrical energy (EEE) [MJ]	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	Exported thermal energy (EET) [MJ]	0,00E+00	0,00E+00	0,00E+00	0,00E+00

¹ As per the PCR requirement, the results of the packaging are separated from the product results.

Information on biogenic carbon content¹

		UPSTREAM	CORE	DOWNSTREAM	TOTAL
	Biogenic carbon content in product [kg]	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	Biogenic carbon content in packaging [kg]	9,07E-03	0,00E+00	0,00E+00	9,07E-03

Note: 1 kg biogenic carbon is equivalent to 44/12 kg CO₂.

¹ As per the PCR requirement, the results of the packaging are separated from the product results.

Difference versus previous versions

The first EPD for AZ25 has been issued in 2022-12-18.
The difference between the two versions is described below:

Product only without packaging			
Indicators	AZ25 2020	AZ25 2022	Difference
Climate Change [kg CO2 eq.]	6,71E+00	4,68E+00	-30,21%
Climate Change (fossil) [kg CO2 eq.]	6,74E+00	4,68E+00	-30,57%
Climate Change (biogenic) [kg CO2 eq.]	-3,35E-02	0,00E+00	-100,00%
Climate Change (land use change) [kg CO2 eq.]	2,04E-03	2,25E-03	10,41%
Ozone depletion [kg CFC-11 eq.]	1,42E-07	9,11E-08	-35,81%
Acidification terrestrial and freshwater [Mole of H+ eq.]	4,54E-02	3,22E-02	-29,17%
Eutrophication freshwater [kg P eq.]	1,74E-03	1,25E-03	-28,17%
Eutrophication marine [kg N eq.]	7,12E-03	5,88E-03	-17,49%
Eutrophication terrestrial [Mole of N eq.]	7,65E-02	6,27E-02	-18,03%
Photochemical ozone formation - human health [kg NMVOC eq.]	2,30E-02	1,87E-02	-18,50%
Resource use, mineral and metals [kg Sb eq.]	5,02E-06	2,12E-05	322,13%
Resource use, energy carriers [MJ]	7,45E+01	5,55E+01	-25,48%
Water scarcity [m³ world equiv.]	1,74E+00	1,86E+00	7,17%
Use of renewable primary energy (PERE) [MJ]	5,09E+01	2,84E+01	-44,26%
Primary energy resources used as raw materials (PERM) [MJ]	0,00E+00	0,00E+00	0,00%
Total use of renewable primary energy resources (PERT) [MJ]	5,09E+01	2,84E+01	-44,26%
Use of non-renewable primary energy (PENRE) [MJ]	7,20E+01	5,49E+01	-23,80%
Renewable primary energy resources used as raw materials (PENRM)	2,47E+00	0,00E+00	-100,00%
Total use of non-renewable primary energy resources (PENRT) [MJ]	7,45E+01	5,49E+01	-26,33%
Input of secondary material (SM) [kg]	1,50E-01	2,00E-01	33,48%
Use of renewable secondary fuels (RSF) [MJ]	0,00E+00	0,00E+00	0,00%
Use of non renewable secondary fuels (NRSF) [MJ]	0,00E+00	0,00E+00	0,00%
Use of net fresh water (FW) [m3]	4,11E-02	4,36E-02	6,23%
Hazardous waste disposed (HWD) [kg]	2,37E-05	3,51E-04	1379,58%
Non-hazardous waste disposed (NHWD) [kg]	6,68E+00	4,37E+00	-34,57%
Radioactive waste disposed (RWD) [kg]	4,49E-04	3,37E-04	-24,98%
Components for re-use (CRU) [kg]	0,00E+00	0,00E+00	0,00%
Materials for Recycling (MFR) [kg]	0,00E+00	0,00E+00	0,00%
Material for Energy Recovery (MER) [kg]	0,00E+00	0,00E+00	0,00%
Exported electrical energy (EEE) [MJ]	0,00E+00	0,00E+00	0,00%
Exported thermal energy (EET) [MJ]	0	0	0,00%
Biogenic carbon content in product [kg]	0	0	0,00E+00
Recycled content [%]	8,75	7,11	-18,74%

Table 3 Results difference between the first EPD and the update (product only without packaging)

Packaging only

Indicators	AZ25 2020 - big bag	AZ25 2020 - 20kg paper bag	AZ25 2020 - 25kg paper bag	AZ25 2022	Difference between MAX AZ25 2020 and AZ25 2022
Climate Change [kg CO2 eq.]	-1,66E-02	-1,86E-02	-1,93E-02	5,62E-02	-439,18%
Climate Change (fossil) [kg CO2 eq.]	2,98E-02	2,76E-02	2,69E-02	5,61E-02	88,50%
Climate Change (biogenic) [kg CO2 eq.]	-4,64E-02	-4,63E-02	-4,63E-02	0,00E+00	-100,00%
Climate Change (land use change) [kg CO2 eq.]	4,37E-05	7,50E-05	7,00E-05	7,31E-05	67,25%
Ozone depletion [kg CFC-11 eq.]	1,12E-09	1,40E-09	1,35E-09	3,84E-10	-65,60%
Acidification terrestrial and freshwater [Mole of H+ eq.]	1,33E-04	1,46E-04	1,41E-04	2,62E-04	97,69%
Eutrophication freshwater [kg P eq.]	6,49E-06	9,10E-06	8,62E-06	1,60E-05	147,04%
Eutrophication marine [kg N eq.]	3,02E-05	3,70E-05	3,54E-05	8,10E-05	168,50%
Eutrophication terrestrial [Mole of N eq.]	3,14E-04	3,57E-04	3,45E-04	6,44E-04	104,71%
Photochemical ozone formation - human health [kg NMVOC eq.]	1,22E-04	1,29E-04	1,25E-04	2,55E-04	109,43%
Resource use, mineral and metals [kg Sb eq.]	1,60E-07	1,57E-07	1,53E-07	1,84E-07	14,81%
Resource use, energy carriers [MJ]	7,86E-01	6,35E-01	6,25E-01	1,49E+00	89,38%
Water scarcity [m³ world equiv.]	1,76E-02	1,85E-02	1,81E-02	1,97E-02	11,64%
Use of renewable primary energy (PERE) [MJ]	2,28E-01	2,49E-01	2,44E-01	1,40E-01	-38,45%
Primary energy resources used as raw materials (PERM) [MJ]	2,89E-01	4,08E-01	3,91E-01	1,55E-01	0,00%
Total use of renewable primary energy resources (PERT) [MJ]	5,17E-01	6,57E-01	6,35E-01	2,95E-01	-42,87%
Use of non-renewable primary energy (PENRE) [MJ]	6,75E-01	4,04E-01	4,27E-01	1,48E+00	119,10%
Renewable primary energy resources used as raw materials (PENRM)	1,12E-01	2,31E-01	1,98E-01	1,03E-02	-90,75%
Total use of non-renewable primary energy resources (PENRT) [MJ]	7,86E-01	6,35E-01	6,25E-01	1,49E+00	89,30%
Input of secondary material (SM) [kg]	0,00E+00	0,00E+00	0,00E+00	0,00E+00	#DIV/0!
Use of renewable secondary fuels (RSF) [MJ]	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00%
Use of non renewable secondary fuels (NRSF) [MJ]	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00%
Use of net fresh water (FW) [m3]	4,16E-04	4,31E-04	4,23E-04	4,58E-04	10,23%
Hazardous waste disposed (HWD) [kg]	1,07E-11	2,62E-14	2,56E-14	9,06E-07	8440190,09%
Non-hazardous waste disposed (NHWD) [kg]	1,40E-02	1,61E-02	1,56E-02	5,46E-02	288,78%
Radioactive waste disposed (RWD) [kg]	3,06E-06	6,74E-09	6,59E-09	8,60E-07	-71,87%
Components for re-use (CRU) [kg]	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00%
Materials for Recycling (MFR) [kg]	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00%
Material for Energy Recovery (MER) [kg]	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00%
Exported electrical energy (EEE) [MJ]	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00%
Exported thermal energy (EET) [MJ]	0	0	0	0	0,00%
Biogenic carbon content in packaging [kg]	0,007055	0,010163	0,009719	0,00906671	28,51%

Table 4 Results difference between the first EPD and the update (packaging only, without the product)

The difference in results versus the first version is due to:

- The update of the primary data to the latest data available: 2022 production data instead of 2020 production data
- Electricity mix update: use of 2022 electricity mix instead of 2020 electricity mix
- The changes in the system boundaries. The old version was a cradle-to-gate EPD whereas the new version is a cradle-to-grave EPD. Indeed, the new version includes downstream processes such as the product downstream transportation and the packaging end-of-life. However, the product end-of-life is excluded.
- The delivery packaging is a weighted average of all the packaging configuration based on sales volume. In the previous version, we declared the results for each packaging configuration
- The recycled content
 - using 2022 primary data instead of 2022 data.
 - In the new EPD, we only accounted post-consumer materials in the recycled content whereas in the previous version, we pre-consumer materials were also accounted in the recycled content.
- Update of background database: Ecoinvent 3.9.1 and MCL 2023 instead of Ecoinvent 3.8 and MLC 2022
- The change of LCIA methodology: we are using EN15804+A2 EF3.1 instead of EN15804+A2 EF3.0

Appendix

Electricity description

TYPE OF INFORMATION	DESCRIPTION
Location	Representative of Saint-Gobain Abrasive Grains Deng Feng plant (China) for 2022
Geographical representativeness description	Photovoltaic: 100%
Reference year	2022 for energy source split
Type of data set	Cradle to gate
Source	EcoInvent 3.9.1

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