Guidance

How To Use LCA Data

Introduction

Rationale and Target Audience

Better Cotton seeks to provide members with further guidance on how to responsibly use cotton Life Cycle Assessment (LCA) data when making environmental claims. The main objective of this document is to guide the proper use of LCA data.

Proper data use can increase benefits while reducing risks. One particular risk is greenwashing (when an organization claims a product is more environmentally responsible than it is, leading to stakeholder distrust). This document offers best practices for leveraging LCA data and ensures alignment with global green claims legislation and traceability requirements. This document is intended to provide clear guidance on **how organisations sourcing BCI Cotton can and cannot use the LCA data** from cotton fiber LCA studies, Better Cotton data in Higg MSI, Scope 3 intervention projects, and yearly GHG footprints for sustainability reporting. It is important to note the use of Better Cotton data and any claims stemming from its use are subject to the requirements of the Better Cotton Claims Framework.

Section One

LCA and GHG Accounting Scopes

LCA is a standardized methodology for assessing environmental impacts across all stages of a product or process life cycle. It evaluates resource use, emissions, and ecological footprints from raw material extraction to disposal. LCA measures greenhouse gas (GHG) emissions or carbon footprint as well as other impact metrics.

Figure 1 presents a case for the LCA of a garment. It is a system boundary diagram showing the product system, depicting the general unit processes that are accounted for in the study. A garment lifecycle involves many more steps than assessing cotton lint, where the agricultural and ginning stages are the only two major processes. In this case, the study is a cradle-to-cradle analysis assessing cotton lint input, garment production, use, and recycling at the end of life.

LCAs evaluate the impact of a product or a service in terms of a unit of a fulfilled function and calculate impacts, such as GHG emissions. The Greenhouse Gas Protocol for carbon accounting includes Scope 1, 2, and 3 GHG emissions. An LCA assessment accounts for all three Scopes; however, this impact is most commonly presented as total GHG emissions. In order to organize the resulting GHG emissions from the LCA assessment into 1, 2, and 3 Scope GHG emissions, it is vital to understand at which point in the lifecycle the emissions are being considered, as well as from whose perspective.

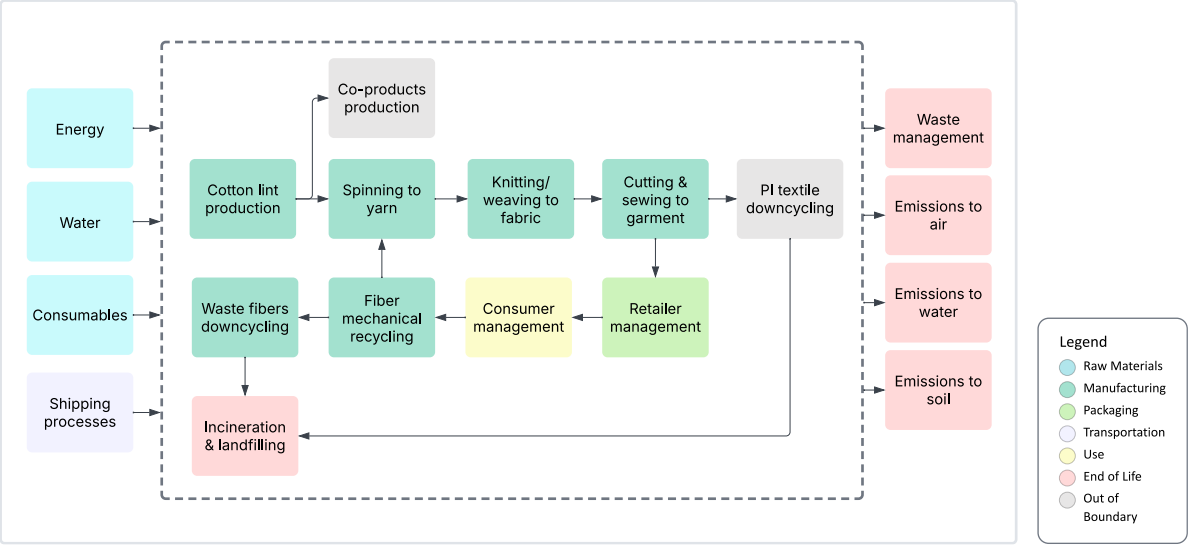

Figure 1. System boundaries for the LCA of a garment from cradle-to-cradle.

For example, for the retailer of a garment, Scope 1 may include air conditioning, fugitive emissions, and fuel combustion from its trucks transporting apparel to different locations. Scope 2 may include electricity consumption in the warehouse and retail stores. Scope 3 may include the remaining emissions, such as the emissions that occurred due to manufacturing the owned vehicles to the emissions from making and applying the fertilizers used in cotton production.

From the cotton farm perspective, Scope 1 includes emissions from fertilizer application, Scope 2 may include electricity used for irrigation, and Scope 3 may include the emissions from fertilizer production, for example.

Thus, the cotton farm's Scopes 1, 2, and 3 emissions are all part of the retailer's Scope 3 emissions.

Better Cotton Initiative members include cotton producers, cotton suppliers and manufacturers, brands and retailers, and certification bodies. For each type of member, Scopes 1, 2, and 3 imply a different set of operations at each level in the supply chain.

Unlike GHG accounting, an LCA always includes all of these impacts and Scope 3 is never optional. Further, LCA includes other metrics, such as ozone depletion, eutrophication (excess nutrients), and resource consumption.

A simple way to distinguish LCA metrics from GHG scope metrics is that LCAs focus on products, processes or services, while GHG scope reporting centers on entities or organizations. Cotton LCA metrics are often used in organizations' GHG reports, specifically in regard to Scope 3 accounting. There are multiple sources of cotton LCA data available, but it's important to consider their limitations when using them.

GHG emissions from cotton lint production are an important sustainability metric for all members. Accurate use of LCA GHG data for Scopes 1, 2, and 3 therefore requires an understanding of life cycle stage and stakeholder perspective.

Section Two

Sources of Cotton LCA Data

Cotton LCA data is based on cotton LCA studies and LCA datasets.

- **An LCA study**, depending on its goal and scope, will assess a specific cotton for a certain organization, within a country or region, with specific agronomic inputs, practices, and yield.
- **An LCA dataset** is derived from one or multiple studies. Datasets are available through LCA databases and are usually built following specific quality criteria and published after an extensive review process before they are available for use by database users to develop more LCA studies. For the case of cotton, several LCA databases provide generic datasets users can integrate into a model to calculate a yarn or a garment's environmental impact.

LCA studies depend on methodological sources, and choices made when assessing cotton lint production will affect the results. *This means results from different LCA studies cannot be compared if the methodological and data sources used in the LCA studies are different*. For example, LCA metrics can be representative of a country's average production, based on statistics and assumptions, or be specific to an organization using primary data to represent its operation. Moreover, the methodological choices in an LCA model play an important role in the results. For this reason, cotton lint LCAs require thoughtful interpretation to ensure accurate application. It's also why many programs set specific guidelines regarding how an LCA must be conducted.

While separate LCA studies should not be directly compared, the following sources of data can be used by Better Cotton members to explore the impact of cotton production:

- **Better Cotton Initiative Cotton Datasets available through the Higg Materials Sustainability Index (Higg MSI) Platform**. Higg MSI uses LCA to measure material impacts, including cotton. Better Cotton submits LCA datasets to Higg MSI, which are based on primary data collected by Better Cotton's implementation partners and are thus representative of BCI farms' production processes as a whole. Currently, information is available for India; the assessment and submission to the MSI Contributor tool for the remaining regions is in progress. While the Higg MSI may be useful for assessing the production of a whole garment, because the data comes from different sources making different choices, comparisons using the Higg MSI should be used with care.
- **Better Cotton Initiative Study Reports.** Better Cotton has published a comparative GHG emissions study of Better Cotton Production and comparable production across five countries (India, Pakistan, China, Tajikistan, Turkey) and GHG emissions for countries contributing over 80% of Better Cotton's total production (India, Pakistan, China, Brazil

and USA). In both reports, the impact is representative of the period 2015-2018. Newer and updated GHG reports will be available on a periodic basis beginning in 2026. The update is to be based on a farm footprinting report plan and updated baseline for comparison. Like the Higg MSI data, these data may be used for the carbon footprint of a garment, for example, and allow for comparisons of products made from cotton from different countries. Comparison with other fibers is not recommended.

- **Other Higg MSI Cotton Datasets** are available for a range of cotton products, independent from Better Cotton, including cotton representative of other programs, and cotton producing regions unaffiliated with any program. Users of any dataset must review each dataset detail and choose accordingly, on a case-by-case basis, depending on what is sought to be represented (e.g., geographic sourcing, sourcing from standards or certified materials, etc). These datasets should not be used for cotton sourcing comparisons.
- **Commercial LCA Databases**, like ecoinvent, WFLDB, Agrifootprint, GaBi, and others are another source of information for the impacts of cotton lint production offering country, regional, or global estimates. Here, users must be aware of identifying the correct product they are looking for: cotton, cotton seed, seedcotton, lint, or others. Understanding the complexity of LCA databases may require some level of practice in the field
- **Private Independent Studies** on cotton and lint production at the farm level developed for farms or farm organizations, or with farms' data, are another potential source of information if they have been critically reviewed for ISO 14044 compliance. The cotton is usually the highest quality for use in a product LCA or footprint. An example of this kind of study is the LCA of cotton cultivation systems commissioned by C&A Foundation. In general, independent studies are valuable when the commissioner needs to be able to compare cotton alternatives for decision making or for marketing purposes.

In all cases, data timeframe, impact allocation choices between seedcotton and lint, and impact assessment method, among other aspects, make each dataset and study unique. This is why independent studies and datasets should not be used for comparisons. Making comparative claims without having a proper comparative ISO conformant critically reviewed LCA study for substantiation can pose risks (see section four) for member organizations.

Section Three

Uses of Cotton LCA Datasets and LCA Metrics

In general, LCA is a great tool for impact contribution and hotspot analysis, understanding levers for environmental improvement, product comparison based on their function, assessing more than only GHG emissions, and thus identifying environmental tradeoffs when comparing different products or intervention alternatives.

Co-benefits of doing LCA may include fostering relationships with suppliers while collecting data and co-creating positive interventions in the supply chain to reduce impact.

In order to compare LCA values, the product systems must adhere to consistent methodological choices. It is inaccurate to compare LCA metrics from independent studies unless they follow the

same specific guidelines. And even if the guidelines are the same, these comparisons are not allowed under ISO standards for LCA. For product comparisons, ISO standards require a comparative LCA study; this means that for product comparison, a case-by-case specific comparative LCA study must be developed.

Using independent datasets or independent single product studies to make sourcing decisions is also not viable because methodological choices, uncertainty drivers, and even temporal aspects of the information may differ. Comparative LCAs ensure consistency and functional equivalence. Thus, for sourcing decisions, it is advisable that companies develop a specific comparative LCA study for their specific decision goals.

The following table summarizes the potential cotton lint LCA uses based on the source of LCA data. Observing this guideline is meant to help Better Cotton members understand what type of LCA data can be used for different purposes.

Table 1. Available cotton LCA data sources and their potential application for different uses.

LCA use/ data source	**Higg MSI database (including Better Cotton datasets)**	**LCA commercial databases**	**Independent assessments**
Hotspot analysis *(e.g., Is fertilization more impactful than irrigation?)*	At material category and production phase level, as available in the Higg product module	Sometimes at country level	At any level, including farm level
Fiber/ lint comparison *(e.g., Is cotton from x less impactful than y?)*	Comparisons are not allowed	Not advisable without carefully reviewing dataset assumptions and methodological aspects	Yes, from studies comparing the fiber/lint in question
Cotton products comparison *(e.g., Is yarn from x less impactful than y?)*	Comparisons are not allowed	Not applicable, but could be an input to independent assessments	Yes, from comparative studies
Identifying tradeoffs from intervention projects *(e.g., Will increasing yield by incrementing fertilizer input be beneficial for all environmental aspects?)*	Not applicable	Not applicable	Yes, if defined as part of the Goal and Scope of the study
Fostering relationships with suppliers *(e.g., Would cotton x and y suppliers be open to implement changes to source 100% renewable electricity in irrigation?)*	Not applicable	Not applicable	Yes, if suppliers are involved in data collection efforts and next steps after learnings from study

Report on Scope 3 metrics *(e.g., What data can be used to report the GHG emissions of the cotton we source?)*	Potentially, disclosing caveats	Potentially, disclosing caveats	Yes, if the study is specific to or for the reporting organization

Section Four

Risks of Misusing LCA Metrics

Environmental claims not backed by robust assessments or following established standards are considered greenwashing and pose specific risks.

Reputational risks: allegations of greenwashing can diminish trust and cause reputational damage. Erosion of trust can result in short and long term damage to the brand, and diminished support from core stakeholders including consumers and investors. These risks are amplified by the nature of social media and how quickly information is shared.

- **Regulatory risks**: specific communication and reporting regulations exist to require companies to explain green claims, and to investigate and enforce actions against misconduct. These regulations vary by country, so it is critical to understand the regulations in the countries in which an organization chooses to operate.
- **Litigation risks**: civil litigation against organizations accused of greenwashing – in particular, climate-related greenwashing is becoming increasingly common.

Section Five

Greenwashing and Regulatory Compliance

Greenwashing refers to misleading sustainability claims that exaggerate environmental benefits. Common examples include vague claims (e.g., "eco-friendly" without substantiation), cherry-picking favorable data while ignoring negative impacts or tradeoffs, and using unverified or self-declared sustainability labels. In order to avoid this, Better Cotton members should align to the following key regulations, among others, when developing claims.

- **EU Green Claims Directive**: Requires verifiable and scientifically sound claims.
- **ISO 14021 & ISO 14067**: Guidelines on self-declared environmental claims and carbon footprint quantification.
- **US Federal Trade Commission (FTC) Green Guides**: Framework for ensuring truthful environmental marketing.

For ensuring compliance, it is recommended to use third-party verified data where possible, provide accessible documentation to substantiate claims, and avoid comparative claims unless they are based on standardized methodologies.

Section Five

Best Practices for Using LCA Data in Claims

These are the best practices for using LCA data in claims. Following these best practices will help minimize the risks of greenwashing.

Transparency and Accuracy

Following ISO 14044 requirements for claims will protect against the risks identified above.

- Clearly state the scope and boundaries of the LCA study used (e.g., cradle-to-gate vs. cradle-to-grave).
- Use the best available data; in the best-case scenario, this would be the most up-to-date and peer-reviewed data available. When the best available is somewhat old and not totally representative of a specific geography, this should be documented explaining the caveat and the justification for why this data metric was chosen.
- Avoid overgeneralizing results—LCA findings vary based on region, production method, assumptions, and LCA assessment method. The method used, including Global Warming Potential (GWP) factors, should be disclosed.
- An internal review (external for ecolabeling) is recommended prior to sharing impact scores or footprints.
- For comparisons, claims can only be published if supported by a third-party reviewed ISO conforming comparative LCA report. Backing claims with uncertainty analysis is recommended.
- For traceability purposes, data sources (published reports, database, or other) shall be specified.

Example 1:

Incorrect	The water scarcity score for our sourced cotton fiber is 3.5.
Correct (LCA practitioner language)	The water scarcity impact for 1 kg of our sourced cotton fabric is assumed to be 3.5L at gin gate. The value is the best available at the moment for our company. It is based on available data for India for the period 2016-2023. The dataset was taken from ecoinvent 3.10 database and assessed using the AWARE method 1.06.
Correct (marketing language)	In 2023, the water scarcity impact for 1 kg of our sourced cotton fabric was measured at 3.5L. Footnote 1. 1. This value was calculated at the gin gate stage and is based on available data for India for the period 2016-2023 using datasets from the ecoinvent 3.10 database, and calculated using the AWARE method 1.06 assessment method.

Contextualizing Results

- Provide comparative references where applicable.
- Clarify the units of measurement and time frame (e.g., kg CO_2e per kg of fiber).

- Highlight limitations and uncertainties in the data to ensure claims remain balanced and factual.

Example 2:

Incorrect	Sourcing Better Cotton fiber has a footprint impact of 3.5 $kgCO_2e$.
Correct (LCA practitioner language)	Based on a study developed for Better Cotton by the firm Anthesis, GHG emissions from Better Cotton production across China, India, Pakistan, Tajikistan, and Turkey are, on average, 3.589 $kgCO_2e$/ kg lint. The study considered data for 3 growing seasons, between 2015 and 2018, and includes agriculture, transportation, and ginning operations. 84% of emissions were allocated to lint, and 16% to cotton seed. The study report is available in this link.
Correct (marketing language)	GHG emissions from Better Cotton production in China, India, Pakistan, Tajikistan, and Turkey averaged 3.589 kgCO2e/ kg of lint in 2018. 84% of emissions were allocated to lint, and 16% to cotton seed. Footnote 1. 1. Study considered data for 2015-2018 growing seasons and included agriculture, transportation, and ginning operations. Full study report available here.

Avoiding Misrepresentation

- Do not use LCA data selectively to make misleading claims.
- Ensure claims reflect an entire product lifecycle, not just a single stage for the benefit of the stakeholder making the claim. Likewise, if the claim pertains to a specific lifecycle stage, ensure transparency.
- Refrain from implying absolute environmental benefits without considering trade-offs.

Example 3:

Incorrect	Our intervention program for improved carbon management achieved a 15% reduction in global warming.
Correct (LCA practitioner language)	Our intervention program for improved carbon management was assessed with LCA. The results showed a 15% reduction in GHG emissions at the farm gate per lb of harvested cotton. However, trade-offs were found as the remaining of impact categories assessed, including eutrophication, and water scarcity show a 5-10% increase in impact.
Correct (marketing language)	According to LCA analysis, our intervention program for improved carbon management resulted in a 15% reduction in GHG emissions per pound of harvested cotton for the time period X compared to Y. The LCA analysis also identified increases in eutrophication (5%) and water scarcity (10%), indicating trade-offs with the intervention program. We plan to explore these in more detail as we consider how to advance this program. Footnote 1 1. The LCA study was performed by ... (provide study details)

Better Cotton LCA data available through the Higg MSI database can be used in claims to be disclosed to the public. These claims have to refer to explicit environmental impact magnitude(s). Comparative assertions are not supported by Better Cotton.

For all stakeholders, the requirements for using Better Cotton LCA data are the following:

- Claim text should be truthful, clear, accurate, unambiguous, and proportionate.
- Although the involved lifecycle stages, geography, and temporality are reported as part of the Higg MSI dataset documentation, it is recommended this information is also described as part of the claim for transparency purposes.
- Should include a link to or QR to the Higg MSI database access page and refer the name of the dataset used.
- Should consider country-specific consumer protection regulations, if applicable.
- Claim text should not be used in conjunction with unambiguous statements or stand-alone terms like carbon neutral, climate neutral, net zero, or sustainable.
- Consideration of offsets or any Beyond Value Chaim Mitigation should be clearly stated in text and separate from the LCA claim
- Claims should use published indicators only.

Section Seven

Conclusion and Next Steps

Responsible use of LCA data strengthens credibility and trust among stakeholders. Better Cotton encourages members to:

- Follow best practices in LCA interpretation and communication. This includes avoiding the use of independent LCA metrics for making comparisons and sourcing decisions.
- Align claims with regulatory requirements to avoid greenwashing, and regularly update them as new data emerges.
- Seek third-party verification for added credibility. In some cases (e.g., the Green Claims Directive of the European Union), claims are subjected to verification as part of regular checks required from government entities. In addition, verification must also be conducted when substantiated complaints are submitted by persons or organizations with legitimate interest.
- Seek independent legal review of intended claims against applicable regulations.
- Consider that LCA is more than the GHG emissions indicators, helping to overcome a limited carbon tunnel vision. At the same time, LCA has limitations, such as the fact that it does not consider holistic sustainability. It focuses on environmental impacts only. Other tools need to be used to measure socioeconomic impacts.