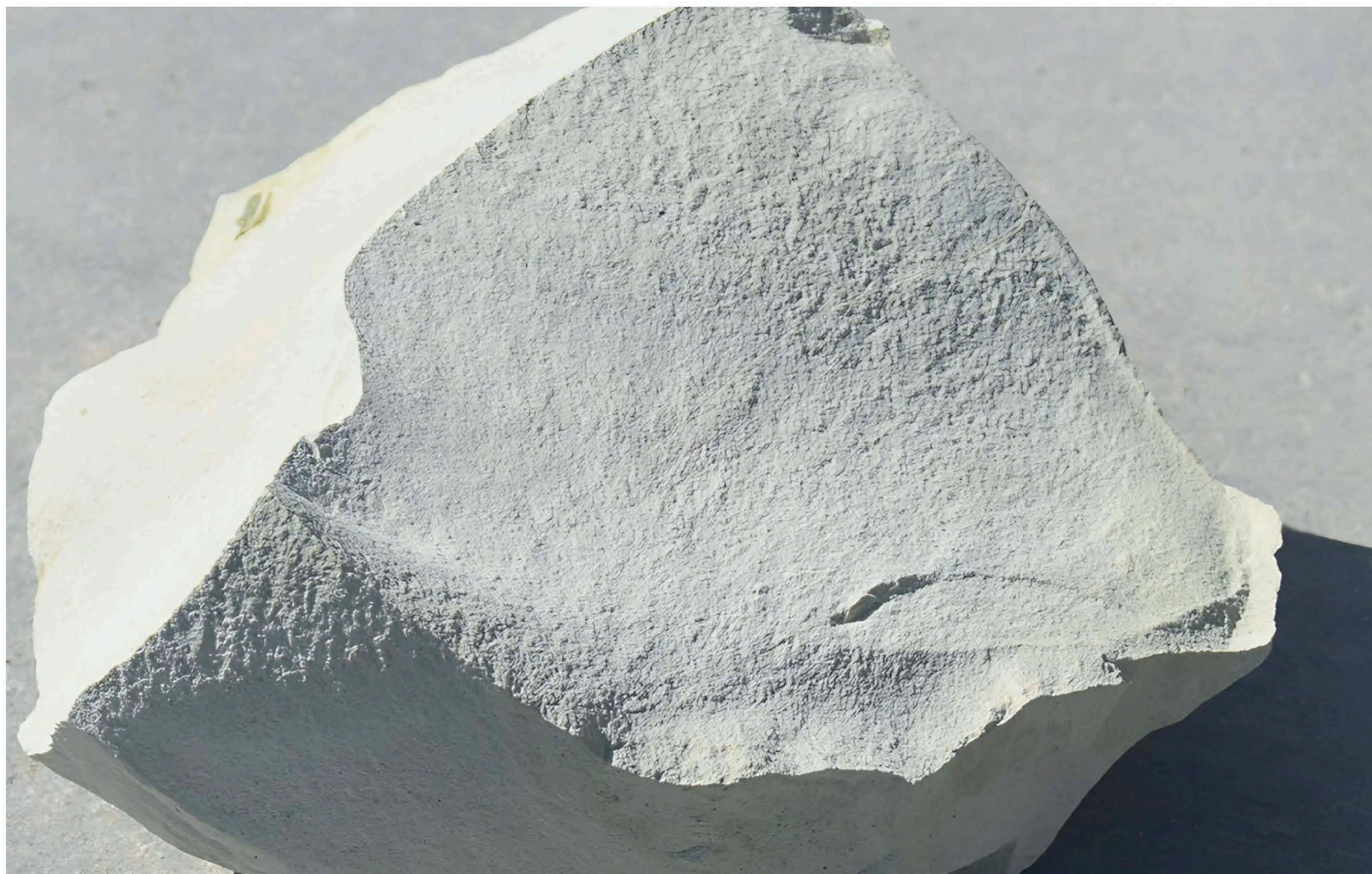




Product-Specific
Environmental Product Declaration

Clinoptilolite Zeolite

Zeolite Composites, LLC

In accordance with ISO 14025 and ISO 21930:2017

Declared Unit = 1 metric tonne

SmartEPD-2025-098-0648-01

Date of Issue

Nov 13, 2025

Expiration Date

Nov 13, 2030

Last Updated

Jan 27, 2026

Refer to the EPD Library at www.smartepd.com for the latest EPD listing information

GLOBAL WARMING POTENTIAL

Total greenhouse gas emissions from cradle to gate (A1-A3)

32.3
kg CO₂-Eq



ACID RAIN

Airborne emissions that enter the atmosphere and transform into acids.

0.22
kg SO₂-Eq



ALGAE BLOOM

Chemicals leaching into aquatic ecosystems.

0.09
kg N-Eq



SMOG

Harmful low-level ozone created from volatile organic compounds (VOCs)

7.54
kg O₃-Eq



OZONE THINNING

Ozone thinning caused by human-made chemicals entering the stratosphere.

3.17e-7
kg CFC-11-Eq



General Information

Zeolite Composites, LLC

PO Box 30809, Seattle, WA 98113

206-276-6187

neil@zeolitecomposites.com

zeolitecomposites.com



Product Name:	Clinoptilolite Zeolite - Packaged Concrete Grade SCM
Declared Unit:	1 metric ton
Declaration Number:	SmartEPD-2025-098-0648-01
Date of Issue:	November 13, 2025
Expiration:	November 13, 2030
Last updated:	January 27, 2026
EPD Scope:	Cradle to gate A1 - A3
Market(s) of Applicability:	North America

General Organization Information

Zeolite Composites, LLC is a vertically integrated, Seattle-based company with a mission to improve the health of our planet for the benefit of all. We accomplish this mission by mitigating climate change and the lingering effects of hazardous materials through the application of zeolite-based solutions that are effective, affordable and scalable.

Further information can be found at: <https://zeolitecomposites.com/>

Limitations, Liability and Ownership

The EPD owner has sole ownership, liability, and responsibility for the EPD.

Environmental declarations from different programs (ISO 14025) may not be comparable. Comparison of the environmental performance of products using EPD information shall be based on the product’s use and impacts at the building or construction works level, and therefore EPDs may not be used for comparability purposes when not considering the whole building life cycle. EPD comparability is only possible 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 in results upstream or downstream of the life cycle stages declared.

The environmental impact results of products in this document are based on a declared unit and therefore do not provide sufficient information to establish comparisons. The results shall not be used for comparisons without knowledge of how the physical properties of the product impact the precise function at the construction level. The environmental impact results shall be converted to a functional unit basis before any comparison is attempted.

A manufacturer shall not make claims based on an industry-average EPD which leads the market to believe the industry-average is representative of manufacturer-specific or product-specific result

Reference Standards

Standard(s):	ISO 14025 and ISO 21930:2017
Core PCR:	Smart EPD® Part A Product Category Rules for Building and Construction Products and Services, 1000, v1.2 Date of issue: March 14, 2025
Sub-category PCR:	Smart EPD® Part B PCR for Supplementary Cementitious Materials, 1000-002, v1.0 Date of issue: May 07, 2024 Valid until: May 07, 2029
Sub-category PCR review panel:	 Contact Smart EPD for more information.
General Program Instructions:	 Smart EPD General Program Instructions v.2.0, March 2025

Verification Information

LCA Author/Creator:	 Alexander Cooper  alex@pathwaysai.co
EPD Program Operator:	 Smart EPD  info@smartepd.com  www.smartepd.com  585 Grove St., Ste. 145, Herndon, VA 20170, USA
Verification:	Independent critical review of the LCA and data, according to ISO 14044 and ISO 14071:  Amy Landis  Michigan Technological University  landis@mtu.edu External Independent external verification of EPD, according to ISO 14025 and reference PCR(s):  Amy Landis  Michigan Technological University  landis@mtu.edu External

Product Information

Declared Unit:	1 metric ton
Mass:	1000 kg
Product Specificity:	 Product Average  Product Specific
Supply Chain Specific Data:	100 %

Product Description

This cradle-to-gate study evaluates the potential environmental impacts of a single product manufactured by Zeolite Composites, LLC at their Victorville, CA facility: Zeolite SCM. This natural zeolite is a Natural Pozzolan and is used as a substitute for portland cement in concrete mixtures. It has a density of 2,300 kg/m³.

Further information can be found at: <https://zeolitecomposites.com/>

Product Specifications

Product Classification Codes:

EC3 - ManufacturingInputs -> CementitiousMaterials ->
SupplementaryCementitiousMaterials

SCM Class:

Natural Pozzolans (ASTM C618, AASHTO M 295, CSA A3001, CSA A3002, NMX-C-618)

Product Composition Diagram



Material Composition

Material/Component Category	Origin	% Mass
Crushed Zeolite	short tons	1.10

Packaging Material	Origin	kg Mass
Packaging - Polypropylene Plastic	None	.98

Hazardous Materials
No regulated hazardous or dangerous substances are included in this product.

EPD Data Specifity

- Primary Data Year:2024
- Manufacturing Specificity:

✗ Industry Average

✗ Manufacturer Average

✓ Facility Specific

Averaging:
Averaging was not conducted for this EPD

System Boundary

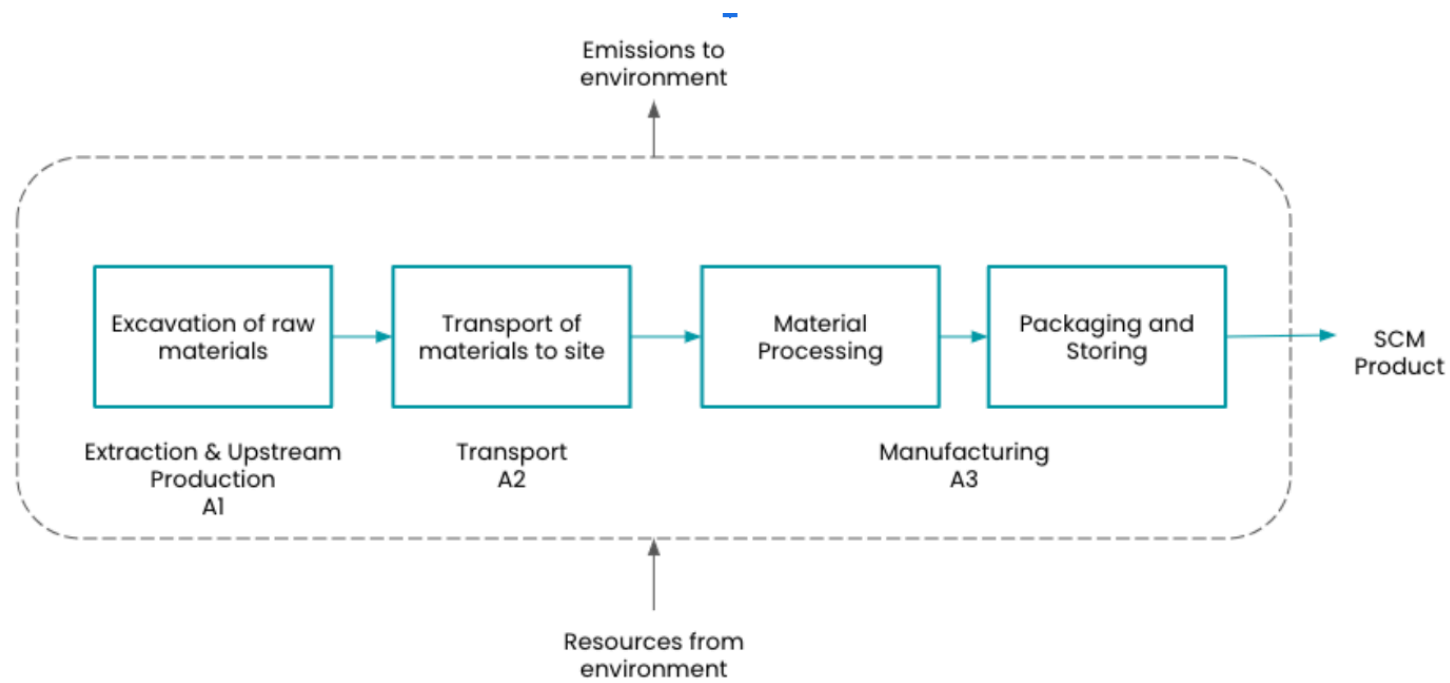
Production	A1	Raw material supply	✓
	A2	Transport	✓
	A3	Manufacturing	✓
Construction	A4	Transport to site	ND
	A5	Assembly / Install	ND

Use	B1	Use	ND
	B2	Maintenance	ND
	B3	Repair	ND
	B4	Replacement	ND
	B5	Refurbishment	ND
	B6	Operational Energy Use	ND
	B7	Operational Water Use	ND
End of Life	C1	Deconstruction	ND
	C2	Transport	ND
	C3	Waste Processing	ND
	C4	Disposal	ND
Benefits & Loads Beyond System Boundary	D	Recycling, Reuse Recovery Potential	ND

Note:

ND = Module not declared

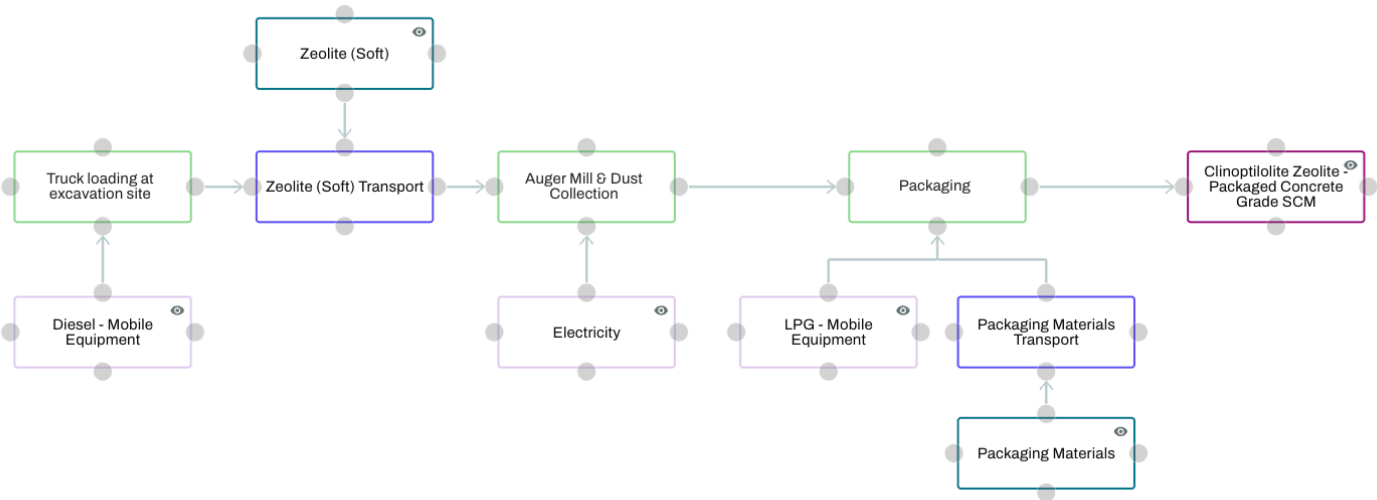
Product Composition Diagram



Plants

 Zeolite Composites Processing Facility 17092 D Street, Victorville, California, United States

Product Flow Diagram



Software And Database

LCA Software:	Pathways v. 1.0
LCI Foreground Database(s):	Ecoinvent v. 3.10 North America
LCI Background Database(s):	Ecoinvent v. 3.10 North America US LCI v. 1.2024-06.0 North America

A foreground LCI database is the database used to model the primary, site-specific data collected for this EPD. A background LCI database is the database used to model generic or non-specific data.

Data Quality

The key requirement for data quality is that data be as accurate and representative as possible. Data quality evaluations are described in Table 3 on page 19 of the associated LCA report and are based on the ISO 14044:2006 standard. To fulfill these requirements and to ensure reliable results, primary data in combination with representative, secondary literature, and consistent background LCI information from ecoinvent v3.10 and USLCI were used.

Life Cycle Module Description

Natural zeolite is collected at the surface of the excavation site and transported to a processing facility. The zeolite then goes through a series of processing steps after entering the facility, including crushing and packaging. The zeolite is packed in plastic bulk bags, shipped by truck from a distributor in Texas. The process does not generate any waste.

LCA Discussion

Allocation Procedure

This is the only product produced at this facility, so no allocation procedures were required.

No end-of-life allocation was defined as end-of-life treatment is outside of the system boundary.
Background data for the study used a cut-off approach for end-of-life allocation.

Cut-off Procedure

The system boundary follows a cradle-to-gate approach, encompassing A1 (Raw Material Extraction & Processing), A2 (Transport), and A3 (Manufacturing) per ISO 21930:2017. Consistent with SmartEPD SCM PCR, the cut-off rule of 1% of total mass, energy, or environmental significance per unit process was applied, with a cumulative cut-off threshold of 5% of overall impact. This was limited to minor process and maintenance materials.
All known and material flows were included. Proxy data was not required but would be used if primary data were unavailable, following data quality requirements outlined in ISO 14044:2006. No known flows were excluded, ensuring completeness of material and energy inputs.

Renewable Electricity

Energy Attribute Certificates (EACs) such as ✗ No
Renewable Energy Certificates (RECs) or Power
Purchase Agreements (PPAs) are included in the
baseline reported results:

Results

Environmental Impact Assessment Results

IPCC AR5 GWP 100, TRACI 2.1

LCIA results are relative expressions and do not predict impacts on category endpoints, the exceeding of thresholds, safety margins or risks.

Impact Category	Method	Indicator	A1	A2	A3	A1 - A3
GWP-total	IPCC AR5 GWP 100	ND	4.20e+0	2.51e+1	2.98e+0	3.23e+1
ODP	TRACI 2.1	ND	1.02e-7	1.80e-7	3.48e-8	3.17e-7
AP	TRACI 2.1	ND	2.00e-2	2.00e-1	1.00e-2	2.30e-1
EP	TRACI 2.1	ND	4.00e-2	5.00e-2	1.62e-3	9.16e-2
POCP	TRACI 2.1	ND	2.20e-1	6.99e+0	3.20e-1	7.54e+0
ADP-fossil	TRACI 2.1	ND	0	0	0	0

Note:

Not all abbreviated indicators listed below may be present in the results above. The inclusion of indicators varies based on PCR requirements.

Abbreviations:

GWP = Global Warming Potential, 100 years (may also be denoted as GWP-total, GWP-fossil (fossil fuels), GWP-biogenic (biogenic sources), GWP-luluc (land use and land use change)), ODP = Ozone Depletion Potential, AP = Acidification Potential, EP = Eutrophication Potential, SFP = Smog Formation Potential, POCP = Photochemical oxidant creation potential, ADP-Fossil = Abiotic depletion potential for fossil resources,

ADP-Minerals&Metals = Abiotic depletion potential for non-fossil resources, WDP = Water deprivation potential, PM = Particular Matter Emissions, IRP = Ionizing radiation, human health, ETP-fw = Eco-toxicity (freshwater), HTP-c = Human toxicity (cancer), HTP-nc = Human toxicity (non-cancer), SQP = Soil quality index.

Comparisons cannot be made between product-specific or industry average EPDs at the design stage of a project, before a building has been specified. Comparisons may be made between product-specific or industry average EPDs at the time of product purchase when product performance and specifications have been established and serve as a functional unit for comparison. Environmental impact results shall be converted to a functional unit basis before any comparison is attempted. Any comparison of EPDs shall be subject to the requirements of ISO 21930 or EN 15804. EPDs are not comparative assertions and are either not comparable or have limited comparability when they have different system boundaries. EPDs are not comparative assertions and are either not comparable or have limited comparability when they have different system boundaries, are based on different product category rules or are missing relevant environmental impacts. Such comparison can be inaccurate, and could lead to erroneous selection of materials or products which are higher-impact, at least in some impact categories.

Resource Use Indicator

Indicator	Unit	A1	A2	A3	A1 - A3
NRSF	MJ, net calorific value	0	0	0	0
PENRE	MJ, net calorific value	6.05e+1	-4.98e-15	2.71e+1	8.76e+1
PENRM	MJ, net calorific value	3.30e+1	0	0	3.30e+1
PENRT	MJ, net calorific value	9.35e+0	-4.98e-15	2.71e+1	1.20e+2
PERE	MJ, net calorific value	4.01e+0	-5.45e-16	2.90e-1	4.30e+0
PERM	MJ, net calorific value	0	0	0	0
PERT	MJ, net calorific value	4.01e+0	-5.45e-16	2.90e-1	4.30e+0
RE	MJ	3.00e-2	0	5.20e-3	3.52e-2
FW	m3	4.00e-2	0	1.99e-3	4.20e-2
RSF	MJ, net calorific value	3.00e-2	0	5.13e-5	3.01e-2
SM	kg	3.00e-2	0	1.00e-2	4.00e-2

Note:

Not all abbreviated indicators listed below may be present in the results above. The inclusion of indicators varies based on PCR requirements.

Abbreviations:

RPRE or PERE = Renewable primary resources used as energy carrier (fuel), RPRM or PERM = Renewable primary resources with energy content used as material, RPRT or PERT = Total use of renewable primary resources with energy content, NRPRE or PENRE = Non-renewable primary resources used as an energy carrier (fuel), NRPRM or PENRM = Non-renewable primary resources with energy content used as material, NRPRRT or PENRT = Total non-renewable primary resources with energy content, SM = Secondary materials, RSF = Renewable secondary fuels, NRSF = Non-renewable secondary fuels, RE = Recovered energy, ADPF = Abiotic depletion potential, FW = Use of net freshwater resources, VOCs = Volatile Organic Compounds.

Waste and Output Flow Indicators

Indicator	Unit	A1	A2	A3	A1 - A3
CRU	kg	0	0	0	0
EEE	MJ	2.00e-2	0	1.81e-3	2.18e-2
HWD	kg	2.90e-1	0	4.00e-2	3.30e-1
RWD	kg	1.47e-5	0	1.26e-6	1.60e-5
MER	kg	1.40e-5	0	2.28e-6	1.63e-5
MFR	kg	1.02e-3	0	9.97e-5	1.12e-3
EET	MJ	0	0	0	0
NHWD	kg	1.43e+1	0	5.90e-1	1.49e+1

Note:

Not all abbreviated indicators listed below may be present in the results above. The inclusion of indicators varies based on PCR requirements.

Abbreviations:

HWD = Hazardous waste disposed, NHWD = Non-hazardous waste disposed, RWD = Radioactive waste disposed, HLRW = High-level radioactive waste, ILLRW = Intermediate- and low-level radioactive waste, CRU = Components for re-use, MFR or MR = Materials for recycling, MER = Materials for energy recovery, MNER = Materials for incineration, no energy recovery, EE or EEE = Recovered energy exported from the product system, EET = Exported thermal energy.

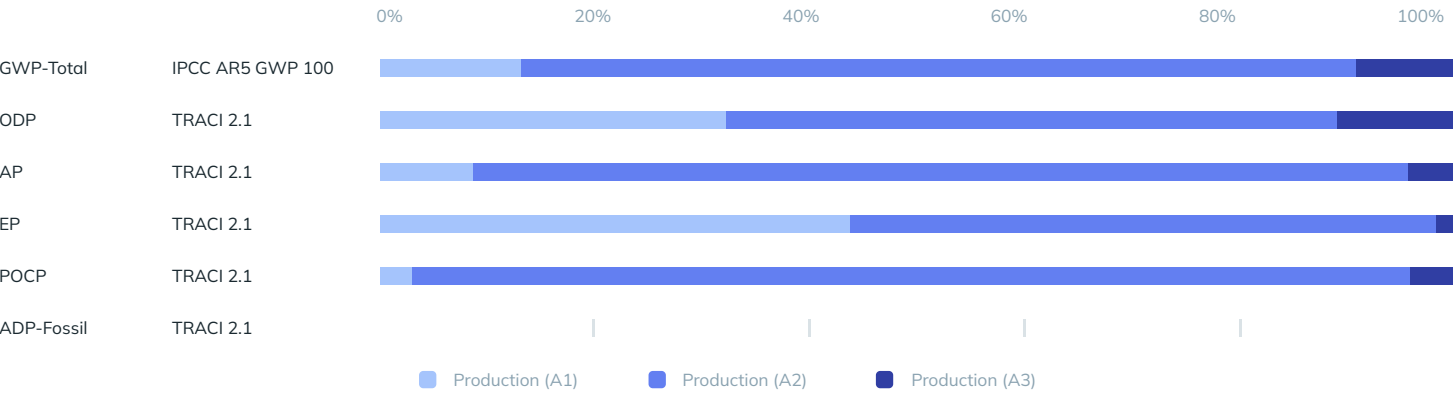
Interpretation

Statements herein only relate to environmental aspects that exist or are likely to be realized. The LCA results demonstrate that the transportation stage (A2) is the dominant contributor across impact categories, particularly for global warming potential (GWP), accounting for roughly 80% of total emissions, primarily due to diesel combustion in transportation.

- Raw materials (A1) contribute less than 10% of GWP, mostly due to the packaging material used
- Manufacturing (A3) contributes roughly 11% of GWP due to the softness of the material and ease of crushing the zeolite, using limited energy.

Key Findings:

- Diesel use in A2 drives most emissions due to the distance from the mine to the mill.
- Collection and crushing of the zeolite are relatively lower drivers of emissions, utilizing some diesel for the collection and electricity for the mill.



Additional Environmental Information

Nothing to report.

Further Information

Further Informatoon

Nothing to report

References

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