Product Category Rule
for Environmental Product Declarations

BIFMA PCR for Storage: UNCPC 3812

NSF Sustainability℠
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No participation fees were charged by NSF to interested parties. NSF International ensured that reasonable balance among the members of the PCR committee was achieved and potential conflicts of interest were resolved prior to commencing this PCR development.

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BIFMA PRODUCT CATEGORY RULES

These product category rules shall be used in preparing an Environmental Product Declaration (EPD) for *storage products*.

ABOUT BUSINESS AND INSTITUTIONAL FURNITURE MANUFACTURERS ASSOCIATION (BIFMA)

BIFMA is the not-for-profit trade association for business and institutional furniture manufacturers. Since 1973, BIFMA has been the voice of the commercial furniture industry. Our industry's service to our customers – providing healthy, comfortable and productive workspaces – rests on an infrastructure of engineering and material standards. These standards, founded on centuries of craft and enhanced by ever-advancing science, embody the best of our knowledge regarding safety, ergonomics, and sustainability.

BIFMA's role is to sponsor the development and refinement of current and future standards, educate on their importance and application, and translate their necessary complexity into more easily understood and implemented formats. We also monitor the state of the industry, serve as a forum for member cooperation and collaboration, interact with international counterparts, and advocate for regulatory conditions that foster value and innovation. Visit www.bifma.org or contact email@bifma.org.

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The National Center for Sustainability Standards will continue to add to its growing portfolio while providing education, outreach, and innovative support to private industry, trade associations, government and academia to foster a consensus-based approach toward conformity assessment in the sustainability field. Visit www.nsfsustainability.org or contact ncss@nsf.org.

1 GENERAL INFORMATION

Utilizing the UN Central Product Classification system for this Product Category Rule (PCR), the Class 3812 is for Other furniture, of a kind used in offices. This PCR includes the scope for subclasses of 38121 – Other metal furniture, of a kind used in offices, and 38122 – Other wooden furniture, of a kind used in offices; as each appropriately applies to the function of storage. Examples of common names or terms used to convey the function of storage within an office setting include, but are not limited to the following: bookcases, lateral files, file cabinets, bins, wardrobes, credenzas, pedestals, overheads, hutches, high-backs, lecterns, cabinets, lockers (if anchored, the purpose is for stability from tipping, wall is not necessary to function), cubbies, modular casework, towers, carts, sideboard. Permanently installed casework or millwork is not within the scope of this PCR. This PCR includes the manufacture of storage products constructed from singular or multiple materials, including but not limited to solid wood, metal, plastic, composite wood (e.g., particle board, medium density fiberboard [MDF], bio-based materials, or mixtures of other materials, solid surface (e.g., glass, stonework, composite materials, or others), surface materials (e.g., laminates, veneers, metallic, fabric), and separate materials including foam, fiberglass, fiberboard, etc. If the primary function of the product is something other than for storage (i.e., a bench intended for seating yet has additional function including storage capacity then this PCR shall not be used for that product.

This document specifies the requirements for the Life Cycle Assessment (LCA) study, and the format and content of the EPD itself. Recognizing the global aspects of the furniture industry, this PCR was designed to be globally applicable; therefore the geographical coverage is global.

The development of this PCR considered existing PCRs in order to attempt to avoid duplication in scope and applicable usage globally. This revision was developed based on the review of an existing PCR sponsored by The International EPD System: PCR2012-19: *Furniture, Except Seats and Mattresses*. The review of this PCR lead to the determination that sufficient difference existed thus supporting the revision to this PCR. Differences noted include, but are not limited to, declaration of functional unit lacking specificity, service life, and testing requirements per ANSI standards.

The PCR document was prepared by NSF (the program operator) and the BIFMA Product Category Rules Task Group in accordance with ISO 14025.[14] An open enrollment period was provided to seek out stakeholders interested in being part of the PCR creation. A multi-stakeholder group composed of furniture industry personnel, material

manufacturers, sustainability consultants, and other experts worked to create the PCR. Alignment with gap analysis and ISO 21930:2017 informed this PCR. This PCR is valid through September 30, 2027. This PCR is not intended to support comparative assertions.

1.1 Goal and scope requirements for the LCA study

The goal of this PCR is to specify the guidelines for developing a Type III Environmental Product Declaration (EPD) using this PCR in conformance with ISO 14025, based on an ISO 14040 and ISO 14044 compliant LCA.[14] EPDs are intended for Business-to-Consumer.

The goal of an LCA that conforms to this PCR shall be, at a minimum, to identify the environmental impacts of each life cycle phase of the product, and shall be presented in such a way as to be relevant to the public.

This PCR was not written to support comparative assertions. Even for similar products, differences in functional unit, use and end-of-life stage assumptions, and data quality may produce incomparable results.[15] It is not recommended to compare LCA studies or EPDs with those of another organization as there may be differences in methodology, assumptions, allocation methods, data quality, such as variability in data sets, and results of variability in assessment software tools used. This PCR shall be used to provide transparent guidance for an organization to conduct an LCA, and develop an EPD, in an effort to measure progress toward environmental improvements of the organization's products being studied.

The scope of the LCA shall include a description of the following according to this PCR:

1. Functional Unit
2. System Boundary
3. Description of data
4. Criteria for inclusion of inputs and outputs (cut off rules)
5. Data quality requirements
6. Units

2 DEFINITIONS

Business to Business: Describes commerce transactions between businesses, such as between two manufacturers, or between a manufacturer and builder. The communication intent is for the additional usage of the results to be incorporated into a larger study in which the results of multiple studies are contributors to a larger scale analysis.

Business to Consumer: (see ISO 14025),[14] as aligned with ISO 21930. Consumer is defined as an individual member or group representing the general public purchasing and/or using goods, property or services. The communication intent is for the sharing of the results with the specifier and / or enduser of the product and not intended to be aggregated into a larger study.

display shelf: A shelf with a sloping surface and retaining flange or edge and that all shelving has a capacity calculated with a height of no more than 0.3048 m (12 inches).

permanentaly installed: Bolted, or otherwise effectively fixed so that it cannot be removed without the use of tools or equipment, to a foundation or an alternative location in a building, structure, facility, or installation.

3 PRODUCT DESCRIPTION

This PCR applies to products that provide the function of storage of materials and supplies and/or other application areas based materials and supplies: e.g., books, files, media, digital media, office supplies, personal effects, laptop or laptop cases, or other items potentially associated with a storage unit. Other functions that the product may provide are not considered herein, yet shall be included in Section 13 A. The product description shall include the name of the product, product manufacturer and/or model number, a general description, and a picture of the product. The product, or range of products, shall be identified by the classification of the product and number of functional units that the product represents. The minimum product or range of products shall be sufficient to meet the service life identified in Section 4: *Functional Unit*.

Such declarations shall include, at a minimum, the following:

- the sub-category of the product **(choose one)** shall be referenced in description and be embedded within each section of the report:
  - static, no moving parts (open storage);
  - closed storage (use of doors, sliding and/or hinged);
  - storage with retractable (drawer);
  - mobile storage (has wheels or casters for movement); or
  - wall-mounted shelving.
- a photo, image, or rendering of the referenced product showing all features:
  - image method can be of any method that clearly conveys product and may include call outs to aid in clarity of features, or multiple images may be considered as appropriate.

Based on multiple proprietary LCAs and one publicly available LCA[1] from furniture industry manufacturers, similar product configurations (i.e., products available with different core construction material [metal, wood, composite], surface treatments, textiles, number of drawers / shelves, etc.) may be included in the same declaration, provided that the range of variation (see Section 13: *EPD Format*) within each impact category does not exceed ± 10% of impact categories listed in Section 9: *Parameters to be Declared in the EPD*. To reduce the number of unique product LCAs and EPDs for similar storage products, a base configuration can be used internally to support and compare product options against the declared base configuration. The LCA report may include multiple configurations that differ from each other by more than 10% in one or more impact categories. A base configuration shall be chosen for an EPD and those configurations (materials, surface treatments, textiles, etc.) that are within the 10% threshold may be indicated in the EPD as being representative by the base configuration. Alternative configurations with greater than 10% change in one or more impact categories shall be reported in separate tables documenting the differences between the base and alternate configuration. If alternative configurations are to be included, then the Goal and Scope of the study shall clearly define that the base configuration represents the normal values and alternate configurations represent ranges in the product(s) environmental impacts; such information

[1] Dietz, Bernhard. 2005. Life Cycle Assessment of Office Furniture Products. Master's Thesis, University of Michigan: Ann Arbor: 1-103. <https://css.umich.edu/publications/research-publications/life-cycle-assessment-office-furniture-products>

shall also be included in the EPD. For example, the base configuration could be the highest selling configuration or average impact configuration; and alternative configurations could then be assessed to reflect maximum and/or minimum impacts to environmental categories.

> NOTE — If product configuration included electrical componentry as part of the inventory, there shall be NO use phase associated with those components. As several scenarios could be developed, there are too many variables in terms of the amount of usage, electrical grid (internal and external), etc., and life expectancy validation to warrant use phase inclusion. In lieu of use phase assumptions associated with electrical components, the underlying LCA study and related EPD shall report energy usage requirements in kW-hr for 1 hour of usage. For power requirements associated with movement of components contained in the finished product (i.e., sliding doors), the scenario should include and reflect the power requirements for the component to be moved from a limit position to the opposite limit position and then returned to the original position; as this would presume a full range of movements per hour of usage.

4 FUNCTIONAL UNIT

The functional unit shall be one unit of storage with a designated representative volume maintained for 10-years. The functional unit shall be presented as how it applies to one of the sub-categories described in Section 4.1.

The ANSI/BIFMA X5.9 method is an industry-recognized and approved test methodology demonstrating that a storage unit remains usable for a period of 10 years. Products that have been documented to meet ANSI/BIFMA X5.9 can be also considered to meet the 10-year service life. The 10-year service life was based upon an extensive study conducted on behalf of BIFMA in which various product types were evaluated for typical service life in their original application prior to replacement due to various reasons, including updates to facility and the need for general replacement. However, subsequent uses including refurbishment, resale, and donation along with disposal, are not part of the specified life cycle considerations within this PCR.

For storage units with a service life of more than 10 years, the entire impact shall be allocated to the 10-year period (i.e., the reference flow shall be one storage unit and not a portion of a storage unit, and results shall not be normalized from a fraction of a storage unit to meet the functional unit).

For storage units with a service life of less than 10 years, a fractional approach shall be used (i.e., it may take more than one storage unit to meet the functional unit requirements). Aggregated results shall be reported for products that require more than one storage unit to meet the service life.

If the product does not meet ANSI/BIFMA X5.9 or equivalent, and the warranty period is five years or more, the maximum service life shall be five years. For products with warranties less than five years, the service life shall equal the warranty period.

4.1 Open Static Storage: (e.g., bookcases, hutches, towers, etc.) A storage device that is stationary and consists of no moving parts. The storage device may contain parts that may be repositioned, (e.g., shelf or divider panel). The storage device shall allow for convenient storage of articles, including but not limited to the following: books, binders, personal and non-personal items found and/or used in the space. Storage space is maximized by utilizing vertical space. A functional unit for this category shall contain 0.15 m^3 of storage capacity, or greater.

Storage capacity calculations (example)

Storage opening size	
depth (m)	0.3
width (m)	0.5
height (m)	0.25
volume (m^3)	0.0375
# of openings	4
total volume (m^3)	0.15

4.2 Closed Static Storage: (e.g., use of doors, sliding and/or hinged) A storage device that is stationary and consists of moving parts. Moving parts may include doors, lids, caps, and/or covers that may be attached by use of hinges or track guides for sliding. The storage device may contain parts that may be repositioned, (e.g., shelf or divider panel). The storage device shall allow for convenient storage of articles, including but not limited to the following: books, binders, personal and non-personal items found and/or used in the space. Storage space is maximized by utilizing vertical space. A functional unit for this category shall contain 0.15 m^3 of storage capacity, or greater.

Storage capacity calculations (example)

Storage opening size	Example 1	Example 2
depth (m)	0.333	0.333
width (m)	0.3	0.15
height (m)	0.25	0.25
volume (m^3)	0.02498	0.0125
# of openings	4	4
total volume (m^3)	0.15	0.15

4.3 Storage Device with Retractable Storage Areas: (e.g., file cabinets, pedestals, lateral files, cabinets, etc.): A storage device that has one or more drawers that extend, and has the intended purpose of facilitating the storage of legal and letter size files or other personal or office related products and materials. Additional functions shall be clearly denoted in the Product Description section of the EPD. A functional unit for this category shall contain 0.15 m^3 of storage capacity, or greater.

Storage capacity calculations (example)

Drawer capacity size	
depth (m)	0.2755
width (m)	0.65
height (m)	0.2755
volume (m^3)	0.049
# of openings	3
total volume (m^3)	0.15

4.4 Mobile Storage: (e.g., has wheels or casters for movement) A storage device that is mobile by way of permanently installed mobility equipment such as wheels or casters. Note that glides (circular, usually metal buttons attached to the bottom of furniture) shall not be considered a method of mobility for a storage device. The storage device may consist of moving parts. Moving parts may include doors, lids, caps, and/or covers that may be attached

by use of hinges or track guides for sliding. The storage device may contain parts that may be repositioned, (e.g., shelf or divider panel). The storage device shall allow for convenient storage of articles, including but not limited to the following: books, binders, personal and non-personal items found and/or used in the space. Storage space is maximized by utilizing vertical space. A functional unit for this category shall contain 0.15 m^3 of storage capacity, or greater.

Storage capacity calculations (example)

Drawer capacity size	
depth (m)	0.441
width (m)	0.31
height (m)	0.28
volume (m^3)	0.038
# of openings	2
total volume (m^3)	0.075

4.5 Wall-mounted storage: a storage device that is stationary and requires usage of a vertical structure for attachment and functional support. The storage device may be flat or angled (e.g., shelf, display shelf) and may contain sides, back, or top panels. Storage space is maximized by utilizing vertical space. A functional unit for this category shall contain 0.05 m^3 of storage capacity, or greater.

Storage capacity calculations (example)

Display shelf capacity	
depth (m)	0.274
width (m)	0.60
height (m)	0.3048
volume (m^3)	0.050
# of openings	1
total volume (m^3)	0.050

4.6 Non-existing classification, or combination thereof: a storage device that meets more than one categories above, or does not conform to the specific requirements of Sections 4.1 through 4.5 or storage product type did not exist at the time of writing this PCR. The storage device within this grouping shall be a clearly defined

functional unit that conforms to the requirements of this PCR, and complies with the capacity defined in this sub-section. The function(s) of general storage includes some combination of storage characteristics described in Sections 4.1 through 4.5 that provide storage for a variety of office and personal items within the space, stored items such as paper, binders, books, office supplies, coats, and personal items. A functional unit for this category shall contain 0.25 m^3 of storage capacity, or greater. Capacity calculations shall be done as exampled above and cumulated as appropriate based upon storage type.

Example:

Open and closed storage with doors and retractable devices.

4.7 Cut-off rules

All known mass and energy flows should be included. Any flows that are knowingly omitted shall be justified in the LCA Report and EPD, and shall meet the criteria as follows: any mass and energy flow within the product boundary, which consists of less than 1%, may be omitted. Cumulative omitted mass or energy flows shall not exceed 5%. Cut-off rules shall not be applied in order to hide data, see ISO 21930 Section 7.1.8.

5 SYSTEM BOUNDARIES

System boundaries are a set of criteria specifying which unit processes are part of a product system. The entire life cycle shall be covered from cradle-to-grave, including all industrial processes from raw material acquisition and pre-processing, production, product distribution and storage, use and maintenance, and end-of-life management. Rules on how recycling processes should be handled are described in detail in Section 6, *Allocation Rules*.

Production of capital goods, infrastructure, and personnel-related activities shall be excluded. The underlying LCA report shall detail the system boundaries and include a description of the life cycle stages for the product under study. The boundary of the study shall follow the modularity principle, thus all environmental aspects and potential impacts are declared in the life cycle stage where they can be attributed. A system boundary example is shown below. (Reference ISO 21930-2017, Figure 1 adapted)

This PCR has been developed to update existing requirements established under ISO 21930:2007 for creation of EPDs for pressure treated wood products to conform with ISO 21930:2017, with overall goals identical to those stated in ISO 21930:2017 Section 5.1.

5.1 Life Cycle Stages

Per ISO 21930:2017 Section 5.2, with the following clarifications and addendums.

This PCR and subsequent EPDs shall, at a minimum, use the mandatory modules and the life cycle stages described in ISO 21930:2017 Section 5.2 and reproduced in Figure 1 below (A1-A3), with the optional inclusion of additional modules A4-A5, B1-B3, C1-C4, and D.

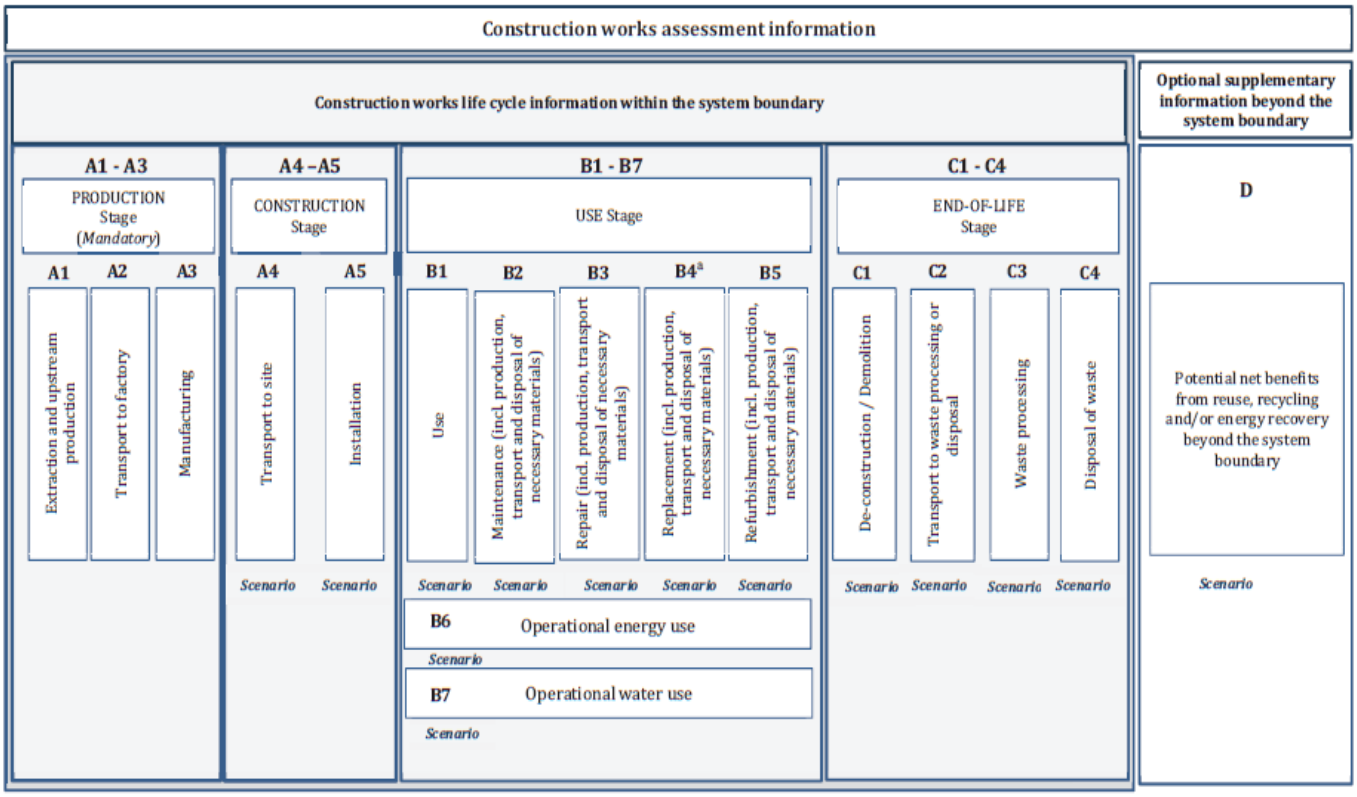
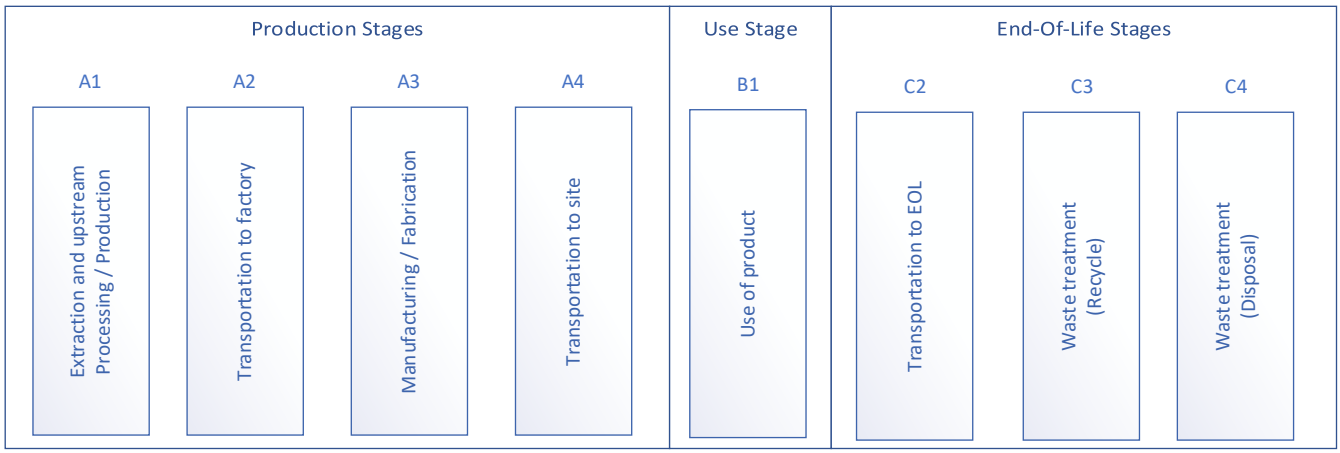


Figure 1

Description of the System Boundary Modules

A full “cradle-to-grave” evaluation is preferred, and modules A1-A5, B1-B3, and C1-C4 shall be included when sufficient supporting data are available. Required modules for each variety of EPD covered by this PCR are illustrated in Figure 2 and Figure 3.



(example flow for illustrative purposes only)

Figure 2
System boundaries

5.2 Production Stage (ISO 21930 Modules A1-A3)

5.2.1 A1 Material extraction and upstream production

The material acquisition, preprocessing, and intermediate processing stage starts when the material is extracted from nature and ends when the material in component form reaches the gate of the production facility or service delivery operation. Materials and related processing are considered as follows:

— primary materials are extracted from nature; examples include iron ore, bauxite, wood, etc., that are used to create basic materials used in the production of office furniture (e.g., semi-finished sheet steel).

— secondary materials are recovered, reclaimed, or recycled content that are used to create basic materials to be used in the production of office furniture. Transportation of materials shall be included in the life cycle impact assessment.

— primary processing is the conversion of primary materials to a bulk form or a generic shape (basic materials or components that are not necessarily manufactured exclusively for the office furniture industry); and

— intermediate processing is the conversion of basic materials to components (e.g., particleboard, plastic pellets, steel coil, etc.).

In practice, many materials can be combinations of both primary and secondary materials. For the material extraction and primary / intermediate processing stage, the boundary ends when the component reaches the gate of the production stage.

5.2.2 A2 Transportation to factory

Waste and scrap created during raw material acquisition and pre-processing, and emissions associated with transporting the material to recycling or landfill centers shall be accounted for in the LCA Report and EPD. Primary data for this stage shall be used, if available; otherwise secondary data shall be used. Secondary data shall be used for industry processes, and shall be from relevant national, regionally specific datasets (see ISO 21930 Sections 7.2 and 7.2). If waste materials are recycled, landfilled, combusted, or composted, the transport distance shall be reported. In the US, the EPA WARM model gives an average transport end of life distance as 32 kilometers (20 miles). This value shall be used for US based processes when primary data or other secondary data are not available, and when transport distance is not integrated into the dataset.

For material waste where it is known that the waste is not embedded into the dataset, or where primary data is being used, and scrap data are unknown, a 10% scrap rate shall be used for the model and material recycling percentages. Scrap rates for the US shall be based on US EPA Municipal Solid Waste Generation, Recycling, and Disposal in the United States: Facts and Figures.[2] Outside the US, a regional or nationally appropriate waste model shall be used.

All transportation, including interfacility transport, prior to the material being shipped to the production stage shall be included.

Transport from the raw material stage to the production stage shall be included. If using a life cycle inventory unit process where this transport data is not included, or primary data do not exist, transport distances for all three modes listed in Table 1 shall be used for North American based processes. Transport of the extracted raw materials

[2] <www.epa.gov/facts-and-figures-about-materials-waste-and-recycling/national-overview-facts-and-figures-materials#Recycling/Composting>

within the acquisition and pre-processing stage is not covered in Figure 1. For processes outside of North America, an appropriate regional or national transportation distance and mode(s) shall be used where primary data do not exist. A weighted average transportation distance may also be calculated from primary data. Table 1 below is intended to be used for material transportation associated with the appropriate process flow(s). If more than one transporation mode was required, then the usage of multiple transportation data sets shall be reflected in the LCA. Where the table shows values for transport for rail, truck, and ship, all values shown in the appropriate row shall be used, if using the table. For instance, veneer is shown to travel by truck, rail, and ship to reach the manufacturer.

Table 1
North American default material transport distances, material acquisition, and preprocessing stage to North American production stage

Raw Material/ Classification grouping		Distance (miles)		
		Rail	Truck*	Water
Veneer	26 wood products	162 miles	332 miles	5,982 miles picking five ports for an average of **all** water transport (Asia, Australia, Africa, Europe, and South America)
Particle Board	26 wood products	162 miles	332 miles	0 miles (NA due to this mode of transport not being significant for this commodity, to our knowledge)
MDF	26 wood products	162 miles	332 miles	0 miles (NA due to this mode of transport not being significant for this commodity, to our knowledge)
Paper Backer	27 pulp, newsprint, paper, and paperboard	N/A	742 miles	0 miles (NA due to this mode of transport not being significant for this commodity, to our knowledge)
Solid Wood	26 wood products	162 miles	332 miles	5,982 miles picking five ports for an average of **all** water transport (Asia, Australia, Africa, Europe, and South America)
Plywood	26 wood products	162 miles	332 miles	5,982 miles picking five ports for an average of **all** water transport (Asia, Australia, Africa, Europe, and South America)
Plastic (inc. polymer-based materials; exc. textiles)	24 plastics and rubber	0 miles (NA due to this mode of transport not being significant for this commodity, to our knowledge)	757 miles in 2007 U.S. DOT Shipment Characteristics by SCTG** Code Table 13 NOTE 1	960 miles in 2007 U.S. DOT Shipment Characteristics by SCTG** Code Table 7 NOTE 2

Table 1
North American default material transport distances, material acquisition, and preprocessing stage to North American production stage

Raw Material/ Classification grouping		Distance (miles)		
		Rail	Truck*	Water
Steel	32 base metal in prim. or semifin. forms and in finished basic shapes	562 miles in 2007 U.S. DOT Shipment Characteristics by SCTG** Code Table 7 NOTE 2	932 miles	833 miles in 2007 U.S. DOT Shipment Characteristics by SCTG** Code Table 7 NOTE 2
Extruded Aluminum	32 base metal in prim. or semifin. forms and in finished basic shapes	562 miles in 2007 U.S. DOT Shipment Characteristics by SCTG** Code Table 7 NOTE 2	932 miles	833 miles in 2007 U.S. DOT Shipment Characteristics by SCTG** Code Table 7 NOTE 2
Cast Aluminum	32 base metal in prim. or semifin. forms and in finished basic shapes	562 miles in 2007 U.S. DOT Shipment Characteristics by SCTG** Code Table 7 NOTE 2	932 miles	833 miles in 2007 U.S. DOT Shipment Characteristics by SCTG** Code Table 7 NOTE 2
Glass	31 nonmetallic mineral products	0 miles (NA due to this mode of transport not being significant for this commodity, to our knowledge)	126 miles	0 miles (NA due to this mode of transport not being significant for this commodity, to our knowledge)
Fabric Leather	30 textiles, leather, and articles of textiles or leather	0 miles (NA due to this mode of transport not being significant for this commodity, to our knowledge)	294 miles	5982 miles picking five ports for an average of **all** water transport (Asia, Australia, Africa, Europe & South America)
Other	this includes all other non-specified material (fiberglass, organics, etc.)	208 miles***	531 miles***	2,282 miles***

NOTE 1 — Oceanic distances were approximated. For materials where a particular mode of transport was not typical or common, it was assumed to be zero.
Table 7 and Table 13 as referenced from: <https://www.bts.gov/surveys/commodity-flow-survey/2017-cfs-preliminary-data>
Tables 1-6 as appropriate.
NOTE 2 — The average transport distances could also be used for complete components or units.
Distances taken from the U.S. Bureau of Transportation Statistics website.
* Truck distance listed in round trip, as the assumption is made that the delivery truck returns empty after making the delivery.
** SCTG refers to Standard Classification Transportable Goods
*** Distances are based upon the average of all other material categories and shall be used in absence of primary data.

5.2.3 A3 Manufacturing stage

The production stage starts with the product components entering the production site and ends with the final product leaving the production gate. This stage is intended to be “gate-to-gate”.

Gate-to-gate describes the product boundary encompassing the fabrication and assembly of business and institutional furniture. For the purposes of this PCR, the entry gate is the receiving dock of the first facility where basic materials used in the manufacture of the furniture (e.g., steel, particleboard, fabric, laminate, etc.) begin the conversion to furniture components. The end gate is the shipping dock where the ready-to-install furniture will be transported for distribution to the end user. The gate-to-gate will include transportation of intermediate materials and components between facilities where more than one physical location is included in the manufacturing process.[9]

The terms “site” and “gate” are used here figuratively, as a product may go though many processes and corresponding intermediate facilities before exiting the production stage as a final product. During production, the product undergoes the transformation from intermediate materials, to product component, to semi-finished product, to the final product; additionally, any co-products or wastes formed during production shall be considered in this stage. Production includes processes such as:

— transport of components or semi-finished products between processes and/or facilities;

— the following shall include the materials and energy use along with the transportation to the point of use:

- production of the final product by assembling of the components or semi-finished products;
- production of the components or semi-finished product(s);
- use of catalysts or other ancillary materials during production;
- any additional preparation of the final product, including forming, surface treatment, machining and/or other processes, as appropriate; and
- materials used in packaging of the final product shall be included.

Waste and scrap created during production shall be included in the LCA model. Commercially available LCA software programs typically embed these flows in the modeling datasets. The primary data shall be used if it is available. In the absence of primary data, if waste materials are recycled, landfilled, combusted, or composted, the transport distances shall follow the current version of the US EPA WARM Model, which is currently 20 miles (32 kilometers) [US EPA Waste Reduction Model (WARM)[11]] within North America, or another appropriate regionally or nationally applicable model outside North America.

For waste and scrap in production processes within the gate-to-gate operations that are under operational control of the producer of the functional unit and are not imbedded in software package's modeling datasets, or when no primary data exist, a 30% scrap rate shall be used for materials and processes in the LCI model. The transport distances shall again follow the US EPA WARM Model,[11] currently 20 miles, or other appropriate regionally or nationally applicable model. The amount of waste material sent to landfill versus recycling shall be based on EPA Municipal Solid Waste Generation, Recycling, and Disposal in the United States: Facts and Figures for Durable Goods[3] within North America, or other appropriate regionally or nationally applicable model for production outside of North America.

Transportation of parts, semi-finished, and finished products to the place of final assembly and/or distribution shall be included. Intercompany movement of parts, semi-finished, and finished products shall be accounted for where facilities fall under operational control of the reporting company. For facilities not under operational control of the reporting company, intercompany movement of goods should be included.

[3] <www.epa.gov/facts-and-figures-about-materials-waste-and-recycling/durable-goods-product-specific-data>

5.3 Construction Stage (ISO 21930 Modules A4-A5)

5.3.1 A4 Transporation to site

The product distribution and storage stage starts with the product leaving the gate of the production facility and ends when the consumer takes possession of the product. Several legs of distribution and storage may occur for one product, including storage at a distribution center and a retail location, if applicable. Product distribution and storage includes processes such as facility operations and transportation between facilities.

5.4 Use Stage (ISO 21930 Modules B1-B7)

The use stage includes B1 Use, B2 Maintenance, B3 Repair, B4 Replacement, B5 Refurbishment, B6 Operational enerty use, and B7 Operational water use. This stage begins when the consumer takes possession of the product and ends with the used product entering the end-of-life stage. For some products, the use stage does not require energy or generate emissions (e.g., greenhouse gases); for these products, transportation from the storage facility to the use-location to the end-of-life location may be the only major processes. Transportation mode and distances shall be based on primary data. Typical processes for use include:

- storage at the use location;
- normal use;
- repair and maintenance occurring during the usage time; and
- assembly and installation of a product.

5.5 End-of-life stage (ISO 21930 Modules C1-C4)

The end-of-life stage includes C1 Deconstruction, C2 Transport to waste processor or disposal, C3 Waste processing, and C4 Disposal. The boundary begins when the used product is ready for disposal, recycling, reuse, etc., and ends when the product is landfilled, returned to nature, or transformed to be recycled or reused. Processes that occur as a result of the disposal are also included within the end of life stage. End-of-life processes may include:

- collection of end-of-life products and packages;
- incineration and sorting of bottom ash; and

— landfilling, landfill maintenance, decomposition emissions.

Primary data on the actual end of life treatment for the product shall be used, if available. In the absence of primary data, the most current version of the following shall be used to determine the percent of each material in the product(s) that can be recycled versus landfilled:

— US EPA Municipal Solid Waste, 2017 Fact and Figures Fact Sheet,[4] or
— US EPA Waste Reduction model (WARM), or
— surrogate (shall be identified in the EPD) within North America, or
— another appropriate regionally or nationally applicable model shall be used outside North America.

The amount of each material in the product that can be assumed to be recycled is determined by multiplying the EPA MSW within North America, or other appropriate regionally or nationally applicable model recycling rate (in %) by the amount of each homogenous material type that is able to be disassembled. The remaining materials that are not recycled should be modeled for end of life using 80% landfill and 20% incineration.[5] To aid in proper disposal and recycling, the product shall have a description to address the components and materials that are mechanically separable by using common tools: hammer, screwdrivers, etc.

5.6 Benefits beyond the system boundary (ISO 21930 Module D) – Optional

Although not a formal life cycle stage, if a product system has potential benefits outside of the system boundary, such as from recycling, reuse, energy recovery, etc., it may be reported here. This does not include impacts from allocated co-products.

Typical processes that are considered in Module D are:

— energy recovery from incineration;
— recycling efforts; and

[4] <www.epa.gov/facts-and-figures-about-materials-waste-and-recycling/advancing-sustainable-materials-management>

[5] The usage of 80% / 20% is a general disposition determined by the US EPA in the “Solid Waste Management and Greenhouse Gases: A Life-Cycle Assessment of Emissions and Sinks” document, page 111, and is deemed to be an acceptable disposition rate of final materials.

— reuse of unused product (if applicable).

Documentation shall be provided to ensure these activities actually take place. Additionally, since Module D is not considered a life cycle stage, it's results do not affect the overall / total LCIA metrics reported in the EPD, but instead shall be reported separately for purpose of transparency.

6 ALLOCATION RULES

Where possible, Allocation should be avoided by dividing unit processes into two or more subprocesses (as specified in ISO 14044, Section 5.3.4: *Allocation*), or through expansion of system boundaries to include the additional functions of co-products. If allocation cannot be avoided, the following hierarchy of allocation methods is preferred:

— mass, or other biophysical relationship; and
— economic value.

If the above-mentioned allocation methods give results differing more than 25% in relevant impact categories for the allocated processes, a justification for the choice of allocation method shall be provided. Deviation from these allocation rules shall be documented and justified.

For allocation due to recycling, companies shall use the Recycled Content Method. The Recycled Content Method is also referred to as the cut-off method, and the 100-0 method. Allocation procedures for reuse and recycling discussed in ISO 14044-2006 (see Section 5.3.4.3) shall be applied for recycling situations.

7 UNITS AND QUANTITIES

International System of Units (SI units) shall be used for both the LCA and the EPD. Quantities shall be represented with a maximum of three significant figures.

8 CALCULATION RULES AND DATA QUALITY REQUIREMENTS

8.1 Types and sources of data

Primary data shall be used for facilities and processes under operational control of the reporting company. Secondary data that is representative of other facilities or locations producing similar components and processes may be used for facility operations that contribute less than 10% of the total product output, when at least 50% of facility operations data are from a primary source. For example, if the reporting company has more than one facility producing similar or same components and products by similar or same processes and materials and is located within the same electrical grid and geographical location, then primary data from the facility producing more than 50% of the annual volume may be used as representative data for all facilities.For facilities and processes outside of the operational control of the reporting company, secondary data may be used. For products that are manufactured wholly or largely outside of the reporting company control (e.g., contracted products or significant assemblies), primary data are highly encouraged; however, secondary data may be used in lieu of primary data. The reporting company shall use energy production data aligned with the region (region shall be used from most local and relevant source being from local power grid, state power grid, country sub-regional power grid, to least of, a national power grid) of manufacture, and shall document the unit processes, and describe how the secondary data are appropriately selected. For the selection of energy production data, the reporting company shall also state what source was justified to be used; for United States, usage of e-grid would be appropriate, whereas the synchronous grid of the EU would be appropriate in Europe. Justification for the inability to obtain primary data shall be provided in this case.

Primary data (site specific or representative secondary averages) should be used for unit processes that contribute to the majority of the mass and energy flows, or which have the most relevant environmental emissions (ISO 14044).

8.2 Data quality

A data quality assessment shall be made for the system under study. All data shall be accurate, complete, and representative of the manufacturing process, current technology, and current measurement capability. The data shall be consistent with the following requirements:

1. The information obtained from the manufacturing process(es) shall be average annual values with the yearly values documented and averaged, and it shall not be more than five years old. The usage of secondary data shall be less than 10 years old. If data older than 10 years is used from a secondary source, justification shall be included to address why newer data are not available.

    a) for products under development or newer products with less than 12 months production data available, the reporting company shall use proxy data for processes and materials from similar existing products, using similar processes and equipment, or shall use industry average process and material data for the entire 12-month period. There shall be no mixing of partial primary data with that of industry average data (using six months of primary data and using industry average for the other six months is prohibited).

2. Data should represent the technology(ies) and process(es) in current use.

3. Data quality assessment shall conform to ISO 14044, Section 5.2.3.6.

4. Data quality assessment shall, at a minimum, address the following:

    a) time-related coverage: age of data and the minimum length of time over which data should be collected;

    b) geographical coverage: geographical area from which data for unit processes should be collected to satisfy the goal of the study;

    c) technology coverage: specific technology or technology mix; and

    d) uncertainty of the information (e.g., data, models and assumptions). Examples: Data quality assessments, examples include (but are not limited to):

        — USLCI Data Guidelines;[6]
        — ILCD Handbook;[12] and

[6] "US Life Cycle Inventory Database." (2012). National Renewable Energy Laboratory, 2012. Accessed November 19, 2012: <www.lcacommons.gov>

— Table 8.2: Criteria to Evaluate the Data Quality Indicators, WRI product standard.[16]

5. Secondary data should always be used in the upstream phases (extraction, processing, and production). Information from databases may be regarded as secondary data, if they fulfill one or more the following requirements:

   a) representative of the geographical area, i.e., data from the same country, or from areas with the same energy supply mix;

   b) technological equivalence;

   c) boundaries towards nature; and

   d) boundaries towards technical systems shall be of best equivalence.

If secondary data are not available, use of a specific proxy is allowed. The user shall document and justify the decision to use the specified proxy.

8.3 Data source

The source of the input data shall be transparent.

8.4 Electricity modeling

Where primary data are available for the electrical power grid for a given unit process, it shall be energy production data aligned with the region (region shall be used from most local and relevant source being from local power grid, state power grid, country sub-regional power grid, to least of, a national power grid) of manufacture used to model the electricity source. If data are not available at that level, the next highest aggregation of electrical grid data shall be used, with a preference of local, regional, national, and then multi-national. For the selection of energy production data, the reporting company shall also state what source was justified to be used, for United States usage of e-grid would be appropriate, whereas the synchronous grid of the EU would be appropriate in Europe.

NOTE — When using an LCI database that does not account for water use, this shall be noted in the EPD.

Carbon offsets shall not be used in the inventory. These refer to credits purchased for processes not under the control of the purchaser. For example, a coal fired power plant might buy carbon credits that support the planting of forests. On-site renewable energy from solar cells or other renewable energy source may only be included in the inventory if the renewable energy certificates (green power attributes or equivalent) are not transferred to another party. This process avoids the issue of double-counting renewable energy inputs and replaces the electricity use in the LCA model.

Renewal energy credits (REC) or certificates may be included providing that they comply with the following definition and requirements:

- renewable energy certificates (often called "green tags," "tradable renewable credits," "TRCs," or "RECs") represent the environmental attributes of power generated from green power systems. Green power is a subset of renewable energy and represents those renewable energy resources that provide the highest environmental benefit, such as Solar, Wind, Geothermal, Biogas, Biomass (some forms of plant and waste material), and Low-impact hydroelectric resources. A renewable energy credit (REC) is created for each megawatt-hour (1 MWh, or 1,000 kilowatt-hours) of renewable electricity generated and delivered to the power grid from a green power source.

If “green” power is used, it must not be reported in inventory or impact assessment results in the LCA and EPD; results must specify the original grid source used for production. However, if there is a transparent path, such as in the EU (Guarantee of Origin), where chain of custody of green power can be traced by kwh and origin (not just CO_2e attributes), these results may be reported separately with an explanatory note stating how the green power is used in the calculations. Renewable Energy Credits or Certificates may be included providing that is applied to the entire facility, a contract for RECs is in place for the duration of the EPD validity period (minimum of 5 years), and the amount or percentage of renewable energy supplied annually is stated. Alternatively, RECs can be purchased annually during the period of validity, for each EPD created using this PCR, as long as a signed public commitment of intent to procure renewable energy is available at the time the EPD is created. This public commitment must include the amount or percent of renewable energy to be purchased annually.

All of the following REC procurement options are acceptable as long the environmental attributes of the green power procurement methods are appropriately assigned and retired and the RECs are Green-e® certified or equivalent (i.e., Europe: EKOenergy Certified; South America: the Brazilian “Certificado de Energia Renovável”):

- unbundled RECs;
- utility supply RECs;
- utility Green Tariff RECs;
- community Choice Aggregation (CCA) RECs;
- RECs included in a Physical Power Purchase Agreement; and
- RECs included in a Financial Power Purchase Agreement.

Additionally, for off-site RECs to count, they must be generated on the same national power grid as the reporting company. Preference is for local, then regional or national.

On-site renewable energy from green power sources may only be included in the inventory if the renewable energy certificates (green power environmental attributes) are not transferred to another party. This requirement avoids the issue of double-counting renewable energy inputs.

8.5 LCIA methodology

Impacts for each of the following categories shall be disclosed in the EPD Impacts. Impacts shall be calculated and reported per functional unit for each life-cycle stage including materials acquisition and refining, production (manufacturing and assembly), distribution and use, and end of life.

The following methodologies shall be used regardless of the location of the manufacturer; other methodologies may be reported in addition to the requirements.

1. Global warming potential (GWP 100 years) [kg CO_2-eq.]: IPCC[13] (most recent version); Biomass CO_2 emissions shall be reported separately:

    - consideration for reporting short-term (20-year horizon) in addition to 100-year reporting is encouraged.

2. Acidification potential (AP) [kg SO_2 eq / kg of emission]: TRACI 2.1 for North America; EN15084 for Europe, or Hauschild and Wenzel for International.

3. Photochemical ozone creation potential (POCP, or "smog") [kg O_3 eq. / kg of emission]: TRACI 2.1 for North America; EN15084 for Europe, or Goedkoop *et al.* for International.

4. Eutrophication potential (EP) [kg N eq / kg of emission]: TRACI 2.1 for North America; EN15084 for Europe, or Heijungs *et al.* for International.

5. Ozone Depletion Air (kg CFC 11-eq – TRACI 2.1): TRACI 2.1 for North America; EN15084 for Europe, or WMO for International:

   — optional indicator and methodology: this additional analysis may be completed in order to align and comply with the requirements found in USGBC's LEED program for EPD optimizations.

6. Formation of tropospheric ozone, in kg NOx, kg O_3 eq, or kg ethene: TRACI 2.1 or CML2001; or outside North America, regionally applicable methodologies.

   NOTE — Where TRACI 2.1 is referenced, TRACI 2.1 or the latest TRACI methodology available shall be used at the time of EPD creation, similarly for reference to CML2001.

8.6 Sensitivity analysis

Sensitivity analyses shall be performed when allocation is used (on processes owned and controlled by the reporting company) and it is not related to mass or energy flows, or where personnel impacts are included in the measurement. If primary data from more than one location is averaged for a unit process, a sensitivity analysis shall be performed using a plus or minus one standard deviation of the technosphere data as the input range investigated. If proxy data representing more than 1% of the mass or energy of the system is used, a sensitivity analysis shall be performed using a range from half to twice the reference flow of the unit process.

9 PARAMETERS TO BE DECLARED IN THE EPD

LCI data and Impact Assessment results shall be declared in the EPD as detailed below.

9.1 Materials composition

Product specifications, consisting of material composition of the reference product, in kg per functional unit, and in percentage of total weight (above the cutoff).

Material	Material weight [kg]	Percent of product [%]	Post-consumer		Pre-consumer	
			Weight [kg]	%	Weight [kg]	%
aluminum	0.365	1.6%	0.1095	30	0	0
plastic	0.27	1.2%	0	0	0.0804	30
steel	11.56	51.3%	2.89	25	0	0
brass	0.02	0.10%	0	0	0	0
powdercoat	0.33	1.5%	0	0	0	0
concrete	10.00	44.4%	0	0	0	0
TOTAL	22.55	100.0%	3.00	—	0.08	—

Figure 2
Reference examples of basic occasional table showing materials and percentage weight of final product

9.2 Life cycle inventory data

Inventory assessment categories shall be reported (e.g., energy and water) in total:

- net freshwater usage (kg) (The EPD shall indicate if water usage from electricity generation is not included.) (Note: 1 kg of water is equal to 1 liter of water); and

- primary energy demand in total (renewable and non-renewable energy) (MJ)

The following inventory indicators describing resource use shall be included:

- renewable primary resources used as an energy carrier (fuel), RPRE, are (first use) bio-based materials used as an energy source. Hydropower, solar, and wind power used in the technosphere are also included in this indicator;

- renewable primary resources with energy content used as material, RPRM, are (first use) biobased materials used as materials (e.g., wood, hemp, etc.);

- non-renewable primary resources used as an energy carrier (fuel), NRPRE, are (first use) materials such as peat, oil, gas, coal, uranium used as an energy source;

- non-renewable primary resources with energy content used as material, NRPRM, are (first use) primary resources such as oil, gas and coal, used for products (e.g., plastic-based products); and

- recovered energy, RE, is energy recovered from disposal of waste in previous systems, such as energy recovery from combustion of landfill gas or energy recovered from other systems using energy sources.

NOTE — The quantification on the indicators RPRM and NRPRM is calculated by multiplication of the mass (kg) of the material input (or its components) with the net calorific value (lower heating value) (MJ/kg) of this input (or its components) for each functional or declared unit. The result for each indicator is a value of MJ/functional or declared unit.

When the total primary energy is given in LCA tools, the indicators RPRE and NRPRE may be calculated as the difference between the total primary energy used and the primary resources used as raw material for the product.

9.3 Impact assessment categories

Impact assessment categories shall be reported by life cycle stage, and in total. Impact categories shall use the characterization models specified in Section 8.5: *LCIA methodology*:

- global warming potential;
- acidification potential;

- photochemical ozone creation potential;
- eutrophication potential;
- ozone depletion air; and
- formation of tropospheric ozone, optional reporting requirement.

In addition to disclosure using the TRACI 2.1 indicators, the equivalent indicators from other impact models such as CML or those in the EC Product Environmental Footprint Guide may also be disclosed. Optional LCIA can include but not limited to the following:

- human toxicity;
- land usage; and
- ecotoxicity.

10 OTHER ENVIRONMENTAL INFORMATION

EPDs developed using this PCR should include, where relevant, additional information related to environmental issues, other than the environmental information derived from LCA, LCI, or information modules. This information shall be separated from the information described in ISO 14025, Section 7.2.2. Identification of the significant environmental aspects should conform to ISO 14025, Sections 7.2.3 and 7.2.4.[14]

11 INDEPENDENT VERIFICATION

This PCR shall be reviewed in accordance to ISO 14025:2006, Section 8.1.2 by qualified LCA practitioners for validity and accuracy. Subsequentially, All verification of EPD, LCA, LCI, and additional environmental information shall conform to ISO 14025, Section 8.1.3. The Type III EPD verification shall conform to ISO 14025, Section 8.1.4. Verifiers shall conform to ISO 14025, Section 8.2: *LCA expertise* and conform to program operator instructions.[14]

12 REFERENCES

ACLCA Guidance to Calculating Non-LCIA Inventory Metrics in Accordance with ISO 21930:2017[7]

American Forest and Paper Association. *Life Cycle Inventory Analysis: Enhanced Methods and Applications for the Products of the Forest Industry*. The International Working Group, 2006[8]

ANSI/BIFMA e3, Furniture Sustainability Standard[9]

ANSI/BIFMA x5.9 Storage Units[9]

Atherton, J. *Declaration by the Metals Industry on Recycling Principles*, International Journal of Life Cycle Assessment 12, 59-60 (2007)[10]

FTC Part 260, Green Guides[11]

(ILCD, 2010) Joint Research Commission, 2010, *ILCD Handbook: General Guide for Life Cycle Assessment*[12]

ILCD Handbook, *European platform on Life Cycle Assessment*[12]

Intergovernmental Panel on Climate Change (IPCC)[13]

ISO 14025:2006 *Environmental labels and declarations – Type III environmental declarations – Principles and*

[7] American Center for Life Cycle Assessment. P.O. Box 2449, Vashon, Washington 98070. <https://aclca.org>

[8] American Forest and Paper Association. 1101 K Street NW. Washington, DC 2005. <www.afandpa.org>

[9] BIFMA. 678 Front Avenue NW, Suite 150, Grand Rapids, MI 49504. <www.bifma.org>

[10] <https://doi.org/10.1065/lca2006.11.283>

[11] Federal Trade Commission. 600 Pennsylvania Avenue, NW, Washington, DC 20580. <www.ftc.gov>

[12] European Platform on Life Cycle Assessment.<https://eplca.jrc.ec.europa.eu>

[13] Intergovernmental Panel on Climate Change. 7bis Avenue de la Paix, C.P. 2300, CH- 1211 Geneva 2, Switzerland. <www.ipcc.ch>

procedures[14]

ISO 14040:2006 *Environmental management - Life cycle assessment – Principles and framework*[14]

World Business Council for Sustainable Development's Global Water Tool[15]

World Resources Institute (WRI), *Product Life Cycle Accounting and Reporting Standard*[16]

13 EPD FORMAT

The content of the EPD shall include the following:

A. Front page:

— to avoid misinterpretation of results, a company shall include a disclaimer to the audience (reader) identifying the difficulties in comparing results and referring the reader to additional information, if needed:

> *"This EPD shall conform to the requirements of this PCR for Storage Products and was not written to support comparative assertions. EPDs based on different PCRs or different calculation models may not be comparable. When attempting to compare EPDs or life cycle impacts of products from different companies, the user should be aware of the uncertainty in the final results due to and not limited to the practitioner's assumptions, the source of the data used in the study, and the software tool used to conduct the study."*

— picture of product or family:

— recommended that additional imagery is included to address disassembly including tools needed and recyclable materials and components of the product(s).

[14] International Organization for Standardization. Case postale 56, CH-1211 Geneve 20, Switzerland <www.iso.org>

[15] World Business Counciel for Sustainable Development, Avenue du Bouchet 2bis, 1209 Geneva, Switzerland <www.wbcsd.org>

[16] World Resources Institute. 10 G Street NE, Suite 800, Washington, DC 20002. www.wri.org

- manufacturer's name and contact information;
- information on the EPD program operator;
- date of certification and period of validity;
- statement of conformity:
  - product has been tested by an accredited testing facility documenting the functional unit (product) met requirements of ANSI/BIFMA X5.9: *Storage Units* testing standard;
- functional unit;
  - details aligning to requirements stated in Section 4: *Functional Unit*, including:
    - 10 year service life, or number of units to meet 10-year service life;
    - additional features and functions above and beyond scope of this PCR, reference Section 3: *Product description*;
    - denotations of any baseline configuration or alternate configurations included and associated environmental impacts shall be clearly defined; and
    - if electrical components are included in scope, then energy requirements during the Use phase shall be listed per kW-hr.

B. Key environmental parameters:

- primary energy demand; and
- percentage of recycled content, demonstrating pre- and post-consumer.

C. Product specifications, as described in Section 3: *Product Description.*

D. Impact assessment categories, as specified in Section 9.3: *Impact Assessment Categories*:

— results shall be in total for the life of the product in addition to each of the four stages of contribution as noted in Section 5: *System Boundaries* (Extraction and Upstream Processing / Production Phase, Manufacturing / Assembly Phase, Usage Phase, EOL / Disposal Phase).

E. Emissions and wastes, as specified in Section 9: *Parameters to be Declared in the EPD*.

F. Additional environmental information per Section 10: *Other Environmental Information.*

G. Statement of hazardous or toxic properties of the product if improperly disposed:

— examples include, but are not limited to, toxicants released if materials are incinerated or leaching of additives to the soil or water.

PRODUCT STAGE			CONSTRUCTION PROCES STAGE		USE STAGE							END OF LIFE STAGE			
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 of waste
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4
X	X	X													
NOTE — X = module included.															

Figure 3

H. Recyclability of product, materials contained and commonly recyclable. This recyclability rate is the maximum amount of the product that is recyclable, based on the availability of recycling facilities in the specified regions and the ability of the product to be disassembled. Note that, per the requirements of the PCR, the End-of-Life results presented in this EPD were calculated using the US EPA's recycling rates within the 2020 Municipal Solid Waste Report for parts that can be disassembled.

I. References, as specified in Section 12: *References*.

13.1 Period of Validity for the EPD

The validity of the EPD shall be reported in the EPD, and shall not exceed a five (5) year period from the date of issuance. If changes in any of the environmental impacts are larger than ± 10%, the EPD shall be adjusted. The EPD shall be reviewed and reissued every five years from the date of issuance or earlier, as appropriate.

13.2 References

The EPD shall, if applicable, refer to:

- the underlying LCA report;
- the relevant PCR document;
- other documents that complement, verify, and support the EPD;
- instruction for recycling of common recyclable materials, including tools required; and
- Program Operator instructions.

13.3 Industry average EPDs

An industry based average EPD may be developed, provided the following conditions are met:

- the study shall consist of data contributions of no less than fifty percent (50%) of the product brand manufacturers (by brand name) that produce product(s) that would fall within the scope of the range of product(s) of the study being conducted;

- the scope of production is specified to a specific region, i.e., North America, Europe, Asia, etc.;

- all data conforms to the requirements of this PCR;

- description of what the product or range of products represents. The range of product shall comply with the requirements as defined in Section 3: *Product description* and Section 4: *Functional unit*. Additional options can be included and presented as additions to the impacts of the base configuration:

    - example: Base configuration is a solid wood file cabinet; options could include integrated slow close drawer slide or lift lid once drawer is pulled out. The study would be based upon appropriate data from manufacturers for a base solid wood file cabinet and thusly the results presented for the industry average would be for the base configuration. The impacts of the options would be presented as “adders” to the environmental impacts of the base configuration, thus allowing for clarity of impacts associated with the options added to the base product configuration.

- the analysis and modeling shall be conducted by an independent third party and shall:

    - use at least two (2) different modeling tools (SimaPro, Gabi, OpenLCA, etc.); and
    - the results are averaged based on the results of the tools used.

- the summary report shall document results reflecting the range due to the modeling parameters:

    - assessment tool and level of assumptions; and

    - allocation approach(es) that were applied to any specific data collected for the purpose of creating the EPD.

ANNEX A: PCR DEVELOPMENT COMMITTEE

The following individuals participated in the review committee from April 2021 through September 2022.

Industry

- Katie Chapman, Haworth
- Ana Maria Leal, Steelcase Inc.
- Thaddeus Owen, Herman Miller Inc.

Public Health / Regulatory

- Dr. Wesley Ingersen, U.S. Environmental Protection Agency

Users

- Keith Kilpack, Scientific Certification Systems (SCS)
- Steve Kooy, BIFMA
- Steve Lubowinski, Wilsonart International
- Danny McGee, Sustainable Research Group, LLC
- Michael Richardson, SGS North America Inc

Academia

- Allen Luccitti, Rochester Institute of Technology Goisano Institute for Sustainability

LCA Expertise

- Alex Mlsna, Kimball International

NSF

- Andrea Burr