## ENVIRONMENTAL PRODUCT DECLARATION

# FABRICATED STEEL ROOF AND FLOOR DECK

VERCO DECKING, INC – A NUCOR COMPANY

Nucor Corporation’s Verco Decking, Inc. is the largest producer of steel roof and floor deck in the United States. The company’s steel decking products are primarily used in nonresidential building construction. The nine Vulcraft/Verco facilities have the capacity to produce and market approximately 560,000 tons of steel decking each year.

Verco sources its material from Nucor steel mills and external steel providers. Nucor is North America’s largest steel producer and recycler, turning approximately 20 million net tons of scrap steel in 2021 into new steel. Nucor uses Electric Arc Furnace (EAF) technology at each of its steel recycling facilities. EAFs use post- consumer scrap as its major feedstock, unlike traditional blast furnace steelmaking, which produces more than 70% of the world’s steel using mined iron ore and metallurgical coal as feedstock.

Through its use of EAFs, Nucor’s steelmaking $CO_2$ emissions are less than one-third of the global average on a per ton basis, and Nucor’s energy intensity is approximately one-quarter the global average.

# ENVIRONMENTAL PRODUCT DECLARATION

VERCO DECKING, INC.
a NUCOR company

**Fabricated Steel Roof and Floor Deck**
Designated Steel Construction Product

**According to ISO 14025, and ISO 21930:2017**

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|---|---|
| EPD PROGRAM AND PROGRAM OPERATOR NAME, ADDRESS, LOGO, AND WEBSITE | **SCS GLOBAL SERVICES HEADQUARTERS**<br>2000 POWELL STREET, SUITE 600<br>EMERYVILLE, CA<br>94608, USA<br>HTTPS://WWW.SCSGLOBALSERVICES.COM/ |
| GENERAL PROGRAM INSTRUCTIONS AND VERSION NUMBER | SCS Type III Environmental Declaration Program: Program Operator Manual. V11.0 |
| MANUFACTURER NAME AND ADDRESS | Nucor Corporation, 1915 Rexford Road, Charlotte, North Carolina 28211 |
| DECLARATION NUMBER | SCS-EPD-09143 |
| DECLARED PRODUCT & FUNCTIONAL UNIT OR DECLARED UNIT | Fabricated steel roof and floor deck, 1 metric ton |
| REFERENCE PCR AND VERSION NUMBER | Part A: Life Cycle Assessment Calculation Rules and Report Requirements (UL Environment, UL 10010, V3.2) and Part B: Designated Steel Construction Product EPD Requirements (UL Environment, UL 10010-34, 2nd edition). |
| DESCRIPTION OF PRODUCT APPLICATION/USE | Steel deck used in construction |
| PRODUCT RSL DESCRIPTION (IF APPL.) | N/A |
| MARKETS OF APPLICABILITY | North America |
| DATE OF ISSUE | June 29, 2023 |
| PERIOD OF VALIDITY | June 29, 2023 through June 28, 2028 (5 years) |
| EPD TYPE | Product-Specific |
| EPD SCOPE | Cradle to Gate |
| YEAR(S) OF REPORTED PRIMARY DATA | 2021 |
| LCA SOFTWARE & VERSION NUMBER | LCA for Experts v10.7.0.183 |
| LCI DATABASE(S) & VERSION NUMBER | LCA for Experts 2023.1 |
| LCIA METHODOLOGY & VERSION NUMBER | TRACI 2.1, IPCC 2013 (AR5) |
| The PCR review was conducted by: | Dr. Tom Gloria, Chair, Industrial Ecology Associates<br>Brandie Sebastian, JBE Consultants<br>James Littlefield, Independent Consultant |
| This declaration was independently verified in accordance with ISO 14025: 2006.<br>☐ INTERNAL ☒EXTERNAL | Beth Cassese, SCS Global Services |
| This life cycle assessment was conducted in accordance with ISO 14044 and the reference PCR by: | **Trinity Consultants** |
| This life cycle assessment was independently verified in accordance with ISO 14044 and the reference PCR by: | Beth Cassese, SCS Global Services |

# ENVIRONMENTAL PRODUCT DECLARATION

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**According to ISO 14025, and ISO 21930:2017**

LIMITATIONS
The environmental impact results of steel products in this document are based on a declared unit and therefore do not provide sufficient information to establish comparisons. The results shall not be used for comparisons without knowledge of how the physical properties of the steel product impact the precise function at the construction level. The environmental impact results shall be converted to a functional unit basis before any comparison is attempted. Environmental declarations from different programs (ISO 14025) may not be comparable.

Exclusions: EPDs do not indicate that any environmental or social performance benchmarks are met, and there may be impacts that they do not encompass. LCAs do not typically address the site-specific environmental impacts of raw material extraction, nor are they meant to assess human health toxicity. EPDs can complement but cannot replace tools and certifications that are designed to address these impacts and/or set performance thresholds – e.g. Type 1 certifications, health assessments and declarations, environmental impact assessments, etc.

Accuracy of Results: EPDs regularly rely on estimations of impacts; the level of accuracy in estimation of effect differs for any particular product line and reported impact.

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.

EPDs from different programs may not be comparable. Full conformance with a PCR allows EPD comparability only when all stages of a life cycle have been considered. However, variations and deviations are possible". Example of variations: Different LCA software and background LCI datasets may lead to differences results for upstream or downstream of the life cycle stages declared.

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," v3.2 (December 2018), in conformance with ISO 21930:2017, serves as the core PCR, with additional considerations from the USGBC/UL Environment Part A Enhancement (2017).

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# ENVIRONMENTAL PRODUCT DECLARATION

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# 1. PRODUCT DEFINITION AND INFORMATION

## Description of Organization

This environmental product declaration (EPD) represents steel deck products produced by Nucor's Verco facilities located in Phoenix, AZ; Fontana, CA; and Antioch, CA. The overall recycled content of Verco Steel decking products (% by Total Weight) is available at Nucor.com and is updated on an annual basis. As a vertically integrated company, Nucor controls a large and growing part of its supply chain from scrap recycling to raw steelmaking to steel products and distribution. Verco decking products are made using sheet steel produced by Nucor's Sheet Mill Group and other manufacturers. All of the steel produced by Nucor is 100% recyclable at the end of its useful life.

For production of the raw steel used in Verco's roof and floor deck, Nucor uses scrap as its primary feedstock, which is largely provided by its wholly-owned subsidiary, the David J. Joseph Company (DJJ). DJJ operates more than 60 scrap recycling facilities within close proximity to Nucor steel mills, processing approximately 5,000,000 tons of ferrous scrap annually and providing an abundant supply of scrap to our steel mills. Having an abundant and reliable supply of recycled scrap with close proximity not only gives Nucor's steel mills a logistical and economic advantage over their competitors, but also a carbon footprint that is a fraction of the average steel producer.

In addition to ferrous scrap, Nucor sheet mills also use direct reduced iron (DRI) produced with natural gas as a raw material input to meet more stringent quality requirements for sheet steel products. Nucor annually produces and uses up to 4.5 million tons of DRI for use by its sheet mills. By using natural gas, Nucor's two DRI plants each emit about **ONE-HALF the $CO_2$** compared to iron produced in blast furnaces at integrated steel mills.

## Product Description

Steel deck is typically manufactured by rolling or otherwise forming light gage steel coils into specific shapes. The coils are either galvanized or uncoated steel to which a coating of paint may be applied. Deck in this EPD represents product manufactured in North America.

Typical steel roof and floor deck panels are 0.04 - 0.08 meters in depth and are manufactured from 22-16 gage material. Greater depths and heavier material thicknesses are available. Floor deck panels that are used only as forms are typically shallower and are manufactured from lighter gage material.

Steel deck products are defined by the following standards.

- **ANSI/SDI RD-2017 Standard for Steel Roof Deck**
- **ANSI/SDI NC-2017 Standard for Non-Composite Steel Floor Deck**
- **ANSI/SDI C-2017 Standard for Composite Steel Floor Deck-Slabs**

The United Nations Standard Products and Service Code (UNSPSC) and the Construction Specifications Institute (CSI) / Constructions Specifications Canadian (CSC) classification identified for steel deck products are:

- CSI MasterFormat Code: 05 31 00 Steel Decking
- UNSPSC Code: 30191805 Structural deck plate

## Product Composition

Steel is an alloy of iron containing small amounts of carbon, manganese, silicon, phosphorus, sulfur, oxygen, and trace alloys. These alloying elements improve the chemical and physical properties of steel, such as strength, ductility, durability, and corrosion resistance. There are many different grades of steel with many different physical, chemical, and environmental properties. Composition data for the studied product can be found in the table below. Various grades of steel will contain different combinations of these elements and/or trace materials. Exact specifications may be found by calling the division and asking for a specifications sheet.

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**Table 1. Composition Data for Steel Product**[1]

| NAME | VALUE | UNIT |
|---|---|---|
| Aluminum | 0-3.0 | % by mass |
| Copper | <3.5 | % by mass |
| Chromium | 0.01-12.5 | % by mass |
| Manganese | <12.5 | % by mass |
| Molybdenum | <1.1 | % by mass |
| Nickel | 0.01-3.0 | % by mass |
| Iron | Balance | % by mass |

## Product Average

The 2021 production data used in this EPD considers steel deck produced by Nucor during the year. The products are manufactured at three locations in the US. Results are weighted according to production totals at all locations. Facility-specific global warming potential results are provided in a separate table.

## Application

Steel deck products are used as structural supports for building applications.

## Declaration of Methodological Framework

The scope of the EPD is cradle-to-gate, including raw material extraction and processing, upstream transportation, and product manufacture (Modules A1, A2, and A3).

## Technical Requirement

Technical data for the studied product can be found in the table below.

[1] https://vulcraft.com/files/SDS/SDS-deck%2012.21.2015.pdf
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**Table 2. Technical data for steel product**

| NAME | VALUE | UNIT |
|---|---|---|
| Density | 7,800 | $kg/m^3$ |
| Melting point | 1425-1450 | °C |
| Electrical conductivity at 20°C | NA | % of IAC[8] |
| Thermal conductivity | NA | W/(m-K) |
| Coefficient of thermal expansion | NA | m/m-°C |
| Modulus of elasticity | NA | $N/mm^2$ |
| Shear modulus | NA | $N/mm^2$ |
| Specific heat capacity | NA | J/kg-°C |
| Hardness, Brinell Number | 80-100 | HB |
| Yield strength | 250-550 | $N/mm^2$ |
| Ultimate tensile strength | 410-655 | $N/mm^2$ |
| Breaking elongation | 13-20 | % |
| Chemical composition | Varies by ASTM Specification/Grade | % by mass |

## Properties of Declared Product as Delivered

Steel deck can be fabricated (i.e., cut or otherwise modified) by a fabricator or shipped directly to a job site or end user.

## Material Composition

Steel deck products are manufactured entirely from carbon steel; with a small amount of galvanized coating or paint applied. They do not contain any materials or substances for which there exists a route to exposure that leads to humans or flora/fauna in the environment being exposed to said materials or substances at levels exceeding safe health thresholds. The products do not contain any hazardous substances according to the Resource Conservation and Recovery Act (RCRA), Subtitle 3. The products do not release dangerous substances to the environment, including indoor air emissions, gamma or ionizing radiation, or chemicals released to air or leached to water and soil.

## Manufacturing

Verco manufactures steel deck from cold-rolled and hot-rolled galvanized coil, the major inputs; with a small amount of paint applied as a coating. Some process materials are needed, such as various surface cleaners. Energy is also needed to form the steel into a pattern of parallel ribs and to move the materials in the manufacturing facility. Metal scrap generated during manufacturing is recycled externally.

The life cycle phases included in this study are illustrated in Figure 1.

Verco facilities source the primary raw material, steel coils, from Nucor steel mills and external steel providers. Coils sourced from Nucor steel mills are produced using EAF technology while coil sourced from external providers may use BF technology. Within this EPD, the results of Verco products made from EAF-based coils and BF-based coils are separated to more accurately represent the impact of raw material procurement for the Verco products. EAF-based coils and BF-based coils are expected to have different impacts from raw material extraction and processing (Module A1) and transport to the manufacturer (Module A2),

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but the impacts of downstream processes are not expected to vary with different steelmaking technologies.

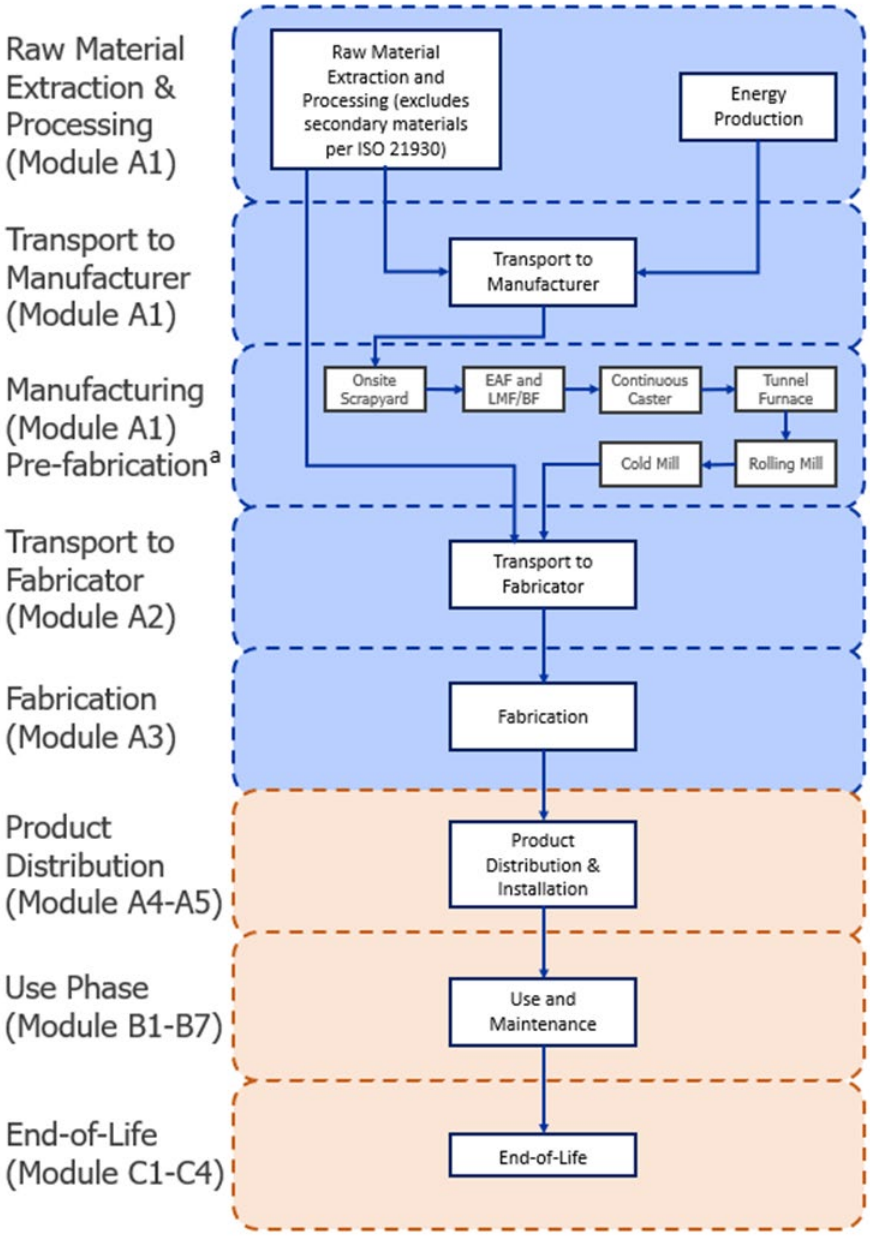


**Figure 1: Flow chart for product system**

a. All facilities source cold mill (galvanized) coil. Verco facilities source BF-derived and EAF-derived coil.

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## Packaging

Packaging at the Verco facilities falls below the cut-off criteria and therefore it is not included in the LCA for this EPD.

# 2. LCA CALCULATION RULES

## Declared Unit

The declared unit is 1 metric ton of fabricated steel product.

## System Boundary

Per the PCR, this cradle-to-gate analysis provides information on the Product Stage of the steel product life cycle, including modules A1, A2, and A3. Product delivery, installation and use, and product disposal (modules A4 – A5, B1 – B7, C1 – C4, and D) have not been included.

| PRODUCT STAGE | | | CONSTRUCTION PROCESS STAGE | | USE STAGE | | | | | | | END OF LIFE STAGE | | | | BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARY |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 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 |
| **A1** | **A2** | **A3** | **A4** | **A5** | **B1** | **B2** | **B3** | **B4** | **B5** | **B6** | **B7** | **C1** | **C2** | **C3** | **C4** | **D** |
| X | X | X | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND |

X = Module declared
MND = Module not declared

## Cut-off Rules

According to the PCR, processes contributing greater than 1% of the total environmental impact indicator for each impact are included in the inventory. In cases where no matching life cycle inventories were available to represent a flow, proxy data were applied based on conservative assumptions regarding environmental impacts. No data gaps were allowed which were expected to significantly affect the outcome of the indicator results. No other known flows are deliberately excluded from this EPD.

The mass input of each omitted stream is less than 1% of the total mass input streams into the system and the cumulative mass input of all omitted streams is less than 5% of the total mass input streams. Therefore, no data gaps were allowed which were expected to significantly affect the outcome of the indicator results.

## Data Sources

The LCA model was created using LCA for Experts, version 10.7.0.183, developed by Sphera. Background life cycle inventory data for raw materials and processes were obtained from the LCA for Experts 2023.1 databases. Primary manufacturing data and fabrication data were provided by Nucor.

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## Data Quality

A variety of tests and checks were performed by the LCA practitioner throughout the project to ensure high quality of the completed LCA. Checks included an extensive review of project-specific LCA models as well as the background data used.

Production data has been collected by Nucor directly from the production sites and are average values for the year 2021 (12 consecutive months of averaged data as required for manufacturer specific data sets). The data has been measured and verified internally. The data is assumed to be the most relevant according to current conditions and production practices. Based on availability of data, natural gas and electricity usage for the operation of administrative offices was included in the system boundary for some facilities.

Time-related coverage, geographical coverage, technological coverage, precision, completeness, representativeness, consistency, reproducibility, sources of data, and uncertainty have each been analyzed as part of this LCA. All inputs and data sources meet the requirements set forth in the PCR and there is no reason to believe that any of the employed material, data, or inputs are not representative of the product under study.

## Geographical Coverage

Primary data represents production in the United States at the following Nucor facilities:

- Verco – Phoenix, AZ
- Verco – Fontana, CA
- Verco – Antioch, CA

Regionally specific datasets, where available, were used to represent each manufacturing location's energy consumption. Proxy datasets were used as needed for raw material inputs to address lack of data for a specific material or for a specific geographical region. These proxy datasets were chosen for their technological representativeness of the actual materials.

## Period under Review

Primary data collected represent production during the 2021 calendar year. This analysis is intended to represent production in 2021.

## Allocation

Per ISO 21930 and the PCR, this is an attributional LCA and as such, no allocation using system expansion was performed. Allocation of background data (energy and materials) taken from the Managed LCA Content (formerly known as GaBi databases) is documented online at https://sphera.com/life-cycle-assessment-lca-database/. No multi-output allocation was required in the foreground system of the study.

## Estimates and Assumptions

The underlying study was conducted in accordance with the PCR. While this EPD has been developed by industry experts to best represent the product system, real life environmental impacts of fabricated steel products may extend beyond those defined in this document.

All of the raw materials and energy inputs have been modeled using processes and flows that closely follow actual production data on raw materials and processes. All of the reported material and energy flows have been accounted for.

Raw Material procurement and upstream transport to Verco facilities is included for all raw materials above the cut-off thresholds. For each raw material, a representative dataset was selected to represent the geographic region of origin. Distances by truck and rail were estimated using Google Maps. Distances by ship were estimated using sea-distances.org.[2] In some cases, the Verco facilities sourced a single raw material from multiple distributors, in which case the transport from every distributor was modeled. Only travel to the facility is accounted for (i.e., return truck and rail trips are considered out of scope).

[2] https://sea-distances.org/

[1]

# 3. LCA RESULTS

North American life cycle impact assessment (LCIA) results are declared using TRACI 2.1 methodology, with the exception of GWP. GWP 100 is reported using the IPCC 2013 (AR5) methodology. LCIA results are relative expressions and do not predict actual impacts, the exceeding of thresholds, safety margins or risks. LCIA results are presented for EAF-based coils and BF-based coils separately.

The six impact categories reported in the LCIA tables below 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 3. EAF-based LCIA results, per 1 metric ton of fabricated product [a]**

| PARAMETER | UNIT | A1 | A2 | A3 | TOTAL |
|---|---|---|---|---|---|
| GWP 100 | kg $CO_2$ eq. | 1.72E+03 | 4.17E+01 | 3.28E+01 | 1.80E+03 |
| ODP | kg CFC 11 eq. | 5.16E-07 | 3.88E-12 | 4.40E-11 | 5.16E-07 |
| AP | kg $SO_2$ eq. | 6.35E+00 | 1.31E-01 | 1.53E-01 | 6.64E+00 |
| EP | kg N eq. | 3.01E-01 | 1.02E-02 | 3.48E-03 | 3.15E-01 |
| SFP | kg $O_3$ eq. | 1.07E+02 | 3.81E+00 | 8.59E-01 | 1.11E+02 |
| $ADP_{FOSSIL}$ | MJ surplus | 1.99E+03 | 5.66E+01 | 4.33E+01 | 2.09E+03 |

b. Results represent a production-weighted average of the three Verco facilities.

**Table 4. BF-based LCIA results, per 1 metric ton of fabricated product [a]**

| PARAMETER | UNIT | A1 | A2 | A3 | TOTAL |
|---|---|---|---|---|---|
| GWP 100 | kg $CO_2$ eq. | 2.18E+03 | 1.17E+01 | 2.15E+01 | 2.22E+03 |
| ODP | kg CFC 11 eq. | 5.34E-13 | 1.54E-13 | 4.28E-11 | 4.35E-11 |
| AP | kg $SO_2$ eq. | 3.85E+00 | 3.40E-02 | 1.08E-01 | 3.99E+00 |
| EP | kg N eq. | 1.63E-01 | 3.41E-03 | 2.33E-03 | 1.69E-01 |
| SFP | kg $O_3$ eq. | 5.90E+01 | 8.05E-01 | 6.79E-01 | 6.05E+01 |
| $ADP_{FOSSIL}$ | MJ surplus | 5.36E+02 | 2.12E+01 | 2.96E+01 | 5.87E+02 |

a. Results represent a production-weighted average of the three Verco facilities.

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**Table 5. EAF-based resource use results, per 1 metric ton of fabricated product [a,b]**

| PARAMETER | UNIT | A1 | A2 | A3 | TOTAL |
|---|---|---|---|---|---|
| $RPR_E$ | MJ LHV | 1.08E+03 | 1.42E+02 | 5.57E+01 | 1.28E+03 |
| $RPR_M$ | MJ LHV | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| $NRPR_E$ | MJ LHV | 2.33E+04 | 7.05E+02 | 4.08E+02 | 2.44E+04 |
| $NRPR_M$ | MJ LHV | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| SM | kg | 6.99E+02 | 0.00E+00 | 0.00E+00 | 6.99E+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 | $m^3$ | 3.92E+01 | 2.37E-01 | 1.19E-01 | 3.96E+01 |

a. Lower calorific values (LHV) of fuels are used for energy parameters.
b. Results represent a production-weighted average of the three Verco facilities.

**Table 6. BF-based resource use results, per 1 metric ton of fabricated product [a,b]**

| PARAMETER | UNIT | A1 | A2 | A3 | TOTAL |
|---|---|---|---|---|---|
| $RPR_E$ | MJ LHV | 2.97E+02 | 1.05E+01 | 8.19E+01 | 3.90E+02 |
| $RPR_M$ | MJ LHV | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| $NRPR_E$ | MJ LHV | 2.19E+04 | 1.69E+02 | 2.83E+02 | 2.23E+04 |
| $NRPR_M$ | MJ LHV | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| SM | kg | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 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 | $m^3$ | 5.41E+00 | 2.77E-02 | 7.42E-02 | 5.51E+00 |

a. Lower calorific values (LHV) of fuels are used for energy parameters.
b. Results represent a production-weighted average of the three Verco facilities.

**Table 7. EAF-based output flows and waste categories results, per 1 metric ton of fabricated product [a,b]**

| PARAMETER | UNIT | A1 | A2 | A3 | Total |
|---|---|---|---|---|---|
| HWD | kg | 1.22E+00 | -1.62E-08 | 1.06E-08 | 1.22E+00 |
| NHWD | kg | 3.10E+01 | 1.47E-01 | 2.96E-01 | 3.15E+01 |
| HLRW | kg | 5.38E-05 | 6.86E-05 | 1.53E-05 | 1.38E-04 |
| ILLRW | kg | 4.66E-02 | 5.73E-02 | 1.28E-02 | 1.17E-01 |
| CRU | kg | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| MR | kg | 1.73E+01 | 0.00E+00 | 9.99E+00 | 2.73E+01 |
| MER | kg | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| EE | MJ LHV | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |

a. Lower calorific values (LHV) of fuels are used for energy parameters.
b. Results represent a production-weighted average of the three Verco facilities.

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**Table 8. BF-based output flows and waste categories results, per 1 metric ton of fabricated product [a,b]**

| PARAMETER | UNIT | A1 | A2 | A3 | Total |
|---|---|---|---|---|---|
| HWD | kg | 1.60E-06 | -1.12E-10 | 1.37E-08 | 1.61E-06 |
| NHWD | kg | 9.69E+01 | 1.75E-02 | 1.30E-01 | 9.70E+01 |
| HLRW | kg | 1.26E-06 | 2.74E-06 | 1.58E-05 | 1.98E-05 |
| ILLRW | kg | 1.22E-03 | 2.30E-03 | 1.32E-02 | 1.67E-02 |
| CRU | kg | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| MR | kg | 0.00E+00 | 0.00E+00 | 7.99E+00 | 7.99E+00 |
| MER | kg | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| EE | MJ LHV | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |

a. Lower calorific values (LHV) of fuels are used for energy parameters.
b. Results represent a production-weighted average of the three Verco facilities.

Any comparison of EPDs shall be subject to the requirements of ISO 21930. Environmental impact results shall be converted to a functional unit basis before any comparison is attempted. 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 have a higher impact, at least in some impact categories.

To align with the PCR, “product specific EPDs which include averaging shall report the range of results for all IPCC 2013 (AR5) and TRACI indicators for products included in the average.” Averaging across manufacturing facilities was used in this EPD, so Table 8 (EAF-based coils) and Table 9 (BF-based coils) report the range of results for the six impact categories included in Table 2 and Table 3, respectively.

**Table 9. EAF-based LCIA results, variation per 1 metric ton of fabricated product [a]**

| PARAMETER | UNIT | A1 (MIN) | A1 (MAX) | A2 (MIN) | A2 (MAX) | A3 (MIN) | A3 (MIN) | TOTAL (MIN) | TOTAL (MAX) |
|---|---|---|---|---|---|---|---|---|---|
| GWP 100 | kg $CO_2$ eq. | 1.72E+03 | 1.74E+03 | 3.58E+01 | 5.38E+01 | 2.77E+00 | 4.11E+01 | 1.79E+03 | 1.81E+03 |
| ODP | kg CFC 11 eq. | 5.14E-07 | 5.23E-07 | 3.31E-12 | 5.02E-12 | 3.24E-11 | 4.85E-11 | 5.14E-07 | 5.23E-07 |
| AP | kg $SO_2$ eq. | 6.34E+00 | 6.40E+00 | 1.13E-01 | 1.69E-01 | 1.56E-02 | 1.83E-01 | 6.56E+00 | 6.66E+00 |
| EP | kg N eq. | 3.00E-01 | 3.05E-01 | 8.78E-03 | 1.31E-02 | 8.22E-04 | 4.40E-03 | 3.13E-01 | 3.18E-01 |
| SFP | kg $O_3$ eq. | 1.06E+02 | 1.08E+02 | 3.27E+00 | 4.91E+00 | 3.61E-01 | 9.88E-01 | 1.11E+02 | 1.13E+02 |
| $ADP_{FOSSIL}$ | MJ surplus | 1.98E+03 | 2.01E+03 | 4.87E+01 | 7.28E+01 | 6.65E+00 | 5.34E+01 | 2.08E+03 | 2.10E+03 |

a. Results compared based on 1 metric ton of fabricated product produced by each facility.

**Table 10. BF-based LCIA results, variation per 1 metric ton of fabricated product [a]**

| PARAMETER | UNIT | A1 (MIN) | A1 (MAX) | A2 (MIN) | A2 (MAX) | A3 (MIN) | A3 (MIN) | TOTAL (MIN) | TOTAL (MAX) |
|---|---|---|---|---|---|---|---|---|---|
| GWP 100 | kg $CO_2$ eq. | 2.17E+03 | 2.20E+03 | 7.59E+00 | 2.18E+01 | 2.77E+00 | 4.11E+01 | 2.21E+03 | 2.23E+03 |
| ODP | kg CFC 11 eq. | 4.90E-13 | 5.61E-13 | 1.96E-14 | 6.70E-13 | 3.29E-11 | 4.83E-11 | 3.34E-11 | 4.89E-11 |
| AP | kg $SO_2$ eq. | 3.85E+00 | 3.86E+00 | 2.12E-02 | 6.44E-02 | 1.57E-02 | 1.84E-01 | 3.90E+00 | 4.09E+00 |
| EP | kg N eq. | 1.62E-01 | 1.65E-01 | 2.22E-03 | 6.11E-03 | 8.31E-04 | 4.40E-03 | 1.68E-01 | 1.73E-01 |
| SFP | kg $O_3$ eq. | 5.86E+01 | 5.95E+01 | 4.84E-01 | 1.60E+00 | 3.66E-01 | 9.90E-01 | 6.04E+01 | 6.12E+01 |
| $ADP_{FOSSIL}$ | MJ surplus | 5.31E+02 | 5.39E+02 | 1.41E+01 | 3.71E+01 | 6.67E+00 | 5.34E+01 | 5.60E+02 | 6.22E+02 |

a. Results compared based on 1 metric ton of fabricated product produced by each facility.

# 4. LCA INTERPRETATION

To facilitate a more detailed understanding of the contributions from different mills and fabrication processes, an analysis is included in this section which details the contribution from Modules A1, A2, and A3. The results in Figure 3 and Figure 4 are shown below for steel roof and floor deck sourced from EAF-based coils and BF-based coils to facilitate a better understanding of which categories contribute most to which impacts.

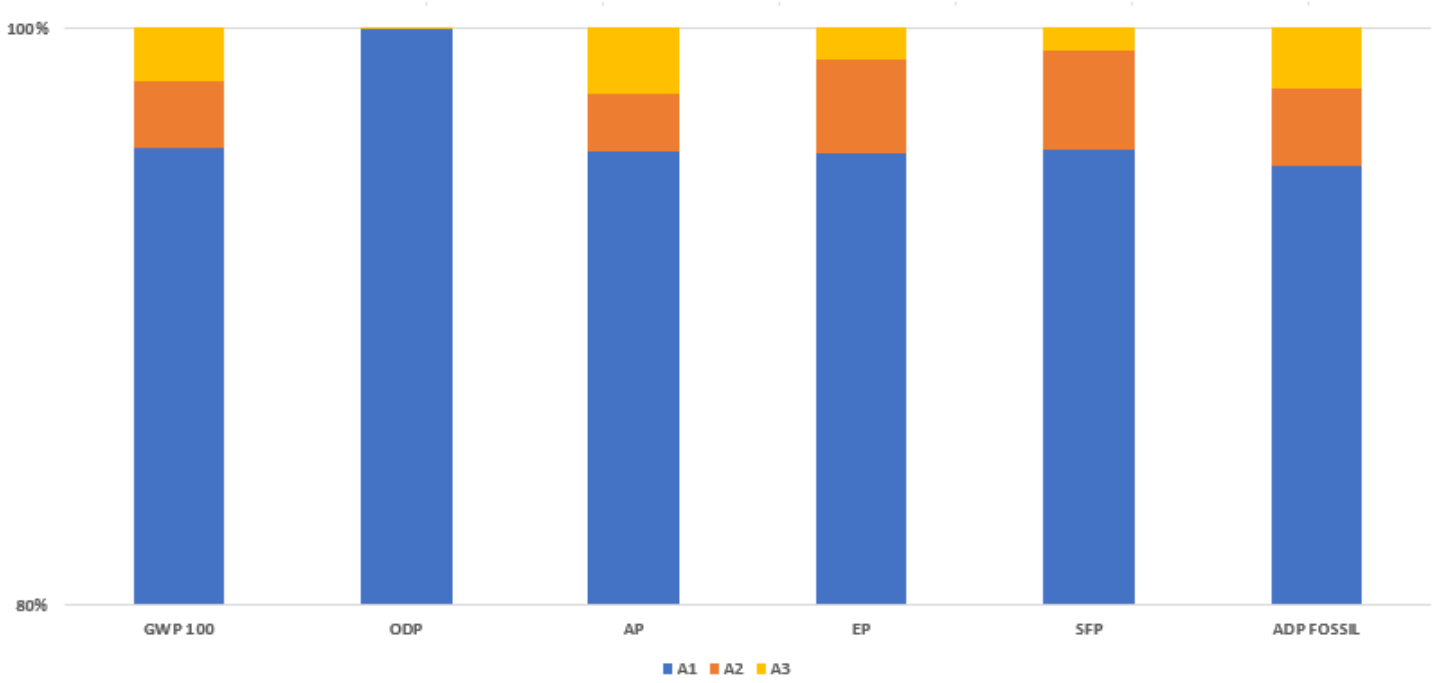


**Figure 3: EAF-based relative contributions by module, IPCC 2013 (AR5) + TRACI 2.1 impact categories**

Overall, Module A1, i.e., manufacturing of EAF-based steel coil products, which includes purchased electricity generation, on-site natural gas, diesel, gasoline, and LPG combustion, and facility emissions, is the key contributor to all potential environmental impacts, including global warming potential, ozone depletion potential, acidification potential, smog formation potential, and abiotic resource depletion potential of fossil energy resources. Module A3, i.e., fabrication, contributes more significantly to eutrophication potential and smog formation potential, but is not the most significant contributor to any impact category. Module A2, i.e., transport to fabricator, is not the most significant contributor in any impact category.

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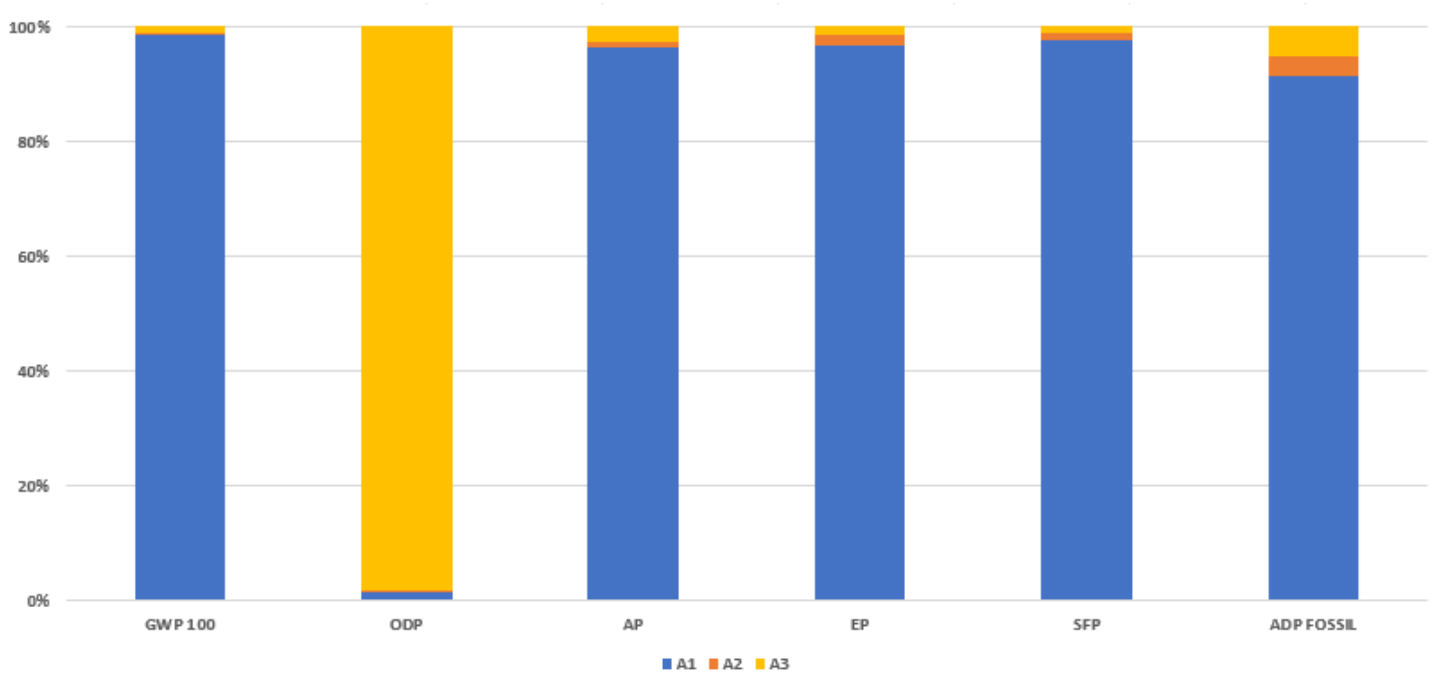


**Figure 4: BF-based relative contributions by module, IPCC 2013 (AR5) + TRACI 2.1 impact categories**

Module A1, i.e., manufacturing of BF-based steel coil products, which includes purchased electricity generation, on-site natural gas, diesel, gasoline, and LPG combustion, and facility emissions, is the key contributor to all potential environmental impacts, excluding ozone depletion potential. Module A3, i.e., fabrication, is the key contributor to ozone depletion potential. Module A2, i.e., transport to fabricator, is not the most significant contributor in any impact category.

## Facility-Specific GWP 100 Results

Verco steel deck products are manufactured at three different facilities. The results presented in the LCA Results section above represent a production-weighted average of these facilities. To understand how the GWP may vary between sites, facility-specific GWP 100 results are presented below, per metric ton. Table 10 represents results for EAF-based coils, and Table 11 represents results for BF-based coils.

**Table 11. EAF-based facility-specific GWP 100 results, per 1 metric ton of fabricated product**

| GWP 100 (kg $CO_2$ eq.) | A1 | A2 | A3 | TOTAL |
|---|---|---|---|---|
| Phoenix, AZ | 1715.56 | 35.81 | 41.09 | 1792.47 |
| Fontana, CA | 1744.35 | 43.59 | 2.77 | 1790.71 |
| Antioch, CA | 1727.42 | 53.75 | 24.69 | 1805.87 |

**Table 12. BF-based facility-specific GWP 100 results, per 1 metric ton of fabricated product**

| GWP 100 (kg $CO_2$ eq.) | A1 | A2 | A3 | TOTAL |
|---|---|---|---|---|
| Phoenix, AZ | 2166.42 | 21.78 | 41.09 | 2229.29 |
| Fontana, CA | 2203.09 | 7.59 | 2.77 | 2213.45 |
| Antioch, CA | 2181.36 | 10.18 | 24.69 | 2216.23 |

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# 5. ADDITIONAL ENVIRONMENTAL INFORMATION

## Health and Safety

**Health:** Refer to the Verco Steel Deck SDS[3] for additional environmental and health protection during the product manufacturing process.

**Safety:** Since 2005, Nucor has partnered with the Occupational Safety and Health Administration (OSHA) through its Voluntary Protection Program (VPP), which recognizes companies that voluntarily go the extra mile to meet rigorous safety standards. The Voluntary Protection Program (VPP) recognizes employers and workers in private industry and federal agencies who have implemented effective safety and health management systems and maintain injury and illness rates below national Bureau of Labor Statistics averages for their respective industries. An important aspect of VPP is the Special Government Employee (SGE) Program, which allows industry employees to work alongside OSHA and of which approximately 640 Nucor employees are active participants as of September 2018. Verco Phoenix is recognized by VPP.

Four Nucor divisions employ the American National Standards Institute (ANSI) Z-10 Occupational Health and Safety Management System. And four others participate in the OSHA Series (OSHAS) 45001 Divisions. ANSI Z-10 is audited to best practices and in safety and health. OHSAS 45001 is an international safety and health system that provides a framework to promote better safety and health systems.

Lastly, Nucor has been awarded the President's Safety Award (PSA) since 1998 for divisions that record Injury and Illness and DART (Days Away, Restricted or Transferred) rates below 2/3 the national average for comparable facilities. High-performing divisions that are VPP-certified are given CEO Recognition. Verco Decking, Inc. has been awarded the PSA.

## Environmental Activities and Certifications

**ISO 14001:2015 Environmental Management System:** The environmental performance of Verco's steel mills focuses on continuous improvement through internal and external training, application of new technologies and how data and results are communicated. To provide a framework for Nucor teammates to follow, Nucor utilizes ISO 14001, which is the international standard that establishes specific requirements for an effective environmental management system (EMS). Verco Decking, Inc. is certified to ISO 14001.

**Sustainability:** Through recycling, Nucor has made the United States the cleanest place in the world to make steel. We are producing sustainable steel that will build our modern 21st century economy. For more than 50 years, Nucor has been making steel using an electric arc furnace (EAF) that melts recycled scrap and turns it into new steel. EAFs are far less energy intensive and more energy efficient than traditional blast furnace steel making. Electric arc furnaces allow Nucor to produce less emissions than competitors who often make steel by melting iron ore and coking coal.

By recycling scrap in EAFs, Nucor's energy intensity (average gigajoules per metric ton of steel produced) is 74% lower than the global average, and its greenhouse gas intensity (metric tons $CO_2$ per ton of steel produced) is less than one-fourth the global average, and nearly one-fifth of the average integrated (BF/BOF) steel producer. Today, Nucor's greenhouse gas emissions intensity is less than one-third of the Paris Climate Agreement's most aggressive 2030 target for the global steel sector, an increase of less than 2 degrees Celsius compared to pre-industrial levels.

Today, Nucor accounts for more than 25% of the United States' steel production, but only accounts for 8% of the domestic steel industry's greenhouse gas emissions. However, Nucor realizes that being one of America's cleanest and most efficient steelmakers is not enough. That is why Nucor is committing to a 35% combined reduction in its steel mill Scope 1 and Scope 2 greenhouse gas intensity by 2030, measured against a 2015 baseline. This goal will take Nucor's steel mill $CO_2$ emissions down to 77% less than 2020's global steelmaking average, and 82% less than today's integrated steelmaking average. Beyond 2030,

[3] https://nuesteelapi-p.nucor.com/api/getFileAttachment?fileId=3625

[1]

Nucor is committed to further reducing its greenhouse emissions to a goal of net zero emission steel at scale.

Nucor also recently launched its Econiq™ product line, which is the world's first net-zero steel available at scale. Econiq is not a single product; it is a net-zero certification, which can be applied to any product from Nucor's steel mills by balancing the $CO_2$ produced by our activities by an equivalent amount being removed. We achieve net-zero on Econiq products by eliminating all remaining Scope 2 emissions (by using 100% renewable energy certificates) and by offsetting all Scope 1 emissions (through the purchase of carbon offsets). Nucor shipped its first Econiq steel to a commercial customer in January 2022.

**Recycled Materials Content:** Nucor proudly uses recycled scrap to make high-quality steel with low emissions, using one of the cleanest and most energy efficient steel-making processes available. Steel can be infinitely recycled and reused without any quality loss. Nationwide, in 2022 Nucor steel products were made from an average of 77.3% recycled content, with some products containing almost 100% recycled content[4].

Globally, only 26.3% of the more than 2 billion net tons of steel produced in 2020 was made by recycling scrap in EAFs – and EAFs only accounted 9.2% of the 1.17 billion net tons of steel made in China. Scrap inputs for the total crude steel production globally have remained at around 35% since 2013.

**Waste and Water Recycling:** Nucor's EAFs, including the ones that produced coils used at its deck facilities, emit less than 1% of the particulate matter of a traditional steel blast furnace – and the company recycles 99% of the EAF dust it collects in its baghouses. Nucor also recognizes that water is a critical natural resource and is essential to our business and the communities in which it operates. Nucor has worked extensively to improve water use efficiency in its processes. Currently there are no Nucor steel mill divisions located in a High or Extremely High Water Stress Area.

Nucor also participates in the Network for Business Innovation and Sustainability (NBIS) By-Product Synergy Group. This NBIS group brings together environmental experts from a wide variety of industries to allow them to compare waste streams and find ways to divert materials from landfills.

**Environmental Training:** In 2015, Nucor established Nucor Environmental University (NEU), an online training platform for Nucor teammates with environmental responsibilities and others looking to expand their involvement with the environmental team. From the beginning, Nucor designed this program to help teammates develop a thorough and meaningful understanding of environmental compliance.

NEU has had over 1,000 active users since its inception in 2015, and Nucor teammates have completed nearly 10,000 environmental training courses, passed over 6,600 training exams, and helped develop dozens of courses. Because of NEU, Nucor's teammates are better prepared to meet the demands of environmental compliance and achieve Nucor's goal of being a sustainable organization.

[4] 2022 Recycled Steel Content of Nucor Steel Products: https://assets.ctfassets.net/aax1cfbwhqog/7Ma2avTxQFdBEwFCITrHkC/e774129e0e550aaf4e5fe9328221366d/Recycled_Content_Letter_Steel_Products_RY2022__002_.pdf
[1]

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**Fabricated Steel Roof and Floor Deck**
Designated Steel Construction Product

**According to ISO 14025, and ISO 21930:2017**

# 7. CONTACT INFORMATION

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