Declaration Owner
Surface Tech LLC
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Product:
JUNO C33™

Declared Unit
The declared unit is one metric ton of JUNO C33™ mined and processed in Sonora, Mexico

EPD Number and Period of Validity
SCS-EPD-07561
EPD Valid January 5, 2022 through January 4, 2027

Product Category Rule
ISO 21930:2017. Sustainability in buildings and civil engineering works — Core rules for environmental product declarations of construction products and services.

Program Operator
SCS Global Services
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Declaration owner:	Surface Tech LLC
Address:	888 Prospect Street, #200, La Jolla, CA 92037
Declaration Number:	SCS-EPD-07561
Declaration Validity Period:	EPD Valid January 5, 2022 through January 4, 2027
Program Operator:	SCS Global Services
Declaration URL Link:	https://www.scsglobalservices.com/certified-green-products-guide
LCA Practitioner:	Ilan MacAdam-Somer, SCS Global Services
LCA Software and LCI database:	OpenLCA 1.10.3 software and the Ecoinvent v3.7.1 database
Product's Intended Application:	As an alternative to supplementary cementitious and/or fine aggregate material
Product RSL:	N/A
Markets of Applicability:	North America
EPD Type:	Product-Specific
EPD Scope:	Cradle-to-Gate
LCIA Method and Version:	TRACI 2.1
Independent critical review of the LCA and data, according to ISO 14044 and ISO 14071	☒ internal ☐ external
LCA Reviewer:	Gerard Mansell, Ph.D., SCS Global Services
Product Category Rule:	ISO 21930:2017. Sustainability in buildings and civil engineering works — Core rules for environmental product declarations of construction products and services.
PCR Review conducted by:	ISO Technical Committee
Independent verification of the declaration and data, according to ISO 14025 and the PCR	☐ internal ☒ external
EPD Verifier:	Thomas Gloria, Ph.D., Industrial Ecology Consultants
Declaration Contents:	

Disclaimers: *This EPD conforms to ISO 14025, 14040, 14044, and ISO 21930.*

Scope of Results Reported: *The PCR requirements limit the scope of the LCA metrics such that the results exclude environmental and social performance benchmarks and thresholds, and exclude impacts from the depletion of natural resources, land use ecological impacts, ocean impacts related to greenhouse gas emissions, risks from hazardous wastes and impacts linked to hazardous chemical emissions.*

Accuracy of Results: *Due to PCR constraints, this EPD provides estimations of potential impacts that are inherently limited in terms of accuracy.*

Comparability: *The PCR this EPD was based on was not written to support comparative assertions. EPDs based on different PCRs, or different calculation models, may not be comparable. When attempting to compare EPDs or life cycle impacts of products from different companies, the user should be aware of the uncertainty in the final results, due to and not limited to, the practitioner's assumptions, the source of the data used in the study, and the specifics of the product modeled.*

In accordance with ISO 21930:2017, EPDs are comparable only if they comply with the core PCR, use the same sub-category PCR where applicable, include all relevant information modules and are based on equivalent scenarios with respect to the context of construction works.

1. Summary of Results

This section contains a summary of the cradle-to-gate LCIA results (**Table 2**) reported for the impact categories required by the PCR [1]—global warming potential (GWP), acidification potential (AP), eutrophication potential (EP), ozone depletion potential (ODP), smog potential (POCP) and fossil fuel depletion (FF) —using the impact method required by the PCR for North America, TRACI 2.1. The LCIA contribution results can be found in **Section 5** and the LCI results can be found in **Section 6.**

Table 1. *The life cycle modules included within the system boundary.*

Product			Construction Process		Use							End-of-life				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 extraction and processing	Transport to manufacturer	Manufacturing	Transport	Construction - installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstruction demolition	Transport	Waste processing	Disposal	Reuse, recovery and/or recycling potential
X	X	X	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND

X = Module Included | MND = Module Not Declared

Table 2. *The cradle-to-gate impact of the JUNO C33™ product, reported by life cycle module for all impact categories. Impact is reported for each metric ton of JUNO C33™ product.*

Impact Category (units)	Total (A1-A3)	A1	A2	A3
GWP (kg CO_2 eq)	67.9	19.8	0.361	47.7
AP (kg SO_2 eq)	0.334	0.111	1.65×10^{-3}	0.221
EP (kg N eq)	0.148	2.80×10^{-2}	3.98×10^{-4}	0.120
ODP (kg CFC-11 eq)	1.09×10^{-5}	3.98×10^{-6}	8.79×10^{-8}	6.85×10^{-6}
POCP (kg NMVOC eq)	6.61	2.83	3.98×10^{-2}	3.74
FF (MJ surplus)	138	38.5	0.796	98.8

2. Declaration Owner and Product Description

2.1 SURFACE TECH LLC

Surface Tech is an innovation-driven company dedicated to providing proven solutions for the construction and building materials industry. By focusing on performance, ease of adoption, sustainability and cost savings, Surface Tech has introduced high-tech products that benefit the asphalt, concrete and specialty products industries.

2.2 PRODUCT DESCRIPTION

JUNO C33™

JUNO C33™ is an alternative supplementary cementitious and/or fine aggregate material designed to reduce the amount of cement and/or fine aggregate used in the production of concrete. It consists of wollastonite—a mineral composed of calcium and silicon and oxygen ($CaSiO_3$)—produced from an Imerys owned mine in Mexico. After mining, the wollastonite ore is transported to an Imerys owned beneficiation plant where it is crushed and sorted by the size of the resulting particulate. A mineral mixture with a purity greater than 60% wollastonite and consisting of particles around 40 microns (HAARP-40) is then packaged and sold as Juno C33™.

2.3 ADDITIONAL ENVIRONMENTAL INFORMATION

No regulated substances or materials of very high concern were identified with the production of JUNO C33™.

2.4 FURTHER INFORMATION

Further information on the product can be found on the manufacturers' website at https://surface-tech.com/.

3. Scope of the Study

3.1 FUNCTIONS OF THE PRODUCT SYSTEM

JUNO C33™ serves the primary function as an alternative to supplementary cementitious and/or fine aggregate materials, reducing the amount of cement and/or fine aggregate required in concrete. In accordance with the PCR for cradle-to-gate LCAs, a declared unit of one metric ton of manufactured and packed product is used. The reference flow for the modeling of this system is one (1) metric ton of JUNO C33™ product (**Table 3**).

Table 3. *The declared unit and reference flow used to model the JUNO C33™ product.*

Parameter	Value	Unit
Declared Unit	1	Metric ton
Reference Flow	1	Metric ton

3.2 PRODUCT MATERIAL COMPOSITION

The JUNO C33™ is comprised of a mineral mixture with a purity greater than 60% wollastonite and consisting of particles around 40 microns (HAARP-40).

3.3 SYSTEM BOUNDARY

The system under study includes the cradle-to-gate life cycle of the JUNO C33™ product, which includes all inputs required and outputs generated from the production life cycle stage.

The production life cycle stage is subdivided into information modules as prescribed by the PCR. Each module is described in **Table 4.** The JUNO C33™ processes incorporated into each life cycle module are described in detail in **Section 4.1**. The major individual unit processes that make up each module of the product stage shown in **Figure 1**.

Table 4. *A description of the life cycle phases included in the JUNO C33™ product's system boundary.*

Module	Module Description	Included in System Boundary
A1	Raw Material extraction and upstream production, which includes raw material extraction and processing, as well as processing of secondary material inputs (e.g., recycled or reused materials)	✓
A2	Transport to factory, which covers transport of raw materials and other inputs to the factory and internal transport	✓
A3	Manufacturing, which includes all fuels, electricity, and water used in manufacturing the product; the extraction and upstream production, transport to factory, and manufacturing of product packaging; transport and treatment of all waste generated at the manufacturing facility	✓
A4	Transport to the building site	**MND**
A5	Installation	**MND**
B1	Use stage	**MND**
B2 – B5	Maintenance, repair, replacement, and refurbishment	**MND**
B6 – B7	Operational energy and water use	**MND**
C1	Deconstruction/demolition	**MND**
C2	Transport to waste processing or disposal	**MND**
C3	Waste processing for generation of secondary materials (i.e. recycling)	**MND**
C4	Disposal of waste	**MND**
D	Optional supplementary information about the potential net benefits from reuse, recycling and energy recovery beyond the system boundary of the studied product system	**MND**

X = Module Included | MND = Module Not Declared

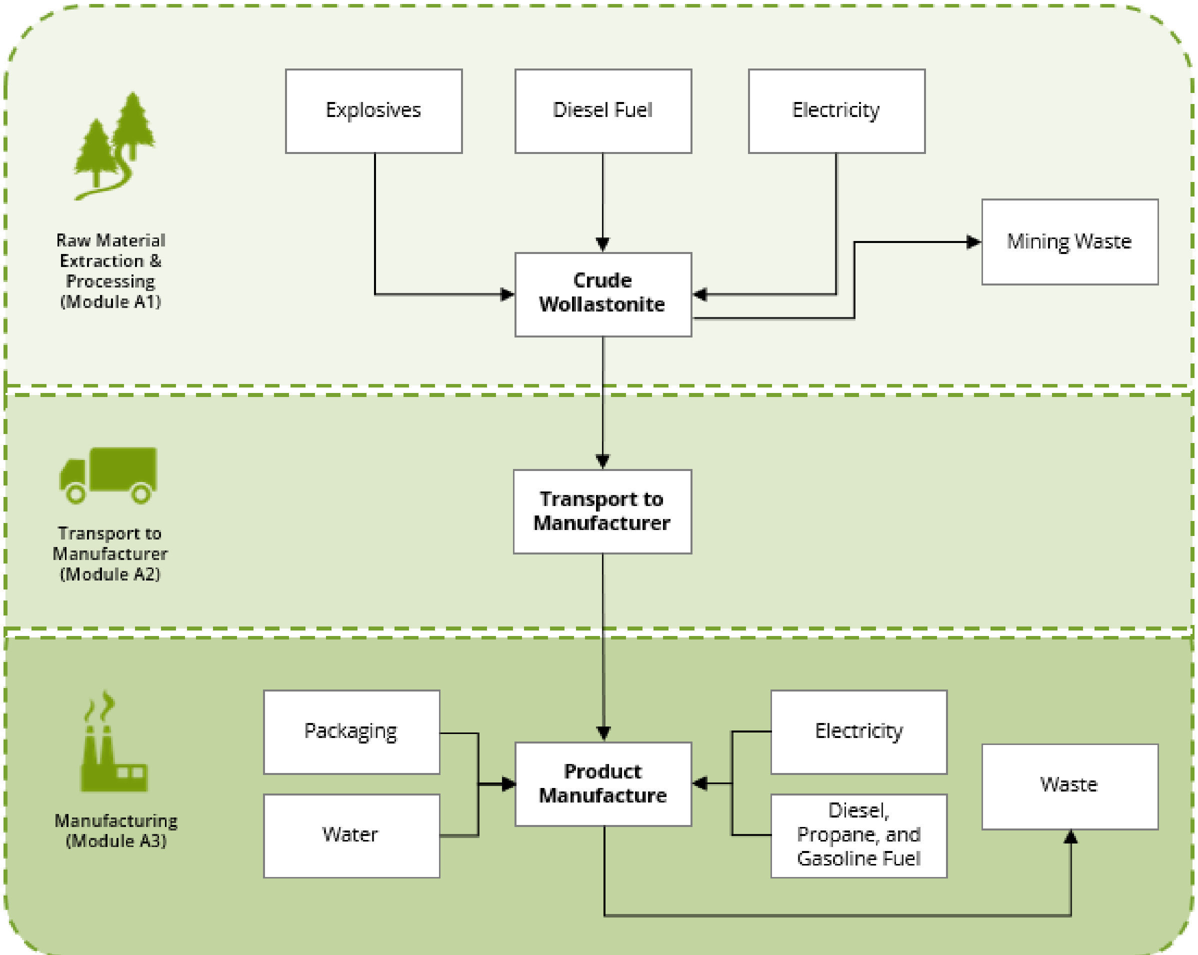

Figure 1. *Flow diagram representing the major processes over the cradle-to-gate life cycle of the JUNO C33™ product.*

4. Technical Information and Scenarios

4.1 LIFE CYCLE MODULES

(A1) Raw Material Extraction

This module includes the inputs and outputs required to mine the raw material, wollastonite ore, produced from an Imerys owned mine in Sonora, Mexico, which is later processed into JUNO C33™ within the A3 manufacturing module. Key inputs include water-gel explosives, diesel fuel, and electricity; electricity is assumed to come from the Mexican power grid and is based on the 2019 average national Mexican grid mix [2].

The transport and treatment of waste generated from the mining of wollastonite ore is also accounted for. Transport for disposal of mining waste is based on the EPA WARM model [3], which assumes a distance of 20 miles (~32km) from point of generation of waste to a disposal facility (e.g., landfill, recycling or incineration). Transport is assumed to be done by EURO 4 diesel truck; the assumed transport capacity and diesel fuel utilization can be found in **Table 5**. All mining waste is landfilled.

(A2) Transport to Factory

This module includes the transport of the wollastonite ore from the Imerys mine to a nearby Imerys owned beneficiation plant also located in Sonora, Mexico. Transport distance and mode of transport were provided by Surface Tech's supplier of JUNO C33™, Imerys. Transport was modeled in OpenLCA v1.10.3 using the Ecoinvent v3.7.1 database. The type of transport, type of vehicle, fuel type, and fuel utilization modeled are reported in **Table 5** below.

Table 5. *The one way distance, fuel utilization, and capacity utilization (percentage of vehicle's freight capacity occupied on the roundtrip) for transport within the A1 and A2 module.*

Transport Specifications	Value	Unit
EURO 4, >32 MT Freight Lorry		
Diesel Fuel Utilization	1.92×10^{-2}	kg/km
Capacity Utilization	52	%

(A3) Manufacturing

This module includes the steps required to process the wollastonite ore into the JUNO C33™ product at the Imerys beneficiation plant and includes any waste generated from these processes, transport of waste, and waste treatment, as well as all inputs and outputs required to produce the JUNO C33™ product's packaging (polypropylene bag and wooden pallet).

The processing steps are described below:

- Crushing of wollastonite ore;
- Sorting of crushed material; and
- Packaging of material with a purity >60% wollastonite consisting of particulates approximately 40 microns in size into polypropylene bags stacked on wooden pallets for transport to customers or a holding facility

These four steps require electricity, freshwater, diesel fuel, gasoline fuel, and propane and generate inert non-hazardous waste and a small amount of hazardous waste. The electricity used at the Mexican based beneficiation facility is assumed to come from the Mexican grid and is modeled using data from the International Energy Administration for the average Mexican national 2019 grid mix [2].

Transport for disposal of all manufacturing waste is based on the EPA WARM model [3], which assumes a distance of 20 miles (~32km) from point of generation of waste to a disposal facility (e.g., landfill, recycling or incineration). Waste is assumed to be transported by a smaller type of truck than is used in module A2—EURO 4, 16-32 MT diesel freight truck; truck transport parameters can be found below in **Table 6.** All inert waste that isn't sold or recycled is landfilled. All hazardous waste is assumed to be stored in an underground deposit.

Table 6. *The one way distance, fuel utilization, and capacity utilization (percentage of vehicle's freight capacity occupied on the roundtrip) for waste transport within the A3 module.*

Transport Specifications	Value	Unit
EURO 4, 16-32 MT Freight Lorry		
One Way Distance	32	km
Diesel Fuel Utilization	3.67×10^{-2}	kg/km
Capacity Utilization	37	%

4.2 DATA SOURCES

Table 7. *The LCI datasets from the Ecoinvent v3.7.1 (2020) database used to model the product system for the JUNO C33™ product.*

Flow	Dataset
A1. Raw Materials	
Wollastonite Ore	market for electricity, medium voltage | electricity, medium voltage | Cutoff, U – (Mexico – IEA 2019) - MX
	machine operation, diesel, < 18.64 kW, generators | machine operation, diesel, < 18.64 kW, generators | Cutoff, U - GLO
	market for explosive, tovex | explosive, tovex | Cutoff, U - GLO
	market for transport, freight, lorry >32 metric ton, EURO4 | transport, freight, lorry >32 metric ton, EURO4 | Cutoff, U - RoW
A2. Transport	
Truck	market for transport, freight, lorry >32 metric ton, EURO4 | transport, freight, lorry >32 metric ton, EURO4 | Cutoff, U - RoW
A3. Manufacturing	
Electricity	market for electricity, medium voltage | electricity, medium voltage | Cutoff, U (Mexico - IEA 2019) - MX
Diesel	machine operation, diesel, < 18.64 kW, generators | machine operation, diesel, < 18.64 kW, generators | Cutoff, U - GLO
Gasoline	market for petrol, unleaded, burned in machinery | petrol, unleaded, burned in machinery | Cutoff, U - GLO
Propane	market for propane, burned in building machine | propane, burned in building machine | Cutoff, U - GLO
Transport	market for transport, freight, lorry 16-32 metric ton, EURO4 | transport, freight, lorry 16-32 metric ton, EURO4 | Cutoff, U - RoW
A3. Product Packaging	
Polypropylene Bags	polypropylene production, granulate | polypropylene, granulate | Cutoff, U - RER
	extrusion, plastic film | extrusion, plastic film | Cutoff, U - RER
Wooden Pallet	treatment of waste polypropylene, sanitary landfill | waste polypropylene | Cutoff, U - RoW
Waste Treatment	
Landfilling Non-Hazardous Waste	treatment of inert waste, sanitary landfill | inert waste | Cutoff, U - RoW
Treatment Hazardous Waste	market for hazardous waste, for underground deposit | hazardous waste, for underground deposit | Cutoff, U - RoW

4.3 DATA QUALITY

The data quality assessment is discussed in **Table 8** below for each of the data quality parameters. No data gaps were allowed which were expected to significantly affect the outcome of the impact indicator or LCI resource results.

Table 8. *Data quality assessment of the JUNO C33™ product system.*

Data Quality Parameter	Data Quality Discussion
Time-Related Coverage: Age of data and the minimum length of time over which data is collected	The most recent available data are used, based on other considerations such as data quality and similarity to the actual operations. Typically, these data are less than 10 years old (typically 2015 or more recent). All of the data used represented an average of at least one year's worth of data collection. Manufacturer-supplied data (primary data) are based on annual production for 2019.
Geographical Coverage: Geographical area from which data for unit processes is collected to satisfy the goal of the study	The data used in the analysis provide the best possible representation available with current data. Actual processes for upstream operations are primarily global. Surrogate data used in the assessment are representative of global operations. Data representing product disposal are based on regional statistics.
Technology Coverage: Specific technology or technology mix	For the most part, data are representative of the actual technologies used for processing, transportation, and manufacturing operations.
Precision: Measure of the variability of the data values for each data expressed	Precision of results are not quantified due to a lack of data. Data collected for operations were typically averaged for one or more years and over multiple operations, which is expected to reduce the variability of results.
Completeness: Percentage of flow that is measured or estimated	The LCA model included all known mass and energy flows for production of the JUNO C33™ product. In some instances, surrogate data used to represent upstream and downstream operations may be missing some data which is propagated in the model. No known processes or activities contributing to more than 1% of the total environmental impact for each indicator are excluded.
Representativeness: Qualitative assessment of the degree to which the data set reflects the true population of interest	Data used in the assessment represent typical or average processes as currently reported from multiple data sources and are therefore generally representative of the range of actual processes and technologies for production of these materials. Considerable deviation may exist among actual processes on a site-specific basis; however, such a determination would require detailed data collection throughout the supply chain back to resource extraction.
Consistency: Qualitative assessment of whether the study methodology is applied uniformly to the various components of the analysis	The consistency of the assessment is considered to be high. All secondary inventory data are from the Ecoinvent v3.7.1 database and are of similar quality and age.
Reproducibility: Qualitative assessment of the extent to which information about the methodology and data values would allow an independent practitioner to reproduce the results reported in the study	Based on the description of data and assumptions used, this assessment would be reproducible by other practitioners. All assumptions, models, and data sources are documented.
Sources of the Data: Description of all primary and secondary data sources	Data representing energy use at the Imerys mine and beneficiation facility represent an annual average and are considered of high quality due to the length of time over which these data are collected (one year), as compared to a snapshot that may not accurately reflect fluctuations in production. The Ecoinvent v3.7.1 database is used for secondary LCI datasets.
Uncertainty of the Information: Uncertainty related to data, models, and assumptions	Uncertainty related to materials in the JUNO C33™ product is low. Data for upstream operations was available for raw materials, since Imerys also produces the key raw material (wollastonite ore) required for production of the JUNO C33™ product. Other upstream operations was modeled using background data and the study relied upon the use of existing representative datasets. These datasets contained relatively recent data (<10 years) and were generally geographically representative. Uncertainty related to the impact assessment methods used in the study are high. The impact assessment method required by the PCR includes impact potentials, which lack characterization of providing and receiving environments or tipping points.

4.4 ALLOCATION

This study follows the allocation guidelines of ISO 14044 and allocation rules specified in the PCR and minimized the use of allocation wherever possible.

However allocation was not required, except for transport as explained below, as the supplier and manufacturer of JUNO C33™, Imerys, calculated the energy and material requirements for the manufacture of the raw materials.

The transportation from primary producer of material components (e.g., the raw materials required for manufacturing) to the manufacturing facility is based on primary data provided by Imerys, including modes, distances, and amount of material transported from each supplier. Transportation was allocated based on the mass and distance the material transported.

4.5 CUT-OFF RULES

The cut-off criteria for including or excluding materials, energy, and emissions data from the study are in accordance with the PCR and are listed below.

- All inputs and outputs to a unit process are included in the LCA calculation for which data are available. Any data gaps are filled with representative data. Assumptions used for filling data gaps are documented in the LCA report.
- Where there is a data gap or insufficient data, criteria for exclusion of inputs and outputs is 1% of primary energy usage (renewable and non-renewable energy) and 1% on a mass basis for the specific unit process. The maximum criteria for exclusion of inputs and outputs is 5% of primary energy usage and mass across all modules included in the LCA.
- If a flow meets the above criteria for exclusion but is considered to have a significant potential environmental impact, it is included.
- Excluded processes include: Processing of waste relegated to recycling or recovery; note that recycling and recovery of all waste is outside of the system boundary [1]

4.6 SUMMARY OF ASSUMPTIONS

- Representative inventory data for raw materials was modeled with unit process data taken from Ecoinvent (**Table 7**).
- Representative inventory data from Ecoinvent, detailed in **Table 7**, was used to model the production of electricity. Electricity use for the Imerys mine and beneficiation plant is modeled based on 2019 IEA data [2] for the Mexico national grid mix.
- Representative inventory data from Ecoinvent was used to model all transport (**Table 7**).
- The transport distance of all waste from the point of generation to a treatment facility is based on the EPA WARM model assumption of 20 miles (~32 km).
- Ecoinvent datasets are used to model the impacts associated with landfilling, which does not include energy recovery from landfill gas (**Table 7**).

4.7 PERIOD UNDER REVIEW

The period of review is January 1, 2019 through December 31, 2019

4.8 COMPARABILITY

The PCR this EPD was based on was not written to support comparative assertions. EPDs based on different PCRs, or different calculation models, may not be comparable. When attempting to compare EPDs or life cycle impacts of products from different companies, the user should be aware of the uncertainty in the final results, due to and not limited to, the practitioner's assumptions, the source of the data used in the study, and the specifics of the product modeled.

5. LCA Results

In accordance with the PCR, the required impact categories—global warming potential (GWP), acidification potential (AP), eutrophication potential (EP), ozone depletion potential (ODP), and smog potential (POCP)—are reported. One additional impact category, fossil fuel depletion (FF), is also reported. As required by the PCR [1], the impact methods for North America, TRACI 2.1, are used.

It should be noted that LCA results are relative expressions and do not predict impacts on category endpoints, the exceeding of thresholds, safety margins or risks. In addition, 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 21930:2017 [1]. 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.

The PCR requires the calculation of biogenic carbon emissions and removals, all of which are negligible since no biogenic carbon is included in the product and or product packaging.

5.1 CRADLE-TO-GATE IMPACT

The cradle-to-gate impact for each LCIA category is reported in **Table 9** below. **Figure 2** shows the percent contribution of each life cycle module to the total cradle-to-gate impact.

Table 9. *The cradle-to-gate impact of the JUNO C33™ product, reported by life cycle module for all impact categories. The second row of each impact category shows the percent contribution of each life cycle module to the total cradle-to-gate impact. Impact is reported for one metric ton of JUNO C33™ product.*

Impact Category (units)	Total (A1-A3)	A1	A2	A3
GWP (kg CO_2 eq)	67.9	19.8	0.361	47.7
	100%	29%	1%	70%
AP (kg SO_2 eq)	0.334	0.111	1.65×10^{-3}	0.221
	100%	33%	0%	66%
EP (kg N eq)	0.148	2.80×10^{-2}	3.98×10^{-4}	0.120
	100%	19%	0%	81%
ODP (kg CFC-11 eq)	1.09×10^{-5}	3.98×10^{-6}	8.79×10^{-8}	6.85×10^{-6}
	100%	36%	1%	63%
POCP (kg NMVOC eq)	6.61	2.83	3.98×10^{-2}	3.74
	100%	43%	1%	57%
FF (MJ surplus)	138	38.5	0.796	98.8
	100%	28%	1%	72%

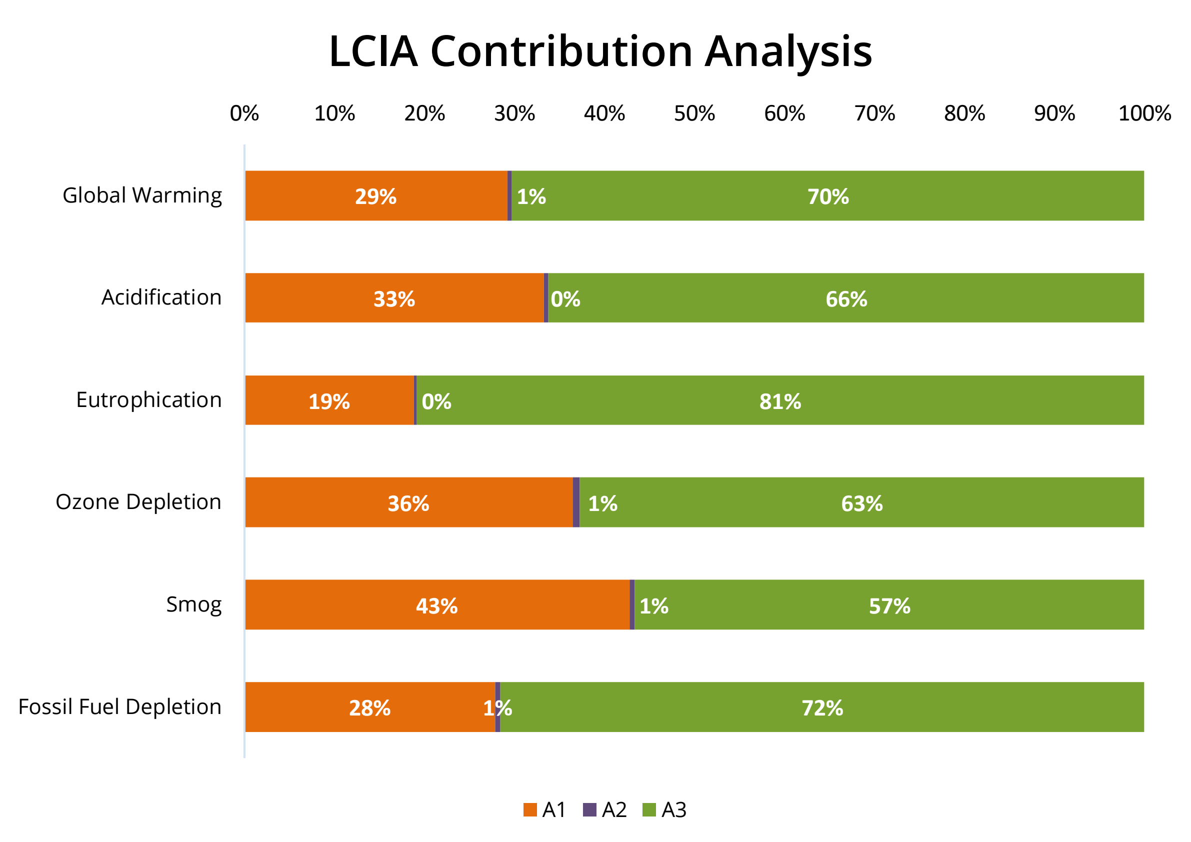

Figure 2. *The contribution of each life cycle module to the total impact of each impact category.*

6. LCI Results

The following life cycle inventory (LCI) parameters specified by the PCR, shown in **Table 10** below, are reported in **Table 11** below.

Table 10. *The full name, abbreviation, and unit of additional LCI indicators required by the PCR.*

Resources	Unit	Waste and Outflows	Unit
RPR_E: Renewable primary resources used as energy carrier (fuel)	MJ, LHV	**HWD:** Hazardous waste disposed	kg
RPR_M: Renewable primary resources with energy content used as material	MJ, LHV	**NHWD:** Non-hazardous waste disposed	kg
$NRPR_E$: Non-renewable primary resources used as an energy carrier (fuel)	MJ, LHV	**HLRW:** High-level radioactive waste, conditioned, to final repository	kg
$NRPR_M$: Non-renewable primary resources with energy content used as material	MJ, LHV	**ILLRW:** Intermediate- and low-level radioactive waste, conditioned, to final repository	kg
SM: Secondary materials	MJ, LHV	**CRU:** Components for re-use	kg
RSF: Renewable secondary fuels	MJ, LHV	**MR:** Materials for recycling	kg
NRSF: Non-renewable secondary fuels	MJ, LHV	**MER:** Materials for energy recovery	kg
RE: Recovered energy	MJ, LHV	**EE:** Recovered energy exported from the product system	MJ, LHV
FW: Use of net freshwater resources	m^3	-	-

Table 11. *The cradle-to-gate inventory impacts of each inventory indicator category reported for each metric ton of JUNO C33™ product. The second row of each inventory category shows the percent contribution of each life cycle module to the total cradle-to-gate impact.*

Impact Category (units)	Total (A1-A3)	A1	A2	A3
RPRe (MJ)	648	5.71	5.99×10^{-2}	642
	100%	1%	0%	99%
RPRm (MJ)	INA	INA	INA	INA
	-	-	-	-
NRPRe (MJ)	754	246	5.28	502
	100%	33%	1%	67%
NRPRm (MJ)	neg.	neg.	neg.	neg.
	-	-	-	-
SM (kg)	0.00	0.00	0.00	0.00
	-	-	-	-
RSF/NRSF (MJ)	neg.	neg.	neg.	neg.
	-	-	-	-
FW (m^3)	2.85	0.194	2.03×10^{-3}	2.66
	100%	7%	0%	93%
HWD (kg)	2.366×10^{-2}	7.105×10^{-4}	1.369×10^{-5}	2.293×10^{-2}
	100%	3%	0%	97%
NWHD (kg)	803	231	0.485	571
	100%	29%	0%	71%
HLRW (kg)	1.384×10^{-4}	1.581×10^{-5}	3.187×10^{-7}	1.223×10^{-4}
	100%	11%	0%	88%
ILLRW (kg)	4.27×10^{-3}	1.64×10^{-3}	3.71×10^{-5}	2.59×10^{-3}
	100%	38%	1%	61%
CRU (kg)	0.00	0.00	0.00	0.00
	-	-	-	-
MR (kg)	0.00	0.00	0.00	0.00
	-	-	-	-
MER (MJ)	neg.	neg.	neg.	neg.
	-	-	-	-
RE (MJ)	neg.	neg.	neg.	neg.
	-	-	-	-

7. References

1. ISO 21930: 2017 Sustainability in buildings and civil engineering works — Core rules for environmental product declarations of construction products and services.

2. IEA, 2020. IEA Electricity Information 2020. https://www.iea.org/countries/mexico

3. US EPA, 2004. "WARM Model Transportation Research - Draft." Memorandum from ICF Consulting to United States Environmental Protection Agency.http://epa.gov/epawaste/conserve/tools/warm/SWMGHGreport.html#background

4. ISO 14025:2006 Environmental labels and declarations – Type III environmental declarations – Principles and Procedures.

5. ISO 14040: 2006/Amd 1:2020 Environmental Management – Life cycle assessment – Principles and Framework

6. ISO 14044: 2006/Amd 1:2017/Amd 2:2020 Environmental Management – Life cycle assessment – Requirements and Guidelines.

7. SCS Type III Environmental Declaration Program: Program Operator Manual. V11.0 November 2021. SCS Global Services.

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9. Ecoinvent Centre (2020) ecoinvent data from v3.7.1 Swiss Center for Life Cycle Inventories, Dübendorf, 2020, http://www.ecoinvent.org

10. European Joint Research Commission. International Reference Life Cycle Data System handbook. *General guide for Life Cycle Assessment – Detailed Guidance.* © European Union, 2010.

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