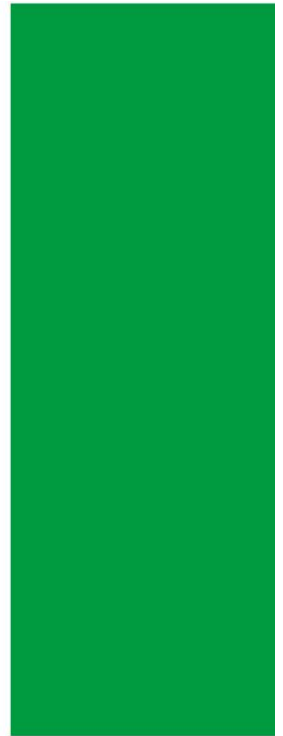


# Product Category Rule for Environmental Product Declarations

*BIFMA PCR for Office Furniture Workspace Products: UNCPC 3814*



**Program Operator**

NSF International

National Center for Sustainability Standards

Valid through August 6, 2020

Extended 12 months per PCRExt 2020-109 valid through July 31, 2021

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**ANSI Eligible Program  
PROGRAM OPERATOR  
ELIGIBILITY ID #0216**



## Product Category Rule for Environmental Product Declarations

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*No participation fees were charged by NSF to interested parties. NSF International ensured that reasonable representation 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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## Product Category Rule for Environmental Product Declarations

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### BIFMA PRODUCT CATEGORY RULES

These product category rules shall be used in preparing an Environmental Product Declaration (EPD) for *office furniture workspace 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 <http://bifma.org> or contact [email@bifma.org](mailto:email@bifma.org).

### ABOUT NSF'S NATIONAL CENTER FOR SUSTAINABILITY STANDARDS (NCSS)

Through the National Center for Sustainability Standards, NSF develops life-cycle based, multi-attribute sustainability standards, protocols, and PCRs for various industries, including building products and materials, furniture, carpet and flooring, fabrics, wallcoverings, roofing membranes, green chemicals, and water and wastewater.

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 <http://www.nsfustainability.org> or contact [ncss@nsf.org](mailto:ncss@nsf.org).

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### GENERAL INFORMATION

This Product Category Rule (PCR) applies to products covered under UN Central Product Classification system, Class 3814 for Other furniture n.e.c. (not elsewhere classified). Examples of common names or terms used to convey the function of office furniture workspace products within an office setting include, but are not limited to, the following: office workspace, paneling solutions, benching, desking open plan, etc. This PCR includes the manufacture of office furniture workspace products constructed from singular or multiple materials including, but not limited to, the following: wood, metal, plastic, particleboard, medium density fiberboard (MDF), bio-based materials, or mixtures of other materials. This PCR is valid through July 31, 2021.

This document specifies the requirements for the Life Cycle Assessment (LCA) study, and the format and content of the EPD itself. The scope of this PCR was based on the availability of information and is North American and European based. Recognizing the global aspects of the furniture industry, global adoption and uniformity of this PCR may be addressed in future revisions as information becomes available. Due to availability, there are some limitations of specificity in the document.

The PCR Committee referenced the existing PCR System Cabinet, which was published in 2011 by JIA WONG ENTERPRISE., LTD. An International PCR for office furniture was reviewed and found not to align as closely with office furniture. In addition there was found to be an office furniture PCR in Europe titled PRODUCT CATEGORY RULES IN ACCORDANCE WITH ISO 14025:2006 DATE 2014-06-10 PRODUCT GROUP: UN CPC 3812 & 3814 OTHER FURNITURE USED IN OFFICES AND OTHER FURNITURE N.E.C. 2012:19 VERSION 1.1 VALID UNTIL: 2017-12-14. The office furniture PCR did not clearly define a functional unit and allowed for inconsistent use of functional unit (m<sup>3</sup>, days or years could be used). The PCR also left time boundary of the functional unit too open to assumption. Distribution transport was optional and the default transport distance was too short for travel in North America. Use phase and end of life were also optional in the PCR and not in line with the recommendations for the BIFMA PCR under development. There were no other similarly classified PCRs found with the same functional unit requirements as defined within this PCR. The PCR Committee referenced the Life Cycle Assessment of Office Furniture Products, which was published in 2005 by the Regents of the University of Michigan, and the Life Cycle



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Assessment: Comparing Fixed Modular Structures, which was published in 2008 by Herman Miller Healthcare. This PCR was developed by an international representation of office furniture manufacturers and non-manufacturing key stakeholders, and thus, is focused on office furniture workspace products for this application within office settings. Additional differences lie in the validation of service life by conforming to the requirements of ANSI testing standards. Appropriate impact methodologies were considered based on manufacturing region, and will be addressed herein.

NSF International (the program operator) and the Business and Institutional Furniture Manufacturers Association Product Category Rules Task group have prepared this PCR document in accordance with ISO 14025. 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.

The purpose of this PCR is to provide transparent guidance for an organization to conduct an LCA and develop an EPD in an effort to measure progress towards environmental improvements of the organization's products being studied and to communicate environmental information about the product to the public.

This PCR was not written to support comparative assertions between products of different manufacturing organizations. 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 variability 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.

### **1.1 Goal and scope requirements for the LCA study**

The goal of this PCR is to specify the guidelines for developing an ISO 14025 conformant Type III Environmental Product Declaration, based on an ISO 14040 and ISO 14044 conformant LCA. The goal of an LCA that conforms to this PCR shall be, at a minimum, to calculate the environmental impacts of each life cycle phase of the product for select indicators, and shall be presented in such a way as to present the life cycle environmental impacts to the



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public. The scope of the LCA shall conform to the ISO 14040 series (ISO 14044 Section 4.2.3.1) and be from cradle-to-grave.

It is recommended that users of this PCR include a statement in their EPD as follows:

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





### 2 PRODUCT DESCRIPTION

This PCR applies to product(s) that provide the function of supporting an individual or group of individuals to conduct work within an office setting by providing defined delineation of workspace. This would include provisions for setting items (computers, papers, phones, task lighting, etc.) on as well as serving as a designated area for an individual to perform other necessary office work-related tasks. The product description shall include the name of the product, product manufacturer and/or model number, a general description, a picture of the product, 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 *Functional Unit*, Section 3.

In order to make it clear to the end user what the reference product in the study consists of, the functional unit shall clearly be disclosed in the EPD. Such declarations shall include, at a minimum, the following:

- The category of the product (**Choose One**):
  - Panels for division of space (No attached worksurface or storage),
  - Panels in addition with other office components (such as a worksurface and storage),
  - Desking (intended for single occupancy at one time),
  - Benching (intended for no less than 2 occupants at one time);
- Number of occupants the reference product is intended to support at one time (i.e., a panel system is chosen and the reference flow used for the LCA is based upon a “6-pack”, and therefore, the number of occupants supported is 6). It shall be clearly reported how many users the reference product used in the LCA study and for which data are reported in the EPD is intended to support;
- Area of physical floor space, in square meters, which the reference product will require; area of work surface provided, in square meters (if any); and volume of storage provided, in cubic meters (if any);
- A photo, image, or rendering of the referenced product;
- The features that the reference product includes in the arrangement / configuration of the LCA study;

Examples include:

- Worksurface,
- Adjustability of worksurface height\*,
- Integrated paneling for work area delineation,



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- Inclusion of privacy / modesty panels,
- Inclusion of electrical components as part of the inventory if the components are incorporated into the product, as appropriate,\*
- Inclusion of storage devices,
- Task lighting,\*

\*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.

Based on multiple proprietary LCAs and one publicly available LCA<sup>1</sup> from furniture industry manufacturers, similar product configurations [i.e., product's available with different textiles, core construction material (metal, wood, composite), surface treatments, number of drawers/shelves, etc.] may be included in the same declaration, provided that the range of variation within each impact category does not exceed  $\pm 10\%$  of impact categories listed in *Parameters to be Declared in the EPD*, Section 8. To reduce the number of unique product LCAs and EPDs for similar office furniture workspace 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 (textiles, materials, surface treatments 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 of more impact category may be reported within the EPD as such, alternatives. 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 shall also be included in the EPD. For example, the base configuration

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<sup>1</sup> Dietz, Bernhard *Life cycle assessment of office furniture products* 2005 <<http://css.snred.umich.edu>>



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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.



### 3

### FUNCTIONAL UNIT

The functional unit shall be one square meter (1m<sup>2</sup>) of workspace for a period of 10 years meeting the requirements below:

1m<sup>2</sup> refers to floorspace the office workspace product occupies. This includes all the office workspace product materials that extend from the floor to the ceiling. In practice, the user would likely create an LCA for their standard office workspace product (example a 6-pack of cubicles) and the user would know the floor space the entire product (the 6-pack that was modeled) occupies. The user would then normalize the results of the entire product to the 1m<sup>2</sup> functional unit.

Office furniture workspace products shall provide defined workspace that allows one or more individuals to fulfill the requirements of a job in an office type environment. Office furniture workspace products will show compliance to ANSI/BIFMA X5.5 and 5.6 to meet the 10 year service life.

- Office furniture workspace products designed to last longer than 10 years shall use one (1) unit of reference flow normalized to the 1m<sup>2</sup> (No fractional products may be reported in this case). For products designed to last longer than 10 years, it can be noted in the EPD the time period the product is intended to last.
- Office furniture workspace products that will not last for 10 years and/or have a warranty period less than 10 years will include the number of units necessary to meet the 10 year time period (for example, an office workspace product with a 4 year warranty will require 2.5 units of product to meet the functional unit requirements).

Office workspace product may include any, and all, of the following features and functions:

- provide for division of space, such as a partition, privacy screen or other way of delineating space;
- provide a worksurface to support office type work in addition to providing physical support for electronics, materials for writing, or other materials that could be set upon or embedded in or attached to the surface;



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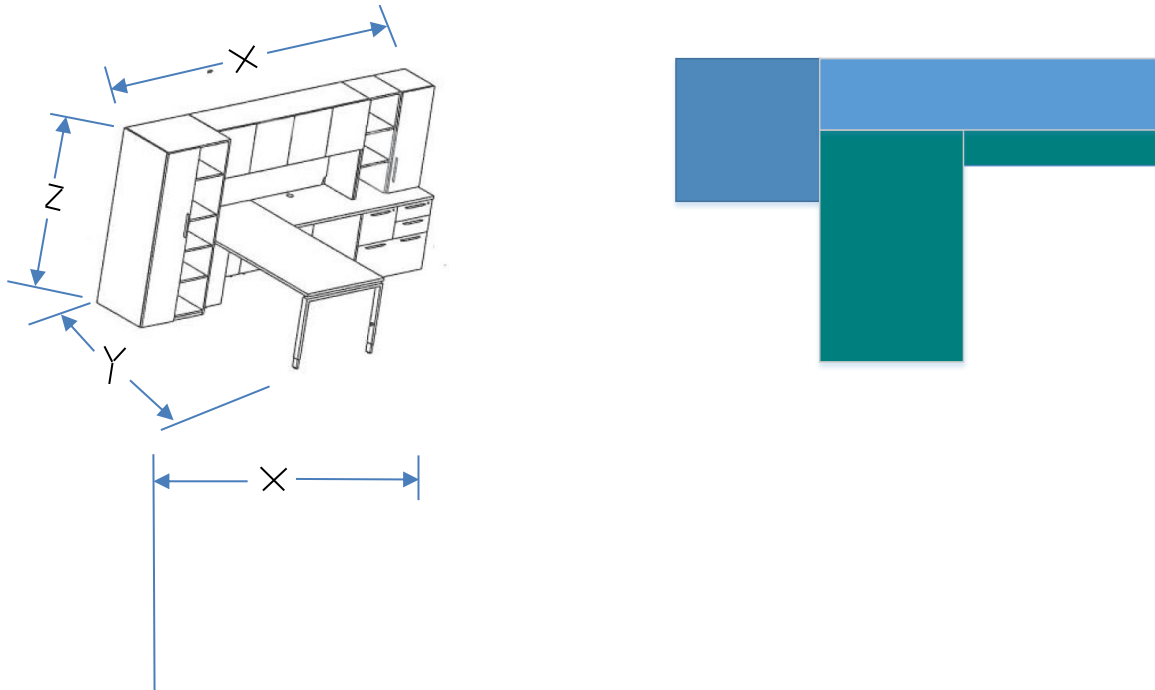
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- provide attached storage of materials such as paper, books, accessories, or other items.

The functional unit is 1m<sup>2</sup> of floor space. It is realized that most users will create an LCA model using a bill of material (BOM) (s) from a typical configuration, such as: a single occupant desk solution, single/double occupant cubicle, 4-pack of desks or other standard configuration as illustrated in Illustration A below. The complete BOM for the standard configuration, including all materials and parts that are needed to make up the configuration would be included in the BOM and thus included in the LCA model. The user would run the LCA model and determine the impacts. The floor space for the standard configuration that was modeled occupies is calculated. If, for example, the floor space of the modeled configuration were 10m<sup>2</sup>, this includes the entire product configuration including all materials in the “Z” height orientation. The user would divide the LCA impacts of the modeled configuration by 10m<sup>2</sup> to normalize the results to the 1m<sup>2</sup> functional unit.

NOTE: Any and all free standing furniture is NOT to be included in the footprint, and thus NOT part of the boundaries of the Functional Unit.

**Illustration A: Typical Arrangements**  
**(Materials within Shaded Areas to be Included in Floor Space Calculations)**



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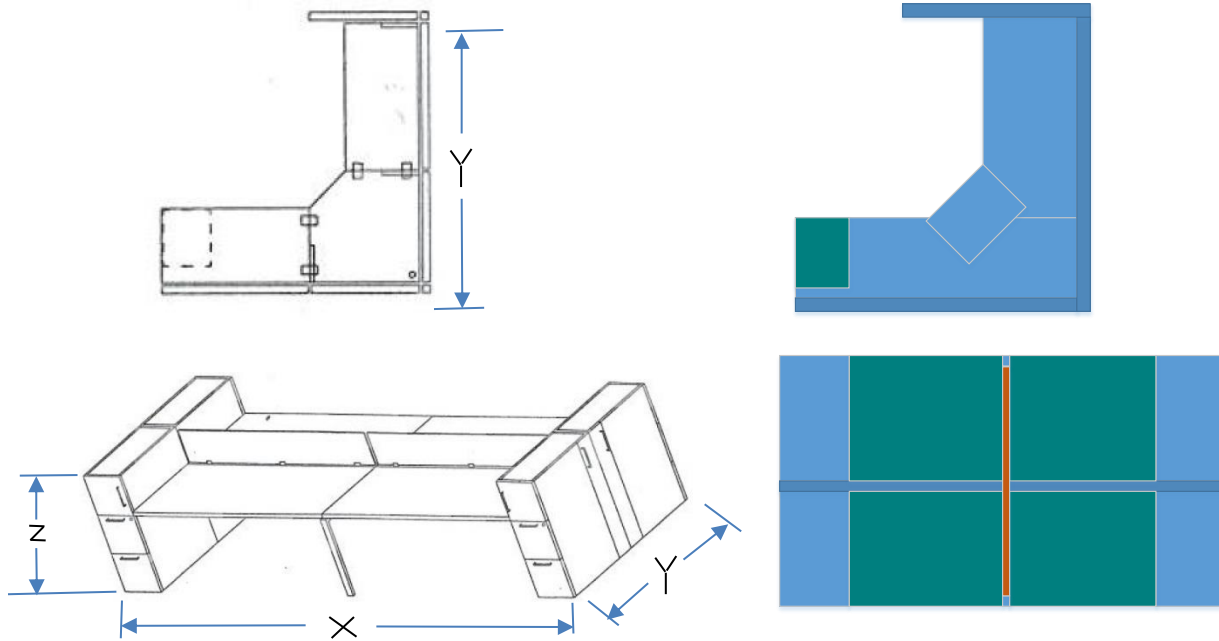
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The ANSI/BIFMA X5.5 and 5.6 method is an industry-recognized and approved test methodology demonstrating that an office furniture workspace products unit remains usable for a period of 10 years. Products that have been documented to meet ANSI/BIFMA X5.5 and 5.6 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.

If the product does not meet ANSI/BIFMA X5.5 and 5.6 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.

### 3.1 Cut-off rules



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All known mass and energy flows should be included. Any flows that are knowingly omitted, shall be justified 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%.



## 4 SYSTEM BOUNDARIES

System boundaries are a set of criteria specifying which unit processes are part of a product system. The entire life cycle is to 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 *Allocation Rules*, section 5. Production of capital goods, infrastructure, and personnel-related activities should not be included. The underlying LCA report shall detail the system boundaries and include a description of the life cycle stages for the product under study. A system boundary example is shown below.

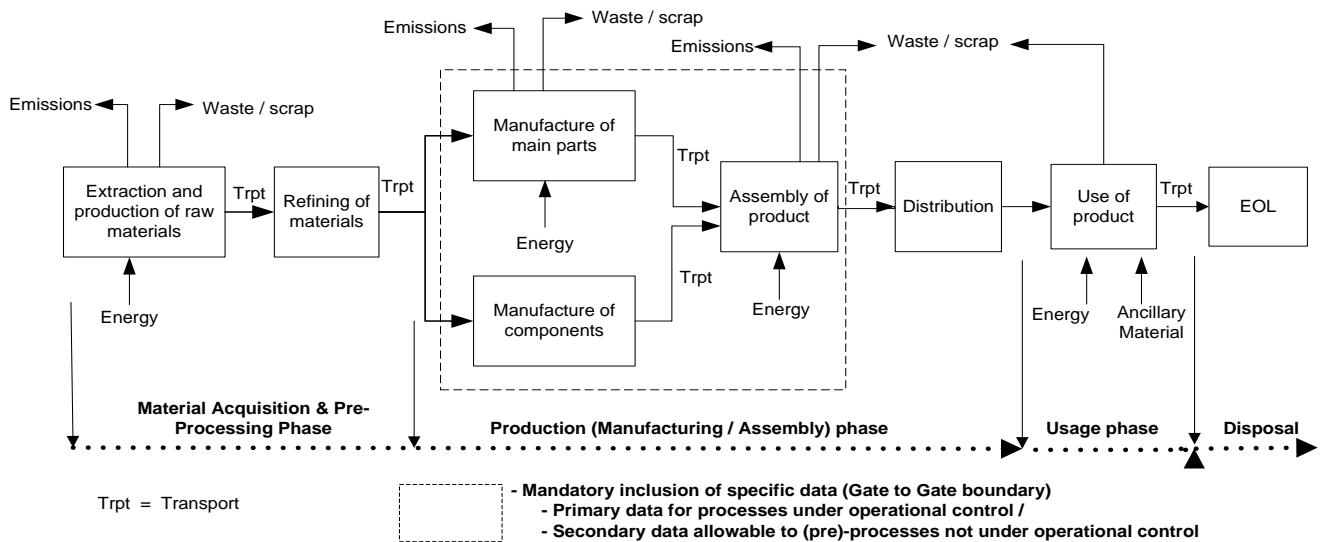


Figure 1: System Boundaries  
example flow for illustrative purposes only

### 4.1 Material acquisition and pre-processing stage





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The material acquisition, pre-processing, 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 the related processing can be considered either “primary” or “secondary”:

- 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., 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 materials to a bulk form or a generic shape (materials or components that are not necessarily manufactured exclusively for the office furniture industry).
- Intermediate processing is the conversion of 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.

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. 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 may come from the USLCI for US based processes, the ELCD (European reference Life Cycle Database) for European based processes, the Japanese LCI Database, other relevant national or regional databases, or similarly regionally developed life cycle inventory data. 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.



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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 USEPA Municipal Solid Waste Generation, Recycling, and Disposal in the United States: Facts and Figures ([current version](#)) 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 are 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 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 transportation 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.



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**Table 1 North American default material transport distances, material acquisition, and pre-processing stage to North American production stage:**

Raw Material/ Classification grouping		Distance (miles)		
		Rail	Truck*	Water
Veneer	26 Wood Products	162 miles	332 miles	5982 Miles Picking 5 Ports for an average of <b>all</b> water transport (Asia, Australia, Africa, Europe & 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	0 miles (NA due to this mode of transport not being significant for this commodity, to our knowledge) [837 miles in 2007 U.S. DOT Shipment Characteristics by SCTG*** Code "Table 7"] <sup>1</sup>	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	5982 Miles Picking 5 Ports for an average of <b>all</b> water transport (Asia, Australia, Africa, Europe & South America)
Plywood	26 Wood Products	162 miles	332 miles	5982 Miles Picking 5 Ports for an average of <b>all</b> water transport (Asia, Australia, Africa, Europe & South America)
Plastic (inc. polymer-based)	24 Plastics & Rubber	0 miles (NA due to this mode of transport not being significant for	757 miles in 2007 U.S. DOT Shipment	960 miles in 2007 U.S. DOT Shipment Characteristics by SCTG*** Code Table 7 <sup>1</sup>



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materials; exc. textiles)		this commodity, to our knowledge)	Characteristics by SCTG*** Code Table 13 <sup>2</sup>	
Raw Material/ Classification grouping		Distance (miles)		
		Rail	Truck*	Water
<b>Steel</b>	32 Base metal in prim. or semifin. forms & in finished basic shapes	562 miles in 2007 U.S. DOT Shipment Characteristics by SCTG*** Code Table 7 <sup>1</sup>	932 miles	833 miles in 2007 U.S. DOT Shipment Characteristics by SCTG*** Code Table 7 <sup>1</sup>
<b>Extruded Aluminum</b>	32 Base metal in prim. or semifin. forms & in finished basic shapes	562 miles in 2007 U.S. DOT Shipment Characteristics by SCTG*** Code Table 7 <sup>1</sup>	932 miles	833 miles in 2007 U.S. DOT Shipment Characteristics by SCTG*** Code Table 7 <sup>1</sup>
<b>Cast Aluminum</b>	32 Base metal in prim. or semifin. forms & in finished basic shapes	562 miles in 2007 U.S. DOT Shipment Characteristics by SCTG*** Code Table 7 <sup>1</sup>	932 miles	833 miles in 2007 U.S. DOT Shipment Characteristics by SCTG*** Code Table 7 <sup>1</sup>
<b>Glass</b>	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)
<b>Fabric Leather</b>	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 5 Ports for an average of <b>all</b> water transport (Asia, Australia, Africa, Europe & South America)
<b>Other</b>	This includes all other non-specified material	208 miles**	531 miles**	2,282 miles**



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(fiberglass, organics, etc.)

NOTE: The average transport distances could also be used for complete components or units.

NOTE: 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:

<[http://www.bts.gov/publications/commodity\\_flow\\_survey/final\\_tables\\_december\\_2009/pdf/entire.pdf](http://www.bts.gov/publications/commodity_flow_survey/final_tables_december_2009/pdf/entire.pdf)>

Distances taken from the U.S. Department of Transportation's Research and Innovative Technology Administration (RITA) website's "TranStats".

\*Truck distance listed in round trip, as the assumption is made that the delivery truck returns empty after making the delivery.

\*\*Distances are based upon the average of all other material categories and shall be used in absence of primary data.

\*\*\*SCTG refers to Standard Classification Transportable Goods

## 4.2 Production

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.



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The terms “site” and “gate” are used here figuratively, as a product may go through 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 USEPA WARM Model, which is currently 20 miles (32 Kilometers) [USEPA Waste Reduction Model (WARM)<sup>11</sup>] 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 USEPA WARM Model<sup>11</sup>, 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 (current version)<sup>9</sup> 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.

### **4.3 Distribution, storage, and use**

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 include processes such as facility operations and transportation between facilities.

The use 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 distribution and use include:

- Transportation to the use location and during use;
- Storage at the use location;
- Normal use;
- Repair and maintenance occurring during the usage time; and
- Assembly and installation of a product.

### **4.4 End-of-life stage**



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The end-of-life stage 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:

- USEPA Municipal Solid Waste (MSW<sup>9</sup>) data, or
- USEPA WARM model, 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<sup>2</sup>.

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<sup>2</sup> 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.





### 5 ALLOCATION RULES

Where possible, allocation should be avoided by dividing unit processes into two or more sub-processes (as specified in ISO 14044, Section 4.3.4, 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.

Deviation from these allocation rules shall be documented and justified.

For allocation due to recycling, companies shall use the Recycled Content Method. Allocation procedures for reuse and recycling discussed in ISO 14044-2006 (see Section 4.3.4.3) shall be applied for recycling situations.

Figure 2 illustrates a simplified process map for a product that uses the Recycled Content Method<sup>3</sup>. The Recycled Content Method is also referred to as the cut-off method, and the 100-0 method.

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<sup>3</sup> The collection process is listed as an attributable end-of-life process; however, the location of this process depends on how the recycled material is collected, as discussed above and in *System Boundaries*, Section 4.



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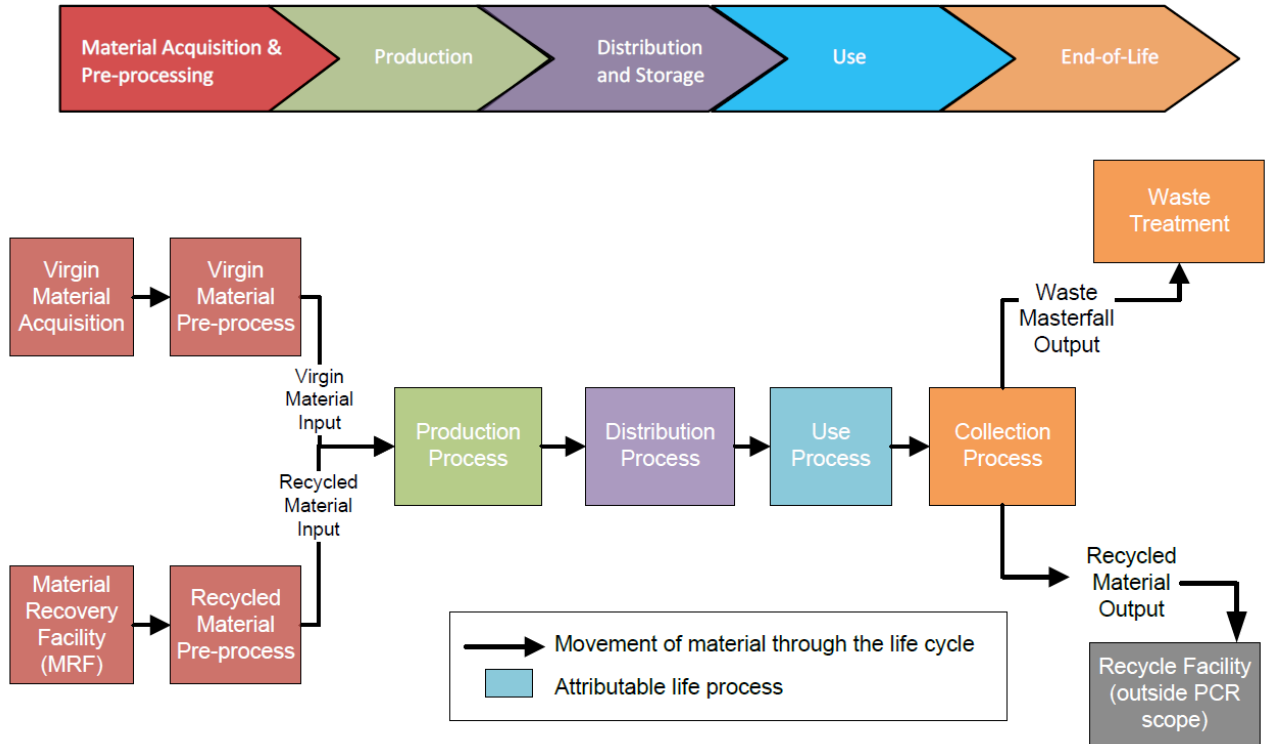


Figure 2: Example Process Map Illustrating the Recycled Material Input Method



**6**

**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.



## 7

## CALCULATION RULES AND DATA QUALITY REQUIREMENTS

### 7.1 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. 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).

### 7.2 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.

2. Data should represent the technology(ies) and process(es) in current use.
3. Data quality assessment shall conform to ISO 14044, Section 4.2.3.6.
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 not limited to):

- [USLCI Data Guidelines](#)
  - ILCD [Handbook](#)
  - Table 8.2: Criteria to Evaluate the Data Quality Indicators, WRI product standard
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 of 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.

### 7.3 Data source



The source(s) of the input data shall be reported.

#### **7.4 Electricity modeling**

Where primary data are available for the electrical power grid for a given unit process, it shall be 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.

Carbon offsets or Renewable Energy Credits or Certificates 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, or might buy Renewable Energy Credits that support the installation of renewable energy at distributed locations. 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.

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

#### **7.5 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<sub>2</sub>-eq.]  
IPCC (most recent version); Biomass CO<sub>2</sub> emissions shall be reported separately.



- a. Consideration for reporting short-term (20-year horizon), in addition to 100-year reporting, is encouraged.
2. Acidification potential (AP) [kg SO<sub>2</sub> eq / kg of emission]  
TRACI 2.1; or outside North America, regionally applicable methodologies.
3. Photochemical ozone creation potential (POCP, or “Smog”) [kg O<sub>3</sub> eq. / kg of emission]  
TRACI 2.1; or outside North America, regionally applicable methodologies.
4. Eutrophication potential (EP) [kg N eq. / kg of emission]  
TRACI 2.1; or outside North America, regionally applicable methodologies.
5. Ozone Depletion Air (kg CFC 11-eq – TRACI 2.1)  
TRACI 2.1; 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.

### 7.6 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.”



## 8

### PARAMETERS TO BE DECLARED IN THE EPD



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

### 8.1 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).

### 8.2 Life cycle inventory data

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

- Net fresh water 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).
- Primary energy demand in total (renewable and non-renewable energy) (MJ)

### 8.3 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 *LCIA methodology*, Section 7.5 of this PCR.

- Global warming potential
- Acidification potential
- Photochemical ozone creation potential
- Eutrophication potential
- Ozone Depletion Air

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 be reported such as:





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- Human Toxicity
- Land Usage
- Ecotoxicity



**9**

**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, 7.2.2. Identification of the significant environmental aspects should conform to ISO 14025, 7.2.3 and 7.2.4.



**10**

**INDEPENDENT VERIFICATION**

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.



### 11 REFERENCES

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.

ANSI/BIFMA e3 Furniture Sustainability Standard.<sup>4</sup>

Atherton, John. *Declaration by the Metals Industry on Recycling Principles*, International Journal of Life Cycle Assessment, 12 (1), 59-60, 2007.

FTC Part 260, Green Guides.<sup>5</sup>

(ILCD, 2010) Joint Research Commission, 2010, *ILCD Handbook: General Guide for Life Cycle Assessment*.<sup>6</sup>

Intergovernmental Panel on Climate Change (IPCC).<sup>7</sup>

ISO 14025:2006 *Environmental labels and declarations – Type III environmental declarations – Principles and procedures*.<sup>8</sup>

ISO 14040:2006 *Environmental management - Life cycle assessment – Principles and framework*.

ISO 14044:2006 *Environmental management - Life cycle assessment – Requirements and guidelines*.

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<sup>4</sup> e3-2012 BIFMA Furniture Sustainability Standard, definitions <[www.BIFMA.org](http://www.BIFMA.org)>

<sup>5</sup> Federal Trade Commission <<http://www.ftc.gov>>

<sup>6</sup> <<http://ict.jrc.ec.europa.eu>>

<sup>7</sup> World Meteorological Organization (secretariat to IPCC), 7bis Avenue de la Paix ,C.P. 2300, CH- 1211 Geneva 2, Switzerland <<http://www.ipcc.ch>>

<sup>8</sup> International Organization for Standardization (ISO), Case postale 56, CH-1211 Geneve 20, Switzerland <[www.iso.org](http://www.iso.org)>



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*Municipal Solid Waste Generation, Recycling, and Disposal in the United States: Facts and Figures for 2008.*<sup>9</sup>

USEPA, *Tool for the Reduction and Assessment of Chemical and Other Environmental Impacts (TRACI)*.<sup>10</sup>

USEPA, *Waste Reduction Model (WARM)*.<sup>11</sup>

*World Business Council for Sustainable Development's Global Water Tool.*<sup>12</sup>

World Resources Institute (WRI), *Draft Product Life Cycle Accounting and Reporting Standard.*<sup>12</sup>

USEPA, *Municipal Solid Waste Generation, Recycling, and Disposal in the United States: Facts and Figures*  
<http://www.epa.gov/solidwaste/nonhaz/municipal/msw99.htm>

US LCI 2004: *Database Project Development Guidelines* <http://www.nrel.gov/lci/docs/dataguidelinesfinalrpt1-13-04.doc>

ILCD Handbook, *European platform on Life Cycle Assessment*. [http://eplca.jrc.ec.europa.eu/?page\\_id=86](http://eplca.jrc.ec.europa.eu/?page_id=86)

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<sup>9</sup> <<http://www.epa.gov/epawaste/nonhaz/municipal/msw99.htm>>

<sup>10</sup> USEPA, *Tool for the Reduction and Assessment of Chemical and Other Environmental Impacts (TRACI)*  
<http://www.epa.gov/nrmrl/std/sab/traci/>

<sup>11</sup> USEPA Waste Reduction Model <[http://www.epa.gov/climatechange/wycd/waste/calculators/Warm\\_home.html](http://www.epa.gov/climatechange/wycd/waste/calculators/Warm_home.html)>  
USEPA Waste Reduction Model <[http://www.epa.gov/climatechange/wycd/waste/calculators/Warm\\_home.html](http://www.epa.gov/climatechange/wycd/waste/calculators/Warm_home.html)>  
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### 12 EPD CONTENT REQUIREMENTS

The content of the environmental product declaration (EPD) shall include the following shall include the following:

A. Front page:

1. 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 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.*

2. Picture of product or family
3. Manufacturer's name and contact information
4. Information on the EPD program operator
5. Date of certification and period of validity
6. Functional unit
  - i. Details aligning to requirements stated in Section 3, including:
    1. 10 year service life, or number of units to meet 10 year service life
    2. Additional Features and functions above and beyond scope of this PCR, reference Section 2.
    3. Denotations of any baseline configuration or alternate configurations included and associated environmental impacts shall be clearly defined.
    4. If electrical components are included in scope, then energy requirements during the Use phase shall be listed per kW-hr.

B. Key environmental parameters:

1. Primary energy demand



2. Percentage of recycled content
- C. Product specifications, as described in *Product Description*, Section 2
- D. Impact assessment categories, as specified in *Impact Assessment Categories*, Section 8.3
- E. Emissions and wastes, as specified in *Parameters to be Declared in the EPD*, Section 8
- F. Additional environmental information per *Other Environmental Information*, Section 9
- G. References, as specified in *References*, Section 11

### 12.1 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  $\pm 5\%$ , the EPD shall be adjusted. The EPD shall be reviewed and reissued every five years from the date of issuance or earlier, as appropriate.

### 12.2 References

The EPD shall, if relevant, refer to:

- The underlying LCA report;
- The relevant PCR document;
- Other documents that complement, verify and support the EPD;
- Instruction for recycling; and
- Program Operator instructions.