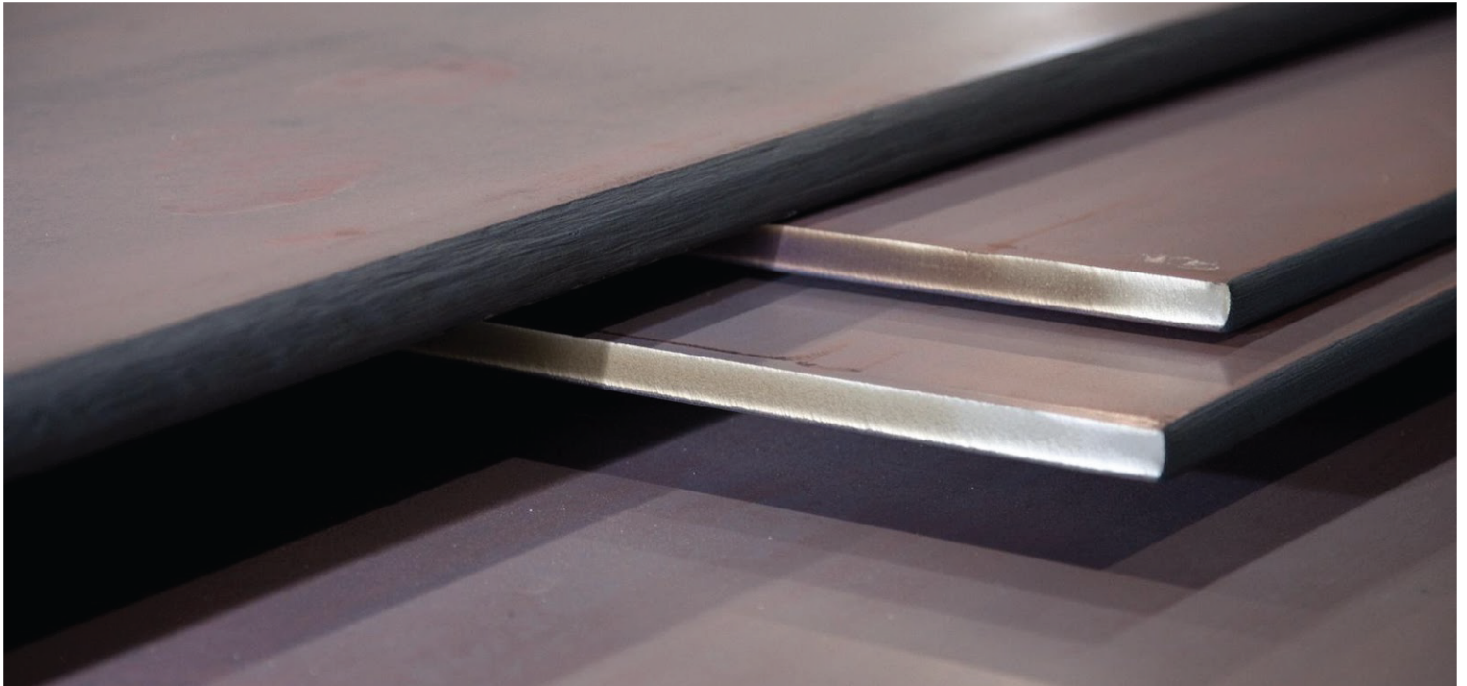


ENVIRONMENTAL PRODUCT DECLARATION

STEEL PLATE

In accordance with ISO 14025 and ISO 21930:2017
NUCOR CORPORATION



NUCOR®

NUCOR STEEL TUSCALOOSA, INC.

Nucor Steel Tuscaloosa offers a wide range of gauges, widths, lengths, and grades that are customized to meet each individual customer's precise specifications. Steel plates are flat-rolled to their final thickness by rolling at high temperatures on a hot-rolling mill. Hot-rolled plate steel can then either be packaged and transported off site for distribution or be further processed at an off-site fabricator. For use in the construction market, the steel plates are detailed, cut, drilled, bolted, welded and otherwise processed at the fabricator to be prepared for installation. The steel plate in this EPD represents product manufactured in North America..

Nucor 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 all 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 energy intensity is 74% lower than the global average, and its greenhouse gas intensity is less than one-third the global average, and nearly one-fifth of the average integrated (BF/BOF) steel producer.





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General Information

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Product Name:	Steel Plate
Declared Unit:	1 metric ton
Declaration Number:	SmartEPD-2024-045-0207-01.1
Date of Issue:	December 04, 2024
Expiration:	December 04, 2029
Last updated:	December 11, 2024
EPD Scope:	Cradle to gate A1 - A3
Market(s) of Applicability:	North America

Reference Standards

Standard(s):	ISO 14025 and ISO 21930:2017
Core PCR:	UL Part A PCR for Building-Related Products and Services v.4 Date of issue: March 01, 2022
Sub-category PCR:	UL Part B: Designated Steel Construction Products Date of issue: December 31, 2020 Valid until: December 31, 2025
Sub-category PCR review panel:	Contact Smart EPD for more information.
General Program Instructions:	Smart EPD General Program Instructions v.1.0, November 2022

Verification Information

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Verification:

Independent critical review of the LCA and data, according to ISO 14044 and ISO 14071: External

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Independent external verification of EPD, according to ISO 14025 and reference PCR(s): External

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Limitations, Liability, and Ownership

Environmental declarations from different programs (ISO 14025) may not be comparable. Comparison of the environmental performance of products using EPD information shall be based on the product's use and impacts at the building level, and therefore EPDs may not be used for comparability purposes when not considering the whole building life cycle. EPD comparability is only possible 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. 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. The EPD owner has sole ownership, liability, and responsibility for the EPD.

Organization Information

This environmental product declaration (EPD) represents unfabricated construction grade steel plate products produced by Nucor's facility located in Tuscaloosa, Alabama. The overall recycled content of Nucor Steel plate 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. All of the steel produced by Nucor is 100% recyclable at the end of its useful life.

For production of the construction grade steel plate at Nucor Steel Tuscaloosa, 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 Steel Tuscaloosa also uses direct reduced iron (DRI) produced with natural gas as a raw material input to meet more stringent quality requirements for plate steel products. Nucor annually produces and uses up to 4.5 million tons of DRI for use by its steel mills. By using natural gas, Nucor's two DRI plants each emit about ONE-HALF the CO₂ compared to iron produced in blast furnaces at integrated steel mills.

Further information can be found at: nucor.com

Product Description

Nucor Steel Tuscaloosa offers a wide range of gauges, widths, lengths, and grades that are customized to meet each individual customer's precise specifications. Steel plates are flat-rolled to their final thickness by rolling at high temperatures on a hot-rolling mill. Hot-rolled plate steel can then either be packaged and transported off site for distribution or be further processed at an off-site fabricator. For use in the construction market, the steel plates are detailed, cut, drilled, bolted, welded and otherwise processed at the fabricator to be prepared for installation. The steel plate in this EPD represents product manufactured in North America.

Further information can be found at: nucor.com

Product Information

Declared Unit:	1 metric ton
Mass:	1000 kg
Product Specificity:	✓ Product Average ✗ Product Specific

Plants



Nucor Steel Tuscaloosa
1700 Holt Road Northeast, Tuscaloosa, AL, USA

Product Specifications

Product Classification Codes:	UNSPSC - 30102204
	Masterformat - 05 12 00
	EC3 - Steel -> StructuralSteel -> PlateSteel

Material Composition

Material/Component Category	Origin	% Mass
Steel Scrap	None	79
Alloying Elements	None	2
Direct Reduced Iron	None	19

Hazardous Materials

No regulated hazardous or dangerous substances are included in this product.



EPD Data Specificity

Primary Data Year: 2023

Manufacturing Specificity:

- ✗ Industry Average
- ✗ Manufacturer Average
- ✓ Facility Specific

Averaging:

Averaging was not conducted for this EPD.

Software and LCI Data Sources

LCA Software: Pathways v. 1.0

LCI Foreground Database(s):

LCI Background Database(s): Ecoinvent v. 3.10 | US LCI v. FY21.Q3.01

Renewable Electricity

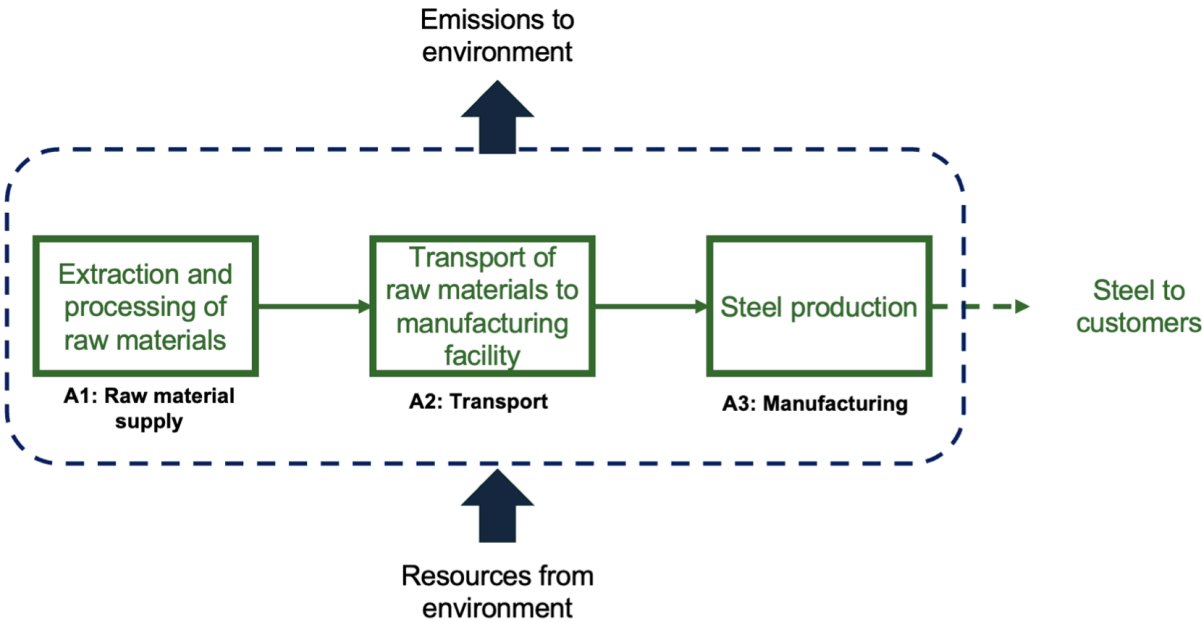
Energy Attribute Certificates (EACs) such as Renewable Energy Certificates (RECs) or Power Purchase Agreements (PPAs) are included in the baseline reported results: ✗ No

System Boundary

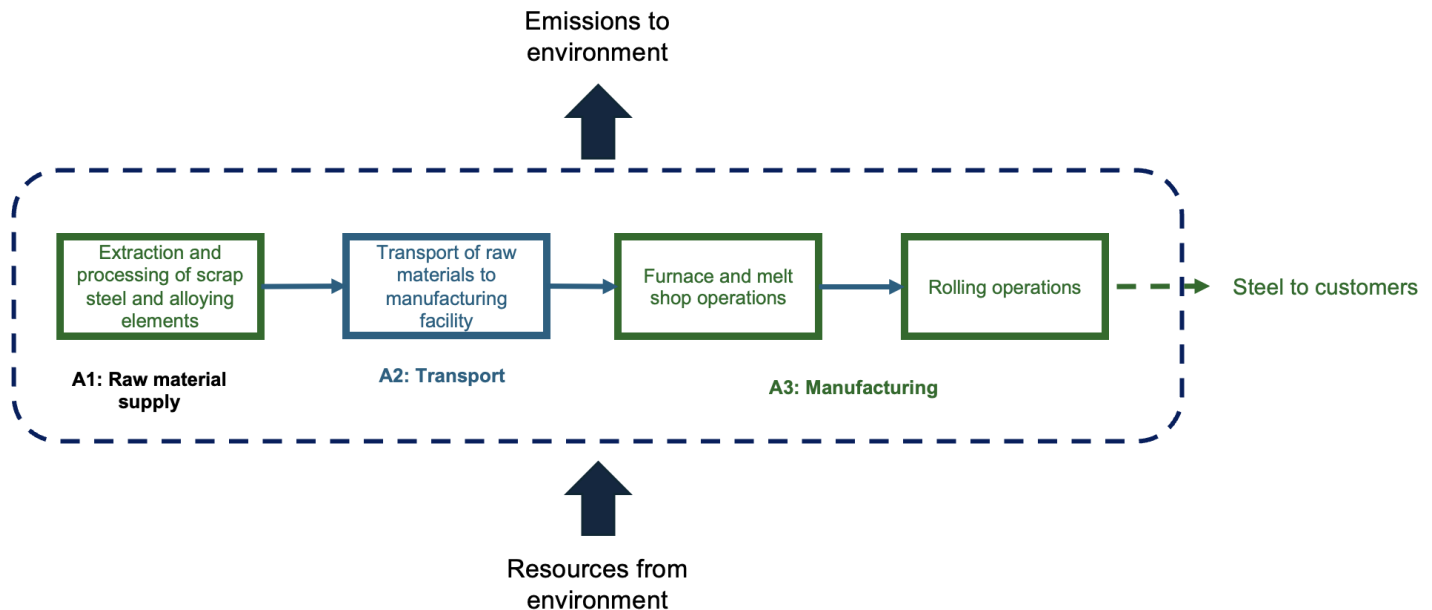
Production	A1	Raw material supply	✓
	A2	Transport	✓
	A3	Manufacturing	✓
Construction	A4	Transport to site	ND
	A5	Assembly / Install	ND
Use	B1	Use	ND
	B2	Maintenance	ND
	B3	Repair	ND
	B4	Replacement	ND
	B5	Refurbishment	ND
	B6	Operational Energy Use	ND
	B7	Operational Water Use	ND

End of Life	C1	Deconstruction	ND
	C2	Transport	ND
	C3	Waste Processing	ND
	C4	Disposal	ND
Benefits & Loads Beyond System Boundary	D	Recycling, Reuse Recovery Potential	ND

System Boundary Diagram



Product Flow Diagram



Life Cycle Module Descriptions

Nucor Steel Tuscaloosa employs Electric Arc Furnace (EAF) technology to manufacture steel using recycled scrap metal or scrap substitutes. These materials arrive by rail, truck, or barge and are meticulously inspected and sorted into designated piles within the on-site scrapyard. From there, the scrap or substitutes are transported by trucks to the scrap buckets in the melt shop.

An overhead charging crane lifts the scrap buckets and empties them into the top of the EAFs. Once the EAFs are loaded with scrap, a powerful electric current is applied through large electrodes made of graphite or other high-carbon materials to melt the raw materials. Additional raw materials are introduced to facilitate the melting process. When optimal melting conditions are achieved, ladles are positioned at the tapping side of the EAFs, the furnaces are turned off, and the molten steel is poured into the ladles. These ladles then carry the molten steel to a ladle metallurgy furnace (LMF), which ensures a more uniform mixture. Various metal alloys may be added to achieve the desired composition and steel grade of the final product.

The molten steel is subsequently moved to casters, where it begins to cool and solidify into slabs. These slabs are reheated and processed through the rolling mill, emerging as steel plates. Any metal scrap generated during manufacturing is recycled internally.

Finally, the steel is transported by rail or truck from Nucor's plate facilities to a diverse range of customers, including downstream fabrication facilities.

LCA Discussion

Allocation Procedure

Since steel manufacturing generates slag as a co-product, an allocation method was applied. This method, developed by the World Steel Association and EUROFER, takes into account how changes in inputs and outputs impact the production of co-products and material flows with specific inherent properties. It aligns with the Product Category Rules (PCR) and ISO 21930. No allocation was defined for end-of-life, as treatment at this stage falls outside the system boundary.

In the steelmaking process, slag is considered a co-product. Slag is allocated using the method developed by the World Steel Association and EUROFER (World Steel Association, 2014). The methodology accounts for the manner in which changes in inputs and outputs affect the production of co-products as well as material flows that carry specific inherent properties. This approach is consistent with the PCR, ISO 21930, and EN 15804 as it is based on underlying relationships and acknowledges the stoichiometry of the reactions occurring. The approach provides an accurate repartition of environmental impacts that are related to producing hot metal and slag. The allocation method divides the existing steel LCI between the single main and co-products, with no extension or splitting of the system. This methodology is not fully conformant with ISO 21930 due to the use of system expansion, however, the system expansion allocation to co-products has minimal impact on the results.

Cut-off Procedure

No cut-off criteria were defined for this analysis. All available energy and material flow data were included in accordance with the system boundary. Proxy data were used as needed in the model to capture all considered life cycle impacts. No known flows should be deliberately excluded.

Data Quality Discussion

The key requirement for data quality is that data be as accurate and representative as possible. The requirements are based on the ISO 14040:2006 and ISO 14044:2006 standard. To fulfill these requirements and to ensure reliable results, primary data in combination with representative, secondary literature, and consistent background life cycle inventory (LCI) information from ecoinvent version 3.8 (Wernet, et al., 2016) and other sources were used

Results

Environmental Impact Assessment Results

IPCC AR5 GWP 100, TRACI 2.1, CML 2016

per 1 metric ton of product .

LCIA results are relative expressions and do not predict impacts on category endpoints, the exceeding of thresholds, safety margins or risks.

Impact Category	Method	Unit	A1	A2	A3	A1A2A3
GWP-total	IPCC AR5 GWP 100	kg CO2 eq	3.71e+2	2.35e+1	5.56e+2	9.51e+2
ODP	TRACI 2.1	kg CFC 11 eq	4.38e-6	2.23e-7	6.69e-6	1.13e-5
AP	TRACI 2.1	kg SO2 eq	1.84e+0	2.74e-1	1.04e+0	3.15e+0
EP	TRACI 2.1	kg N eq	1.44e+0	3.90e-2	2.42e+0	3.90e+0
POCP	TRACI 2.1	kg O3 eq	2.48e+1	7.22e+0	1.78e+1	4.98e+1
ADP-fossil	CML 2016	MJ	2.08e+3	8.29e+1	7.12e+3	9.28e+3

Note:

Not all abbreviated indicators listed below may be present in the results above. The inclusion of indicators varies based on PCR requirements.

Abbreviations:

GWP = Global Warming Potential, 100 years (may also be denoted as GWP-total, GWP-fossil (fossil fuels), GWP-biogenic (biogenic sources), GWP-luluc (land use and land use change)), ODP = Ozone Depletion Potential, AP = Acidification Potential, EP = Eutrophication Potential, SFP = Smog Formation Potential, POCP = Photochemical oxidant creation potential, ADP-Fossil = Abiotic depletion potential for fossil resources, ADP-Minerals&Metals = Abiotic depletion potential for non-fossil resources, WDP = Water deprivation potential, PM = Particulate Matter Emissions, IRP = Ionizing radiation, human health, ETP-fw = Eco-toxicity (freshwater), HTP-c = Human toxicity (cancer), HTP-nc = Human toxicity (non-cancer), SQP = Soil quality index.

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 or EN 15804. EPDs are not comparative assertions and are either not comparable or have limited comparability when they have different system boundaries. 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.

Resource Use Indicators

per 1 metric ton of product .

Indicator	Unit	A1	A2	A3	A1A2A3
RPRE	MJ, LHV	2.17e+2	7.00e-1	6.39e+1	2.82e+2
RPRM	MJ, LHV	0	0	0	0
NRPRE	MJ, LHV	2.21e-3	8.29e+1	3.32e+3	3.40e+3
NRPRM	MJ, LHV	8.77e+1	0	3.96e+2	4.84e+2
SM	kg	1.62e+0	4.09e-2	9.58e-1	2.62e+0
RSF	MJ, LHV	0	0	0	0
NRSF	MJ, LHV	0	0	0	0
FW	m3	6.49e+0	1.00e-2	1.38e+0	7.88e+0

Note:
Not all abbreviated indicators listed below may be present in the results above. The inclusion of indicators varies based on PCR requirements.

Abbreviations:
RPRE or PERE = Renewable primary resources used as energy carrier (fuel), RPRM or PERM = Renewable primary resources with energy content used as material, RPRT or PERT = Total use of renewable primary resources with energy content, NRPRE or PENRE = Non-renewable primary resources used as an energy carrier (fuel), NRPRM or PENRM = Non-renewable primary resources with energy content used as material, NRPRM or PENRM = Total non-renewable primary resources with energy content, SM = Secondary materials, RSF = Renewable secondary fuels, NRSF = Non-renewable secondary fuels, RE = Recovered energy, ADPF = Abiotic depletion potential, FW = Use of net freshwater resources, VOCs = Volatile Organic Compounds.

Waste and Output Flow Indicators

per 1 metric ton of product .

Indicator	Unit	A1	A2	A3	A1A2A3
HWD	kg	6.63e+1	1.18e-1	8.11e+1	1.48e+2
NHWD	kg	1.24e+3	1.69e+0	2.05e-3	1.24e+3
HLRW	kg	4.56e-4	3.07e-6	2.87e-4	7.46e-4
ILLRW	kg	9.62e-4	7.37e-6	6.36e-4	1.61e-3
CRU	kg	0	0	0	0
MFR	kg	-1.69e+2	8.80e-3	1.59e+0	-1.67e+2
MER	kg	2.92e-4	2.18e-6	1.09e-4	4.03e-4
EE	MJ, LHV	0	0	0	0

Note:
Not all abbreviated indicators listed below may be present in the results above. The inclusion of indicators varies based on PCR requirements.

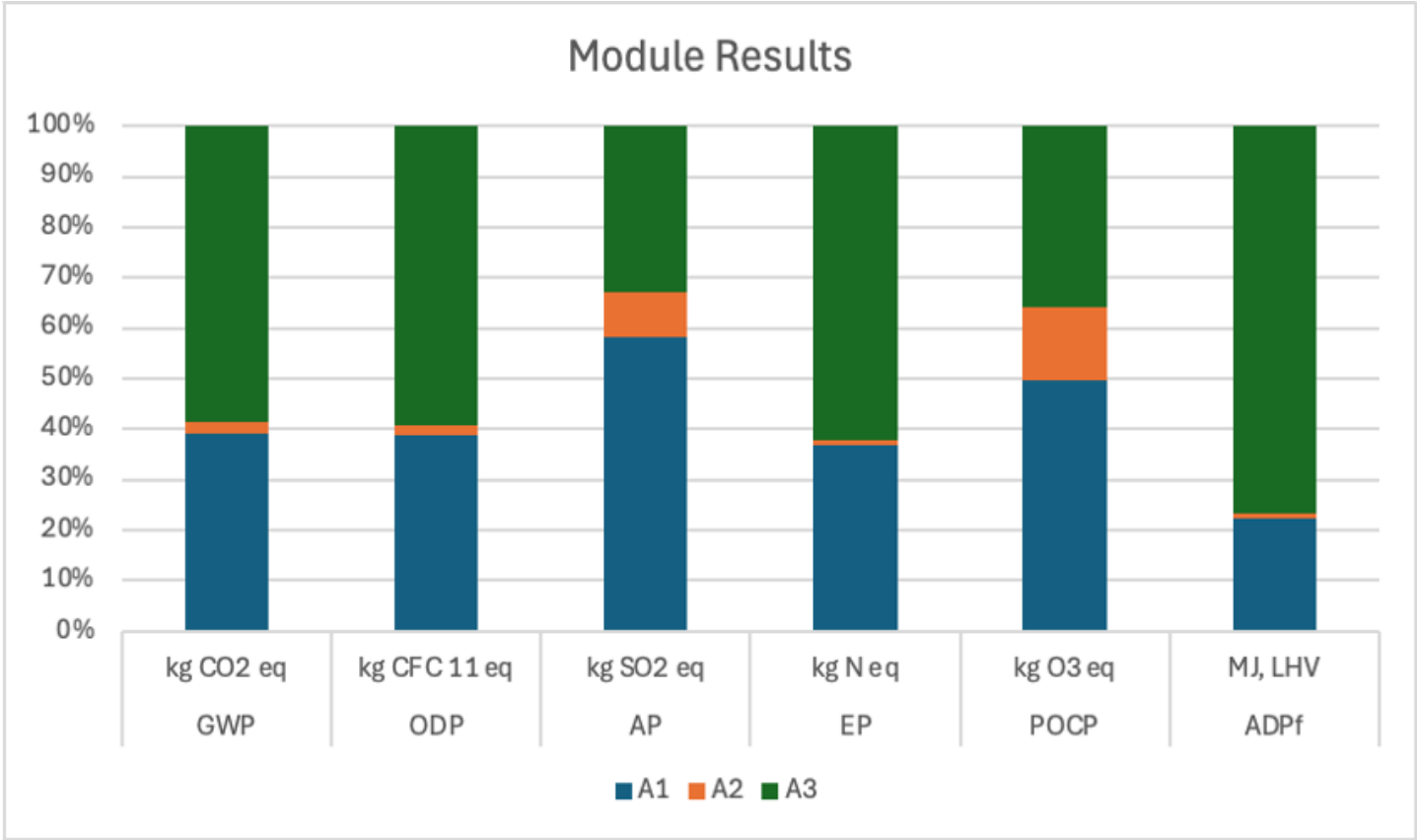
Abbreviations:
HWD = Hazardous waste disposed, NHWD = Non-hazardous waste disposed, RWD = Radioactive waste disposed, HLRW = High-level radioactive waste, ILLRW = Intermediate- and low-level radioactive waste, CRU = Components for re-use, MFR or MR = Materials for recycling, MER = Materials for energy recovery, MNER = Materials for incineration, no energy recovery, EE or EEE = Recovered energy exported from the product system, EET = Exported thermal energy.

Interpretation

The results of the LCA indicate that Module A3 is the largest contributor to Nucor’s product footprint across impact categories. Module A1 is also a significant contributor. Impacts of Module A3 include electricity, fuel consumption (gasoline, diesel, and propane), as well as process materials. Impacts of Module A1 include the steel scrap and alloying elements, with alloying elements being the highest contributor to impacts. Module A2 contains inbound transport of the steel to the facility and is a small contributor to the product footprint.

Assumptions include allocation of process materials, energy use, process gasses, and packaging from whole facility to Nucor’s products. This has a minimal effect as the variation in the input amounts would affect the inbound transportation impacts, but the steel enters the facility burden free. Assumptions around inbound transport distances for certain materials will have minimal effect. Distances were approximated using approximate supplier locations and GPS mapping. Transport is not a major contributor to the result. The analysis also only includes products made only at Nucor’s Tuscaloosa facility and is only applicable to products manufactured at the Tuscaloosa, Alabama, United States facility.

The study timeframe is for the year 2023 for Nucor manufacturing at their Tuscaloosa, Alabama, United States manufacturing facility. This study does not include comparisons or benchmarking. Environmental declarations from different programs based upon different PCRs may not be comparable.



Additional Environmental Information

Nucor does not participate in any third-party environmental activities and certification programs.

Further Information

Further information on the product can be found at nucor.com
The background LCA report is available, upon request.

References

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