

**Declaration Owner**

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Product

Electric Resistance Welded (ERW) Pipe

Declared Unit

The declared unit is one metric ton of ERW Pipe.

California Steel Industries Plant

14000 San Bernardino Avenue, Fontana, CA 92335

This EPD represents ERW Pipe fabricated by California Steel Industries from low alloy steel produced in a basic oxygen furnace or an electric arc furnace by several steel mills around the world, including Brazil, Japan, Mexico, the United States, and South Korea.

EPD Number and Period of Validity

SCS-EPD-04736
EPD Valid: November 3, 2017 through November 2, 2022

Product Category Rule

North American Product Category Rule for Designated Steel Construction Products. May 2015.

Program Operator

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Table of Contents

Scope.....cover

About California Steel Industries 2

Product Description..... 2

Material Content..... 2

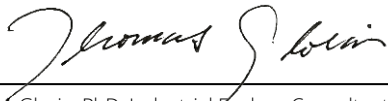
Product Life Cycle Diagram 3

Life Cycle Assessment Stages and Reported Information 5

Life Cycle Impact Assessment 6

Supporting Technical Information..... 8

References 10

PCR review, was conducted by	Tom Gloria, PhD, Industrial Ecology Consultants (Review Chair) Email: t.gloria@industrial-ecology.com
Approved Date: November 3, 2017 – End Date: November 2, 2022	
Independent verification of the declaration and data, according to ISO 14025:2006 and ISO 21930: 2007.	<input type="checkbox"/> internal <input checked="" type="checkbox"/> external
Third party verifier	 <hr/> Tom Gloria, PhD, Industrial Ecology Consultants



ABOUT CALIFORNIA STEEL INDUSTRIES

We are the only West Coast steel supplier manufacturing five different product lines: hot rolled, pickled and oiled, galvanized and cold rolled sheet, and electric resistance welded pipe (ERW pipe). In most of our product groups, we have the broadest production capabilities on the West Coast. We compete with other western U.S. steel manufacturers, domestic suppliers from east of the Rocky Mountains, and with imported steel from around the world. Our success in this competitive arena is proven by our ability to continue to increase sales and production year after year.

Much of CSI's product lines are also sold to service distribution centers throughout the Western and Midwestern United States, with some product also sold worldwide through the export market. Our steel is found in thousands of products that make our lives better and safer every day.

California Steel Industries is committed to reaching high levels of productivity and quality. Since CSI began operations in 1984, almost \$900 million has been invested in our facilities to maintain, modernize and add operations. CSI is also committed to continued compliance to all environmental regulations, to protect present and future human health in our local environment.

California Steel Industries is located approximately 50 miles east of Los Angeles in Fontana, California, on what was once part of the former Kaiser Steel facility. Our facility sits on 430 acres, with approximately 115 acres of the plant under roof. We employ about 1,000 full-time regular employees, supplemented by a small contingency staff. We maintain a union-free workforce, through open communications and fair treatment.

PRODUCT DESCRIPTION

ERW pipe is intended to be used for the distribution of oil and gas, but can be used for various engineering and construction purposes. ERW pipe is also known as "steel pipe" and is produced from low alloyed hot rolled steel. CSI's ERW pipe outer diameter (OD) ranges from 6-5/8" (16.8 cm) to 24" (61.0 cm), wall thickness ranges from 0.156" (0.396 cm) to 0.750" (1.91 cm), and can have lengths up to 80' (24.4 m). The ERW Pipe in this study has a density of 7,850 kg/m³. Specifications for mechanical and performance properties include:

- API-5L in Grades 5LB to X-70, PSL2
- CSA 245.1 (equivalent API-5L grades)
- ASTM/ASME A53 Grade B

In accordance with the PCR, the declared unit and product density are shown in Table 1.

Table 1. Declared unit for ERW Pipe and the approximate density.

Parameter	Value
Declared Unit	1 metric ton
Density	7,850 kg/m ³

MATERIAL CONTENT

The ERW pipe represented by this EPD contains at least 15% recycled steel scrap with an alloy content less than 3%. In general, the carbon steel products will contain more than 97% iron, including < 1.7% Manganese, < 0.26% Carbon, < 0.10% Chromium, <0.35% Silicon, and a total of < 0.30% Nickel, Sulfur, Vanadium, Phosphorous, Molybdenum, and other alloying elements.

ERW Pipe under normal conditions does not present inhalation, ingestion, or contact health hazards. However, operations such as welding, grinding, sawing and burning, which may cause airborne particulates or fume formation, may present a health hazard.

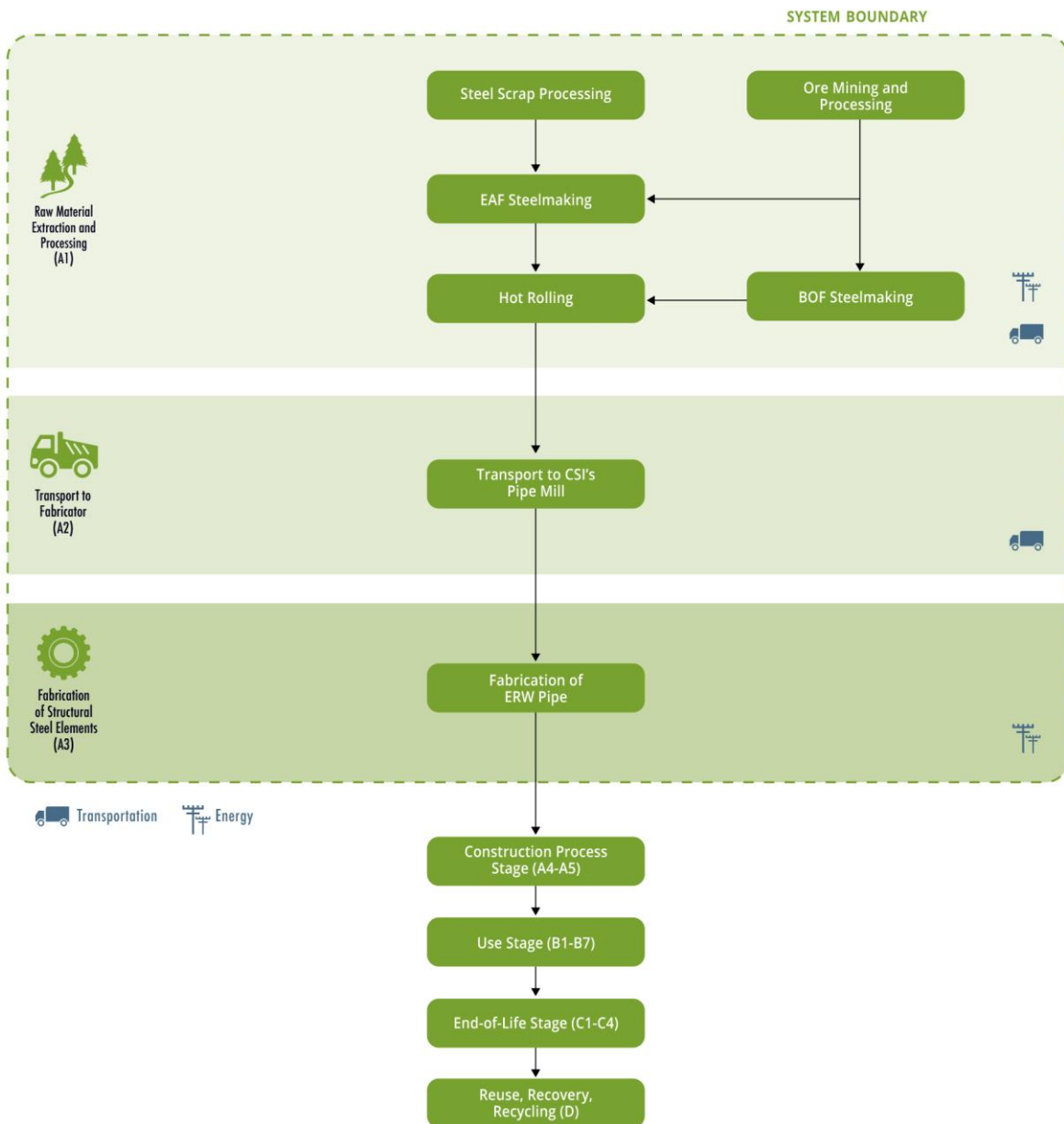
The material for ERW pipe contains hazardous chemicals which are subject to the reporting requirements of Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR part 372. The following chemicals present in this material are subject to the reporting requirements of Section 313:

- Aluminum (CAS #: 7429-90-5)
- Chromium Alloy (CAS #: 7440-47-3)
- Copper (CAS #: 7440-50-8)
- Manganese (CAS #: 7439-96-5)
- Nickel: (CAS #: 7440-02-0)
- Phosphorous (CAS #: 7723-14-0)



PRODUCT LIFE CYCLE FLOW DIAGRAM

The diagram below is a representation of the most significant contributions to the production of ERW pipe. This includes resource extraction, steelmaking, transport to fabrication, and product fabrication. The cradle-to-gate (A1-A3) system boundaries are shown in the diagram.



LIFE CYCLE ASSESSMENT STAGES AND REPORTED INFORMATION

In accordance with the PCR, the life cycle stages included in this EPD are as shown below (X = included, MND = module not declared).

Product			Construction Process		Use							End-of-Life				Benefits & Loads Beyond the System Boundary
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Raw Material Extraction and Processing	Transport to the Manufacturer	Fabrication	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 = included, MND = module not declared

The following life cycle stages are included in the EPD:

Raw Material Extraction and Processing (A1): Includes all activities necessary to produce hot rolled steel, including but not limited to the recovery or extraction and processing of feedstock materials, furnace and related process operation at the melt shop, and casting and rolling of the final product.

Transport to the Fabricator (A2): Includes the transport of hot rolled steel to the pipe mill by rail or ship.

Fabrication (A3): Includes all activities necessary for the fabrication of ERW pipe, which includes production of all pre-products and products.

The Reference Service Life (RSL) of the products is not specified.

The construction process stage, use stage, end-of-life stage, and Module D of the product are excluded from the system boundaries of this study. Additional elements that are excluded from the study are:

- Construction activities, capital equipment and infrastructure
- Maintenance and operation of equipment
- Personnel travel and resource use
- Durable reusable dunnage and ancillary materials for the fabrication of ERW pipe

The deletion of these inputs or outputs is permitted since it is not expected to significantly change the overall conclusions of the EPD and complies with the cut-off criteria required by the PCR.

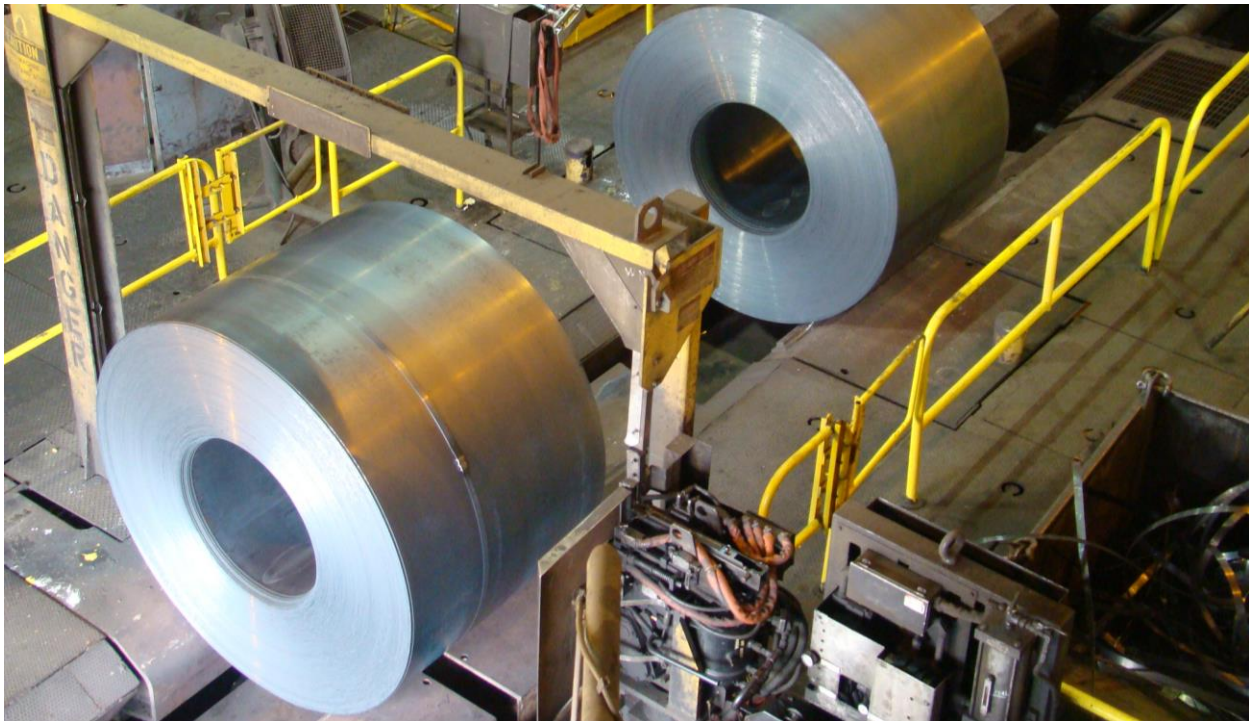
LIFE CYCLE IMPACT ASSESSMENT

Results are reported in Table 2 according to the LCIA methodologies of Tool for the Reduction and Assessment of Chemical and Other Environmental Impacts (TRACI version 2.1) and CML-IA version 4.1.

Table 2. LCIA results for 1 metric ton of ERW Pipe produced by California Steel Industries. Values in parenthesis show the percent contribution of each life cycle module to the result for each impact category.

Impact Category	Units	Total (A1-A3)	A1	A2	A3
			Steel Production	Transport to Fabricator	Fabrication
Global Warming Potential	Metric ton CO ₂ eq	3.0 (100%)	2.7 (91%)	2.4x10 ⁻² (0.81%)	0.24 (8.2%)
Ozone Depletion Potential	Metric ton CFC-11 eq	1.8x10 ⁻⁷ (100%)	1.6x10 ⁻⁷ (86%)	3.2x10 ⁻⁹ (1.7%)	2.3x10 ⁻⁸ (13%)
Acidification Potential	Metric ton SO ₂ eq	1.7x10 ⁻² (100%)	1.5x10 ⁻² (88%)	3.9x10 ⁻⁴ (2.3%)	1.7x10 ⁻³ (10%)
Eutrophication Potential	Metric ton N eq	1.9x10 ⁻² (100%)	1.9x10 ⁻² (99%)	5.9x10 ⁻⁵ (0.31%)	1.5x10 ⁻⁴ (0.80%)
Photochemical Ozone Creation Potential	Metric ton O ₃ eq	0.19 (100%)	0.18 (94%)	5.8x10 ⁻³ (3.0%)	6.5x10 ⁻³ (3.4%)
Depletion of Abiotic Resources (Elements)*	Metric ton Sb eq	3.6x10 ⁻⁵ (100%)	3.6x10 ⁻⁵ (100%)	1.6x10 ⁻⁸ (0.046%)	7.2x10 ⁻⁸ (0.20%)
Depletion of Abiotic Resources (Fossil)	MJ, net calorific value	3.4x10 ⁴ (100%)	2.9x10 ⁴ (87%)	3.3x10 ² (1.0%)	4.0x10 ³ (12%)

* The indicator for abiotic depletion potential (elements) is based on assumptions regarding current reserves estimates. Users should use caution when interpreting results because there is insufficient information on which indicator is best for assessing the depletion of abiotic resources.



Resource Use:

The PCR requires that several parameters be reported in the EPD, including resource use, waste categories and output flows, and other environmental information. The results for these parameters per declared unit are shown in Table 3.

Table 3. Resource use and wastes results for 1 metric ton of ERW Pipe produced by California Steel Industries.

Parameter	Units	Total (A1-A3)	A1	A2	A3
			Steel Production	Transport to the Fabricator	Fabrication
Use of renewable primary energy excluding renewable primary energy resources used as raw materials	MJ, net calorific value	3.0x10 ³	2.7x10 ³	16	2.9x10 ²
Use of renewable primary energy resources used as raw materials	MJ, net calorific value	0.0	0.0	0.0	0.0
Total use of renewable primary energy resources	MJ, net calorific value	3.0x10 ³	2.7x10 ³	16	2.9x10 ²
Use of nonrenewable primary energy excluding nonrenewable primary energy resources used as raw materials	MJ, net calorific value	3.5x10 ⁴	3.0x10 ⁴	3.5x10 ²	4.4x10 ³
Use of nonrenewable primary energy resources used as raw materials	MJ, net calorific value	13	13	0.0	0.0
Total use of nonrenewable primary energy resources (primary energy and primary energy resources used as raw materials)	MJ, net calorific value	3.5x10 ⁴	3.0x10 ⁴	3.5x10 ²	4.4x10 ³
Use of secondary materials	Metric ton	0.16	0.16	0.0	0.0
Use of renewable secondary fuels	MJ, net calorific value	negligible	negligible	negligible	negligible
Use of nonrenewable secondary fuels	MJ, net calorific value	negligible	negligible	negligible	negligible
Net use of fresh water	m ³	1.8	0.68	0.0	1.1
Nonhazardous waste disposed	Metric ton	0.89	0.88	1.6E-03	3.3x10 ⁻³
Hazardous waste disposed	Metric ton	1.2x10 ⁻²	4.5x10 ⁻³	0.0	7.1x10 ⁻³
Radioactive waste disposed	Metric ton	1.0x10 ⁻⁵	9.0x10 ⁻⁶	3.1E-07	6.6x10 ⁻⁷
Components for re-use	Metric ton	INA	INA	INA	INA
Materials for recycling	Metric ton	0.10	3.9x10 ⁻²	0.0	6.2x10 ⁻²
Materials for energy recovery	Metric ton	9.4x10 ⁻⁵	3.6x10 ⁻⁵	0.0	5.7x10 ⁻⁵
Exported energy	MJ per energy carrier	INA	INA	INA	INA

INA: Indicator not assessed

Disclaimer:

This Environmental Product Declaration (EPD) conforms to ISO 14025, 14040, ISO 14044, and ISO 21930.

Scope of Results Reported: The PCR requires the reporting of a limited set of LCA metrics; therefore, there may be relevant environmental impacts beyond those disclosed by this EPD. The EPD does not indicate that any environmental or social performance benchmarks are met nor thresholds exceeded.

Accuracy of Results: 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 are estimations of potential impacts. The accuracy of results in different EPDs may vary as a result of value choices, background data assumptions and quality of data collected.

Comparability: EPDs are not comparative assertions and are either not comparable or have limited comparability when they cover different life cycle stages, are based on different product category rules or are missing relevant environmental impacts. Such comparisons can be inaccurate, and could lead to the erroneous selection of materials or products which are higher impact, at least in some impact categories. Any comparison of EPDs shall be subject to the requirements of ISO 21930. For comparison of EPDs which report different module scopes, such that one EPD includes Module D and the other does not, the comparison shall only be made on the basis of Modules A1, A2, and A3. Additionally, when Module D is included in the EPDs being compared, all EPDs must use the same methodology for calculation of Module D values.

SUPPORTING TECHNICAL INFORMATION

Data Sources

Unit processes were developed within SimaPro 8.3. Primary data were provided by California Steel Industries for their facility in Fontana, California. Where primary upstream data were unavailable, secondary data were used. Secondary datasets with the greatest degree of representativeness were chosen from Ecoinvent. Detailed descriptions of unit processes can be found in the accompanying documentation. See Table 4 for a description of data sources used for the LCA.

Table 4. Data sources used for the LCA study.

Module	Technology Source	Data Source	Region	Year
A1	SimaPro 8.3	California Steel Industries, Ecoinvent	US, Brazil, Japan, Mexico, South Korea	2016
A2	SimaPro 8.3	California Steel Industries, Ecoinvent	US, Global, and "Rest-of-World"	2016
A3	SimaPro 8.3	California Steel Industries	US	2016
Other Processes	SimaPro 8.3	Ecoinvent	North America, Global, and "Rest-of-World"	2016

Allocation

The LCA followed the allocation guidelines of ISO 14044 and the PCR. Co-products from steelmaking were treated using system expansion, as described in the World Steel Association LCA Methodology Report (2011). It is assumed that all BOF mills supplying steel produce two valuable co-products; slag and mill scale. Similarly, it is assumed that all EAF mills produce three valuable co-products; slag, baghouse dust, and mill scale. In Table 5 the systems expansion assumptions for these co-products are shown.

Table 5. System expansion assumptions for co-products at the steel mill.

Product	Co-product function	Avoided production
EAF Slag	9.0% Cement or clinker production	0.9 metric ton per metric ton of cement
	91% Aggregate or roadstone	Gravel production
BOF Slag	9.0% Cement or clinker production	0.9 metric ton per metric ton of cement
	83% Aggregate or roadstone	Gravel production
	8.0% Fertilizer	Lime production
Baghouse dust	Any zinc application	Zinc production; 0.205 metric ton zinc/metric ton dust
Millscale	Metallurgical input to steelmaking	Iron ore extraction

Limitations

- The LCIA indicators prescribed by the PCR do not represent all categories of potential environmental impacts, such as impacts to terrestrial ecosystems.
- Representative datasets were used to reflect the regional energy mix for electricity use.
- Where primary data were unavailable, representative secondary data from Ecoinvent database were used. This includes the transportation from primary producer of raw material components to the steel mill, the production of low alloy steel at the steel mills, and the hot rolling of steel not produced at CSI's hot strip mill.

Data Quality

Data Quality Parameter	Data Quality Discussion
<p>Time-Related Coverage: Age of data and the minimum length of time over which data is collected</p>	<p>Primary data collected from California Steel Industries are representative of operations in 2016. Representative datasets (secondary data) used for upstream and background processes are generally less than 10 years old. All of the data used represented an average of at least one year's worth of data collection.</p>
<p>Geographical Coverage: Geographical area from which data for unit processes is collected to satisfy the goal of the study</p>	<p>The data used in the study provide the best possible representation available with current data. Data used where primary data was unavailable are representative of the regions in which processes are known to occur. Where data was unavailable, Global or "Rest-of-World" (average for all countries in the world with uncertainty adjusted) regions from Ecoinvent were chosen. All datasets used are considered sufficiently similar to actual processes.</p>
<p>Technology Coverage: Specific technology or technology mix</p>	<p>Data are representative of the actual technologies used for processing, transportation, and manufacturing operations.</p>
<p>Precision: Measure of the variability of the data values for each data expressed</p>	<p>Precision of results are not quantified due to a lack of data. Data collected for operations were typically averaged for one year and over multiple operations, which is expected to reduce the variability of results.</p>
<p>Completeness: Percentage of flow that is measured or estimated</p>	<p>The LCA model included all known mass and energy flows for the production of ERW pipe. In some instances, surrogate data used to represent upstream 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. In total, these missing data represent less than 1% of the mass or energy flows across all modules.</p>
<p>Representativeness: Qualitative assessment of the degree to which the data set reflects the true population of interest</p>	<p>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.</p>
<p>Consistency: Qualitative assessment of whether the study methodology is applied uniformly to the various components of the analysis</p>	<p>The consistency of the assessment is considered to be high. Data sources of similar quality and age are used; with a bias towards Ecoinvent data. All modules of the product stage are equally considered.</p>
<p>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</p>	<p>Based on the description of data and assumptions used, this assessment would be reproducible by other practitioners. All assumptions, methods, and data sources are documented.</p>
<p>Sources of the Data: Description of all primary and secondary data sources</p>	<p>Data representing California Steel Industries' operations 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. Secondary LCI datasets are sourced from Ecoinvent.</p>
<p>Uncertainty of the Information: Uncertainty related to data, models, and assumptions</p>	<p>Data for upstream operations relied upon use of existing representative datasets. These datasets contained relatively recent data (<10 years), but in some cases, lacked geographical representativeness. Uncertainty related to the impact assessment methods used in the study are high. The impact methods required by the PCR include impact potentials, which lack characterization of providing and receiving environments or tipping points.</p>

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