Eccomelt356.2. Recycled Aluminium

Eccomelt

ENVIRONMENTAL PRODUCT DECLARATION

ISO 14025:2006 and EN 15804

ASTM INTERNATIONAL

Eccomelt is pleased to present this environmental product declaration (EPD) for their Eccomelt356.2. This EPD was developed in compliance with ISO 14025 and has been verified by Lindita Bushi from Athena Sustainable Materials Institute.
The LCA and the EPD were prepared by Vertima Inc.
The EPD includes cradle-to-gate life cycle assessment (LCA) results.

For more information about Eccomelt, visit https://eccomelt.com/about-us/.
For any explanatory material regarding this EPD, please contact the program operator.

1. GENERAL INFORMATION

PCR GENERAL INFORMATION		
Reference PCR	PRODUCT CATEGORY RULES (PCR) FOR BASIC ALUMINIUM PRODUCTS AND SPECIAL ALLOYS. The International EPD® System, December 2022 to December 2026	
The PCR moderator and Commitee:	*Elena Neri,* *INDACO2 srl,* *elena.neri@indaco2.it*	*Raffmetal SpA* *Ecodynamics Group - University of Siena,* *INDACO2 Srl*

EPD GENERAL INFORMATION		
Program Operator	ASTM Program Operator 100 Barr Harbor Drive, West Conshohocken (PA) 19428-2959 USA www.astm.org	
Declared Product	**Eccomelt356.2. Recycled Aluminium**	
EPD Registration Number 717	**EPD Date of Issue** July 2024	**EPD Period of Validity** July 2024 - July 2029
EPD Recipient Organization	Eccomelt 45 Commercial Rd, East York, ON M4G 1Z3, Canada https://eccomelt.com/about-us/	eccomelt

EPD Type/Scope and Declared Unit Product-specific cradle-to-gate EPD with Declared unit of 1 kg of Eccomelt pre-treatment post-consumer aluminium scrap.	**Year of Reported Manufacturer Primary Data** July 1, 2022 - June 30, 2023

Geographical Scope	**LCA Software**	**LCI Databases**	**LCIA Methodology**
North America	Open LCA version 1.11.0	Ecoinvent 3.9.1 and US LCI	EN 15804:2012+A2:2019

This LCA and EPD were prepared by:	Gatien Geraud Essoua Essoua Ph.D., Eng. Forestry. Vertima Inc. www.vertima.ca
This EPD and LCA were independently verified in accordance with ISO 14025:2006, ISO 14040:2006 and ISO 14044:2006, as well as the pcr for basic aluminium products and special alloys from internati onal EPD system, which is based on EN 15804 ☐ Internal ☒ External	Lindita Bushi Lindita Bushi, Ph.D. Athena Sustainable Materials Institute

LIMITATIONS

This declaration is an environmental product declaration in accordance with ISO 14025 that describes environmental characteristics of the described product and provides transparency and disclosure of environmental impacts [1]. This EPD does not guarantee that any performance benchmarks, including environmental performance benchmarks, are met.

EPDs within the same product category but from different programmes 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 characterization factors), have equivalent content declarations and be valid at the time of comparison.

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

2. PRODUCT SYSTEM DESCRIPTION

Eccomelt, is located in the United States and Canada. Eccomelt is the market leader in the production of a consistent chemically pure, low energy intensive substitute for A356.2/AlSi7 with one of the lowest carbon footprints in the industry. Since 2006, Eccomelt has provided OEMs, Tier 1's, and foundries in the U.S., Europe, Canada, and Mexico with the eccomelt356.2, patented process that is an innovation in the aluminum industry

Eccomelt has developed a strong reputation of delivering high quality products, services and added value options to its customers.

2.1. PRODUCT DESCRIPTION

Eccomelt356.2 is a sustainable, high quality A356/AlSi7Mg0.3 pretreatment scrap made from 100% post-consumer aluminum. Eccomelt356.2 recycled aluminum scrap is used to produce secondary ingots that can replace primary aluminum ingots and help foundries lower the carbon footprint and maximize the recycling content in their castings without compromising their quality. It helps increase the foundry's melt rate, reducing the energy consumption and therefore further reducing the castings' carbon footprint. Figure 1 shows recycled aluminum of Eccomelt LLC. The product category classification Code (UN CPC) code is 4153.

Figure 1: Packaged Aluminum356.2 recycled product.

2.1.2. Technical requirements

For specific properties and performance data of Eccomelt recycled aluminum, please consult the following link: https://eccomelt.com/technical-papers/.

2.2. DECLARATION OF METHODOLOGICAL FRAMEWORK

This LCA is a cradle-to-gate study. For this analysis, the attributional approach was followed and impacts of infrastructure have been excluded. Life cycle stage included in the analysis is upstream stage. According to the PCR [3], no allocation was applied to this analysis as there are no co-product at the end of the process. The LCA was performed accordingly with the ASTM program operator rules [4]. OpenLCA software v1.11 [5], an open-source software, was used to calculate the inventory and to assess potential environmental impacts associated with the inventoried emissions. Ecoinvent v3.9.1 and USLCI databases were used and the methodology applied was EN 15804:2012+A2:2019 [6, 7, 2].

2.3. MATERIALS COMPOSITION

Table 1: Materials composition of 1 kg of recycled aluminum input

Materials	Toronto plant	Manchester plant	Houston plant	Unit
Post-consumer aluminum	100%	100%	100%	kg

2.4. PRODUCT APPLICATION

Eccomelt356.2, a recycled aluminum product has been used to produce wheels using a low-pressure casting process since 2006 (Figure 2).

Figure 2: Example of use of recycled aluminum.

2.5. MANUFACTURING

Eccomelt uses a patented, non thermal recycling and cleaning method to process aluminum wheels that creates an extremely low carbon A356/AISi7 aluminum alloy product in a form that lowers operational costs and reduces emissions in the factories of our customers.

2.6. PACKAGING

Eccomelt356.2 are packaged using the materials presented in Table 2.

Table 2: Amount of packaging materials used per 1kg of Eccomelt356.2

Materials	Toronto plant	Manchester plant	Houston plant	Unit
Softwood	1.13E-03	1.07E-03	1.09E-03	Palett
Polypropylene	1.08E-03	1.03E-03	1.04E-03	kgs
Nylon	5.67E-05	5.44E-05	5.45E-05	kgs
Metal	4.06E-03	3.90E-03	3.91E-03	kgs
Paperboard	1.26E-06	1.15E-06	1.19E-06	kgs

3. LCA CALCULATION RULES

3.1. DECLARED UNIT

The selected declared unit (DU) for this study according to the PCR [3] is 1 kg of Eccomelt pre-treatment post-consumer aluminium scrap. Table 3 presents all products targeted by this report and their respective DU.

Table 3: Declared Unit of studied Eccomelt product.

Items	Units	Recycled aluminum
Declared Unit	kg	1
Average Density	kg/m^3	2,710

3.2. SYSTEM BOUNDARIES

According to PCR [3], the system boundaries are Cradle-to-Gate system. The life cycle stage included in the analysis is upstream stage. This stage includes:

- Collection of post-consumer aluminium wheels,
- Raw materials transportation to the manufacturing plants,
- Mechanical cleaning, crushing and packaging,
- Waste management.

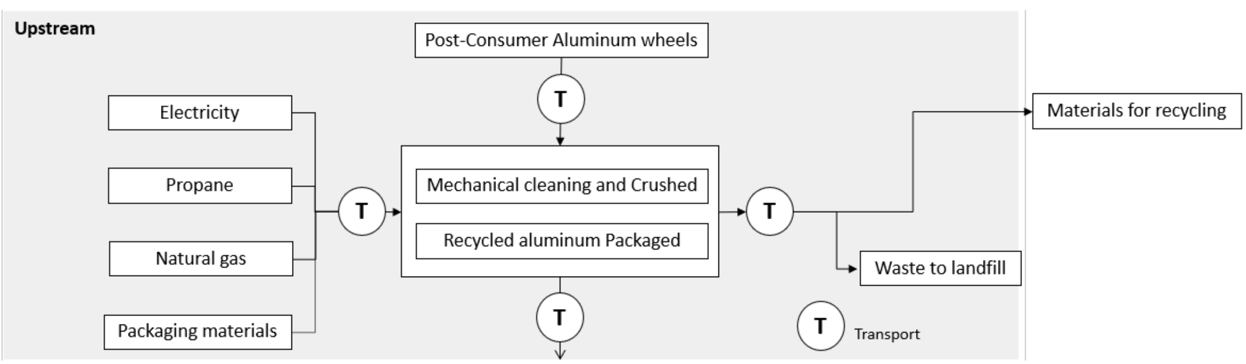

Figure 3: System boundary of upstream processes of Eccomelt356.2.

Collection of post-consumer aluminium wheels: This stage includes the recovery of post-consumer aluminium wheels. Wheels come from car wreckers/recyclers and automobile demolition. All recovery wheels are loaded on truck or/and train ready for delivery on the Eccomelt plants. The accounted process does not include:

- Scrap production (i.e. processes from other previous lifecycles that generate pre or post-consumer scraps),
- Maintenance of machineries and other operations made occasionally (i.e. > 3 years frequency) or in emergency situations,

Raw materials transportation to Eccomelt plants: This stage includes the transportation of post-consumer wheels recovered from suppliers to Eccomelt plants in Ontario, Canada and in the USA in Manchester, Georgia and Houston, Texas. In Ontario, transportation was performed by truck and train while in Manchester and Houston, it was by truck only. Transportation were modelized as fuel burn in the trucks or trains. The amount of fuel consumption per tkm of truck and train transportation used come from the US LCI database, which in the North America database.

Mechanical cleaning, crushing and packaging: This stage includes all input to the manufacturing process. Energies used are electricity, diesel and propane. The steps account for the production and transport to each plant of packaging materials used to package ready for delivery the lower case Eccomelt356.2.

Waste management: This stage includes management of waste generated during the post-consumer aluminum treatment. The waste generated goes to the recycling centre and landfill site.

3.3. ALLOCATION

ISO 14040/44 allocation procedure states that whenever possible, allocation should be avoided by collecting data related to the process under study or by expanding the product system [8, 9]. As the output of the factory is Eccomelt356.2, no allocation was applied in this study.

Allocation of waste shall follow the polluter pay principle as mentioned in standard EN 15804 [2]. The waste sent for recycling shall be attributed to the product system using the recycled material flow as secondary materials. A cut-off approach was used because recycled/reused material is part of raw material preparation for another product system. Therefore, the transport from the manufacturing plant to the recycling plant was accounted for. For the waste goes to landfill, the environmental burden was attribute to the Eccomelt356.2 product system.

3.4. CUT-OFF METHODOLOGY

According to the PCR [3], if a mass flow or energy flow represents less than 1% of the cumulative mass or energy flow of the system, it may be excluded from system boundaries. However, these flows should not have a relevant environmental impact. Also, at least 99% of the energy usage and mass flow shall be included.

In the present study, no primary data (input material, energy consumption) was excluded from the system boundaries.

Water consumption was assumed to be for employees use such as processing, cleaning, drinking and sanitation.

No data on the construction, maintenance or dismantling of the capital assets, daily transport of the employees, office work, business trips or other activity from Eccomelt employees was included in the model.

3.5. DATA SOURCES AND QUALITY REQUIREMENTS

Data Quality Parameter	Data Quality Discussion
Source of Manufacturing Data: Description sources of data	Manufacturing data was collected from Eccomelt manufacturing plants located at East York, 1 Copeland St, Toronto, ON M4G 3E7, Canada; Manchester, 101 Delano Dr, GA 31816-1832, USA and Houston: 6605 Rankin Road Humble, TX 77396, USA for the production period from July 1, 2022 to June 30, 2023. This data included: total production mass of products produced at the manufacturing plant, as well as the total annual units in kg and total production mass of products under study; raw materials entering the production of the

Data Quality Parameter	Data Quality Discussion
	products under study, losses of materials, transport mode and distance of materials, energy consumption, water consumption, emissions to the environment at the manufacturing plant, waste treatment and packaging material.
Source of Secondary Data: Description sources of raw materials, energy source, transport, waste and packaging data	When appropriate, the grid mix was changed for the grid mix of the province or country where the production takes places. Otherwise, ecoinvent data representative from the global market or "rest-of-the-world" were selected as proxies. Wood material data and transport data were taken form the US LCI database, which is specific to a North American context or from the ecoinvent v3.9.1 database.
Geographical Representativeness	The manufacturing facilities are located in Ontario, Canada, Houston, Texas and Manchester, Georgia in the USA; hence electricity consumption is based on the provincial grid mix. Geographical correlation of the material supply and the selected datasets are representative of each specific area or a larger area.
Temporal Representativeness	Primary data was collected to be representative of the full from July 1, 2022 to June 30, 2023, although it was not always the case for ecoinvent and US LCI datasets. Nevertheless, ecoinvent and US LCI remain reference LCI databases.
Technological Representativeness	Primary data, obtained from the manufacturer, is representative of the current technologies and materials used by the company.
Completeness	All relevant process steps were considered and modeled to satisfy the goal and scope. Cut-off criteria were respected.

4. LIFE CYCLE ASSESSMENT RESULTS

4.1. RESULTS TABLES

It should be noted that the Life Cycle Impact Assessment (LCIA) results are relative expressions and do not predict impacts on category endpoints, the exceeding of thresholds, safety margins, or risks.

The life cycle assessment results are presented per DU. According to the PCR, results presented derive from the life cycle impact assessment (LCIA) and the life cycle inventory (LCI).

According to the PCR, the life cycle impact assessment shall be presented for the global context [3].

LCIA results are presented inTable 4,

Table 5, Table 6 for Toronto, Manchester and Houston facilities respectively.

Table 4: Eccomelt356 life cycle impact assessment results for Toronto facility

Impacts Categories	Units	Upstream Stage
climate change - global warming potential (GWP100)	kg CO2-Eq	6.03E-02
climate change: biogenic - global warming potential (GWP100)	kg CO2-Eq	-3.38E-02
climate change: fossil - global warming potential (GWP100)	kg CO2-Eq	9.24E-02
climate change: land use and land use change - global warming potential (GWP100)	kg CO2-Eq	1.74E-03
ozone depletion - ozone depletion potential (ODP)	kg CFC-11-Eq	1.38E-09
acidification - accumulated exceedance (AE)	mol H+-Eq	6.35E-04
eutrophication: terrestrial - accumulated exceedance (AE)	mol N-Eq	2.51E-03
eutrophication: marine - fraction of nutrients reaching marine end compartment (N)	kg N-Eq	2.54E-04
eutrophication: freshwater - fraction of nutrients reaching freshwater end compartment (P)	kg PO4-Eq	1.45E-05
photochemical oxidant formation: human health - tropospheric ozone concentration increase	kg NMVOC-Eq	7.89E-04
material resources: metals/minerals - abiotic depletion potential (ADP): elements (ultimate reserves)	kg Sb-Eq	9.71E-01
energy resources: non-renewable - abiotic depletion potential (ADP): fossil fuels	MJ, net calorific value	5.30E-07
water use - user deprivation potential (deprivation-weighted water consumption)	m3 world eq. deprived	1.33E-01

Table 5: Eccomelt356 life cycle impact assessment results for Manchester facility

Impact Categories	Units	Upstream Stage
climate change - global warming potential (GWP100)	kg CO2-Eq	8.85E-02
climate change: biogenic - global warming potential (GWP100)	kg CO2-Eq	-2.20E-02
climate change: fossil - global warming potential (GWP100)	kg CO2-Eq	1.10E-01
climate change: land use and land use change - global warming potential (GWP100)	kg CO2-Eq	2.16E-04
ozone depletion - ozone depletion potential (ODP)	kg CFC-11-Eq	1.35E-09
acidification - accumulated exceedance (AE)	mol H+-Eq	5.90E-04
eutrophication: terrestrial - accumulated exceedance (AE)	mol N-Eq	2.34E-03
eutrophication: marine - fraction of nutrients reaching marine end compartment (N)	kg N-Eq	2.53E-04
eutrophication: freshwater - fraction of nutrients reaching freshwater end compartment (P)	kg PO4-Eq	1.37E-05
photochemical oxidant formation: human health - tropospheric ozone concentration increase	kg NMVOC-Eq	7.66E-04
material resources: metals/minerals - abiotic depletion potential (ADP): elements (ultimate reserves)	kg Sb-Eq	4.85E-07
energy resources: non-renewable - abiotic depletion potential (ADP): fossil fuels	MJ, net calorific value	1.40E+00
water use - user deprivation potential (deprivation-weighted water consumption)	m3 world eq. deprived	3.97E-02

Table 6: Eccomelt356 life cycle impact assessment results for Houston facility

Impact Categories	Units	Upstream Stage
climate change - global warming potential (GWP100)	kg CO2-Eq	9.31E-02
climate change: biogenic - global warming potential (GWP100)	kg CO2-Eq	-3.35E-02
climate change: fossil - global warming potential (GWP100)	kg CO2-Eq	1.27E-01
climate change: land use and land use change - global warming potential (GWP100)	kg CO2-Eq	9.03E-05
ozone depletion - ozone depletion potential (ODP)	kg CFC-11-Eq	1.33E-09
acidification - accumulated exceedance (AE)	mol H+-Eq	6.85E-04
eutrophication: terrestrial - accumulated exceedance (AE)	mol N-Eq	2.56E-03
eutrophication: marine - fraction of nutrients reaching marine end compartment (N)	kg N-Eq	2.57E-04
eutrophication: freshwater - fraction of nutrients reaching freshwater end compartment (P)	kg PO4-Eq	4.54E-05
photochemical oxidant formation: human health - tropospheric ozone concentration increase	kg NMVOC-Eq	8.23E-04
material resources: metals/minerals - abiotic depletion potential (ADP): elements (ultimate reserves)	kg Sb-Eq	4.45E-07
energy resources: non-renewable - abiotic depletion potential (ADP): fossil fuels	MJ, net calorific value	1.21E+00
water use - user deprivation potential (deprivation-weighted water consumption)	m3 world eq. deprived	1.75E-02

4.2. LIFE CYCLE INVENTORY RESULTS

According to the PCR, the life cycle inventory (LCI) shall be presented for resource used and output flows and waste categories [3]. The environmental parameters use for inventory analysis describes the use of renewable and non-renewable material resources, renewable and non-renewable primary energy and water. The LCI results are presented in Table 7, Table 8 and Table 9 for Toronto, Manchester and Houston facilities respectively.

Table 7: Life cycle inventory results for a DU manufactured at Toronto plant

Resource use		
Parameter	**Unit**	**Upstream Stage**
RPRE(1)	MJ, LHV	1.35E+00
RPRM(2)	MJ, LHV	0.00E+00
PERT(3)	MJ, LHV	1.35E+00
NRPRE(4)	MJ, LHV	9.69E-01
NRPRM(5)	MJ, LHV	0.00E+00
PENRT(6)	MJ, LHV	9.69E-01
SM(7)	kg	1.02E+00
RSF (8)	MJ, LHV	0.00E+00
NRSF(9)	MJ, LHV	0.00E+00
FW(10)	m^3	0.00E+00
Output Flows and Waste		
HWD(11)	kg	7.56E-02
NHWD(12)	kg	6.00E-02
HLRW(13)	m^3	1.17E-10
ILLRW(14)	m^3	1.96E-10
CRU(15)	kg	0.00E+00
MR(15)	kg	0.00E+00
MER(15)	kg	0.00E+00
EE, electricity(15)	MJ, LHV	0.00E+00
EE, thermal(15)	MJ, LHV	0.00E+00

Table 8: Life cycle inventory results for a DU manufactured at Manchester plant

Resource use		
Parameter	**Unit**	**Upstream Stage**
RPRE(1)	MJ, LHV	8.90E-01
RPRM(2)	MJ, LHV	0.00E+00
PERT(3)	MJ, LHV	8.90E-01
NRPRE(4)	MJ, LHV	1.39E+00
NRPRM(5)	MJ, LHV	0.00E+00
PENRT(6)	MJ, LHV	1.39E+00
SM(7)	kg	1.01E+00
RSF (8)	MJ, LHV	0.00E+00
NRSF(9)	MJ, LHV	0.00E+00
FW(10)	m^3	0.00E+00
Output Flows and Waste		
HWD(11)	kg	7.07E-02
NHWD(12)	kg	6.27E-02
HLRW(13)	m^3	6.97E-10
ILLRW(14)	m^3	2.42E-09
CRU(15)	kg	0.00E+00
MR(15)	kg	0.00E+00
MER(15)	kg	0.00E+00
EE, electricity(15)	MJ, LHV	0.00E+00
EE, thermal(15)	MJ, LHV	0.00E+00

Table 9: Life cycle inventory results for a DU manufactured at Houston plant

Resource use		
Parameter	**Unit**	**Upstream Stage**
RPRE(1)	MJ, LHV	8.37E-01
RPRM(2)	MJ, LHV	0.00E+00
PERT(3)	MJ, LHV	8.37E-01
NRPRE(4)	MJ, LHV	1.20E+00
NRPRM(5)	MJ, LHV	0.00E+00
PENRT(6)	MJ, LHV	1.20E+00
SM(7)	kg	1.06E+00
RSF (8)	MJ, LHV	0.00E+00
NRSF(9)	MJ, LHV	0.00E+00
FW(10)	m^3	0.00E+00
Output Flows and Waste		
HWD(11)	kg	2.26E-01
NHWD(12)	kg	4.37E-02
HLRW(13)	m^3	9.10E-11
ILLRW(14)	m^3	7.31E-10
CRU(15)	kg	0.00E+00
MR(15)	kg	0.00E+00
MER(15)	kg	0.00E+00
EE, electricity(15)	MJ, LHV	0.00E+00
EE, thermal(15)	MJ, LHV	0.00E+00

*In the calculation of RPR_M and $NRPR_M$, packaging materials were excluded.

(1): RPR_E = RPRT - RPR_M, where RPRT (3) is equal to the value for renewable energy obtained using the CED LHV methodology.

(2): RPR_M, is calculated by multiplication of the mass (kg) of the material input (or its components) with the net calorific value (lower heating value) (MJ/kg) of this input as per ACLCA ISO 21930 Guidance [10]. In the calculation of RPR_M, packaging materials were excluded.

(4): $NRPR_E$ = NRPRT - $NRPR_M$, where NRPRT (6) is equal to the value for non- renewable energy obtained using the CED LHV methodology (both non- renewable energy fossil fuel and nuclear).

(5): $NRPR_M$, is calculated by multiplication of the mass (kg) of the material input (or its components) with the net calorific value (lower heating value) (MJ/kg) of this input as per ACLCA ISO 21930 Guidance [10]. In the calculation of $NRPR_M$, packaging materials were excluded.

(7): Calculated as per ACLCA ISO 21930 Guidance [10], 6.5 Secondary material, SM: There is SM involved in Eccomelt product.

(8): Calculated as per ACLCA ISO 21930 Guidance [10], 6.6 Renewable secondary fuels, RSF: There is no RSF involved in the Eccomelt manufacturing process.

(9): Calculated as per ACLCA ISO 21930 Guidance [10]., 6.7 Non-renewable secondary fuels, NRSF: There is no NRSF involved in the Eccomelt manufacturing process.

(10): Represents the use of net fresh water in the factory that are part of the life cycle inventory

(11): Calculated from life cycle inventory results, based on datasets marked as "hazardous".

(12): Calculated from life cycle inventory results, based on waste "non hazardous"

(13): Calculated as per ACLCA ISO 21930 Guidance [10], 10.3 High-level radioactive waste, conditioned, to final repository. It should be noted that Eccomelt manufacturing process does not generate any HLRW. High-level radioactive waste, e.g., when generated by electricity production, consists mostly of spent fuel from reactors." (ISO 21930:2017, clause 7.2.14).

(14): Calculated as per ACLCA ISO 21930 Guidance [10], 10.4 Intermediate- and low-level radioactive waste, conditioned, to final repository. It should be noted Eccomelt manufacturing process does not generate any ILLRW. Low- and intermediate-level radioactive wastes, e.g., when generated by electricity production, arise mainly from routine facility maintenance and operations (ISO 21930:2017, clause 7.2.14).

(15): Reused components (CRU), Materials for recycling (MR), materials for energy recovery (MER) and exported energy (EE) are accounted for in this project.

4.3. CONTRIBUTION ANALYSIS

The aim of this section is to present additional details on the contribution to the impacts and resource use of the different life cycle modules of the product studied.

The contribution analysis of Eccomelt356.2 product for the Toronto plant (Figure 4) indicate that, the transportation represents between 3% to 91% of the total environmental impact for all impacts categories. Truck transport is responsible for 64% of the impact. The mechanical cleaning, crushing and packaging represents the second contributor with the impacts between 9% to 96% depends to the impact category. The impact of pallet production and propane and diesel burn in machinery contribute between 60% to 83% for all impacts categories except for the water used impact category with 97% of the total impact.

In the case of Manchester plant (Figure 5), the contribution analysis of the Eccomelt356 product indicate that, the transportation represents between 8% to 77% of the total environmental impact for all impacts categories. Transport is responsible for 100% of the impacts. The mechanical cleaning, crushing and packaging represents the second contributor with the impacts between 23% to 92% depends to the impact category. The impact of pallet production, diesel burn in machinery and electricity used contribute between 44% to 90% for all impacts categories.

Regarding the Houston plant (Figure 6) the contribution analysis of the Eccomelt356 product indicate that, the transportation represents between 5% to 70% of the total environmental impact for all impacts categories. Truck transport is responsible for 100% of the impacts. The mechanical cleaning, crushing and packaging represents the second contributor with the impacts between 30% to 95% depends to the impact category. In this module, the impact of pallet production, diesel burn in machinery and electricity used contribute between 72% to 95% for all impacts categories.

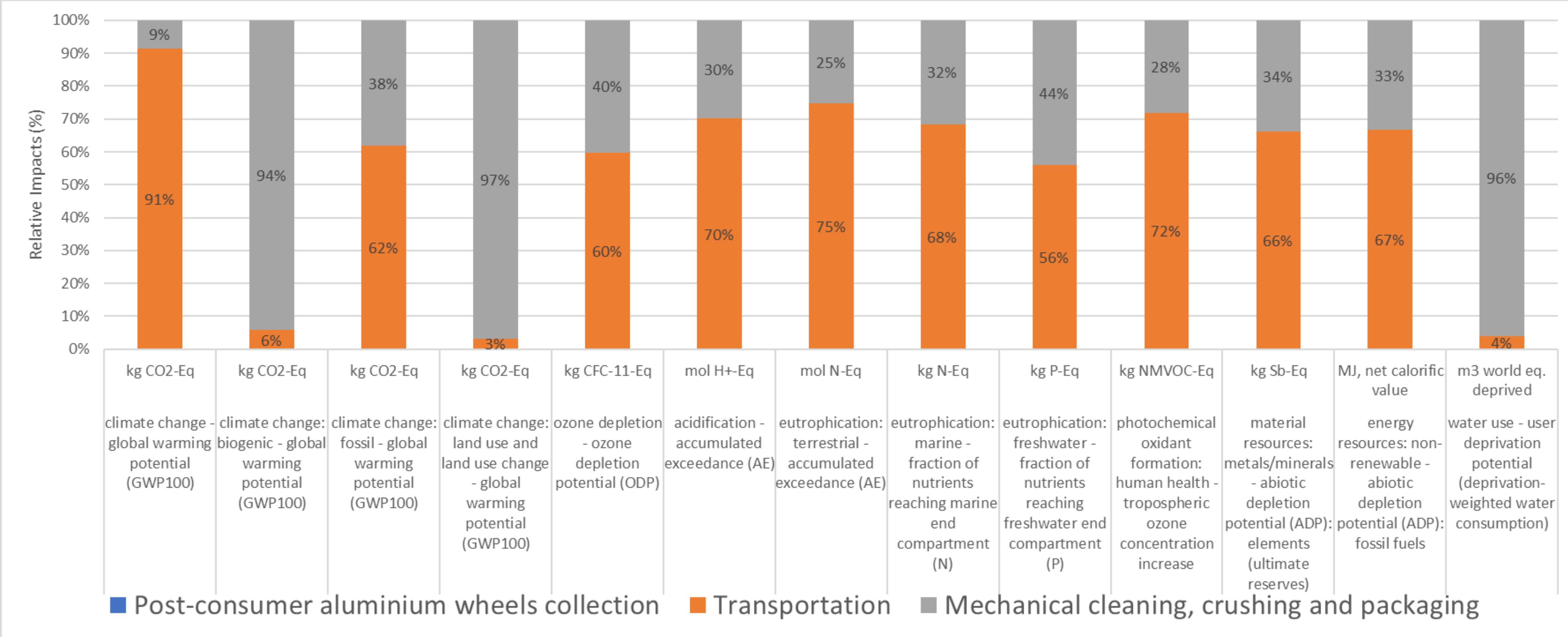

Figure 4: Contribution of each life cycle module for Eccomelt356 product for Toronto plant.

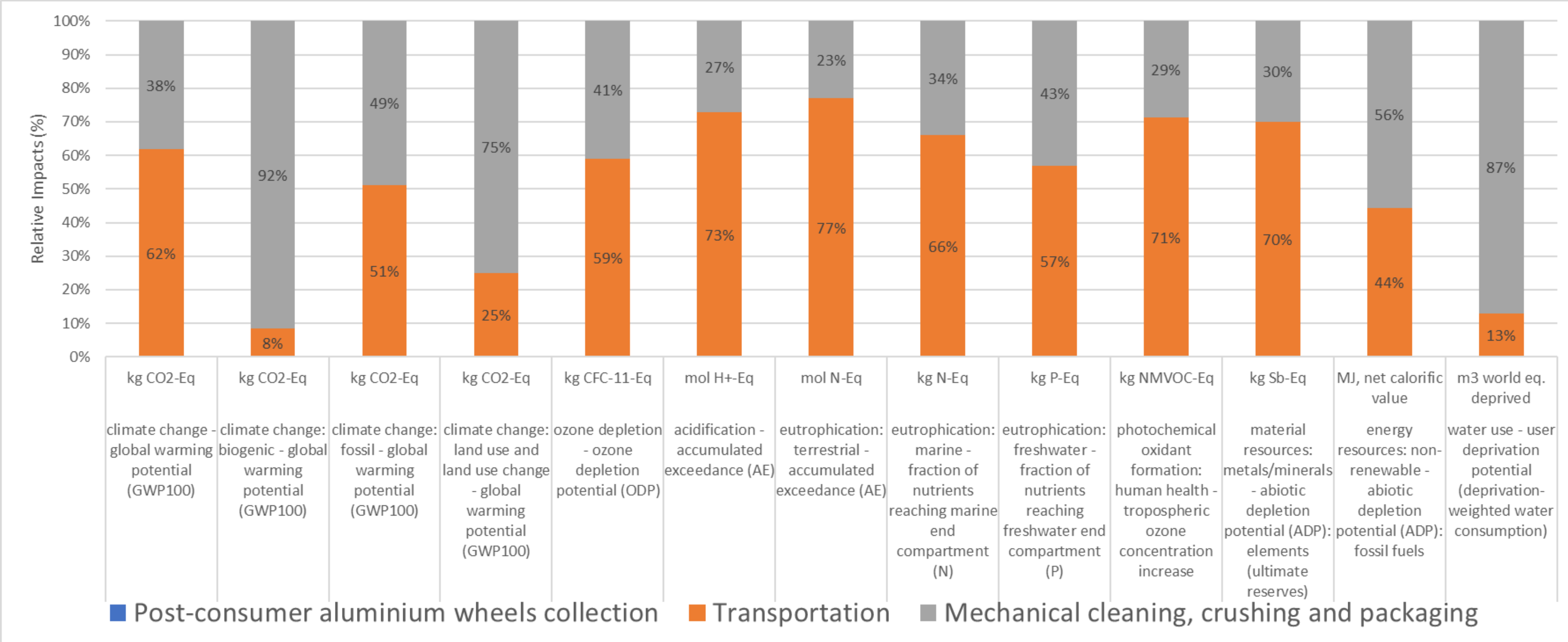

Figure 5: Contribution of each life cycle module for Eccomelt356 product for Manchester plant.

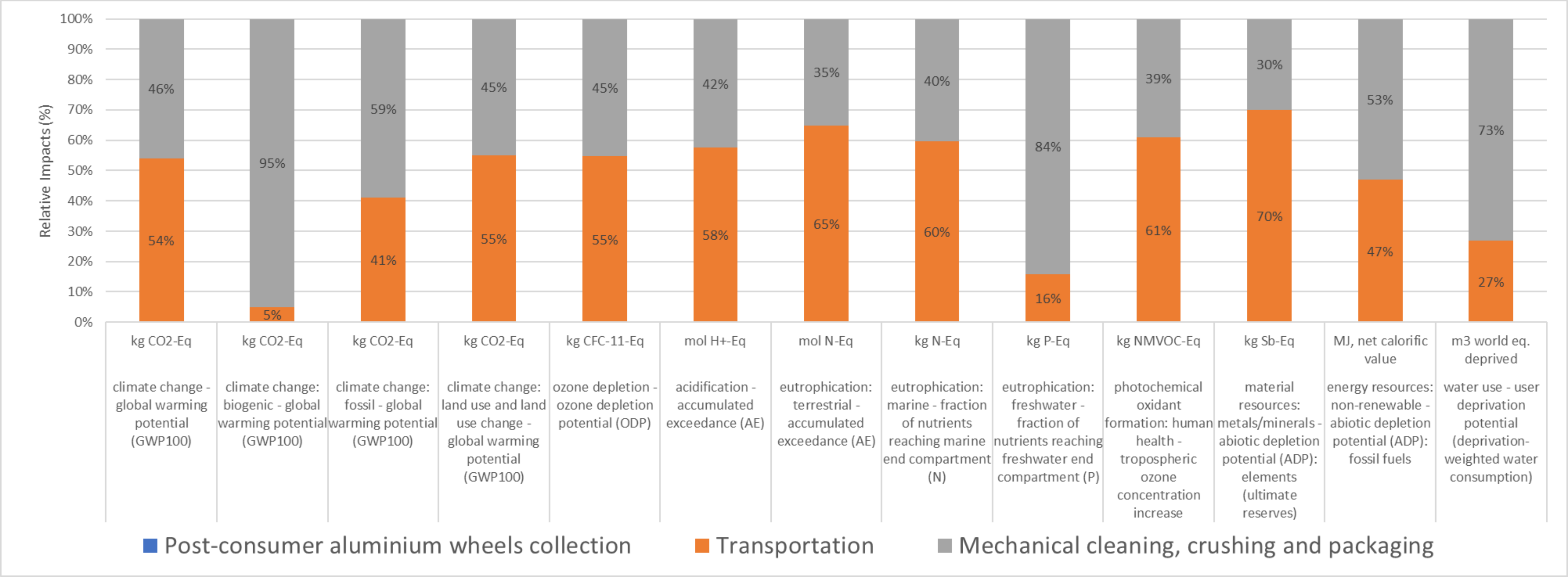

Figure 6: Contribution of each life cycle module for Eccomelt356 product for Houston plant.

5. ADDITIONAL ENVIRONMENTAL INFORMATION

In addition, Eccomelt company is certified ISO 9001-2015.

6. REFERENCES

[1] ISO 14025, « «Environmental labels and declarations – Type III environmental declarations – Principles and procedures. 25pp,»,» 2006.

[2] CEN EN 15804:2012+A2:2019, « European Standard, «EN 15804: Sustainability of construction works - Environmental product eclarations - Core rules for the product category of construction products.,» 2012.

[3] International EPD System, «Basic aluminum products and special alloys.,» 2022-12-09.

[4] ASTM Program Operator Rules. Version: 8.0, Revised 04/29/20.

[5] OpenLCA, " 'https://www.openlca.org/?s=version+1.11,'' [Online]. [Accessed 18 03 2024].," [Online].

[6] Frischknecht R, « Overview and Methodology. ecoinvent report No. 1.," Swiss Centre for Life Cycle Inventories, Dübendorf.,» 2007.

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[8] ISO 14040:2006/Amd1:2020, «Environmental management - Life cycle assessment - Principles and framework. 20 pp,» 2006.

[9] ISO 14044:2006/Amd1:2017/Amd2:2020, «Environment management - Life cycle assessment - Requirements and guidelines, International Organization for Standardization,,» 2006.

[10] American Center for Life cycle Assessment (ACLCA), «ACLCA Guidance to Calculating Non-LCIA Inventory metrics in Accordance with ISO 21930;2017.,» American Center for Life cycle Assessment, 2019.

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