
North American Product Category Rule for Designated Steel Construction Products

Approved: May 5, 2015
Valid through May 5, 2020
Version 1.0

Program Operator:

SCSglobal
SERVICES

SCS Global Services
2000 Powell St, suite 600
Emeryville, CA 94608

NORTH AMERICAN PRODUCT CATEGORY RULE FOR DESIGNATED STEEL CONSTRUCTION PRODUCTS



Industrial Ecology Consultants

35 Bracebridge Road
Newton, Massachusetts 02459

Critical Review by Independent Third Party

The program operator, SCS Global Services commissioned a panel of qualified experts to review the Metal Products Product Category Rule (SCS Global Services: North American Product Category Rule for Designated Steel Construction Products). The objectives of the review were to verify conformance to the applicable International Organization of Standardization (ISO) standards and SCS Global Services' General Program Instructions (GPIs). As such, Industrial Ecology Consultants assembled a panel of LCA/PCR experts that included two industry experts to assist with the conformance review. Specifically, the panel of reviewers of the PCR included:

Dr. Thomas Gloria, Ph.D. (Chair)
Metal Industry and LCA Expert,
Managing Director, Industrial Ecology Consultants

Dr. Alain Dubrueil
Metal Industry and LCA Expert,
Independent Consultant

James Littlefield
LCA Expert,
Independent Consultant

Review Results

On the basis of the objectives set forth to review this PCR, the review panel concludes that the PCR conforms to the applicable ISO standards: ISO 14025, ISO 14040, ISO 14044, and ISO 21930; and the General Program Instructions of SCS Global Services.

Respectfully,

Thomas P. Gloria, Ph.D.



5 May 2015
Newton, Massachusetts, US

Table of Contents

Introduction	3
1 Scope	3
2 Normative References	4
3 Terms and Definitions	4
4 Abbreviations	5
5 General aspects.....	6
5.1 Objective of this Supplemental PCR	6
5.2 Types of EPDs with respect to life cycle stages covered.....	6
5.3 Comparability of EPDs for construction products.....	6
5.4 Additional information.....	6
5.5 Ownership, responsibility, and liability for the EPD	6
5.6 Communication formats	7
6 Product Category Rules for LCA	7
6.1 Products category	7
6.1.1 Structural Steel.....	7
6.1.2 Cold-Formed Steel Sections	7
6.1.3 Concrete Reinforcing Steel.....	7
6.2 Life Cycle Stages and Information Modules to be included.....	8
6.2.1 General.....	8
6.2.2 A1-A3 Product Stage, information modules (Required)	10
6.2.3 A4-A5, Construction process stage, information modules	11
6.2.4 B1-B5, Use stage, information modules related to the building fabric	11
6.2.5 B6-B7, use stage, information module related to the operation of the building	11
6.2.6 C1-C4 End-of-life, information modules	11
6.2.7 D, Benefits and loads beyond the system boundary, information module (Optional).....	11
6.3 Calculation Rules for the LCA	12
6.3.1 Functional Unit.....	12
6.3.2 Declared Unit	12
6.3.3 Reference Service Life (RSL).....	12

NORTH AMERICAN PRODUCT CATEGORY RULE FOR DESIGNATED STEEL CONSTRUCTION PRODUCTS

6.3.4	System boundaries.....	12
6.3.5	Criteria for the exclusion of inputs and outputs.....	13
6.3.6	Selection of data	13
6.3.7	Data quality requirements	14
6.3.8	Developing product level scenarios	15
6.3.9	Units	15
6.4	Inventory Analysis	15
6.4.1	Collecting Data	15
6.4.2	Calculation procedures	15
6.4.3	Allocation of input flows and output emissions	15
6.5	Impact Assessment	16
7	Content of EPD.....	18
7.1	Declaration of general information	18
7.2	Declaration of environmental parameters derived from LCA	20
7.2.1	General.....	20
7.2.2	Rules for declaring LCA information per module.....	20
7.2.3	Parameters describing environmental impacts	21
7.2.4	Parameters describing resource use.....	22
7.2.5	Other environmental information describing different waste categories and output flows	23
7.3	Scenarios and additional technical information	23
7.3.1	General.....	23
7.3.2	Construction process stage.....	24
7.3.3	B1-B7 Use Stage	24
7.3.4	End-of-Life	24
7.4	Additional information on release of dangerous substances to indoor air, soil and water during the use stage	24
7.5	Aggregation of information modules.....	24
8	Project Report	24
9	Verification and Validity of an EPD	24
10	Informative References	25

Introduction

This Product Category Rule (PCR) is for preparing an Environmental Product Declaration (EPD) for fabricated structural steel, cold-formed steel sections, and concrete reinforcing steel used and/or sold in North America. This PCR is based on the European PCR for construction products (EN 15804), and conforms to ISO 21930, with specific guidance for these products in North America.

Existing PCRs for fabricated structural steel, cold-formed steel sections, and concrete reinforcing steel were reviewed for applicability to products used and/or sold in North America.

IBU has developed a Part B PCR for Structural Steels. The following key elements make the Part B addendum inappropriate for this product scope in North America.

- The IBU PCR conforms to EN 15804, a European standard, and is not applicable to products used and/or sold in North America.
- The IBU PCR only includes structural steel, while this PCR includes additional product groups (i.e., cold-formed steel sections, and concrete reinforcing steel).

UL, in partnership with IBU, has published a PCR (Part A) with an addendum (Part B) specific to metal products in North America. The scope of the Part B addendum for Building Metals includes copper, zinc, and relevant alloys. However, the addendum does not include steel construction products, and it was determined a new PCR was needed for this product scope in North America.

Development of this PCR was guided by the Program Operator (SCS Global Services), with contributions from the American Institute of Steel Construction (AISC), the American Iron and Steel Institute (AISI), the Concrete Reinforcing Steel Institute (CRSI), the Metal Building Manufacturers Association (MBMA), the Steel Framing Alliance (SFA), ArcelorMittal, and Nucor Corporation. In addition, the World Steel Association provided feedback on an early draft of the PCR. Public comments were sought through an open comment period. Representatives of PE INTERNATIONAL, AISI, and Gerdau Long Steel North America provided comments, which were addressed before preparing the final document. This PCR has been critically reviewed by the following members of the peer review panel:

- Tom Gloria (Chair of Peer Review Panel), Industrial Ecology Associates
- Alain Dubreuil, Independent Consultant
- James Littlefield, Independent Consultant

1 Scope

This PCR is providing requirements based on ISO 21930 and guidance based on EN 15804, for the preparation of EPDs for fabricated structural steel, cold-formed steel sections, and concrete reinforcing steel products used and/or sold in North America. North America includes Canada, Mexico, and the United States. At the discretion of the Program Operator, this PCR may be applicable to other steel construction products not specifically described herein.

2 Normative References

The following documents, in whole or in part, are normatively referenced in this PCR and are indispensable in its application:

ISO 14025: 2006, *Environmental management – Type III environmental declarations – Principles and Procedure*, International Organization for Standardization, Geneva, Switzerland.

ISO 14044: 2006, *Environmental management – Life cycle assessment – Requirements and guidelines*, International Organization for Standardization, Geneva, Switzerland.

ISO 21930: 2007, *Sustainability in building and construction – Environmental declaration of building products*, International Organization for Standardization, Geneva, Switzerland.

3 Terms and Definitions

The following terms and definitions apply under this Product Category Rule.

Key unit process- A unit process which contributes 15% or more to any category indicator result.

NOTE: A definition for “Key unit process” is provided to enforce data quality requirements. Key unit process(es) are unrelated to criteria used for the exclusion of inputs and outputs (i.e., cut off criteria).

Primary data - quantified value of a unit process or an activity obtained from a direct measurement or a calculation based on direct measurements at its original source.

NOTE: Primary data need not necessarily originate from the product system under study because primary data may relate to a different but comparable product system to that being studied.

NOTE: Primary data may include GHG emission factors and/or GHG activity data (defined in ISO 14064-1, 2.11).

[ISO / TS 14067]

Secondary data -data obtained from sources other than a direct measurement or a calculation based on direct measurements at the original source.

NOTE: Such sources can include databases and published literature validated by competent authorities.

[ISO / TS 14067]

4 Abbreviations

The following abbreviations apply under this Product Category Rule.

ADP – Abiotic Depletion Potential
AISC – American Institute of Steel Construction
AISI – American Iron and Steel Institute
AP – Acidification Potential
ASTM – American Society for Testing and Materials
BOF – Basic Oxygen Furnace
CCC – Criterion Continuous Concentration
CFC - Chlorofluorocarbon
CMC - Criterion Maximum Concentration
CML – Institute of Environmental Sciences, Leiden University
EAF – Electric Arc Furnace
EP – Eutrophication Potential
EPD – Environmental Product Declaration
eq – Equivalent
IA – Impact Assessment
IBU - Institut Bauen und Umwelt e.V.
GWP – Global Warming Potential
LCA – Life Cycle Assessment
LCI – Life Cycle Inventory
LCIA – Life Cycle Impact Assessment
MBMA – Metal Building Manufacturers Association
MJ – Megajoule
NREL – National Renewable Energy Laboratory
ODP – Ozone Depletion Potential
PCR – Product Category Rule
POCP – Photochemical Ozone Creation Potential
RfC – Reference Concentration
RfD – Reference Dose
RSL – Reference Service Life
SFA – Steel Framing Alliance
TRACI – Tool for the Reduction and Assessment of Chemical Impacts
SI – International System of Units

5 General aspects

5.1 Objective of this PCR

This PCR provides requirements and additional guidance for the preparation of EPDs of fabricated structural steel, cold-formed steel sections, and concrete reinforcing steel.

This PCR establishes a set of consistent rules which will enable the creation of EPDs for fabricated structural steel, cold-formed steel sections, and concrete reinforcing steel.

5.2 Types of EPDs with respect to life cycle stages covered

The LCA-based information in an EPD covered by this PCR can include the following:

- **The product stage only.** Such an EPD covers raw material supply, transport, manufacturing and associated processes; this EPD is said to be “cradle to gate” and is based on information modules A1 to A3;
- **The product stage and Module D.** Such an EPD is said to be “cradle to gate with options”, and is based on information modules A1 to A3, along with Module D.

As the scope of this PCR is fabricated structural steel, cold-formed steel sections, and concrete reinforcing steel, the EPDs produced under this PCR do not cover the operational impacts of the whole building. It is the production of these construction products, not the impacts from the operational phase of a whole building, which are the subject of EPDs covered by this PCR.

5.3 Comparability of EPDs for construction products

Comparisons of EPDs shall be limited to EPDs prepared following this PCR, shall consider the complete life cycle, and shall be considered within the context of a building. See ISO 21930, section 5.6 for further guidance.

5.4 Additional information

When additional information is included as part of the EPD report, the information shall be written in accordance with ISO 21930, Section 8.2.4.

5.5 Ownership, responsibility, and liability for the EPD

For a Product-specific EPD, the name of the steel producer and/or manufacturer shall be listed on the front cover of the EPD.

NORTH AMERICAN PRODUCT CATEGORY RULE FOR DESIGNATED STEEL CONSTRUCTION PRODUCTS

For an Industry-wide EPD representing group of steel producers and/or manufacturers or a trade association, the names of steel producers and/or manufacturers recognized as participants in the development of the EPD shall be included either on the front cover of the EPD or through a web link on the EPD front cover to direct users to a complete list of manufacturers represented by the EPD.

For an Industry-wide EPD, the names of steel producers and/or manufacturers which contributed data to the EPD may also be included on the EPD.

5.6 Communication formats

For communication of the EPD information, EPD shall be prepared following the requirements in Section 7.1.

6 Product Category Rules for LCA

6.1 Products category

The products which are covered by this PCR are fabricated structural steel, cold-formed steel sections, and concrete reinforcing steel used and/or sold in North America. These products are described in Sections 6.1.1 - 6.1.3.

6.1.1 Structural Steel

The elements included in the scope of this PCR for structural steel are defined in the AISC 303-10 Code of Standard Practice for Steel Buildings and Bridges, Section 2, *Classification of Material*.

6.1.2 Cold-Formed Steel Sections

The shapes included in the scope of this PCR for Cold-Formed Steel Framing structural and nonstructural members/sections are defined in the American Iron and Steel Institute - North American Specification for the Design of Cold-Formed Steel Structural Members (AISI S100), North American Standard for Cold-Formed Steel Framing – Product Data (AISI S201), North American Standard for Cold-Formed Steel Framing – Nonstructural Members (AISI S220) and the Cold-Formed Steel Design Manual (AISI D100).

6.1.3 Concrete Reinforcing Steel

The steel reinforcing bars included in the scope of this PCR are those defined in one of the following specifications:

- ASTM A615/A615M Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement, or

NORTH AMERICAN PRODUCT CATEGORY RULE FOR DESIGNATED STEEL CONSTRUCTION PRODUCTS

- ASTM A706/A706M Standard Specification for Deformed and Plain Low-Alloy Steel Bars for Concrete Reinforcement.

Steel reinforcing bar with coatings are excluded from the scope of this PCR.

6.2 Life Cycle Stages and Information Modules to be included

6.2.1 General

The following table describes the life cycle stages of steel construction products. Only life cycle stages A1-A3 are required for producing an EPD. Inclusion of Module D is optional. All other life cycle stages are not within the scope of this PCR.

NORTH AMERICAN PRODUCT CATEGORY RULE
FOR DESIGNATED STEEL CONSTRUCTION PRODUCTS

Product Stage		Included within scope?
A1	Raw material extraction and processing, processing of secondary material input (e.g., recycling processes)	<i>Required</i>
A2	Transport to manufacturer	<i>Required</i>
A3	Manufacturing	<i>Required</i>
Construction Process Stage		
A4	Transport to the Building Site	<i>Not in scope</i>
A5	Installation into the Building	<i>Not in scope</i>
Use Stage		
B1	Use or application of the installed product	<i>Not in scope</i>
B2	Maintenance	<i>Not in scope</i>
B3	Repair	<i>Not in scope</i>
B4	Replacement	<i>Not in scope</i>
B5	Refurbishment	<i>Not in scope</i>
Use Stage, related to the operation of the building		
B6	Operational energy use	<i>Not in scope</i>
B7	Operational water use	<i>Not in scope</i>
End of Life Stage		
C1	De-construction, demolition	<i>Not in scope</i>
C2	Transport to waste processing	<i>Not in scope</i>
C3	Waste processing for reuse, recovery and/or recycling	<i>Not in scope</i>
C4	Disposal	<i>Not in scope</i>
Benefits and loads beyond the system boundary		
D	Reuse, recovery, and/or recycling potentials, expressed as net impacts and benefits	<i>Optional</i>

6.2.2 A1-A3 Product Stage, information modules (Required)

The following sections describe the scope for the life cycle stages included in this PCR.

6.2.2.1 Structural Steel

For structural steel elements, the product stage includes A1, A2, and A3 below. These modules include provisions of all materials, products and energy, as well as waste treatment of final residues during the product stage.

- A1, all activities necessary for the production of structural steel including but not limited to the recovery or extraction and processing of feedstock materials, furnace and related process operations at the melt shop, casting and rolling into the final product. For products requiring secondary processing all activities performed during secondary processing and transportation from the primary producer to the secondary producer are to be included. All upstream activities related to fuel use and/or electricity generation are included in this stage.
- A2, transport to the structural steel fabricator.
- A3, fabrication of structural steel elements.

6.2.2.2 Cold-formed steel sections

For cold-formed steel sections, the product stage includes A1, A2, and A3 below. These modules include provisions of all materials, products and energy, as well as waste treatment of final residues during the product stage.

- A1, raw material extraction and processing, including all activities necessary for the production of steel including but not limited to the recovery or extraction and processing of feedstock materials, furnace and related process operation at the melt shop, casting of the slab, all finishing operations including hot rolling, cold rolling and galvanizing, including transportation to any off site finishing facility. All upstream activities related to fuel use and/or electricity generation are included in this stage.
- A2, transport to the manufacturer.
- A3, manufacture of sections.

6.2.2.3 Concrete Reinforcing Steel

For concrete reinforcing steel, the product stage includes A1, A2, and A3 below. These modules include provisions of all materials, products and energy, as well as waste treatment of final residues during the product stage.

NORTH AMERICAN PRODUCT CATEGORY RULE FOR DESIGNATED STEEL CONSTRUCTION PRODUCTS

- A1, raw material extraction and processing, including all activities necessary for the production of steel including but not limited to the recovery or extraction and processing of feedstock materials, furnace and related process operation at the melt shop, creation of the billet, and the rolling of the final product at either the primary or secondary processor, including transportation from a primary producer to a secondary producer and within the facilities. All upstream activities related to fuel use and/or electricity generation are included in this stage.
- A2, transport to the reinforcing bar fabricator.
- A3, fabrication of reinforcement.

6.2.3 A4-A5, Construction process stage, information modules

A4-A5 construction process stage information modules are not included in the scope of this PCR.

6.2.4 B1-B5, Use stage, information modules related to the building fabric

B1-B5 construction process stage information modules are not in the scope of this PCR.

6.2.5 B6-B7, use stage, information module related to the operation of the building

B6-B7 construction process stage information modules are not in the scope of this PCR.

6.2.6 C1-C4 End-of-life, information modules

C1-C4 end-of-life stage information modules are not in the scope of this PCR.

6.2.7 D, Benefits and loads beyond the system boundary, information module (Optional)

Module D reports the potential benefit or burden from the displacement of primary materials and/or fuels associated with recycling and recovery at end-of-life. Reuse of steel products at end of life shall not be included in the Module D calculation.

The modeling of benefits and burdens beyond the system boundary includes the use of current North American industry-average data to represent processes, including current recycled content levels and end-of-life recycling rates for North American steel construction products. When optional Module D is reported in an EPD, the EPD shall explicitly describe the methodology used to calculate the reported values, and shall address any uncertainty or comparability issues relative to these values (Note: see Section 7.2.3).

6.3 Calculation Rules for the LCA

6.3.1 Functional Unit

The steel construction products which are in the scope of this PCR can be used in a large number of building designs and applications, ranging from commercial to residential applications, in buildings of many different sizes, designs, and locations. The large number of applications means that a single functional unit cannot be clearly defined. Accordingly, a declared unit is used in lieu of a functional unit.

6.3.2 Declared Unit

For EPDs produced using this document, a declared unit is used in lieu of a functional unit. The declared unit clearly defines the reference flow in the EPD, as well as the relevant technical characteristics of the product.¹ This definition limits the functional application to structural and nonstructural construction, and includes the specific products described in Section 6.1.

The declared unit for an EPD is one metric ton of steel construction product. Optionally, results may also be reported on the basis of one short ton. The information in the following table shall be included in the EPD alongside the description of the declared unit.

Name	Required Unit	Optional Unit
Declared Unit	metric ton	short ton
Density	kg/m ³	lb/ft ³

NOTE: Comparison of EPD on a mass basis, alone, is insufficient and should consider the technical performance of the product.

6.3.3 Reference Service Life (RSL)

The RSL cannot be established for EPDs covering only Modules A1 to A3. Because an EPD created from this PCR has this scope, the RSL shall be declared as “not specified.”

6.3.4 System boundaries

The system boundary for this PCR is the Product Stage, which includes information modules A1-A3.

Module A1 shall include all extraction and processing of raw materials; any reuse of products or materials from a previous product system; processing of secondary materials; generation of electricity

¹ International Life Cycle Database Handbook: General Guide for Life Cycle Assessment – Detailed Guidance. Section 6.4.6.

from primary energy resources, including upstream processes; and any energy recovery or other recovery processes from secondary fuels.

Module A2 shall include all transportation to the factory gate and all internal transport.

Module A3 shall include production of all ancillary materials, pre-products, products, and co-products, including any packaging.

See Figure 3 in ISO 21930 for more information on the product stage.

6.3.5 Criteria for the exclusion of inputs and outputs

The use of criteria for the exclusion of inputs and outputs (i.e., cut off rules) may be used to in situations for which data is not readily available. Cut off rules shall not be used in order to hide data. All hazardous and toxic materials and substances shall be included in the inventory and the cut-off rules do not apply. All use of criteria for exclusion of inputs and outputs shall be documented in the Project Report.

The following steps shall be used for the exclusion of inputs and outputs:

- All inputs and outputs to a unit process shall be included in the LCA calculation for which data are available. Any data gaps may be filled through use of conservative assumptions using representative data. Assumptions used for filling data gaps shall be documented in the Project Report.
- In situations where there is a data gap or insufficient data, criteria for exclusion of inputs and outputs shall be 1% of primary energy usage (including both renewable and non-renewable energy) and 1% on a mass basis for the specific unit process. The maximum criteria for exclusion of inputs and outputs shall be 5% of primary energy usage and mass across all modules included in the LCA.
- Care should be exercised to ensure that material and energy flows which may cause significant emissions to air, water, or soil are included. Use of conservative assumptions and expert judgment may be needed to ensure that this requirement is followed.

6.3.6 Selection of data

For all key unit processes, primary inventory data should be used, when available. If primary data is unavailable for a key unit process, this should be clearly stated in the “Limitations” section of the EPD. In situations where secondary data is used to represent a key unit process, secondary data shall include regionally appropriate electricity supply mix.

NORTH AMERICAN PRODUCT CATEGORY RULE FOR DESIGNATED STEEL CONSTRUCTION PRODUCTS

NOTE: Use of secondary data from a region outside North America to represent a key unit process occurring in North America may require adjustment of the secondary data to include the regionally-appropriate electricity supply mix.

For Industry-wide EPDs representative of a product from a group of manufacturers, data inputs to the life cycle assessment shall be an average of three or more production facilities. The EPD shall include a statement that discusses the manner in which the data represents the actual region of production for the product being assessed.

For all unit processes which are not “key” unit processes, secondary data may be used from life cycle databases, such as ecoinvent, NREL US LCI, GaBi, or other peer-reviewed sources. Secondary data used to represent North American processes from non-North American data sources may be used if North American data is unavailable. This data may be adjusted to reflect a North American electricity grid mix if it is believed that such an adjustment will have a significant impact on the reported results.

6.3.7 Data quality requirements

Data quality requirements are specified to enable the goal and scope of the LCA to be met. Data quality shall be documented in the LCA report. Data shall be representative of the manufacturer's data and conditions according to temporal, geographical and technological requirements. The following specific requirements apply, and any deviations shall be justified:

- Temporal: Data shall be as recent as possible. The obtained information from the manufacturing process (primary data) shall be no older than 5 years. Average background (secondary) data shall not be older than 10 years. Data shall be collected for at least one year.
- Geographical: The geographic region of the production sites included in the calculation of representative data shall be documented.
- Technological: Data will represent technology in use and reflect the physical reality of the material and/or product.

In addition, the LCA project report shall provide a qualitative discussion on the following topics related to the data quality:

- Precision
- Completeness: refer to cut-off rules in Section 6.3.5 and the system boundary requirements in Section 6.3.4.
- Representativeness
- Consistency
- Reproducibility
- Sources of data
- Uncertainty of data, models, and assumptions

NORTH AMERICAN PRODUCT CATEGORY RULE FOR DESIGNATED STEEL CONSTRUCTION PRODUCTS

Data shall be complete according to system boundary (6.3.4) and following the cut off criteria (see section 6.3.5).

6.3.8 Developing product level scenarios

Product level scenarios are applicable to the construction stage, use stage, and end-of-life stage. These life cycle stages are not included in the PCR scope and product level scenarios are not needed.

6.3.9 Units

Results shall be reported using SI units on the basis of one metric ton (i.e., the declared unit). Optionally, results may also be reported using U.S. Customary units on the basis of one short ton. Units to be used for reporting of results are described in Tables 1 through 4.

NOTE: If results are reported using both SI units and U.S. Customary units, for some results, the units are short ton per short ton and metric ton per metric ton. In these instances the values are the same and it is not necessary to report the value more than one time. Reporting of results shall clearly indicate that the value applies to both SI units and U.S. Customary units.

6.4 Inventory Analysis

6.4.1 Collecting Data

Data collection shall follow guidance from ISO 14044, section 4.3.2.

6.4.2 Calculation procedures

Calculation procedures shall follow the requirements of ISO 14044. Calculation procedures and assumptions shall be documented in the LCA report. Calculation procedures should be applied consistently throughout the study.

For elementary flows of combustible materials (e.g., fossil fuels), the net calorific value (lower heating value) shall be used. Use of a lower heating value is not applicable to most sources of renewable energy (e.g., wind and solar).

6.4.3 Allocation of input flows and output emissions

6.4.3.1 General

For unit processes with more than one input and/or more than one output, the guidance from ISO 14044 for allocation shall be followed.

6.4.3.2 Co-product allocation

The recovery and use of co-products, including process gases and slag, outside of the steel mill should be accounted for, if possible, using the system expansion approach. Where system expansion is not possible (e.g., when the substituted product is a waste itself), partitioning shall be applied to the different co-products, as in EN 15804 Section 6.4.3.2. The EPD shall explain how co-product allocation has been addressed.

Production Process	Main co-products
Coke oven	CO Gas Coke Benzene Tar Toluene Xylene Sulfur
Blast Furnace	Blast Furnace Gas Hot Metal Slag
Basic Oxygen Furnace (BOF)	BOF gas Crude steel Slag
Electric Arc Furnace (EAF)	Crude steel Slag

6.4.3.3 Allocation procedure of reuse, recycling, and recovery

The optional Module D can be used to calculate a credit (or burden) for the net output of potentially recycled steel at end-of-life, accounting for recycled steel input used in the production of the steel construction product. When optional Module D is reported in an EPD, the EPD shall explicitly describe the methodology used to calculate the reported values, as required in Section 7.2.3.

6.5 Impact Assessment

Life cycle impact assessment results shall be calculated using the indicators shown in the table below using the required reporting units. Life cycle impact assessment results may also be shown using the

NORTH AMERICAN PRODUCT CATEGORY RULE FOR DESIGNATED STEEL CONSTRUCTION PRODUCTS

optional reporting units. Indicator calculations are to use characterization factors from TRACI, version 2.1 (March 2012)² and CML-IA baseline method, version 4.1 (October 2012)³ as shown in Table 1 below.

Table 1. List of Impact Categories, parameter name, LCIA method, and units for reporting of results.

Impact Category	Parameter	LCIA Method	Required Reporting Units (per metric ton of steel product)	Optional Reporting Units (per short ton of steel product)
Global Warming	Global warming potential (GWP) ⁴	TRACI (version 2.1)	metric ton CO ₂ eq	short ton CO ₂ eq
Ozone Depletion	Depletion potential of the stratospheric ozone layer (ODP)	TRACI (version 2.1)	metric ton CFC-11 eq	short ton CFC-11 eq
Acidification of Land and water	Acidification potential of soil and water (AP)	TRACI (version 2.1)	metric ton SO ₂ eq	short ton SO ₂ eq
Eutrophication	Eutrophication potential (EP)	TRACI (version 2.1)	metric ton N eq	short ton N eq
Photochemical ozone creation	Formation potential of tropospheric ozone (POCP)	TRACI (version 2.1)	metric ton O ₃ eq	short ton O ₃ eq
Depletion of abiotic resources (elements) [†]	Abiotic depletion potential (ADP-elements) for non-fossil resources	CML Baseline Method, Version 4.1 (October 2012)	metric ton antimony eq	short ton antimony eq
Depletion of abiotic resources (fossil)	Abiotic depletion potential (ADP-fossil fuels) for fossil resources	CML Baseline Method, Version 4.1 (October 2012)	MJ, net calorific value	BTU, net calorific value

Results for the LCI indicator of “Depletion of abiotic resources, elements”, shall include the following disclaimer:

² Tool for the Reduction and Assessment of Chemical and Other Environmental Impacts (TRACI), v2.1. US Department of Environmental Protection, Washington, DC. 2012.

³ CML-IA database v4.1. Institute of Environmental Sciences (CML). University of Leiden, Netherlands. October 2012.

⁴ IPCC, 2007: Climate Change 2007: Synthesis Report. Contribution of Working Groups I, II and III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change [Core Writing Team, Pachauri, R.K and Reisinger, A. (eds.)]. IPCC, Geneva, Switzerland, 104 pp.

† This indicator 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.⁵

Impact assessment may additionally be conducted using an LCIA methodology which is applicable to the North American context. When this optional assessment information is reported, a table shall be included which provides descriptions of the environmental mechanism associated with the impact category, and a description of the characterization model used to assess category indicator results. The environmental relevance of the selected category indicator should also be discussed for each impact category.

Following the requirement of ISO 14044 Section 4.4.2.2.1, EPDs must use accurate and descriptive names for both impact categories and category indicators.

7 Content of EPD

7.1 Declaration of general information

The following information is required and shall be included in the EPD

- a) The following information shall be reported on the front page of the EPD.
 - The commissioner and owner of the EPD,
 - The location(s) of steel production, and
 - The location(s) of steel product manufacture or fabrication.
- b) A description of the steel products use, a completed declared unit table (Section 6.3.2), and a completed technical performance table (Section 6.3.2).
- c) Identification of the product's name (including any product code) and a visual representation of the product.
- d) A description of the product's materials, including any coatings.
- e) Name of the Type III Program Operator, the address and website of the Type III Program Operator, and any verification logo (if relevant).
- f) The date the declaration was issued and the five year period of validity.
- g) A description of which life cycle stages are not included in the EPD.

⁵ *Assessing resource depletion in LCA: a review of methods and methodological issues.* Klinglmaier, M., et al. International Journal of Life Cycle Assessment (2014). 19:580-592.

NORTH AMERICAN PRODUCT CATEGORY RULE FOR DESIGNATED STEEL CONSTRUCTION PRODUCTS

- h) A description of the allocation approach used for co-products (Section 6.4.3.2) and Module D, if applicable (Section 6.4.3.3).
- i) The results from the LCA (Sections 6.5, 7.2.4, and 7.2.5) and the required Disclaimers (see sections 7.2.2 and 7.2.3).
- j) For an Industry-wide EPD representing group of steel producers and/or manufacturers or a trade association, the names of manufacturers recognized as participants in the development of the EPD shall be included either on the front cover of the EPD or through a web link on the EPD front cover to direct users to a complete list of steel producers and/or manufacturers represented by the EPD.

For an Industry-wide EPD, the names of steel producers and/or manufacturers which contributed data to the EPD may also be included on the EPD.

- k) A material or substance which is present in the product shall be described if two conditions are met:
 - If exposure to the material/substance at levels exceeding safe thresholds can cause health impacts to humans or flora/fauna in the environment.
 - A route of exposure can be documented where the material/substance which is present in the product can lead to the exposure of humans or flora/fauna in the environment at levels which exceed safe health thresholds, as a result of activities occurring anywhere in the life cycle.⁶

In the EPD, it shall be stated whether or not any materials or substances present in the product meet the above criteria. If so, the percent content of that material/substance in the final product shall be stated.

NOTE. According to ISO 21930, product content is only declared if materials and substances are present which “can adversely affect human health and the environment”, in any stage of the product life cycle. The above two conditions must be met for adverse effects to occur.

NOTE. Steel products used inside the building envelope (e.g., used in load-bearing applications present inside wall structures) do not include materials or substances which have any potential route of exposure to humans or flora/fauna in the environment.

⁶ In establishing safe thresholds of exposure for humans, measures such as Reference Concentrations (RfC) or Reference Dose (RfD) can be used, which are established by US EPA and available in the Integrated Risk Information System database. In establishing safe thresholds of exposure for flora/fauna, measures such as Criteria Maximum Concentration (CMC) or Criterion Continuous Concentration (CCC) can be used, also established by US EPA and available as part of the National Recommended Water Quality Criteria. Other data sources can be used to establish safe thresholds of exposure for humans and flora/fauna, with justification.

NORTH AMERICAN PRODUCT CATEGORY RULE FOR DESIGNATED STEEL CONSTRUCTION PRODUCTS

NOTE. Galvanized steel products used in external applications (e.g., as roofing materials), may cause exposure through leaching and transport of metals such as zinc into local soils. However, disclosure of zinc content is only required if resulting exposures occur at levels exceeding safe thresholds for flora/fauna.

l) Information on where explanatory material may be found (e.g., website links).

m) In addition, the following table shall be completed and included in the EPD:

PCR review, was conducted by	
Approved XX/XX/XXXX, Valid until XX/XX/XXXX	
Independent verification of the declaration and data, according to ISO 14025:2006 and ISO 21930:2007.	☐ Internal ☐ External
Third party verifier:	

n) The EPD shall include a simple flow diagram of the major processes included in the LCA. These life cycle stages shall at a minimum be divided into: raw material extraction and processing; transport to manufacturer, and product manufacture. These life cycle stages may be further subdivided for the flow diagram.

7.2 Declaration of environmental parameters derived from LCA

7.2.1 General

This section provides guidance on reporting environmental parameters in the EPD derived from the LCA.

7.2.2 Rules for declaring LCA information per module

This PCR should only be used to create EPDs which are “cradle to gate” or “cradle to gate, with options” in scope (Note: see Section 6.2.1). Any life cycle stages which are excluded or not relevant should be noted as such.

The following information shall be provided in the EPD:

- Statements regarding any limitations in the use of primary data for “key” unit processes contributing over 15% to any indicator result.
- A data quality assessment summary, addressing each module included in the EPD scope. This data quality assessment summary shall address all aspects of data quality from ISO 14044 Section 4.2.3.6.2: time-related coverage; geographical coverage; technology coverage; precision;

NORTH AMERICAN PRODUCT CATEGORY RULE FOR DESIGNATED STEEL CONSTRUCTION PRODUCTS

completeness; representativeness; consistency; reproducibility; sources of the data; and uncertainty of the information. This assessment can be done either qualitatively, or quantitatively (e.g., pedigree matrix approach).

In addition, the following statement shall be included:

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.

7.2.3 Parameters describing environmental impacts

The EPD shall include the following disclaimer stating limitations in reported results, on the same page, or an adjacent page, to where results are reported:

Disclaimer:

This Environmental Product Declaration (EPD) conforms to ISO 14025, ISO 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.*

NORTH AMERICAN PRODUCT CATEGORY RULE FOR DESIGNATED STEEL CONSTRUCTION PRODUCTS

When optional Module D is reported in an EPD, the EPD shall explicitly describe the methodology used to calculate the reported values, and shall address any uncertainty or comparability issues relative to these values, and shall include the following paragraph:

Interpreting the Results in Module D: *The values in Module D include a recognition of the benefits or impacts related to steel recycling which occur at the end of the product's service life. The rate of steel recycling and related processes will evolve over time. The results included in Module D attempt to capture future benefits, or impacts, but are based on a methodology that uses current industry-average data reflecting current processes.*

7.2.4 Parameters describing resource use

Parameters describing resource use shall be subject to the requirements contained in EN 15804, section 7.2.4. Parameters to be reported are shown in the table below.

Table 2. Parameters describing resource use.

Parameter	Required Reporting Units (per metric ton of steel product)	Optional Reporting Units (per short ton of steel product)
Use of renewable primary energy excluding renewable primary energy resources used as raw materials	MJ, net calorific value ‡	BTU, net calorific value ‡
Use of renewable primary energy resources used as raw materials	MJ, net calorific value ‡	BTU, net calorific value ‡
Total use of renewable primary energy resources (primary energy and primary energy resources used as raw materials)	MJ, net calorific value ‡	BTU, net calorific value ‡
Use of nonrenewable primary energy excluding nonrenewable primary energy resources used as raw materials	MJ, net calorific value	BTU, net calorific value
Use of nonrenewable primary energy resources used as raw materials	MJ, net calorific value	BTU, net calorific value
Total use of nonrenewable primary energy resources (primary energy and primary energy resources used as raw materials)	MJ, net calorific value	BTU, net calorific value
Use of secondary material	metric ton	short ton
Use of renewable secondary fuels	MJ, net calorific value	BTU, net calorific value
Use of nonrenewable secondary fuels	MJ, net calorific value	BTU, net calorific value
Net use of fresh water	m ³	gallons

NOTE In order to identify the input part of renewable/nonrenewable primary energy used as an energy carrier and not used as raw materials, the parameter “use of renewable/nonrenewable primary energy excluding renewable/nonrenewable primary energy resources used as raw materials” is considered and can be calculated as the difference between the total input of primary energy and the input of energy resources used as raw materials.

[EN 15804]

‡ Net calorific value is applicable to combustible fuels and is not applicable to other forms of renewable energy (e.g., solar, wind).

7.2.5 Other environmental information describing different waste categories and output flows

Other environmental information describing different waste categories and output flows shall be subject to the requirements contained in EN 15804, section 7.2.5. Parameters to be reported are shown in the tables below.

Table 3. Other environmental information describing waste categories.

Parameter	Required Reporting Units (per metric ton of steel product)	Optional Reporting Units (per short ton of steel product)
Hazardous waste disposed	metric ton	short ton
Nonhazardous waste disposed	metric ton	short ton
Radioactive waste disposed	metric ton	short ton

[EN 15804]

Table 4. Other environmental information describing output flows.

Parameter	Required Reporting Units (per metric ton of steel product)	Optional Reporting Units (per short ton of steel product)
Components for re-use	metric ton	short ton
Materials for recycling	metric ton	short ton
Materials for energy recovery	metric ton	short ton
Exported energy	MJ per energy carrier	BTU per energy carrier

[EN 15804]

7.3 Scenarios and additional technical information

7.3.1 General

In addition to reporting results for Modules A1-A3 for fabricated structural steel, cold-formed steel sections, or concrete reinforcing steel, results may additionally be reported for the production of one metric ton of structural steel or cold-formed steel which is not fabricated or manufactured. Results calculated using a second LCIA method (see Section 6.5) for these unfinished products may also be reported. These results may additionally be reported on the basis of one short ton using U.S. Customary units.

These results must be included at the end of the EPD, and shall include the same disclaimer text described in Section 7.2.3.

7.3.2 Construction process stage

Construction process stage shall not be part of the EPD scope.

7.3.3 B1-B7 Use Stage

Use stage shall not be part of the EPD scope.

7.3.4 End-of-Life

End-of-life stage shall not be part of the EPD scope.

7.4 Additional information on release of dangerous substances to indoor air, soil and water during the use stage

This information need not be reported in the EPD since the Use Phase is not included in the declared scope.

7.5 Aggregation of information modules

For reporting purposes, the EPD may aggregate modules A1, A2, and A3, so that all three modules are reported as a single module (i.e., Module A). Results for Module D may not be aggregated with other modules.

8 Project Report

The project report (i.e., the LCA report) shall provide a comprehensive summary of the life cycle analysis and supporting information. The project report shall be provided to the EPD verifier and the verifier is subject to protect the confidentiality of any information described as “confidential”. The project report is not intended to be part of the public communication.

9 Verification and Validity of an EPD

EPD verification shall follow ISO 14025 and ISO 21930.

EPDs are valid for a five year period. During the five year period, an EPD shall be updated to account for any changes that affect the content or accuracy of the EPD.

NOTE: A change in results of +/- 10% should be reported to the verifier and the EPD may need to be updated.

10 Informative References

AISC 303-10, Code of Standard Practice for Steel Buildings and Bridges. American Institute of Steel Construction, Chicago, IL. 2010.

ASTM A615/A615M, Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement, ASTM International, West Conshohocken, PA, (2014).

ASTM A653, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process, ASTM International, West Conshohocken, PA, (2013).

ASTM A706/A706M, Standard Specification for Deformed and Plain Low-Alloy Steel Bars for Concrete Reinforcement, ASTM International, West Conshohocken, PA, (2014).

ASTM A1003 / A1003M, Standard Specification for Steel Sheet, Carbon, Metallic- and Nonmetallic-Coated for Cold-Formed Framing Members, ASTM International, West Conshohocken, PA, (2013).

EN 15804: 2012+A1: 2013, Sustainability in construction works – Environmental product declarations – Core rules for the product category for construction products. European Committee for Standardization.

CML-IA database v4.1. Institute of Environmental Sciences (CML). University of Leiden, Netherlands. October 2012.

D100-13, Cold-Formed Steel Design Manual. American Iron and Steel Institute, Washington DC. 2013.

European Commission - Joint Research Centre - Institute for Environment and Sustainability: International Reference Life Cycle Data System (ILCD) Handbook - General guide for Life Cycle Assessment - Detailed guidance. First edition March 2010. EUR 24708 EN. Luxembourg. Publications Office of the European Union; 2010.

IPCC, 2007: Climate Change 2007: Synthesis Report. Contribution of Working Groups I, II and III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change [Core Writing Team, Pachauri, R.K and Reisinger, A. (eds.)]. IPCC, Geneva, Switzerland, 104 pp.

ISO 14064-1:2006. Specification with guidance at the organization level for quantification and reporting of greenhouse gas emissions and removals, International Organization for Standardization, Geneva, Switzerland.

ISO / TS 14067: 2013. Greenhouse gases- Carbon footprint of products – Requirements and guidelines for quantification and communication, International Organization for Standardization, Geneva, Switzerland.

Life Cycle Assessment of Metal Construction Association (MCA) Production Processes, Metal Roof and Wall Panel Products. PE International. April 24, 2012. www.metalconstruction.org.

NORTH AMERICAN PRODUCT CATEGORY RULE
FOR DESIGNATED STEEL CONSTRUCTION PRODUCTS

S100-12, North American Cold-Formed Steel Specification. American Iron and Steel Institute, Washington DC. 2012.

S201-12, North American Standard for Cold-Formed Steel Framing – Product Data 2012 Edition. AISI. 2012.

S220-11, North American Standard for Cold-Formed Steel Framing - Nonstructural members. American Iron and Steel Institute, Washington DC, Standard. 2011.

Tool for the Reduction and Assessment of Chemical and Other Environmental Impacts (TRACI), v2.1. US Department of Environmental Protection, Washington, DC, (2012).