ENVIRONMENTAL PRODUCT DECLARATION

LOW EMBODIED CARBON (LEC) COLD-FORMED STEEL FRAMING SYSTEMS

INTERIOR FRAMING, EXTERIOR FRAMING, INTERIOR FINISHING, EXTERIOR FINISHING,
FLOOR FRAMING, STEEL FRAMING CONNECTORS, WOOD FRAMING CONNECTORS

ClarkDietrich proudly offers steel framing products and services nationwide, plus the backing of our Steel Framing Industry Association (SFIA) certification.

Programme:	The International EPD® System
Programme operator:	EPD International AB
EPD registration number:	S-P-12752
Publication Date:	03-18-2024
Valid Until:	03-15-2029

This EPD was done in accordance with ISO 14025 and ISO 21930.
This EPD does not comply with EN15804+A2.

ClarkDietrich

ClarkDietrich is in an unprecedented position to help you bring change to the built environment. One of the ways we do that is by offering the industry's most comprehensive lineup of labor-saving, steel construction products and services across the United States and abroad. But also key to our leadership are the steps we've taken to be at the forefront of contributing to the sustainability of your projects.

This Low Embodied Carbon (LEC) Environmental Product Declaration (EPD) document is just one of many actions that back our responsible stance. It is a standardized, internationally recognized tool containing data to help you evaluate our products' impact from a comprehensive level. Further, our EPDs are third-party verified based on an ISO-compliant assessment of our products' complete life cycle, from cradle to gate.

For more details, visit ClarkDietrich Sustainability

EPD®
THE NORTH AMERICAN EPD® SYSTEM

EPD®
THE INTERNATIONAL EPD® SYSTEM

ENVIRONMENTAL PRODUCT DECLARATION

ClarkDietrich

LOW EMBODIED CARBON (LEC) – COLD-FORMED STEEL PRODUCTS
North American Product Category Rule for Designated Steel Construction Products

According to ISO 14025 and ISO 21930:2017

EPD Program and Program Operator Name, Address, Logo, and Website	**The International EPD® System** **EPD International AB** **Box 210 60** **SE-100 31 Stockholm** **Sweden** **www.environdec.com** **info@environdec.com** as provided by EPD North America
General Program Instructions and Version Number[1]	General Programme Instructions for the International EPD® System. Version 4.0. 2021-03-29
Manufacturer Name and Address	ClarkDietrich | 9050 Centre Pointe Dr., Ste. 400 West Chester, OH 45069
Declaration Number	S-P-12752
Declared Product & Declared Unit	Cold-Formed Steel Products; 1 metric ton
Reference PCR and Version Number[2]	UL Part A: Life Cycle Assessment Calculation Rules and Report Requirements, v4.0 (2022) Part B: Steel Construction Product EPD Requirements, v2.0 (2020)
Description of Product Application/Use	Cold-Formed Steel Products
Markets of Applicability	North America
Date of Issue	03-15-2024
Period of Validity	5 years from date of issue
EPD Type	Product-specific Type III
EPD Scope	Cradle to gate
Year(s) of Reported Primary Data	April 2022 - March 2023
LCA Software & Version Number	Sphera Managed LCA Content Database 2023.2 (formerly GaBi Database)
LCI Database(s) & Version Number	Sphera LCA for Experts 10.7 (formerly GaBi)
LCIA Methodology & Version Number	TRACI 2.1, IPCC AR5 GWP_{100}, CML 2001-Jan 2016 ADP_{fossil}

Part A PCR review was conducted by:	Lindita Bushi, PhD, Chair Hugues Imbeault-Tétrault, Eng., M.A. Sc. Jack Geibig
The sub-category PCR review was conducted by:	Dr. Tom Gloria (Chair) Brandie Sebastian James Littlefield
Independent third-party verification of the declaration and data, according to ISO 14025:2008	☐ EPD Process Ceritification ☒ EPD Verification ☐ Pre-Verified Tool
This declaration was independently verified in accordance with ISO 14025: 2006. The UL Environment "Part A: Calculation Rules for the Life Cycle Assessment and Requirements on the Project Report," v4.0, based on CEN Norm EN 15804 (2012) and ISO 21930:2017, serves as the core PCR, with additional considerations from the USGBC/UL Environment Part A Enhancement (2017). ☐ INTERNAL ☒EXTERNAL	 James Mellentine, Thrive ESG Approved by: The International EPD® System
This life cycle assessment was conducted in accordance with ISO 14044 and the reference PCR by:	WAP Sustainability Consulting
This life cycle assessment was independently verified in accordance with ISO 14044 and the reference PCR by:	James Mellentine, Thrive ESG
The procedure for follow-up of data during EPD validity, as defined by the GPI, involves third party verifier:	☐ Yes ☒ No

[1]Not all requirements in the GPI are fulfilled, particularly the requirement, for construction products, to follow EN 15804 for certain aspects of the LCA method.
[2]This EPD is based on a PCR that satisfies procurement rules at the federal, state, and municipal levels which call for EPDs based on the UL Part B PCR. The UL Part B PCR was used to meet regulatory (example: Buy Clean California Act, etc.) and market expectations (example: Building Transparency EC3 comparisons, LEED and existing vendor procurement requirements, product scoring programs, etc.). The EPD should not be used outside of this context.

Limitations:
Environmental declarations from different programs (ISO 14025) may not be comparable.
Comparison of the environmental performance of construction works and construction products using EPD information shall be based on the product's use and impacts at the construction works level. In general, EPDs may not be used for comparability purposes when not considered in a construction works context. Given this PCR ensures products meet the same functional requirements, comparability is permissible provided the information given for such comparison is transparent and the limitations of comparability explained.

When comparing EPDs created using this PCR, variations and deviations are possible. Example of variations: Different LCA software and background LCI datasets may lead to different results for upstream or downstream of the life cycle stages declared.

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

1. Product Definition and Information

1.1. Description of Company/Organization

ClarkDietrich offers a comprehensive lineup of steel construction products and services across the United States. Using cold-formed steel, we manufacture innovative products for interior and exterior framing and finishing, floor framing, steel and wood framing connectors, metal lath and accessories.

Within our facilities we attempt to recycle 100% of preconsumer steel waste from all aspects of our processing, beginning with the slitting of the master coil and continuing through to the final roll-forming of our product. Every day at every plant. Steel is fully recyclable, and we have always been diligent in this effort.

Product development is focused on labor savings systems, which incorporates optimal utilization of all raw materials. From concept to launch, our product offering consciously engages optimal use of material as well as ease of construction.

Formed in 2011 through the combination of two established market leaders—ClarkWestern Building Systems and Dietrich Metal Framing— ClarkDietrich is in an unprecedented position to help you bring change to the built environment.

Manufacturing Sites:

Baltimore, MD
Bristol, CT
Dade City, FL
Dallas, TX
McDonough, GA
Pasadena, TX
Riverside, CA
Rochelle, IL
Sacramento, CA
Vienna, OH
Warren, OH East

1.2. Product Description

Product Identification

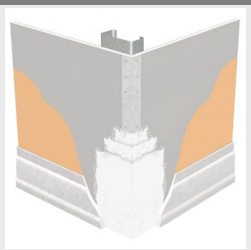
This EPD covers Low Embodied Carbon (LEC) Cold-Formed Steel Products as defined by the United States General Services Administration's (GSA) Interim IRA Low Embodied Carbon Material Requirements top 20% limit for cold-formed and galvanized steel products (U.S. GSA, 2023), as well as private sector projects looking to achieve low embodied carbon optimization. 100% of LEC cold-formed steel framing products represented by this EPD originate from an EAF steel mill. These products will be identified and differentiated using a label that clearly shows the acronym LEC (Low Embodied Carbon) on the skid, bundle, bucket, carton or box, and when possible will also be included in the inkjet string on individual products.

Cold-formed steel framing products have bare steel thicknesses in the range of 26 gauge (0.0120 inches) to 10 gauge (0.1180 inches). Using cold-formed steel, innovative products are manufactured for use as interior and exterior framing and finishing, floor framing, steel and wood framing connectors, metal lath and accessories. These products are most commonly used as specified and in compliance with the International Building Code, International Residential Code and State and Local Building Codes.

This EPD covers products under UN CPC Codes 41262 and 42190.

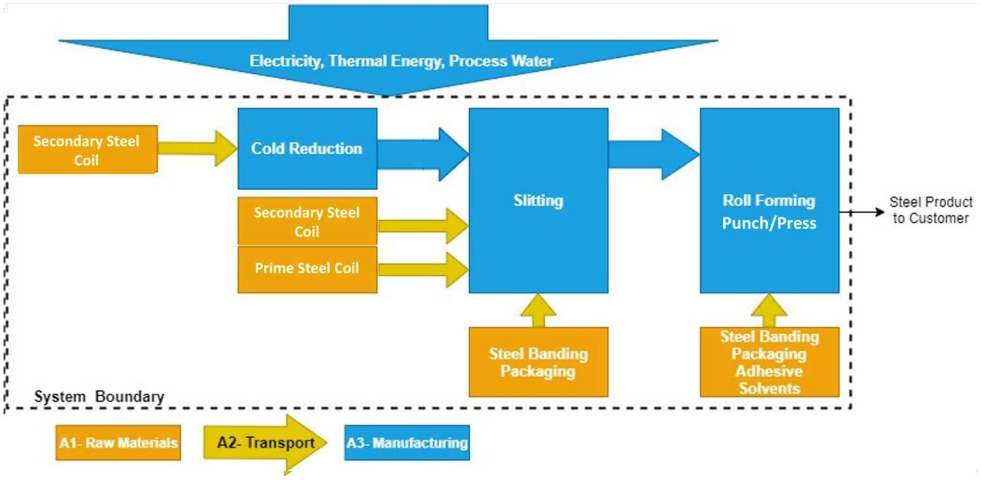
Product Specification List (For comprehensive product list reference: https://www.clarkdietrich.com/products)

Product Image	Product Category	Product Description (non-exhaustive list)
	**Interior Framing**	• ProSTUD® Drywall Framing • TRAKLOC® Drywall Framing System • BlazeFrame® RipTRAK™ • Shaftwall and Area Separation Wall Systems • 360 TRAK™ • RedHeader PRO® Rough Opening System • MaxTrak® Slotted Deflection Track • RC Deluxe® Resilient Channel and various channels and framing members
	**Exterior Framing**	• Structural Framing • HDS® Framing System • Furring/Hat Channel • L-Angle/Corner Angle • U-Channel (CRC) • Z-Girt for Rainscreen Framing

PRODUCT IMAGE	PRODUCT CATEGORY	PRODUCT DESCRIPTION (NON-EXHAUSTIVE LIST)
	**Interior Finishing**	• 103 Deluxe® Corner Bead • Quicksilver™ Corner Bead • Control Joints • Metal Lath • Commercial Beads
	**Exterior Finishing**	• Metal Lath • Corners and Casing Beads • Control Joints • Expansion Joints • Casing Beads • Weep & Sill Screeds
	**Floor Framing**	• TradeReady® Joist System • C-Joist • Structural Rim Track • Floor Framing Accessories
	**Steel and Wood Framing Connectors**	• Spazzer® 9200 and 5400 Spacing and Bridging Bar • SwiftClip™ Support Clips • EasyClip™ Support Clips • Various Connectors and Clips

Flow Diagram and System Boundary

The diagram below shows the flow of cold-formed steel products through major processes. The arrows between processes indicate transportation of intermediate products. Material input flows have associated inbound transportation. See section 1.8 for definitions of secondary and prime steel coils and additional details on the manufacturing process.



1.3. Application

Using cold-formed steel, innovative products are manufactured for interior framing, interior finishing, exterior framing, floor framing, as well as steel and wood framing connectors, metal lath, and accessories. These products are most commonly used in compliance with the International Building Code and the International Residential Code.

Common applications of cold-formed steel framing products are as follows:

- Interior Framing – Nonstructural and Structural Load Bearing
- Exterior Framing – Structural Load-Bearing and Curtain-Wall
- Interior Finishing – Nonstructural
- Exterior Finishing – Nonstructural
- Floor Framing – Structural Load-Bearing
- Steel Framing Connectors – Structural and Nonstructural
- Wood Framing Connectors – Structural and Nonstructural

1.4. Declaration of Methodological Framework

The EPD has been created strictly in accordance with the standards and norms below:

- ISO 14025: Environmental labels and declarations – Type III environmental declarations – Principles and procedures. (ISO, 2006)
- ISO 21930: Sustainability in building and construction – Environmental declaration of building products, International Organization for Standardization, Geneva, Switzerland (ISO, 2017).
- Product Category Rule (PCR) Guidance for building-related products and services- Part A: Life Cycle Assessment Calculation Rules and Report Requirements (UL, 2022)
- Product Category Rule (PCR) Guidance for building-related products and services- Part B: Designated steel construction product EPD requirements (UL, 2020)

This LCA uses an attributional approach.

1.5. Technical Requirements

Applicable Product and Manufacturing Standards and Specifications per the International Building Code or as generally accepted practice in the industry if not referenced by the International Building Code. The products listed here are not intended to be all-inclusive or comprehensive. Please visit the following list for a comprehensive product list: https://www.clarkdietrich.com/products.

Product Category	Product Description	Product Specification	Material Specification
Interior Framing	ProSTUD® Drywall Framing Trakloc® Drywall Framing System Blazeframe® RipTRAK™ Shaftwall and Area Separation Wall Systems 360 TRAK™ MaxTrak® Slotted Deflection Track RC Deluxe® Resilient Channel and various channels and framing members	AISI S220	ASTM A1003
	RedHeader PRO™ Rough Opening System	AISI S240	ASTM A1003
Exterior Framing	Structural Framing HDS® Framing System	AISI S240	ASTM A1003
Interior Finishing	103 Deluxe® Corner Bead Quicksilver™ Corner Bead Metal Casing Beads and Control Joints	ASTM C1047	ASTM A653
Exterior Finishing	Metal Lath	ASTM C847	ASTM A653
	Corners, Casing Beads, Control Joints and Expansion Joints	ASTM C1861	ASTM A653
Floor Framing	TradeReady® Joist System C-Joist Structural Rim Track and Accessories	AISI S240	ASTM A1003
Steel and Wood Framing Connectors	Spazzer® 9200 and 5400 Spacing and Bridging Bar SwiftClip™ Support Clips EasyClip™ Support Clips Various Connectors and Clips	AISI S100 AISI S220 AISI S240 As Applicable	ASTM A1003

1.6. Properties of Declared Product as Delivered

The following table lists metal thicknesses and strengths for all structural, nonstructural and finishing products:

Product Category	Gauge	Mils	Base Steel Thickness (inches)	Design Thickness (inches)	Yield Strength (ksi)
Interior Framing	25 to 20	15 to 33	0.0150 to 0.0329	0.0158 to 0.0346	33 to 70
Exterior Framing	20 to 12	33 to 97	0.0329 to 0.0966	0.0346 to 0.1017	33 to 50
Interior Finishing	26 min	12 min	0.012 min	0.01224 min	N/A
Exterior Finishing	26 min	12 min	0.012 min	0.01224 min	N/A
Floor Framing	18 to 12	43 to 97	0.0428 to 0.0966	0.0451 to 0.1017	33 to 50
Steel Framing Connectors	20 to 10	33 to 118	0.0329 to 0.1180	0.0346 to 0.1242	33 to 50
Wood Framing Connectors	20 to 10	33 to 118	0.0329 to 0.1180	0.0346 to 0.1242	33 to 50
Product		**Weight per Sq. Yd.**		**Sheet Size**	**Galvanization**
Exterior Finishing – Metal Lath		2.5 or 3.4 lbs.		27” by 97”	G60 min

NOTE: For more detailed product line information go to http://www.clarkdietrich.com/products.

1.7. Material Composition

Cold-formed steel framing products are made from coils of low alloy sheet steel with various metallic and conversion coatings for corrosion protection. This EPD only covers prime steel coils purchased from electric arc furnace (EAF) coil suppliers. Primary product components as follows:

COLD-FORMED STEEL PRODUCTS BASED ON 6” CSJ, G60, 43 MIL STUD	
Component Name	*Mass by % total*
Base Metal	*> 97.9%*
Metallic Coating	*< 2.1%*

Recycled content in EAF steel includes both pre- and post-consumer recycled content and varies by supplier.

1.8. Manufacturing

Roll-Forming Production Process

Prime Steel Coils are received into the warehouse from EAF steel suppliers. Steel coils from secondary or BOF suppliers cannot be utilized for products covered in this EPD. The Prime Steel Coils are slit into appropriate widths in a continuous slitting process. Then the slit coils are loaded into the roll forming machinery where continuous roll formers and/or expanders shape the slit coils into finished products. The finished products are packaged into skids, and the skids are loaded onto a truck where they will be shipped to the customer.

Connectors, Clips and Accessory Production Process

Prime Steel Coils are received into the warehouse from EAF steel suppliers. Steel coils from secondary or BOF suppliers cannot be utilized for products covered in this EPD. For the stamping press process the Prime Steel Coils are slit into appropriate widths with a continuous slitting process, then the slit coils are loaded onto an Uncoiler and the material passes through straightening and feeder equipment where it enters a make die. As it passes through the make die, it stamps various connector, clip and accessory profiles, with features that may include angles, slots, darts, or pre-drilled holes for fasteners. The parts are then packaged and shipped to the customer. For the conventional process, Prime Steel Coils are processed into steel sheets. Conventional equipment such as presses, punches and drills utilize the sheet goods and produce the various connector, clip and accessory profiles, with features that may include angles, slots, darts, or pre-drilled holes for fasteners. The parts are then packaged and shipped to the customer.

Definitions:

- **Electric Arc Furnaces (EAF) versus Basic Oxygen Furnaces (BOF)**:
    - Both EAF and BOF are crucial players in steelmaking, but they differ significantly in their primary raw material inputs, energy source, environmental impact.
    - Raw material inputs for EAFs are primarily scrap steel (typically 60-99%). This promotes recycling and sustainability. Raw material inputs for BOFs are primarily molten iron (typically 70-80%) directly from blast furnaces, along with a smaller portion of scrap steel. BOFs use virgin resources, requiring mining and processing of iron ore.
    - Energy sources for EAFs are electrical grids which power high-intensity arcs to melt scrap. This offers flexibility in utilizing renewable energy sources. Energy sources for BOFs are oxygen blowing and exothermic reactions within the furnace generate heat. BOFs rely on fossil fuels to power blast furnaces and generate oxygen.
- **Prime Steel Coils:** Coils that are purchased directly from a steel mill to meet or exceed the specifications needed to manufacture a specific product or products.
    - The production of Prime Steel Coils for this EPD takes place in North American EAFs.
- **Secondary Steel Coils:** Coils that are purchased on the secondary market that may or may not match exact specifications needed but can be cold reduced and coated to meet desired specifications. Typically, the original source steel mill is not known for secondary coils, as is the transportation distance and mode, these secondary coils cannot be considered for this EPD.

1.9. Packaging

All of the various steel framed products are packaged and shipped using one of the following methods: skids, boxes, buckets or cartons.

Product Image	Product Category	Product Description
	Exterior Framing: Skid	Products are generally nested together in pairs, then stacked with other sets of nested pairs and are held together using banding and wood dunnage.
	Interior Framing: Skid	Products are generally nested together in pairs, then stacked with other sets of nested pairs and are held together using banding and wood dunnage.
	Exterior Finishing: Metal Lath – Skids	Product sheets are stacked on top of each other in a bundle and held together with plastic strapping. The bundles are stacked on top of each other and held together using banding and wood dunnage.
	Interior & Exterior Finishing: Boxes	Desired quantity of products are stacked on top of each other, then secured inside of a cardboard box. Then cardboard boxes are stacked together with other boxes to form a skid of product and held together using banding and wood dunnage.
	Steel and Wood Framing Connectors: Buckets or Cartons	Products are placed in a carton or plastic buckets then secured into the buckets with a plastic lid. The buckets or cartons are stacked together with other buckets or cartons to form a skid of product and held together using banding and wood dunnage.

As required per ISO 21930 and the Part A PCR, information on packaging is provided to specify the end-of-life scenarios used for packaging or to support development of the end-of-life scenarios for packaging at the construction works level where the A5 module is not declared. These data are provided in the table below per metric ton of cold-formed steel products.

PACKAGING WASTE	VALUE	UNIT
Plastic Packaging Waste to Landfill	1.03E+01	kg
Plastic Packaging Waste to Incineration	2.52E+00	kg
Plastic Packaging Waste to Recycling	2.03E+00	kg
Pulp Packaging Waste to Landfill	6.24E-01	kg
Pulp Packaging Waste to Incineration	1.50E-01	kg
Pulp Packaging Waste to Recycling	3.28E+00	kg
Wood Packaging Waste to Landfill	5.83E+00	kg
Wood Packaging Waste to Incineration	1.41E+00	kg
Wood Packaging Waste to Recycling	2.65E+00	kg

1.10. Transportation

Transportation from suppliers to ClarkDietrich's sites were calculated using primary data on the mode of transport, and distances were calculated based on the supplier location and the location of manufacturing.

1.11. Product Installation

Product Installation is not declared in this EPD.

1.12. Use

Use of product is not declared in this EPD.

1.13. Reference Service Life and Estimated Building Service Life

As the declared system boundary is A1-A3, a reference service life is not declared.

1.14. Reuse, Recycling, and Energy Recovery

Reuse, Recyling and Energy Recovery of product is not declared in this EPD.

1.15. Disposal

Disposal of product is not declared in this EPD.

2. Life Cycle Assessment Background Information

2.1. Functional or Declared Unit

The declared unit of calculation is one metric ton of Cold-Formed Steel Product (1,000 kg).

Name	Required Unit	Value
Declared Unit	Metric Ton	1
Density	kg/m^3	7,850

2.2. System Boundary

The declared system boundary is cradle-to-gate. Cradle-to-gate includes the PCR life cycle modules A1, A2, and A3. The declared system boundaries are shown in Table 1.

2.3. Estimates and Assumptions

All estimates and assumptions are within the requirements of ISO 14040/44. The primary energy and ancillary material data were collected as annual totals including all utility usage and production information. For the LCA, the energy and ancillary usage information was divided by the production to use per metric ton.

Assumptions and limitations to the study have been identified as follows:

- This LCA only covers EAF steel coils purchased by ClarkDietrich and does not include BOF steel coils. This aligns with the goal and scope of the study to represent the impacts of ClarkDietrich's products with low embodied carbon for meeting GSA and private sector limits set for cold-formed galvanized steel products.
- Supplier EPDs utilized in this LCA reported all LCA results as site-specific values. In the case of one supplier, results for resource use indicators and waste and output flows are reported as weighted-average results for multiple mills. The site-weighted average results are used in this LCA's results since they are the best data available.
- EPDs are available for all EAF steel supplied to ClarkDietrich.
- The auxiliary materials and packaging materials were available for two ClarkDietrich sites, and hence the specific values per unit of sold product were considered for all other sites. This is considered a conservative estimate since the products made these sites require more auxiliary materials and packaging materials than those made at other ClarkDietrich sites.
- Steel waste occurring in production is accounted for in A1 (raw materials) and A2 (transportation of raw materials), where impacts are modeled for sourcing and transporting the materials that are lost in production.
- Production processes related to secondary steel coils are not applicable to this EPD, however, utility usage for these processes are included in the manufacturing inputs and outputs, as well as the allocation calculations, as a conservative estimate.
- Availability of geographically more accurate background LCI datasets would have improved the accuracy of the study.

- Since this LCA uses the cut-off approach to model recycled material in the product, no credit is given to the product system. Instead, the manufacturer realizes reduced environmental impacts through the absence of the burden of extracting virgin material.
- Only known and quantifiable environmental impacts are considered.
- Due to the assumptions and value choices listed above, these do not reflect real-life scenarios and hence they cannot assess actual and exact impacts, but only potential environmental impacts.

2.4. Cut-off Criteria

Input and output flows of mass and energy greater than 1% (based on total mass final product and total energy usage of the product system) or greater than 1% of environmental impacts were included within the scope of analysis. Flows less than 1% were included if sufficient data were available to warrant inclusion and/or the flow was thought to have significant environmental impact. Cumulative excluded flows and environmental impacts are less than 5% per module based on total mass, energy usage, and impacts of the product system. Where data gaps were identified, they are filled by conservative assumptions with average, generic, or proxy data and assumptions are documented. No known flows relevant to the product system are deliberately excluded from this LCA and EPD. Some material inputs may have been excluded within the MLC datasets used for this project. All MLC datasets have been critically reviewed and conform to the exclusion requirement of the PCR, Part A: “Calculation Rules for the Life Cycle Assessment and Requirements on the Background Report”.

2.5. Data Sources

Primary data were collected by facility personnel and from utility bills and were used for all manufacturing processes for fiscal year 2022, defined as April 2022 to March 2023. Whenever available, supplier data were used for raw materials used in the production process. Supplier EPDs were utilized for 100% of the EAF prime steel coils purchased by ClarkDietrich. When primary data do not exist, secondary data for raw material production were utilized from Sphera Managed LCA Content (fka GaBi) Database 2023.2.

Electricity mixes used in A3 vary per production site and are modeled per the EPA eGRID region, and corresponding GaBi dataset, that covers each production site, listed below:

- Baltimore, MD: RFCE
- Dallas, TX: ERCT
- Riverside, CA: CAMX
- Vienna, OH: RFCW
- Bristol, CT: NEWE
- McDonough, GA: SRSO
- Rochelle, IL: RFCW
- Warren, OH East: RFCW
- Dade City, FL: FRCC
- Pasadena, TX: ERCT
- Sacramento, CA: CAMX

2.6. Data Quality

The geographical scope of the manufacturing portion of the life cycle is the United States. All primary data were collected from the manufacturer. The geographic coverage of primary data is considered excellent.

The primary data provided by the manufacturer represents all information for April 2022 to March 2023. Using this data meets the PCR requirements. Time coverage of this data is considered excellent. Primary data provided by the manufacturer are specific to the technology that ClarkDietrich uses in manufacturing their product. They are site-specific and considered of good quality.

Supplier EPDs were utilized for representing EAF prime steel coils. This data represents the technology specific to the suppliers and technological representativeness of this data is considered very good. Geographic coverage of this data is considered good. Time coverage of EPDs ranges from 2022 to present and is considered of very good quality. Supplier EPD consistency is considered good. A majority of steel supplier EPDs reported product- and site-specific results for LCIA impact categories. Supplier EPDs used consistent PCRs and LCIA methodologies for global warming potential (IPCC AR5 GWP_{100}) and other LCA impact categories (TRACI, with CML 2001-2016 for ADP_{fossil}). However, the LCA modeling software and databases used were not consistent across all supplier EPDs. For a majority of the EAF steel supply, supplier EPD results were modeled in LCA FE using MLC datasets. A minority of EPD results were modeled in SimaPro using ecoinvent datasets or modeled in OpenLCA using ecoinvent datasets. Use of consistent LCA software and background LCA data would improve the consistency of this LCA.

It is worth noting that the electricity and thermal energy used in manufacturing the product includes overhead energy such as lighting and heating. Sub-metering would improve the technological coverage of data quality. Data necessary to model cradle-to-gate unit processes were sourced from Sphera Managed LCA Content (fka GaBi) datasets and critically reviewed LCAs.

2.7. Period under Review

Period under review is ClarkDietrich's 2022 fiscal year, defined as April 2022 to March 2023.

2.8. Allocation

General principles of allocation were based on ISO 14040/44. Where possible, allocation was avoided. As this LCA is limited to low embodied carbon cold-formed steel products, there are co-products at the manufacturing site. Manufacturing inputs were allocated on a mass basis based on quantities produced at the facility. As a default, Sphera Managed LCA Content datasets use a physical mass basis for allocation.

3. Life Cycle Assessment Results

Table 1. Description of the system boundary modules

	PRODUCT STAGE			CONSTRUCT-ION PROCESS STAGE		USE STAGE							END OF LIFE STAGE				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 supply	Transport	Manufacturing	Transport from gate to site	Assembly/Install	Use	Maintenance	Repair	Replacement	Refurbishment	Building Operational Energy Use During Product Use	Building Operational Water Use During Product Use	Deconstruction	Transport	Waste processing	Disposal	Reuse, Recovery, Recycling Potential
EPD Type	X	X	X	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND

3.1 Life Cycle Impact Assessment Results

LCIA results are relative expressions and do not predict impacts on category endpoints, the exceeding of thresholds, safety margins or risks. These six impact categories are globally deemed mature enough to be included in Type III environmental declarations. Other categories are being developed and defined and LCA should continue making advances in their development. However, the EPD users shall not use additional measures for comparative purposes.

Table 2. North American Impact Assessment Results: 1 metric ton of Cold-Formed Steel Product

TRACI, IPCC AR5 GWP_{100}, AND CML 2001-2016	A1	A2	A3	A1-A3
GWP [kg CO_2 eq]	1.54E+03	5.41E+01	6.62E+01	**1.66E+03**
AP [kg SO_2 eq]	5.29E+00	2.73E-01	1.73E-01	**5.74E+00**
EP [kg N eq]	2.10E+00	2.35E-02	1.82E-02	**2.14E+00**
ODP [kg CFC 11 eq]	5.71E-05	1.39E-13	5.73E-12	**5.71E-05**
SFP [kg O_3 eq]	1.22E+02	7.19E+00	3.97E+00	**1.33E+02**
ADP_{fossil} [MJ, LHV]	4.97E+03	7.50E+02	1.97E+03	**7.69E+03**

Comparability: 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. 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.

Table 3. Carbon Emissions and Removals

PARAMETER	A1	A2	A3	A1-A3
BCRP [kg CO_2]	0.00E+00	0.00E+00	0.00E+00	**0.00E+00**
BCEP [kg CO_2]	0.00E+00	0.00E+00	0.00E+00	**0.00E+00**
BCRK [kg CO_2]	0.00E+00	0.00E+00	2.20E+01	**2.20E+01**
BCEK [kg CO_2]	0.00E+00	0.00E+00	0.00E+00	**0.00E+00**
BCEW [kg CO_2]	0.00E+00	0.00E+00	0.00E+00	**0.00E+00**
CCE [kg CO_2]	0.00E+00	0.00E+00	0.00E+00	**0.00E+00**
CCR [kg CO2]	0.00E+00	0.00E+00	0.00E+00	**0.00E+00**
CWNR [kg CO_2]	0.00E+00	0.00E+00	0.00E+00	**0.00E+00**

3.2 Life Cycle Inventory Results

Table 4. Resource Use: 1 metric ton of Cold-Formed Steel Product

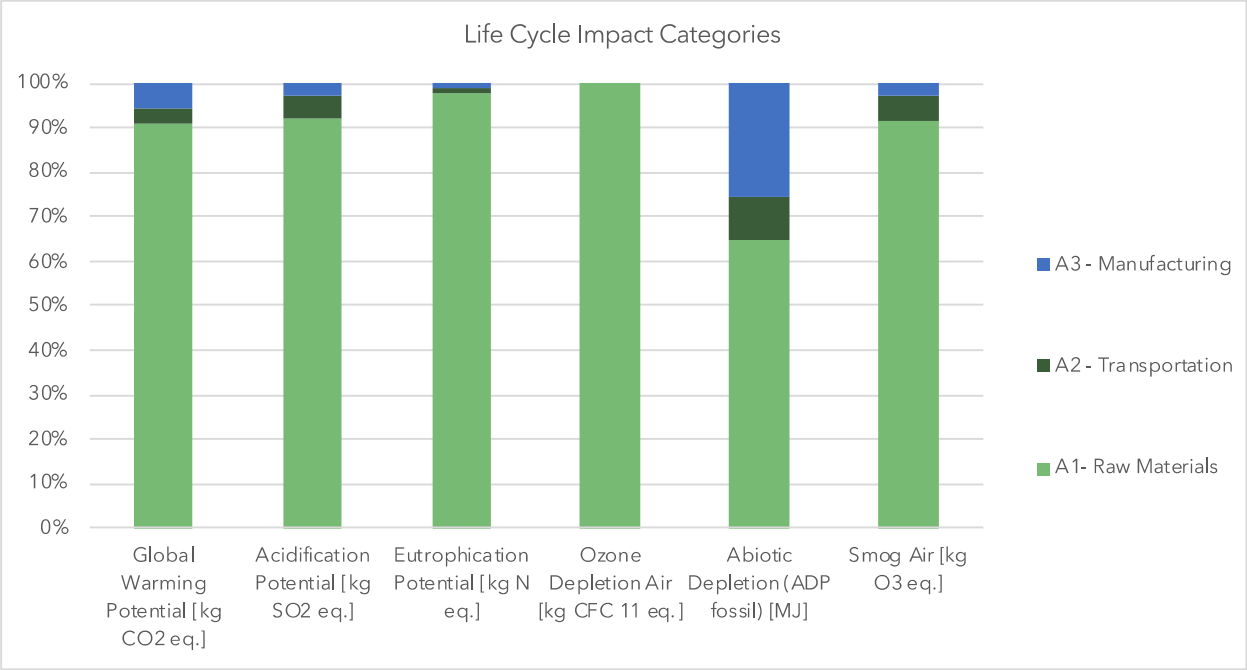
PARAMETER	A1	A2	A3	A1-A3
RPR_E [MJ, LHV]	1.52E+03	3.01E+01	1.22E+02	**1.67E+03**
RPR_M [MJ, LHV]	6.31E+00	0.00E+00	2.62E+02	**2.68E+02**
$NRPR_E$ [MJ, LHV]	2.04E+04	7.56E+02	1.79E+03	**2.30E+04**
$NRPR_M$ [MJ, LHV]	1.69E+02	0.00E+00	3.73E+02	**5.41E+02**
SM [kg]	7.69E+02	0.00E+00	0.00E+00	**7.69E+02**
RSF [MJ, LHV]	0.00E+00	0.00E+00	0.00E+00	**0.00E+00**
NRSF [MJ, LHV]	0.00E+00	0.00E+00	0.00E+00	**0.00E+00**
RE [MJ, LHV]	0.00E+00	0.00E+00	0.00E+00	**0.00E+00**
FW [m^3]	1.63E+01	1.03E-01	4.62E-01	**1.68E+01**

Table 5. Output Flows and Waste Categories: 1 metric ton of Cold-Formed Steel Product

PARAMETER	A1	A2	A3	A1-A3
HWD [kg]	3.75E+00	2.17E-09	1.07E-06	**3.75E+00**
NHWD [kg]	3.82E+01	6.58E-02	1.77E+00	**4.00E+01**
HLRW [kg]	2.77E-03	2.57E-06	9.81E-05	**2.87E-03**
ILLRW [kg]	1.03E-01	2.17E-03	8.27E-02	**1.88E-01**
CRU [kg]	0.00E+00	0.00E+00	0.00E+00	**0.00E+00**
MR [kg]	1.42E+02	0.00E+00	4.36E+01	**1.86E+02**
MER [kg]	0.00E+00	0.00E+00	0.00E+00	**0.00E+00**
EE [MJ, LHV]	0.00E+00	0.00E+00	1.42E-01	**1.42E-01**

4. Life Cycle Assessment Interpretation

For all the impact categories, steel coil production (A1) has the highest contribution, 92% or more, to cradle-to-gate impacts. One exception is ADP_{fossil}, where raw materials contribute 65%. Raw materials transportation (A2) contributes less than 10% to all impact categories. In the case of abiotic depletion potential of fossil resources, raw materials transport contributes about 10%. Manufacturing (A3) impacts range from <1% (ozone depletion potential) to 25% (abiotic depletion potential of fossil resources).



The weighted average cradle-to-gate GWP of ClarkDietrich's cold-formed steel products across all sites is 1,659 kg CO_2e/metric ton, about 25% lower than the GSA limit for cold-formed and galvanized steel products at 2,228 kg CO_2e/metric ton. The cradle-to-gate GWP for each individual site also falls below the GSA.

5. Supporting Documentation

Product specific sustainability related documents can be found at https://clarkdietrich.ecomedes.com/.

No substances required to be reported as hazardous per the EPA's Resource Conservation and Recovery Act were identified during the LCA associated with the production or disposal of this product.

Additional information such as Safety Data Sheets (SDS) and Code Evaluation Reports may be found at https://www.clarkdietrich.com/support-tools/support-docs.

6. References

AGA. (2022). *Hot-Dip Galvanized Steel After Fabrication.* Retrieved from https://galvanizeit.org/uploads/default/2022-EPD-AGA-Hot-Dip-Galvanized-Steel-After-Fabrication.pdf

AISI. (2019). *Life Cycle Inventories of North American Steel Products*. Sphera.

CML - Department of Industrial Ecology. (2016, September 5). *CML-IA Characterisation Factors*. Retrieved from https://www.universiteitleiden.nl/en/research/research-output/science/cml-ia-characterisation-factors

IPCC. (2013). *Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change.* [Stocker, T.F., D. Qin, G.-K. Plattner, M. Tignor, S.K. Allen, J. Boschung, A. Nauels, Y. Xia, V. Bex and P.M. Midgley (eds.)]. Cambridge, United Kingdom and New York, NY, USA: Cambridge University Press.

ISO. (2006). *ISO 14025: Environmental labels and declarations - Type III environmental declarations - Principles and procedures.* Geneva: International Organization for Standardization.

ISO. (2006). *ISO 14040/Amd 1:2020: Environmental management - Life cycle assessment - Principles and framework.* Geneva: International Organization for Standardization.

ISO. (2006). *ISO 14044/Amd 1:2017/Amd 2:2020: Environmental Management - Life cycle assessment - Requirements and Guidelines.* Geneva: International Organization for Standardization.

ISO. (2017). *ISO 21930: Sustainability in buildings and civil engineering works - Core rules for environmental product declarations of construction products and services.* Geneva: International Organization for Standardization.

U.S. GSA. (2023, December 12). *U.S. General Services Administration Inflation Reduction Act Low Embodied Carbon Steel Requirements.* Retrieved from gsa.gov: https://www.gsa.gov/system/files/Steel%20-%20GSA%20IRA%20Low%20Embodied%20Carbon%20Requirements%20%28Dec.%202023%29_508.pdf

UL Environment. (2018). *UL PCR Part B: Designated Steel Construction Product EPD Requirements (UL 10010-34) v2.* UL Environment.

UL Environment. (2022). *Part A: Life Cycle Assessment Calculation Rules and Report Requirements, UL 10010, V4.*

US EPA. (2012). *TRACI: The Tool for the Reduction and Assessment of Chemical and Other Environmental Impacts. Version 2.1 - User Guide.* Retrieved from https://nepis.epa.gov/Adobe/PDF/P100HN53.pdf

WAP Sustainability Consulting. (2024). *Life Cycle Assessment of ClarkDietrich Low Embodied Carbon Cold-Formed Steel Products.*