ENVIRONMENTAL PRODUCT DECLARATION

IN ACCORDANCE WITH ISO 14025:2006 AND EN 15804+A2:2019/AC:2021

SmartEPD-2026-160-1136-01

MAXIMO 955X



ZINC NACIONAL

SMART EPD
ENVIRONMENTAL PRODUCT DECLARATION

Date of Issue:	Expiration:	Last updated:
Nov 12, 2026	Nov 12, 2031	Nov 12, 2026

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

General Information



Zinc Nacional

Serafín Peña 938 Sur, Centro Monterrey, N.L., México, CP 64000

+52 (81) 8342 6861

atamargo@gpromax.com

zincnacional.com

Product Name:	MAXIMO 955X
Declared Unit:	1 kg of Maximo 955x plus its packaging, ready for delivery.
Declaration Number:	SmartEPD-2026-160-1136-01
Date of Issue:	November 12, 2026
Expiration:	November 12, 2031
Last updated:	November 12, 2026
EPD Scope:	Cradle to gate with other options A1 - A3, D
Market(s) of Applicability:	North America, Global

General Organization Information

Zinc Nacional is a major recycler and producer of Zinc Compounds. It manufactures zinc oxide and zinc sulfate. Its products are used in over 30 countries. Zinc Nacional is a major global supplier to the animal feed, ceramics, fertilizer, paint, rubber, and lubricants industries, among others.

Further information can be found at: https://www.zincnacional.com/en/

Limitations, Liability and Ownership

“EPDs within the same product category but published in different EPD programmes, may not be comparable. For two EPDs to be comparable, they shall be based on the same PCR (including the same first-digit version number) or be based on fully aligned PCRs or versions of PCRs; cover products with identical functions, technical performances and use (e.g. identical declared/functional units); have identical scope in terms of included life-cycle stages (unless the excluded life-cycle stage is demonstrated to be insignificant); apply identical impact assessment methods (including the same version of characterisation factors); and be valid at the time of comparison. The EPD owner has the sole ownership, liability, and responsibility for the EPD”

Reference Standards

Standard(s):	ISO 14025:2006 and EN 15804+A2:2019/AC:2021
Core PCR:	EPD International PCR for Construction Products 2019:14 v2.0.1 Date of issue: June 05, 2025 Valid until: April 07, 2030
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:
Amalia Sojo
EarthShift Global
amalia@earthshiftglobal.com

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: External
Hong Jin | AmSpec LLC | hong.jin@amspecgroup.com

Independent external verification of EPD, according to ISO 14025 and reference PCR(s): External
Hong Jin | AmSpec LLC | hong.jin@amspecgroup.com

Product Information

Declared Unit: 1 kg of Maximo 955x plus its packaging, ready for delivery.
Mass: 1 kg
Product Specificity:
✗ Product Average
✓ Product Specific

Product Description

This study evaluates the environmental performance of Zinc Oxide Maximo 955x, distributed in big bags (capacity of big bags: 1,000 kg; weight: 2.8 kg). Zinc oxide Maximo 955x is a critical component that activates and accelerates the vulcanization process of tire manufacturing and rubber compounding. Many characteristics in rubber are attributed to Zinc oxide, such as: thermal properties, mold cleanliness and shrinkage, tire abrasion and wear resistance, ultraviolet light protection and processability.

Further information can be found at: https://www.zincnacional.com/downloads/oxzinal-955x-en.pdf

Product Specifications

Product Classification Codes: UNCPC - 34220

Product Composition Diagram

Parameter		Amount
Purity	99.4 %	Minimum
Zinc (Zn)	79.9 %	Minimum
Lead (Pb)	0.037 %	Maximum
Iron (Fe)	0.032 %	Maximum
Cadmium (Cd)	0.011 %	Maximum
Copper (Cu)	0.003 %	Maximum
Sulfur (S)	0.05 %	Maximum
Insoluble in HCL	0.08 %	Maximum
Surface area	4.0 - 6.0 m^2/g	-
Fineness through #325 mesh screen	99.94 %	Minimum

Table 1. Material Composition

Material/Component Category	Origin	% Mass
Maximo 910 (Zinc Oxide, CAS 1314-13-2, 99% min)	Zinc Nacional	50%
Oxzinal 821 (Zinc Oxide, CAS 1314-13-2, 99.6% min)	Zinc Nacional	50%

Packaging Material	Origin	kg Mass
Polypropylene	Mexico	2.74
Polyethylene	Mexico	0.056

Biogenic Carbon Content	kg C per kg
Biogenic carbon content in product	0
Biogenic carbon content in accompanying packaging	0

Hazardous Materials
Zinc Oxide is classified under the GHS as hazardous to the aquatic environment (see safety data sheet HS-PT-00001, revision 12, 2022). The hazard relates to release into the aquatic environment, for example through spills. The product is supplied in closed big bags. Release of dangerous substances during the use stage is not assessed in this cradle-to-gate EPD.

EPD Data Specificity

Primary Data Year: 2024

Manufacturing Specificity:

- ✗ Industry Average
- ✓ Manufacturer Average
- ✓ Facility Specific

Averaging:

Averaging was not conducted for this EPD

Table 2. 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	✓

Note:

ND = Module not declared

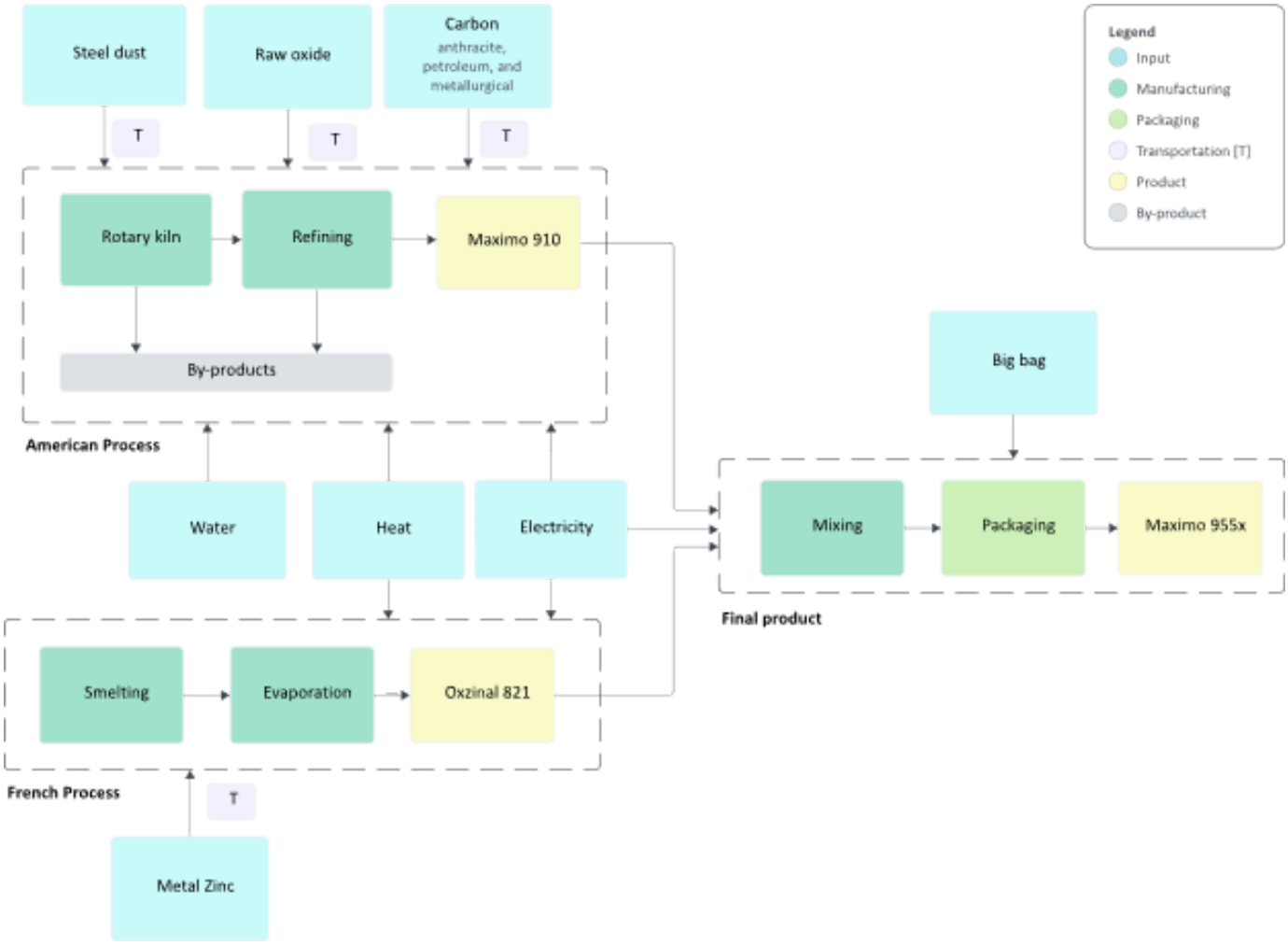
Product Composition Diagram

<table>
<tr><th colspan="3">A1 – A3</th><th>A4 – A5</th><th>B1 – B7</th><th>C1 – C4</th><th>D</th></tr>
<tr><td colspan="3">Product Stage</td><td>Distribution/ Installation Stage</td><td>Use Stage</td><td>End-of-life Stage</td><td rowspan="2">Beyond Product Life Cycle</td></tr>
<tr><td>A1
Raw Material</td><td>A2
Transport</td><td>A3
Manufacturing</td><td colspan="3">ND</td></tr>
</table>

Plants

Zinc Nacional Pedro Galindo 101, Lomas del Roble, San Nicolás de los Garza N.L., México, 66450

Product Flow Diagram



Maximo 955x is made out of two products: Maximo 910 and Oxzinal 821, and it is delivered in Big Bags, with capacity for 1,000 kg.
Maximo 910 is fabricated through the American Process, which uses Electric Arc Furnace (EAF) Dust from a Steel Electric Arc Furnace, carbon, and limestone.
Oxzinal 821 is fabricated through the French Process, that uses Metal Zinc.

Software And Database

LCA Software:	SimaPro v. 10.3		
LCI Foreground Database(s):	Ecoinvent v. 3.11	Mexico, US, RoW	Cut-off
LCI Background Database(s):	Ecoinvent v. 3.11	Mexico, US, RoW	Cut-off

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

A comprehensive data quality assessment was conducted to evaluate multiple data quality indicators, such as reliability, representativeness, and geographic and temporal correlation. Data were found to be consistent, precise, and reproducible, with selected datasets being recent and relevant to current operations.
The ecoinvent data quality system was used for background datasets. All inputs and processes were determined to be representative and suitable for supporting the conclusions of the LCA.
Primary data was obtained from the manufacturing facility and reviewed for completeness and accuracy. Where data gaps existed, proxy data were used.
Secondary data were selected for their alignment with the study's geographic, temporal, and technological scope.
All inventory parameters were reviewed for completeness, with no significant data gaps identified.

Table 3. Data Sources

Process	Source type	Source	Reference year	Data category	Share of primary data, of GWP-GHG results for A1-A3
Zinc {GLO}| market for zinc	A1	ecoinvent 3.11 Cut-off	2011-2024	Raw Materials	0
Heat, central or small-scale, other than natural gas {RoW}| heat production, hard coal briquette, stove 5-15kW, modified	A3	ecoinvent 3.11 Cut-off	1988-2024	Manufacturing	30.3

Life Cycle Module Description

[Module A1] Raw material
Maximo 955x is made out of two products: Maximo 910 and Oxzinal 821, and it is delivered in Big Bags, with capacity for 1,000 kg. The steel dust input used in the process comes from steel-mill facilities in Mexico and in the US, and carries no upstream burden under the Polluter Pays Principle. Other inputs are modeled with ecoinvent 3.11 datasets for the Rest of World (RoW), North America (RNA) or Global (GLO) markets, because Mexico-specific datasets are not available.

[Module A2] Transport
All the material is transported in bulk, so no packaging is needed. Inputs reach the plant from suppliers in over actual supplier distances. These are modeled with RoW Euro 5 truck and rail datasets.

[Module A3] Manufacturing
Maximo 910 is produced using the American process, which includes (1) pelletizing Electric Arc Furnace dust mixed with water, (2) drying with heat from natural gas, and entering this material through a Waelz Process using various furnaces run on natural gas. The main stage of non-ferrous metal separation includes coal oxidation in the material bed. Calcination occurs in a furnace also running on natural gas. Vaporized zinc is collected in a dust collector and sent to further processing in the Wet Plant, where the hydrometallurgical process takes place.

Oxzinal 821 is manufactured using the French process. Metallic zinc is melted in melting crucibles using natural gas as fuel. Zinc metal vaporizes and immediately oxidizes upon contact with air, forming zinc oxide powder. This powder is carried by an air stream to dust collectors and then to storage hoppers. The zinc oxide obtained in this manner has a concentration of 80.2%.

Maximo 955x is a mixture of Maximo 910 (50%) and Oxzinal 821 (50%). Following production, the product Maximo 955x is packaged in big bags (1,000 kg) prior to distribution.

A3 takes place entirely at the Mexican plant, with electricity from the Mexican grid (Mexico-specific dataset) and on-site cogeneration (a RoW combined-cycle natural gas dataset used as a proxy), and natural gas modeled with a RoW dataset.

[Module D] Benefits and loads beyond the system boundary
Only Maximo 910 generates by-products: volatiles (assumed 30%) and slag (assumed 70%). Volatiles are used by refining industries for further processing and resource recovery. Slag is used by the cement industry for adjusting ferrous oxides content in its product; it mainly substitutes a ferrous mineral or laterite.

By-products are modeled with RoW and GLO datasets as datasets for Mexico are not available.

Stages not included are employee transport; manufacture and maintenance of plant and machinery (including infrastructure in adapted datasets); administrative, management, marketing and R&D activities. These are statistically insignificant and irrelevant to the goal and scope of the LCA study. All other foreground flows are included, covering at least 99% of product mass including packaging; no foreground flow was cut off.

LCA Discussion

Allocation Procedure

This study follows the Polluter Pays Principle (PPP), as described in Annex 4 of the PCR-A. The flows that leave the system for use in a subsequent product system are accounted for when calculating the net flow to consider in module D.

Cut-off Procedure

All relevant flows are included in the analysis, which is at least 99% of total product mass including packaging.

Renewable Electricity

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

Scenarios

Reuse, Recovery and / or Recycling Potentials & Relevant Scenario Information (D)

D Module

Further assumptions for scenario development:	The by-products of the American process for manufacturing Maximo 910, include volatiles and slag. Volatiles are used by refining industries for further processing and resource recovery. Slag

is used by the cement process with the purpose of adjusting the ferrous oxides content in the mix for preparing cement; it mainly substitutes a ferrous mineral or laterite. It is assumed that the by-products generated are 30% volatiles and 70% slag.

Results

Table 4. Environmental Impact Assessment Results

EF 3.1

per 1 kg of product of Maximo 955x plus its packaging, ready for delivery..

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

Impact Category	Unit	Method	A1 - A3	D
GWP-fossil	kg CO2 eq	EF 3.1	4.14e+0	-1.27e-2
GWP-biogenic	kg CO2 eq	EF 3.1	3.25e-2	-2.41e-5
GWP-luluc	kg CO2 eq	EF 3.1	5.86e-3	-2.26e-5
GWP-total	kg CO2 eq	EF 3.1	4.18e+0	-1.28e-2
GWP-GHG	kg CO2 eq	EF 3.1	4.09e+0	-1.26e-2
AP	mol H+ eq	EF 3.1	2.71e-2	-1.05e-4
EP-freshwater	kg P eq	EF 3.1	2.38e-3	-2.55e-6
EP-marine	kg N eq	EF 3.1	4.83e-3	-3.40e-5
EP-terrestrial	mol N eq	EF 3.1	5.06e-2	-4.20e-4
POCP	kg NMVOC eq	EF 3.1	1.70e-2	-1.13e-4
ODP	kg CFC 11 eq	EF 3.1	3.74e-8	-1.67e-10
ADP-minerals&metals	kg Sb eq	EF 3.1	7.87e-4	-3.11e-8
ADP-fossil	MJ	EF 3.1	5.49e+1	-1.79e-1
WDP	m3 world eq deprived	EF 3.1	1.48e+0	-9.21e-3

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.

Disclamer for or ADP-minerals/metals, ADP-fossil and WDP: The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator.

Raw material supply contributes 40% to over 90% of the total impact from cradle to gate.
Transportation of raw materials is around 10-15% in most impact categories. This is related to the materials with larger mass transported by truck (57% of facilities providing EAF dust in Mexico). Rail transportation impacts are lower per kgkm in comparison. The manufacturing stage is driven by energy consumption for mixing, separation, and other production stages using coal, natural gas and electricity, mainly in making Maximo 910. Proxy data (included in Stage D) do not exceed 10% of total environmental impacts.

Packaging

Impact Category	Unit	Method	A1 - A3	D
GWP-fossil	kg CO2 eq	EF 3.1	3.50e-2	ND
GWP-biogenic	kg CO2 eq	EF 3.1	-5.87e-4	ND
GWP-luluc	kg CO2 eq	EF 3.1	3.14e-5	ND
GWP-total	kg CO2 eq	EF 3.1	3.45e-2	ND
GWP-GHG	kg CO2 eq	EF 3.1	3.38e-2	ND
AP	mol H+ eq	EF 3.1	1.29e-4	ND
EP-freshwater	kg P eq	EF 3.1	9.62e-6	ND
EP-marine	kg N eq	EF 3.1	2.63e-5	ND
EP-terrestrial	mol N eq	EF 3.1	2.68e-4	ND
POCP	kg NMVOC eq	EF 3.1	1.38e-4	ND
ODP	kg CFC 11 eq	EF 3.1	7.00e-10	ND
ADP-minerals&metals	kg Sb eq	EF 3.1	1.94e-7	ND
ADP-fossil	MJ	EF 3.1	7.78e-1	ND
WDP	m3 world eq deprived	EF 3.1	1.17e-2	ND

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.

Disclamer for or ADP-minerals/metals, ADP-fossil and WDP: The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator.

Table 5. Resource Use Indicator

per 1 kg of product of Maximo 955x plus its packaging, ready for delivery..

Indicator	Unit	A1 - A3	D
PERE	MJ, net calorific value	1.05e+0	-1.92e-2
PERM	MJ, net calorific value	0	0
PERT	MJ, net calorific value	1.05e+0	-1.92e-2
PENRE	MJ, net calorific value	6.07e+1	-3.59e-1
PENRM	MJ, net calorific value	3.55e-1	0
PENRT	MJ, net calorific value	6.10e+1	-3.59e-1
SM	kg	1.45e+0	0
RSF	MJ, net calorific value	0	0
NRSF	MJ, net calorific value	0	0
FW	m3	8.42e-3	-4.61e-4
RE	MJ	ND	ND

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, NRPRT 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.

Table 6. Waste and Output Flow Indicators

per 1 kg of product of Maximo 955x plus its packaging, ready for delivery..

Indicator	Unit	A1 - A3	D
HWD	kg	0	0
NHWD	kg	0	0
RWD	kg	0	0
CRU	kg	0	0
MFR	kg	1.95e+0	-1.95e+0
MER	kg	0	0
EEE	MJ	0	0
EET	MJ	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:

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

Raw material supply contributes 40% to over 90% of the total impact from cradle to gate. Transportation of raw materials is around 10-15% in most impact categories. This is related to the materials with larger mass transported by truck (57% of facilities providing EAF dust in Mexico). Rail transportation impacts are lower per kgkm in comparison. The manufacturing stage is driven by energy consumption for mixing, separation, and other production stages using coal, natural gas and electricity.

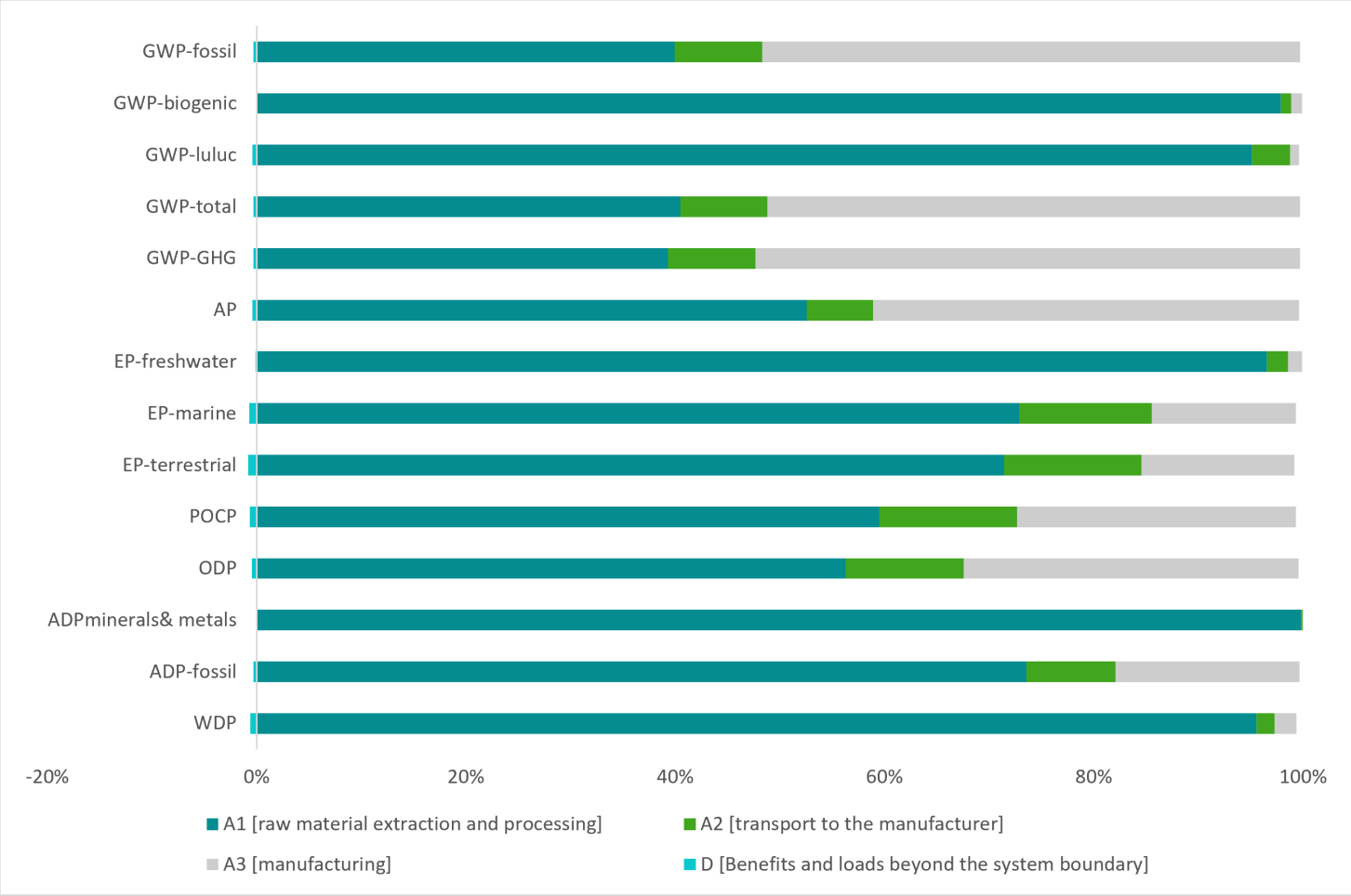


Table 7. Environmental Activities and Certifications

Certification
ISO 14001:2015
Ecovadis - Sustainability Rating

Further Information

Authorship of the EPD

Amalia Sojo and Mariana Ortega
EarthShift Global

References

Andreasi, B., Biganzoli, F., Ferrara, N., Amadei, A., Valente, A., Sala, S., & Ardente, F. (2023). Updated characterisation and normalisation factors for the Environmental Footprint 3.1 method. *Publications Office of the European Union*, *JRC130796*. https://doi.org/10.2760/798894

European Committee for Standardization (CEN). (2019). *EN 15804:2012+A2:2019 Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products*.

International EPD System. (2025). *PCR 2019:14 Construction products (EN 15804+A2) (version 2.0.1)*.

International EPD System. (2026). *PCR 2021:03 Basic chemicals (version 1.1.6)*.

ISO. (2006a). *ISO 14025:2006 Environmental labels and declarations - Type III environmental declarations - Principles and procedures*.

ISO. (2006b). *ISO 14040:2006 - Environmental management — Life cycle assessment — Principles and framework*. International Organization for Standardization. https://www.iso.org/standard/37456.html

ISO. (2006c). *ISO 14044:2006 - Environmental Management—Life Cycle Assessment—Requirements and Guidelines*. International Organization for Standardization. https://www.iso.org/standard/38498.html

PRé Sustainability. (2024). *SimaPro LCA software - PRé Sustainability*. https://network.simapro.com/pre/

Wernet, G., Bauer, C., Steubing, B., Reinhard, J., Moreno-Ruiz, E., & Weidema, B. (2016). The ecoinvent database version 3 (part I): overview and methodology. *International Journal of Life Cycle Assessment*, *21*(9), 1218–1230. https://doi.org/https://doi.org/10.1007/s11367-016-1087-8

Zinc Nacional. (2026a, September 10). *Zinc Nacional*. https://www.zincnacional.com/en/

Zinc Nacional. (2026b, September 10). *Zinc Oxide - Maximo 955x*. /https://www.zincnacional.com/downloads/oxzinal-955x-en.pdf