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Investigating the effect of environmental product declaration adoption in LEED® on the construction industry: A case study

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Abstract

Industry adoption of environmental product declarations (EPDs, an internationally standardized document providing quantified environmental impacts over the life cycle of a product) is increasing as LEED® v4 material credits allow reliance on their content. This raises the question as to whether this reliance is appropriate, as well as larger questions about how it is affecting the wider construction industry. A case study is presented to investigate the use of EPDs in construction projects through the experience and perspective of members of three major stakeholder groups: Owner/Client, Designer, and Contractor. This includes the motivations for using EPDs, potential concerns with the methodology and creation of EPDs, the reliance of the information within EPDs and determining appropriateness of this reliance through the various stages of project delivery. Findings indicate that EPD impacts on the timeline is a key concern from the contractors while limited transparency of EPD development processes was a key concern for designers. Stakeholders noted that the integrative design process was critical to the success of this project, avoiding long lead-times and allowing for close review of specifications.

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Keywords: life cycle assessment (LCA); environmental product declaration (EPD); product category rules (PCR); ISO 14025; LEED; case study

1. Introduction

As building operating energy intensity decreases, the initial and recurring embodied energy in buildings requires increased attention [1]. Version 4 (v4) of the Leadership in Energy and Environmental Design (LEED) rating system

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[2], responds to this by placing greater emphasis on the environmental impact of materials during construction and throughout the life-cycle of the building and includes a credit designed to encourage adoption of environmental product declarations (EPDs), which has thus far been successful in increasing global use [3].

This paper presents a case study showcasing the benefits and challenges of using materials with EPDs from the viewpoints of three stakeholders on a Canadian LEED® v4 project: the Owner/Client (Canada Green Building Council, CaGBC), the Designer (DIALOG), and the Contractor (Ledcor). The study includes the motivations for using EPDs, potential concerns with the methodology and creation of EPDs and the reliance on the information within EPDs, and evaluates the appropriateness of this reliance in design and construction.

Nomenclature

CaGBC	Canada Green Building Council
EPD	Environmental product declaration
IDP	Integrated Design Process
ID+C	Interior Design + Construction (LEED rating system type)
ISO	International Organization for Standardization
LCA	Life cycle analysis
LEED	Leadership in Energy and Environmental Design
PCR	Product category rules

2. Context

2.1. Definition of EPDs

There are three types of environmental product labels: category labels (Type I [4]), self-declared environmental claims (Type II [5]) and environmental product declarations (Type III [6]). The latter are documents which provide quantified environmental information and are independently verified over the life cycle of a specific product. The impact categories and their values stated on EPDs are determined through a process of life cycle analysis (LCA), a methodology to determine the environmental impact of processes and ingredients through the cradle-to-grave product life cycle [7]. In order to enable comparison between products, EPDs must adhere to product category rules (PCRs), which define the criteria for a specific product category and establish the requirements that must be achieved when creating an EPD for a product [8], including criteria to be used in the LCA of any product in the category. However, PCRs may be developed by anyone who calls themselves a program operator, with no limit on who may do so [9], causing significant variation between these rules. Ideally, EPDs enable fair comparison between similar products adhering to comparable PCRs and summarize third-party verified LCA results.

2.2. Historical Drivers for EPD use in construction

Increased awareness and concern about environmental impacts, the increasing importance of embodied energy, and the increased awareness of the importance of evaluating product impacts over their lifecycle have resulted from increased influence of sustainability and rating systems such as LEED® in the built environment. The use of LCA data in environmental labelling schemes has been in use since the early 1990s [10]. The first registered EPD was published for water taps and electrical appliances through the International EPD System in Sweden in 1999. In 2000, the Institute for Environmental Research and Education founded *Earthsure* in the United States, becoming the first EPD program in North America. As more EPD programs were established, a need arose for harmonization between these differing schemes, leading to the creation of ISO standards for EPDs, which included ISO 14025 – Environmental labels and declarations [6], created by a Technical Committee for the European Committee for Standardization [10], who published EN 15804 in 2012 as a “core PCR” to establish a higher level of harmonization in the European building and construction product market. EN 15804 is a suite of standards for the sustainability of construction works, part of which includes the processes of developing EPDs [11].