Business & Policy How & Buy

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What Is Life Cycle Analysis?

By Gemma Alexander

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How can you tell which choices are really sustainable? Sure, it's obvious that wasting water is bad. But is the energy use and pollution from manufacturing a new washing machine worse than continuing to use an old water-guzzling appliance? When does improved gas mileage cancel out the manufacturing impacts of a hybrid electric vehicle to lower your transportation footprint? How does a company even know what the environmental impacts of its products are? The answer is life cycle analysis.

Life Cycle Analysis

Life Cycle Assessment (LCA) is defined as the systematic

analysis of the potential environmental impacts of products or services during their entire life cycle. It assesses the total impact of the product on human health, natural resources, ecosystem function, and climate. An LCA includes the inputs – energy and material resources – used to make, distribute, use, and dispose of a product. It also includes the outputs – greenhouse gases and other pollutants as well as wastewater and garbage – created in each step of the product's life cycle. Because of the severity of the climate crisis, carbon footprints are sometimes used as a proxy for LCA. Often, the various impacts of an LCA are converted into carbon dioxide equivalents (CO2-eq) for ease of comparison.

The International Organisation for Standardisation (ISO) describes the four main phases of an LCA:

1. Goal and scope definition
2. Inventory analysis
3. Impact assessment
4. Interpretation

Data and Boundaries

Despite guidelines for standardization, each LCA is unique. The scope can be affected by the goal. Some LCAs might attempt a true cradle-to-cradle analysis – the impact of an item from production through recycling it at its end of life. Others may stop at distribution, excluding the impact of product use after purchase. Limiting the scope in this way is a more affordable way to identify improvements in the sustainability of the manufacturing processes. Unfortunately, it can also be a sneaky way to distract from a product's true impact, for example, by highlighting the sustainable production of a polluting product. This is a greenwashing strategy known as the "Lesser of Two Evils." Fortunately, this misuse of life cycle analysis is rare. Most companies that are willing to take on the expensive and time-consuming process of conducting LCAs do so to gain important knowledge to improve their processes.

Life cycle analysis is an iterative process. Often, the inventory analysis will reveal gaps in the available data about a product's inputs and outputs. For example, in the fashion industry, a clothing brand may not have access to information about the methods used to manufacture the fabrics they buy. Initial analyses may quantify some of a

product's environmental impacts while merely identifying others for which there is insufficient data. In these situations, companies are challenged to reduce the quantified impacts while pursuing reliable data on others for a subsequent LCA.

Interpretation

With so many differences in scope, even with standardized methodology, using LCA data to inform consumer choices is tricky. The most accurate LCAs are those with a strictly limited scope. An LCA of a particular type of wine will involve fewer assumptions and estimates than one measuring the global impact of a wide variety of food types . Everyone wants to take something as complex as the entire life cycle of a product and distill it down to a simple answer. But even when an LCA provides simple numerical results, it requires interpretation to be useful.

Using Life Cycle Analyses

You cannot directly compare the results of an LCA of one beverage type to a separate LCA of another beverage type because of differences in scope and assumptions. But that doesn't mean LCAs are useless to consumers; it means you have to look a little bit more deeply.

Take a little time to understand the boundaries of the LCA in question. Read through the findings to see which components contribute the most impact. For example, LCAs of diapers are inconsistent – some find in favor of cloth, others disposable. The difference hinges on the water used for washing cloth and the method of disposal used for the study. Similarly, LCAs can illustrate that how you drink your coffee matters as much as which coffee you buy. And even though every life cycle analysis will generate a different carbon footprint for beef, they all share the conclusion that beef and lamb have bigger carbon footprints than almost every other food.

LCA results may not be as straightforward as providing a simple thumbs up or down for a product. But they are valuable resources for understanding environmental impacts and identifying opportunities for improvement to make better choices.