MAGLIN™
Site Furniture

Environmental Product Declaration

Environmental Product Declaration for 350 Series Bike Racks, in various sizes and with a range of options, produced by Maglin Site Furniture at their facility in Woodstock, ON, Canada

ADMINISTRATIVE INFORMATION

International Certified Environmental Product Declaration

Declared Product:	This Environmental Product Declaration (EPD) covers bench products produced by Maglin Site Furniture. Declared unit: 1 bike rack
Declaration Owner:	Maglin Site Furniture 3-468 Innovation Way Woodstock, ON https://www.maglin.com/
Program Operator:	Labeling Sustainability 11670 W Sunset Blvd Los Angeles, CA 90049 www.labelingsustainability.com
Product Category Rule:	ISO 21930:2017 Sustainability in buildings and civil engineering works - Core rules for environmental product declarations of construction products and services and Sub Product Category Rule for Site Furnishings, CSI MasterFormat, Section 32 33 00 PCR Program Operator: Labeling Sustainability PCR review was conducted by: Geoffrey Guest, Ph.D.
Independent LCA Reviewer and EPD Verifier:	This declaration was independently verified in accordance with ISO 14025:2006. Independent verification of the declaration, according to ISO 14025:2006. Internal ☐ ; External ☐ X Third Party Verifier Geoffrey Guest, Certified 3rd Party Verifier under the Labeling Sustainability Program (www.labelingsustainability.com), CSA Group (www.csaregistries.ca)
Date of Issue:	16 November 2021
Period of Validity:	5 years; valid until 16 November 2026
EPD Number:	bcf6b178-c1d3-4df3-a790-a8accfea365f

TABLE OF CONTENTS

Administrative Information 1
Company Description 3
Study Goal 3
Description Of Product And Scope 4
A1 Raw Material Recycled Content And Material Losses 6
System Boundaries 7
Cut-Off Criteria 9
Data Sources And Data Quality Assessment 9
- Raw Material Transport 9
- Electricity 10
- Process/Space Heating 10
- Fuel Required For Machinery 10
- Waste Generation. 10
- Recovered Energy. 10
- Recycled/Reused Material/Components. 10
- Module A1 Material Losses 10
- Direct A3 Emissions Accounting 10
- A4 Product Transport Requirements 10
- B Product Use Phase 10
- C Product End-Of-Life 11

Data Quality Assessment 15
- Precision 15
- Completeness 15
- Consistency 15
- Reproducibility 15
- Representativeness. 16

Environmental Indicators And Inventory Metrics 16
Total Impact Summary 17
Interpretation 18
Additional Environmental Info 18
References 19
- Iso Standards 19
- En Standards 19
- Other References 20

COMPANY DESCRIPTION

In 1983 Ian McAskile was inside crafting home furnishings, and the inspiration struck to take his craft outdoors. He knew from extensive experience that the indoors shows you walls. However, the outdoors serves the wonders – and those who want to make their exterior environment stunning and sustainable deserve to work with people with the same passion. Enter Maglin (named after Ian's daughters, Maggie and Lindsay), a site furniture company made to meet the need for contemporary outdoor amenities that are aesthetically pleasing while environmentally friendly. From benches, bollards, bike racks, and receptacles to panels, planters, tables, chairs, custom projects, and more — Maglin Sit Furniture strategically configures and thoughtfully customizes adaptable solutions that will enhance any area.

Maglin continues to grow both as a company — offering new and expanding product lines in response to the needs of its clients, but also as a corporate citizen — building social consciousness into its operation; from supporting a variety of charitable causes, facilitating staff dialogue about diversity issues, to reevaluating our manufacturing process to strive for increasingly environmentally kind products.

STUDY GOAL

The intended application of this life cycle assessment (LCA) is to comply with the procedures for creating a Type III environmental product declaration (EPD) and publish the EPD for public review on the website, www.labelingsustainability.com. This level of study is per EPD Product Category Rule (PCR) for Bench published by the International Standards Organization (ISO) 14025:2006 Environmental labels and declarations, Type III environmental declarations-Principles and procedures; ISO 14044:2006 Environmental management, Life cycle assessment- Requirements and guidelines; and ISO 14040:2006 Environmental management, Life cycle assessment-Principles and framework. The performance of this study and its subsequent publishing align with the business-to-business (B2B) communication requirements for the environmental assessment of building products. The study does not intend to support comparative assertions and is designed to be disclosed to the public.

This project report was commissioned to differentiate Maglin Site Furniture from their competition for the following reasons:

- Generate an advantage for the organization.
- Offer customers information to help them make informed product decisions.
- Improve the environmental performance of Maglin Site Furniture by continuously measuring, controlling, and reducing the environmental impacts of their products.
- Help project facilitators working on Leadership in Energy and Environmental Design (LEED) projects achieve their credit goal,
- And to strengthen Maglin Site Furniture's license to operate in the community.

The intended audience for this LCA report is Maglin Site Furniture's employees, their suppliers, project specifiers of their products, architects, and engineers. The EPD report is also available for policymakers, government officials interested in sustainability, academic professors, and LCA professionals. This LCA report does not include product comparisons from other facilities.

DESCRIPTION OF PRODUCT AND SCOPE

Maglin bike racks come in various options and sizes to meet their customers' project needs. This makes it difficult to capture every possible bench option that could manufacture and sold by Maglin for a project. To accomplish this goal, this EPD reports using two different methods. Firstly, is the average method. This method is detailed in ISO 21930:2017, Section 5.3 Average EPDs for similar products groups. Next, a representative product is chosen for a product line. All product variations plus or minus 10% are included in this average value. The three product lines that employ the average system are Iconic, Orbit, and 3100 Series.

Secondly is the "low" and "high" option by mass weight. The range method of reporting a complete product line is different from modeling just an average product for that range with a tolerance of plus or minus 10% deviation from the average product modeled. Using the range method allows manufacturers to capture a full product line within that range and understand the impacts of their options and product series add-ons. This method is compliant with the primary PCR for this EPD, ISO 21930: 2017 Sustainability in buildings and civil engineering works — Core rules for environmental product declarations of construction products and services, and the sub-PCR, Sub Product Category Rule for Site Furnishings, CSI MasterFormat, Section 323300.

Per the sub-PCR, the following statements describe the process for determining a product range and including the products. "By performing a realistic range for modeling hundreds of combinations of a piece of furniture also allows for longevity of the EPD by keeping up with the design aesthetic and customizing furniture. For the future options to be included in this EPD, they must appear on the list of features considered when creating the low and high options. The lowest and highest option shall be reported along with an average of the two when reporting the impacts. A complete table with the product's technical attributes, as defined in the Section on the Product Description, must be listed for the base case and worst cases with a complete Bill of Materials (BOM) to .1% by weight. If the impacts from the low, high, and average differ by more than 10%, an explanation must be included as part of the reporting. Similar products that vary less than 10% between models due to finished or mounting options can be included but noted. The table below outlines each product line's high and low options and the list of included models in that range.

The functional unit considers an entire product unit, and therefore, the impacts attributed to each declared product in this EPD cannot necessarily be compared due to their different seat capacities. Thus, to calculate the comparable impacts, one should normalize them to a per-seat basis.
Maglin standard paint colors include Fine Textured (Preferred for all cast aluminum products)-Silver, Evergreen, Black, Gunmetal, Bronze, Slate, Titanium Gloss- Silver, Evergreen, Black, Gunmetal, Bronze, Graphite, and Titanium.

The product descriptions in the table below outline the products and options used to calculate each category range. The PCR states the inclusion of product ranges must follow these guidelines: "The range of products as an acceptable reporting method for this PCR is detailed in the Product Description. This is different from an average EPD, where one "typical" product is modeled and represents all variations within 10% of it. Performing a realistic range for modeling hundreds of combinations of a piece of furniture also allows for longevity of the EPD by keeping up with the design aesthetic and customizing furniture. For the future options to be included in this EPD, they must appear on the list of features considered when creating the low and high options. The lowest and highest option shall be reported along with an average of the two when reporting the impacts."

This EPD shall cover all products within the low/high range. Those products shall share the same nomenclature, such as MBR-Product Group-model number, and shall fall within the range weight. In addition, products included in the "average" perimeter shall be within 10% +/- of the listed weight and follow the same nomenclature MBR-Product Group-model number.

Table 1: **All Product Ranges, Averages, Description covered by this EPD**

Product	Description
ALL STYLES & COLOURS	
MBR-2300-00001/Average/Iconic	Constructed using cast aluminum and mild steel base plate, power coated, and available in surface mount.
MBR-2900-00001/Low/MUG	Constructed using mild steel, power coated, and available in surface mount & direct burial options.
MBR-2900-00002/High/MUG	Constructed using mild steel, power coated, and available in surface mount & direct burial options.
MBR-3100-00001/Average/Orbit	Constructed using stainless steel, bead blasted, and available in surface mount.
MBR-3100-00002/Average/3100	Constructed using stainless steel, bead blasted, and available in surface mount.
MBR-1600-00007/Low/SC	Constructed using cast aluminum and with or without steel rod, powder coated, and available in surface mount & direct burial options. Can be used for 2 bikes.
MBR-1600-00008/High/SC	Constructed using cast aluminum and with or without steel rod, powder coated, and available in surface mount & direct burial options. Can be used for 2 bikes.
MBR-0100-00003/Low 100	Constructed using HS steel tube and a spun aluminum cap, powder coated, and available in surface mount & direct burial options. Can be used for 2 bikes.
MBR-0100-00001/High/100	Constructed using HS steel tube and a spun aluminum cap, powder coated, and available in surface mount & direct burial options. Can be used for 2 bikes.
MBR-0150-00002/Low/150	Constructed using HS steel tube and with or without a steel mounting plate, powder coated, and available in surface mount & direct burial options. Can be used for 2 bikes.
MBR-0150-00001/High/150	Constructed using HS steel tube and with or without a steel mounting plate, powder coated, and available in surface mount & direct burial options. Can be used for 2 bikes.
MBR-0200-00005/Low/200	Constructed using HS steel tube and spun aluminum cap, powder coated, and available in surface mount & direct burial options, and with or without lettering. Can be used for 2 bikes.
MBT-0200-00003/High/200	Constructed using HS steel tube and spun aluminum cap, powder coated, and available in surface mount & direct burial options, and with or without lettering. Can be used for 2 bikes.
MBR-0300-00001/Low/300	Constructed using HS steel tube and a solid steel rod, powder coated, and available in surface mount & direct burial options. Available with 4, 5, or 7 bike rings.
MBR-0300-00007/High/300	Constructed using HS steel tube and a solid steel rod, powder coated, and available in surface mount & direct burial options. Available with 4, 5, or 7 bike rings.
MBR-0350-00001/Low/350	Constructed using HS steel tube and a formed steel angle, powder coated, and available in surface mount & direct burial options. Available with 4 or 5 bike rings.
MBR-0350-00002/High/350	Constructed using HS steel tube and a formed steel angle, powder coated, and available in surface mount & direct burial options. Available with 4 or 5 bike rings.
MBR-0400-00007/Low/400	Constructed using HS steel tube and either steel base plate or flat bar, powder coated, and available in surface mount & direct burial options. Available with 5, 7, 9, or 11 bike rings.

MBR-0400-00001/High/400	Constructed using HS steel tube and either steel base plate or flat bar, powder coated, and available in surface mount & direct burial options. Available with 5, 7, 9, or 11 bike rings.
MBR-0500-00003/Low/500	Constructed using HS steel tube and either steel base plate or flat bar, powder coated, and available in surface mount & direct burial options. Can be used for 2 bikes.
MBR-0500-00001/High/500	Constructed using HS steel tube and either steel base plate or flat bar, powder coated, and available in surface mount & direct burial options. Can be used for 2 bikes.

This LCA assumes the impacts from products manufactured in accordance with the standards outlined in this report. This LCA is a cradle-to-grave study.

BIKE RACK DESIGN SUMMARY

The following tables provide a list of the bike rack products considered in this EPD along with key performance parameters.

Table 7: **Declared products with 350 Series considered in this environmental product declaration**

Prod #	Unique name/ ID	Short description	Product type	Unit	Density, dry kg/Unit	Carbon content, kg C/FU dry basis	product Group	Height (cm)	Length (cm)	Depth (cm)	Diameter (cm)
16	MBR-0350-00001	350 Series - Constructed using HS steel tube and a formed steel angle with 4 or 5 bike rings.	Bike Rack	piece	28.68	0	350 Series	94.600	na	60.5	62.5
17	MBR-0350-00002	350 Series - Constructed using HS steel tube and a formed steel angle with 4 or 5 bike rings.	Bike Rack	piece	35.65	0	350 Series	94.600	na	60.5	62.5

A1 RAW MATERIAL RECYCLED CONTENT AND MATERIAL LOSSES –

The following table provides a list of the raw material inputs (module A1) across all products considered, their recyclability content and assumed material losses.

Table 2: **Module A1 raw material inputs, the recyclability content and assumed material losses (dry basis)**

Product	Category	Primary Content	Post Industrial Content	Post-Consumer Content	Material Losses
Aluminum Production	metal working, average for aluminum product manufacturing	0%	0%	100%	8%
Metal Working, Steel	metal working, average for steel product manufacturing	100%	0%	0%	0%
Packaging	packaging film, low density polyethylene	100%	0%	0%	1%
Steel Raw Material	steel, low-alloyed	0%	100%	0%	0%
Aluminum raw material	aluminum alloy	39%	0%	61%	0%

SYSTEM BOUNDARIES

The following figure depicts the cradle-to-grave system boundary considered in this study:

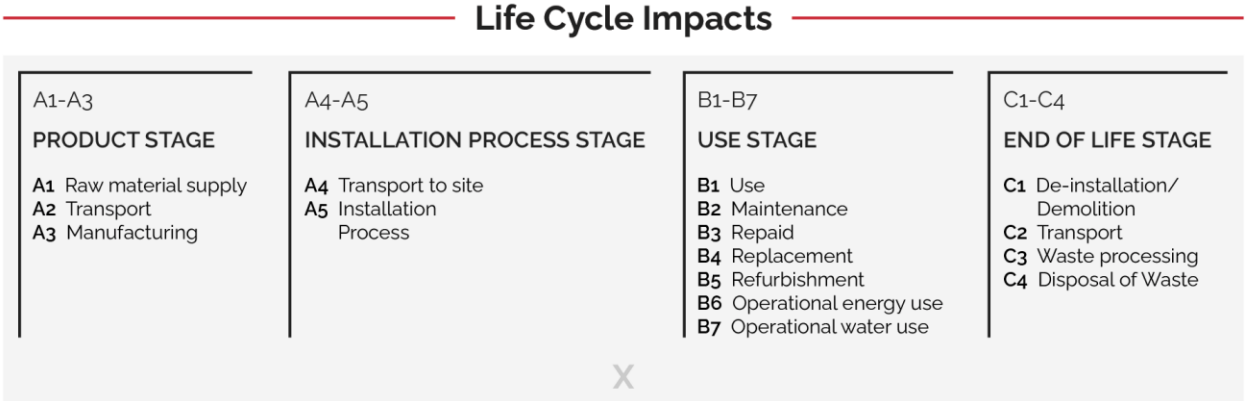

Figure 1: **General life cycle phases for consideration in a construction works system**

This is a Cradle-to-grave life cycle assessment, and the following life cycle stages are included in the study:

A1: Raw material supply (upstream processes) - Extraction, handling, and processing of the materials used in manufacturing the declared products in this LCA.

A2: Transportation - Transportation of A1 materials from the supplier to the "gate" of the manufacturing facility (i.e., A3).

A3: Manufacturing (core processes)- The energy and other utility inputs used to store, move, and manufacture the declared products and to operate the facility.

A4: Product plant gate-to-site of use logistics

A5: Product at-site installation requirements

B: Product use phase requirements and direct emissions (if applicable)

C: Product end-of-life requirements

According to the PCR, the following figure illustrates the general activities and input requirements for producing bench products and is not necessarily exhaustive.

Figure 2: **Process Flow Diagram for processes covered in this study**

In addition, as according to the relevant PCR, the following requirements are excluded from this study:

- Production, manufacture, and construction of A3 building/capital goods and infrastructure;
- Production and manufacture of steel production equipment, steel delivery vehicles, earthmoving equipment, and laboratory equipment;
- Personnel-related activities (travel, furniture, office supplies)
- Energy use related to company management and sales activities.

For this LCA, the manufacturing plant, owned and operated by Maglin Site Furniture, is in Woodstock, Ontario, Canada. All operational data is formulated using the actual data from Maglin Site Furniture's plant at the above location, including water, energy consumption, and waste generation. All inputs for this system boundary are calculated for the plant.

This life cycle inventory was organized in a spreadsheet. It was then input into an RStudio environment where pre-calculated LCIA results for relevant products/activities stemming from the ecoinvent v3.6 database and a local EPD database combined with primary data from Maglin Site Furniture were utilized. Explanations of the contribution of each data source to this study are outlined in the section

'Data Sources and Quality. Further LCI details for each declared product are provided in the detailed LCA report sections 'Detailed LCI tables' and 'Transport tables.' A parameter uncertainty analysis was also performed where key statistical results (e.g., min/mean/max, etc.) are provided in the detailed LCA report.

No known flows are deliberately excluded from this EPD.

CUT-OFF CRITERIA

ISO 14044:2006 and the focus PCR require the LCA model to contain a minimum of 95% of the total inflows (mass and energy) to the upstream and core modules be included in this study. The cut-off criteria were applied to all other processes unless otherwise noted above. A 1% cut-off is considered for all renewable and non-renewable primary energy consumption and the total mass of inputs within a unit process where the neglected inputs do not exceed 5%.

DATA SOURCES AND DATA QUALITY ASSESSMENT

No recovered on-site energy occurs at this facility.

Table 3: **Reused or recycled components/materials at the A3 facility site**

Component/material for re-use/recycling	Value	Units	Re-used/recycled on-site or off-site
Plastic packaging	102.8047	kg	Off-site

The following statements explain how the above facility requirements/generation were derived:

Raw material transport: Maglin does not produce 100% of the materials for their products in-house; they primarily prep and assemble products manufactured by outside vendors. Maglin used engineering drawings to determine each product's exact parts and weights. The pieces were then further refined by a supplier. When multiple suppliers can manufacture the same part, allocation by purchased percentage during the reference period was used to determine transportation distances and geographical reference data. All raw material inputs are not primary information, and the ecoinvent database was used to model their raw material inputs and manufacturing processes—for example, transportation between suppliers and Maglin's primary data provided by Maglin.

Once Maglin receives the specific part, it is prepped and transferred to a coating manufacturer. Maglin uses three types of coatings. First, E-Coat is used on steel or aluminum before powder coating. E-Coat is applying a coating with an electrical current onto the material. The process is standard in the automotive industry but can vary for each supplier. Three (3) main stages are typical: Pre-treatment, E-Coat, and Curing. The Pre-treatment stage includes cleaning, pre-treatment, and rinsing. The second stage is E-Coating Process. The final step is Post Rinse and Baking. This wet film process allows the coating to get into interior recesses and cavities (like galvanizing), which makes it superior to a Prime base coat in most instances. The result is a flat black finish and is ready to receive the powder coating.

Aluminum parts receive an Alodine treatment before powder coating. The Alodine method used on Maglin products is a military specification developed and used by the US department of defense to boost corrosion resistance and provide a good base for the subsequent application of paint. The finish is clear. There is a size limitation with Alodine because it is a batch process versus a line system in e-coating, so Maglin only processes smaller aluminum parts. Once properly treated, they are transported by truck back to Maglin, where they will be inspected and transported to the powder coating facilities.

Electricity: Primary electricity consumption was calculated for the Maglin facility from electricity bills. Since 2020 was an uncommon year due to the pandemic, 12 consecutive months were used, from June 2020 to July 2021. Maglin's utility provider provides monthly usage in kilowatt-hours (kWh), so no conversions were performed.

Process/space heating: The facility is heated by natural gas. All direct usage, as reported in monthly utility bills, was reported. Since 2020 was an uncommon year due to the pandemic, 12 consecutive months were used, from June 2020 to July 2021. Natural gas is reported in m3 of usage. The conversion factor used for m3 to MJ to represent the burning of the natural gas was 1 m3 of natural gas= 38.3 MJ of energy.

Fuel required for machinery: On-site machinery for moving materials uses electricity; therefore, no additional fuel usage was reported.

Waste generation: All waste was calculated using primary information from Maglin utility bills. Transportation defaults were used because the driver route and ultimate destination are unknown. Therefore, the exact mileage could not be confirmed by the waste hauler.

Recovered energy: No on-site energy is recovered on site.

Recycled/reused material/components: According to the Advancing Sustainable Materials Management: 2018 Fact Sheet (US EPA), only 14% of the total plastic packaging and 81% of paper/cardboard packaging is recycled in the USA, and hence, this value was the same for Canada. Similarly, according to the same report, 24% steel components of bike racks were assumed to be recycled off-site.

Module A1 material losses: Default material losses were used.

Direct A3 emissions accounting: Direct emissions for on-site natural gas heating was based on a representative ecoinvent process.

- **A4 Product transport requirements:** Maglin reported the average customer distance based on direct calculations of distance and number of bike racks purchased from purchased orders. For example, the distance of 1,058 km is a representative distance a product is trucked to a customer.

- **A5 product installation:** Depending upon the type of product, some of the bike racks can only be installed using fasteners whereas the remaining could either be grouted into the floor using a concrete mix or fixed to the floor using fasteners. For those products having dual installation possibilities, it has been assumed that concrete grouting would be the preferred path of

installation and 90% of those products are installed in this manner whereas the remaining 10% are fastened to the ground.

- **B product use phase:** No use phase material or energy inputs for bike racks were assumed in this study.
- **C product end-of-life:** To determine end-of-life in this study, it is assumed that 60% of the steel components of the bike racks will be sent to a landfill at the end of its service life, and about 13% is incinerated. This assumption has been made based on the Advancing Sustainable Materials Management: 2018 Fact Sheet (US EPA). Similarly, for aluminum components of the bike racks, it is assumed that 15% of the components are being sent in for incineration, whereas the remaining are sent to the landfill. Similar end-of-life disposal values for wood and plastics were also derived from the Advancing Sustainable Materials Management: 2018 Fact Sheet (US EPA). Unfortunately, Maglin has been in business for 40 years; therefore, they do not have direct knowledge of what their customers would do at the end of the estimated service life of 50 years.

The following tables depict a list of assumed life cycle inventory utilized in the LCA modeling to generate the impact results across the life cycle modules in scope. In addition, an assessment of the quality of each LCI activity used from various sources is also provided.

Table 4: **LCI inputs assumed for module A1 (i.e., raw material supply) Data Quality Assessment Key Poor=0, Fair=1, Good=2, Very Good =3**

.

Input	LCI.activity	Data.source	Geo	Year	Technology	Time	Geography	Reliability	Completeness
Stainless Steel	Market for steel, chromium steel 18/8/steel, chromium/GLO/kg	ecoinvent v3.6	Ontario	v3.6 in 2019	2	2	2	3	3
Aluminum Production	metal working, average for aluminum product manufacturing/metal working, average for aluminum product manufacturing/RoW/kg	ecoinvent v3.6	Multiple Regions	v3.6 in 2019	2	2	2	3	3
Plastic Packaging	market for packaging film, low density polyethylene/packaging film, low density polyethylene/GLO/kg	ecoinvent v3.6	Multiple Regions	v3.6 in 2019	1	2	1	3	3
Steel Raw Material	market for steel, low-alloyed/steel, low-alloyed/GLO/kg	ecoinvent v3.6	Multiple Regions	v3.6 in 2019	2	2	2	3	3
Metal Working, Steel	metal working, average for steel product manufacturing/metal working, average for steel product	ecoinvent v3.6	Multiple Regions	v3.6 in 2019	2	2	2	3	3

	manufacturing/RoW/kg								
aluminum raw material	aluminum alloy production, AlLi/aluminum alloy, AlLi/RoW/kg	ecoinvent v3.6	Multiple Regions	v3.6 in 2019	2	2	2	3	3
Stainless Steel	metal working, average for chromium steel product manufacturing/metal working, average for chromium steel product manufacturing/RER/kg	ecoinvent v3.6	Multiple Regions	v3.6 in 2019	2	2	2	3	3

Table 5: **LCI inputs assumed for module A2 (i.e., transport of A1 inputs) Data Quality Assessment Key Poor=0, Fair=1, Good=2, Very Good =3.**

Input	LCI.activity	Data.source	Geo	Year	Technology	Time	Geography	Reliability	Completeness
aluminum raw material-freight transport via Truck	market for transport, freight, lorry 7.5-16 metric ton, EURO6/transport, freight, lorry 7.5-16 metric ton, EURO6/RoW/tkm	ecoinvent v3.6	RoW	v3.6 in 2019	2	2	1	3	3
Bulk Waste-freight transport via Truck	market for transport, freight, lorry 7.5-16 metric ton, EURO6/transport, freight, lorry 7.5-16 metric ton, EURO6/RoW/tkm	ecoinvent v3.6	RoW	v3.6 in 2019	2	2	1	3	3
Plastic Packaging-freight transport via Truck	market for transport, freight, lorry 7.5-16 metric ton, EURO6/transport, freight, lorry 7.5-16 metric ton, EURO6/RoW/tkm	ecoinvent v3.6	RoW	v3.6 in 2019	2	2	1	3	3
Steel Raw Material-freight transport via Truck	market for transport, freight, lorry 7.5-16 metric ton, EURO6/transport, freight, lorry 7.5-16 metric ton, EURO6/RoW/tkm	ecoinvent v3.6	RoW	v3.6 in 2019	2	2	1	3	3
Stainless Raw Material-freight transport via Truck	market for transport, freight, lorry 7.5-16 metric ton, EURO6/transport, freight, lorry 7.5-16	ecoinvent v3.6	RoW	v3.6 in 2019	2	2	1	3	3

	metric ton, EURO6/RoW/tkm								

Table 6: **LCI inputs assumed for module A3. Data Quality Assessment Key Poor=0, Fair=1, Good=2, Very Good =3.**

Input	LCI.activity	Data.source	Geo	Year	Technology	Time	Geography	Reliability	Completeness
Bulk Waste	process-specific burdens, inert material landfill/process-specific burdens, inert material landfill/RoW/kg	ecoinvent v3.6	Ontario	v3.6 in 2019	2	2	2	3	3
Electricity	market for electricity, medium voltage/electricity, medium voltage/CA-ON/kWh	ecoinvent v3.6	Ontario	v3.6 in 2019	2	2	2	3	3
Natural Gas	heat production, natural gas, at boiler modulating >100kW/heat, district or industrial, natural gas/CA-QC/MJ	ecoinvent v3.6	Ontario	v3.6 in 2019	2	2	2	3	3
Powder Coating, aluminum	market for powder coat, aluminum sheet/powder coat, aluminum sheet/GLO/m2	ecoinvent v3.6	Multiple Regions	v3.6 in 2019	2	2	2	3	3
Powder Coating, steel	market for powder coat, steel/powder coat, steel/GLO/m2	ecoinvent v3.6	Multiple Regions	v3.6 in 2019	2	2	2	3	3

Table 7: **LCI inputs assumed across modules A4 to C4 (i.e., from plant gate-to-grave if applicable) Data Quality Assessment Key Poor=0, Fair=1, Good=2, Very Good =3.**

Input	LCI.activity	Data.source	Geo	Year	Technology	Time	Geography	Reliability	Completeness
A5. Fasteners	market for steel, low-alloyed/steel, low-alloyed/GLO/kg	ecoinvent v3.6	Multiple Regions	v3.6 in 2019	2	2	2	3	3
A5. Fasteners-freight transport via Truck	market for transport, freight, lorry 7.5-16 metric ton, EURO6/transport, freight, lorry 7.5-16 metric ton, EURO6/RoW/tkm	ecoinvent v3.6	see corrsp. product input above	v3.6 in 2019	2	2	1	3	3

C3. Incinerated Waste aluminum racks	treatment of scrap aluminum, municipal incineration/scrap aluminum/RoW/kg	ecoinvent v3.6	Multiple Regions	v3.6 in 2019	1	2	1	3	3
C2. Incinerated Waste aluminum racks- freight transport via Truck	market for transport, freight, lorry 7.5-16 metric ton, EURO6/transport, freight, lorry 7.5-16 metric ton, EURO6/RoW/tkm	ecoinvent v3.6	see corrsp. product input above	v3.6 in 2019	2	2	1	3	3
C3. Incinerated Waste steel racks	treatment of scrap steel, municipal incineration/scrap steel/RoW/kg	ecoinvent v3.6	Multiple Regions	v3.6 in 2019	2	2	1	3	3
C2. Incinerated Waste steel racks- freight transport via Truck	market for transport, freight, lorry 7.5-16 metric ton, EURO6/transport, freight, lorry 7.5-16 metric ton, EURO6/RoW/tkm	ecoinvent v3.6	see corrsp. product input above	v3.6 in 2019	1	2	1	3	3
C3. Landfill Waste aluminum racks	treatment of waste aluminum, sanitary landfill/waste aluminium/RoW/kg	ecoinvent v3.6	Multiple Regions	v3.6 in 2019	2	2	1	3	3
C2. Landfill Waste aluminum racks- freight transport via Truck	market for transport, freight, lorry 7.5-16 metric ton, EURO6/transport, freight, lorry 7.5-16 metric ton, EURO6/RoW/tkm	ecoinvent v3.6	see corrsp. product input above	v3.6 in 2019	1	2	1	3	3
C3. Landfill Waste steel rack	treatment of scrap steel, inert material landfill/scrap steel/RoW/kg	ecoinvent v3.6	Multiple Regions	v3.6 in 2019	2	2	1	3	3
C2. Landfill Waste steel rack- freight transport via Truck	market for transport, freight, lorry 7.5-16 metric ton, EURO6/transport, freight, lorry 7.5-16 metric ton, EURO6/RoW/tkm	ecoinvent v3.6	see corrsp. product input above	v3.6 in 2019	1	2	1	3	3
C3. Plastic Packaging waste	treatment of waste plastic, mixture, sanitary landfill/waste plastic, mixture/RoW/kg	ecoinvent v3.6	Multiple Regions	v3.6 in 2019	2	2	1	3	3
C2. Plastic Packaging waste- freight transport via Truck	market for transport, freight, light commercial vehicle/transport, freight, light commercial vehicle/RoW/tkm	ecoinvent v3.6	see corrsp. product input above	v3.6 in 2019	1	2	1	3	3
A4. Truck Transport	Product-to-site transport requirements	See A4 transport	Ontario	2020-06-01	2	2	1	3	3

		requirements		to 2021-05-31					
A4. Truck Transport-freight transport via Truck	market for transport, freight, lorry 7.5-16 metric ton, EURO6/transport, freight, lorry 7.5-16 metric ton, EURO6/RoW/tkm	ecoinvent v3.6	see corrsp. product input above	v3.6 in 2019	1	2	1	3	3

DATA QUALITY ASSESSMENT

Data quality/variability requirements, as specified in the PCR, are applied. This section describes the achieved data quality relative to the ISO 14044:2006 requirements. Data quality is judged based on its precision (measured, calculated, or estimated), completeness (e.g., unreported emissions), consistency (degree of uniformity of the methodology applied within a study serving as a data source), and representativeness (geographical, temporal, and technological).

Precision: The manufacturers collected and provided primary data on their annual production through measurement and calculation. The LCA practitioner and 3rd Party Verifier validated the plant gate-to-gate data for accuracy.

Completeness: All relevant specific processes, including inputs (raw materials, energy, and ancillary materials) and outputs (emissions and production volume), were considered, and modeled to represent the specified and declared products. Most relevant background materials and processes were taken from ecoinvent v3.6 LCI datasets, where relatively recent region-specific electricity inputs were utilized. In addition, the most relevant EPDs requiring key A1 inputs were also used where readily available.

Consistency: To ensure consistency, the same modeling structure across the respective product systems were utilized for all inputs, which consisted of raw material inputs and ancillary material, energy flows, water resource inputs, product and co-products outputs, returned and recovered Bench materials, emissions to air, water, and soil, and waste recycling and treatment. The same background LCI datasets from the ecoinvent v3.6 database were used across all product systems. Crosschecks concerning the plausibility of mass and energy flows were continuously conducted. The LCA team conducted mass and energy balances at the plant and selected the process level to maintain a high level of consistency.

Reproducibility: Internal reproducibility is possible since the data and the models are stored and available in a machine-readable project file for all foreground and background processes. Labeling Sustainability's proprietary Bench LCA calculator* was used for all production facilities and product-specific calculations. The detailed LCA report provides a considerable level of transparency as the specifications, and material quantity makeup for the declared products are presented, and key primary and secondary LCI data sources are summarized. The provision of more detailed publicly accessible data to allow full external reproducibility was not possible due to confidentiality reasons.

*Labeling Sustainability has developed a proprietary tool that calculates PCR-compliant LCA results for Bench product designs. The tool auto-calculates results by scaling base-unit Technosphere inputs (i.e., 1 kg sand, 1 kWh electricity, etc.) to replicate the reference flow conversions in any typical LCA software like openLCA or SimaPro. The tool was tested against several LCAs performed in openLCA, and the tool generated identical results to those realized in openLCA across every impact category and inventory metric (where comparisons could be readily made).

Representativeness: The representativeness of the data is summarized as follows.

- Time-related coverage of the manufacturing processes' primary collected data from 2020-06-01 to 2021-05-31.
- Upstream (background) LCI data was either the PCR specified default (if applicable) or more appropriate LCI datasets found in the country-adjusted ecoinvent v3.6 database.
- Geographical coverage for inputs required by the A3 facility(ies) represents its region of focus; other upstream and background processes are based on US, North American, or global average data and adjusted to regional electricity mixes when relevant.
- Technological coverage is typical or average and specific to the participating facilities for all primary data.

ENVIRONMENTAL INDICATORS AND INVENTORY METRICS

Per the PCR, this EPD supports the life cycle impact assessment and inventory metrics listed in the tables below. As specified in the PCR, the most recent US EPA Tool for the Reduction and Assessment of Chemical and Other Environmental Impacts (TRACI), impact categories were utilized to provide a North American context for the mandatory category indicators to be included in the EPD. Additionally, the PCR requires a set of inventory metrics to be reported with the LCIA indicators (see tables below).

Table 8: **Life cycle impact categories and life cycle inventory metrics**

ID	LCIA.indicators	Abbreviations	Units
1	environmental impact: acidification	AP	kg SO2eq
2	environmental impact: ecotoxicity	ETP	kg 2,4-D-.
3	environmental impact: global warming	GWP	kg CO2-Eq
4	environmental impact: ozone depletion	ODP	kg CFC-11.
5	environmental impact: photochemical oxidation	PCOP	kg O3eq
6	Abiotic Depletion-elements	ADPe	kg Sbeq
7	Abiotic Depletion-fossil fuels	ADPf	kg Sbeq
Inventory metrics			
8	Total primary energy	TPE	MJ-Eq
9	Non-Renewable Resources	NRR	kg
10	Renewable energy	RE	MJ-Eq
11	environmental impact: land filling, bulk waste	LFW	kg waste
12	environmental impact: land filling, hazardous waste	LFHW	kg waste
13	water depletion: WDP	WDP	m3 water-.

It should be noted that emerging LCA impact categories and inventory items are still under development and can have high levels of uncertainty that preclude international acceptance pending further development. Use caution when interpreting data in any of the following categories.

- Renewable primary energy resources as energy (fuel);
- Renewable primary resources as material;
- Non-renewable primary resources as energy (fuel);
- Non-renewable primary resources as material;
- Secondary Materials;
- Renewable secondary fuels;
- Non-renewable secondary fuels;
- Recovered energy;
- Abiotic depletion potential for non-fossil mineral resources.
- Land use related impacts, for example on biodiversity and/or soil fertility;
- Toxicological aspects;
- Emissions from land use change [GWP 100 (land-use change)];
- Hazardous waste disposed;
- Non-hazardous waste disposed;
- High-level radioactive waste;
- Intermediate and low-level radioactive waste;
- Components for reuse;
- Materials for recycling;
- Materials for energy recovery;
- Recovered energy exported from the product system.

TOTAL IMPACT SUMMARY

The following table reports the total LCA results for the 350 series bikes racks on a per 1 bike rack basis.

Table 9: **Total life cycle (across modules in scope) impact results, assuming the geometric mean point values, on a per 1 bike rack basis**

Midpoint Impact Categories: 350 Series

Indicator/LCI Metric	AP	EP	GWP	ODP	PCOP	ADPe	ADPf
Unit	**moles of H+-Eq**	**kg N**	**kg CO2-Eq**	**kg CFC-11-Eq**	**kg NOx-Eq**	**kg Sb-Eq**	**MJ, net calorific value**
Minimum	42.4	0.0599	181	1.42e-05	0.451	0.00162	2620
Maximum	49.9	0.0723	215	1.66e-05	0.534	0.00194	3020
Mean	46.2	0.0661	198	1.54e-05	0.493	0.00178	2820
Median	46.2	0.0661	198	1.54e-05	0.493	0.00178	2820
MBR-0350-00001	42.4	0.0599	181	1.42e-05	0.451	0.00162	2620
MBR-0350-00002	49.9	0.0723	215	1.66e-05	0.534	0.00194	3020

Inventory Metrics: 350 Series

Indicator/LCI Metric	TPE	RE	NRE	NRR	RR	WDP	LFW	LFHW
Unit	MJ-Eq	MJ-Eq	MJ-Eq	kg	m3	m3	kg waste	kg waste
Minimum	2910	178	2730	123	0.00427	1.35	88.1	0.00702
Maximum	3370	210	3160	147	0.00485	1.64	106	0.00848
Mean	3140	194	2940	135	0.00456	1.5	97	0.00775
Median	3140	194	2940	135	0.00456	1.5	97	0.00775
MBR-0350-00001	2910	178	2730	123	0.00427	1.35	88.1	0.00702
MBR-0350-00002	3370	210	3160	147	0.00485	1.64	106	0.00848

INTERPRETATION

It should be noted that the results are presented on a whole unit product basis, and therefore, the impacts attributed to each declared product in this EPD cannot necessarily be compared due to their differing capacities based how the number of seats. Thus, to calculate comparable impacts, one should normalize the impacts to a per-seat basis.

ADDITIONAL ENVIRONMENTAL INFO

No regulated substances of very high concern are utilized on site.

"The Sub PCR, Sub Product Category Rule for Site Furnishings, CSI MasterFormat, Section 323300, states "A chemical schedule of hazardous materials and substances shall be included in the EPD report. The general cut-off rules do not apply to such substances. This includes paints, finishes, adhesives, and sealants. The EPD shall consist of a chemical schedule of all paints, finishes, adhesives, and sealants used on the product rages, whether they appear in the LCA product model or not. Substances shall be listed by name, Chemical Abstract Registry Numbers (CAS RN), and hazard category according to the GreenScreen methodology. The finish schedule shall be completed to 0.1% or 1,000 ppm whenever possible."

Metal components of the Maglin bike racks can be powder coated. The chemical inventory below is for the powder coating of their products. It covers the full color line with all work performed by an outside vendor. Maglin does not have operational control over the painting process. An average amount of powder coating per bench component ranges from 0.01 to 0.06 kilograms of coating.

Table 10: **Hazard Screening for Powder Coating Substances**

Substance (May Contain)	CAS RN	Weight by %	GreenScreen Score
1,3-Benzenedicarboxylic acid (May Contain)	1.214996e+12	< 10	LT – UNK: Present on a GreenScreen Specified List, but there is insufficient information to classify the hazard This material was added based on the Quartz database of common building materials. The manufacturer would not disclose any trade secrets therefore this material may or may not be in the actual product.

Aluminum Powder (May Contain)	7429-90-5	1634256000	BM1: Avoid - Chemical of High Concern
Amorphous silica (May Contain)	7631-86-9	< 3	BM1: Avoid - Chemical of High Concern
Aluminum hydroxide (May Contain)	21645-51-2	1635552000	BM 2: Use but Search for Substitutes
Titanium Dioxide (May Contain)	13463-67-7	25-30	LT-1: GreenScreen Benchmark-1 Avoid - Chemical of High Concern
1,3,5-Triglycidyl-s-triazinetrione (May Contain)	2451-62-9	1609804800	LT-1: GreenScreen Benchmark-1 Avoid - Chemical of High Concern
Quartz (May Contain)	14808-60-7	1615161600	LT-1: GreenScreen Benchmark-1 Avoid - Chemical of High Concern
Diiron Trioxide (May Contain)	1309-37-1	1614902400	BM1: Avoid - Chemical of High Concern
Silica gel (Main Contain)	112926-00-8	1615161600	LT – UNK: Present on a GreenScreen Specified List, but there is insufficient information to classify the hazard

REFERENCES

ISO Standards:

- ISO 6707-1: 2014 Buildings and Civil Engineering Works - Vocabulary - Part 1: General Terms
- ISO 14021:1999 Environmental Labels and Declarations - Self-declared Environmental Claims (Type II Environmental Labeling)
- 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 14044:2006 Environmental Management - Life Cycle Assessment - Requirements and Guidelines
- ISO 14067:2018 Greenhouse Gases – Carbon Footprint of Products – Requirements and Guidelines for Quantification
- ISO 14050:2009 Environmental Management - Vocabulary
- ISO 21930:2017 Sustainability in Building Construction - Environmental Declaration of Building Products

EN Standards:

- EN 16757 Sustainability of construction works - Environmental product declarations – Product Category Rules for concrete and concrete elements
- EN 15804 Sustainability of construction works - Environmental product declarations -Core rules for the product category of construction products

Other References:

- USGBC LEED v4 for Building Design and Construction, 11 Jan 2019 available at https://www.usgbc.org/resources/pcr-committee-process-resources-part-b
- USGBC PCR Committee Process & Resources: Part B, USGBC, 7 July 2017 available at https://www.usgbc.org/resources/pcr-committee-process-resources-part-b.
- US EPA (2020) Advancing Sustainable Materials Management: 2018 Fact Sheet, https://www.epa.gov/sites/production/files/2021-01/documents/2018_ff_fact_sheet_dec_2020_fnl_508.pdf