Are Life Cycle-Based Labeling and a Broadening of Environmental Certification Programs Needed?

Dr. Jim Bowyer

Dr. Jeff Howe
Phil Guillery
Kathryn Fernholz

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Dovetail Partners, Inc.

Are Life Cycle-Based Labeling and a Broadening of Environmental Certification Programs Needed?

Executive Summary

There are vast differences in the environmental impacts associated with producing various building materials. Such impacts are virtually unknown to the consuming public. Today there are two dominant approaches to evaluating the environmental attributes of products. One approach is to evaluate a product based on a single attribute such as recycled content or chemical-free. The second approach is to evaluate the environmental attributes of the raw material used in the product such as organically grown vegetables and certified wood. Both of these approaches are widely used despite the fact that both omit critical information regarding environmental attributes while also covering relatively few products.

There are life-cycle-analysis (LCA) based programs now in place that would allow rapid development of rigorous, self-sustaining, scientifically based transparent information regarding environmental performance for a wide range of products. The use of LCA derived information in environmental programs such as LEED[1] has the potential to significantly increase the objectivity, clarity, and capacity of such programs.

With respect to building materials it is clearly time to expand current requirements for certification of wood products in green building programs to include *all* products used in framing, decking, sheathing, and cladding. It is also time to give serious consideration to LCA-based product labeling of all construction materials.

Introduction

So, you're an environmentally conscious builder and you use only FSC certified wood in order to meet LEED green building standards. Wonderful. Now, how much do you know about the environmental performance of those steel beams you used last week, the vinyl siding that you applied Monday, and the insulated concrete structure that you began work on this morning?

In fact, most of the same concerns that led to development of certification programs for forests and forest management – those related to environmental protection, social issues, and long-term economic stability – also apply to extraction and processing of other basic raw materials. For instance, Brazil is a leading supplier of iron ore and pig iron to the U.S. Yet, persistent reports indicate pervasive use of slave labor in Brazil to clear forests to make charcoal used in pig iron smelters. In Ecuador, severe environmental damage and human suffering has been documented in conjunction with petroleum extraction and subsequent shipment to the U.S., a portion of which goes to make vinyl and other forms of plastic used in construction. In British Columbia, mining of sand and gravel for export

[1] Leadership in Energy and Environmental Design (LEED), a program of the U.S Green Building Council

to the U.S. that is used in making concrete and a variety of cement-based products is known to be wreaking havoc on local environments. In addition to these realities, many of the products now unquestioned by LEED and other green building standards result in extremely high energy consumption and very large emissions to air and water in their production, use, and disposal. All of this begs the question: Why is environmental labeling being pursued only for wood and not for all building products, and what must be done in order to correct deficiencies in the way that environmental acceptability of construction products is determined today?

Current Approaches to Identification of Environmentally Responsible Products

There are currently two dominant approaches to evaluating the environmental attributes of products. One approach is to evaluate a product based on a single attribute such as recycled content or chemical-free. The second approach is to evaluate the raw material used in the product such as organic grain or certified wood. Both of these approaches are widely used and provide some benefits for consumers in regards to offering additional information about the products. However, both of these approaches also have severe limitations.

A Focus on a Single Product Attribute

Currently, products are generally judged to be either environmentally good or bad based on a single product attribute: a product contains recycled content (good) or it doesn't (bad); it is "natural" (good) or it isn't (bad); it was produced from rapidly renewable resources (good) or it wasn't (bad).

The focus on a single product characteristic keeps things simple and easy to comprehend – simple for the consumer and simple for organizations making judgments about various products. Unfortunately, focusing narrowly on product attributes is often useful in identifying environmentally preferable products only in the most straightforward of situations. For instance, if faced with purchasing one of two brands of aluminum garage doors, one of which is made of 100% recycled aluminum and the other of 100% virgin aluminum; the consumer is presented a clear choice. While a recycled label wouldn't say so, the product made entirely of virgin content requires 20 times more energy to produce than the recycled alternative. Also, production of the recycled aluminum results in far less in the way of impacts to air, water, and land, and is clearly environmentally superior. Suppose, however, that a consumer is faced with the choice of selecting steel framing that has 35% recycled content or wood framing members that contain no recycled content. In this case, a choice to use steel framing based on recycled content would result in more than twice the energy consumption and more than four times the fossil fuel consumption to produce the framing members, and increased emissions to air and water in roughly the same magnitude as the differences in fuel consumption. Insulating the framed-in wall to a given R-value would result in even greater differences in energy consumption. Is a product containing recycled content always an environmentally better choice? Clearly not!

Suppose now that an environmentally concerned consumer is trying to decide between a product certified as "free from genetically modified material" and one that is made from rapidly-renewable fiber produced by crops that have been genetically modified to enhance growth rate. In this case, making a choice based simply on an absence of genetically modified material could well mean that the consumer is systematically choosing a product that requires the cultivation and disturbance of far larger land areas, and associated environmental impacts, than the product made from fiber of faster growing plants. Is freedom from genetically modified material necessarily better from an environmental point of view? Without asking this question in any context, such as that outlined above, the answer might be yes. However, when examining the question of genetic modification from a broader environmental perspective, the answers become far less clear.

The reality is that a single product attribute seldom provides enough information to allow an informed and rational decision regarding the environmental acceptability of any product. Too often, single attribute claims lead to more questions than answers. Nonetheless, many consumers and consumer advocates continue to use single attribute claims as a basis for judging environmental performance.

A Focus on a Single Raw Material

In the book "Seeds of Change: Five Plants that Transformed Mankind", author Henry Hobhouse mentions what may have been the first raw material certification program, that for "non-slave" produced sugar from the Caribbean. He goes on to mention that more times than not the claim was false. Producers felt pressure to make the claim based on perceptions of consumer concerns, but the reality of delivering on the claim eluded them. This challenge continues to be a hurdle in the push for certification of raw materials. Although customers may assert an interest in environmental attributes, their willingness to pay the costs of certification programs to assure these attributes are delivered and the capacity and ability of producers to make the necessary changes to ensure environmental performance continue to limit adoption.

Because of worldwide concern about forests, efforts to encourage better management of forests through development of management guidelines and third party oversight were developed in the 1990s. Known as certification programs, these have proliferated in recent years, both in terms of the number of programs and number of acres or hectares certified. According to the latest UNECE/FAO Forest Products Annual Market Review, as of May 2005, about 241 million hectares (or 6.2%) of the world's forests are certified.

Unlike a single attribute approach to assessing environmental performance, forest certification programs consider a broad range of issues, including

- compliance with local and regional laws and international treaties,
- tenure and use rights to the land and forest resources,
- indigenous people's rights,

- economic viability,
- community relations and worker's rights,
- environmental impacts, and
- existence of a forest management plan and associated monitoring and assessment.

Increasingly, third-party oversight is used to verify compliance with certification requirements.

While such programs go well beyond single attribute based evaluation of a product, in that they extensively examine environmental, social, and economic factors related to forest management and wood harvest, there is a significant problem with the way that certification information is used in practice.

When combined with a chain of custody system that tracks wood from forest to marketplace, distributors of wood and wood products are able to guarantee that certified products were sustainably produced. Such products are increasingly specified by environmentally concerned architects, builders, and others. The problem is again one of context, in that those specifying certified wood products are not demanding the same evidence of environmental sustainability for non-wood construction materials. In effect, non-wood materials are being given a free pass, the implication being that typical practices employed in their production are inherently environmentally better than those associated with production of wood products. However, as noted previously, most of the same concerns that led to development of certification programs for forests and forest management also apply to extraction and processing of other basic raw materials. The June 2005 edition of *Metropolis* includes an article entitled "The Ethics of Bricks." In it, author Lance Hosey calls on the building industry to develop new standards for evaluating production. He reports that about one-quarter of all steel and cement used in the United States is imported and notes that LEED does not require project managers to know who made them, what their standard of living was, or if worker's rights are protected. All of these questions are addressed in the Forest Stewardship Council's (FSC) forest management certification program. Using the FSC experience as a model, it should be possible to provide this kind of information about other building materials.

Requiring that products made of one material demonstrate environmental sustainability without requiring the same of products made of other materials makes little sense if environmental sustainability is really the objective.

What is Missing in Present Approaches to Identification of Environmentally Preferable Products?

A single product attribute seldom provides enough information to allow an informed and rational decision regarding the environmental acceptability of any product. Requiring that products made of one material demonstrate environmental sustainability without requiring the same of products made of other materials makes little sense if environmental sustainability is really the objective.

In addition to these problems, neither the single-attribute approach, nor product certification programs as they exist today require systematic evaluation of environmental burdens through the life cycles of products.

What must be done in order to correct deficiencies in the way that environmental acceptability of construction products is determined today? There is no one answer, no miracle solution, but two things are obvious:

1. Environmental labeling programs, if they are to facilitate meaningful comparisons, must quickly evolve to include all products used for similar applications.
2. All assessments of environmental performance of products must include evaluation based on examination of a broad range of environmental indicators representing the full life cycle of products using internationally accepted protocols for evaluation. Another way of saying this is that **environmental life cycle analysis** must play a major role in product evaluation and labeling.

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What is Environmental Life Cycle Analysis?

Environmental life cycle analysis, or LCA, provides a mechanism for systematically evaluating the environmental impacts linked to a product or process and in guiding process or product improvement efforts. LCA-based information also provides insights into the environmental impacts of raw material and product choices, and maintenance and end-of-product-life strategies. Because of the systematic nature of LCA and its power as an evaluative tool, the use of LCA is increasing as environmental performance becomes more and more important in society. It is likely that LCA will soon become widely used within American industry and by those involved in crafting national and regional environmental policy.

An LCA typically begins with a careful accounting of all the measurable raw material inputs (including energy), product and co-product outputs, and emissions to air, water, and land; this part of an LCA is called a Life Cycle Inventory (LCI). Examination of energy use is particularly revealing, since a number of serious environmental problems are related to consumption of energy including acid deposition, oil spills, air pollution (SO_2, NO_x), and increasing concentrations of atmospheric carbon dioxide. An LCI may deal with product manufacture only, or the study boundaries may be defined more broadly to include product use, maintenance, and disposal. In a subsequent stage of the LCA, factors are considered that are currently not precisely measurable, such as impacts of an industrial activity on the landscape, flora, fauna, air, or water. For a more complete

discussion of LCA, see the January 2005 Dovetail report *Life Cycle Analysis: A Key to Better Environmental Decisions*.[2]

How Life Cycle-Based Labeling Would Benefit Consumers

The National Renewable Energy Laboratory (NREL), an entity of the U.S. Department of Energy, is working with the U.S. Environmental Protection Agency and with the Canadian-based Athena Sustainable Materials Institute on an initiative known as the U.S. Database Project[3]. The objective is to create a publicly available, national LCI database for commonly used materials, products, and processes. The purpose is to 1) support public and private sector efforts to develop environmentally oriented decision support systems and tools; 2) provide regional benchmark data for use in assessing environmental performance of companies, manufacturing plants, and production processes, and in evaluating the environmental attributes of new technologies or products; and 3) provide a firm foundation to subsequent life-cycle analysis tasks such as impact assessment. Ultimately the database could also provide the foundation for a national product-labeling program in which building materials and other products would bear a label – very similar to the nutrition label found today on food packages – that would summarize environmental impacts in the form of seven to ten easy to understand indices.

Product labeling based on a life cycle approach would bring significant information to environmentally concerned consumers that is now totally missing in all environmental assessment programs today. The introduction of LCA in product labeling and assessment programs would also provide a basis for rapidly increasing the availability of environmental performance information across a wide range of products.

A Caveat

LCA alone does not answer all of the environmentally related questions that consumers are interested in. For instance, LCA does not address six of the seven components of forest certification programs listed at the bottom of page 2 and top of page 3. As a result, there is an immediate need for development of rigorous programs for certifying environmental performance of steel and steel products, cement-based products, plastic and plastic foam products, fiberglass products, and so on. Such certification programs should address essentially the same range of environmental, social and economic impact issues examined as part of forest and wood certification programs.

There is an immediate need for development of rigorous programs for certifying environmental performance of steel and steel products, cement-based products, plastic and plastic foam products, fiberglass products, and other building materials.

[2] (http://www.dovetailinc.org/documents/DovetailLCA0105.pdf)
[3] (http://www.epa.gov/ORD/NRMRL/lcaccess/dataportal.htm)

Sustainable forest guidelines and procedures developed over the past decade can be used as a template in development of certification programs for other basic industries. Similarly, experience gained by third-party certifiers and others working in forest certification can serve as a guide for avoiding problems that have been encountered in forest certification program development.

It is possible that an LCA label could be standardized for certain product categories, and manufacturers could still use single attribute claims and raw material certification programs to communicate more information about their product. This combining of labels would be similar to what is already standard practice in food labeling, with both the standard nutrition label as well as organic certification program labels and manufacturers claims that appear on products.

The Bottom Line

There are vast differences in the environmental impacts associated with producing various building materials. Such impacts are virtually unknown to the consuming public. Yet, there are now life-cycle-analysis or LCA programs in place that would allow rapid development of rigorous, self-sustaining, scientifically based transparent information regarding environmental performance for a wide range of products. The time has come for use of LCA derived information in programs focused on environmental sustainability.

In addition, there are environmental, social, and economic concerns and issues associated with production of all basic raw materials. In the building materials arena, where only wood products manufacturers and distributors are currently asked to demonstrate environmentally sustainable practices, there is no justifiable reason for not now seeking the same assurances from manufacturers and distributors of all other products used in construction. As a beginning point, it is clearly time to expand current requirements for building materials certification in green building programs to include ***all*** products used in framing, decking, sheathing, and cladding.

In the building materials arena, where only wood products manufacturers and distributors are currently asked to demonstrate environmentally sustainable practices, there is no justifiable reason for not now seeking the same assurances from manufacturers and distributors of all other products used in construction.

Dr. Jim Bowyer is a professor within the University of Minnesota's Department of Bio-based Products (part time) and an Elected Fellow of the International Academy of Wood Science. He is the current Chairman of the Tropical Forest Foundation, Chairman of the Minnesota Bio-fiber Council, Scientific Advisor to the Temperate Forest Foundation and Past President of the Forest Products Society (93-94), and of the Society of Wood Science and Technology (87-88).

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DOVETAIL PARTNERS, INC.
4801 N. Highway 61, Suite 108
White Bear Lake, MN 55110
Phone: 651-762-4007
Fax: 651-762-9642
www.dovetailinc.org