Democratization of Food Environmental Product Declarations, with a Beer Example

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Abstract

Type III EPDs are becoming more and more common, and are a must-have in some fields. However, the cost of developing them is high, leaving small companies at an extreme disadvantage. To address this economic barrier, IERE has developed automated EPDs using beer as an example. The system depends on a deep understanding of the process and the range of options for making the product, but the results is a piece of software that can be used by any brewer with only business information needed as inputs to the calculation. Calculations are in real time, feedback as to sources of impacts is given to the brewer, and the public can see the results in an online EPD. The cost is reasonable, with the lowest fees only $150 per year, allowing EPDs to be created for each batch of beer, providing ISO compliant EPDs for a few dollars each. This model can be applied to all food products, with the outcome of a democratized EPD system.

1. Introduction

Type III Environmental Product Declarations (EPD) are an increasingly common tool used by companies to communicate the environmental impacts of their products. They are especially useful for business to business (B2B) communication as organizations attempt to better understand the impacts of their supply chains. The use of EPDs is also being driven by industry groups such as the US Green Building Council (USGBC) and even government as is the case with the French Grenelle Environnement.

Generating EPDs, performing the life cycle assessments (LCA), and undergoing third party verification can be costly endeavors. Some companies, especially small and medium enterprises (SMEs) such as farmers and small food processors, may find these costs prohibitive and forego EPDs thereby putting them at a competitive disadvantage.

In an attempt to address the cost barrier to EPD adoption several programs, including those mentioned above, have made allowances for the use of industry average or sectorial EPDs within a product category.

However, these average EPDs inherently fail to meet many, if not all, of the objectives of Type III environmental labels as defined by ISO 14025:2006:

a) “to provide LCA-based information and additional information on the environmental aspects of products”;
b) “to assist purchasers and users to make informed comparisons between products”;
c) “to encourage improvement of environmental performance”;
d) “to provide information for assessing the environmental impacts of products over their life cycle.”

While industry average EPDs may provide some value with respect to objectives “a” and “d” they lack the ability to differentiate similar products or incentivize environmental improvement. This paper proposes an alternative approach to increasing the use of EPDs while keeping costs low by using an automated EPD system. A pilot study that utilized an automated system to generate EPDs for multiple products within the same product category was conducted with micro-breweries in the Pacific Northwest.

2. Method

2.1. Automation Overview

An automated EPD system is not only cost effective, it also mitigates many of the issues associated with comparability among EPDs by providing a consistent modeling framework and background data. The process PCR development addresses many important modeling decisions and assumptions (system boundary, functional unit, cut-off rules, data quality requirements, impact assessment results, and reporting requirements). However, there are typically several instances where decisions are left to the discretion of the LCA practitioner. The result is potentially large variation in model design and impact results for EPDs that are published under the same PCR.

An automated system takes EPD standardization a step further than the PCR by using a single modelling framework, default background data, default assumptions, and a simple user interface that is accessible by non-technical users.

The pilot study developed an automated EPD system for a group of small-scale brewers that would not have the time or money to develop a custom EPD for one of their products, let alone all of the different beers they produced. The tool is available on an annual subscription basis and subscribers are able to generate EPDs for as many batches as they would like. Users can perform what-if analyses when planning new brews or to investigate opportunities for reducing their impacts.

2.2. System Design

The LCA model used in the EPD tool conforms to the Earthsure Beer Product Category Rule, number 50202201:2012 (IERE, 2012) as well as ISO 14040, 14044 and 14025 (ISO, 2006; 2006b; 2006c). The functional unit for the EPD is twelve ounces of beer delivered to the point of consumption. However, the tool allows users to calculate impacts associated with other commonly used units (e.g. 16 oz., ½ barrel). Figure 1 shows the system boundary used for the EPD system's underlying LCA model. The beer life cycle is separated into three life cycle stages. Upstream production includes the raw material use, manufacturing and transport of all inputs to the brewery stage. Beer production includes all brew house operations from grain mashing, through boiling and fermentation, to packaging and cleaning of equipment for the next batch. The use phase consists of distribution to the point of consumption (either retail or restaurant) as well as treatment of waste products. Capital goods, employee activity, and recycling of discarded materials are excluded from the study.

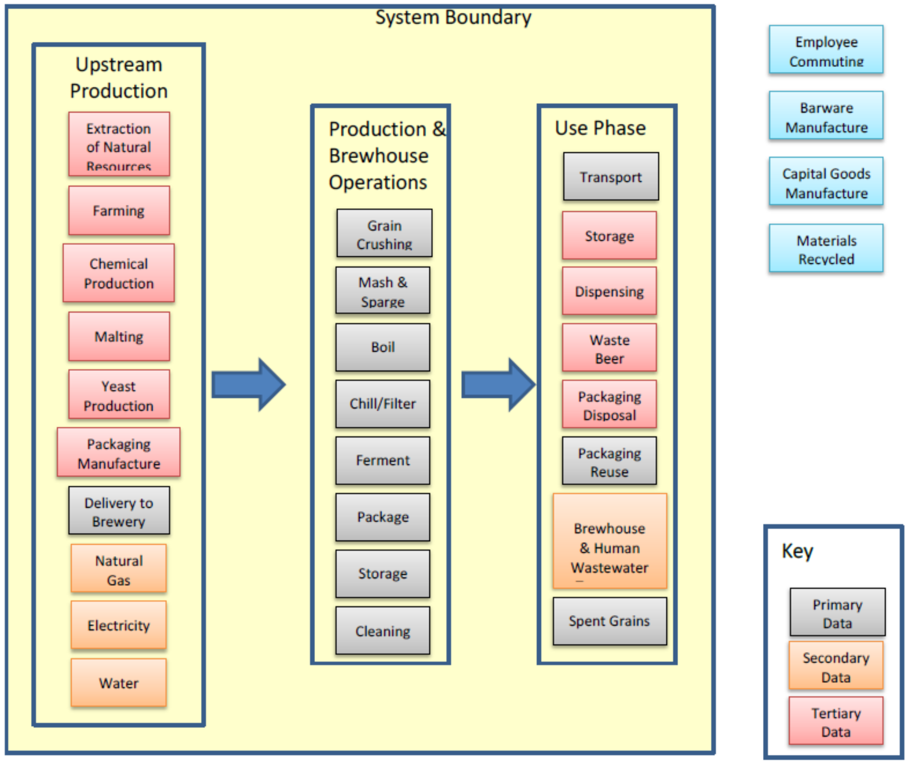
Primary data was collected for all unit processes under the direct control of the brewery with a reference flow of one batch. Information on the beer recipe, production volume, equipment usage and packaging were input directly by the brewers into the software.

Production data for agricultural products was obtained from USDA National Agricultural Statistics Service Information, USDA National Agricultural Library Digital Commons (USDA, 2012), and the Ecoinvent database[vi]. Material content data for cleaners and other chemicals were obtained from Material Safety Data Sheets (MSDS) provided by suppliers and linked to life cycle inventory data from the Ecoinvent database.

Regionally specific process LCI data was used whenever possible. This included the creation of an electrical grid mix to represent each brewery's local electric utility. When regional process data were not available, US average process LCI data were used.

The cutoff rules used specified that at least 95% of all mass and energy and all known toxic materials are included in the analysis. No product representing more than 1% of the total mass or energy of the system was excluded. Life cycle impact assessment was performed using the US EPA TRACI 2.1 methodology (Bare, et al, 2002). Total life cycle inventory amounts for water use and land occupation are also calculated per the PCR guidelines.

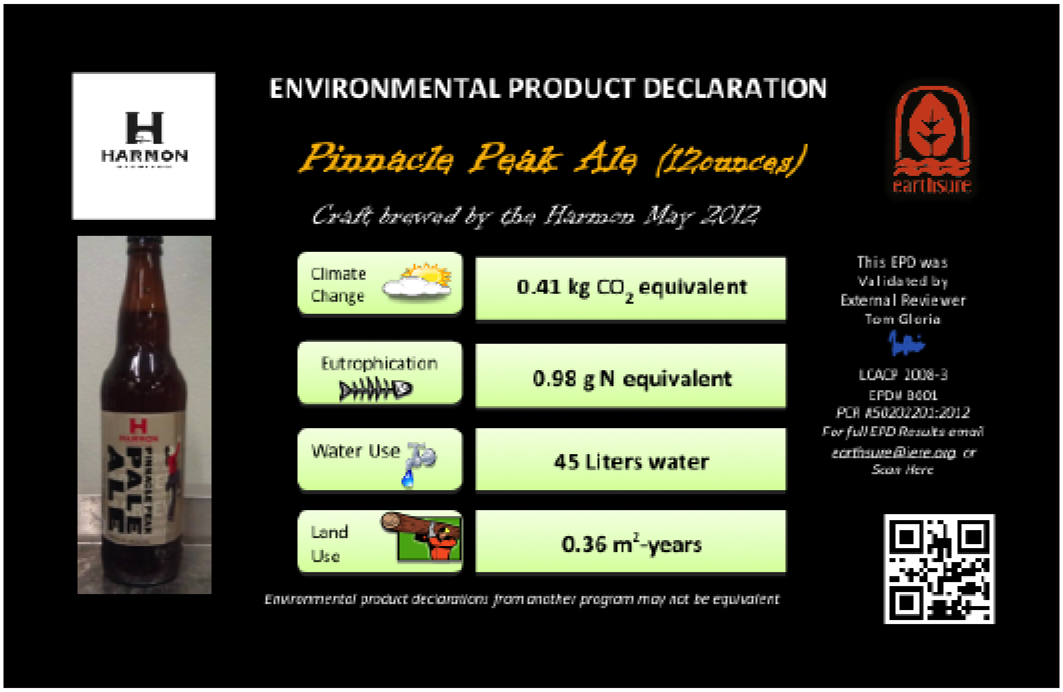
Figure 1: LCA System Boundary



3. Results and Discussion

Figure 2 shows an example EPD created by a brewer that participated in the pilot. While the reported impacts for each beer analyzed were generally of the same order of magnitude, the largest sources of those impacts varied for several of the brewers. The environmental impacts of the beer life cycle are primarily related to material inputs, brewery operations, and beer consumption. The ingredient phase of the life cycle is the main contributor to ecotoxicity, ozone depletion, and water use at all five breweries; it is also the prime factor in eutrophication, land use, and smog at four breweries. The brewery phase is the primary contributor to climate change and acidification at three breweries; this phase has the highest smog value at a single brewery. The consumer use phase contributes heavily to climate change given the release of CO_2 when beer is consumed. The packaging phase is not a common prime source of impacts among the breweries; nonetheless, it is the main contributor to eutrophication and land use at an individual brewery.

Figure 2: Example Beer EPD



The EPDs were made publically available online for customers to view and compare the impacts of the different beers. In addition, the brewers were able to use the results in their own marketing materials. The pilot was able to achieve the goal of producing a high quality EPD for a group of small and medium enterprises at an affordable price. Cost per EPD varied based on the size of the brewery and the number of EPDs each generated. However, the costs were still quite low, especially compared to conventional EPD development, with one brewer paying the equivalent of $50 per EPD.

The pilot also showed that EPDs can be an effective tool for companies to measure their environmental impacts and provide incentive to improve the environmental performance of their production. All five of the participating brewers have modified or plan to modify their practices after creating their EPDs. Examples of these changes include: insulating storage tanks to reduce energy requirements; changing cleaning procedures to limit chemical use; investing in energy efficient equipment; the purchase of an electric vehicle for distribution.

4. Conclusion

The pilot study showed that an automated system is capable of providing accurate, verifiable and cost effective EPDs that adhere to the goals and ISO 14025. This was achieved at a low cost per EPD and required little technical knowledge on the part of the EPD owner. More importantly, it provided companies that are interested in sustainability with valuable information that they can now use to reduce their environmental impact. The brewers would likely not have access to this information otherwise as they do not have the time, money or expertise required to generate EPDs in a conventional manner.

Such a system bridges the gap between a one-time single product LCA and a sector level average by utilizing primary data for operations occurring within the organization. Because these operations are under the direct control of the organization, they are most likely to be the source of differences between similar products. The use of default data for all other background processes significantly reduces the resources required for data collection when compared with a traditionally developed EPD.

Many more such automation systems are needed to bring EPDs into the hands of the small producer and subsequently their customers. Agricultural products are prime candidates for EPD automation due to the similarities in the production of a crops as well as the large number of farms. We estimate that crop EPDs could be produced at an even lower price point than the beer pilot, further democratizing EPDs. Information technology coupled with parameterized LCA models can be a force for achieving better environmental performance for food systems.

5. Acknowledgements

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