ENVIRONMENTAL PRODUCT DECLARATIONS FOR BUILDING MATERIALS AND PRODUCTS: U.S. POLICY AND MARKET DRIVERS

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Abstract

Environmental Product Declarations (EPDs) hold promise to designers, specifiers and policy makers looking to reduce the environmental impact of building materials and products. The U.S. government is not developing a national EPD program. Integrating life cycle assessment (LCA) methods and data to create meaningful EPDs is complex. The lack of centralized leadership coupled with the technical and policy complexity has lead to both industry confusion about and innovative approaches towards the development and use of EPDs. Leadership from industry, academia and environmental non-profits coupled with policy from State and Federal governments is shaping U.S. development. This paper outlines the current state of U.S. practice regarding EPDs in the building industry and is followed by an analysis of drivers motivating the development of building industry specific EPDs. The authors provide some observations about the opportunities and challenges to developing harmonized and rigorous EPDs within both U.S. and global context.

1. INTRODUCTION

The promise of transparent and rigorous supply chain specific Environmental Product Declarations (EPDs) is compelling: enabling designers and specifiers to differentiate between seemingly similar products; motivating industry to improve manufacturing processes and efficiencies; and advancing a more comprehensive understanding of total life cycle environmental impacts. Conversely, implementing standards to enable equitable, practical and meaningful EPDs is challenging: competing (and sometimes conflicting) methods and standards are in development; leadership by government, non-profit and private sectors is varied and disconnected; and the reliability and uncertainty in background data is not well understood [1, 2]. The simplicity of the concept (e.g. an environmental 'nutrition label' for products) spurs demand by policy makers and practitioners yet the complexity of the execution makes academics wary of definitive results.

Most EPDs are substantially based on Life Cycle Assessment (LCA) methodology. LCA is the internationally standardized methodology for identifying and quantifying environmental impacts of products and services. LCA is a relatively young discipline and the accepted international standards (ISO 14040) were designed explicitly as a tool to improve specific

processes and not to compare between products [3]. Standards are being developed to standardize the creation and reporting of supply chain specific reporting of product environmental performance [4, 5]. However, industry/product specific 'rules' (Product Category Rules, PCRs) must be created to address the unique characteristics, scope and performance of individual products and materials to enable accurate comparisons between products [6].

There is significant interest and activity currently underway in the U.S. to advance our ability to create building industry specific PCRs and promote transparency of information concerning the environmental impacts of building materials and products. The author(s) are currently participating in two research projects, (1) Drafting U.S. PCR for concrete as a 'road test' to evaluate PCR/EPD standards and methods and (2) LCA for WA: a evaluation of LCA data, methods, tools and research for potential inclusion in the Washington State Building Code. Drawing upon these resources, an overview of the current state of U.S. practice is followed by an analysis of policy and non-governmental organization (NGO) drivers motivating the development of building industry specific EPDs and PCRs and observations of opportunities and challenges.

2. CURRENT U.S. PRACTICE

The U.S. government is not coordinating the development of a national EPD operator program. (An EPD program operator is a 'body or bodies that conduct a Type III environmental declaration program' [4]).
Both of the dominant U.S. standards organizations, ASTM International and the American National Standards Institute (ANSI), as the official U.S. representative to ISO are participating in the development of LCA and PCR standards [3, 4, 6, 7, 8]. There is not a 'national' EPD operator, nor an official EPD operator program. Thus new and established EPD operators are looking to position themselves and define markets for their services. Industry trade organizations exploring the option of becoming the EPD operator for their industry look to balance the benefit of providing service to their members and ensuring the EPD results are credibly perceived.

Neither is the U.S. government coordinating the development of a national PCR repository. A non-profit, NGO, The Institute for Environmental Research and Education (IERE) has proposed the creation of a U.S. PCR repository but funding mechanisms and organizational structure have not yet been defined [9]. EPDs are also dependent on environmental impact data. Publically available U.S. life cycle inventory (LCI) databases with relevant building industry data are neither complete nor up to date. Thus in the development of PCRs, on top of the general complexity and lack of detailed information for the development of LCI data, and the difficulty of interpreting LCA results, manufacturers and specifiers are confused about what standards to follow and how to proceed.

PCRs are currently under development for different product categories with the efforts lead and funded by different mechanisms [10, 11, 12]. Examples that demonstrate the range of methods used include: The National Renewable Energy Lab (NREL) has provided funding to IERE to develop a PCR for windows [9]; and FP Innovations, a Canadian wood research institute (funded by both industry and government) recently developed a PCR and EPD for North American Wood products [11]. Many listings of current PCRs are being compiled by various NGOs such as IERE and BuildingGreen.com [9, 13]. Academia has also become very

involved. The Carbon Leadership Forum (CLF), (an organization lead by the lead author), is leading the development of a PCR for ready mix concrete funded by building industry sponsors and the University of Washington [14].

3. POLICY AND ADVOCACY DRIVERS

Although the U.S. government is not providing centralized leadership, there is increasing momentum within the building industry and in state and local governments focused on the potential of EPDs to advance the understanding of and to reduce the environmental impact of building materials and products. What follows is a brief introduction to different policy and NGO advocacy positions that are driving the development of EPDs and PCRs in the U.S.

3.1 Federal Government

In 2009, President Obama signed Executive Order 13514: Federal Leadership in Environmental, Energy Economic Performance which states that federal agencies must establish an integrated strategy towards sustainability in the Federal Government and to make reductions of greenhouse gas emissions (GHG) a priority for Federal agencies [15]. As a result of this, an interagency work group (Section 13) was formed to 'assess the feasibility of working with Federal suppliers…to measure and reduce supply chain GHG emissions, while encouraging sustainable supplier operations' [16].

This workgroup has focused on evaluating green rating systems, carbon footprint and EPD standards with a goal of providing guidance for State and Federal agencies looking to establish green procurement strategies. This effort is being lead by the General Services Administration (GSA), which among other responsibilities is responsible for building and managing Federal buildings. The committee is expected to publish recommendations in March of 2012 per A. Bennett of the Environmental Protection Agency (EPA) [17] and the draft documents will be available for public comment after that time.

3.2 State & Local Government

States and cities often make local amendments and additions to the national standard International Building Code [18]. The New York City Building Department is considering limiting the cement permitted in concrete [19]. Last year the Oregon State Legislature considered (but withdrew) a 'wood first' bill in which State projects would prioritize wood construction [20]. Similar to the 2009 'Wood First Act' adopted in the Province of British Columbia, Canada, LCI data that characterized the relatively low environmental impact of wood products was used as one of the primary arguments in favor or the bill that mandates that government funded construction projects prioritize the use of wood products [21]. The State of Washington has funded a study (by authors) to understand how LCA methods, data, tools and research could be integrated into the state building code [22]. Although the Federal government can provide guidelines for recommended practice, Federal rules will only impact GSA projects. Thus it is likely that cities and states will integrate LCA and EPD data in varied manners and timelines such as the assembly bill on global warming in California [23].

3.3 U.S. Green Building Council

The U.S. Green Building Council is a non-profit NGO focused on advancing sustainable building design and construction and is the developer of the LEED building rating system. Regional USGBC chapters are often the focus of sustainable building community of a region.

LEED is the dominant green rating system in the US commercial construction market with over 10,000 buildings certified. Starting in 2004 the USGBC has been exploring how to link LCA into LEED [24]. Over the past few years several 'pilot credits' have been proposed enabling users to test the integration of LCA into the LEED rating system. Currently the LEED 2012 draft is under revision and will be published for the next round of public comment in January of 2012. Based on the previous draft, three areas of linking LCA are proposed: (1) Environmentally Preferable Structure and Enclosure, which provides points for systems that either use low environmental impact structures or enclosures (or alternately re-use an existing structure); (2) Non-Structural Materials Transparency, which provides points for use of products with EPD data; and (3) Avoidance of Chemicals of Concern in Building Materials, which prioritize materials and products that declare a list of ingredients used and which do not contain any substances identified as causing cancer or reproductive toxicity [25].

3.4 Architecture 2030

Architecture 2030 is an independent non-profit organization focused on addressing climate change through targeting building industry improvements. The 2030 Challenge for products is literally a challenge to all in the building industry (designers, builders, manufacturers and owners) to prioritize products that meet a maximum carbon-equivalent footprint of 30% below the product category average with gradual reduction to 50% or better by 2030. Along with this challenge Architecture 2030 has developed resources to explain methodology and strategy which is being published online at the Building Green Information Hub [13].

The 2030 Challenge for Products complements the original 2030 Challenge that calls for a stepped reduction in operational impacts of buildings to carbon neutral (using no fossil fuel GHG emitting energy to operate) in 2030. Issued in 2006, the 2030 Challenge and has been adopted by 73% of the top 30 U.S. Architecture firms and 40% of all U.S. firms along with XX cities, YY States and [26]. The widespread adoption of the 2030 challenge provides a strong platform for education and adoption for the 2030 challenge for products.

As currently structured the 2030 challenge for products will help spur demand for EPDs. Many industry PCRs and product benchmarks must be developed before the objectives of being able to evaluate and specify 'low carbon' products will be possible. See EPD section for more information on the current status of these efforts

3.5 Living Building Challenge

The Living Building Challenge is a forward looking building certification standard developed by a non profit NGO, the International Living Futures Institute and is closely allied with the Cascadia Green Building Council (integrating USGBC and Canadian Green Building Council members in Oregon, Washington British Columbia and Alaska). The stated purpose of the Living Building Challenge is to 'define the most advanced measure of sustainability in the built environment possible today and act to diminish the gap between current limits and ideal solutions' [27]. In order to be certified as a ‘living building’ both prescriptive and performance criteria must be met.

Within the material ‘petal’, LCA is addressed in two components. First the total embodied impacts of the building must be estimated and carbon offsets purchased from a list of approved sources. Additionally, there is a ‘red list’ of materials identified that should not be ingredients of any of the building products. Materials included must either be ‘red list free’ or the design team must document that significant effort has been made to identify alternate

products. Manufactures that demonstrate transparency and share the product ingredients are to be prioritized in final decision making.

3.6 International Green Construction Code

The International Green Construction Code by the International Code Council is in the middle of its initial creation [18]. Multiple LCA related items were voted on at meetings in October 2011. Public updates in early 2012 are still being considered and will be able to be incorporated into the final presentation.

3.7 Grass roots advocacy for 'leadership standards'

There has been significant debate over the past few years in evaluating the two main wood certification schemes, FSC and SFI [28]. This debate has highlighted the scrutiny that forestry certification schemes bring to forest product manufacturing and identified that similar focus on other material manufacturing is potentially appropriate. Structural engineers in particular have begun focusing on expanding the leadership standards to include the other primary structural materials of steel, concrete and masonry [29, 30, 31]. These efforts are focusing on the need to integrate multi-criteria environmental impact assessment with social and local/regional sustainability metrics to develop comprehensive performance standards. As industries work to develop methods of self certification (such as the National Ready Mix Concrete Association (NRMCA) sustainable plant certification), input from those with understanding of the industry, but without ties to the specific materials and products, will be of great value [32].

4. OBSERVATIONS

What follows is a summary of some observations made regarding the adoption and implementation of EPDs and LCA within the design and construction industry.

4.1 Market driven standards create unique challenges and opportunities

Without centralized control there is confusion. However, with confusion comes innovation. As multiple market and academia driven PCR and EPD efforts are underway using different methodologies there will be opportunities to compare and contrast.

4.2 Global PCR harmonization may be challenging

Although LCA promises 'objective' data, the scope selected, as well as decisions regarding product definitions such as which are co-, bi- or waste products, must be set based on policy goals, or at least with commonality in the definitions, or transparency with respect to the decisions set. In developing the concrete PCR, the primary author notes that distinct, and reasonable, differences in assumptions are being developed between the U.S. and Europe.

4.3 Including data variability and uncertainty is critical

If EPDs are to be used to aid in green purchasing, they should include some information about the variability and uncertainty in the results. Without this information, it is not possible to understand if differences are statistically significant [2].

4.4 Program operators: who are they-who should they be?

Per ISO, a program operator can be a completely independent or an industry trade organization [4]. Without a government supported EPD program it is likely that multiple EPD operator models will continue to evolve in the U.S. This leads to the possible development of various certification and professional associations for LCAs, EPDs and program operators, with related standards and criteria, eventually being established [9]. This evolution is no different than those for other professional societies and certification programs, with eventual consensus and acceptance such as with the growth of the green rating system program such as LEED [18].

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