



SmartEPD-2025-054-0280-01.1

EnviroMix 728

Date of Issue

Jan 30, 2025

Expiration date

Jan 30, 2030

Last updated

Feb 19, 2025

General Information

Chryso Saint-Gobain

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Product Name:	EnviroMix 728
Declared Unit:	1 tonne
Declaration Number:	SmartEPD-2025-054-0280-01.1
Date of Issue:	January 30, 2025
Expiration:	January 30, 2030
Last updated:	February 19, 2025
EPD Scope:	Cradle to gate A1 - A3
Market(s) of Applicability:	North America

General Organization Information

Chryso, part of Saint-Gobain Construction Chemicals, is a global leader in sustainable construction solutions. With a team of 3,000 experts worldwide, we develop cutting-edge admixtures, additives, and AI-driven technologies to tackle the toughest challenges in the concrete and cement industry. From scientists to commercial teams, we deliver tailored solutions and foster long-lasting relationships that catalyze innovation and success. Our solutions not only enhance our customers competitive edge but also significantly reduce their carbon footprint and improve material performance, helping to build a better future, for both people and the planet.

Further information can be found at: www.chrysoinc.com

Limitations, Liability, and Ownership

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 products use and impacts at the building 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 results for upstream or downstream of the life cycle stages declared. The EPD owner has sole ownership, liability, and responsibility for the EPD.

EPDs within the same product category but registered in different EPD programmes, or not compliant with EN 15804, may not be comparable. For two EPDs to be comparable, they must be based on the same PCR (including the same 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 equivalent system boundaries and descriptions of data; apply equivalent data quality requirements, methods of data collection, and allocation methods; apply identical cut-off rules and impact assessment methods (including the same version of characterisation factors); have equivalent content declarations; and be valid at the time of comparison. For further information about comparability, see EN 15804 and ISO 14025.

The justification for a cradle-to-gate study can be attributed to the current EPD landscape in the cement industry.

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 v1.01 Date of issue: January 15, 2024 Valid until: July 15, 2025
Sub-category PCR review panel:	 Contact Smart EPD for more information.
General Program Instructions:	 Smart EPD General Program Instructions v.1.0, November 2022

Verification Information

ACLCA PCR Guidance Version:	1.0
ACLCA PCR Conformance Level:	Transparency
LCA Author/Creator:	 Saint-Gobain North American ESG Sustainability Group  sustainability@saint-gobain.com
EPD Program Operator:	 Smart EPD  info@smartepd.com  www.smartepd.com  585 Grove St., Ste. 145 PMB 966, Herndon, VA 20170, USA
Verification:	Independent critical review of the LCA and data, according to ISO 14044 and ISO 14071:  Gaurav Das  gd30gcc@gmail.com External Independent external verification of EPD, according to ISO 14025 and reference PCR(s):  Gaurav Das  gd30gcc@gmail.com External

Product Information

Declared Unit:	1 tonne
Mass:	1000 kg

Product Specificity: ✓ Product Average
✗ Product Specific

Product Description

High-Performance Admixture based on CHRYSO EnviroMix technology, specially designed for high SCM concrete mix designs. CHRYSO offers a complete range of innovative solutions for ready-mixed concrete, in plant or on site aiming to improve the performance, production, workability, aesthetics and durability of concrete. CHRYSO EnviroMix 728 provides high early strengths to increase SCM content in concrete and achieve substantial savings. It provides optimized workability and placeability to achieve targeted concrete quality and performance on-site while reducing jobsite time and costs.

Further information can be found at: <https://www.chrysoinc.com/solutions/chrysoenviromix/>

Product Specifications

Product SKU(s): CHRYSO@EnviroMix 728: 200_FA20001BK
Product Classification Codes: UNSPSC - 12162305
EC3 - ManufacturingInputs -> ConcreteAdmixtures

Material Composition

Material/Component Category	Origin	% Mass
Water	Undisclosed	Confidential
Polycarboxylate	Undisclosed	Confidential
Sodium Thiocyanate	Undisclosed	Confidential
Additives	Undisclosed	Confidential

Hazardous Materials

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

EPD Data Specificity

Primary Data Year: 2023-2024
Manufacturing Specificity: ✗ Industry Average
✓ Manufacturer Average
✗ Facility Specific

Averaging:

A weighted average was calculated based on production yields. This calculation resulted in a 81% weight for the Royse City plant. The two plants' EnviroMix 728 products are within a 10% threshold of variability.

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

Plants

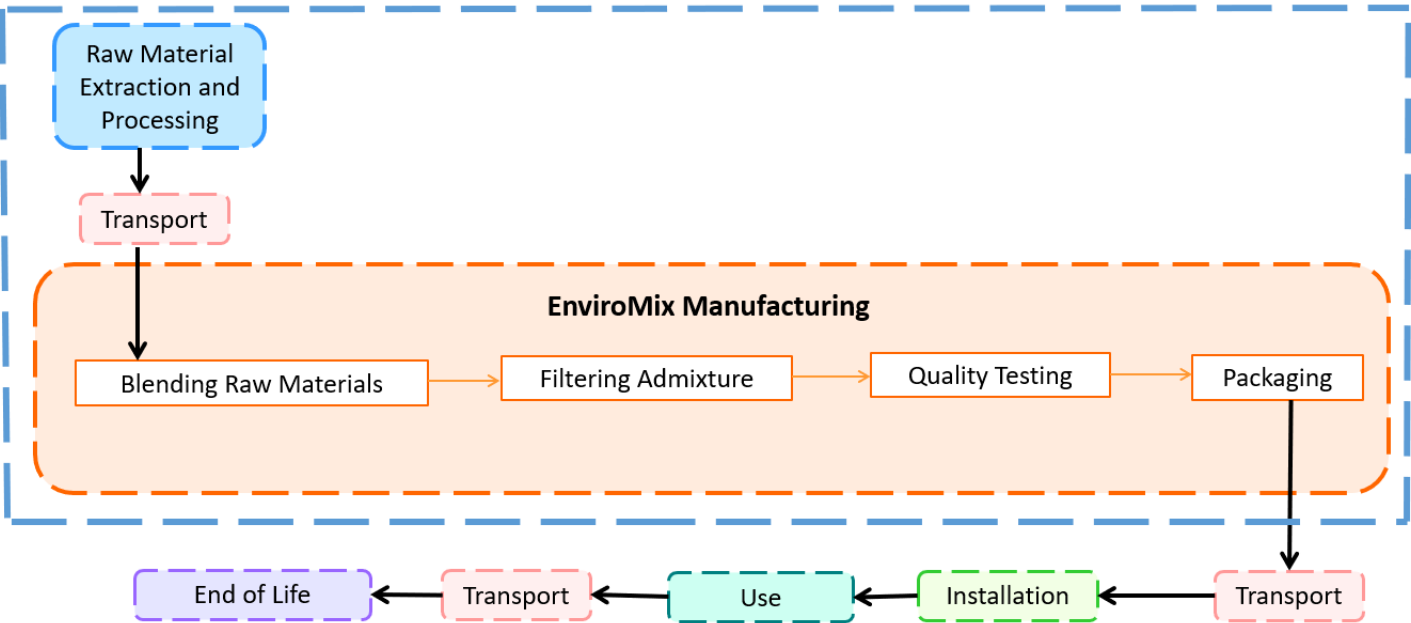
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Product Flow Diagram



Software and Database

LCA Software:	 Sphera LCA for Experts (formerly GaBi) v. 10.7.1
LCI Foreground Database(s):	 GaBi Professional Database v. 2022
LCI Background Database(s):	 US LCI v.  Ecoinvent v. 3.9  GaBi Professional Database v. 2022

Data Quality

Wherever secondary data is used, the study adopts critically reviewed data for consistency, precision, and reproducibility to limit uncertainty. The data sources used are complete and representative of North America in terms of the geographic and technological coverage and are less than ten years old. Any deviations from these initial data quality requirements for secondary data are documented in the report. The results of an LCA are only as good as the quality of input data used. Important data quality factors include precision (measured, calculated, or estimated), completeness, consistency, and reproducibility. The data used for primary data are based on direct information sources from the CertainTeed facilities. The energy and water usage data were collected directly from the utility meters, and the allocation was based on the analysis of experts at the plant. Therefore, the precision for primary data is considered high; however, the uncertainty of the primary data has not been quantified.

Secondary data sets were used for raw materials extraction and processing, transportation, and energy production flows. Primary data was collected from the CertainTeed experts as tracked by automated systems and records. Since most of the data is annually reported, the consistency is considered high. Secondary data was consistently modeled using primarily the Sphera LCA FE database with inputs from the USLCI and Ecoinvent v3.9 when data was not available in the Sphera LCA FE database. Proxies were only identified and used if secondary data was not available. This methodology provides consistency throughout the model. The representativeness of the datasets is chosen to be representative of North America, average technologies of the major producers and distributors of recent and modern timeframes. Most of the secondary data sets have some uncertainty information documented and varies per model. Uncertainty for primary data was not quantified. However, the collected data and allocation methodologies were judged by the operations personnel to be accurate, so the uncertainty is considered low. Overall, the primary data from the manufacturing location is of very high quality, being directly tracked and measured by facility personnel. Therefore, the secondary data is likely to have a higher degree of uncertainty than the primary production data. This is considered when interpreting the results of this life cycle assessment.

Life Cycle Module Descriptions

Raw Materials (Module A1)

A thorough analysis of the material inputs was completed for the inventory of this study.

Transportation of raw materials (Module A2)

Raw materials are transported to the manufacturing sites by standard freight truck, train, or ocean freighters. Unless otherwise noted, transport vehicles are fueled with diesel fuel. The Raw material transportation distance were modeled based on the actual data provided by experts from the plant.

Manufacturing (Module A3)

Concrete chemical admixtures are produced by blending raw materials such as surfactants, polymers, and various chemicals in precise proportions to achieve desired effects like improved workability, altered setting time, or enhanced strength. The process often involves specialized equipment like high-shear mixers, agitated reactors, or batch mixers to ensure uniform consistency. After formulation, the admixture is filtered, tested for quality, and packaged for distribution, with potential additional steps like neutralization or stabilization depending on the product type.

Heating and cooling are commonly applied to optimize processing conditions and maintain product stability. The selection of equipment depends on the physical properties of the raw materials, whether liquid or powder, and the specific requirements of the final admixture. Throughout the process, strict quality control is essential to ensure the admixture delivers the intended performance.

Packaging (Module A3)

Packaging of the final product after production is included in the life cycle assessment. The majority of final product is delivered to customers in bulk tankers and stored in bulk tanks ranging in size from 500 2000 gals at the customer site, therefore very little packaging is used to sell these admixtures.

LCA Discussion

Allocation Procedure

Allocation was conducted based on the production mass data provided by the facilities as a percentage of the overall production mass. Since the plant does not have submetering, there is no way to determine exact consumption for specific product lines. Mass allocation is the most accurate and representative way to allocate energy and water usage data. No waste flows during production have been allocated as co-products. Emissions associated with land use change were not included in the LCA due to the negligible impacts. The EnviroMix product is made in Denver, CO and Royse City, TX. However, there are additional products produced at these locations that were excluded from the study.

Cut-off Procedure

Processes whose total contribution to the final result, with respect to their mass and in relation to all considered impact categories, is less than 1% can be neglected. The sum of the neglected processes may not exceed 5% by mass of the considered impact categories. For that a documented assumption is admissible. For Hazardous Substances as defined by the U.S. Occupational Health and Safety Act the following requirements apply:

The Life Cycle Inventory (LCI) of hazardous substances will be included, if the inventory is available.

If the LCI for a hazardous substance is not available, the substance will appear as an input in the LCI of the product, if its mass represents more than 0.1% of the product composition.

If the LCI of a hazardous substance is approximated by modeling another substance, documentation will be provided. This EPD is in compliance with the cut-off criteria. No known flows were deliberately excluded. Capital items for the production processes (machines, buildings, etc.) were not taken into consideration.

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

Results

Environmental Impact Assessment Results

IPCC AR5 GWP 100, TRACI 2.1, IPCC AR6 GWP 100, CML 2016 v4.8
per 1 tonne of product .

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

EnviroMix 728

Impact Category	Method	Unit	A1	A2	A3	A1A2A3
GWP-total [including biogenic carbon]	IPCC AR5 GWP 100	kg CO2 eq	3.84e+2	8.81e+1	3.50e+1	5.07e+2
GWP-total [including biogenic carbon]	TRACI 2.1	kg CO2 eq	3.71e+2	1.11e+2	3.07e+1	5.13e+2
GWP-total [excluding biogenic carbon]	TRACI 2.1	kg CO2 eq	3.91e+2	8.69e+1	2.74e+1	5.06e+2
GWP-fossil [excluding biogenic carbon]	IPCC AR6 GWP 100	kg CO2 eq	4.04e+2	8.81e+1	3.27e+1	5.25e+2
ODP	TRACI 2.1	kg CFC 11 eq	7.22e-6	2.43e+1	1.08e-10	2.43e+1
AP	TRACI 2.1	kg SO2 eq	9.65e-1	7.01e-1	9.97e-2	1.77e+0
EP	TRACI 2.1	kg N eq	5.31e-1	1.08e-2	3.02e-2	5.72e-1
POCP	TRACI 2.1	kg O3 eq	1.17e+1	2.07e+1	8.57e-1	3.33e+1
ADP-fossil	CML 2016 v4.8	MJ	8.92e+3	1.11e+3	2.42e+2	1.03e+4

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 = Particulate 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 Indicators

per 1 tonne of product .

EnviroMix 728

Indicator	Unit	A1	A2	A3	A1A2A3
PERE	MJ	7.39e+2	0	2.59e+1	7.65e+2
PERM	MJ	0	0	0	0
PERT	MJ	7.39e+2	0	2.59e+1	7.65e+2
PENRE	MJ	9.72e+3	1.12e+3	2.56e+2	1.11e+4
PENRM	MJ	6.16e+2	0	0	6.16e+2
PENRT	MJ	1.03e+4	1.12e+3	2.56e+2	1.17e+4
RPRE	MJ	ND	ND	ND	0
RPRM	MJ	ND	ND	ND	0
RPRT	MJ	ND	ND	ND	0
NRPRE	MJ	ND	ND	ND	0
NRPRM	MJ	ND	ND	ND	0
NRPRT	MJ	ND	ND	ND	0
ADP-fossil	MJ	ND	ND	ND	0
SM	kg	ND	ND	ND	0
RSF	MJ	ND	ND	ND	0
NRSF	MJ	ND	ND	ND	0
FW	m3	6.63e+0	0	4.47e+0	1.11e+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:

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.

Waste and Output Flow Indicators

per 1 tonne of product .

EnviroMix 728

Indicator	Unit	A1	A2	A3	A1A2A3
HWD	kg	1.82e-7	0	1.31e-1	1.31e-1
NHWD	kg	3.44e+0	0	3.00e+1	3.34e+1
RWD	kg	ND	ND	ND	0
HLRW	kg	1.05e-4	0	5.80e-6	1.10e-4
ILLRW	kg	1.26e-1	0	4.88e-3	1.31e-1
CRU	kg	ND	ND	ND	0
MFR	kg	ND	ND	ND	0
MER	kg	ND	ND	ND	0
MNER	kg	ND	ND	ND	0
EEE	MJ	ND	ND	ND	0
EET	MJ	ND	ND	ND	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.

Carbon Emissions and Removals

per 1 tonne of product .

EnviroMix 728

Indicator	Unit	A1	A2	A3	A1A2A3
BCRP	kg CO2	ND	ND	ND	0
BCEP	kg CO2	ND	ND	ND	0
BCRK	kg CO2	ND	ND	ND	0
BCEK	kg CO2	ND	ND	ND	0
BCEW	kg CO2	ND	ND	ND	0
CCE	kg CO2	ND	ND	ND	0
CCR	kg CO2	ND	ND	ND	0
CWNR	kg CO2	ND	ND	ND	0

Note:

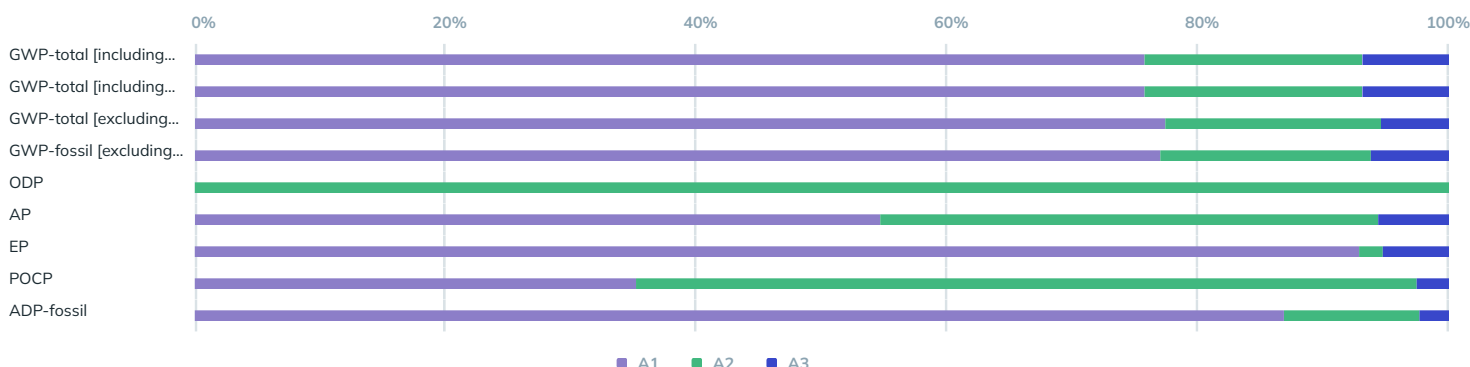
Not all abbreviated indicators listed below may be present in the results above. The inclusion of indicators varies based on PCR requirements.

Abbreviations:

BCRP = Biogenic Carbon Removal from Product, BCEP = Biogenic Carbon Emission from Product, BCRK = Biogenic Carbon Removal from Packaging, BCEK = Biogenic Carbon Emission from Packaging, BCEW = Biogenic Carbon Emission from Combustion of Waste from Renewable Sources Used in Production Processes, CCE = Calcination Carbon Emissions, CCR = Carbonation Carbon Removals, CWNR = Carbon Emissions from Combustion of Waste from Non-Renewable Sources used in Production Processes, GWP-luc = Carbon Emissions from Land-use Change.

Interpretation

Based on the results from the life cycle assessment model, the life cycle impacts are strongly driven by the raw materials. The impacts of the raw materials are primarily attributed to the polycarboxylate in the product recipe. The manufacturing of EnviroMix also drives the Global Warming Potential. The electricity consumption is a significant contributor to the manufacturing impacts.



Additional Environmental Information

This information can prepare Chryso for future sustainable supply chain requirements and can form the basis of marketing literature focused on environmental benefits. This LCA will also assist Chryso with evaluating any environmental claims made by competitors. Chryso should use the LCA study for evaluating alternate raw materials, source locations, and recycled content as part of a sustainable product development process, in order to take a leadership position in sustainable product development. Chryso should also use this LCA as a basis to meet future requirements for customer sustainable purchasing programs and government requirements. Chryso should investigate opportunities to reduce energy consumption in the areas of raw material transportation and especially manufacturing, as these are areas of the process directly under Chrysos control. Reduction in these areas will also provide cost savings and potential competitive advantage to Chryso. Additionally, sub-metering of energy and water use in the manufacturing stage would be helpful for better allocation of the energy and water used within the facility, as well as to measure and benchmark for efficiency opportunity analysis.

Further Information

Renewable Energy

Saint-Gobain is committed to achieving Carbon Neutrality by 2050. In January 2021, Saint-Gobain North America started receiving Renewable Energy Certificates (RECs) from a 12-year virtual power purchase agreement (vPPA) with the Blooming Grove Wind Farm in McLean County, Illinois. Each year within the agreement, the company receives and retires these RECs, effectively reducing CO2 equivalent emissions from electricity usage in the United States and Canada. The updated results incorporate the impact of RECs on the electricity used in the manufacturing process (A3), as shown in the aggregated A1, A2, and A3 data in the Modified Impact Results: Renewable Electricity table. The reduced impacts resulting from allocated RECs at Denver, CO and Royse City, TX were calculated using 100% wind-generated electricity, covering 33% of the plants electricity consumption in 2023 and 2024. The REC data was modeled using the US-SERC Electricity production, wind, 1-3MW turbine, onshore dataset, with a carbon intensity of 13.2 kg CO2e/MWh*. Any remaining energy not covered by RECs was modeled based on local energy grid information for the manufacturing sites. The table reflects the results for EnviroMix 728.

Overall Environmental Impact Potentials (including RECs)

LCIA Method	Impact Category	Unit	A1A2A3	A1	A2	A3
IPCC AR5 GWP 100	GWP-total	kg CO2 eq	5.05E+02	3.84E+02	8.81E+01	3.31E+01
TRACI 2.1	ODP	kg CFC 11 eq	2.43E+01	7.22E-06	2.43E+01	8.65E-09
TRACI 2.1	AP	kg SO2 eq	1.76E+00	9.65E-01	7.01E-01	9.82E-02
TRACI 2.1	EP	kg N eq	5.73E-01	5.31E-01	1.08E-02	3.05E-02
TRACI 2.1	POCP	kg O3 eq	3.33E+01	1.17E+01	2.07E+01	8.30E-01
CML 2016 v4.8	ADP-fossil	MJ	1.01E+04	8.92E+03	1.11E+03	2.17E+02
TRACI 2.1	GWP-fossil	kg CO2 eq	5.04E+02	3.91E+02	8.69E+01	2.55E+01
IPCC AR5 GWP 100	GWP-fossil	kg CO2 eq	5.23E+02	4.04E+02	8.81E+01	3.07E+01
TRACI 2.1	GWP-total	kg CO2 eq	6.99E+02	3.71E+02	1.11E+02	2.88E+01

References

- Smart EPD Part A Product Category Rules for Building and Construction Products and Services, Version 1.01. January 2024. SmartEPD.
- General Program Instructions for Smart EPD, Version 2.0. November 2024. SmartEPD.
- EN 15804 EN 15804 + A2:2019, Sustainability of construction works Environmental Product Declarations Core rules for the product category of construction products.
- ISO 21930:2017 Sustainability in building construction Environmental declaration of building products
- ISO 14025:2006, Environmental labels and declarations Type III environmental declarations Principles and procedures
- ISO 14040:2006, Environmental management Life cycle assessment Principles and framework
- ISO 14020:2022: Environmental statements and programs for products Principles and general requirements
- ISO 14044:2006, Environmental management Life cycle assessment Requirements and guidelines
- ISO 14026:2006, Environmental labels and declarations Type III environmental declarations Principles and procedures.
- Sphera LCA FE Databases. <https://sphera.com/product-sustainability-software/>
- US LCI Database. <https://www.nrel.gov/lci/>
- Ecoinvent v3.9 Database. <http://ecoinvent.org/>
- Chryso Website. <https://www.chrysoinc.com/>
- Life Cycle Assessment: Chryso Inc.- Enviromix 728 and 740 LCA Report. January 2025. Saint-Gobain North America.