Green Building Programs in the United States

A Review of Recent Changes Related to Designation of Environmentally Preferable Materials

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May 29, 2008

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Introduction

Over the last year and a half, the market for green building has officially exploded into the mainstream. In 2006, two percent of newly-constructed homes were considered "green". According to a survey of the National Association of Home Builders (NAHB) conducted by McGraw-Hill Construction, "by the end of 2010 more than half of NAHB's members, who build more than 80 percent of the homes in the U.S., will be incorporating green practices into the development, design and construction of new homes." A subsequent report concluded that the value of green building construction would increase to $60 billion by 2010.

In previous Dovetail Reports[1], flaws in the processes used to identify environmentally preferable materials within several leading green building programs have been identified. Specifically it has been noted that:

- Prescriptive standards are the norm, with only one green building program utilizing a systematic evaluation that includes life cycle assessment.
- Most programs award intuition-driven requirements for construction materials, such as recycled content and rapid renewability, even though products that do not have these characteristics often have demonstrably lower environmental impact.
- Only one program requires consideration of embodied energy or manufacturing-related emissions in identification of environmentally preferable materials.
- All programs require third-party certification of only one structural building material – wood – despite well-known environmental and social issues associated with production of materials other than wood.

Those articles have also made the case that it is incumbent upon leaders of green building programs to make sure that guidelines are truly leading society toward environmentally better practices. In this regard, as green building concepts move to the mainstream, periodic assessment of green building programs vis-à-vis measures of environmental performance, and appropriate revisions of standards, must become ongoing priorities.

This article reviews recent updates and proposed changes to the most prominent green building programs in the United States. Included in this review are the USGBC's LEED-NC and LEED-H programs, NAHB's National Green Building Standard, and GBI's Green Globes program.[2] The report focuses on each programs strengths and weaknesses that impact the identification of environmentally preferable construction materials, including how each addresses indoor air

[1] Dovetail Report: March 2005, Bamboo Flooring: Environmental Silver Bullet of Faux Savior? (http://www.dovetailinc.org/documents/DovetailBamboo0305.pdf); Dovetail Report: June 2006 Designation of Environmentally Preferable Building Materials: Fundamental Change Needed Within LEED(http://www.dovetailinc.org/documents/DovetailLEED0606.pdf). Also see: *Green Building Standards Challenged by Authority on Environmental Impacts of Building Materials*, http://www.dovetailinc.org/DovetailNews92607.html

[2] Other prominent green building programs such as the Austin Texas Energy Green Building™ Program, Built Green Colorado, Atlanta Earth Craft, and the Wisconsin Green Built Home programs have not undergone significant changes relating to materials in the past year, and therefore are not included in this report.

quality (in relation to materials), life cycle assessment, recycled-content and salvaged materials, certified products, locally-sourced materials, biobased materials, and material consumption reduction.

Our conclusion is that critical issues related to designation of environmentally preferable construction materials remain unaddressed in most green building programs. Furthermore, variability in the standards is causing confusion, and proliferation of scientifically unsubstantiated prescriptive standards is occurring as new programs are developed and existing programs are revised. Despite the strong adoption rate for green building programs, there is much room for improvement and work needs to be done to reach the goal of ensuring that programs truly result in improved environmental performance. To this end, expanded adoption of life cycle assessment for identification of environmentally preferable materials is essential.

Comparing Green Building Programs

LEED

The US Green Building Council's (USGBC) Leadership in Energy and Environmental Design (LEED) program is perhaps the most widely recognized national green building standard.[3] First released in 2000, there are now many different LEED rating systems, including systems focused on new construction, homes, schools, hospitals, and commercial interiors. Most recently, the USGBC has joined with the American Society of Interior Designers (ASID) to develop ReGreen, a home remodeling program standard. In June 2007, intentions were announced for streamlining the LEED rating system into one main standard with additional requirements and guidelines for different types of projects, new regionally based credits, and consideration of the incorporation of life cycle assessment in all systems. The USGBC is planning to release LEED version 3.0 in 2009, which may address these intentions. The two most widely referenced LEED programs, LEED-New Construction (LEED-NC) and LEED for Homes (LEED-H), are included in this report. A summary of overall provisions of each is presented in Table 1.

LEED-New Construction

LEED-NC applies to newly constructed commercial, retail, and some high-density residential buildings. LEED-NC was the first program developed by the USGBC and has largely set the precedent for subsequent LEED standards. The latest version, LEED-NC 2.2, was released in October 2005 and LEED-NC 2009 has just been opened for public comment. To date, 6,800 projects have been registered to the LEED-NC standard and over 1,000 projects certified.

In June 2007, several provisions of LEED-NC 2.2 related to energy-efficiency were updated, but no changes were made regarding environmentally preferable materials. The only major materials-related change in LEED-NC 2009 is a new credit for fulfilling criteria that the local/regional authority deem important to that area, which may include criteria for materials. The draft standard also includes a credit relating to flooring systems where all flooring in the building must now comply with specific emissions standards or be certified for compliance to receive points.

[3] For additional background information about LEED, see the Dovetail Report, A Beginner's Guide to Green Building:: What the Forest Sector Needs to Know About USGBC & LEED, http://www.dovetailinc.org/reports/pdf/DovetailLEED0405fl.pdf

Table 1.
Point Distribution in Current LEED-NC and LEED-H Programs

	Point distribution LEED-NC		Point distribution LEED-H	
Program Name	**LEED-NC, Version 2.2**	**LEED-NC 2009**	**LEED-H pilot 1.11a**	**LEED-H 2.0**
Release Date	**Released October 2005 Updated June 2007***	**To be released in 2009, open for public comment**	**January 1, 2007**	**January 1, 2008**
Focus area within program:				
Innovation/ design process	**5 points**	**6 points**	**10 points**	**11 points, 3 prerequisites**
Location and linkages			**9 points, 4 prerequisites**	**10 points**
Sustainable sites	**14 points, 1 prerequisite**	**26 points, 1 prerequisite**	**21 points, 2 prerequisites**	**22 points, 2 prerequisites**
Water efficiency	**5 points**	**10 points, 1 prerequisite**	**15 points**	**15 points**
Energy and atmosphere	**17 points, 3 prerequisites**	**35 points, 3 prerequisites**	**38 points, 1 prerequisite**	**38 points, 2 prerequisites**
Materials and resources	**13 points, 1 prerequisite**	**14 points, 1 prerequisite**	**14 points, 3 prerequisites**	**16 points, 3 prerequisites**
Indoor environmental quality	**15 points, 2 prerequisites**	**15 points, 2 prerequisites**	**20 points, 7 prerequisites**	**21 points, 7 prerequisites**
Awareness and education			**3 points, 1 prerequisite**	**3 points, 1 prerequisite**
Regional Credit Bonus		**4 points**		
	69 points, 1 prerequisite	**110 points, 8 prerequisites**	**130 points, 18 prerequisites**	**136 points, 18 prerequisites**
*** update requires at least 2 points instead of 1 through Optimum Energy Performance Credit**				

LEED-Homes

LEED-H was first released in pilot form in September 2005, with revisions to the pilot in January 2007. The program moved from the pilot stage to full implementation in January 2008. Materials-related credits that have been added or changed from the latest pilot version 1.11a to LEED-H 2.0 are highlighted in yellow in Table 2 and summarized below.

A comparison of provisions of version 2.0 with the 1.11a pilot reveals the following changes:

Environmentally Preferable Products. LEED-H 2.0 expands and clarifies credit MR 2.2 (Environmentally Preferable Products). Under this credit, builders choose from a list of building components and verify if components meet any of the following criteria: Environmentally Preferable, and/or Emissions Preferable, and/or Local (within 500 miles). Changes from the previous version have been highlighted in the center column of Table 2.

Life Cycle Assessment. In the new LEED-H 2.0 there is no longer any mention of life cycle assessment (LCA) in conjunction with materials selection or building design. The pilot version 1.11a mentioned LCA in credit MR 2 as a way to choose materials, but did not specify its use or offer points to support it. In May 2007, LEED announced that projects could achieve points through using the "Innovations in Design" credit, which awards points based on going above and beyond the basic standards, by utilizing the Cradle to Cradle LCA system. However this opportunity is not clearly articulated in the latest version of LEED-H v2.0.

Recycled-Content and Salvaged Materials. In LEED-H 2.0, concrete wall structures with the incorporation of 30% fly ash or slag are now included in the list of environmentally preferable products. Also, the previous concrete slab point was reduced to requiring 20% fly ash/slag instead of 30%. Reclaimed windows (framing), wall/roof sheathing, doors, framing, landscape decking, and exterior siding are now accepted for 0.5 point each. Recycled-content gypsum board is no longer accepted. Recycled paint is now acceptable when in compliance with Green Seal Standard GS-43.

Indoor Air Quality. LEED-H 2.0 has updated some criteria for Indoor Environmental Quality, and now includes a list of emissions values that meet South Coast Air Quality Management District (SCAQMD) Rule #1168 for adhesives and sealants, SCAQMD Rule #1113 for architectural coatings, and Green Seal Standards GC-03 and GS-11 for paints. Also, cabinets, counters and trim made from reclaimed, recycled-content or FSC-certified materials must now ensure that composite products are free of added urea-formaldehyde resins to be eligible for 0.5 point. SCS Floorscore certification was also added in version 2.0.

Material Consumption Reduction. For the first time, the LEED-H 2.0 standard gives formal recognition to off-site framing construction, modular prefabricated construction or panelized construction. These practices can reduce environmental impacts by reducing material use and on-site construction waste. Modular or panelized construction can also reduce thermal breaks and increase insulation effectiveness. Version 1.11a pilot recognized structural insulated panels (SIPS) only. The point allocation has also been increased for utilizing on-site advanced framing techniques.

Table 2. Specifications for Environmentally Preferable Products in LEED-H 2.0

Assembly	Component	EPP Specification (0.5 point per component)	Emissions Specifications (0.5 point per component)	Local Prod. (0.5 point per component)
Exterior wall	Framing/wall structure	Concrete wall structure: use 30% fly ash or slag. Wood frame: FSC certified or reclaimed or finger-jointed studs.	NA	Eligible
Exterior wall	Siding or masonry	Recycled content, reclaimed, or FSC certified.	NA	Eligible
Floor	Flooring (45% of total floor area)	Linoleum, cork, bamboo, FSC-certified or reclaimed wood, sealed concrete, recycled content flooring, or combination.	Carpet and pad: all carpet and pad complies with Carpet & Rug Institute Green Label Plus Program. Hard flooring: automatic ½ point for using hard surface flooring. Hard flooring: additional ½ point for using product that is SCS Floor Score certified.	Eligible
Floor	Flooring (90% of total floor area)	Meet specifications above to receive additional 0.5 point.	NA	Eligible (add. 0.5 point)
Floor	Framing	FSC certified or reclaimed.	NA	Eligible
Foundation	Aggregate	NA	NA	Eligible
Foundation	Cement	Use 20% fly ash or slag.	NA	Eligible
Interior wall	Framing	FSC certified or reclaimed.	NA	Eligible
Interior walls AND ceilings	Gypsum board	NA	NA	Eligible
Interior wall AND ceilings AND millwork	Paints and coatings	Recycled paint meets GreenSeal standard GS-43.	Use products that comply with all applicable standards in Table 25, LEED-H Std.	Not eligible
Landscape	Decking or patio materials	Recycled content, FSC certified, or reclaimed.	NA	Eligible
Other	Cabinets	Recycled content, FSC certified, or reclaimed AND composite materials must contain no added urea formaldehyde resins.	NA	Eligible
Other	Counters (kitchens and bathrooms)	Recycled content, FSC certified, or reclaimed AND composite materials must contain no added urea formaldehyde resins.	NA	Eligible
Other	Doors (not including garage or insulated doors)	Recycled content, FSC certified, or reclaimed.	NA	Eligible
Other	Trim	Recycled content, FSC certified, or reclaimed AND composite materials must contain no added urea formaldehyde resins.	NA	Eligible
Other	Adhesives and sealants	NA	Use products that comply with all applicable standards in Table 26, LEED-H Std.	Not eligible
Other	Window framing	Recycled content, FSC certified, or reclaimed.	NA	Eligible
Roof	Framing	FSC certified.	NA	Eligible
Roof	Roofing	Recycled content.	NA	Eligible
Roof AND floor AND wall	Insulation	Recycled content of 20% or more.	Comply with California "practice for testing of VOCs from building materials using small chambers"	Eligible
Roof, floor, wall (2 of 3)	Sheathing	Recycled content, FSC certified, or reclaimed.	NA	Eligible

Unless otherwise noted, 90% of the selected component must meet the specifications shown – 0.5 credit for each; total credits – 8 maximum.

LEED Summary

Although several changes have been made to the LEED-H program, there are still several key features of all LEED programs that limit their ability to result in a minimal environmental impact. Recognized as the primary leader in the green building sector, LEED has not made substantial changes to how it selects environmentally preferable materials. The LEED programs continue to use scientifically unsubstantiated prescriptive standards and to resist adoption of life cycle assessment.[4] The absence of life cycle assessment (LCA) in all LEED programs means that the use of some of the materials listed as environmentally preferable in the current standards, some of which are known to result in substantially greater environmental impacts than non-preferred materials, continues to be rewarded. Also, without LCA, there is still no requirement in any LEED program for consideration of embodied energy or manufacturing-related emissions, including greenhouse gas (GHG) emissions, in identifying environmentally preferable materials.

As in all previous drafts of LEED programs, wood continues to be the only structural building material that requires certification. Only one of the available forest certification programs – FSC – is recognized by LEED. A USGBC-commissioned study that examined the possibility of recognition of additional forest certification programs (Yale 2008) was rather inconclusive, leaving status quo as the most likely outcome.

In addition, there is no requirement or mandatory prerequisite for certification of any structural building material other than wood.[5] Moreover, preference continues to be given to non-certified, rapidly-renewable materials despite a now several-year-old USGBC commissioned report that indicated that there is no justification for doing so. [6]

NAHB National Green Building Standard

The NAHB Model Green Homebuilding Guidelines were released in 2005 for use by individual home builders or Home Builder Associations (HBAs) interested in green building practices. The program is completely voluntary and does not incorporate a certification process. Instead, builders can perform self-assessments by following the guidelines, or HBAs can use the guidelines as a model to create their own regional green building standards. The guidelines apply to residential buildings only.

In February 2007, the NAHB Research Council announced intentions of writing a new National Green Building Standard (NGBS) based on their Model Green Home Building Guidelines. The standard is being developed with the International Code Council in order to pursue ANSI (American National Standards Institute) accreditation. The new guidelines have gone through the public comment period for the first draft and balloting was completed in March 2008. The standard is anticipated to be finalized in May 2008 pending ANSI approval.

NAHB's current guidelines have a set level of points needed in each category in order to reach specific certification levels (Table 3). In the new standard, several credits are mandatory (as

[4] LEED continues to work toward incorporation of LCA into its programs (see Norris 2007), It appears likely, however, that the use of this tool will be optional even if the use of LCA is accepted.
[5] LEED-H MR2.1 is a mandatory prerequisite that all tropical hardwoods must be FSC certified.
[6] https://www.usgbc.org/ShowFile.aspx?DocumentID=1814

compared to none previously), primarily in the areas of energy efficiency and indoor environmental quality. In addition, the "Global Impact" category has been removed, and a higher "Emerald" level has been added. One other change is the addition of points for remodeling projects; points for remodeling are not shown in Tables 3 or 4.

Table 3.
Points of NAHB Model Green Homebuilding Guidelines compared
to the new National Green Building Standard (draft, May 2008)

Minimum Points Required for Green Building Levels				
NAHB Model Green Home Building Guidelines				
	Bronze	Silver	Gold	Emerald
Lot Design, Preparation, and Development	8	10	12	n/a
Resource Efficiency	44	60	77	n/a
Energy Efficiency	37	62	100	n/a
Water Efficiency	6	13	19	n/a
Indoor Environmental Quality	32	54	72	n/a
Operation, Maintenance, and Homeowner Education	7	7	9	n/a
Global Impact	3	5	6	n/a
Additional Points from Sections of Your Choice	100	100	100	n/a
Total Points	**237**	**311**	**395**	n/a
National Green Building Standard (new program in final comment period)				
Lot Design, Preparation, and Development	39	66	93	119
Resource Efficiency	45	79	113	146
Energy Efficiency	30	60	100	120
Water Efficiency	14	26	41	60
Indoor Environmental Quality	36	65	100	140
Operation, Maintenance, and Homeowner Education	8	10	11	12
Global Impact	n/a	n/a	n/a	n/a
Additional Points from Sections of Your Choice	50	100	100	100
Total Points	**222**	**406**	**558**	**697**

Materials-related credits in the NAHB program are summarized in Table 4 and in the following paragraphs. Changes to the Model Green Home Building Guidelines that will likely be reflected in the new National Green Building Standard, are highlighted.

Recent changes to the NAHB standard are as follows:

Environmentally Preferable Products. Slight changes have been made in regard to material consumption in the new standard, but most provisions are unchanged. According to the public draft of the new standard, each component must meet the criteria (e.g., recycled-content, biobased, local, etc.) to receive points, but the required content percentages are currently not written into the standard. It is uncertain whether these will be added prior to the final release; minor changes may yet occur before the new standard is adopted. Materials made with renewable energy (at least 33% of the primary manufacturing process) or derived from renewable sources, combustible waste sources, or renewable energy credits can now also achieve points.

Biobased Products. Biobased products with the "USDA Biobased Credit Product" label, or products that meet this criteria, are now eligible for points under the new standard. Wool, cork, bamboo, engineered wood, and cotton, as well as cellulosic materials (wood, straw, natural fibers) and products made from crops (soy-based, corn-based) or other biobased materials with at least 50% biobased content can receive points through the biobased credit.

*Indoor Air Quality***.** Changes to this part of the standard include an increased use of references to established product standards and acceptable emission rates. The new standard rewards the use of products that comply with the California Department of Health's "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources using Small-Scale Environmental Chambers" (CA 01350). To be recognized, the products must be third-party certified. Examples of qualifying third-party certification programs include the GreenGuard Children and Schools Certification Program, Scientific Certification Systems (SCS) Indoor Advantage Gold Program and the FloorScore Indoor Air Certification Program. The standard also references GreenSeal, the Carpet and Rug Institute's (CRI) Green Label program and recognizes products that meet the criteria of these standards. The new standard also addresses such issues as formaldehyde and other emissions from flooring materials and non-structural panels by referencing standards such as ANSI A208.1 and A208.2, as well as several other related emissions standards.[7]

Life Cycle Assessment. The NAHB guidelines have long included LCA as an option for selecting environmentally preferable products in the Innovative Design category. The new version awards points for using a life cycle assessment (LCA) tool that is compliant with ISO 14044 or other recognized standard.

Material Consumption Reduction. In the new standard a credit for building reuse has been added. Points are also now awarded for wall components that meet both structural and insulation criteria.

[7] *See National Green Building Standard 901.4 for more information.*

Table 4. NAHB Model Green Homebuilding Guidelines vs. the National Green Building Standard

NAHB Model Home Guidelines 2006			NGBS 2007 Materials-related Credits		
Credit	Description	Points	Credit	Description	Points
Materials and Resources		(Possible)	**Materials and Resources**		(Possible)
2.1.1	Create an efficient floor plan that maintains a home's functionality (house size included)	9	601.1	House size	15
2.1.2	Advanced framing techniques	8	601.2	Advanced framing techniques	9
2.1.3	Building dimensions that minimize material cuts	6	601.3	Designed to minimize material cuts	13
2.1.4	Detailed framing plan	7	601.4	Detailed framing plans and material lists	4
2.1.5	Materials that require no additional on-site finishing	4	601.5	Pre-cut assemble components, panelized	13
2.1.6	Prefabricated building systems	25	601.7	Materials do not require additional finishing on-site	12
			601.9	Wall systems with thermal characteristics	4
2.2.8	Use termite-resistant structural materials in areas known to be termite-infested	7			
			603.1	Existing buildings are reused	12
2.3.2	Salvaged Materials	6	603.2	Reclaimed and/or salvaged materials	3
2.3.3	Onsite waste sorting	6	603.3	Onsite sorting	4
2.4.1	Recycled-content materials	3	604.1	Recycled content materials	6
			605.1	Construction site waste management plan	6
2.5	Recycle waste materials during construction	18	605.2	Onsite recycling	7
			605.3	Construction waste recycled offsite	6
2.6.1	Renewable materials (agricultural byproducts, soy-based, bamboo, wood-based)	3	606.1	Biobased products: Certified Solid wood in accordance with 606.2, engineered wood, bamboo, wool, cotton, or cork. Cellulosic materials (wood, straw, natural fibers) and products made from crops (soy-based, corn-based) or other biobased materials with at least 50% content Products with minimum biobased contents of USDA's Designation of Biobased Items for Federal Procurement Products with "USDA Certified Biobased Product' label.	8
2.6.2	Certified wood products from ATFS, CSA, FSC, PEFC, SFI, other programs recognized by PEFC.	4	606.2	Certified wood products from ATFS, CSA, FSC, PEFC, SFI, other programs recognized by PEFC.	7
			606.3	Materials made with primary energy (at least 33% of the primary manufacturing process) derived for manufacturing from renewable sources, combustible waste sources, or renewable energy credits.	6
2.7.1	Resource-efficient materials	3	607.1	Resource-Efficient Materials	9
2.8.1	Local Materials (300 mile radius)	5	608.1	Local materials	10
2.8.2	Life-cycle assessment of framing materials	8	609.1	LCA	15

NAHB Model Home Guidelines 2006		
Credit	Description	Points
Indoor Environmental Quality		
5.1.5	Composite materials contain no urea-formaldehyde	8
5.1.6	Carpet components are "Green Label" from Carpet and Rug Institute	6
5.1.8	Low-VOC wallpaper	3
7.1.1	Products from companies with environmental management systems	3
7.1.2	Low-VOC paints	6
7.1.3	Low VOC sealants and adhesives	5

NGBS 2007 Materials-related Credits		
Credit	Description	Points
Indoor Environmental Quality		
901.4	Structural plywood used for floor, wall, and/or roof sheathing is compliant with U.S. Department of Commerce Product Standard PS 1 and/or Product Standard PS 2. OSB used for floor, wall, and/or roof sheathing is compliant with PS 2.	mandatory
	Nonstructural products contain no urea-formaldehyde, comply with EPP Spec CPA 2-06; HPVA HP-1-2004; US HUD Title 24, Part 3280; ANSI A208.1 and A208.2	10
901.5	Carpet meets CRI Green Label Standards	8
901.6	Flooring meets California Department of Health's CA 01350,certified by a third party program, such as the FloorScore or GREENGUARD	6
901.7	Low VOC wall coverings, comply with California Department of Health's CA 01350, as certified by a third party such as GREENGUARD or SCS	4
901.8	Low VOC site-applied architectural coatings meet GS-11, or CA 01350 as certified by a third party	5
901.9.1	Low VOC site-applied adhesives and sealants on sub-floors	5
901.9.2	Low VOC site-applied adhesives and sealants on interior	5
901.10	Kitchen and bath cabinets comply with Kitchen Cabinet Manufacturers Association Environmental Stewardship Program 01-06 or meet low/non-emitting criteria	4
901.11	Insulation for wall, ceiling, ducts and floor meets formaldehyde emissions of CA 01350 as certified by a third party	5
903.5.3	Moisture content of lumber does not exceed 19% moisture before being enclosed	4

NAHB National Green Building Standard Summary

The draft version of the new National Green Building Program is a vast improvement over the initial NAHB program and has the potential to dramatically influence green residential building. By pursuing ANSI certification, the program is following a well-established and highly-credible process for standard setting and accreditation. The NAHB standard is unique in several ways, including its established recognition of LCA as a tool for evaluating materials. However, the NAHB program could go further to ensure leadership in green building practices by expanding the use of LCA beyond framing materials, and requiring its use. The NAHB includes recognition of all of the leading forest certification programs operating in North America; wood, however, remains the only structural building material that requires third-party certification.

Green Globes

Green Globes is a program of the Green Building Initiative (GBI). The Green Globes standard was initially developed based on the UK Building Research Establishment's Environmental Assessment Method (BREEAM). It was adapted for use in Canada in 1996, and in the United States in 2004. In 2000, Green Globes Canada became an online rating tool that uses point allocation to determine qualification for certification; this feature characterizes the current U.S. Green Globes program. Builders can audit themselves using the online program and then achieve certification through third-party verification.

Green Globes was developed initially for use with construction of commercial buildings. GBI has specifically addressed residential structures by indicating that Green Globes is intended as a template for development of regional and local housing standards, and GBI collaborated with the National Association of Home Builders in developing the previously-described National Green Building Standard. The GBI offers assessment tools related to the Management and Operation of Existing Buildings, Building Emergency Management, Building Intelligence, and Fit-Up (for commercial interiors).

In 2005, GBI became the first green building organization to be accredited as a standards developer by the American National Standards Institute (ANSI). The GBI Proposed American National Standard 01-2008P for Commercial Buildings is currently in development and undergoing public review for ANSI recognition. The proposed standard is meant to be used for commercial buildings; the GBI recommends that single-family residential building utilize the NAHB National Green Building Standard that is also in the process of achieving ANSI recognition.

Like previous versions, the GBI Proposed American National Standard 01-2008P for Commercial Construction is divided into seven areas of assessment: Project Management, Site, Energy, Water, Resources, Emissions and Storage of Hazardous Materials, and Indoor Environment. The newest proposed version is much more prescriptive than previous versions of Green Globes. There are four Achievement levels possible, and a minimum of 35% of 1000 possible points must be awarded to achieve certification. The proposed standard now requires some mandatory measures in each category, while previous versions did not. For example, in the Resources/Materials category, a minimum of 29% of 145 possible points must be attained for certification. See Table 5 for the required points allotted per category. Points relating to environmentally preferable materials in the current Green Globes New Construction standard and the GBI Proposed American National Standard are shown in Table 6. Changes from the old standard to the new standard in relation to environmentally preferable products are outlined below.[8]

Life Cycle Assessment. Since its inception, identification of environmentally preferable materials in the Green Globes program has been informed by life cycle assessment, meaning that materials evaluation is systematic and based on internationally accepted protocols, and that embodied energy and emissions linked to the manufacturing process are also considered in materials evaluation. The GBI Proposed American National Standard offers two ways to select

[8] *See GBI Proposed American National Standard 01-2008P for more information.*

materials; through a Performance Path that awards points for using a complete life cycle assessment (45 points), or through a Prescriptive Path (35 points) that offers a variety of options that are each eligible for points. The GBI released its own version of a life cycle assessment tool that was developed in cooperation with the Athena Sustainable Materials Institute. Work continues to incorporate more LCA data into the online database to make the process of life cycle assessment more widely accessible.

Recycled-Content and Salvaged Materials. If not following the LCA path, the Prescriptive path allocates points for recycled post-consumer or post-industrial (pre-consumer) content materials (based on cost or weight of total project materials), for furnishings, fit-outs, and finishes, and assemblies. The previous version (Green Globes Design v.1) broke this down by cost only, and points were awarded using the Green Globes system calculator. Points are now awarded for off-site salvaged materials, based on weight or cost.

Table 5.
Required Points for Certification through the GBI Proposed American National Standard 01-2008P

Environmental Assessment Area	**Total Points Available**	**Minimum Percentage of Points Required For Compliance at Each of the Four Levels***
Project Management	100	50
Site	120	24 (0 for *major renovations)*
Energy	300	Performance Path A: 150
		Prescriptive path B: 100
Water**	130	26
Resources/Materials	145	29
Emissions and Storage of Hazardous Materials	45	9
Indoor Environment	160	32
Total 1000 (less non-applicable	1000 (less non-applicable points)	329 (using Energy path A)
		270 (using Energy path B)

**Where points do not sum to a whole number, round up the points to the nearest whole number.*

***The Water Assessment Area has a unique method for calculating final point allocations. Please refer to section 9.1 for further information.*

Environmentally Preferable Products. The new GBI Proposed American National Standard recognizes third-party forest certification programs endorsed by the PEFC in addition to the SFI, CSA, FSC, and AFS certification programs. Using wood products for 1% to 20% or more of total building materials can achieve points, based on cost or weight (the previous version awarded points starting at 20%). Local materials are awarded in the prescriptive path (LCA would take locally sourced materials into account by considering total energy). Points are possible by using 1% to 20% of total building materials that are harvested, recovered, salvaged, or extracted within a 500 mile radius and/or shipped primarily by rail or water within a 1500 mile radius. Seventy percent of a building component by weight is required for credit. Additional points are available for materials processed and manufactured according to these same criteria.

Biobased Products. On the Prescriptive path, using biobased products for 1% to 20% or more of building materials can gain points for assemblies and points for furnishings, fit-outs, and finishes, based on cost or weight. The points are determined by the described percentages in the manual. The Green Globes Design v.1 used cost only as a basis for awarding points.

Indoor Air Quality. Points are awarded for using 1%-100% of total building materials that meet certain VOC levels for adhesives, paints, sealants, and finishes. The VOCs of materials must either have been tested in accordance with the SCAQMD or ASTM 5116, or achieved certification through Carpet and Rug Institute®, Ecologo, Green Seal®, GreenGuard Environmental Institute®, Resilient Floor Covering Institute®, or another equivalent Voluntary Certification Program applicable to the product or material that met or exceeded the VOC content or VOC emissions listed in the tables provided. The list of VOC requirements has been expanded since the previous version.

Material Consumption Reduction. The new standard awards points for utilizing materials efficiently, using renewable raw materials, or incorporating multi-functional assemblies. It also promotes the development of a building service life plan. The GBI has decreased the points awarded for using a design plan that incorporates possible easy demounting, disassembly, and reuse in the future.

Table 6.
Point Allocation for Credits Relating to Environmentally Preferable Materials in the Current and Proposed Standards.

Green Globes Design v.1	GBI Proposed American Standard 01-2008P
E.1 Materials with low environmental impact (40 points)	10. 1.1 Assemblies (Structural System and Envelope), PERFORMANCE PATH – Assemblies (25 points) Assemblies (Structural System and Envelope), PRESCRIPTIVE PATH – Assemblies (20 points)
E.2 Minimized consumption and depletion of material resources (30 points)	10.2.1 Furnishings, Finishes and Fit-outs—PERFORMANCE PATH (20 points) Furnishings, Finishes and Fit-outs - PRESCRIPTIVE PATH (15 points)
	10. 3 Other Material Properties (12 points) – includes certified wood & salvaged products
E.3 Re-use of existing structures (10 points)	10.4 Re-use of Existing Structure's (18 points)
	10.5 Reduction, Re-use and Recycling of Waste (9 points)
E.4 Building durability, adaptability and disassembly (12 points)	10.6 Resource Conservation through Design (14 points) - includes Design for Re-Configuration, Demounting and Disassembly, Building Service Life Plan
E.5 Reduction, re-use and recycling of waste (10 points)	10.7 Building Envelope (42 points)
G.2.9 G.2 Source Control of Indoor Pollutants, VOC's low-VOC emitting and third-party environmentally certified (10 points)	12.2.1 Source Control of Indoor Pollutants - Volatile Organic Compounds (VOC) (10 points)

Green Globes Summary

The GBI is the only entity to date to focus on life cycle assessment as a foundation for green building design and materials selection, and the new national commercial standard reflects this as well. The new standard in draft is much more prescriptive than the previous version, which has both good and bad attributes. On one hand the mere offering of an alternative prescriptive path could be seen as undermining the importance of LCA, but on the other the pairing of the two options could generate awareness to more builders about the best way to choose materials (calling the LCA path "Performance" and offering more points through it supports this scenario). Through development of the on-line tool and the partnerships in developing new ANSI-recognized national standards, the GBI has introduced a new standard for green building programs. Continued development is still needed to extend the use of LCA to selection of all building components, and to bring uniform certification requirements to structural building materials other than wood. The GBI and its partners may also need to make more significant investments in training and education to assist in the uptake of the on-line tool and to support the expanded use of LCA.

The Bottom Line

All of the major green building programs are evolving. Life cycle assessment is recognized in some building programs, but not all, and even those that do give recognition only do so for framing materials. This means that the principal green building programs are not holding non-structural materials to the same standards as structural materials. This is partly due to the more ready availability of LCA information for framing materials than for other materials. As more data becomes available this discrepancy needs to be addressed.

The bottom line is that critical issues related to designation of environmentally preferable construction materials remain unaddressed in most green building programs. Furthermore, current variability in the standards is causing confusion and proliferation of scientifically unsubstantiated prescriptive standards as new programs are developed and existing programs are revised. Despite the strong adoption rate for green building programs, there is much room for improvement and work needs to be done to reach the goal of ensuring the programs truly result in improved environmental performance.

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