Textile Exchange

Life Cycle Inventory Library User Guidance

Contents

1. Introduction

This guidance shares key information on the contents of the Textile Exchange's Life Cycle Inventory Library (LCI Library), as well as how to extract LCI data from it.

Specifically, it includes:

- Basic information about the LCI Library (section 2):
  - Its structure
  - The scope of the datasets
  - Its intended users
- How to use the LCI Library (section 0):
  - Pre-requisites practitioners should meet prior to using the LCI library
  - Guidance for identifying the most appropriate dataset for the goals of the study
  - Guidance for filling in data
- Lifecycle assessment (LCA) modeling considerations (section 0)
- Additional considerations for disclaimers and comparative assessments (section 0)

Information about submitting data into the LCI library can be found in the LCI Library Submission Guidance on the LCI Library webpage.

Please get in touch with impactdata@textileexchange.org to request submission templates and for further details on the submission process.

1.1. Objective

The goal of the user guidance is to ensure the correct and appropriate use of the data contained in the LCI Library and to prevent the misuse of it. The guidance also gives users the information needed to access, download, use data, and troubleshoot any issues.

1.2. Scope and boundaries of the LCI Library

The LCI Library contains lifecycle inventory data in the form of modeling parameters and/or elementary flows (when available). In some cases, both data types are available in the LCI library for a given activity, and in other cases, just one data type may be available.

The datasets contained in the LCI Library may have different levels of completeness. If there are no datapoints for certain parameters or elementary flows, it does not necessarily mean that they don't exist or that there is no impact. The data consolidated in version one of LCI Library is based off publicly available data only.

The LCI Library does not contain Life Cycle Impact Assessment (LCIA) information.

2. LCI Library Basics

2.1. LCI Library structure

The Textile Exchange LCI Library consists of:

- One record table, which includes descriptive information about a selected activity
- Two values tables, which include the specific inventory values (modeling parameters and elementary flows).

The data fields in each type of table are described below.

2.1.1. Records Table

The records table contains the following descriptive information for each dataset (see Figure 1):

- Activity name: information about the material under assessment and the stages included in the dataset.
- Activity scope: information about the stages included in the dataset. This information may be generic or specific depending on the data source.
- Reference product: describes a quantifiable product the dataset bases its results on. E.g., cotton – ginned cotton lint, or hemp – scrunched hemp fiber.[1]
- Reference product amount and reference product UOM (unit of measure): Results are reported in reference to the quantity of reference product represented by the amount and unit of measurement, e.g. the water consumption required to produce 1 kg of the

[1] Please note, the reference product may or may not be a product generated in an activity. This is because some studies used in the LCI Library have scopes that are larger than the library's. The reference product is in most cases the reference flow of the study cited.

reference product. E.g., 1 kg cotton – ginned cotton lint, 1 kg hemp – scrunched hemp fiber.

- Material type: describes the broad material type that was studied. E.g., cotton, polyester, and hemp.
- Country or region: datasets may include the global region or country where the study was conducted. This field may be a country (e.g., India), a region (e.g., Europe) or "unspecified geography" if the study location was not specified or includes a combination of multiple locations.
- Subdivision: datasets may include a geographic subdivision where the study was conducted. This field may not be displayed if no subdivision is specified.
- Description: additional information regarding the data.
- Publication year: the year when the study was published.
- Citation: the source of the dataset.
- Completeness flag: used to flag incomplete elementary flow data sets[2].

[2] if there are no datapoints for certain parameters or elementary flows, it does not necessarily mean that they don't exist or there is no impact.

Records

Record Information	Value/Description
activity_name	Wool - greasy wool (merino) - production (farm)
activity_scope	production (farm)
reference_product	Wool - greasy wool (merino)
reference_product_amount	1
reference_product_uom	kg
material_type	Wool
country_or_region	Australia
subdivision	Western Australia
description	Source in document: Table 1; Reference in the document: Wiedemann S, Yan M-J, Henry B, Murphy C (2016) Resource use and greenhouse gas emissions from three wool production regions in Australia. J Clean Prod 122:121–132
publication_year	2020
citation	Wiedemann, S., Biggs, L., Nebel, B. et al. Environmental impacts associated with the production, use, and end-of-life of a woolen garment. Int J Life Cycle Assess 25, 1486–1499 (2020). https://doi.org/10.1007/s11367-020-01766-0
completeness_flag	Incomplete Elementary Flows

Figure 1: Records table example

2.1.2. Values tables (modeling parameters and/or elementary flows)

Two types of data are available for download from the values tables: (1) modeling parameters and (2) elementary flows.

1. **Modeling parameters:** product, material, or energy entering or exiting a system being studied. Modeling parameters include any relevant input or output used to model results for one specific activity, including intermediate flows such as electricity use, fuel used onsite, fertilizer, and pesticides. This download may also contain a combination of intermediary flows and elementary flows, depending on the data source.

2. **Elementary flows**: material or energy entering the system being studied that has been drawn from the environment without previous human transformation, or material or

energy leaving the system being studied that is released into the environment without subsequent human transformation.

Both types of downloads have the same structure, which is described below and can be seen in Figure 2.Figure 2

- Input/output: specifies whether the material enters or exits the system being studied.
- Compound or material: identifies the material or energy flow. For the modeling parameters table, this may be any input or output such as electricity use, fuel, fertilizer, and pesticides. For the elementary flows table, the compound or material is from the LCI Library elementary flows master list.
- Value and unit: together the indicator value and unit provide the quantity of the specified compound or material that is inputted or outputted by the specified activity and reference product.
- Compartment: indicates whether the specified compound or material was released to air, water, or soil. The compartment may be blank if it was not specified. Compartment is only relevant for outputs.
- Comments: available in the download of the modeling parameters and elementary flows. Comments may provide any additional information relevant for using the data.

Modeling Parameters

Input/Output	Compound or Material	Value	Unit	Compartment
Input	Diesel	8.21	MJ	
Input	Electricity	0.41	kWh	
Input	Liquefied Petroleum Gas	0.50	MJ	
Input	Water	7,103.00	L	

Elementary Flows

Input/Output	Compound or Material	Value	Unit	Compartment
Input	Water	7,103.00	L	

Figure 2: Values table example

2.2. Scope of the data in the LCI Library

The scope of the LCI Library is cradle-to-gate, from raw material extraction or production to pre-spin (i.e., raw material extraction and processing). The exact scope of each dataset in the LCI Library varies. For example, a dataset may cover a portion of the raw material extraction process. The specific scope of a dataset can be derived from the activity name. If

additional information about specific datasets is needed, users can refer to the source of the data.

2.3. LCI Library intended users

The LCI Library is intended to be used by people trained in Life Cycle Assessment methods (LCA practitioners), either in house or in a consulting capacity, intending to model the production process of a specific fiber or material.

3. How to use the LCI Library

3.1. Pre-requisites

The LCI library is a tool to be used by LCA practitioners when completing a lifecycle assessment of a fiber or material. In this process, and prior to using the LCI Library, the practitioner should define:

- The goal and scope of the study. Please note, the information contained in the LCI Library is for raw material extraction and initial processing, i.e., pre-spin, and so additional inventory data beyond what is in the LCI Library may be required to meet goals of their study.
- The LCIA methodology to be used, based on goals of their study.
- The functional unit and reference flow. The practitioner may need to adapt the data in the LCI Library, which are reported relative to a reference product amount, based on the functional unit or reference flow of the study.
- Data quality, applicability, and completeness considerations. As with any library, the type, quality, and completeness of data varies across datasets. Practitioners should have clarity regarding the type and quality and completeness of data they need for their study so they can assess whether selected datasets are aligned with their goals.

3.2. Identifying relevant data

3.2.1. Searching in the LCI Library

When using the Textile Exchange's LCI Library, LCA practitioners can:

1) Select the **material type** from the drop-down list to begin browsing data in the LCI Library. All subsequent data will be filtered based on the selected material type.

2) Select the **reference product** from the drop-down menu, which displays all reference product options available for the selected material type.

3) Select relevant **activity name**: once the material type and the reference product are selected, the LCI Library will display the activity name(s) and geographies available for the selected parameters. Users may select the combination that works best for the goal of their study.

   Example:
   A practitioner wants to model the production of wool in Country A. If the library contains data for merino wool in Country A, and wool in Country B, depending on the knowledge of the practices each country has, the study's goal and the quality of the data in each dataset, the practitioner may choose one over the other to better describe their model.

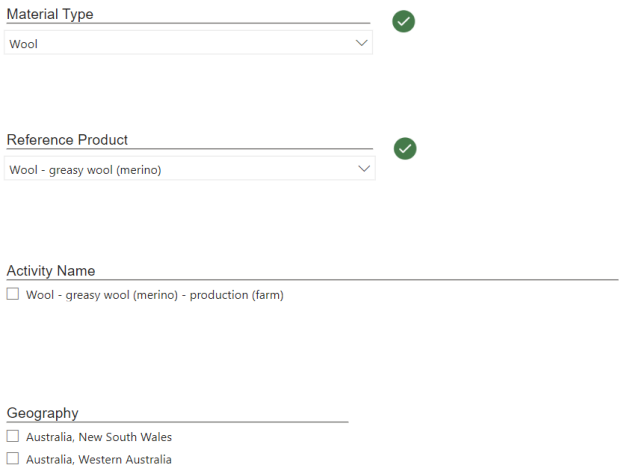


Figure 3: Example of activity selecting process

4) Select the data to download: once the specific activity is selected, the LCI Library will show:

   a) Record information such as publication year, citation, scope of the dataset, and more (see section 0 and Figure 1: Records table example).

      The Records table will show a comment regarding the completeness of the elementary flows data, for example whether the elementary flow list is incomplete or filtered based on the master list. If a dataset has an incomplete elementary flow flag, practitioners should evaluate whether the completeness affects the quality of their work and decide whether the dataset is valuable for their purpose.

      Example:

A practitioner finds a dataset with the incomplete elementary flow flag. The practitioner views the available data and finds that the elementary flows include a complete list of greenhouse gases. If the goal of the study is assessing the carbon footprint of a product, the dataset might be sufficient. If, on the other hand, the goal is to assess the water footprint, the dataset won't provide the required information.

b) The data from the Values Tables is available for modeling parameters and elementary flows. Both datasets can be downloaded independently by pressing the download button.

3.2.2. Understanding what's available, data gaps, and complementing datasets.

The type and quality of data contained in each dataset may vary. If the selected activity has two datasets (modeling parameters and elementary flow), it is recommended to review both, as one may be more relevant for the specific goal of the study. Please note:

- Scope of the data: different activities may have different scopes the name of the activity provides information about the stages included. If more data is needed, users can refer to the comment section or the source of the data (citation information).
  - Identifying gaps in the scope of the data: practitioners may find that the scope of the selected activity doesn't completely align with the goal of their study. See section 0 for best practices in filling the gaps.
- The type of data in each dataset – modeling parameters versus elementary flows: if both datasets are available for the selected activity, the type, quantity, and potentially the completeness of data will differ between the two tables and practitioners should select the most appropriate dataset for use according to the goals of the study.

  Example:
  A practitioner is looking to model the production process of a fiber or material. The LCI library presents one dataset with modeling parameters that contains most of the production processes of the fiber or material, and one dataset with elementary flows containing water and carbon dioxide. If the goal of the study is to measure the water footprint, the elementary flow data will be more appropriate for the goal of the study.
  - Identifying gaps in modeling parameters datasets: depending on the selected activity, modeling parameters datasets may have different degrees of completeness. The absence of data doesn't mean absence of impact. Practitioners are encouraged to check whether all the parameters they need for their model are included in the selected dataset. If the dataset is missing modeling parameters,

practitioners are encouraged to complement their model with data from other sources (see section 0).

- Identifying gaps in elementary flows dataset: depending on the selected activity, elementary flows datasets may have different degrees of completeness. The absence of data doesn't mean absence of impact. Practitioners are encouraged to check whether the list of elementary flows is relevant and comprehensive for the goal of their study. For guidelines on modifying elementary flow datasets, see section 0.

3.3. Filling data gaps and modifying datasets

In certain situations, practitioners may want to either modify datasets or fill data gaps.

- Reference product: if practitioners are using a reference product different to the relevant datasets, practitioners should adapt the data to accurately reflect their reference product.

  Example:
  A practitioner would like to calculate results for 1kg of yarn production (the project's reference product). The dataset selected is for 1kg of greasy wool. The practitioner learns that 1.5kg of greasy wool is required to make 1 kg of yarn. To align the units, the practitioner should multiply the greasy wool datapoints by 1.5.

- Scope gaps: practitioners should fill scope gaps according to the scenarios presented in the table b1. Scope example is described in the left column and dataset type in the top row. Best practices are described for each combination of scope example and dataset type:

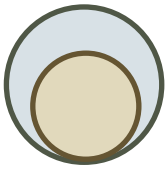
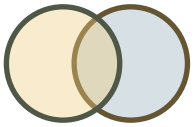
- Modeling parameter gaps:

  Modifications should be done for the following two scenarios:

  - The list of modeling parameters in the dataset is missing one or more parameters that the practitioner is looking to include. In this scenario, we recommend seeking a complementary data source for the missing parameter in the model.
  - The practitioner has primary or secondary data for one or more parameters that is better suited for the goal of the study than the data available in the selected dataset (e.g., amount of fertilizer used for farming commonly used in a specific location). In this scenario, practitioners are encouraged to modify the dataset to include data better suited for their study.

- Elementary flows gaps: If the dataset does not have an elementary flow list that meets the requirement of the model, we encourage the practitioner to not use the elementary flow data, as it represents an aggregation of information for the modeled process and its modification might not have the desired result. The only exception is if the dataset contains only one type of data and the missing data needed is not related. In that case, we encourage complementing the dataset only with non-related data. For example, an activity's elementary flow dataset contains only greenhouse gas data, it can be complemented with elementary flows such as water inputs.

Table 1. Filling scope gaps in different scenarios. In the table, the orange circles represent the scope of the dataset in the LCI Library and the blue circles represent the scope of the user's study.

Situation	Modeling parameters	Elementary flows
 The scope of the user's study includes the scope of the LCI Library dataset in full and extends beyond it.	Practitioners are encouraged to seek complementary data for the portion of the scope not covered by the dataset.	Practitioners are encouraged to seek complementary data exclusively for the portion of the scope not covered by the dataset as the data represents an aggregation of information for the modeled process.
 The scope of the user's study overlaps with the scope of the LCI Library dataset, but the LCI Library dataset scope extends beyond the scope of the user's study.	Practitioners are encouraged to remove the modeling parameters existing in the dataset but that are not applicable to the study and add complementary data if portion of the scope not covered by the dataset.	Practitioners are encouraged to NOT use the dataset as the data represents an aggregation of information for the modeled process and its modification might not have the desired result.

4. LCA modeling

Users trained in LCA methods and modeling can incorporate data from the LCI Library into their study to generate Life Cycle Impact Assessment (LCIA) results. Practitioners can use the modeling parameters as inputs to create their own model, or they can calculate impact

assessment results based on the elementary flows downloaded from the LCI Library. We strongly encourage practitioners to refer to the study cited in the LCI Library for additional information.

For either application, the LCIA methodology should be chosen based on the goals of the practitioner's study. LCA-specific software products or generic data analysis software can be used to create models and perform calculations.

We encourage all LCA reports that utilize data from the LCI Library to undergo a third-party critical review.

5. Other Considerations

5.1. Reporting considerations

Practitioners should include in their report:

- All relevant disclaimers about the completeness and representativeness of the data.
- Citation of all data sources used, as noted in the LCI Library.

5.2. Considerations for comparative assessments

The data included in the LCI Library comes from several studies, each using different methods, and should not be used for comparisons. Users must refer to the citations of each dataset to build and understanding of the methods used.

Data should not be used for comparative assessments unless the inventory is from the same original study and practitioners are working on comparative LCAs following the relevant ISO standards e.g., ISO 14040 Environmental management Life Cycle Assessment – principles and framework, ISO 14044: Environmental management Life Cycle Assessment – requirements and guidelines, or ISO 14067: Greenhouse gases Carbon footprint of products – requirements and guidelines for quantification.

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