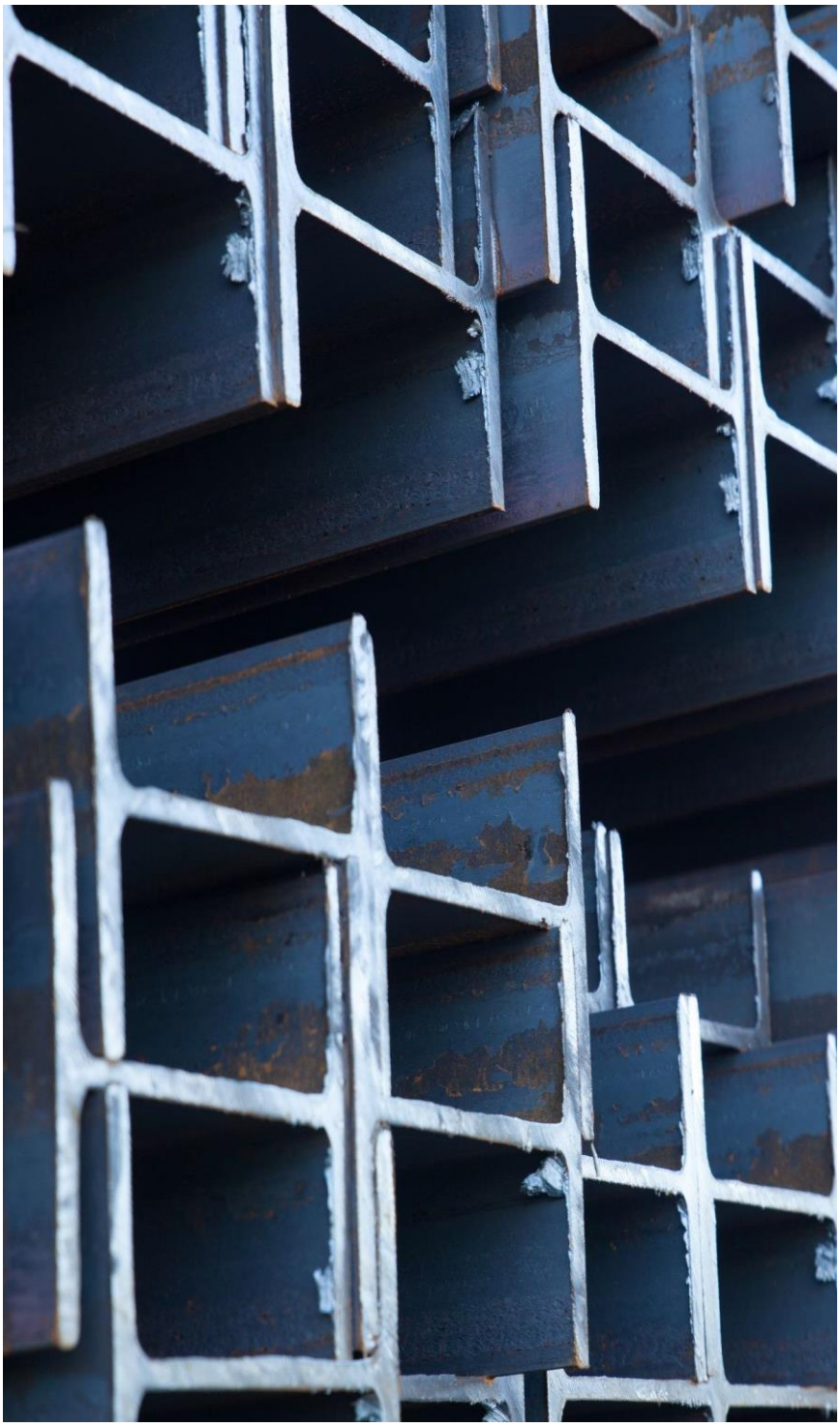
ENVIRONMENTAL PRODUCT DECLARATION

FABRICATED HOT-ROLLED STRUCTURAL STEEL SECTIONS

NUCOR CORPORATION



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NUCOR®

Nucor Corporation operates two ISO 14001-certified structural steel mills, Nucor-Yamato Steel and Nucor Steel Berkeley, that have the capacity to annually produce up to 3,250,000 tons of wide-flange steel beams, pilings and heavy structural steel products for fabricators, construction companies, manufacturers and steel service centers.

Nucor Corporation is North America's largest recycler, turning approximately 20 million net tons of scrap steel in 2019 into new steel. Nucor uses Electric Arc Furnace (EAF) technology at each of its 25 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 CO2 emissions are one-half of the global average on a per ton basis, and Nucor's energy intensity is approximately one-quarter the global average.

UL CERTIFIED ENVIRONMENTAL PRODUCT DECLARATION UL.COM/EPD

ENVIRONMENTAL PRODUCT DECLARATION

NUCOR®

Fabricated Hot-Rolled Structural Steel Sections
Designated Steel Construction Product

According to ISO 14025, EN 15804 and ISO 21930:2017

EPD PROGRAM AND PROGRAM OPERATOR NAME, ADDRESS, LOGO, AND WEBSITE	UL Environment 333 Pfingsten Road Northbrook, IL 60611	https://www.ul.com/ https://spot.ul.com
GENERAL PROGRAM INSTRUCTIONS AND VERSION NUMBER	General Program Instructions v.2.5 March 2020	
MANUFACTURER NAME AND ADDRESS	Nucor Corporation, 1915 Rexford Road, Charlotte, North Carolina 28211	
DECLARATION NUMBER	4789793365.102.1	
DECLARED PRODUCT & FUNCTIONAL UNIT OR DECLARED UNIT	Fabricated Hot-Rolled Structural Steel Sections, 1 metric ton	
REFERENCE PCR AND VERSION NUMBER	Part A: Calculation Rules for the LCA and Requirements Project Report, (IBU/UL Environment, V3.2, 12.12.2018) and Part B: Designated Steel Construction Product EPD Requirements (UL Environment, V2.0, 08.26.2020).	
DESCRIPTION OF PRODUCT APPLICATION/USE	Hot rolled structural steel sections used in construction	
PRODUCT RSL DESCRIPTION (IF APPL.)	N/A	
MARKETS OF APPLICABILITY	North America	
DATE OF ISSUE	January 1, 2021	
PERIOD OF VALIDITY	5 Year	
EPD TYPE	Product-Specific	
EPD SCOPE	Cradle to gate	
YEAR(S) OF REPORTED PRIMARY DATA	2019	
LCA SOFTWARE & VERSION NUMBER	GaBi v10	
LCI DATABASE(S) & VERSION NUMBER	GaBi 2020.2	
LCIA METHODOLOGY & VERSION NUMBER	IPCC AR5 + TRACI 2.1	

This PCR review was conducted by:	UL Environment PCR Review Panel epd@ulenvironment.com
This declaration was independently verified in accordance with ISO 14025: 2006. ☐ INTERNAL ☒ EXTERNAL	Grant R. Martin Grant R. Martin, UL Environment
This life cycle assessment was independently verified in accordance with ISO 14044 and the reference PCR by:	James Mellentine James Mellentine, Thrive ESG

LIMITATIONS

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: 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.

1. Product Definition and Information

Description of Organization

This environmental product declaration (EPD) represents recycled structural steel produced via an electric arc furnace (EAF) from Nucor-Yamato Steel in Armorel, Arkansas and Nucor Steel-Berkeley in Huger, South Carolina.

Nucor owns a controlling 51% interest in the Nucor-Yamato Steel (NYS) structural mill located in northeast Arkansas. Built in 1988, NYS employs more than 1000 teammates and has the capacity to produce over 2.3 million tons per year of wide-flange beams, H-piling, sheet piling, standard I-beams, channels and various other structural shapes. NYS is the largest structural beam mill in the Western Hemisphere. Using EAF steel recycling technology, last year NYS produced high-quality structural steel with 91.7 percent recycled content.

NYS is the only North American producer of high-strength, low-alloy beams. Common applications for the high-strength, low-alloy beams include gravity columns for high-rise buildings, long span trusses for stadiums and convention centers, and for all projects where seismic design is a critical factor.

Nucor also owns a steel beam mill in Berkeley County, South Carolina, that utilizes EAF steel recycling technology. Nucor Steel Berkeley was constructed in 1995. Considering Nucor's production capabilities and the mix of structural products generally produced and marketed, the total capacity of Nucor's two structural mills is estimated at approximately 3,250,000 tons per year.

Both NYS and Nucor Steel Berkeley use a special continuous casting method that produces a beam blank closer in shape to that of the finished beam than traditional methods. Structural steel products come in standard sizes and grades, which allows us to maintain inventory levels of these products to meet our customers' expected orders.

Product Description

Hot-rolled fabricated structural steel sections are used in building, bridge and industrial products. these products are rolled shapes such as parallel flange sections, structural angles, channels and tees that are detailed, cut, drilled, bolted, welded and otherwise processed at the fabricator to be prepared for installation.

Structural sections produced by Nucor are defined by the following ASTM standards:

- **AISC 303** - American Institute of Steel Construction "Code of Standard Practice for Steel Buildings and Bridges" Latest Edition
- **AISC 341** – American Institute of Steel Construction "Seismic Provisions for Structural Steel Buildings" Latest Edition
- **AISC 360** – American Institute of Steel Construction "Specification for Structural Steel Buildings" Latest Edition
- **ASTM** – American Society for Testing and Materials
- **AWS D1.1** - American Welding Society "Structural Welding Code – Steel" Latest Edition
- **AWS A1.5** – American Welding Society "Bridge Welding Code" Latest Edition
- **AWS D1.8** - American Welding Society "Structural Welding Code – Seismic Supplement" Latest Edition
- **AASHTO** - American Association of State Highway and Transportation Officials, LRFD Bridge Design Specifications, Customary U.S. Units, Latest Edition "

Product Average

The 2017 production data used in this EPD considers hot-rolled structural products produced by Nucor Corporation

during the year. The products are manufactured at Nucor Yamato Steel and Nucor Steel Berkeley. Results are weighted according to production totals at the both locations based on the 2017 data. Facility-specific global warming potential results are provided in a separate table.

Application

Hot-rolled fabricated structural steel sections are used various construction capacities. These products are rolled into a variety shapes such as parallel flange sections, angles, channels and tees that are detailed, cut, drilled, bolted, welded, and otherwise processed at the fabricator in order to prepare them for installation.

Technical Requirements

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

Table 1. Technical data for steel product

NAME	VALUE	UNIT
Density	7,800	kg/m^3
Melting point	1425-1540	°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

The sections can be fabricated (i.e., cut or otherwise modified) by a fabricator or shipped directly to a job site.

Material Composition

Structural steel sections are manufactured entirely from carbon steel. 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.

Manufacturing

Nucor manufactures structural sections from secondary steel (i.e., from steel scrap) via an electric arc furnace (EAF). Steel scrap is loaded into a refractory-lined vessel and melted via electric energy supplied through graphite electrodes. Oxy-fuel burners and other means of generating heat through chemical reactions are also employed. The chemistry of

the molten steel is adjusted at this stage by adding material to attain a specific alloy composition and by removing impurities, which migrate to the slag. Once the desired chemical composition is attained, the molten steel is then cast into billets for eventual processing in the rolling mill located in the same facility.

At the rolling mill, the billets are reheated in a natural gas furnace and run through rollers to shape their profile. Any steel scrap generated is recycled internally (i.e., put back into the EAF). The finished products are packaged and loaded onto trucks for distribution to fabricators or job sites.

Fabrication results are taken from the American Institute of Steel Construction (AISC) average EPD (AISC, 2016).

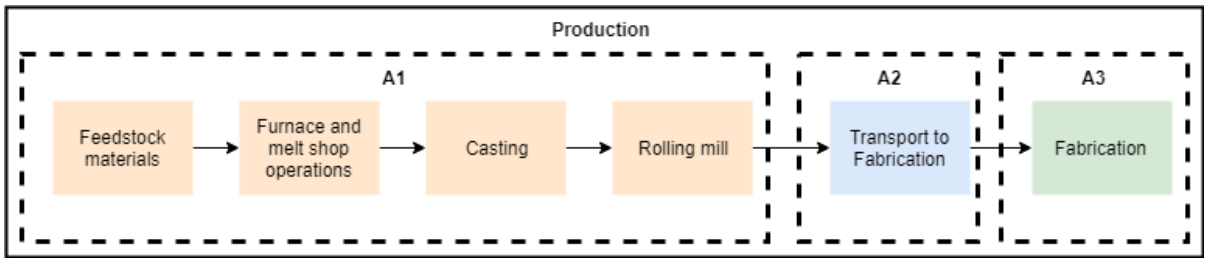

Figure 1: Flow chart for product system

Transportation

Transportation to the customer or construction site is outside the scope of this EPD.

Product Installation

Installation is outside the scope of this EPD.

Use

Product use is outside the scope of this EPD.

Reuse, Recycling, and Energy Recovery

Product reuse, recycling, and incineration for energy recovery is outside the scope of this EPD

Disposal

Product disposal is outside the scope of this EPD.

2. LCA Calculation Rules

Declared Unit

The declared unit is 1 metric ton of fabricated steel product. An alternative declared unit of 1 short ton is also presented.

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 STAGE			CONSTRUCT-ION 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

Cut-off Rules

No cut-off criteria are defined for this study. The system boundary was defined based on relevance to the goals of the study. For the processes within the system boundary, all available energy and material flow data have been included in the model. In cases where no matching life cycle inventories are available to represent a flow, proxy data have been applied based on conservative assumptions regarding environmental impacts

Data Sources

The LCA model was created using the GaBi Software system for life cycle engineering, version 10, developed by Sphera (Sphera, 2020). Background life cycle inventory data for raw materials and processes were obtained from the GaBi 2020.2 database. Primary manufacturing data were provided by Nucor.

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.

Geographical Coverage

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

- Nucor Steel Berkeley (Huger, SC)
- Nucor-Yamato Steel (Blytheville, AR)

Fabrication is represented by average US structural sections fabrication data.

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 2017 calendar year. This analysis is intended to represent production in 2019.

Allocation

Co-products during steel mill operations are allocated using a method used developed by the World Steel Association and EUROFER (Worldsteel and EUROFER, 2014) to be in line with CEN EN 15804 (CEN, 2019). The methodology takes into account the manner in which changes in inputs and outputs affect the production of co-products. The method also takes into account material flows that carry specific inherent properties.

Mill outputs such as scale and baghouse dust are handled via system expansion in line with the Worldsteel and EUROFER methodology. Recovered materials are assumed to substitute on a 1:1 mass basis. Mill scale is substituted with iron ore and baghouse dust is substituted for zinc or iron ore, depending on its specific zinc and iron contents.

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.

Transportation distances were provided by some mills for the inbound transportation of purchased steel scrap. These distances were used to estimate scrap transport and applied to all purchased scrap, even for mills that did not provide data. Other key materials were assumed to be transported 250 miles via truck and 250 miles via rail.

3. LCA Results

North American life cycle impact assessment (LCIA) results are declared using TRACI 2.1 methodology, with the exception of GWP which uses the latest IPCC methodology (IPCC, 2014). LCIA results are relative expressions and do not predict actual impacts, the exceeding of thresholds, safety margins or risks.

Fabrication requires 1.07 metric ton of structural sections per 1 metric ton of fabricated product. A1 includes production of all 1.07 metric ton of structural sections.

Table 2. LCIA results, per 1 metric ton

PARAMETER	UNIT	A1	A2	A3	TOTAL
GWP 100	kg CO_2 eq.	1.10E+03	1.07E+01	1.10E+02	**1.22E+03**
ODP	kg CFC 11 eq.	4.67E-10	1.00E-09	3.38E-08	**3.53E-08**
AP	kg SO_2 eq.	2.80E+00	4.96E-02	2.98E-01	**3.15E+00**
EP	kg N eq.	1.32E-01	4.20E-03	1.51E-02	**1.51E-01**
SFP	kg O_3 eq.	4.49E+01	1.43E+00	2.92E+00	**4.92E+01**
ADP_{fossil}	MJ surplus	1.27E+03	1.72E+01	8.52E+01	**1.37E+03**

Table 3. LCIA results, per 1 short ton

PARAMETER	UNIT	A1	A2	A3	TOTAL
GWP 100	kg CO_2 eq.	9.96E+02	9.70E+00	9.97E+01	**1.10E+03**
ODP	kg CFC 11 eq.	4.24E-10	9.08E-10	3.07E-08	**3.20E-08**
AP	kg SO_2 eq.	2.54E+00	4.50E-02	2.70E-01	**2.86E+00**
EP	kg N eq.	1.20E-01	3.81E-03	1.37E-02	**1.37E-01**
SFP	kg O_3 eq.	4.07E+01	1.30E+00	2.65E+00	**4.47E+01**
ADP_{fossil}	MJ surplus	1.15E+03	1.56E+01	7.73E+01	**1.24E+03**

Table 4. Resource use results, per 1 metric ton

PARAMETER	UNIT	A1	A2	A3	TOTAL
RPR_E	MJ LHV	6.70E+02	4.66E-03	1.08E-01	**6.70E+02**
RPR_M	MJ LHV	0	0	0	**0**
$NRPR_E$	MJ LHV	1.52E+04	1.52E-01	1.55E+00	**1.52E+04**
$NRPR_M$	MJ LHV	0	0	0	**0**
SM	kg	7.44E+02	0	3.31E-01	**7.44E+02**
RSF	MJ LHV	0	0	0	**0**
NRSF	MJ LHV	0	0	0	**0**
RE	MJ LHV	0	0	0	**0**
FW	m^3	4.40E+00	3.61E-02	5.10E-01	**4.95E+00**

Table 5. Resource use results, per 1 short ton

PARAMETER	UNIT	A1	A2	A3	TOTAL
RPR_E	MJ LHV	6.08E+02	4.23E-03	9.76E-02	**6.08E+02**
RPR_M	MJ LHV	0	0	0	**0**
$NRPR_E$	MJ LHV	1.38E+04	1.38E-01	1.41E+00	**1.38E+04**
$NRPR_M$	MJ LHV	0	0	0	**0**
SM	kg	6.75E+02	0	3.00E-01	**6.75E+02**

Parameter	Unit	A1	A2	A3	Total
RSF	MJ LHV	0	0	0	**0**
NRSF	MJ LHV	0	0	0	**0**
RE	MJ LHV	0	0	0	**0**
FW	m^3	3.99E+00	3.28E-02	4.62E-01	**4.49E+00**

Table 6. Output flows and waste categories results, per 1 metric ton

Parameter	Unit	A1	A2	A3	Total
HWD	kg	1.21E-01	1.70E-07	1.97E-05	**1.21E-01**
NHWD	kg	7.47E-02	1.48E-02	6.81E+00	**6.90E+00**
HLRW	kg	9.16E-04	3.92E-06	1.33E-04	**1.05E-03**
ILLRW	kg	7.67E-01	3.27E-03	1.11E-01	**8.81E-01**
CRU	kg	0	0	0	**0**
MR	kg	7.77E+00	0	7.33E+01	**8.10E+01**
MER	kg	0	0	0	**0**
EE	MJ LHV	0	0	0	**0**

Table 7. Output flows and waste categories results, per 1 short ton

Parameter	Unit	A1	A2	A3	Total
HWD	kg	1.10E-01	1.54E-07	1.78E-05	**1.10E-01**
NHWD	kg	6.77E-02	1.35E-02	6.18E+00	**6.26E+00**
HLRW	kg	8.31E-04	3.56E-06	1.20E-04	**9.55E-04**
ILLRW	kg	6.96E-01	2.97E-03	1.00E-01	**7.99E-01**
CRU	kg	0	0	0	**0**
MR	kg	7.05E+00	0	6.65E+01	**7.35E+01**
MER	kg	0	0	0	**0**
EE	MJ LHV	0	0	0	**0**

4. LCA Interpretation

The below figure presents the relative contribution of the A1, A2, and A3 modules to the total. ODP results for fabrication (A3) are driving overall impact due to anomalies in the background data used in the AISC EPD.

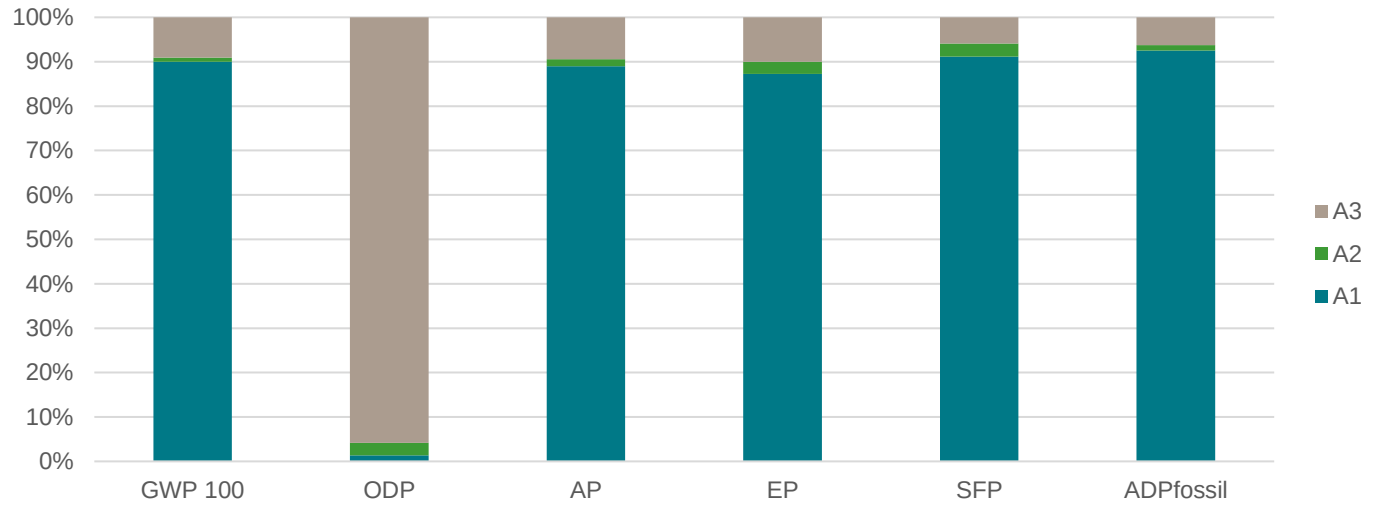

Figure 2: Relative contributions by module, IPCC AR5 + TRACI 2.1 impact categories

Within mill fabrication, the main drivers are iron/steel inputs, alloying materials, and electricity. Process emissions associated with the melt shop and rolling mill are relevant contributors to potential global warming impact and, to a lesser extent, acidification, eutrophication, and smog formation impact. Natural gas is a significant driver for ADP, fossil impacts. ODP impacts are driven by aluminum used as an alloying material. This is likely due to the use of Aluminum Association background data, which was deemed the most representative for all North American aluminum production.

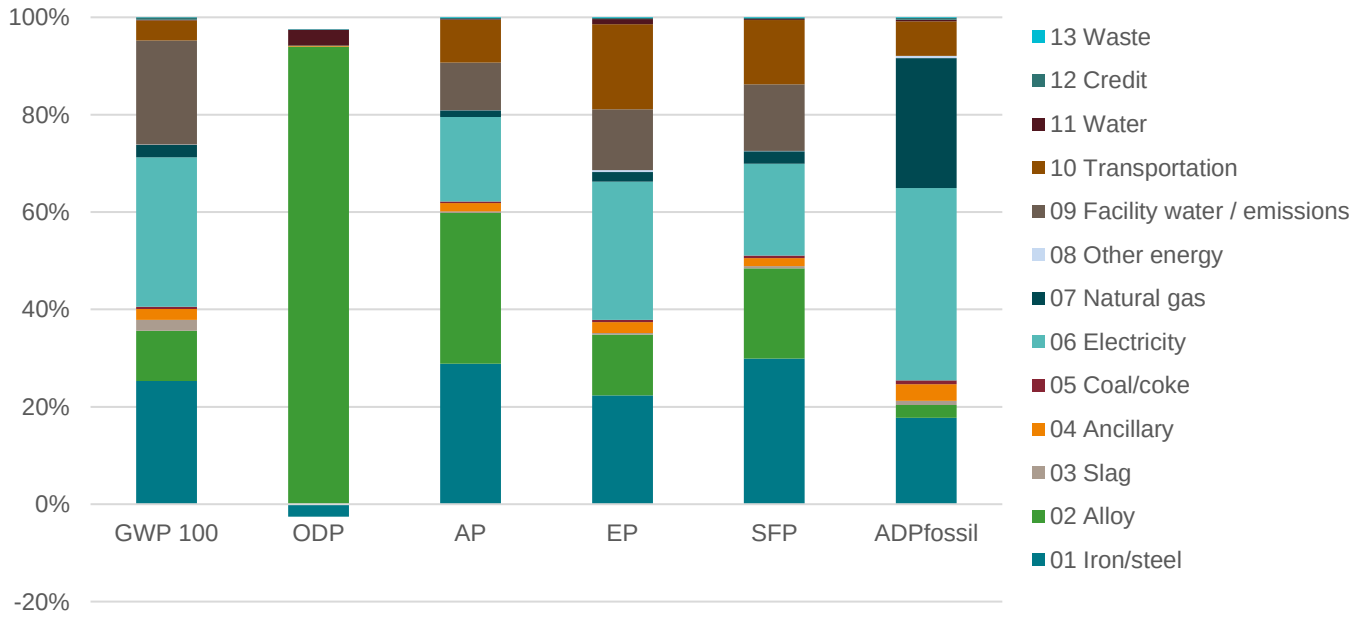

Figure 3: Relative contributions for module A1, IPCC AR5 + TRACI 2.1 impact categories

Facility-Specific GWP100 Results

Nucor hot-rolled structural product may be shipped from one of two different mills. The results presented previously represent a production-weighted average of these facilities. To understand how the GWP may vary between sites, facility-specific GWP100 results are presented below, per metric ton. As mill products may be shipped to any number of fabricators, the US average AISC fabricator data was used for both sites and therefore does not change. Results are also presented for beam at the mill level, which excludes impacts from the additional material requirements associated with the scrap generated during fabrication.

Table 8: Facility-specific GWP100 results, per 1 metric ton

GWP [kg CO2 eq.]	A1	A2	A3	Total	Cradle-to-Gate, Mill Product
Nucor Steel Berkeley	1.71E+03	1.07E+01	1.10E+02	**1.83E+03**	**1.60E+03**
Nucor Yamato Steel	8.75E+02	1.07E+01	1.10E+02	**9.96E+02**	**8.16E+02**

Table 9: Facility-specific GWP100 results, per 1 short ton

GWP [kg CO2 eq.]	A1	A2	A3	Total	Cradle-to-Gate, Mill Product
Nucor Steel Berkeley	1.55E+03	9.70E+00	9.97E+01	**1.66E+03**	**1.45E+03**
Nucor Yamato Steel	7.94E+02	9.70E+00	9.97E+01	**9.04E+02**	**7.40E+02**

5. Additional Environmental Information

Environment and Health During Manufacturing

Refer to the Nucor Beam SDS[1] for additional environmental and health protection during the product manufacturing process. Be sure to follow all recommended handling and product manufacturing guidance.

Environmental Activities and Certifications

ISO 14001: The environmental performance of Nucor's structural steel mills on continuous improvement through internal and external training, application of new technologies and how we communicate data and results. 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). We are proud to announce that Nucor's structural steel facilities have achieved ISO 14001:2015 certification.

Waste and Water Recycling: Nucor's EAFs, including the ones at its structural steel mills, emit less than 1% of the particulate matter of a traditional steel blast furnace – and the company recycles 99 percent of the EAF dust its 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 we operate. We have worked extensively to improve water use effciency in our processes. One hundred percent of the process water from our steelmaking operations is recycled multiple times at our structural

[1] https://assets.ctfassets.net/aax1cfbwhqog/UcLHwfmcRVoyrpxb15vZl/c73a00f2a213af726e2ef74584c79517/SDS-Bar_Steel.pdf

steel mills. Currently there are no Nucor steel mill divisions located in a High or Extremely High Water Stress Area.

Nucor-Yamato Steel (NYS) Acitivities: NYS teammates received the Arkansas Recycling Coalition's 2019 Community Involvement Award, which honors those that have "proven to be positive community role models by routinely researching and utilizing source reduction, landfill diversion and recycling as the primary solid waste management approach." Secondly, these businesses have "visibly promoted recycling and sustainability within the community or region in which its facility is located."

NYS has made significant contributions to advance waste reduction, recycling and sustainability in Arkansas, including:

• Armorel School recycling presentation and donation of classroom recycling containers (May 2018)

• Armorel School (K-12) recycling trailer (August 2018 and ongoing)

• Manilla School (K-12) recycling trailer (March 2019 and ongoing)

• Blytheville Relay for Life event recycling trailer (June 2018)

• Blytheville Chili Cook-Off recycling trailer (October 2018)

• Roy Pearson St. Jude Golf Tournament recycling trailer (October 2018)

• Blytheville Mayfest recycling trailer (May 2018)

• Holiday recycling (December 2018)

• Arbor Day presentation and tree giveaway (March 2019)

• Sending collected recycling to Abilities Unlimited in Blytheville, Arkansas (since 2007)

Nucor Steel Berkeley Acitivities: Nucor Steel Berkeley was constructed on 8000 acres on the Cooper River outside of Charleston, South Carolina. Of the 8000 acres, Nucor utilized 3000 acres for mill operations, and donated the remaining 5000 acres of environmentally and historically significant real property through a conservation easement to the Lord Berkeley Conservation Trust ("LBCT"). This property includes a large quantity of wetlands. As holder of the conservation easement, LBCT will be able to enforce the development and use restrictions contained in the easement in perpetuity. By granting the conservation easement, Nucor furthered its goal of being an environmentally friendly and responsible member of the Berkeley County community, and for its efforts, Nucor was awarded the Environmental Merit Award from South Carolina Soil & Water Conservation Society.

Like NYS, Nucor Steel Berkeley maintains a strong community presence, engaging in various outreach opportunities to improve the community in which we live and work. Every year, the Berkeley County Chamber of Commerce in South Carolina presents Transcend Awards, recognizing businesses that are making vital contributions to the county. In 2018, the Chamber named Nucor Steel Berkeley winner of the 2018 Industry Transcend Award, which recognizes a manufacturer that has risen above and beyond the ordinary contributions of a business in the community for the good of the entire region. The Chamber highlighted Nucor's teammates' dedication and described Nucor as a company heavily involved in local non-profits for the under-served, dedicated to the future success of the county's children, and a contributor to a clean and safe environment.

In terms of safety, Nucor Steel Berkeley has also attained Voluntary Protection Program (VPP) certification from OSHA, which is OSHA's highest level of recognition and demonstrates our commitment to leading the industry by example.

6. References

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7. Contact Information

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