Environmental Product Declaration

According to ISO 14025

11 Steel Sheet Products

SDI's steel mills produce high-quality steel using electric arc furnace technology, which primarily uses recycled ferrous scrap as feedstock. In 2021, 83% of the feedstock charged to furnaces at SDI steel mills was recycled ferrous scrap and internally generated iron substitutes. SDI's steel is sold to consumers that both further process and manufacture end products. Additionally, SDI sells a meaningful amount of steel to its own manufacturing businesses that produce finished products for consumers. Ultimately, when these products reach the end of their lives, they can be collected as scrap and reused in steelmaking operations through SDI's metals recycling platform, creating SDI's circular manufacturing model.

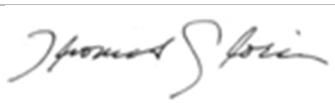
SDI's product offerings include hot-rolled steel sheet, cold-rolled steel sheet, metallic-coated steel sheet, structural steel beams and shapes, rail, engineered special bar quality steel, cold finished steel, merchant bar quality steel, specialty steel section, joists, and deck. Additionally, SDI produces liquid pig iron and processes both ferrous and nonferrous scrap for sale.

Issue Date: March 21, 2024

Valid Until: March 21, 2029

1 CONTENT OF THE EPD

EPD Program and program operator name, address, logo, and website		ASTM International 100 Barr Harbor Drive P.O. Box C700, West Conshohocken, PA 19428-2959, USA www.astm.org
General Program Instructions and Version	ASTM. (2020). General Program Instructions, Version: 8.0. ASTM Program Operator for Product Category Rules (PCR) and Environmental Product Declarations (EPDs).	
Manufacturer Name and Address	Steel Dynamics, Inc. Butler Facility 4500 County Road 59 Butler, Indiana 46721, United States	
Declaration Number	EPD 644	
Declaration version	0	
Declared Product & Functional Unit or Declared Unit	Eleven steel sheet products, 1 metric tonne of steel sheet at the factory gate: 1. Hot-rolled steel sheet 2. Processed, hot-rolled steel sheet 3. Pickled & oiled, hot-rolled steel sheet 4. Metallic-coated, hot-rolled steel sheet 5. Temper-passed, pickled, hot-rolled steel sheet 6. Pickled, hot-rolled, annealed steel sheet 7. Cold-rolled, full-hard steel sheet 8. Cold-rolled, full-hard, temper rolled steel sheet 9. Cold-rolled, fully processed steel sheet 10. Metallic-coated, cold-rolled steel sheet 11. Post-annealed, metallic-coated, cold-rolled steel sheet	
Reference PCR and Version Number	Product Category Rules (PCR) Guidance for Building Related Products and Services Part A: Life Cycle Assessment Calculation Rules and Report Requirements (UL Environment, v3.2) and Part B: Designated Steel Construction Product EPD Requirements (UL Environment, v2.0).	
Description of Product's Intended Application and Use (as Identified When Determining Product RSL, if Applicable)	Steel sheet are used in various market applications. These products are further processed into a variety of shapes and sizes.	
Markets of Applicability:	Global	
Date of Issue:	March 21, 2024	
Period of Validity	March 21, 2049	
EPD Type:	Product Specific	
EPD Scope	Cradle to gate	
Year of reported manufacturer primary data:	2021	
LCA Software & Version Number:	SimaPro V.9.5	
LCI Database & Version Number:	Ecoinvent v3.9.1 and US-EI 2.2 V2020.3 databases	
LCIA Methodology & Version Number:	TRACI 2.1, IPCC AR5	

The sub-category PCR review was conducted by:	Thomas P. Gloria, Ph. D. Industrial Ecology Consultants
	Brandie Sebastian JBE Consultants
	James Littlefield Independent Consultants
This declaration was independently verified in accordance with ISO 14025:2006. The UL Environment "Part A: Life Cycle Assessment Calculation Rules and Report Requirements," v3.2, in conformance with ISO 21930:2017, serves as the core PCR, with additional considerations from the USGBC/UL Environment Part A Enhancement (2017) ☐ INTERNAL ☒ EXTERNAL	
	Timothy S. Brooke ASTM International 100 Barr Harbor Drive West Conshohocken, PA 19428
This life cycle assessment was conducted in accordance with ISO 14044 and the reference PCR by: HATCH	Dalton Killorn and Catalina Gonzalez **Hatch Ltd.** 2800 Speakman Drive, Mississauga Ontario Canada L5K 2R7
This life cycle assessment was independently verified in accordance with ISO 14044 and the reference PCR by: ☐ INTERNAL ☒ EXTERNAL	
	Thomas P. Gloria, Ph. D. Industrial Ecology Consultants 35 Bracebridge Rd. Newton, MA 02459-1728

Disclaimer:

This Report is meant to be read as a whole, and sections should not be read or relied upon out of context. The Report incorporates information provided by third parties. This includes information relating to inputs, feed types and quality, production characteristics and/or outputs related to the products for which an Environmental Product Declaration ("EPD") has been prepared. Hatch has relied upon the accuracy and quality of this information to perform its assessment. Unless specifically stated otherwise, Hatch has not verified the information and disclaims any responsibility or liability in connection with same.

While this Report assesses the anticipated environmental impact of certain identified products, actual impacts can be affected by a variety of factors, some of which may occur after the effective date of this report, or which may not have been known or reasonably ascertainable by Hatch at the time of drafting. The PCR requires the reporting of a limited set of LCA metrics, allowing for the possibility that relevant environmental impacts may exist beyond those disclosed by this EPD. The EPD does not indicate that any environmental or social performance benchmarks are met, nor thresholds exceeded.

This EPD has been developed in accordance with the PCR applicable for the identified product following the principles, requirements and guidelines of the ISO 14040, ISO 14044, ISO 14025, and ISO 21930 standards. The results in this EPD Report are estimations of potential impacts. The quality the information, conclusions, estimates, and projections found in the Report are consistent with its specified level of accuracy and the circumstances under which it was prepared. The accuracy of results in different EPDs may vary as a result of background data assumptions and quality of data collected. This Report contains the professional opinion of Hatch based upon information available at the time of its preparation and for the production period identified herein.

The environmental impact results of steel sheet 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.

2 PRODUCT DEFINITION AND INFORMATION

2.1 DESCRIPTION OF ORGANIZATION

The Steel Dynamics, Inc. Butler Facility (Butler Facility) is a division of Steel Dynamics, Inc. (SDI), one of the largest and most diversified steel producers and metal recyclers in the United States and Mexico. The Butler Facility, located in Butler, Indiana, United States, includes the original SDI steel mill, which is the first of the company's many operations.

Established in 1996, the Butler Facility is SDI's original steel production facility. The Butler Facility conducts iron and steel production in addition to downstream coil finishing. The Butler Facility has the capacity to produce 3.2 million tons of steel per year. The Butler Facility continues to earn the trust of its valued customers by offering a wide variety of innovative, high-quality steel products, produced on-time. The Butler Facility team continues to focus on product development, responsiveness, and customer support.

2.2 PRODUCT DESCRIPTION

2.2.1 PRODUCT IDENTIFICATION

The Butler Facility produces flat-rolled steel products, including hot rolled, pickled, cold-rolled, and metallic-coated. Photographs of the Butler Facility's steel products are shown in Figure 2-1.

Hot-rolled steel sheet

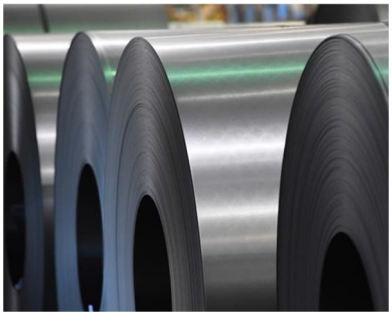
Processed, hot-rolled steel sheet

Pickled & oiled, hot-rolled steel sheet

Metallic-coated, hot-rolled steel sheet

Temper-passed, pickled, hot-rolled steel sheet

Pickled, hot-rolled, annealed steel sheet



Cold-rolled, full-hard steel sheet

Cold-rolled, full-hard, temper rolled steel sheet

Cold-rolled, fully processed steel sheet

Metallic-coated, cold-rolled steel sheet

Post-annealed, metallic-coated, cold-rolled steel sheet

Figure 2-1: Product Photographs

2.2.2 PRODUCT SPECIFICATION

Specifications for the steel products manufactured by the Butler Facility are shown in Table 2-1.The average product properties are shown in Table 2-2.

Table 2-1: Product Specifications

Product	Thickness		Width		Coating Weight	Specification
	(IN)	(CM)	(IN)	(CM)		
Hot-rolled steel sheet. Processed, hot-rolled steel sheet.	0.039 - 0.375	0.099-0.952	36 - 62	91 - 157	N/A	CS, DS, SS, HSLA, UHSS, A36, A414, A606, A786, 1050, various ASTM, JIS, SAE
Pickled & oiled, hot-rolled steel sheet. Temper-passed, pickled, hot-rolled steel sheet. Pickled, hot-rolled, annealed steel sheet.	0.039 - 0.375	0.099-0.952	36 - 61	91 - 154	N/A	CS, DS, SS, HSLA, UHSS, A36, A414, A606, A786, 1050, various ASTM, JIS, SAE
Cold-rolled, full-hard steel sheet. Cold-rolled, full-hard, temper rolled steel sheet.	0.012 - 0.100	0.031-0.254	36 - 61	91 - 154	N/A	CS, DS, SS, HSLA, A606, JIS, SAE, A109
Cold-rolled, fully processed steel sheet.	0.012 - 0.100	0.031-0.254	36 - 61	91 - 154	N/A	CS, DS, SS, HSLA, A606, JIS, SAE, A109
Metallic-coated, hot-rolled steel sheet.	0.042 - 0.160	0.107-0.406	36 - 62	91 - 157	G30 - G235	CS, FS, SS, HSLA, SAE, A929, A1003

Product	Thickness		Width		Coating Weight	Specification
	(IN)	(CM)	(IN)	(CM)		
Metallic-coated, cold-rolled steel sheet. Post-annealed, metallic-coated, cold-rolled steel sheet.	0.012 - 0.071	0.031-0.180	36 - 61.5	91 - 156	A40 / A60	CS, FS, DS Mod., SS, A792, A1003, HSLA, SAE

Table 2-2: Average Technical Data for Steel Products

Product Properties [a]	Value	Unit
Density	7,850	kg/m^3
Melting point	1,370	°C
Electrical conductivity at 20°C	3-15	% of IAC
Thermal conductivity	45	W/(m-K)
Coefficient of thermal expansion	0.000016	m/m-^{o}C
Modulus of elasticity	210,000	N/mm^2
Shear modulus	81,000	N/mm^2
Specific heat capacity	420	J/kg-^{o}C
Hardness, Brinell Number	240 max	HB
Yield strength	828 max	N/mm^2
Ultimate tensile strength	966 max	N/mm^2
Breaking elongation	50 max	%
Chemical composition	98 (Iron)	% by mass

[a] Properties are not reflective of individual products, which vary based on customer specifications.

2.2.3 FLOW DIAGRAM

A flow diagram illustrating the production process and life cycle phases included in the scope of this EPD is shown in Figure 2-2. Refer to Section 4 for a description of the manufacturing process and Table 4-1 for a description of the flow of products through each unit process.

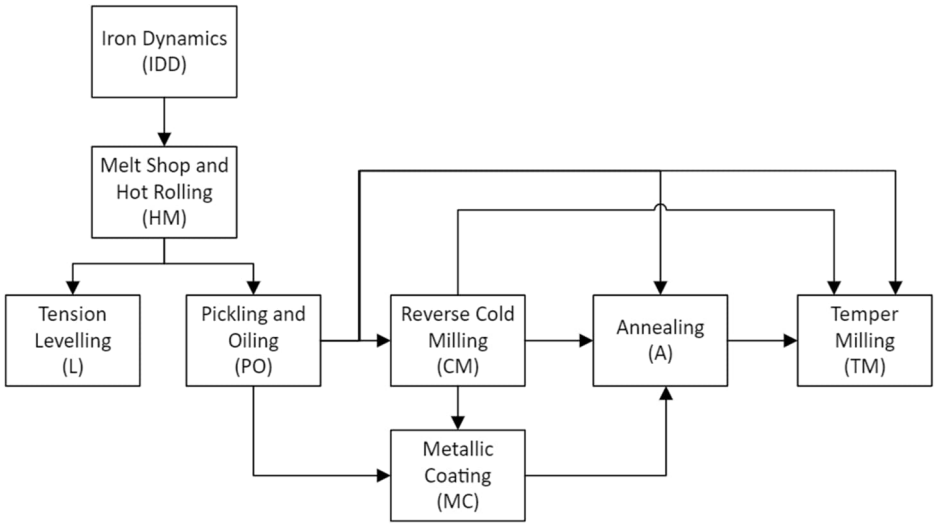


Figure 2-2: Process Flow Diagram

2.3 PRODUCT AVERAGE

Primary data supplied by the Butler Facility is based on the annual production rates for the 2021 calendar year. As the products are reported per facility, no product averaging was required.

2.4 APPLICATION

Typical applications for steel products produced by the Butler Facility are shown in Table 2-3.

Table 2-3: Product Applications

Product Category	Applications
Hot Rolled (A)	Pipe and Tube, Storage Racks, Tread Plate, Floor Grating, Lawn and Garden, Irrigation, Agriculture, Heavy Equipment, Roof Joists and Purlins, Foundation Supports, Automotive Clips and Brackets, Truck Trailers
Hot Rolled, Pickled (B)	Tubing, Purlin, Agriculture, Heavy Equipment, Automotive Stampings / Parts, Truck Trailers, Appliances, Washers, Furniture, Storage Racks, Recreation Products, Door Frames, Shelving, HVAC Units, Water Heaters, Hardware
Cold Rolled, Full Hard (C)	Downstream Coil Conversion, Coil Conversion Customers
Cold Rolled, Fully Processed (D)	Automotive Parts and Tubing, Appliances, Pipe and Tube
Metallic Coated Products (E)	Metal Building Panels and Structures, Agricultural Storage, Pipe and Tube, Solar Structures, Culverts and Drainage, Wall Stud, Wood Connectors, HVAC Ducts, HVAC Units, Appliances, Entry Doors, Automotive, Electrical Enclosures, Battery Enclosures, Retail Shelving, Door Hardware, Utility Truck Bodies

Product category legend:

A: Hot-rolled steel sheet; and Processed, hot-rolled steel sheet.

B: Pickled & oiled, hot-rolled steel sheet; Temper-passed, pickled, hot-rolled steel sheet; and Pickled, hot-rolled, annealed steel sheet.

C: Cold-rolled, full-hard steel sheet; and Cold-rolled, full-hard, temper rolled steel sheet.

D: Cold-rolled, fully processed steel sheet.

E: Metallic-coated, hot-rolled steel sheet; Metallic-coated, cold-rolled steel sheet; and Post-annealed, metallic-coated, cold-rolled steel sheet.

2.5 MATERIAL COMPOSITION

The feedstock to the Butler Facility's EAF is composed of approximately 85% scrap (purchased recycled steel scrap and internal steel scrap) and iron (from Iron Dynamics). Material composition varies based on customer specifications. Average material compositions for the 11 steel products under assessment are shown in Table 2-4.

Table 2-4: Average Product Composition

Product	Iron and Steel	Alloying Elements	Metallic-Coating
1. Hot-Rolled Steel Sheet	99%	1%	-
2. Processed, Hot-Rolled Steel Sheet	99%	1%	-
3. Pickled & Oiled, Hot-Rolled Steel Sheet	99%	1%	-
4. Metallic-Coated, Hot-Rolled Steel Sheet	97%	1%	2%
5. Temper-Passed, Pickled, Hot-Rolled Steel Sheet	99%	1%	-
6. Pickled, Hot-Rolled, Annealed Steel Sheet	99%	1%	-
7. Cold-Rolled, Full-Hard Steel Sheet	99%	1%	-
8. Cold-Rolled, Full-Hard, Temper Rolled Steel Sheet	99%	1%	-
9. Cold-Rolled, Fully Processed Steel Sheet	99%	1%	-
10. Metallic-Coated, Cold-Rolled Steel Sheet	96%	1%	3%
11. Post-Annealed, Metallic-Coated, Cold-Rolled Steel Sheet	96%	1%	3%

3 DECLARATION OF METHODOLOGICAL FRAMEWORK

3.1 DECLARED UNIT

The declared unit is 1 metric tonne of steel sheet product at the factory gate. The conversion factors to allow users to conduct further calculations are provided in Table 3-1.

Table 3-1: Technical Data for Declared Steel Sheet

Name	Value	Unit
Declared Unit	1	tonne (1,000 kg)

Environmental impact results based on a declared unit of a steel sheet product 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 [R-1].

3.2 SYSTEM BOUNDARY

The EPD follows a cradle-to-gate production of steel products, which is limited to the Product Stage (Modules A1-A3), as depicted in Table 3-2. Construction Process (Modules A4-A5), End-of-Life (Modules C1-C4), and Benefits/Loads beyond the system boundaries (Module D) are excluded from the system boundary.

Table 3-2: Life Cycle Stages Included in the System Boundary

Product			Construction Process		Use							End-of-Life				Benefits/Loads Beyond the System Boundaries
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Extraction and upstream production	Transport to factory	Manufacturing	Transport to site	Installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational Energy Use	Operational Water Use	Deconstruction/ demolition	Transport	Waste processing	Disposal	Reuse, recycling and/or energy recovery
X	X	X	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND

X = Module included. MND = Module not declared

3.3 GEOGRAPHICAL COVERAGE

Primary data is specific to the Butler Facility, located in Butler, Indiana, United States.

3.4 ALLOCATION

Mass allocation was deemed the most accurate and reproducible method of calculating the energy and material requirements for the manufacture of the steel sheet products. To ensure consistency, the same LCI modeling structure and allocation procedure was used across each of the unit processes, where applicable.

Treatment of manufacturing wastes are allocated entirely to the Butler Facility following the “polluter pays” principle. The “polluter pays” principle establishes that “processes relevant to waste processing are assigned to the product system that generates the waste until the system boundary between product systems is reached”.

3.5 CUT-OFF RULES

All inputs and outputs to and from a process within the system boundary were collected and included in the model. All known mass and energy flows have been reported. No known flows are deliberately excluded.

3.6 DATA SOURCES

The LCA model was developed using SimaPro v.9.5.

Primary data representing raw materials, secondary materials, transportation, ancillary materials, packaging materials, electricity, fuels, water, waste treatment, and emission (air and water) were obtained directly from the Butler Facility for the 2021 production year. Secondary data for the extraction and upstream production of raw materials was obtained from the Ecoinvent v3.9.1 and US-EI 2.2 V2020.3 databases.

3.7 DATA QUALITY

The results of the data quality evaluation including temporal, geographical, technological, representativeness, and completeness are presented in Table 3-3.

Table 3-3: Data Quality Assessment

Data Quality Requirements	Description
Technology coverage	Primary data is representative of the technologies used in the Butler Facility operations. *Technological representativeness is characterized as medium to high*.
Geographic coverage	The geographic coverage of data is either specific to the United States or a global average. *Geographic representativeness is characterized as medium*.
Time Coverage	Primary data is based on operations in the 2021 calendar year. Generic data was collected from the Ecoinvent and US-EI databases. *Temporal representativeness is characterized as high*.
Precision	Although the precision of the results (variance) is not quantified, the data collected for the manufacturing of the steel products is based on primary information. *Precision is characterized as high.*
Completeness	All known material and energy inputs and outputs to and from the Butler Facility were considered and modelled in this LCA. Mass balances and industry benchmarking were completed to identify data gaps. In cases where gaps were identified, the Butler Facility was engaged to resolve issues.
Consistency	The same LCI modelling structure and allocation procedure was used across the system for consistency.
Reproducibility	The full set of datasets, assumptions, and allocation methods used are reported in the corresponding life cycle assessment project report to allow reproducibility.
Transparency	A high-level of transparency, including the disclosure of datasets, assumptions, and allocation methods, allows for internal and external reproducibility.
Uncertainty	A sensitivity check on the assumptions made toward the process selected to represent purchased electricity was completed to assess uncertainties in the data.

3.8 PERIOD UNDER REVIEW

Primary data was collected based on the annual production rate for 2021.

3.9 ESTIMATES AND ASSUMPTIONS

Iron Dynamics uses purchased industrial scrap sourced from industrial suppliers that do not undergo any treatment or recycling processes prior to delivery to the Butler Facility. Following the cut-off approach, these materials are available burden free and do not bear any environmental impacts [R-7].

Butler Facility uses purchased recycled scrap that originates from a variety of sources including consumer products, building materials, and industrial processes. Following the cut-off approach, the production of purchased steel scrap bears only the impacts of the recycling process [R-7].

Iron Dynamics and the Butler Facility produces multiple output that are sold for recycling (slag, oversized revert material, baghouse dust, spent pickle liquor, and dross). Following the cut-off approach, the impacts of the recycling process are attributable to the secondary materials produced from the recycled products. Therefore, no impacts have been included related to the recycling of these waste products [R-7].

3.10 UNITS

The data is declared in SI units.

4 MANUFACTURING

The Butler Facility includes the Iron Dynamics pig iron production facility and the SDI Butler EAF steel mill facility.

The Iron Dynamics' process produces liquid pig iron and crude zinc oxide from purchased co-products and waste materials (mill scale, blast furnace dust, pellet chips, iron bearing materials and oxides) and internally recycled by-products (mill scale, revert material, Iron Dynamics baghouse dust, and melt shop EAF dust). Liquid pig iron from Iron Dynamics' furnace is transferred via ladles to the melt shop and hot rolling unit process, where it contributes sensible heat and virgin iron units to the EAF feedstock mix to produce steel.

The Butler Facility produces steel products using EAF technology. The EAF is charged with purchased pig iron, liquid pig iron produced by the Iron Dynamics unit process, purchased hot briquetted iron, purchased recycled steel scrap, and internal steel scrap. The charged materials are melted with heat supplied by electrical energy, and impurities are removed from the molten steel as slag through the addition of lime additives. The furnace is tipped to pour off the slag and the molten steel is tapped into a ladle, which transports the molten steel to the Ladle Metallurgy Furnace (LMF).

The LMF can perform a variety of processes, including desulfurization and deoxidation. The temperature of the steel can be controlled by supplying power to carbon electrodes, and the chemistry of the steel can be changed by reducing or adding alloying elements.

The molten steel from the LMF is passed through the thin slab casters, converting the molten steel into a continuous sheet that is solidified and sheared to length. The slab is reheated in the tunnel furnace and is sent to the hot rolling mill, where water jets remove mill scale from the slab, the thickness of the slab is reduced to customer requirements, and the reduced slab is coiled.

The hot rolled material can be sent through several finishing processes, including:

- **Tension Levelling:** The tension levelling unit process leverages a series of rollers to pull the steel beyond its yield point, resulting in flat steel with minimal defects [R-8].
- **Pickling and Oiling:** In the pickling stage, steel is submerged in hydrochloric acid baths to remove stains and impurities. Pickled steel intended for sale is coated with oil to protect it from oxidation, while pickled steel intended for further processing bypasses oiling and is sent to the next unit process.
- **Metallic Coating:** In the metallic coating unit process, a layer of zinc (galvanized) or zinc-aluminum (galvalume) alloy is applied to the surface of the steel to prevent rusting [R-8].
- **Reverse Cold Milling:** The reverse cold milling unit process passes near room temperature hot-rolled steel through a set of rollers to reduce the thickness of the steel, increasing its strength and machinability while also increasing its brittleness [R-8].
- **Annealing:** The annealing unit process heat treats cold rolled steel with hydrogen and nitrogen gasses to increase ductility and prevent re-oxidation [R-8]. All outputs from the annealing unit process are sent to the temper milling unit process for further processing.
- **Temper Milling:** The temper milling unit process elongates the steel with a series of rollers to improve its physical properties, including surface finish, flatness, and yield strength [R-8].

The flow of products through each process stage is summarized in Table 4-1. All steel products entering the hot rolling mill (and beyond) have gone through the meltshop.

Table 4-1: Process Stages Describing Product Flow

Product	Process Stages
Hot-rolled steel sheet	IDD > HM
Processed, hot-rolled steel sheet	IDD > HM > L
Pickled & oiled, hot-rolled steel sheet	IDD > HM > PO
Metallic-coated, hot-rolled steel sheet	IDD> HM > PO > MC
Temper-passed, pickled, hot-rolled steel sheet	IDD > HM > PO > TM
Pickled, hot-rolled, annealed steel sheet	IDD > HM > PO > A > TM
Cold-rolled, full-hard steel sheet	IDD > HM > PO > CM
Cold-rolled, full-hard, temper rolled steel sheet	IDD > HM > PO > CM > TM
Cold-rolled, fully processed steel sheet	IDD > HM > PO > CM > A > TM
Metallic-coated, cold-rolled steel sheet	IDD > HM > PO > CM > MC
Post-annealed, metallic-coated, cold-rolled steel sheet	IDD > HM > PO > CM > MC > A > TM

4.1 DISPOSAL

Steel products are typically fully (100%) recycled at the end of life. No biogenic carbon (decay potential) is expected.

Disposal of manufacturing wastes is modeled assuming 100% of the hazardous wastes are incinerated, and 100% of the non-hazardous materials are disposed in a landfill. The Ecoinvent database was used to model the impacts associated with incineration and landfilling (which does not include energy recovery from landfill gas).

4.2 BENEFITS BEYOND THE SYSTEM BOUNDARY

Module D is outside of the scope of this EPD.

5 ENVIRONMENTAL INDICATORS DERIVED FROM LCA

The following sections present Life Cycle Impact Assessment (LCIA) and Life Cycle Inventory (LCI) results.

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 [R-4].

Any comparison of EPDs shall be subject to the requirements of ISO 21930 [R-6]. 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 [R-4].

5.1 LCA RESULTS FROM LCIA

The LCIA results are declared using the Tool for the Reduction and Assessment of Chemical and other environmental Impacts (TRACI) version 2.1, except for Global Warming Potential which is reported using the IPCC AR5 (IPCC, 2013) methodology, excluding the uptake of CO2.

TRACI version 2.1 was selected to report the environmental impacts categories, as it is a midpoint oriented LCIA methodology developed by the U.S. Environmental Protection Agency specifically for the U.S. using input parameters consistent with U.S. locations [R-5].

These six impact categories presented in Table 5-1 to Table 5-11 are globally deemed mature enough to be included in Type III environmental declarations. Other categories are being developed and defined. However, the EPD users shall not use additional measures for comparative purposes [R-4].

Results that are not declared are reported as “indicator not declared” with the acronym “IND”.

Table 5-1: LCA Results – 1 Tonne of Hot-Rolled Steel Sheet

Impact Category Indicators	Unit	A1	A2	A3	A1-A3
Global warming potential (GWP 100)	kg $CO_{2\ eq}$	2.69E+02	2.82E+01	9.13E+02	1.21E+03
Ozone depletion potential (ODP)	kg CFC-11 $_{eq}$	5.77E-06	4.14E-07	3.01E-05	3.63E-05
Eutrophication potential (EP)	kg N $_{eq}$	9.69E-01	2.38E-02	5.14E+00	6.13E+00
Acidification potential (AP)	kg $SO_{2\ eq}$	1.45E+00	4.29E-01	3.10E+00	4.97E+00
Smog formation potential (SFP)	kg $O_{3\ eq}$	1.80E+01	1.07E+01	3.11E+01	5.98E+01
Abiotic resource depletion potential for fossil energy resources (ADP_{fossil})	MJ surplus	1.08E+02	5.51E+01	8.00E+02	9.63E+02

Table 5-2: LCA Results – 1 Tonne of Processed, Hot-Rolled Steel Sheet

Impact Category Indicators	Unit	A1	A2	A3	A1-A3
Global warming potential (GWP 100)	kg $CO_{2\ eq}$	0.00E+00	0.00E+00	1.28E+03	1.28E+03
Ozone depletion potential (ODP)	kg CFC-11 $_{eq}$	0.00E+00	0.00E+00	3.90E-05	3.90E-05
Eutrophication potential (EP)	kg N $_{eq}$	0.00E+00	0.00E+00	6.37E+00	6.37E+00
Acidification potential (AP)	kg $SO_{2\ eq}$	0.00E+00	0.00E+00	5.26E+00	5.26E+00
Smog formation potential (SFP)	kg $O_{3\ eq}$	0.00E+00	0.00E+00	6.29E+01	6.29E+01
Abiotic resource depletion potential for fossil energy resources (ADP_{fossil})	MJ surplus	0.00E+00	0.00E+00	1.02E+03	1.02E+03

Table 5-3: LCA Results – 1 Tonne of Pickled & Oiled, Hot-Rolled Steel Sheet

Impact Category Indicators	Unit	A1	A2	A3	A1-A3
Global warming potential (GWP 100)	kg $CO_{2\ eq}$	0.00E+00	0.00E+00	1.23E+03	1.23E+03
Ozone depletion potential (ODP)	kg CFC-11 $_{eq}$	0.00E+00	0.00E+00	4.21E-05	4.21E-05
Eutrophication potential (EP)	kg N $_{eq}$	0.00E+00	0.00E+00	6.15E+00	6.15E+00
Acidification potential (AP)	kg $SO_{2\ eq}$	0.00E+00	0.00E+00	5.07E+00	5.07E+00
Smog formation potential (SFP)	kg $O_{3\ eq}$	0.00E+00	0.00E+00	6.12E+01	6.12E+01
Abiotic resource depletion potential for fossil energy resources (ADP_{fossil})	MJ surplus	0.00E+00	0.00E+00	1.00E+03	1.00E+03

Table 5-4: LCA Results – 1 Tonne of Metallic-Coated, Hot-Rolled Steel Sheet

Impact Category Indicators	Unit	A1	A2	A3	A1-A3
Global warming potential (GWP 100)	kg $CO_{2\ eq}$	6.55E+01	2.70E+00	1.31E+03	1.38E+03
Ozone depletion potential (ODP)	kg CFC-11 $_{eq}$	2.25E-06	3.81E-08	4.74E-05	4.97E-05
Eutrophication potential (EP)	kg N_{eq}	8.21E-01	2.06E-03	6.14E+00	6.97E+00
Acidification potential (AP)	kg $SO_{2\ eq}$	7.93E-01	2.78E-02	5.21E+00	6.03E+00
Smog formation potential (SFP)	kg $O_{3\ eq}$	7.42E+00	9.13E-01	6.40E+01	7.24E+01
Abiotic resource depletion potential for fossil energy resources (ADP_{fossil})	MJ surplus	5.84E+01	5.37E+00	1.17E+03	1.24E+03

Table 5-5: LCA Results – 1 Tonne of Temper-Passed, Pickled, Hot-Rolled Steel Sheet

Impact Category Indicators	Unit	A1	A2	A3	A1-A3
Global warming potential (GWP 100)	kg $CO_{2\ eq}$	0.00E+00	1.13E-03	1.27E+03	1.27E+03
Ozone depletion potential (ODP)	kg CFC-11 $_{eq}$	0.00E+00	1.62E-11	4.53E-05	4.53E-05
Eutrophication potential (EP)	kg N_{eq}	0.00E+00	6.27E-07	6.25E+00	6.25E+00
Acidification potential (AP)	kg $SO_{2\ eq}$	0.00E+00	6.20E-06	5.26E+00	5.26E+00
Smog formation potential (SFP)	kg $O_{3\ eq}$	0.00E+00	1.90E-04	6.31E+01	6.31E+01
Abiotic resource depletion potential for fossil energy resources (ADP_{fossil})	MJ surplus	0.00E+00	2.24E-03	1.04E+03	1.04E+03

Table 5-6: LCA Results – 1 Tonne of Pickled, Hot-Rolled, Annealed Steel Sheet

Impact Category Indicators	Unit	A1	A2	A3	A1-A3
Global warming potential (GWP 100)	kg $CO_{2\ eq}$	0.00E+00	1.11E-03	1.32E+03	1.32E+03
Ozone depletion potential (ODP)	kg CFC-11 $_{eq}$	0.00E+00	1.59E-11	4.57E-05	4.57E-05
Eutrophication potential (EP)	kg N_{eq}	0.00E+00	6.16E-07	6.28E+00	6.28E+00
Acidification potential (AP)	kg $SO_{2\ eq}$	0.00E+00	6.09E-06	5.35E+00	5.35E+00
Smog formation potential (SFP)	kg $O_{3\ eq}$	0.00E+00	1.87E-04	6.49E+01	6.49E+01
Abiotic resource depletion potential for fossil energy resources (ADP_{fossil})	MJ surplus	0.00E+00	2.20E-03	1.13E+03	1.13E+03

Table 5-7: LCA Results – 1 Tonne of Cold-Rolled, Full-Hard Steel Sheet

Impact Category Indicators	Unit	A1	A2	A3	A1-A3
Global warming potential (GWP 100)	kg $CO_{2\ eq}$	0.00E+00	0.00E+00	1.27E+03	1.27E+03
Ozone depletion potential (ODP)	kg CFC-11 $_{eq}$	0.00E+00	0.00E+00	4.32E-05	4.32E-05
Eutrophication potential (EP)	kg N_{eq}	0.00E+00	0.00E+00	6.23E+00	6.23E+00
Acidification potential (AP)	kg $SO_{2\ eq}$	0.00E+00	0.00E+00	5.26E+00	5.26E+00
Smog formation potential (SFP)	kg $O_{3\ eq}$	0.00E+00	0.00E+00	6.30E+01	6.30E+01
Abiotic resource depletion potential for fossil energy resources (ADP_{fossil})	MJ surplus	0.00E+00	0.00E+00	1.04E+03	1.04E+03

Table 5-8: LCA Results – 1 Tonne of Cold-Rolled, Full-Hard, Temper Rolled Steel Sheet

Impact Category Indicators	Unit	A1	A2	A3	A1-A3
Global warming potential (GWP 100)	kg $CO_{2\ eq}$	0.00E+00	1.10E-03	1.33E+03	1.33E+03
Ozone depletion potential (ODP)	kg CFC-11 $_{eq}$	0.00E+00	1.59E-11	4.80E-05	4.80E-05
Eutrophication potential (EP)	kg $N_{\ eq}$	0.00E+00	6.14E-07	6.41E+00	6.41E+00
Acidification potential (AP)	kg $SO_{2\ eq}$	0.00E+00	6.07E-06	5.52E+00	5.52E+00
Smog formation potential (SFP)	kg $O_{3\ eq}$	0.00E+00	1.86E-04	6.57E+01	6.57E+01
Abiotic resource depletion potential for fossil energy resources (ADP_{fossil})	MJ surplus	0.00E+00	2.20E-03	1.09E+03	1.09E+03

Table 5-9: LCA Results – 1 Tonne of Cold-Rolled, Fully Processed Steel Sheet

Impact Category Indicators	Unit	A1	A2	A3	A1-A3
Global warming potential (GWP 100)	kg $CO_{2\ eq}$	0.00E+00	1.10E-03	1.40E+03	1.40E+03
Ozone depletion potential (ODP)	kg CFC-11 $_{eq}$	0.00E+00	1.59E-11	4.94E-05	4.94E-05
Eutrophication potential (EP)	kg $N_{\ eq}$	0.00E+00	6.14E-07	6.57E+00	6.57E+00
Acidification potential (AP)	kg $SO_{2\ eq}$	0.00E+00	6.07E-06	5.73E+00	5.73E+00
Smog formation potential (SFP)	kg $O_{3\ eq}$	0.00E+00	1.86E-04	6.89E+01	6.89E+01
Abiotic resource depletion potential for fossil energy resources (ADP_{fossil})	MJ surplus	0.00E+00	2.20E-03	1.21E+03	1.21E+03

Table 5-10: LCA Results – 1 Tonne of Metallic-Coated, Cold-Rolled Steel Sheet

Impact Category Indicators	Unit	A1	A2	A3	A1-A3
Global warming potential (GWP 100)	kg $CO_{2\ eq}$	1.22E+02	2.70E+00	1.39E+03	1.51E+03
Ozone depletion potential (ODP)	kg CFC-11 $_{eq}$	4.18E-06	3.81E-08	4.70E-05	5.12E-05
Eutrophication potential (EP)	kg $N_{\ eq}$	1.53E+00	2.06E-03	6.39E+00	7.92E+00
Acidification potential (AP)	kg $SO_{2\ eq}$	1.48E+00	2.78E-02	5.54E+00	7.04E+00
Smog formation potential (SFP)	kg $O_{3\ eq}$	1.38E+01	9.13E-01	6.75E+01	8.22E+01
Abiotic resource depletion potential for fossil energy resources (ADP_{fossil})	MJ surplus	1.09E+02	5.37E+00	1.24E+03	1.35E+03

Table 5-11: LCA Results – 1 Tonne of Post-Annealed, Metallic-Coated, Cold-Rolled Steel Sheet

Impact Category Indicators	Unit	A1	A2	A3	A1-A3
Global warming potential (GWP 100)	kg $CO_{2\ eq}$	0.00E+00	1.10E-03	1.56E+03	1.56E+03
Ozone depletion potential (ODP)	kg CFC-11 $_{eq}$	0.00E+00	1.59E-11	5.33E-05	5.33E-05
Eutrophication potential (EP)	kg $N_{\ eq}$	0.00E+00	6.14E-07	7.87E+00	7.87E+00
Acidification potential (AP)	kg $SO_{2\ eq}$	0.00E+00	6.07E-06	7.16E+00	7.16E+00
Smog formation potential (SFP)	kg $O_{3\ eq}$	0.00E+00	1.86E-04	8.39E+01	8.39E+01
Abiotic resource depletion potential for fossil energy resources (ADP_{fossil})	MJ surplus	0.00E+00	2.20E-03	1.44E+03	1.44E+03

5.2 LCA RESULTS FROM LCI

Table 5-12: LCA Results – 1 Tonne of Hot-Rolled Steel Sheet

Inventory Indicators	Unit	A1	A2	A3	A1-A3
Renewable primary resources used as an energy carrier (fuel) (RPRE)	MJ LHV	6.92E+01	5.73E-01	5.58E+02	6.28E+02
Renewable primary resources with energy content used as material (RPRM)[1]	MJ LHV	IND	IND	IND	IND
Non-renewable primary resources used as an energy carrier (fuel) (NRPRE)	MJ LHV	2.71E+03	3.62E+02	1.33E+04	1.63E+04
Non-renewable primary resources with energy content used as material, (NRPRM)[1]	MJ LHV	IND	IND	IND	IND
Secondary materials (SM)[2]	kg	8.29E+02	0.00E+00	2.14E+02	1.04E+03
Renewable secondary fuels (RSF) [1]	MJ LHV	IND	IND	IND	IND
Non-renewable secondary fuels (NRSF) [1]	MJ LHV	IND	IND	IND	IND
Recovered energy (RE) [1]	MJ LHV	IND	IND	IND	IND
Consumption of freshwater resources (FW)	m^3	1.65E-01	1.30E-02	1.60E+01	1.62E+01
Hazardous waste disposed (HWD)	kg	0.00E+00	0.00E+00	5.94E+00	5.94E+00
Non-hazardous waste disposed (NHWD)	kg	0.00E+00	0.00E+00	1.78E+00	1.78E+00
High-level radioactive waste (HLRW) [1]	m^3	IND	IND	IND	IND
Intermediate and low-level radioactive waste (ILLRW) [1]	m^3	IND	IND	IND	IND
Components for Re-use (CRU) [1]	kg	IND	IND	IND	IND
Materials for recycling, i.e., secondary material for use in the next product system (MR)	kg	0.00E+00	0.00E+00	1.17E+02	1.17E+02
Materials for energy recovery, i.e., secondary fuels for use in the next product system (MER) [1]	kg	IND	IND	IND	IND
Recovered energy exported from the product system (EE)[1]	MJ LHV	IND	IND	IND	IND

[1] Calculated as per ACLCA ISO 21930 Guidance [R-9]. Not applicable for this product system.
[2] Calculated as per ACLCA ISO 21930 Guidance [R-9]. Includes purchased recycled steel scrap. Does not include internally recycled by-products.

Table 5-13: LCA Results – 1 Tonne of Processed, Hot-Rolled Steel Sheet

Inventory Indicators	Unit	A1	A2	A3	A1-A3
Renewable primary resources used as an energy carrier (fuel) (RPRE)	MJ LHV	0.00E+00	0.00E+00	6.58E+02	6.58E+02
Renewable primary resources with energy content used as material (RPRM)[1]	MJ LHV	IND	IND	IND	IND
Non-renewable primary resources used as an energy carrier (fuel) (NRPRE)	MJ LHV	0.00E+00	0.00E+00	1.74E+04	1.74E+04
Non-renewable primary resources with energy content used as material, (NRPRM)[1]	MJ LHV	IND	IND	IND	IND
Secondary materials (SM) [2]	kg	0.00E+00	0.00E+00	1.07E+03	1.07E+03
Renewable secondary fuels (RSF) [1]	MJ LHV	IND	IND	IND	IND
Non-renewable secondary fuels (NRSF) [1]	MJ LHV	IND	IND	IND	IND
Recovered energy (RE) [1]	MJ LHV	IND	IND	IND	IND
Consumption of freshwater resources (FW)	m^3	0.00E+00	0.00E+00	1.75E+01	1.75E+01
Hazardous waste disposed (HWD)	kg	0.00E+00	0.00E+00	6.10E+00	6.10E+00
Non-hazardous waste disposed (NHWD)	kg	0.00E+00	0.00E+00	1.83E+00	1.83E+00
High-level radioactive waste (HLRW) [1]	m^3	IND	IND	IND	IND
Intermediate and low-level radioactive waste (ILLRW) [1]	m^3	IND	IND	IND	IND
Components for Re-use (CRU) [1]	kg	IND	IND	IND	IND
Materials for recycling, i.e., secondary material for use in the next product system (MR)	kg	0.00E+00	0.00E+00	1.20E+02	1.20E+02
Materials for energy recovery, i.e., secondary fuels for use in the next product system (MER) [1]	kg	IND	IND	IND	IND
Recovered energy exported from the product system (EE)[1]	MJ LHV	IND	IND	IND	IND

[1] Calculated as per ACLCA ISO 21930 Guidance [R-9]. Not applicable for this product system.
[2] Calculated as per ACLCA ISO 21930 Guidance [R-9]. Includes purchased recycled steel scrap. Does not include internally recycled by-products.

Table 5-14: LCA Results – 1 Tonne of Pickled & Oiled, Hot-Rolled Steel Sheet

Inventory Indicators	Unit	A1	A2	A3	A1-A3
Renewable primary resources used as an energy carrier (fuel) (RPRE)	MJ LHV	0.00E+00	0.00E+00	6.42E+02	6.42E+02
Renewable primary resources with energy content used as material (RPRM)[1]	MJ LHV	IND	IND	IND	IND
Non-renewable primary resources used as an energy carrier (fuel) (NRPRE)	MJ LHV	0.00E+00	0.00E+00	1.67E+04	1.67E+04
Non-renewable primary resources with energy content used as material, (NRPRM)[1]	MJ LHV	IND	IND	IND	IND
Secondary materials (SM) [2]	kg	0.00E+00	0.00E+00	1.03E+03	1.03E+03
Renewable secondary fuels (RSF) [1]	MJ LHV	IND	IND	IND	IND
Non-renewable secondary fuels (NRSF) [1]	MJ LHV	IND	IND	IND	IND
Recovered energy (RE) [1]	MJ LHV	IND	IND	IND	IND
Consumption of freshwater resources (FW)	m^3	0.00E+00	0.00E+00	1.66E+01	1.66E+01
Hazardous waste disposed (HWD)	kg	0.00E+00	0.00E+00	5.91E+00	5.91E+00
Non-hazardous waste disposed (NHWD)	kg	0.00E+00	0.00E+00	1.77E+00	1.77E+00
High-level radioactive waste (HLRW) [1]	m^3	IND	IND	IND	IND
Intermediate and low-level radioactive waste (ILLRW) [1]	m^3	IND	IND	IND	IND
Components for Re-use (CRU) [1]	kg	IND	IND	IND	IND
Materials for recycling, i.e., secondary material for use in the next product system (MR)	kg	0.00E+00	0.00E+00	1.48E+02	1.48E+02
Materials for energy recovery, i.e., secondary fuels for use in the next product system (MER) [1]	kg	IND	IND	IND	IND
Recovered energy exported from the product system (EE)[1]	MJ LHV	IND	IND	IND	IND

[1] Calculated as per ACLCA ISO 21930 Guidance [R-9]. Not applicable for this product system.
[2] Calculated as per ACLCA ISO 21930 Guidance [R-9]. Includes purchased recycled steel scrap. Does not include internally recycled by-products.

Table 5-15: LCA Results – 1 Tonne of Metallic-Coated, Hot-Rolled Steel Sheet

Inventory Indicators	Unit	A1	A2	A3	A1-A3
Renewable primary resources used as an energy carrier (fuel) (RPRE)	MJ LHV	1.34E+02	5.21E-02	6.49E+02	7.83E+02
Renewable primary resources with energy content used as material (RPRM)[1]	MJ LHV	IND	IND	IND	IND
Non-renewable primary resources used as an energy carrier (fuel) (NRPRE)	MJ LHV	8.24E+02	3.52E+01	1.79E+04	1.88E+04
Non-renewable primary resources with energy content used as material, (NRPRM)[1]	MJ LHV	IND	IND	IND	IND
Secondary materials (SM) [2]	kg	0.00E+00	0.00E+00	1.02E+03	1.02E+03
Renewable secondary fuels (RSF) [1]	MJ LHV	IND	IND	IND	IND
Non-renewable secondary fuels (NRSF) [1]	MJ LHV	IND	IND	IND	IND
Recovered energy (RE) [1]	MJ LHV	IND	IND	IND	IND
Consumption of freshwater resources (FW)	m^3	2.69E+00	1.14E-03	1.74E+01	2.01E+01
Hazardous waste disposed (HWD)	kg	0.00E+00	0.00E+00	5.87E+00	5.87E+00
Non-hazardous waste disposed (NHWD)	kg	0.00E+00	0.00E+00	1.74E+00	1.74E+00
High-level radioactive waste (HLRW) [1]	m^3	IND	IND	IND	IND
Intermediate and low-level radioactive waste (ILLRW) [1]	m^3	IND	IND	IND	IND
Components for Re-use (CRU) [1]	kg	IND	IND	IND	IND
Materials for recycling, i.e., secondary material for use in the next product system (MR)	kg	0.00E+00	0.00E+00	1.46E+02	1.46E+02
Materials for energy recovery, i.e., secondary fuels for use in the next product system (MER) [1]	kg	IND	IND	IND	IND
Recovered energy exported from the product system (EE)[1]	MJ LHV	IND	IND	IND	IND

[1] Calculated as per ACLCA ISO 21930 Guidance [R-9]. Not applicable for this product system.
[2] Calculated as per ACLCA ISO 21930 Guidance [R-9]. Includes purchased recycled steel scrap. Does not include internally recycled by-products.

Table 5-16: LCA Results – 1 Tonne of Temper-Passed, Pickled, Hot-Rolled Steel Sheet

Inventory Indicators	Unit	A1	A2	A3	A1-A3
Renewable primary resources used as an energy carrier (fuel) (RPRE)	MJ LHV	0.00E+00	2.19E-05	6.62E+02	6.62E+02
Renewable primary resources with energy content used as material (RPRM)[1]	MJ LHV	IND	IND	IND	IND
Non-renewable primary resources used as an energy carrier (fuel) (NRPRE)	MJ LHV	0.00E+00	1.50E-02	1.75E+04	1.75E+04
Non-renewable primary resources with energy content used as material, (NRPRM)[1]	MJ LHV	IND	IND	IND	IND
Secondary materials (SM) [2]	kg	0.00E+00	0.00E+00	1.03E+03	1.03E+03
Renewable secondary fuels (RSF) [1]	MJ LHV	IND	IND	IND	IND
Non-renewable secondary fuels (NRSF) [1]	MJ LHV	IND	IND	IND	IND
Recovered energy (RE) [1]	MJ LHV	IND	IND	IND	IND
Consumption of freshwater resources (FW)	m^3	0.00E+00	7.66E-07	1.77E+01	1.77E+01
Hazardous waste disposed (HWD)	kg	0.00E+00	0.00E+00	5.92E+00	5.92E+00
Non-hazardous waste disposed (NHWD)	kg	0.00E+00	0.00E+00	1.77E+00	1.77E+00
High-level radioactive waste (HLRW) [1]	m^3	IND	IND	IND	IND
Intermediate and low-level radioactive waste (ILLRW) [1]	m^3	IND	IND	IND	IND
Components for Re-use (CRU) [1]	kg	IND	IND	IND	IND
Materials for recycling, i.e., secondary material for use in the next product system (MR)	kg	0.00E+00	0.00E+00	1.48E+02	1.48E+02
Materials for energy recovery, i.e., secondary fuels for use in the next product system (MER) [1]	kg	IND	IND	IND	IND
Recovered energy exported from the product system (EE)[1]	MJ LHV	IND	IND	IND	IND

[1] Calculated as per ACLCA ISO 21930 Guidance [R-9]. Not applicable for this product system.
[2] Calculated as per ACLCA ISO 21930 Guidance [R-9]. Includes purchased recycled steel scrap. Does not include internally recycled by-products.

Table 5-17: LCA Results – 1 Tonne of Pickled, Hot-Rolled, Annealed Steel Sheet

Inventory Indicators	Unit	A1	A2	A3	A1-A3
Renewable primary resources used as an energy carrier (fuel) (RPRE)	MJ LHV	0.00E+00	2.15E-05	6.67E+02	6.67E+02
Renewable primary resources with energy content used as material (RPRM)[1]	MJ LHV	IND	IND	IND	IND
Non-renewable primary resources used as an energy carrier (fuel) (NRPRE)	MJ LHV	0.00E+00	1.47E-02	1.81E+04	1.81E+04
Non-renewable primary resources with energy content used as material, (NRPRM)[1]	MJ LHV	IND	IND	IND	IND
Secondary materials (SM) [2]	kg	0.00E+00	0.00E+00	1.03E+03	1.03E+03
Renewable secondary fuels (RSF) [1]	MJ LHV	IND	IND	IND	IND
Non-renewable secondary fuels (NRSF) [1]	MJ LHV	IND	IND	IND	IND
Recovered energy (RE) [1]	MJ LHV	IND	IND	IND	IND
Consumption of freshwater resources (FW)	m^3	0.00E+00	7.52E-07	1.80E+01	1.80E+01
Hazardous waste disposed (HWD)	kg	0.00E+00	0.00E+00	5.91E+00	5.91E+00
Non-hazardous waste disposed (NHWD)	kg	0.00E+00	0.00E+00	1.77E+00	1.77E+00
High-level radioactive waste (HLRW) [1]	m^3	IND	IND	IND	IND
Intermediate and low-level radioactive waste (ILLRW) [1]	m^3	IND	IND	IND	IND
Components for Re-use (CRU) [1]	kg	IND	IND	IND	IND
Materials for recycling, i.e., secondary material for use in the next product system (MR)	kg	0.00E+00	0.00E+00	1.48E+02	1.48E+02
Materials for energy recovery, i.e., secondary fuels for use in the next product system (MER) [1]	kg	IND	IND	IND	IND
Recovered energy exported from the product system (EE)[1]	MJ LHV	IND	IND	IND	IND

[1] Calculated as per ACLCA ISO 21930 Guidance [R-9]. Not applicable for this product system.
[2] Calculated as per ACLCA ISO 21930 Guidance [R-9]. Includes purchased recycled steel scrap. Does not include internally recycled by-products.

Table 5-18: LCA Results – 1 Tonne of Cold-Rolled, Full-Hard Steel Sheet

Inventory Indicators	Unit	A1	A2	A3	A1-A3
Renewable primary resources used as an energy carrier (fuel) (RPRE)	MJ LHV	0.00E+00	0.00E+00	6.58E+02	6.58E+02
Renewable primary resources with energy content used as material (RPRM)[1]	MJ LHV	IND	IND	IND	IND
Non-renewable primary resources used as an energy carrier (fuel) (NRPRE)	MJ LHV	0.00E+00	0.00E+00	1.74E+04	1.74E+04
Non-renewable primary resources with energy content used as material, (NRPRM)[1]	MJ LHV	IND	IND	IND	IND
Secondary materials (SM) [2]	kg	0.00E+00	0.00E+00	1.03E+03	1.03E+03
Renewable secondary fuels (RSF) [1]	MJ LHV	IND	IND	IND	IND
Non-renewable secondary fuels (NRSF) [1]	MJ LHV	IND	IND	IND	IND
Recovered energy (RE) [1]	MJ LHV	IND	IND	IND	IND
Consumption of freshwater resources (FW)	m^3	0.00E+00	0.00E+00	1.77E+01	1.77E+01
Hazardous waste disposed (HWD)	kg	0.00E+00	0.00E+00	5.90E+00	5.90E+00
Non-hazardous waste disposed (NHWD)	kg	0.00E+00	0.00E+00	1.76E+00	1.76E+00
High-level radioactive waste (HLRW) [1]	m^3	IND	IND	IND	IND
Intermediate and low-level radioactive waste (ILLRW) [1]	m^3	IND	IND	IND	IND
Components for Re-use (CRU) [1]	kg	IND	IND	IND	IND
Materials for recycling, i.e., secondary material for use in the next product system (MR)	kg	0.00E+00	0.00E+00	1.47E+02	1.47E+02
Materials for energy recovery, i.e., secondary fuels for use in the next product system (MER) [1]	kg	IND	IND	IND	IND
Recovered energy exported from the product system (EE)[1]	MJ LHV	IND	IND	IND	IND

[1] Calculated as per ACLCA ISO 21930 Guidance [R-9]. Not applicable for this product system.
[2] Calculated as per ACLCA ISO 21930 Guidance [R-9]. Includes purchased recycled steel scrap. Does not include internally recycled by-products.

Table 5-19: LCA Results – 1 Tonne of Cold-Rolled, Full-Hard, Temper Rolled Steel Sheet

Inventory Indicators	Unit	A1	A2	A3	A1-A3
Renewable primary resources used as an energy carrier (fuel) (RPRE)	MJ LHV	0.00E+00	2.15E-05	6.88E+02	6.88E+02
Renewable primary resources with energy content used as material (RPRM)[1]	MJ LHV	IND	IND	IND	IND
Non-renewable primary resources used as an energy carrier (fuel) (NRPRE)	MJ LHV	0.00E+00	1.47E-02	1.84E+04	1.84E+04
Non-renewable primary resources with energy content used as material, (NRPRM)[1]	MJ LHV	IND	IND	IND	IND
Secondary materials (SM) [2]	kg	0.00E+00	0.00E+00	1.04E+03	1.04E+03
Renewable secondary fuels (RSF) [1]	MJ LHV	IND	IND	IND	IND
Non-renewable secondary fuels (NRSF) [1]	MJ LHV	IND	IND	IND	IND
Recovered energy (RE) [1]	MJ LHV	IND	IND	IND	IND
Consumption of freshwater resources (FW)	m^3	0.00E+00	7.50E-07	1.90E+01	1.90E+01
Hazardous waste disposed (HWD)	kg	0.00E+00	0.00E+00	5.97E+00	5.97E+00
Non-hazardous waste disposed (NHWD)	kg	0.00E+00	0.00E+00	1.78E+00	1.78E+00
High-level radioactive waste (HLRW) [1]	m^3	IND	IND	IND	IND
Intermediate and low-level radioactive waste (ILLRW) [1]	m^3	IND	IND	IND	IND
Components for Re-use (CRU) [1]	kg	IND	IND	IND	IND
Materials for recycling, i.e., secondary material for use in the next product system (MR)	kg	0.00E+00	0.00E+00	1.49E+02	1.49E+02
Materials for energy recovery, i.e., secondary fuels for use in the next product system (MER) [1]	kg	IND	IND	IND	IND
Recovered energy exported from the product system (EE)[1]	MJ LHV	IND	IND	IND	IND

[1] Calculated as per ACLCA ISO 21930 Guidance [R-9]. Not applicable for this product system.
[2] Calculated as per ACLCA ISO 21930 Guidance [R-9]. Includes purchased recycled steel scrap. Does not include internally recycled by-products.

Table 5-20: LCA Results – 1 Tonne of Cold-Rolled, Fully Processed Steel Sheet

Inventory Indicators	Unit	A1	A2	A3	A1-A3
Renewable primary resources used as an energy carrier (fuel) (RPRE)	MJ LHV	0.00E+00	2.15E-05	7.07E+02	7.07E+02
Renewable primary resources with energy content used as material (RPRM)[1]	MJ LHV	IND	IND	IND	IND
Non-renewable primary resources used as an energy carrier (fuel) (NRPRE)	MJ LHV	0.00E+00	1.47E-02	1.95E+04	1.95E+04
Non-renewable primary resources with energy content used as material, (NRPRM)[1]	MJ LHV	IND	IND	IND	IND
Secondary materials (SM) [2]	kg	0.00E+00	0.00E+00	1.06E+03	1.06E+03
Renewable secondary fuels (RSF) [1]	MJ LHV	IND	IND	IND	IND
Non-renewable secondary fuels (NRSF) [1]	MJ LHV	IND	IND	IND	IND
Recovered energy (RE) [1]	MJ LHV	IND	IND	IND	IND
Consumption of freshwater resources (FW)	m^3	0.00E+00	7.50E-07	1.97E+01	1.97E+01
Hazardous waste disposed (HWD)	kg	0.00E+00	0.00E+00	6.10E+00	6.10E+00
Non-hazardous waste disposed (NHWD)	kg	0.00E+00	0.00E+00	1.82E+00	1.82E+00
High-level radioactive waste (HLRW) [1]	m^3	IND	IND	IND	IND
Intermediate and low-level radioactive waste (ILLRW) [1]	m^3	IND	IND	IND	IND
Components for Re-use (CRU) [1]	kg	IND	IND	IND	IND
Materials for recycling, i.e., secondary material for use in the next product system (MR)	kg	0.00E+00	0.00E+00	1.52E+02	1.52E+02
Materials for energy recovery, i.e., secondary fuels for use in the next product system (MER) [1]	kg	IND	IND	IND	IND
Recovered energy exported from the product system (EE)[1]	MJ LHV	IND	IND	IND	IND

[1] Calculated as per ACLCA ISO 21930 Guidance [R-9]. Not applicable for this product system.
[2] Calculated as per ACLCA ISO 21930 Guidance [R-9]. Includes purchased recycled steel scrap. Does not include internally recycled by-products.

Table 5-21: LCA Results – 1 Tonne of Metallic-Coated, Cold-Rolled Steel Sheet

Inventory Indicators	Unit	A1	A2	A3	A1-A3
Renewable primary resources used as an energy carrier (fuel) (RPRE)	MJ LHV	2.50E+02	5.21E-02	6.81E+02	9.31E+02
Renewable primary resources with energy content used as material (RPRM)[1]	MJ LHV	IND	IND	IND	IND
Non-renewable primary resources used as an energy carrier (fuel) (NRPRE)	MJ LHV	1.53E+03	3.52E+01	1.91E+04	2.07E+04
Non-renewable primary resources with energy content used as material, (NRPRM)[1]	MJ LHV	IND	IND	IND	IND
Secondary materials (SM) [2]	kg	0.00E+00	0.00E+00	1.04E+03	1.04E+03
Renewable secondary fuels (RSF) [1]	MJ LHV	IND	IND	IND	IND
Non-renewable secondary fuels (NRSF) [1]	MJ LHV	IND	IND	IND	IND
Recovered energy (RE) [1]	MJ LHV	IND	IND	IND	IND
Consumption of freshwater resources (FW)	m^3	5.01E+00	1.14E-03	1.90E+01	2.40E+01
Hazardous waste disposed (HWD)	kg	0.00E+00	0.00E+00	6.01E+00	6.01E+00
Non-hazardous waste disposed (NHWD)	kg	0.00E+00	0.00E+00	1.78E+00	1.78E+00
High-level radioactive waste (HLRW) [1]	m^3	IND	IND	IND	IND
Intermediate and low-level radioactive waste (ILLRW) [1]	m^3	IND	IND	IND	IND
Components for Re-use (CRU) [1]	kg	IND	IND	IND	IND
Materials for recycling, i.e., secondary material for use in the next product system (MR)	kg	0.00E+00	0.00E+00	1.51E+02	1.51E+02
Materials for energy recovery, i.e., secondary fuels for use in the next product system (MER) [1]	kg	IND	IND	IND	IND
Recovered energy exported from the product system (EE)[1]	MJ LHV	IND	IND	IND	IND

[1] Calculated as per ACLCA ISO 21930 Guidance [R-9]. Not applicable for this product system.
[2] Calculated as per ACLCA ISO 21930 Guidance [R-9]. Includes purchased recycled steel scrap. Does not include internally recycled by-products.

Table 5-22: LCA Results – 1 Tonne of Post-Annealed, Metallic-Coated, Cold-Rolled Steel Sheet

Inventory Indicators	Unit	A1	A2	A3	A1-A3
Renewable primary resources used as an energy carrier (fuel) (RPRE)	MJ LHV	0.00E+00	2.15E-05	9.35E+02	9.35E+02
Renewable primary resources with energy content used as material (RPRM)[1]	MJ LHV	IND	IND	IND	IND
Non-renewable primary resources used as an energy carrier (fuel) (NRPRE)	MJ LHV	0.00E+00	1.47E-02	2.16E+04	2.16E+04
Non-renewable primary resources with energy content used as material, (NRPRM)[1]	MJ LHV	IND	IND	IND	IND
Secondary materials (SM) [2]	kg	0.00E+00	0.00E+00	1.02E+03	1.02E+03
Renewable secondary fuels (RSF) [1]	MJ LHV	IND	IND	IND	IND
Non-renewable secondary fuels (NRSF) [1]	MJ LHV	IND	IND	IND	IND
Recovered energy (RE) [1]	MJ LHV	IND	IND	IND	IND
Consumption of freshwater resources (FW)	m^3	0.00E+00	7.50E-07	2.48E+01	2.48E+01
Hazardous waste disposed (HWD)	kg	0.00E+00	0.00E+00	5.86E+00	5.86E+00
Non-hazardous waste disposed (NHWD)	kg	0.00E+00	0.00E+00	1.74E+00	1.74E+00
High-level radioactive waste (HLRW) [1]	m^3	IND	IND	IND	IND
Intermediate and low-level radioactive waste (ILLRW) [1]	m^3	IND	IND	IND	IND
Components for Re-use (CRU) [1]	kg	IND	IND	IND	IND
Materials for recycling, i.e., secondary material for use in the next product system (MR)	kg	0.00E+00	0.00E+00	1.47E+02	1.47E+02
Materials for energy recovery, i.e., secondary fuels for use in the next product system (MER) [1]	kg	IND	IND	IND	IND
Recovered energy exported from the product system (EE)[1]	MJ LHV	IND	IND	IND	IND

[1] Calculated as per ACLCA ISO 21930 Guidance [R-9]. Not applicable for this product system.
[2] Calculated as per ACLCA ISO 21930 Guidance [R-9]. Includes purchased recycled steel scrap. Does not include internally recycled by-products.

6 LCA: INTERPRETATION

6.1 LIMITATIONS

Based on the goal and scope of this LCA, the following limitations were found:

- The analysis in this study is specific to the 11 steel products produced in 2021 at the Butler Facility.
- This study addresses the environmental aspects and potential environmental impacts throughout a product's life cycle from raw material acquisition through production (i.e., cradle-to-gate).
- The impact assessment results are relative expressions and do not predict impacts on category endpoints, the exceeding of thresholds, safety margins, or risks.
- This study is limited to the potential environmental impacts of steel sheet products for the impact categories considered, and it does not consider human or ecotoxicity.
- The study is limited to the environmental performance of steel production and does not account for specific uses of these products.

6.2 CONTRIBUTION ANALYSIS

The impact assessment by module for 1 tonne of the 11 steel products is shown in Figure 6-1 through Figure 6-11 on a percent (%) basis.

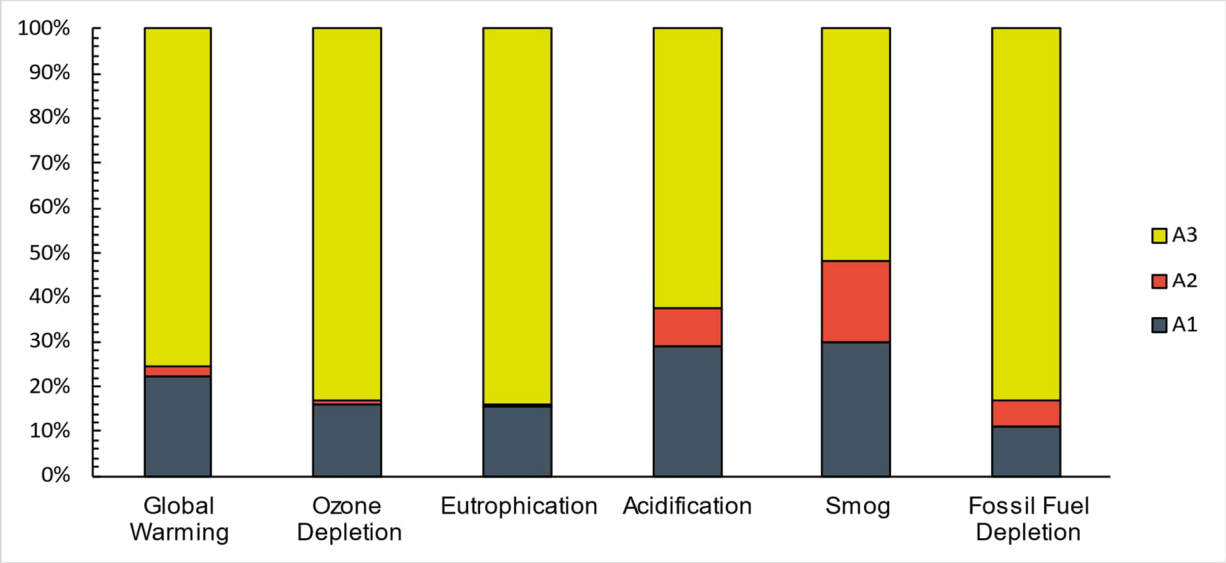


Figure 6-1: Contribution Analysis – 1 Tonne of Hot-Rolled Steel Sheet

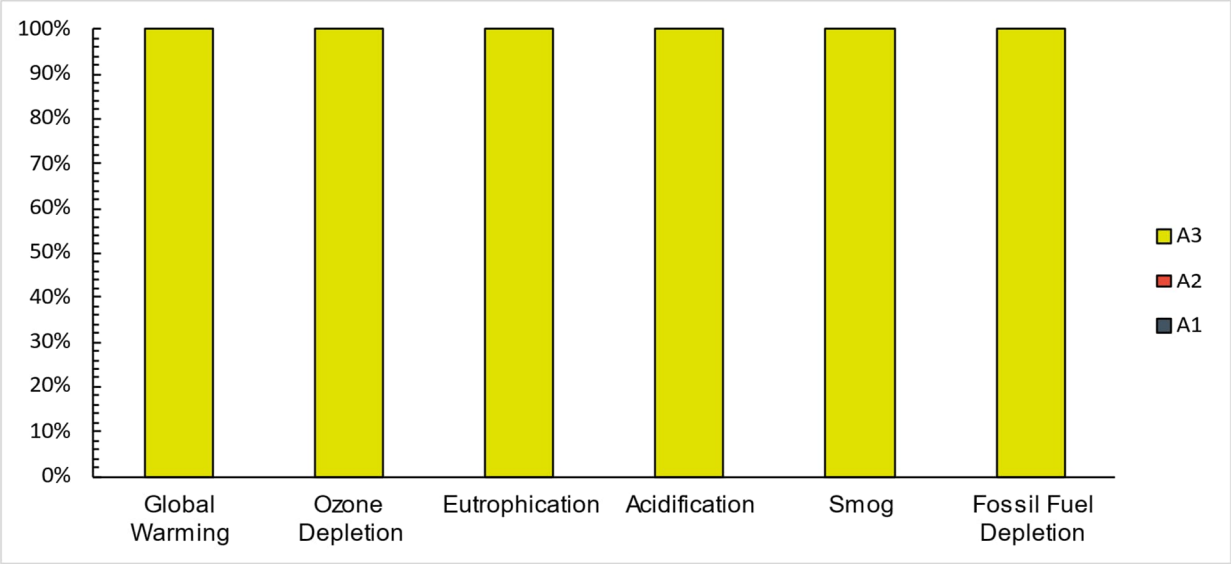


Figure 6-2: Contribution Analysis – 1 Tonne of Processed, Hot-Rolled Steel Sheet

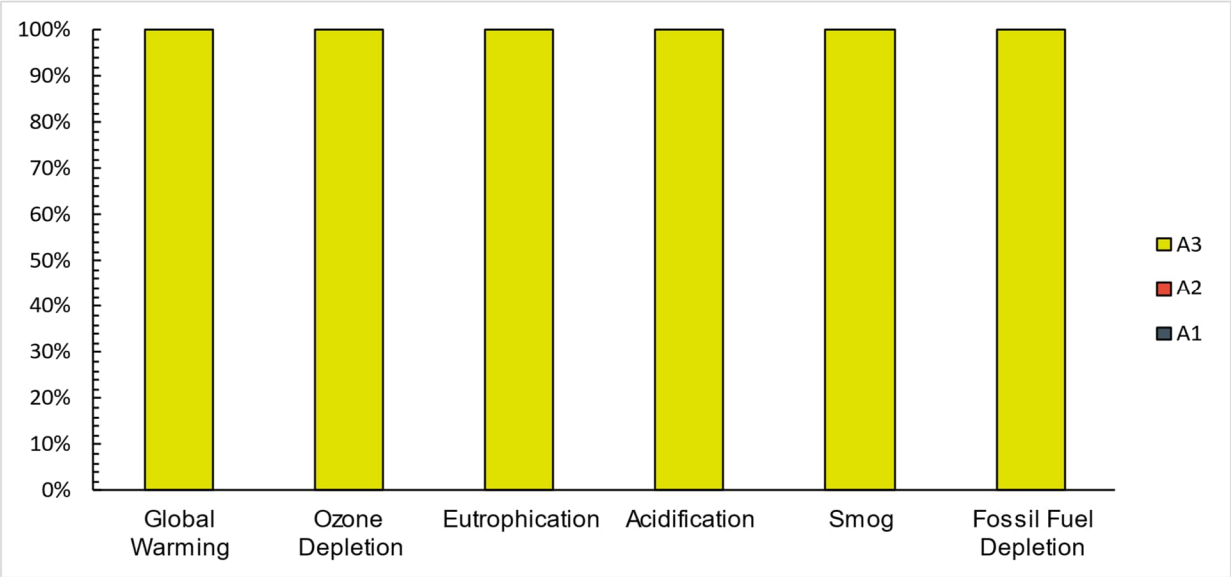


Figure 6-3: Contribution Analysis – 1 Tonne of Pickled & Oiled, Hot-Rolled Steel Sheet

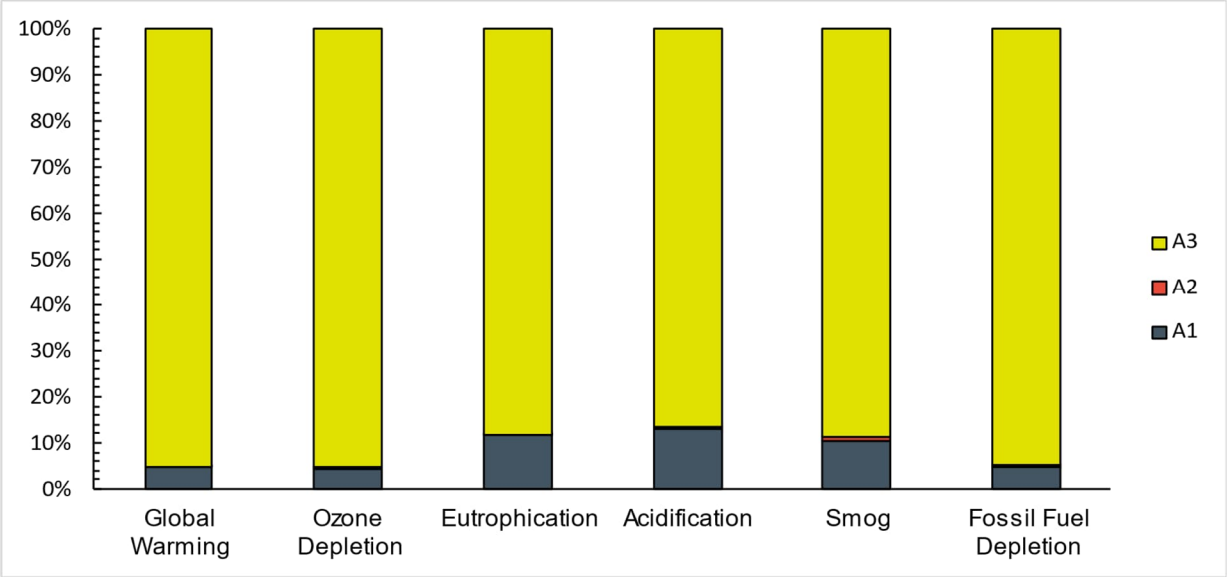


Figure 6-4: Contribution Analysis – 1 Tonne of Metallic-Coated, Hot-Rolled Steel Sheet

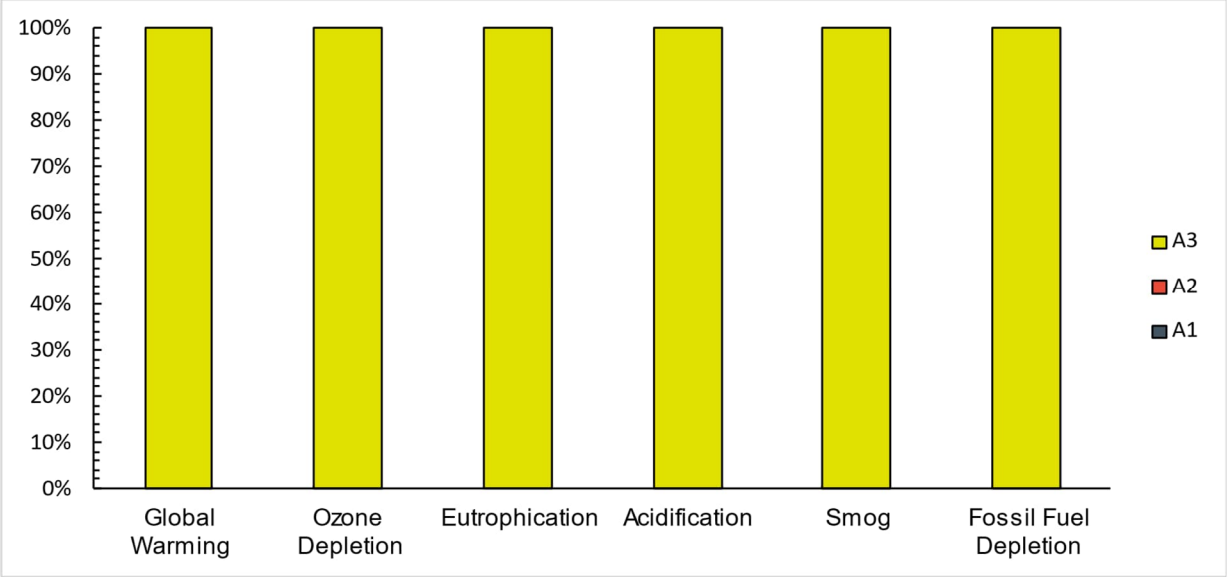


Figure 6-5: Contribution Analysis – 1 Tonne of Temper-Passed, Pickled, Hot-Rolled Steel Sheet

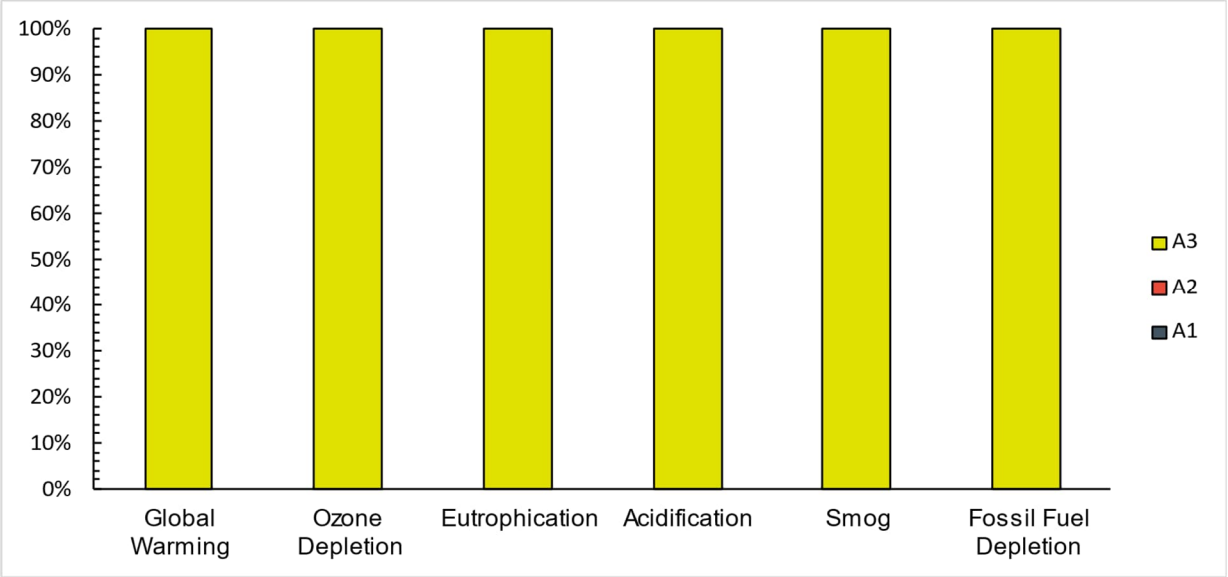


Figure 6-6: Contribution Analysis – 1 Tonne of Pickled, Hot-Rolled, Annealed Steel Sheet

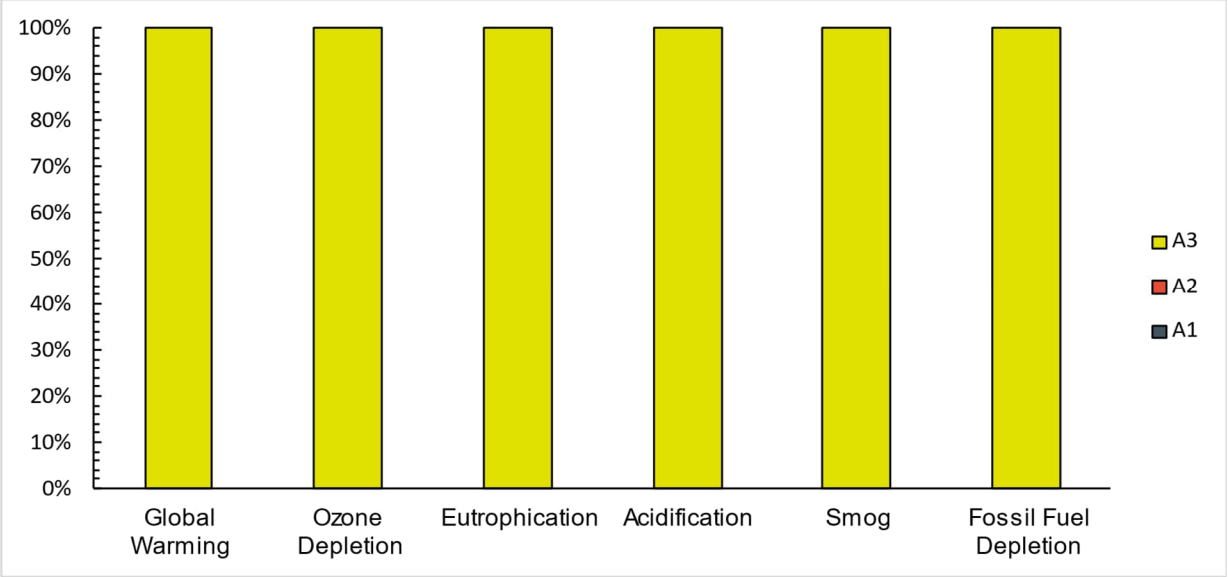


Figure 6-7: Contribution Analysis – 1 Tonne of Cold-Rolled, Full-Hard Steel Sheet

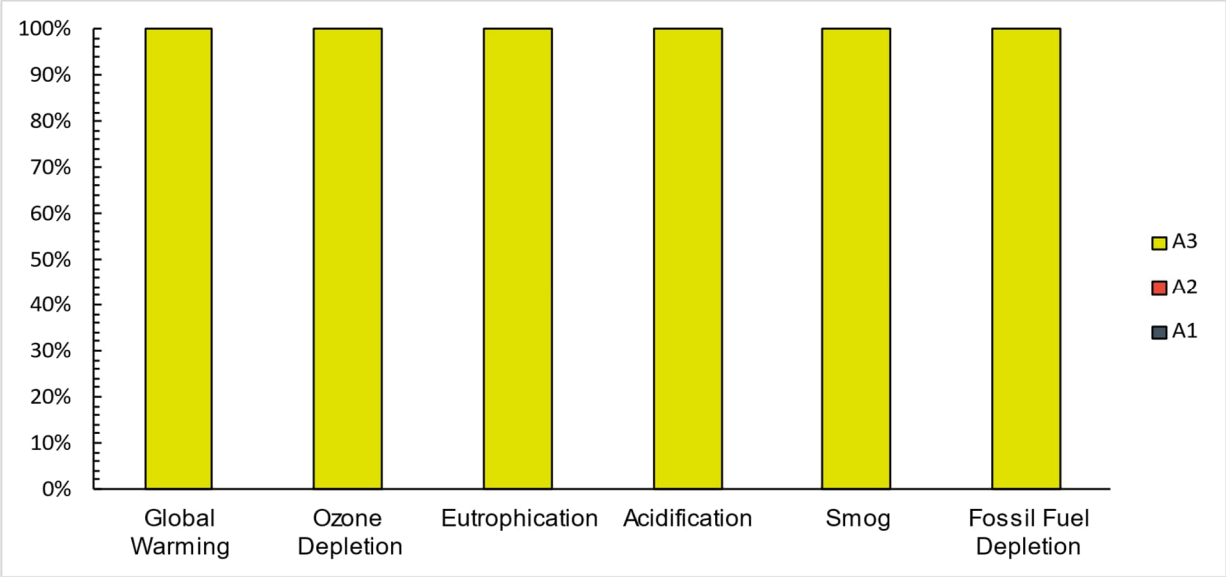


Figure 6-8: Contribution Analysis – 1 Tonne of Cold-Rolled, Full-Hard, Temper Rolled Steel Sheet

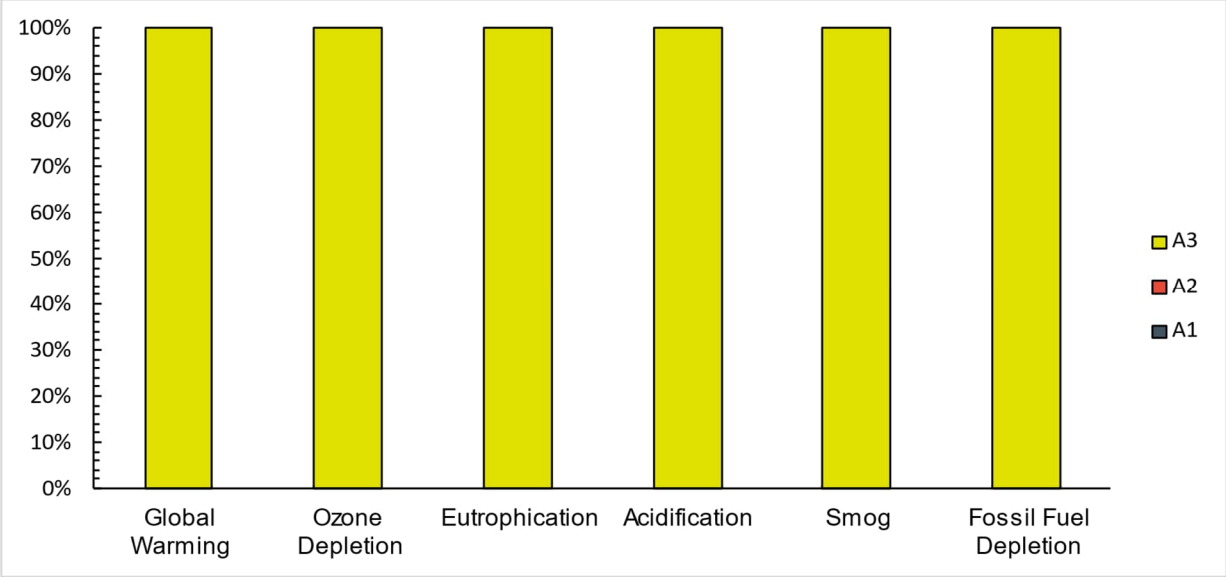


Figure 6-9: Contribution Analysis – 1 Tonne of Cold-Rolled, Fully Processed Steel Sheet

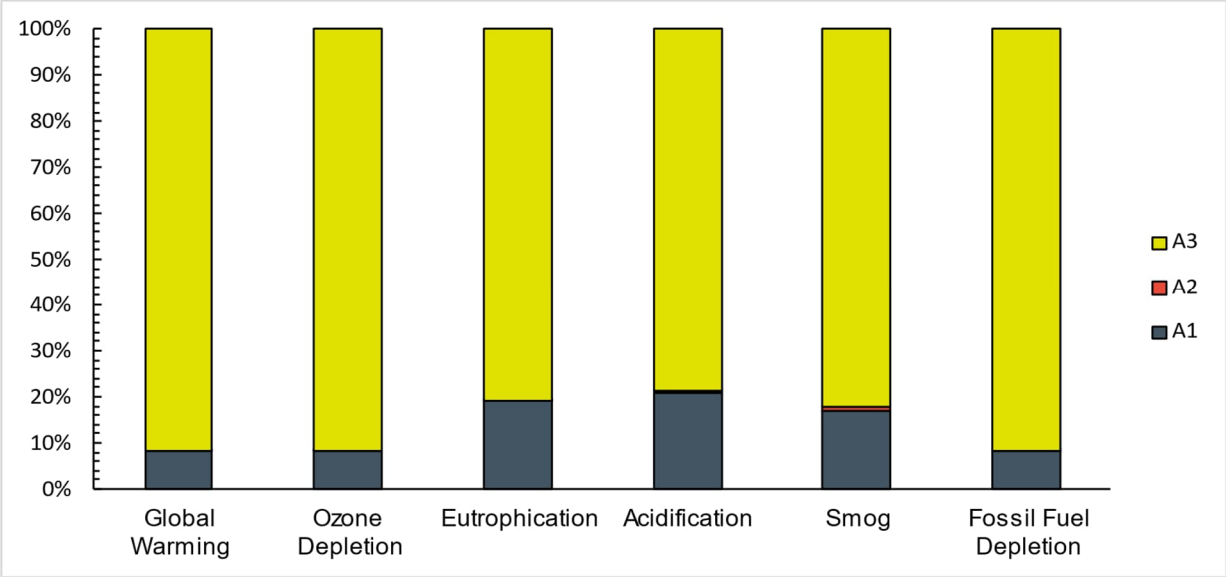


Figure 6-10: Contribution Analysis – 1 Tonne of Metallic-Coated, Cold-Rolled Steel Sheet

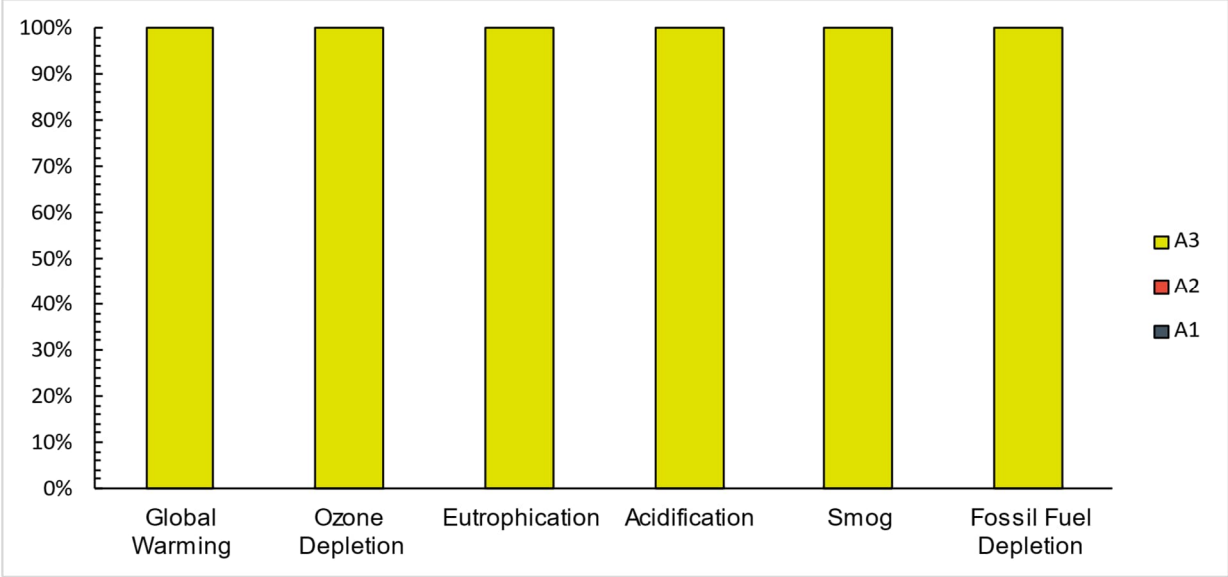


Figure 6-11: Contribution Analysis – 1 Tonne of Post-Annealed, Metallic-Coated, Cold-Rolled Steel Sheet

7 ADDITIONAL ENVIRONMENTAL INFORMATION

7.1 ENVIRONMENT AND HEALTH DURING MANUFACTURING

SDI is committed to providing safe and healthy working conditions for the prevention of work-related injuries and illness; protecting the environment and conserving natural resources; and contributing positively to the communities in which we operate by acting with integrity and fulfilling our compliance obligations. We strive to incorporate sound environmental, health & safety practices into our daily decisions.

In support of our environmental, health & safety policy and mission statement, we are committed to continually improve our environmental, health & safety management and performance by:

1. Integrating our core values, strategic focus, and environmental, health & safety management objectives and initiatives.
2. Fulfilling our environmental, health & safety compliance obligations by meeting all applicable local, state, and federal regulations, customer requirements, and corporate governance.
3. Demonstrating proper safety and environmental behavior through personal example.
4. Maintaining open, two-way consultation and participation when addressing environmental, health & safety issues and goals.
5. Driving continuous improvement initiatives to eliminate safety hazards and to reduce environmental, health & safety risks.
6. Promptly reporting all safety and environmental concerns.
7. Identifying opportunities for environmental sustainability by emphasizing responsible use of energy including the adoption of innovative practices to encourage energy conservation and improve energy efficiency.
8. Communicating and fostering the use of environmental, health & safety best practices.
9. Actively participating in the environmental, health & safety community and taking prominent roles within our industry to set the standard for environmental stewardship and safe working conditions.

7.2 ENVIRONMENTAL ACTIVITIES AND CERTIFICATIONS

The SDI Butler facility is IATF 16949, ISO 9001, and ISO 14001 accredited.

7.3 RENEWABLE ENERY CERTIFICATES

SDI allocated and retired 193,885 MWh of wind generation renewable energy certificates (RECs) to the SDI Butler EAF steel mill facility in 2021. These RECs do not apply to the Iron Dynamics facility.

As per ULE PCR Part A, RECs shall not be included in the LCA but may be reported separately, apart from LCA results [R-1]. The LCA/LCI results including RECs were calculated following the 2022 American Center for Life Cycle Assessment Guidance for Quantifying Renewable Electricity Instruments in Environmental Product Declarations [R-10].

The LCA results of each product under analysis considering RECs, are shown in Table 7-1 to Table 7-11.

Table 7-1: LCA Results Including RECs – 1 Tonne of Hot-Rolled Steel Sheet

Impact Category Indicators	Unit	A1	A2	A3	A1-A3
Global warming potential (GWP 100)	kg $CO_{2\ eq}$	2.69E+02	2.82E+01	8.68E+02	1.17E+03
Ozone depletion potential (ODP)	kg CFC-11 $_{eq}$	5.77E-06	4.14E-07	2.77E-05	3.39E-05
Eutrophication potential (EP)	kg N_{eq}	9.69E-01	2.38E-02	5.03E+00	6.02E+00
Acidification potential (AP)	kg $SO_{2\ eq}$	1.45E+00	4.29E-01	2.89E+00	4.77E+00
Smog formation potential (SFP)	kg $O_{3\ eq}$	1.80E+01	1.07E+01	2.93E+01	5.81E+01
Abiotic resource depletion potential for fossil energy resources (ADP_{fossil})	MJ surplus	1.08E+02	5.51E+01	7.59E+02	9.22E+02
Inventory Indicators	**Unit**	**A1**	**A2**	**A3**	**A1-A3**
Renewable primary resources used as an energy carrier (fuel) (RPRE)	MJ LHV	6.92E+01	5.73E-01	7.93E+02	8.62E+02
Renewable primary resources with energy content used as material (RPRM)[1]	MJ LHV	IND	IND	IND	IND
Non-renewable primary resources used as an energy carrier (fuel) (NRPRE)	MJ LHV	2.71E+03	3.62E+02	1.24E+04	1.55E+04
Non-renewable primary resources with energy content used as material, (NRPRM)[1]	MJ LHV	IND	IND	IND	IND
Secondary materials (SM)[2]	kg	8.29E+02	0.00E+00	2.14E+02	1.04E+03
Renewable secondary fuels (RSF) [1]	MJ LHV	IND	IND	IND	IND
Non-renewable secondary fuels (NRSF) [1]	MJ LHV	IND	IND	IND	IND
Recovered energy (RE) [1]	MJ LHV	IND	IND	IND	IND
Consumption of freshwater resources (FW)	m^3	1.65E-01	1.30E-02	1.48E+01	1.50E+01
Hazardous waste disposed (HWD)	kg	0.00E+00	0.00E+00	5.94E+00	5.94E+00
Non-hazardous waste disposed (NHWD)	kg	0.00E+00	0.00E+00	1.78E+00	1.78E+00
High-level radioactive waste (HLRW) [1]	m^3	IND	IND	IND	IND
Intermediate and low-level radioactive waste (ILLRW) [1]	m^3	IND	IND	IND	IND
Components for Re-use (CRU) [1]	kg	IND	IND	IND	IND
Materials for recycling, i.e., secondary material for use in the next product system (MR)	kg	0.00E+00	0.00E+00	1.17E+02	1.17E+02
Materials for energy recovery, i.e., secondary fuels for use in the next product system (MER) [1]	kg	IND	IND	IND	IND
Recovered energy exported from the product system (EE)[1]	MJ LHV	IND	IND	IND	IND

[1] Calculated as per ACLCA ISO 21930 Guidance [R-9]. Not applicable for this product system.
[2] Calculated as per ACLCA ISO 21930 Guidance [R-9]. Includes purchased recycled steel scrap. Does not include internally recycled by-products.

Table 7-2: LCA Results Including RECs – 1 Tonne of Processed, Hot-Rolled Steel Sheet

Impact Category Indicators	Unit	A1	A2	A3	A1-A3
Global warming potential (GWP 100)	kg $CO_{2\ eq}$	0.00E+00	0.00E+00	1.22E+03	1.22E+03
Ozone depletion potential (ODP)	kg CFC-11 $_{eq}$	0.00E+00	0.00E+00	3.58E-05	3.58E-05
Eutrophication potential (EP)	kg $N_{\ eq}$	0.00E+00	0.00E+00	6.23E+00	6.23E+00
Acidification potential (AP)	kg $SO_{2\ eq}$	0.00E+00	0.00E+00	4.99E+00	4.99E+00
Smog formation potential (SFP)	kg $O_{3\ eq}$	0.00E+00	0.00E+00	6.06E+01	6.06E+01
Abiotic resource depletion potential for fossil energy resources (ADP_{fossil})	MJ surplus	0.00E+00	0.00E+00	9.65E+02	9.65E+02
Inventory Indicators	**Unit**	**A1**	**A2**	**A3**	**A1-A3**
Renewable primary resources used as an energy carrier (fuel) (RPRE)	MJ LHV	0.00E+00	0.00E+00	9.08E+02	9.08E+02
Renewable primary resources with energy content used as material (RPRM)[1]	MJ LHV	IND	IND	IND	IND
Non-renewable primary resources used as an energy carrier (fuel) (NRPRE)	MJ LHV	0.00E+00	0.00E+00	1.63E+04	1.63E+04
Non-renewable primary resources with energy content used as material, (NRPRM)[1]	MJ LHV	IND	IND	IND	IND
Secondary materials (SM) [2]	kg	0.00E+00	0.00E+00	1.07E+03	1.07E+03
Renewable secondary fuels (RSF) [1]	MJ LHV	IND	IND	IND	IND
Non-renewable secondary fuels (NRSF) [1]	MJ LHV	IND	IND	IND	IND
Recovered energy (RE) [1]	MJ LHV	IND	IND	IND	IND
Consumption of freshwater resources (FW)	m^3	0.00E+00	0.00E+00	1.60E+01	1.60E+01
Hazardous waste disposed (HWD)	kg	0.00E+00	0.00E+00	6.10E+00	6.10E+00
Non-hazardous waste disposed (NHWD)	kg	0.00E+00	0.00E+00	1.83E+00	1.83E+00
High-level radioactive waste (HLRW) [1]	m^3	IND	IND	IND	IND
Intermediate and low-level radioactive waste (ILLRW) [1]	m^3	IND	IND	IND	IND
Components for Re-use (CRU) [1]	kg	IND	IND	IND	IND
Materials for recycling, i.e., secondary material for use in the next product system (MR)	kg	0.00E+00	0.00E+00	1.20E+02	1.20E+02
Materials for energy recovery, i.e., secondary fuels for use in the next product system (MER) [1]	kg	IND	IND	IND	IND
Recovered energy exported from the product system (EE)[1]	MJ LHV	IND	IND	IND	IND

[1] Calculated as per ACLCA ISO 21930 Guidance [R-9]. Not applicable for this product system.
[2] Calculated as per ACLCA ISO 21930 Guidance [R-9]. Includes purchased recycled steel scrap. Does not include internally recycled by-products.

Table 7-3: LCA Results Including RECs – 1 Tonne of Pickled & Oiled, Hot-Rolled Steel Sheet

Impact Category Indicators	Unit	A1	A2	A3	A1-A3
Global warming potential (GWP 100)	kg $CO_{2\ eq}$	0.00E+00	0.00E+00	1.18E+03	1.18E+03
Ozone depletion potential (ODP)	kg CFC-11 $_{eq}$	0.00E+00	0.00E+00	3.94E-05	3.94E-05
Eutrophication potential (EP)	kg $N_{\ eq}$	0.00E+00	0.00E+00	6.02E+00	6.02E+00
Acidification potential (AP)	kg $SO_{2\ eq}$	0.00E+00	0.00E+00	4.84E+00	4.84E+00
Smog formation potential (SFP)	kg $O_{3\ eq}$	0.00E+00	0.00E+00	5.93E+01	5.93E+01
Abiotic resource depletion potential for fossil energy resources (ADP_{fossil})	MJ surplus	0.00E+00	0.00E+00	9.55E+02	9.55E+02
Inventory Indicators	**Unit**	**A1**	**A2**	**A3**	**A1-A3**
Renewable primary resources used as an energy carrier (fuel) (RPRE)	MJ LHV	0.00E+00	0.00E+00	8.76E+02	8.76E+02
Renewable primary resources with energy content used as material (RPRM)[1]	MJ LHV	IND	IND	IND	IND
Non-renewable primary resources used as an energy carrier (fuel) (NRPRE)	MJ LHV	0.00E+00	0.00E+00	1.58E+04	1.58E+04
Non-renewable primary resources with energy content used as material, (NRPRM)[1]	MJ LHV	IND	IND	IND	IND
Secondary materials (SM) [2]	kg	0.00E+00	0.00E+00	1.03E+03	1.03E+03
Renewable secondary fuels (RSF) [1]	MJ LHV	IND	IND	IND	IND
Non-renewable secondary fuels (NRSF) [1]	MJ LHV	IND	IND	IND	IND
Recovered energy (RE) [1]	MJ LHV	IND	IND	IND	IND
Consumption of freshwater resources (FW)	m^3	0.00E+00	0.00E+00	1.53E+01	1.53E+01
Hazardous waste disposed (HWD)	kg	0.00E+00	0.00E+00	5.91E+00	5.91E+00
Non-hazardous waste disposed (NHWD)	kg	0.00E+00	0.00E+00	1.77E+00	1.77E+00
High-level radioactive waste (HLRW) [1]	m^3	IND	IND	IND	IND
Intermediate and low-level radioactive waste (ILLRW) [1]	m^3	IND	IND	IND	IND
Components for Re-use (CRU) [1]	kg	IND	IND	IND	IND
Materials for recycling, i.e., secondary material for use in the next product system (MR)	kg	0.00E+00	0.00E+00	1.48E+02	1.48E+02
Materials for energy recovery, i.e., secondary fuels for use in the next product system (MER) [1]	kg	IND	IND	IND	IND
Recovered energy exported from the product system (EE)[1]	MJ LHV	IND	IND	IND	IND

[1] Calculated as per ACLCA ISO 21930 Guidance [R-9]. Not applicable for this product system.
[2] Calculated as per ACLCA ISO 21930 Guidance [R-9]. Includes purchased recycled steel scrap. Does not include internally recycled by-products.

Table 7-4: LCA Results Including RECs – 1 Tonne of Metallic-Coated, Hot-Rolled Steel Sheet

Impact Category Indicators	Unit	A1	A2	A3	A1-A3
Global warming potential (GWP 100)	kg $CO_{2\ eq}$	6.55E+01	2.70E+00	1.25E+03	1.32E+03
Ozone depletion potential (ODP)	kg CFC-11 $_{eq}$	2.25E-06	3.81E-08	4.38E-05	4.61E-05
Eutrophication potential (EP)	kg $N_{\ eq}$	8.21E-01	2.06E-03	5.98E+00	6.80E+00
Acidification potential (AP)	kg $SO_{2\ eq}$	7.93E-01	2.78E-02	4.91E+00	5.73E+00
Smog formation potential (SFP)	kg $O_{3\ eq}$	7.42E+00	9.13E-01	6.15E+01	6.98E+01
Abiotic resource depletion potential for fossil energy resources (ADP_{fossil})	MJ surplus	5.84E+01	5.37E+00	1.11E+03	1.18E+03
Inventory Indicators	**Unit**	**A1**	**A2**	**A3**	**A1-A3**
Renewable primary resources used as an energy carrier (fuel) (RPRE)	MJ LHV	1.34E+02	5.21E-02	1.00E+03	1.14E+03
Renewable primary resources with energy content used as material (RPRM)[1]	MJ LHV	IND	IND	IND	IND
Non-renewable primary resources used as an energy carrier (fuel) (NRPRE)	MJ LHV	8.24E+02	3.52E+01	1.67E+04	1.75E+04
Non-renewable primary resources with energy content used as material, (NRPRM)[1]	MJ LHV	IND	IND	IND	IND
Secondary materials (SM) [2]	kg	0.00E+00	0.00E+00	1.02E+03	1.02E+03
Renewable secondary fuels (RSF) [1]	MJ LHV	IND	IND	IND	IND
Non-renewable secondary fuels (NRSF) [1]	MJ LHV	IND	IND	IND	IND
Recovered energy (RE) [1]	MJ LHV	IND	IND	IND	IND
Consumption of freshwater resources (FW)	m^3	2.69E+00	1.14E-03	1.57E+01	1.84E+01
Hazardous waste disposed (HWD)	kg	0.00E+00	0.00E+00	5.87E+00	5.87E+00
Non-hazardous waste disposed (NHWD)	kg	0.00E+00	0.00E+00	1.74E+00	1.74E+00
High-level radioactive waste (HLRW) [1]	m^3	IND	IND	IND	IND
Intermediate and low-level radioactive waste (ILLRW) [1]	m^3	IND	IND	IND	IND
Components for Re-use (CRU) [1]	kg	IND	IND	IND	IND
Materials for recycling, i.e., secondary material for use in the next product system (MR)	kg	0.00E+00	0.00E+00	1.46E+02	1.46E+02
Materials for energy recovery, i.e., secondary fuels for use in the next product system (MER) [1]	kg	IND	IND	IND	IND
Recovered energy exported from the product system (EE)[1]	MJ LHV	IND	IND	IND	IND

[1] Calculated as per ACLCA ISO 21930 Guidance [R-9]. Not applicable for this product system.
[2] Calculated as per ACLCA ISO 21930 Guidance [R-9]. Includes purchased recycled steel scrap. Does not include internally recycled by-products.

Table 7-5: LCA Results Including RECs – 1 Tonne of Temper-Passed, Pickled, Hot-Rolled Steel Sheet

Impact Category Indicators	Unit	A1	A2	A3	A1-A3
Global warming potential (GWP 100)	kg $CO_{2\ eq}$	0.00E+00	1.13E-03	1.22E+03	1.22E+03
Ozone depletion potential (ODP)	kg CFC-11 $_{eq}$	0.00E+00	1.62E-11	4.26E-05	4.26E-05
Eutrophication potential (EP)	kg $N_{\ eq}$	0.00E+00	6.27E-07	6.13E+00	6.13E+00
Acidification potential (AP)	kg $SO_{2\ eq}$	0.00E+00	6.20E-06	5.03E+00	5.03E+00
Smog formation potential (SFP)	kg $O_{3\ eq}$	0.00E+00	1.90E-04	6.12E+01	6.12E+01
Abiotic resource depletion potential for fossil energy resources (ADP_{fossil})	MJ surplus	0.00E+00	2.24E-03	9.95E+02	9.95E+02
Inventory Indicators	**Unit**	**A1**	**A2**	**A3**	**A1-A3**
Renewable primary resources used as an energy carrier (fuel) (RPRE)	MJ LHV	0.00E+00	2.19E-05	9.27E+02	9.27E+02
Renewable primary resources with energy content used as material (RPRM)[1]	MJ LHV	IND	IND	IND	IND
Non-renewable primary resources used as an energy carrier (fuel) (NRPRE)	MJ LHV	0.00E+00	1.50E-02	1.65E+04	1.65E+04
Non-renewable primary resources with energy content used as material, (NRPRM)[1]	MJ LHV	IND	IND	IND	IND
Secondary materials (SM) [2]	kg	0.00E+00	0.00E+00	1.03E+03	1.03E+03
Renewable secondary fuels (RSF) [1]	MJ LHV	IND	IND	IND	IND
Non-renewable secondary fuels (NRSF) [1]	MJ LHV	IND	IND	IND	IND
Recovered energy (RE) [1]	MJ LHV	IND	IND	IND	IND
Consumption of freshwater resources (FW)	m^3	0.00E+00	7.66E-07	1.64E+01	1.64E+01
Hazardous waste disposed (HWD)	kg	0.00E+00	0.00E+00	5.92E+00	5.92E+00
Non-hazardous waste disposed (NHWD)	kg	0.00E+00	0.00E+00	1.77E+00	1.77E+00
High-level radioactive waste (HLRW) [1]	m^3	IND	IND	IND	IND
Intermediate and low-level radioactive waste (ILLRW) [1]	m^3	IND	IND	IND	IND
Components for Re-use (CRU) [1]	kg	IND	IND	IND	IND
Materials for recycling, i.e., secondary material for use in the next product system (MR)	kg	0.00E+00	0.00E+00	1.48E+02	1.48E+02
Materials for energy recovery, i.e., secondary fuels for use in the next product system (MER) [1]	kg	IND	IND	IND	IND
Recovered energy exported from the product system (EE)[1]	MJ LHV	IND	IND	IND	IND

[1] Calculated as per ACLCA ISO 21930 Guidance [R-9]. Not applicable for this product system.
[2] Calculated as per ACLCA ISO 21930 Guidance [R-9]. Includes purchased recycled steel scrap. Does not include internally recycled by-products.

Table 7-6: LCA Results Including RECs – 1 Tonne of Pickled, Hot-Rolled, Annealed Steel Sheet

Impact Category Indicators	Unit	A1	A2	A3	A1-A3
Global warming potential (GWP 100)	kg $CO_{2\ eq}$	0.00E+00	1.11E-03	1.27E+03	1.27E+03
Ozone depletion potential (ODP)	kg CFC-11 $_{eq}$	0.00E+00	1.59E-11	4.30E-05	4.30E-05
Eutrophication potential (EP)	kg $N_{\ eq}$	0.00E+00	6.16E-07	6.15E+00	6.15E+00
Acidification potential (AP)	kg $SO_{2\ eq}$	0.00E+00	6.09E-06	5.12E+00	5.12E+00
Smog formation potential (SFP)	kg $O_{3\ eq}$	0.00E+00	1.87E-04	6.29E+01	6.29E+01
Abiotic resource depletion potential for fossil energy resources (ADP_{fossil})	MJ surplus	0.00E+00	2.20E-03	1.08E+03	1.08E+03
Inventory Indicators	**Unit**	**A1**	**A2**	**A3**	**A1-A3**
Renewable primary resources used as an energy carrier (fuel) (RPRE)	MJ LHV	0.00E+00	2.15E-05	9.35E+02	9.35E+02
Renewable primary resources with energy content used as material (RPRM)[1]	MJ LHV	IND	IND	IND	IND
Non-renewable primary resources used as an energy carrier (fuel) (NRPRE)	MJ LHV	0.00E+00	1.47E-02	1.71E+04	1.71E+04
Non-renewable primary resources with energy content used as material, (NRPRM)[1]	MJ LHV	IND	IND	IND	IND
Secondary materials (SM) [2]	kg	0.00E+00	0.00E+00	1.03E+03	1.03E+03
Renewable secondary fuels (RSF) [1]	MJ LHV	IND	IND	IND	IND
Non-renewable secondary fuels (NRSF) [1]	MJ LHV	IND	IND	IND	IND
Recovered energy (RE) [1]	MJ LHV	IND	IND	IND	IND
Consumption of freshwater resources (FW)	m^3	0.00E+00	7.52E-07	1.67E+01	1.67E+01
Hazardous waste disposed (HWD)	kg	0.00E+00	0.00E+00	5.91E+00	5.91E+00
Non-hazardous waste disposed (NHWD)	kg	0.00E+00	0.00E+00	1.77E+00	1.77E+00
High-level radioactive waste (HLRW) [1]	m^3	IND	IND	IND	IND
Intermediate and low-level radioactive waste (ILLRW) [1]	m^3	IND	IND	IND	IND
Components for Re-use (CRU) [1]	kg	IND	IND	IND	IND
Materials for recycling, i.e., secondary material for use in the next product system (MR)	kg	0.00E+00	0.00E+00	1.48E+02	1.48E+02
Materials for energy recovery, i.e., secondary fuels for use in the next product system (MER) [1]	kg	IND	IND	IND	IND
Recovered energy exported from the product system (EE)[1]	MJ LHV	IND	IND	IND	IND

[1] Calculated as per ACLCA ISO 21930 Guidance [R-9]. Not applicable for this product system.
[2] Calculated as per ACLCA ISO 21930 Guidance [R-9]. Includes purchased recycled steel scrap. Does not include internally recycled by-products.

Table 7-7: LCA Results Including RECs – 1 Tonne of Cold-Rolled, Full-Hard Steel Sheet

Impact Category Indicators	Unit	A1	A2	A3	A1-A3
Global warming potential (GWP 100)	kg $CO_{2\ eq}$	0.00E+00	0.00E+00	1.24E+03	1.24E+03
Ozone depletion potential (ODP)	kg CFC-11 $_{eq}$	0.00E+00	0.00E+00	4.13E-05	4.13E-05
Eutrophication potential (EP)	kg $N_{\ eq}$	0.00E+00	0.00E+00	6.14E+00	6.14E+00
Acidification potential (AP)	kg $SO_{2\ eq}$	0.00E+00	0.00E+00	5.09E+00	5.09E+00
Smog formation potential (SFP)	kg $O_{3\ eq}$	0.00E+00	0.00E+00	6.16E+01	6.16E+01
Abiotic resource depletion potential for fossil energy resources (ADP_{fossil})	MJ surplus	0.00E+00	0.00E+00	1.00E+03	1.00E+03
Inventory Indicators	**Unit**	**A1**	**A2**	**A3**	**A1-A3**
Renewable primary resources used as an energy carrier (fuel) (RPRE)	MJ LHV	0.00E+00	0.00E+00	9.42E+02	9.42E+02
Renewable primary resources with energy content used as material (RPRM)[1]	MJ LHV	IND	IND	IND	IND
Non-renewable primary resources used as an energy carrier (fuel) (NRPRE)	MJ LHV	0.00E+00	0.00E+00	1.68E+04	1.68E+04
Non-renewable primary resources with energy content used as material, (NRPRM)[1]	MJ LHV	IND	IND	IND	IND
Secondary materials (SM) [2]	kg	0.00E+00	0.00E+00	1.03E+03	1.03E+03
Renewable secondary fuels (RSF) [1]	MJ LHV	IND	IND	IND	IND
Non-renewable secondary fuels (NRSF) [1]	MJ LHV	IND	IND	IND	IND
Recovered energy (RE) [1]	MJ LHV	IND	IND	IND	IND
Consumption of freshwater resources (FW)	m^3	0.00E+00	0.00E+00	1.68E+01	1.68E+01
Hazardous waste disposed (HWD)	kg	0.00E+00	0.00E+00	5.90E+00	5.90E+00
Non-hazardous waste disposed (NHWD)	kg	0.00E+00	0.00E+00	1.76E+00	1.76E+00
High-level radioactive waste (HLRW) [1]	m^3	IND	IND	IND	IND
Intermediate and low-level radioactive waste (ILLRW) [1]	m^3	IND	IND	IND	IND
Components for Re-use (CRU) [1]	kg	IND	IND	IND	IND
Materials for recycling, i.e., secondary material for use in the next product system (MR)	kg	0.00E+00	0.00E+00	1.47E+02	1.47E+02
Materials for energy recovery, i.e., secondary fuels for use in the next product system (MER) [1]	kg	IND	IND	IND	IND
Recovered energy exported from the product system (EE)[1]	MJ LHV	IND	IND	IND	IND

[1] Calculated as per ACLCA ISO 21930 Guidance [R-9]. Not applicable for this product system.
[2] Calculated as per ACLCA ISO 21930 Guidance [R-9]. Includes purchased recycled steel scrap. Does not include internally recycled by-products.

Table 7-8: LCA Results Including RECs –
1 Tonne of Cold-Rolled, Full-Hard, Temper Rolled Steel Sheet

Impact Category Indicators	Unit	A1	A2	A3	A1-A3
Global warming potential (GWP 100)	kg $CO_{2\ eq}$	0.00E+00	1.10E-03	1.29E+03	1.29E+03
Ozone depletion potential (ODP)	kg CFC-11 $_{eq}$	0.00E+00	1.59E-11	4.61E-05	4.61E-05
Eutrophication potential (EP)	kg N_{eq}	0.00E+00	6.14E-07	6.32E+00	6.32E+00
Acidification potential (AP)	kg $SO_{2\ eq}$	0.00E+00	6.07E-06	5.35E+00	5.35E+00
Smog formation potential (SFP)	kg $O_{3\ eq}$	0.00E+00	1.86E-04	6.43E+01	6.43E+01
Abiotic resource depletion potential for fossil energy resources (ADP_{fossil})	MJ surplus	0.00E+00	2.20E-03	1.06E+03	1.06E+03
Inventory Indicators	**Unit**	**A1**	**A2**	**A3**	**A1-A3**
Renewable primary resources used as an energy carrier (fuel) (RPRE)	MJ LHV	0.00E+00	2.15E-05	1.01E+03	1.01E+03
Renewable primary resources with energy content used as material (RPRM)[1]	MJ LHV	IND	IND	IND	IND
Non-renewable primary resources used as an energy carrier (fuel) (NRPRE)	MJ LHV	0.00E+00	1.47E-02	1.78E+04	1.78E+04
Non-renewable primary resources with energy content used as material, (NRPRM)[1]	MJ LHV	IND	IND	IND	IND
Secondary materials (SM) [2]	kg	0.00E+00	0.00E+00	1.04E+03	1.04E+03
Renewable secondary fuels (RSF) [1]	MJ LHV	IND	IND	IND	IND
Non-renewable secondary fuels (NRSF) [1]	MJ LHV	IND	IND	IND	IND
Recovered energy (RE) [1]	MJ LHV	IND	IND	IND	IND
Consumption of freshwater resources (FW)	m^3	0.00E+00	7.50E-07	1.81E+01	1.81E+01
Hazardous waste disposed (HWD)	kg	0.00E+00	0.00E+00	5.97E+00	5.97E+00
Non-hazardous waste disposed (NHWD)	kg	0.00E+00	0.00E+00	1.78E+00	1.78E+00
High-level radioactive waste (HLRW) [1]	m^3	IND	IND	IND	IND
Intermediate and low-level radioactive waste (ILLRW) [1]	m^3	IND	IND	IND	IND
Components for Re-use (CRU) [1]	kg	IND	IND	IND	IND
Materials for recycling, i.e., secondary material for use in the next product system (MR)	kg	0.00E+00	0.00E+00	1.49E+02	1.49E+02
Materials for energy recovery, i.e., secondary fuels for use in the next product system (MER) [1]	kg	IND	IND	IND	IND
Recovered energy exported from the product system (EE)[1]	MJ LHV	IND	IND	IND	IND

[1] Calculated as per ACLCA ISO 21930 Guidance [R-9]. Not applicable for this product system.
[2] Calculated as per ACLCA ISO 21930 Guidance [R-9]. Includes purchased recycled steel scrap. Does not include internally recycled by-products.

Table 7-9: LCA Results Including RECs – 1 Tonne of Cold-Rolled, Fully Processed Steel Sheet

Impact Category Indicators	Unit	A1	A2	A3	A1-A3
Global warming potential (GWP 100)	kg $CO_{2\ eq}$	0.00E+00	1.10E-03	1.36E+03	1.36E+03
Ozone depletion potential (ODP)	kg CFC-11 $_{eq}$	0.00E+00	1.59E-11	4.74E-05	4.74E-05
Eutrophication potential (EP)	kg $N_{\ eq}$	0.00E+00	6.14E-07	6.48E+00	6.48E+00
Acidification potential (AP)	kg $SO_{2\ eq}$	0.00E+00	6.07E-06	5.55E+00	5.55E+00
Smog formation potential (SFP)	kg $O_{3\ eq}$	0.00E+00	1.86E-04	6.75E+01	6.75E+01
Abiotic resource depletion potential for fossil energy resources (ADP_{fossil})	MJ surplus	0.00E+00	2.20E-03	1.17E+03	1.17E+03
Inventory Indicators	**Unit**	**A1**	**A2**	**A3**	**A1-A3**
Renewable primary resources used as an energy carrier (fuel) (RPRE)	MJ LHV	0.00E+00	2.15E-05	1.03E+03	1.03E+03
Renewable primary resources with energy content used as material (RPRM)[1]	MJ LHV	IND	IND	IND	IND
Non-renewable primary resources used as an energy carrier (fuel) (NRPRE)	MJ LHV	0.00E+00	1.47E-02	1.88E+04	1.88E+04
Non-renewable primary resources with energy content used as material, (NRPRM)[1]	MJ LHV	IND	IND	IND	IND
Secondary materials (SM) [2]	kg	0.00E+00	0.00E+00	1.06E+03	1.06E+03
Renewable secondary fuels (RSF) [1]	MJ LHV	IND	IND	IND	IND
Non-renewable secondary fuels (NRSF) [1]	MJ LHV	IND	IND	IND	IND
Recovered energy (RE) [1]	MJ LHV	IND	IND	IND	IND
Consumption of freshwater resources (FW)	m^3	0.00E+00	7.50E-07	1.87E+01	1.87E+01
Hazardous waste disposed (HWD)	kg	0.00E+00	0.00E+00	6.10E+00	6.10E+00
Non-hazardous waste disposed (NHWD)	kg	0.00E+00	0.00E+00	1.82E+00	1.82E+00
High-level radioactive waste (HLRW) [1]	m^3	IND	IND	IND	IND
Intermediate and low-level radioactive waste (ILLRW) [1]	m^3	IND	IND	IND	IND
Components for Re-use (CRU) [1]	kg	IND	IND	IND	IND
Materials for recycling, i.e., secondary material for use in the next product system (MR)	kg	0.00E+00	0.00E+00	1.52E+02	1.52E+02
Materials for energy recovery, i.e., secondary fuels for use in the next product system (MER) [1]	kg	IND	IND	IND	IND
Recovered energy exported from the product system (EE)[1]	MJ LHV	IND	IND	IND	IND

[1] Calculated as per ACLCA ISO 21930 Guidance [R-9]. Not applicable for this product system.
[2] Calculated as per ACLCA ISO 21930 Guidance [R-9]. Includes purchased recycled steel scrap. Does not include internally recycled by-products.

Table 7-10: LCA Results Including RECs – 1 Tonne of Metallic-Coated, Cold-Rolled Steel Sheet

Impact Category Indicators	Unit	A1	A2	A3	A1-A3
Global warming potential (GWP 100)	kg $CO_{2\ eq}$	1.22E+02	2.70E+00	1.33E+03	1.46E+03
Ozone depletion potential (ODP)	kg CFC-11 $_{eq}$	4.18E-06	3.81E-08	4.42E-05	4.84E-05
Eutrophication potential (EP)	kg $N_{\ eq}$	1.53E+00	2.06E-03	6.26E+00	7.79E+00
Acidification potential (AP)	kg $SO_{2\ eq}$	1.48E+00	2.78E-02	5.29E+00	6.80E+00
Smog formation potential (SFP)	kg $O_{3\ eq}$	1.38E+01	9.13E-01	6.54E+01	8.01E+01
Abiotic resource depletion potential for fossil energy resources (ADP_{fossil})	MJ surplus	1.09E+02	5.37E+00	1.19E+03	1.30E+03
Inventory Indicators	**Unit**	**A1**	**A2**	**A3**	**A1-A3**
Renewable primary resources used as an energy carrier (fuel) (RPRE)	MJ LHV	2.50E+02	5.21E-02	1.09E+03	1.34E+03
Renewable primary resources with energy content used as material (RPRM)[1]	MJ LHV	IND	IND	IND	IND
Non-renewable primary resources used as an energy carrier (fuel) (NRPRE)	MJ LHV	1.53E+03	3.52E+01	1.81E+04	1.97E+04
Non-renewable primary resources with energy content used as material, (NRPRM)[1]	MJ LHV	IND	IND	IND	IND
Secondary materials (SM) [2]	kg	0.00E+00	0.00E+00	1.04E+03	1.04E+03
Renewable secondary fuels (RSF) [1]	MJ LHV	IND	IND	IND	IND
Non-renewable secondary fuels (NRSF) [1]	MJ LHV	IND	IND	IND	IND
Recovered energy (RE) [1]	MJ LHV	IND	IND	IND	IND
Consumption of freshwater resources (FW)	m^3	5.01E+00	1.14E-03	1.76E+01	2.26E+01
Hazardous waste disposed (HWD)	kg	0.00E+00	0.00E+00	6.01E+00	6.01E+00
Non-hazardous waste disposed (NHWD)	kg	0.00E+00	0.00E+00	1.78E+00	1.78E+00
High-level radioactive waste (HLRW) [1]	m^3	IND	IND	IND	IND
Intermediate and low-level radioactive waste (ILLRW) [1]	m^3	IND	IND	IND	IND
Components for Re-use (CRU) [1]	kg	IND	IND	IND	IND
Materials for recycling, i.e., secondary material for use in the next product system (MR)	kg	0.00E+00	0.00E+00	1.51E+02	1.51E+02
Materials for energy recovery, i.e., secondary fuels for use in the next product system (MER) [1]	kg	IND	IND	IND	IND
Recovered energy exported from the product system (EE)[1]	MJ LHV	IND	IND	IND	IND

[1] Calculated as per ACLCA ISO 21930 Guidance [R-9]. Not applicable for this product system.
[2] Calculated as per ACLCA ISO 21930 Guidance [R-9]. Includes purchased recycled steel scrap. Does not include internally recycled by-products.

Table 7-11: LCA Results Including RECs –
1 Tonne of Post-Annealed, Metallic-Coated, Cold-Rolled Steel Sheet

Impact Category Indicators	Unit	A1	A2	A3	A1-A3
Global warming potential (GWP 100)	kg $CO_{2\ eq}$	0.00E+00	1.10E-03	1.51E+03	1.51E+03
Ozone depletion potential (ODP)	kg CFC-11 $_{eq}$	0.00E+00	1.59E-11	5.04E-05	5.04E-05
Eutrophication potential (EP)	kg $N_{\ eq}$	0.00E+00	6.14E-07	7.73E+00	7.73E+00
Acidification potential (AP)	kg $SO_{2\ eq}$	0.00E+00	6.07E-06	6.92E+00	6.92E+00
Smog formation potential (SFP)	kg $O_{3\ eq}$	0.00E+00	1.86E-04	8.19E+01	8.19E+01
Abiotic resource depletion potential for fossil energy resources (ADP_{fossil})	MJ surplus	0.00E+00	2.20E-03	1.40E+03	1.40E+03
Inventory Indicators	**Unit**	**A1**	**A2**	**A3**	**A1-A3**
Renewable primary resources used as an energy carrier (fuel) (RPRE)	MJ LHV	0.00E+00	2.15E-05	1.37E+03	1.37E+03
Renewable primary resources with energy content used as material (RPRM)[1]	MJ LHV	IND	IND	IND	IND
Non-renewable primary resources used as an energy carrier (fuel) (NRPRE)	MJ LHV	0.00E+00	1.47E-02	2.06E+04	2.06E+04
Non-renewable primary resources with energy content used as material, (NRPRM)[1]	MJ LHV	IND	IND	IND	IND
Secondary materials (SM) [2]	kg	0.00E+00	0.00E+00	1.02E+03	1.02E+03
Renewable secondary fuels (RSF) [1]	MJ LHV	IND	IND	IND	IND
Non-renewable secondary fuels (NRSF) [1]	MJ LHV	IND	IND	IND	IND
Recovered energy (RE) [1]	MJ LHV	IND	IND	IND	IND
Consumption of freshwater resources (FW)	m^3	0.00E+00	7.50E-07	2.34E+01	2.34E+01
Hazardous waste disposed (HWD)	kg	0.00E+00	0.00E+00	5.86E+00	5.86E+00
Non-hazardous waste disposed (NHWD)	kg	0.00E+00	0.00E+00	1.74E+00	1.74E+00
High-level radioactive waste (HLRW) [1]	m^3	IND	IND	IND	IND
Intermediate and low-level radioactive waste (ILLRW) [1]	m^3	IND	IND	IND	IND
Components for Re-use (CRU) [1]	kg	IND	IND	IND	IND
Materials for recycling, i.e., secondary material for use in the next product system (MR)	kg	0.00E+00	0.00E+00	1.47E+02	1.47E+02
Materials for energy recovery, i.e., secondary fuels for use in the next product system (MER) [1]	kg	IND	IND	IND	IND
Recovered energy exported from the product system (EE)[1]	MJ LHV	IND	IND	IND	IND

[1] Calculated as per ACLCA ISO 21930 Guidance [R-9]. Not applicable for this product system.
[2] Calculated as per ACLCA ISO 21930 Guidance [R-9]. Includes purchased recycled steel scrap. Does not include internally recycled by-products.

8 REFERENCES

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[R-4] UL Environment, UL 10010. Product Category Rules for Building Related Products and Services. Part A: Life Cycle Assessment Calculation Rules and Report Requirements, December 2018, version 3.2.

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