

## **The Impact of LEED™ 2.1 On Wood Markets**

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### **Abstract**

The U.S. Green Building Council (USGBC) is “transforming building construction” with the increasingly popular, *Leadership in Energy and Environmental Design (LEED)™ Green Building Rating System, Version 2.1* (USGBC 2003). LEED is a numerical rating system that ascribes “points” to specific “green building” attributes present in building design. Numerous federal agencies have embraced the concept of Green Building Design and are using the LEED approach to assess conformity.

The particular points awarded for building materials and resources do not bode well for wood and wood-based products. The current version of LEED 2.1 does not provide any incentives for the use of wood in construction, often recognized as one of the most environmentally-beneficial building products. Further, it discriminates against products that are manufactured more than 500 miles from where they are used; favors short rotation products over well-managed forests; and, gives no recognition to renewable products, strongly favoring anything that is just recycled.

This paper examines the history of USGBC, the LEED document, and the credits of greatest concern to the industry.

### **Introduction**

The American Forest & Paper Association (AF&PA), an unwelcome non-participant in development of the nation’s leading green building rating system, believes the anti-harvesting, preservationist sentiment of the past two decades has manifested itself at the U.S. Green Building Council (USGBC). This attitude, held by those opposed to any harvesting of wood, does not bode well for the recognition of wood products as a green building material. It places the wood industry in a difficult position, needing to overcome this unfounded prejudice to convince green building designers that wood products are a higher order, environmentally-friendly building material. This paper examines those credit areas from the USGBC’s increasingly popular document, *Leadership in Energy and Environmental Design (LEED)™ Green Building Rating System, Version 2.1* (USGBC 2003) that inappropriately discriminate against wood products.

The USGBC is not modest when it comes to trumpeting their success during the past decade. Their beginning dates back to 1993, with 23 members (Consortium for Energy Efficiency 2002). Today, the USGBC has over 3000 members, including 100 company members. In June 1993, USGBC began operations with initial seed funding of just \$125,000 (USGBC 2001) -- today, their budget is

approximately \$10 million. In 1993, one individual ran the day-to-day business of USGBC -- today, USGBC has over 40 full-time staff. The membership growth in USGBC, the introduction of LEED to the marketplace, and its growing acceptance is impressive. For the wood industry, the price of USGBC's success is a rating system with an inherent bias against wood products and, in turn, wood buildings. The developers of LEED have chosen to penalize traditional wood products, despite repeated scientific studies, which clearly show it as a superior environmental product.

### **History of USGBC**

During the early 1990's the green building movement was struggling to take hold. A failed attempt to develop a sustainability standard under the auspices of the American Society of Testing and Materials (ASTM) sent the movement's supporters in search of an alternative organization willing to develop a rating system. The U.S. Department of Energy became an ally of green building enthusiasts and by 1996 had contracted with Public Technology, Inc. and USGBC to develop *The Sustainable Building Technical Manual: Green Building Design, Construction, and Operations* (PTI 1996). The Manual was written under contract, including editorial contributions from people closely aligned with USGBC. In fact, the current President and CEO of USGBC served as DOE's Assistant Secretary for Energy Efficiency and Renewable Energy when the Manual was released. The following, from the Introduction of the Manual, provides insight into the involvement of USGBC and its founder:

*Public Technology, Inc. developed this manual to address the growing demand for information on the design and construction of green buildings. The manual was jointly sponsored by PTI's Urban Consortium Environmental and Energy Task Forces. The U.S. Green Building Council (USGBC) worked with PTI to develop the manual. David Gottfried of Gottfried Technology Inc., served as managing editor. An Advisory Committee of local-government and private-sector representatives assisted in developing the manual. The manual underwent a consensus review process by members of the USGBC and was peer reviewed by U.S. DOE and U.S. EPA officials.*

### **Background on LEED™ Green Building Rating System**

The LEED 2.1 rating system is a credit-driven assessment program for rating new and existing commercial, institutional, and high-rise residential buildings. Evaluation of environmental performance is made from a "whole building" perspective over a building's life cycle, and a standard scale is provided to define what constitutes a "green building."

These overall ratings are awarded based on how many points are accumulated. Assessment and point scoring is conducted by LEED accredited designers. USGBC also accredits these design professionals and provides third-party review of the building's compliance with LEED. The award categories are:

Certified (28 – 32 points)  
Silver (33 – 38 points)  
Gold (39 – 51 points)  
Platinum (52 – 60 points)

LEED is divided into six categories of environmental and energy performance criteria, each offering a different number of possible points. There are a total of 69 possible points. The six categories are:

Sustainable Sites (14 points)  
Water Efficiency (5 points)  
Energy & Atmosphere (17 points)  
Materials & Resources (13 points)  
Indoor Environmental Quality (15 points)  
Innovation & Design Process (5 points)

The Materials & Resources section is of most interest to the wood products industry. The Indoor Environmental Quality category is of equal importance to manufacturers of wood products using formaldehyde-based adhesives. Specifically, the Materials & Resource section contains one prerequisite and provides seven areas for evaluation, resulting in an overall possibility of 13 points for this section. The credit areas include:

Storage and Collection of Recyclables (prerequisite)  
Building reuse (3 points)  
Construction waste management (2 points)  
Resource reuse (2 points)  
Recycled content (2 points)  
Local/regional materials (2 points)  
Rapidly renewable (1 point)  
Certified wood (1 point)

Similarly, the Indoor Environmental Quality section lists two prerequisites and eight areas for point evaluation. The credit area of interest to the wood products has the potential for four points, but only one is applicable to composite wood products:

Low emitting materials, composite wood (1 point)

### **Wood Industry Concerns**

USGBC claims that LEED is intended to improve the environmental performance of the building industry through a point-based building rating system. While noble in its intent to bring environmental consideration to the construction process, the LEED system fails to meet its own goal. There are three general areas of concern associated with the technical content of LEED and the procedures followed by

USGBC in development and maintenance of this standard. The next section of this paper will focus on the specific technical concerns of the industry.

- **The LEED rating system clearly discriminates against the use of wood products:** Through several of its specific credits, certain wood products are put at a significant disadvantage. This is a disservice to “green” builders, architects and the government. Wood products are a vital component of sound architectural design and facilitate ease of quality design and construction. Wood is among the most environmentally benign of all building materials, because, among other things, it is a renewable resource that sequesters huge amounts of carbon.

- **NIST has concluded that the LEED system does not properly rate products based on environmental criteria:** A September 2002 study sponsored by the U.S. Department of Commerce’s National Institute of Science and Technology (NIST) is highly critical of certain methodologies employed in the LEED system for calculating environmental points (NIST 2002). The study examined in detail three specific points in each of the *Material and Resources* and *Energy and Atmosphere* areas of the LEED system for new building construction. The NIST report is especially critical of LEED’s arbitrary thresholds, its emphasis on cost rather than environmental impact measures, the lack of appropriate baselines and measures of improvement, and the program’s inability to compare buildings in different locations on equal terms.

The following is from the General Research Conclusion in the NIST report:

*This project revealed a variety of discrepancies in outcome in LEED credits. These discrepancies undermine the achievement of individual credit intentions and the goals of the program as a whole. Life Cycle Assessment (LCA) has proven to be a valuable methodology for simulation of impacts from utilization of the LEED program. The lack of comparability between LEED ratings and LCA results indicates that when considered in a lifecycle perspective LEED does not provide a consistent, organized structure for achievement of environmental goals... [and] it is not successful at being a comprehensive methodology for assessment of environmental impacts...Refinement of LEED should emphasize integration of life cycle oriented measures and standards”.*

- **The USGBC has not developed LEED in a consensus process open to all interested parties:** The process USGBC uses to create and maintain LEED does not meet the generally accepted criteria for development of a consensus standard. The USGBC fails to meet most of the measures of a successful standards development process as set out by the American National Standards Institute (ANSI).

### **Technical Concerns with LEED Credits**

The entire LEED document was reviewed for its impact on wood products. From that review, five credit areas were identified as particularly troubling. Those credit areas are addressed in detail below, including a reference to the relevant LEED 2.1 section. Each credit is paraphrased, a discussion of why the credit is flawed is provided, and a recommended solution to the credit is suggested.

## **LEED Credit MR4 – Recycled Content**

MR4 is the credit for using recycled content materials. A building is eligible for one point if the "sum of the post-consumer recycled content plus ½ of the post-industrial recycled content constitutes at least 5% of the total value of materials in the project." A second point is also given if the sum of post-consumer and ½ post-industrial recycled content exceeds 10%.

### *Why this is flawed*

While recycling connotes an environmental benefit, as a matter of environmental management, renewability is far more desirable. Yet, the LEED system entirely ignores the benefits of renewable building materials, which, by their very nature, do not exhaust finite resources.

While recycling may connote an environmental benefit, as a matter of environmental management, renewability is at least, if not more, environmentally desirable. Renewable building materials do not exhaust finite resources, are biodegradable, require less energy for processing and generate fewer emissions from manufacturing than other building materials, such as steel and concrete. Although it has recycled content, steel requires at least 66% more energy than wood to produce.

NIST criticizes the specific LEED Recycled Content Value (RCV) formula used for measuring recycled content because it is cost-based, not mass or environmentally based, and provides no additional incentive for improvements over current practices (NIST 2002). It therefore favors existing high cost steel manufacturing. NIST's BEES model (NIST 2001) exposes a huge discrepancy between LEED's cost based recycling content rate and the measured environmental impacts of the chosen materials.

### *Recommended Change*

An additional measure for Renewability should be incorporated through the use of a "Renewable Content Value."

One point should be awarded for materials manufactured from renewable, as compared with non-renewable, content. Since even a small use of renewable materials translates into significantly lower environmental impacts, the credit should apply if the "Renewable Content Value (or Volume)" is 5%.

Consistent with the credit for recycled content, a second point should be given if the "Renewable Content Value (or Volume)" exceeds 10%.

## **LEED CREDIT MR5 – Local Manufacture**

LEED MR5 is the credit for building materials that are manufactured locally, thus supporting the local economy and reducing the environmental impacts related to transportation. One point is given if 20% of materials are manufactured within a radius of 500 miles, and a second point is given if 50% of

those materials (that are manufactured within 500 miles), are made from materials harvested, extracted or recovered within 500 miles.

*Why this is flawed*

By ignoring basic economics and the fact that communities grow efficiently by exporting what they are good at producing in exchange for importing what others are good at producing, this credit distorts local and external economies. Purchasing an environmentally friendly product from a long distance is usually far more “green” than purchasing a polluting product from a short distance. This credit favors the latter, and does so principally based on cost, not environmental impact or attractiveness. The NIST report points out that the calculation method for this credit bears little relationship to environmental impacts that are more a function of mass and transport distances than they are of cost and distance. Moreover, the stipulated distance (i.e. 500 miles) is entirely arbitrary, and, by itself, has no environmental justification.

*Recommended Change*

As there is no verifiable environmental justification for a regional/local criterion of this kind, this credit as currently formulated should be eliminated.

**LEED CREDIT MR 6 – Rapidly Renewable Materials**

LEED MR 6 credit is given for use of rapidly renewable materials. One point is given if 5% of the total value of all building materials were manufactured from “rapidly renewable” sources. Rapidly renewable is defined as products that originate from plants that are harvested within a 10 year cycle.

*Why this is flawed*

“Rapidly” is a relative term. In the case of wood products, plantation-grown wood fiber is more rapidly produced than wood fiber from natural stands. Any plantation-grown wood should qualify for this credit, but its description suggests that only “short-rotation” production would be eligible. This makes little sense from an environmental perspective, since there are various environmental benefits that derive from different age classes and rotation lengths in managed forests. For example, forest stands of longer rotations are desirable as habitat for some species but not for others that might prefer less cover and more disturbance. The critical element should be yields and not rotation lengths, as improved yields translate into more stored carbon and less overall land disturbance.

This credit can have the negative impact of encouraging the harvest of short-rotation plants, i.e. bamboo, without a requirement for sustainable yield.

*Recommended Change*

We have already recommended that credits be given for the use of renewable materials. An additional point should be granted for use of materials from intensively managed resources such as planted forest stands.

### **LEED CREDIT MR 7 – Certified Materials**

LEED MR 7 grants a credit only for Forest Stewardship Council (FSC) certified wood materials.

#### *Why this is flawed*

Many credible certification systems have evolved to meet the demands of the marketplace for independent certification of conformance to a recognized sustainable forestry management program. In North America these programs include the Sustainable Forestry Initiative® (SFI), Canadian Standards Association (CSA), American Tree Farm System, along with the FSC. Preference for a single certification system discriminates unfairly and inappropriately. Crediting only FSC also discriminates against the 10 million small non-industrial forest landowners that own 60% of the productive forest land in the U.S.

The SFI® Program is based on a rigorous standard and certification process that is controlled by an independent sustainable forestry board (SFB). Numerous environmental groups, professional organizations, state legislatures, and academic communities support the SFI Program. The SFI Program has also been endorsed by nine major labor unions in the U.S., representing 2.5 million workers. At the World Summit on Sustainable Development held in Johannesburg in September of 2002, the SFI Program was recognized with a World Summit Business Award for Sustainable Development Partnerships by the United Nations Environmental Program and the International Chamber of Commerce.

Of the leading certification schemes in operation in the United States, only the SFI program has a strict separation between standard setting and accreditation of certifying bodies. Recognized international protocols (ISO) for auditing explicitly require that these functions be separate. Some 118 core indicators must be met for a successful third party certification to the SFI Standard.

Independent comparisons of the SFI and FSC programs by the Meridian Institute and the Pinchot Institute demonstrate that both programs serve to expand the practice of sustainable forest management. There is simply no defensible rationale for crediting FSC exclusively. It appears the Natural Resources Defense Council, a USGBC member and FSC-US Board member, has unduly influenced LEED in this respect.

Over 70 million acres have certified to the SFI Program in the U.S. and Canada. This exceeds the acreage in North America certified under the FSC by a factor of 10. Limitation to the FSC has presented enormous obstacles to obtaining adequate supplies of products.

### *Recommended Change*

The SFI program is the most widely subscribed to system and has the necessary institutional framework to maintain its integrity and consistency. Providing credit for only FSC certification grants their program a monopoly that serves to ignore the fundamental objective of expanding and rewarding the practice of sustainable forest management. A credit should be given for the use of materials derived from other credible certified sources, including the SFI program and the American Tree Farm System.

### **LEED EQ Credit 4.4 Low-Emitting Materials: Composite Wood.**

EQ Credit 4.4 requires composite wood and agrifiber products to have no added urea-formaldehyde resins.

#### *Why this is flawed*

There are no environmental advantages to specifying exclusively urea-formaldehyde free resin systems. In fact, there are a number of disadvantages to such a specification.

In the manufacturing process of composite panel products, many of the available “alternate resin systems” pose dangerous health risks to workers and require substantially more energy to use. The composite wood products industry, while having had access to these alternate resin systems for many years, has, for the most part, avoided their use. As a result, non-UF-bonded products are typically not available to those designing and constructing commercial buildings.

The composite panel industry has proactively reduced formaldehyde emission levels by over 80%. Correspondingly, there has been a marked reduction in complaints about formaldehyde odor or potential irritant effects from composite wood products. With modern manufacturing standards in place that substantially limit formaldehyde emissions, specifying composite panel products that meet the respective ANSI-accredited standards clearly fulfills the intent of “reducing the quantity of indoor air contaminants.”

Additionally, composite wood products are used only as the substrate for a wide variety of consumer products, including furniture, cabinetry, millwork and fixtures. These consumer products are all finished with surface and edge treatments that encapsulate any remaining low levels of volatile organic compounds, including those that may naturally occur in wood. Emissions from these consumer products have been tested and found to be at the same level as “background concentrations” or equal to ambient air.

Due to the most recent peer-reviewed and internationally-accepted scientific research that shows a negligible health affect, if any, from products that meet the ANSI manufacturing standards’ emission requirements, a requirement for “no added urea-formaldehyde” is impractical and environmentally counter-productive.

### *Recommended changes*

1. Under the subsection heading “Requirements,” replace the current sentence with, “Composite wood and agrifiber products must be third-party certified as meeting ANSI standard requirements for formaldehyde emissions, or contain no added urea-formaldehyde resins.
2. Under subsection heading “Submittals,” modify the first checkbox to read, “...listing all the composite wood and agrifiber products used in the building and stating that they are third-party certified as meeting ANSI standard requirements for formaldehyde emissions or that they contain no added urea-formaldehyde.”
3. Add an additional sentence under the second checkbox that reads, “Provide a manufacturer’s Grademark Certification Label for composite wood or agrifiber products that are third-party certified to comply with formaldehyde emission requirements in the product’s ANSI standard.”
4. Under subsection heading “Potential Technologies & Strategies,” replace the current sentence with, “Specify only composite wood and agrifiber products, or products containing these as substrates, that are third-party certified to comply with formaldehyde emissions requirements in the product’s ANSI standard, or that contain no added urea-formaldehyde resins.”

### **Conclusion**

As shown, relying solely on the current LEED 2.1 standard is neither consistent with the intent of “green building” nor with an informed design process. As currently constituted the LEED system is biased in favor of certain products and not necessarily the most environmentally friendly choices. Nonetheless, the concept of evaluating buildings for their positive environmental contribution is sound. With some substantive and procedural changes, the LEED green building rating system *could* achieve its stated goal of improving the environmental performance of the entire building industry. However, to produce a system that can enjoy such broad support, USGBC must amend LEED to include sound, unbiased technical criteria and incorporate a development process that is transparent and allows all materially affected parties to participate.

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