Declaration Owner

BlueScope Buildings North America, Inc.
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Product:

Steel Secondary Framing

Declared Unit

The declared unit is one metric ton of steel secondary framing produced across six BlueScope Buildings North America, Inc. facilities

EPD Number and Period of Validity

SCS-EPD-10178
EPD Valid June 6, 2024 through June 5, 2029

Product Category Rule

PCR Guidance for Version 4.0. UL Environment. March 2022.

PCR Guidance for Building-Related Products and Services. Part B: Designated Steel Construction Product EPD Requirements. UL Environment. August 2020.

Program Operator

SCS Global Services
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Declaration owner:	BlueScope Buildings North America, Inc.
Address:	1540 Genessee St, Kansas City, MO 64102, USA
Declaration Number:	SCS-EPD-10178
Declaration Validity Period:	EPD Valid June 6, 2024 through June 5, 2029
Program Operator:	SCS Global Services
Declaration URL Link:	https://www.scsglobalservices.com/certified-green-products-guide
LCA Practitioner:	Tess Garvey, Ph.D., SCS Global Services
LCA Software and LCI database:	OpenLCA 2.0 software and the Ecoinvent v3.9.1 database
Product's Intended Application:	Secondary framing is used in the construction of roof and wall secondary structures
Product RSL:	n/a
Markets of Applicability:	Global
EPD Type:	Product-Specific
EPD Scope:	Cradle-to-Gate
LCIA Method and Version:	IPCC AR5 and TRACI 2.1
Independent critical review of the LCA and data, according to ISO 14044 and ISO 14071	☐ internal ☒ external
LCA Reviewer:	Lindita Bushi, Ph.D., Athena Sustainable Materials Institute
Part A Product Category Rule:	PCR Guidance for Building-Related Products and Services Part A: Life Cycle Assessment Calculation Rules and Report Requirements. Version 4.0. UL Environment. March 2022.
Part A PCR Review conducted by:	Lindita Bushi, PhD (Chair); Hugues Imbeault-Tétreault, ing., M.Sc.A.; Jack Geibig
Part B Product Category Rule:	PCR Guidance for Building-Related Products and Services. Part B: Designated Steel Construction Product EPD Requirements. UL Environment. August 2020.
Part B PCR Review conducted by:	Thomas Gloria, PhD; Brandie Sebastian, James Littlefield
Independent verification of the declaration and data, according to ISO 21930:2017, UL Part A and ISO 14025:2006	☐ internal ☒ external
EPD Verifier:	Lindita Bushi, Ph.D., Athena Sustainable Materials Institute
Declaration Contents:	

Disclaimers: *This EPD conforms to ISO 14025, 14040, 14044, and ISO 21930.*

Scope of Results Reported: *The PCR requirements limit the scope of the LCA metrics such that the results exclude environmental and social performance benchmarks and thresholds, and exclude impacts from the depletion of natural resources, land use ecological impacts, ocean impacts related to greenhouse gas emissions, risks from hazardous wastes and impacts linked to hazardous chemical emissions.*

Accuracy of Results: *Due to PCR constraints, this EPD provides estimations of potential impacts that are inherently limited in terms of accuracy.*

Comparability: *The PCR this EPD was based on was not written to support comparative assertions. EPDs based on different PCRs, or different calculation models, may not be comparable. When attempting to compare EPDs or life cycle impacts of products from different companies, the user should be aware of the uncertainty in the final results, due to and not limited to, the practitioner's assumptions, the source of the data used in the study, and the specifics of the product modeled.*

In accordance with ISO 21930:2017, EPDs are comparable only if they comply with the core PCR, use the same sub-category PCR where applicable, include all relevant information modules and are based on equivalent scenarios with respect to the context of construction works.

1. BlueScope Buildings North America, Inc.

BlueScope Buildings North America, Inc. ("BBNA") is a business unit of BlueScope Steel Ltd. and an international steel solutions company with global presence. Operating in North America with more than 2,000 employees - BlueScope Buildings North America, Inc. is the leader in customized and fully-engineered steel buildings solutions. Headquartered in Kansas City, Missouri, BlueScope Buildings North America, Inc. is backed by notable brands and seven manufacturing facilities.

2. Products

2.1 PRODUCT DESCRIPTION

This EPD is for secondary framing manufactured by BBNA across six facilities, including Annville, PA, Evansville, WI, Jackson, TN, Rainsville, AL, St. Joseph, MO, and Visalia, CA. The sizes produced generally are customized and specific to the project, ranging from 8-12 in (20.3-30.5 cm) depth and 20-40 ft (6.1-12.2m) span.

Acrylic-coated galvanized C/Z structural members are cold formed to serve as support for metal roof and wall panels. Steel "cee" and "zee" shaped purlins are used in the roof to span the distance between the primary rigid framed rafters in order to support the metal roof panels (standing seam roof or through fastened roof). Steel cee and zee shaped girts used on the walls to span the distance between the primary rigid framed columns in order to support the metal wall panels (or other wall cladding materials). In addition, cold formed steel components are used for endwall framing and posts for doors and windows. These elements are pre-punched following pre-engineered design. Once they are finished, they will be transported to the jobsite.

2.2 PRODUCT FLOW DIAGRAM

A flow diagram illustrating the production processes and life cycle phases included in the scope of the EPD is provided below.

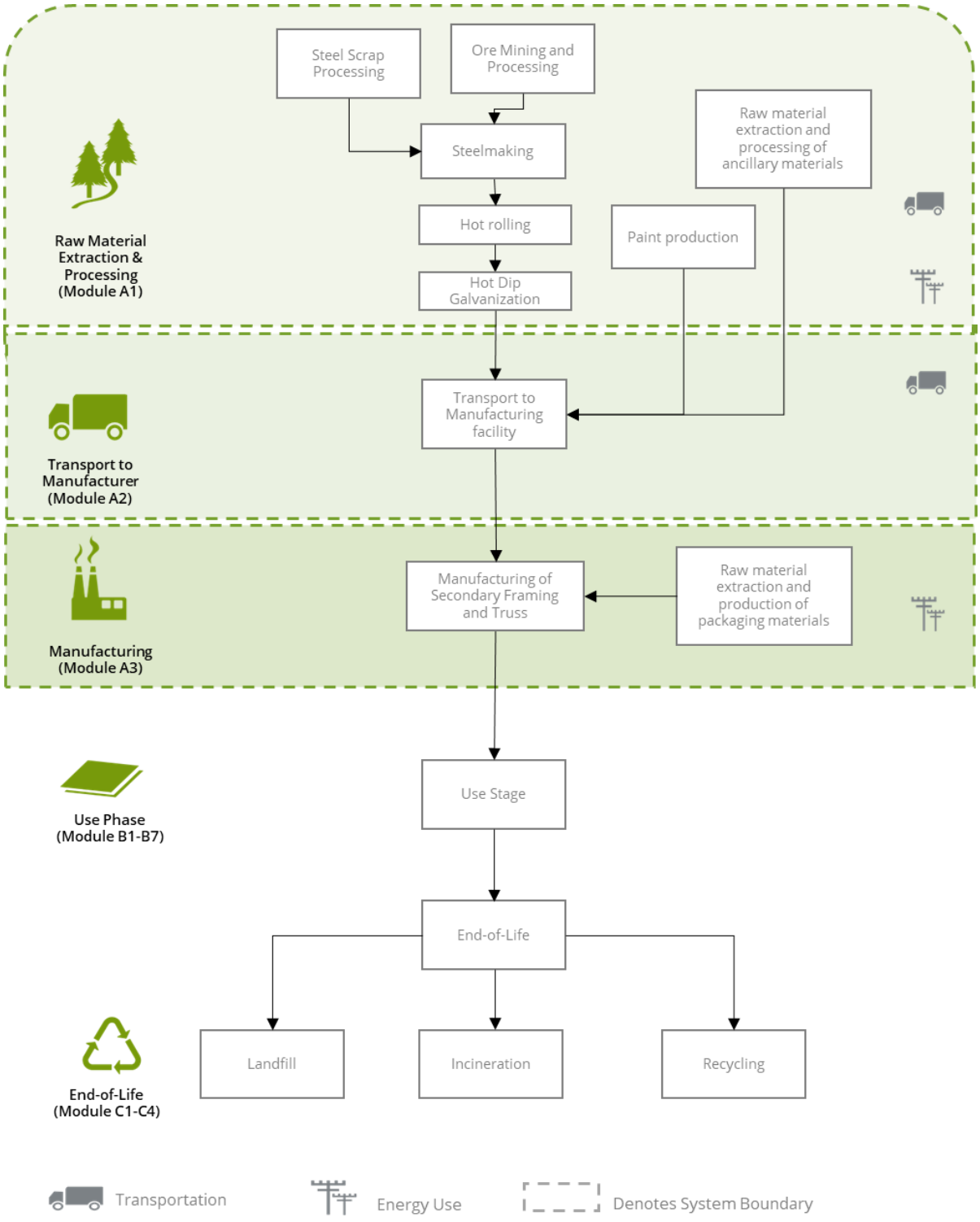

Figure 1. *Flow Diagram for the life cycle of the BBNA secondary framing.*

2.3 DECLARATION OF METHODOLOGICAL FRAMEWORK

The scope of the EPD is cradle-to-gate, including raw material extraction and processing, steelmaking and intermediate steel product manufacture, coating, transportation to the BBNA facilities, and final product manufacturing at six facilities owned and operated by BBNA: Annville, PA, Evansville, WI, Jackson, TN, Rainsville, AL, St. Joseph, MO, and Visalia, CA. The life cycle phases included in the product system boundary are shown below.

Table 1. *Life cycle phases included in the BBNA secondary framing product system boundary.*

Product			Construction Process		Use							End-of-life				Benefits and loads beyond the system boundary
A1	A2	A3	A4	A5	B1	B1	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Raw material extraction and processing	Transport to manufacturer	Manufacturing	Transport	Construction - installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstruction demolition	Transport	Waste processing	Disposal	Reuse, recovery and/or recycling potential
X	X	X	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND

X = Module Included | MND = Module Not Declared

Cut-off and allocation procedures are described below and conform to the PCR and ISO standards.

2.4 TECHNICAL DATA

Technical specifications for the steel products in this EPD include ASTM A653, A 1011 and A1076. The applicable CSI code is 05 12 00 Structural Steel Framing. The secondary framing will be used in the construction of metal buildings, conforming to CSI 13 34 19. Additional technical specifications can be found in the MBMA Industry-wide EPD for Secondary Framing.

2.5 INTENDED APPLICATION

The secondary framing is used in the construction of roof and wall secondary structures.

2.6 MATERIAL COMPOSITION

The secondary framing made by BBNA contains galvanized low alloy carbon steel coils. The average density of the products is 7,850 kg/m3.

Steel construction products under normal conditions do not present inhalation, ingestion, or contact health hazards. These products are used inside the building envelope, or other structures, and do not include materials or substances which have potential route of exposure to humans or flora/fauna in the environment.

2.7 PROPERTIES OF DECLARED PRODUCT AS DELIVERED

The secondary framing is produced in sizes ranging from 8-12 in (20.3-30.5 cm) depth and 20-40 ft (6.1-12.2m) span.

2.8 MANUFACTURING

Galvanized steel coils are shipped to six BBNA facilities across North America, including Annville, PA, Evansville, WI, Jackson, TN, Rainsville, AL, St. Joseph, MO, and Visalia, CA. At these facilities, secondary framing is cold-formed, and shaped as cee and zee purlins.

2.9 PACKAGING

Packaging for the secondary framing includes wood-based dunnage.

2.10 FURTHER INFORMATION

Further information on the product can be found on the manufacturers' website at https://bluescopebuildings.com/

3. LCA: Calculation Rules

3.1 DECLARED UNIT

The declared unit used in the EPD is defined as one (1) metric ton of secondary framing, consistent with the PCR.

Table 2. *The modules and unit processes included in the scope for the BBNA secondary framing.*

Module	Module Description	Unit Processes Included in Scope
A1	Extraction and processing of raw materials; any reuse of products or materials from previous product systems; processing of secondary materials; generation of electricity from primary energy resources; energy, or other, recovery processes from secondary fuels	Raw material extraction and processing for the raw materials upstream of the BBNA facilities. Steelmaking, hot rolling of the steel coil, as well as any coating or painting upstream of BBNA operations.
A2	Transport (to the manufacturer)	Transportation to the six BBNA facilities in Annville, PA, Evansville, WI, Jackson, TN, Rainsville, AL, St. Joseph, MO, and Visalia, CA.
A3	Manufacturing, including ancillary material production	Secondary framing manufacture at the six BBNA facilities.
A4	Transport (to the building site)	Module Not Declared
A5	Construction-installation process	Module Not Declared
B1	Product use	Module Not Declared
B2	Product maintenance	Module Not Declared
B3	Product repair	Module Not Declared
B4	Product replacement	Module Not Declared
B5	Product refurbishment	Module Not Declared
B6	Operational energy use by technical building systems	Module Not Declared
B7	Operational water uses by technical building systems	Module Not Declared
C1	Deconstruction, demolition	Module Not Declared
C2	Transport (to waste processing)	Module Not Declared
C3	Waste processing for reuse, recovery and/or recycling	Module Not Declared
C4	Disposal	Module Not Declared
D	Reuse-recovery-recycling potential	Module Not Declared

3.2 UNITS

All data and results are presented using SI units.

3.3 ESTIMATES AND ASSUMPTIONS

- BBNA was able to provide the specific steel mill and steelmaking technology where galvanized steel products were sourced from a service center. These steel mills included the North Star electric arc furnace in Delta, Ohio and other electric arc furnace mills in the US. To model the steelmaking, the results were taken from the North Star hot rolled band EPD from 2022, while other EAF steel was modeled using the representative dataset in ecoinvent.
- Product manufacturing beyond hot rolling assumed an 8% scrap rate.
- Electricity for hot dip galvanization (HDG) coating was assumed to from the eGRID subregion in which the steel was procured from.
- Representative inventory data for other raw materials were modeled with unit process data taken from Ecoinvent.
- Representative inventory data for electricity use were modified to reflect the eGRID subregion electricity supply mixes at the BBNA facilities.
- Transportation for manufacturing wastes was modeled using the EPA WARM model assumption of 20 miles (~32 km), from the point of product use to a landfill, material recovery center, or waste incinerator. Ecoinvent datasets are used to model the impacts associated with incineration and landfilling, which does not include energy recovery from landfill gas.

The PCR requires the results for several inventory flows related to construction products to be reported including energy and resource use and waste and outflows. These are aggregated inventory flows, and do not characterize any potential impact; results should be interpreted considering this limitation.

3.4 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. No data gaps were allowed which were expected to significantly affect the outcome of the indicator results. No known flows are deliberately excluded from this EPD.

3.5 DATA SOURCES

Primary data were provided by BBNA for the six facilities producing secondary framing. The sources of secondary LCI data are supplier-specific LCA, EPDs, and the Ecoinvent database.

Table 3. *Data sources for the BBNA secondary framing.*

Flow	Dataset	Data Source	Publication Date
Supplier EPDs			
Bare and painted Zincalume	Steelscape LCA report	LCA report	2022
Steel processing			
Upstream and third party HDG coating and Cold rolling	LCI for HDG taken from AISI report Ecoinvent datasets to build LCI of steel: steel production, electric, low-alloyed | Cutoff, U - Europe without Switzerland and Austria * modified for eGRID subregion (RFCW, SRTV, CAMX) steel production, converter, low-alloyed | Cutoff, U – RER* modified for eGRID subregion (RFCW) hot rolling, steel | Cutoff, U - Europe without Austria market group for electricity, medium voltage | Cutoff, U – US market for natural gas, high pressure | Cutoff, U – US market for hydrochloric acid, without water, in 30% solution state | Cutoff, U - RER market for nitrogen, liquid | Cutoff, U – RER market for zinc | Cutoff, U – GLO process-specific burdens, hazardous waste incineration plant |Cutoff, U – RoW zinc coating, pieces | zinc coat, pieces | Cutoff, U - RER	AISI report Ecoinvent 3.9.1	2021 2022
Other raw materials and ancillary			
Welding wire	market for steel, low-alloyed, hot rolled | steel, low-alloyed, hot rolled | Cutoff, U – GL	Ecoinvent 3.9.1	2022
Lubricating oils	market for lubricating oil | lubricating oil | Cutoff, U - RER	Ecoinvent 3.9.1	2022
Industrial gases			
Argon	market for argon, liquid | argon, liquid | Cutoff, U - RER	Ecoinvent 3.9.1	2022
Acetylene	market for acetylene | acetylene | Cutoff, U - RER	Ecoinvent 3.9.1	2022
Carbon dioxide	market for carbon dioxide, liquid | carbon dioxide, liquid | Cutoff, U - RER	Ecoinvent 3.9.1	2022
Oxygen	market for oxygen, liquid | oxygen, liquid | Cutoff, U - RER	Ecoinvent 3.9.1	2022
Electricity and Fuel Use			
Electricity	market for electricity, medium voltage | electricity, medium voltage | Cutoff, U – *various (RFC, MRO, WECC)* modified for eGRID subregions (MROE, SRTV, SPNO, CAMX) as appropriate	Ecoinvent 3.9.1 eGRID 2021	2022 2023
Natural gas	market for heat, central or small-scale, natural gas | heat, central or small-scale, natural gas | Cutoff, U - Europe without Switzerland	Ecoinvent 3.9.1	2022
Propane	market for propane, burned in building machine | propane, burned in building machine | Cutoff, U - GLO	Ecoinvent 3.9.1	2022
Diesel	market for diesel, burned in agricultural machinery | diesel, burned in agricultural machinery | Cutoff, U - GLO	Ecoinvent 3.9.1	2022
Light fuel oil	heat production, light fuel oil, at boiler 10kW, non-modulating | heat, central or small-scale, other than natural gas | Cutoff, U - Europe without Switzerland	Ecoinvent 3.9.1	2022
Heavy fuel oil	market for heavy fuel oil, burned in refinery furnace | heavy fuel oil, burned in refinery furnace | Cutoff, U - GLO	Ecoinvent 3.9.1	2022
Other facility			
Paint wastes	treatment of waste paint, municipal incineration | waste paint | Cutoff, U - Europe without Switzerland treatment of waste paint, inert material landfill | waste paint | Cutoff, U - Europe without Switzerland	Ecoinvent 3.9.1	2022
Nonhazardous wastes	process-specific burdens, inert material landfill | process-specific burdens, inert material landfill | Cutoff, U – RoW process-specific burdens, municipal waste incineration | process-specific burdens, municipal waste incineration | Cutoff, U - Europe without Switzerland	Ecoinvent 3.9.1	2022
Other Hazardous wastes	process-specific burdens, hazardous waste incineration plant | process-specific burdens, hazardous waste incineration plant | Cutoff, U - RoW treatment of spent antifreezer liquid, hazardous waste incineration | spent antifreezer liquid | Cutoff, U – RoW treatment of spent solvent mixture, hazardous waste incineration | spent solvent mixture | Cutoff, U - Europe without Switzerland	Ecoinvent 3.9.1	2022
Used oil treatment	treatment of waste mineral oil, hazardous waste incineration | waste mineral oil | Cutoff, U - Europe without Switzerland	Ecoinvent 3.9.1	2022
Water use at facility			
Water use	tap water production, conventional treatment | tap water | Cutoff, U - RoW	Ecoinvent 3.9.1	2022
Transportation			
Truck transport	transport, freight, lorry 16-32 metric ton, EURO4 | transport, freight, lorry 16-32 metric ton, EURO4 | Cutoff, U - RER	Ecoinvent 3.9.1	2022
Rail transport	market for transport, freight train | transport, freight train | Cutoff, U - US	Ecoinvent 3.9.1	2022

3.6 DATA QUALITY

The data quality assessment addressed the following parameters: time-related coverage, geographical coverage, technological coverage, precision, completeness, representativeness, consistency, reproducibility, sources of data, and uncertainty.

Table 4. *Data quality assessment for the underlying LCA of BBNA secondary framing.*

Data Quality Parameter	Data Quality Discussion
Time-Related Coverage: Age of data and the minimum length of time over which data is collected	The most recent available data are used, based on other considerations such as data quality and similarity to the actual operations. Typically, these data are less than 10 years old (typically 2019 or more recent). All of the data used represented an average of at least one year's worth of data collection. Manufacturer-supplied data (primary data) are based on a full year of operations from at each of the BBNA facilities from July 1, 2022- June 30, 2023. Supplier LCA and EPD results are produced using a full year of data from calendar year 2019 (Steelscape).
Geographical Coverage: Geographical area from which data for unit processes is collected to satisfy the goal of the study	The data used in the analysis provide the best possible representation available with current data. Actual processes for upstream operations are primarily North American. Surrogate data used in the assessment are representative of North American operations. Data representative of European operations are considered sufficiently similar to actual processes. Data representing disposal practices are based on regional statistics.
Technology Coverage: Specific technology or technology mix	For the most part, data are representative of the actual technologies used for processing, transportation, and manufacturing operations.
Precision: Measure of the variability of the data values for each data expressed	Precision of results are not quantified due to a lack of data. Data collected for operations were typically averaged for one or more years and over multiple operations, which is expected to reduce the variability of results.
Completeness: Percentage of flow that is measured or estimated	The LCA model included all known mass and energy flows for production of the steel products. In some instances, surrogate data used to represent upstream and downstream operations may be missing some data which is propagated in the model. No known processes or activities contributing to more than 1% of the total environmental impact for each indicator are excluded.
Representativeness: Qualitative assessment of the degree to which the data set reflects the true population of interest	Data used in the assessment represent typical or average processes as currently reported from multiple data sources and are therefore generally representative of the range of actual processes and technologies for production of these materials. Considerable deviation may exist among actual processes on a site-specific basis; however, such a determination would require detailed data collection throughout the supply chain back to resource extraction. For supplier information, the most representative source of data possible was chosen or modeled.
Consistency: Qualitative assessment of whether the study methodology is applied uniformly to the various components of the analysis	The consistency of the assessment is considered to be high within A2 and A3. Data sources of similar quality and age are used with a bias towards Ecoinvent v3.9.1 data. As some of the data taken for upstream production is taken from LCAs or EPDs performed by other practitioners, the consistency between A1 and A2/A3 would be improved with primary data on steelmaking and intermediate steel product manufacture. Different portions of the product life cycle are equally considered; however, it must be noted that final disposition of the product is based on assumptions of current average practices in Europe and North America.
Reproducibility: Qualitative assessment of the extent to which information about the methodology and data values would allow an independent practitioner to reproduce the results reported in the study	Based on the description of data and assumptions used, this assessment would be reproducible by other practitioners with access to the primary data. All assumptions, models, and data sources are documented.
Sources of the Data: Description of all primary and secondary data sources	Data representing energy use at the BBNA manufacturing facilities represent an annual average and are considered of high quality due to the length of time over which these data are collected, as compared to a snapshot that may not accurately reflect fluctuations in production. The Ecoinvent database is used for secondary LCI datasets. The other EPD data are also considered high quality due to the fact that they similarly span a full calendar year.
Uncertainty of the Information: Uncertainty related to data, models, and assumptions	Uncertainty related to materials in the steel products is low. Actual supplier data for upstream operations was not available for all suppliers and the study relied upon the use of existing representative datasets. These datasets contained relatively recent data (<10 years) but lacked geographical representativeness. Uncertainty related to the impact assessment methods used in the study are high. The impact assessment method required by the PCR includes impact potentials, which lack characterization of providing and receiving environments or tipping points.

3.7 PERIOD UNDER REVIEW

The period of review for the steel secondary framing produced at the six BBNA facilities is taken from July 1, 2022 through June 30, 2023.

3.8 ALLOCATION

This assessment follows the allocation guidelines of ISO 14044 and allocation rules specified in the PCR and minimized the use of allocation wherever possible. This LCA follows the attributional approach.

Mass allocation was deemed the most accurate and reproducible way of calculating the energy and material requirements for the manufacture of the steel products within BBNA facilities. Primary data for resource use (e.g., electricity, natural gas, water), waste/byproducts, and emissions released, are allocated on a mass-basis as a fraction of total annual production for steel products. Some facilities additionally produce cladding, which is accounted for in the total facility production.

With respect to secondary materials, the 100-0 recycled content approach is used in which the recycled material bears only the burden of any processing from waste material and transportation to the facility.

The transportation from primary producer of material components to the BBNA manufacturing facilities is based on primary data provided by BBNA, including modes, distances, and amount of material transported. Transportation was allocated on the basis of the mass and distance the material was transported.

3.9 COMPARABILITY

Full conformance with the PCR for steel products allows EPD comparability only when all stages of a life cycle have been considered, when they comply with all referenced standards, use the same sub-category Part B PCR, and use equivalent scenarios with respect to construction works. However, variations and deviations are possible.

4. LCA: Scenarios and Additional Technical Information

Manufacturing

Galvanized steel coils are shipped to six BBNA facilities across North America, including Annville, PA, Evansville, WI, Jackson, TN, Rainsville, AL, St. Joseph, MO, and Visalia, CA. At these facilities, secondary framing is cold-formed, and shaped as cee and zee purlins.

Transportation of waste materials at manufacturing assumes a 20 mile (~32 km) average distance to disposal, consistent with assumptions used in the US EPA WARM model. Hazardous wastes are disposed by incineration.

5. LCA: Results

Results of the Life Cycle Assessment are presented below. It is noted that LCA results are relative expressions and do not predict impacts on category endpoints, the exceeding of thresholds, safety margins or risks.

The following environmental impact category indicators are reported using characterization factors based on the U.S. EPA's Tool for the Reduction and Assessment of Chemical and Other Environmental Impacts – TRACI 2.1 and IPCC AR5.

TRACI 2.1 Impact Category	Unit
Global Warming Potential **(GWP)***	kg CO_2 eq
Ozone Depletion Potential **(ODP)**	kg CFC 11 eq
Acidification Potential **(AP)**	kg SO_2 eq
Eutrophication Potential **(EP)**	kg N eq
Smog Formation Potential **(SFP)**	kg O_3 eq
Abiotic depletion potential **(FFD)** for fossil resources	MJ Surplus, LHV

*Results presented in this EPD are based on IPCC AR5

These 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.

The following inventory parameters, specified by the PCR, are also reported.

Resources	Unit	Waste and Outflows	Unit
RPR_E: Renewable primary resources used as energy carrier (fuel)	MJ, LHV	**HWD:** Hazardous waste disposed	kg
RPR_M: Renewable primary resources with energy content used as material	MJ, LHV	**NHWD:** Non-hazardous waste disposed	kg
$NRPR_E$: Non-renewable primary resources used as an energy carrier (fuel)	MJ, LHV	**HLRW:** High-level radioactive waste, conditioned, to final repository	kg
$NRPR_M$: Non-renewable primary resources with energy content used as material	MJ, LHV	**ILLRW:** Intermediate- and low-level radioactive waste, conditioned, to final repository	kg
SM: Secondary materials	kg	**CRU:** Components for re-use	kg
RSF: Renewable secondary fuels	MJ, LHV	**MR:** Materials for recycling	kg
NRSF: Non-renewable secondary fuels	MJ, LHV	**MER:** Materials for energy recovery	kg
RE: Recovered energy	MJ, LHV	**EE:** Recovered energy exported from the product system	MJ, LHV
FW: Use of net freshwater resources	m^3	-	-

Table 5. *Life Cycle Impact Assessment (LCIA) results for the production-weighted average of the declared unit of secondary framing at the six BBNA facilities in Annville, PA, Evansville, WI, Jackson, TN, Rainsville, AL, St. Joseph, MO, Visalia, CA. Results reported in MJ are calculated using lower heating values. All values are rounded to three significant digits.*

Impact Category	Life cycle stage			
	A1	A2	A3	Total (A1-A3)
IPCC AR5				
GWP (kg CO_2 eq)	1,270	165	133	1,570
	81%	10%	8%	100%
TRACI 2.1				
GWP (kg CO_2 eq)	1,260	162	126	1,550
	81%	10%	8%	100%
ODP (kg CFC-11 eq)	$3.64x10^{-5}$	$3.64x10^{-6}$	$2.89x10^{-6}$	$4.30x10^{-5}$
	85%	8%	7%	100%
AP (kg SO_2 eq)	4.10	0.735	0.416	5.25
	78%	14%	8%	100%
EP (kg N eq)	4.18	0.155	0.493	4.83
	87%	3%	10%	100%
SFP (kg O_3 eq)	61.7	20.6	9.36	91.7
	67%	22%	10%	100%
FFD (MJ surplus)	906	323	180	1,410
	64%	23%	13%	100%

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 6. *Resource use and waste flows for the production-weighted average of the declared unit of secondary framing at the six BBNA facilities in Annville, PA, Evansville, WI, Jackson, TN, Rainsville, AL, St. Joseph, MO, Visalia, CA. Results reported in MJ are calculated using lower heating values. All values are rounded to three significant digits.*

Parameter	Life cycle stage			
	A1	A2	A3	Total (A1-A3)
Resources				
RPR_E (MJ)	1,230	33.6	31.7	1,290
	95%	3%	2%	100%
RPR_M (MJ)	0.00	0.00	370	370
	0%	0%	100%	100%
$NRPR_E$ (MJ)	14,400	2,170	1,540	18,100
	79%	12%	9%	100%
$NRPR_M$ (MJ)	0.00	0.00	0.00	0.00
	n/a	n/a	n/a	n/a
SM (kg)	1,040	0.00	0.00	1,040
	100%	0%	0%	100%
RSF/NRSF (MJ)	0.00	0.00	0.00	0.00
RE (MJ)	0.00	0.00	0.00	0.00
FW (m^3)	22.1	0.300	0.514	22.9
	96%	1%	2%	100%
Wastes				
HWD (kg)	0.0	0.0	0.667	0.667
	0.0%	0.0%	100%	100%
NHWD (kg)	0.0	0.0	1.28	1.28
	n/a	n/a	100%	100%
HLRW (kg)	0.0	0.0	0.0	0.0
	n/a	n/a	n/a	n/a
ILLRW (kg)	0.0	0.0	0.0	0.0
	n/a	n/a	n/a	n/a
CRU (kg)	0.0	0.0	0.0	0.0
MR (kg)	0.0	0.0	63.7	63.7
	0.0%	0.0%	100%	100%
MER (kg)	0.0	0.0	0.0	0.0
EE (MJ)	0.0	0.0	0.0	0.0

The PCR requires the calculation of biogenic carbon emissions and removals. No biogenic carbon is associated with the product. However, wood-based dunnage material is used in packaging. The biogenic carbon removal associated with the packaging is 12.4 kg CO_2 / ton secondary framing; emissions are not included as packaging end of life is outside the scope.

6. LCA: Interpretation

The contributions to total impact indicator results are dominated by the upstream production of raw materials and steelmaking (A1). The transportation of materials to the facilities (A2) is generally the second-greatest contributing module except for eutrophication for which manufacturing (A3) is the second-greatest contributing module.

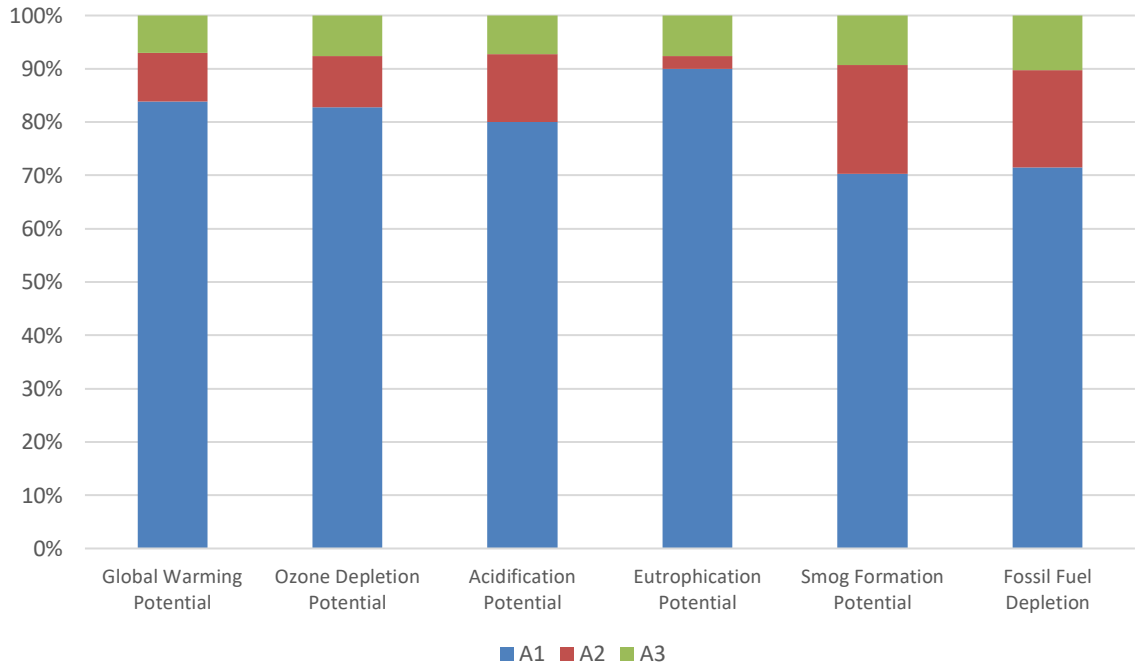

Figure 2. *Contribution analysis for the production-weighted average across the six facilities of the declared unit for BBNA secondary framing.*

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. See Section 3.8 of the Part B Designated Steel Construction Product PCR for additional EPD comparability guidelines.

7. Additional Environmental Information

Manufacturing: Throughout North America, BBNA facilities are recognized as an IAS AC-472 accredited metal building manufacturer. The IAS accreditation program recognizes manufacturers who design and fabricate safe, high-quality structures. The rigorous certification process scrutinizes all of the things that are important to you in selecting a manufacturer, including raw material purchasing, welding practices, material receiving, quality control measures and overall fabrication quality assurance.

Many of BBNA's global products meet Factory Mutual design requirements and meet regional snow and hurricane codes.

Commitment to product quality: In 1959, we opened the doors to our Research and Development Center, a dedicated space for product development and testing. Today, it is home to the industry's only privately owned Guarded Hot Box, a testing apparatus to quantify energy efficiency. We also have numerous other tests focused on product strength, efficiency and longevity:

- Full-scale load tests for frames, beams, trusses and more complex structures,
- An acid rain test that accelerates the effect of acid rain and other acidic environments in order to predict the long-term performance of a material,
- A wind uplift test to verify roof panels perform in accordance with Factory Mutual, Corps of Engineers, Underwriters Laboratories and ASTM E1592 test specifications,
- A 1,000-hour paint test that simulates 15 to 20 years of sunlight and dew accumulation, and
- Real-time tests to validate paint performance for 25 years or longer.

It's because of this unique space, and the people who work in it, that we have a unique perspective on how to build some of the strongest and longest-lasting buildings in the industry.

8. References

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