



# **Quantifying Sustainability:**

A Study of Three Sustainable  
Building Rating Systems and  
the AIA Position Statement

**AIA** Sustainability Discussion Group

May 2008

## Contents

Introduction .....	1
AIA Public Policies and Position Statements.....	2
Rating Systems	
Green Globes™ for New Construction	
Overview .....	3
Conclusion .....	4
LEED® for New Construction version 2.2	
Overview .....	6
Conclusion .....	7
SBTool 07	
Overview .....	9
Conclusion .....	10

## Introduction

*The AIA maintains a position of neutrality regarding rating systems currently available in the marketplace to promote the choice of the best tool for each individual project, providing guidance to our members and acting as a collaborative critic for continuous improvement of all rating systems as tools for architects and the construction industry.*

In December 2005 the AIA adopted a position statement on sustainable rating systems. A primary objective of the position statement was to encourage outcome- and performance-based thinking as the central approach to a building project. With that approach in mind, the statement defined 16 criteria for rating systems that support enhanced performance-based project outcomes (see following page). The position statement further encouraged the development of sustainable design guidelines within the industry that address the most critical subject areas within the practice of architecture, thereby advancing the goal of carbon neutrality and sustainability in the built environment.

In 2007 the Sustainability Discussion Group (SDiG) of the AIA Board of Directors chose to examine three broadly accepted rating systems that provide scoring of sustainable features in building design and construction: Green Globes™ for New Construction, LEED® for New Construction and Major Renovations version 2.2 (LEED-NC), and SBT007. The three systems were chosen based on their levels of acceptance in the American market, their differences in objectives, and a desire to provide an indication of the range of systems available. The systems chosen have distinguished themselves by developing unique approaches to the difficult challenge of quantifying sustainability.

The SDiG offers this analysis to industry and to the public with hopes that it will be received in the spirit in which it was prepared: as an opportunity to learn how three unique, creative, and evolving green building rating systems resonate in various dimensions with the goals of the AIA position statement on sustainability. It is important to note that while the study offers a side-by-side comparison of the rating systems to the position statement, and thereby offers a guide to choosing an appropriate rating system based on the AIA's criteria, it does not intend to rank or grade the systems against each other.

The overall effort is based on a conviction that careful review of this study along with recommended resources will lead the reader to a deeper understanding of the three systems while it raises awareness about the underlying concepts and structure of rating systems with regard to performance-based project approaches.

On behalf of its members, the AIA looks forward to ongoing collaboration with all three organizations in order to advance the goal of carbon neutrality within buildings, deepen our mutual understanding of sustainability goals and objectives, and pursue continued improvement of all rating systems as tools for the design and construction industries.

## AIA Public Policies and Position Statements

See all of the AIA's public policies and position statements at [www.aia.org/advocacy](http://www.aia.org/advocacy), under Advocacy Resources.

Public policies are AIA statements of belief to policy makers, the public, and the construction industry on issues affecting the membership, the profession of architecture, or the American Institute of Architects. Position statements elaborate on public policies or apply them to specific conditions or events.

Commentaries and explanations are white papers or other analyses that amplify AIA doctrine by presenting rationale and facts to support adherence to a specific public policy or position statement. Rules governing content, format, review, and adoption of policies and positions are contained in Chapter 9 of the Rules of the Board of the American Institute of Architects.

For reference, the AIA's public policy on sustainable practice and position statement on sustainable rating systems are included here.

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### Public Policy

The creation and operation of the built environment require an investment of the earth's resources. Architects must be environmentally responsible and advocate for the sustainable use of those resources.

### Position Statement on Sustainable Rating Systems

The AIA supports the development and use of rating systems and standards that promote the design and construction of communities and buildings that contribute to a sustainable future.

### Explanation

The AIA encourages, through the efforts of its Board Committees, Knowledge Communities, Task Forces, Working Groups, and related activities the inclusion of the following features in "green building" rating systems, standards, or regulations for the design and construction of the built environment. That it:

1. Is developed and renewed on a regular basis through a consensus-based process, in which all interested parties can participate;
2. Require clearly defined design documentation to demonstrate compliance;
3. Require compliance to be validated by an independent third party;
4. Require the development of sustainable sites avoiding the conversion of prime agricultural lands or wetlands, regenerating brownfield sites, or those that result in regenerative benefits to the natural environment;
5. Require specific goals in the efficient use of water resources that promote application of new wastewater technologies;
6. Require specific goals for significant reductions in energy use, especially nonrenewable energy sources, with enhanced performance assured through commissioning of building systems;
7. Promote the use of renewable energy sources;
8. Require reduced use of nonrenewable natural resources through the reuse of existing structures and materials, reductions in construction waste, promotion of recycled content materials, and use of materials independently certified as from sustainable sources;
9. Require specific goals for improved indoor environmental quality through enhanced indoor air quality, thermal comfort, acoustics, daylighting, and pollutant source control and use low-emission materials and building system controls;
10. Promote the development and application of innovative designs and collaborative processes intended to improve environmental performance;
11. Recognize the life cycle value of a community or project in addition to construction first costs, including assessment of impact on climate change, acid rain, water pollution, resource depletion, and toxicity factors;
12. Utilize life cycle assessment data as the basis for design and construction decision making;
13. Acknowledge national, regional, and bioclimatic differences;
14. Reduce (and eventually eliminate) on-site and off-site toxic elements in the built environment;
15. Require specific measurable reductions in carbon dioxide (CO<sub>2</sub>) production in the built environment; and
16. Require documentation of actual building energy and operational performance.

## Green Globes™ for New Construction | Overview

*Green Building Initiative (GBI) is a not-for-profit organization originally conceived to assist homebuilders in green building practices. In the United States this initiative began with a model program sponsored by the National Association of Home Builders. In 2004 the GBI adopted the Green Globes rating system through an agreement with a Canadian commercial building assessment tool, based on the Building Research Establishment Environmental Assessment Method (BREAM). In 2002 the system was adapted for the U.S. market by representatives from Arizona State University, the Athena Institute, Building Owners and Managers Association (BOMA), and several Canadian agencies. The GBI was one of the first of several organizations approved by the American National Standards Institute (ANSI) as a Standards Development Organization (SDO) to develop a set of criteria designed for municipalities to incorporate building performance energy efficiency requirements into local building codes. The GBI's current technical committee is established under ANSI and members include university faculty, manufacturers, and design professionals.*

[www.thegbi.org](http://www.thegbi.org)

In the United States Green Globes is developed through continued research and technical reviews by the Green Building Initiative (GBI) technical committees, which follow ANSI protocols. Committees include design professionals, building product manufacturers, interested parties, and non-governmental organizations. Draft ANSI standards are published online for review and commentary by members and nonmembers.

The GBI's Green Globes system reviewed here was released in October 2007 and includes an assessment process, a rating system, and a guide for integrating environmentally friendly design into buildings of all sizes and throughout the construction process. Green Globes features modules for New Construction and for the Continual Improvement of Existing Buildings, encompassing Building Energy Management, Building Intelligence, and Fit-up.

Projects are awarded points based on their performance in seven areas of assessment in the New Construction module and six in the Existing Building module. The checklist for the New Construction module is organized by green building practices as well as the sequence of the design process. This project dashboard is divided into project delivery phases: Predesign Project Initiation, Predesign Site Analysis, Design Development, Construction Documents, Contracting and Construction, and Commissioning. Each of these phases is subdivided into seven assessment areas: Project Management, Energy, Indoor Environment, Site, Water, Resources, and Emissions. Completing an online questionnaire yields a detailed report at each stage, in addition to offering project design suggestions aimed at reducing the building's overall environmental impact.

Green Globes can be used for self-assessment but if the project team wishes to claim compliance with a specific Green Globe certification, a third-party review of the documentation is required. Official accreditation is obtained through the submittal of required project documentation as well as a project walk-through by regional reviewers. Projects are awarded a final rating of one (35–54 percent), two (55–69 percent), three (70–84 percent), or four (85–100 percent) globes based on cumulative point totals.

Information on Green Globes is available through the Web site, which has limited access to nonmembers. The Web site contains resource links, case studies, and an online user's forum. Free limited trials of the assessment program are available. Green Globes requires purchase of this tool by users wishing to self-certify their projects and additional fees apply for third-party certification.

## Green Globes™ for New Construction | Conclusions

Green Globes offers a broad based evaluation of projects by both the design process and based on environmental criteria. When used to certify a project more stringent and specific requirements in the areas of energy reduction and operational performance are needed, as these are two areas that most influence carbon production.

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1 Developed and renewed on a regular basis through a consensus-based process in which all interested parties can participate

Green Globes is developed and reviewed on a regular basis primarily through a consensus-based process directed by the ANSI Technical Committee. Members are invited to join subcommittees of this technical committee through an online application procedure. The technical committee provides opportunities for GBI members to provide commentary on changes. Members are encouraged to contribute to the development of Green Globes' standards and are instrumental in efforts to establish Green Globes as an ANSI standard. The GBI's ANSI procedures provide for public meetings, public comment periods, and periodic review and revision of the standard.

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2 Require clearly defined design documentation to demonstrate compliance

Green Globes' third-party reviews require clearly defined documentation to demonstrate compliance. A third-party reviewer will evaluate construction documents, energy models, wastewater systems, material data sheet, as well as complete a walk-through of the building post construction.

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3 Require compliance to be validated by an independent third party

Green Globes' validation requires third-party assessment through the Canadian Standards Association (CSA) America Inc., a developer of standards and personnel certification programs. The GBI provides a two-part, third-party assessment to demonstrate compliance. The first part evaluates the design immediately following the construction documents stage. The second part includes a walk-through of the building postconstruction. The GBI encourages project teams to use the online questionnaire to self-assess projects even if they do not register for certification by a third-party assessment.

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4 Require the development of sustainable sites avoiding the conversion of prime agricultural lands or wetlands, regenerating brownfield sites, or those that result in regenerative benefits to the natural environment

Green Globes encourages but does not require the development of sustainable sites and mitigation of brownfields. The assessment questionnaire requests information on strategies to enhance site ecology and maximize the regeneration of the natural environment through the preservation of open space, landscape design, and low-impact development. Points are available if the project avoids the conversion of prime agricultural lands and the development of wetlands. Points are also provided for projects that minimize the ecological impact of construction.

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5 Require specific goals in the efficient use of water resources that promote application of new wastewater technologies

Green Globes encourages but does not require the efficient use of water resources or the application of new wastewater techniques. The questionnaire addresses each phase of project development and encourages the setting of consumption targets for indoor water use, the reduction of off-site treatment of water, and strategies for minimizing outdoor and mechanical system water use. The more conservation achieved through the design and the construction process, the more points earned in the final project assessment.

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6 Require specific goals for significant reductions in energy use, especially nonrenewable energy sources, with enhanced performance assured through commissioning of building systems

Green Globes encourages but does not require specific goals for significant reductions in energy use. Energy credits address these issues through performance-based and prescriptive paths, including scoring on the U.S. Environmental Protection Agency's (EPA's) Target Finder system, which references the Commercial Buildings Energy Consumption Survey (CBECS). The questionnaire asks for a commitment to minimize energy demand through a variety of strategies.

Commissioning is not required but is included in the assessment tool and points are awarded for whole building commissioning throughout the design and construction process. Points are awarded for the training of facility managers and through verification of warranty and maintenance services, which can enhance continued building performance.

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7 Promote the use of renewable energy sources

Green Globes promotes the use of renewable energy sources through points awarded in several phases of the design project, including points awarded if the construction company uses renewable energy.

8	Require reduced use of nonrenewable natural resources through the reuse of existing structures and materials, reductions in construction waste, promotion of recycled content materials, and use of materials independently certified as from sustainable sources	Green Globes encourages but does not require the use of nonrenewable natural resources through points awarded for the reuse of existing structures and materials, reductions in construction waste, and the promotion of recycling and recycled content materials. Green Globes encourages the use of materials independently certified as from sustainable sources through ANSI audit procedures. Green Globes lists the Sustainable Forestry Initiative (SFI) as one of the acceptable sources for certification, which has consistent auditing practices through organizations such as ANSI, ISO 19011:2002. This certification program was developed by the industry to train loggers and landowners on industry standards. The SFI is not a third-party verifier of social and ecological values for sustainable forest practice.
9	Require specific goals for improved indoor environmental quality (IEQ) through enhanced indoor air quality (IAQ), thermal comfort, acoustics, daylighting, and pollutant source control and use low-emission materials and building system controls	Green Globes encourages but does not require improved IEQ. Green Globes provides numerous points throughout the entire design process for enhanced indoor air quality, thermal comfort, acoustics, daylighting, and pollutant source controls, as well as building system controls.
10	Promote the development and application of innovative designs and collaborative processes intended to improve environmental performance	Green Globes promotes the development and application of collaboration through the encouragement of the development of an Environmental Management System (EMS) and project management category. Green Globes does not isolate innovative practices but encourages team collaboration throughout the assessment tool.
11	Recognize the life cycle value of a community or project in addition to construction first costs, including assessment of impact on climate change, acid rain, water pollution, resource depletion, and toxicity factors	Green Globes recognizes the impact of construction to the life cycle value of a community development through several of the points awarded for projects. These include the calculation of the life cycle of a building's materials, minimizing emissions from mechanical equipment, as well as light and water pollution prevention. Green Globes recognizes resource depletion and toxicity factors of project components throughout the various phases of project delivery. A point is given for project impact assessments as defined by the National Center for Environmental Assessments, a program through the EPA which provides information on pollutants and transportation impacts. The scope of Green Globes was crafted to promote buildings that contribute to healthy communities but there is not a direct metric that examines the life cycle value to a community.
12	Utilize life cycle assessment data as the basis for design and construction decision making	Green Globes' new Life cycle Assessment (LCA) tool, developed in cooperation with the Athena Institute and the University of Minnesota and Morrison Hershfield Consulting Engineers, provides the cradle-to-grave implications of building materials selection in terms of carbon emissions potential, embodied primary energy (fossil fuel depletion), pollution to air and water, and weighted resource use. Project reports are generated through this tool, which allow designers to adjust material choices to determine which choices meet the desired sustainable strategies.
13	Acknowledge national, regional, and bioclimatic differences	There is no direct adaptation of the structure of Green Globes based on regional or bioclimatic differences. Climatic differences are addressed through its reliance on the EPA Target Finder and CBECS data for energy consumption. Green Globes also references ASHRAE 90.1 and tailors the requirements for some regional requirements, especially relating to envelope design.
14	Reduce (and eventually eliminate) on site and off-site toxic elements in the built environment	Green Globes provides an Emissions category to review strategies for all emissions, referring to design criteria by the EPA and encourages design and construction methods, which will mitigate air and water contamination and reduce toxic elements such as pesticides and ozone depleting substances in building materials.
15	Require specific measurable reductions in CO <sub>2</sub> production in the built environment	Green Globes encourages but does not require energy reduction, which can lead to measurable reductions in CO <sub>2</sub> production. A project management point is given for a commitment to reduce the energy demand of a building. This assessment tool is linked to the EPA Target Finder, which can assist with determining calculations for the reduction of CO <sub>2</sub> and lead to compliance with the AIA's position statement goals for a 50-percent reduction of a building's energy consumption.
16	Require documentation of actual building energy and operational performance	Green Globes encourages but does not require measurement and verification to document actual operational performance. Green Globes provides a Commissioning category and points are awarded for the initial documentation of actual building energy and operational performance as predicted by design. Green Globes also awards points for the training of facility operators and maintenance manuals to assist with continued operational performance.

## LEED® for New Construction version 2.2 | Overview

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*The U.S. Green Building Council (USGBC) is a not-for-profit organization established in 1993 to encourage the design and production of high performance buildings. The Leadership in Energy and Environmental Design (LEED) project rating system was developed to bring innovations in green building practices to the U.S. market.*

[www.usgbc.org](http://www.usgbc.org)

The U.S. Green Building Council (USGBC) has cultivated its series of rating system products to include LEED for New Construction, Homes, Commercial Interiors, Core and Shell, Schools, Retail, Healthcare, Existing Buildings, and pilots for Neighborhood Development and Portfolio Performance Program. The USGBC offers an accreditation program for LEED, providing education and testing for individuals to become a LEED-accredited professional. LEED-NC was originally released to the public in January 2001 as version 2.0, and has since released versions 2.1 and 2.2. The USGBC is currently in the process of launching LEED version 3.0, an inclusive approach to the portfolio of LEED products, aligning the many versions of the LEED green building rating system as well as incorporate recent advances in building science and technology.

The development of LEED products is driven by consensus and open information sharing by volunteer leaders in the design professions, as well as technical experts. The formal LEED Committee structure is composed of a steering committee, product committees, and credit category technical advisory groups (TAGs). A Technical Scientific Advisory Committee reviews the LEED reference guides, training, and accreditation and reviews difficult credit interpretations. The USGBC is approved by the American National Standards Institute (ANSI) as a Standards Development Organization (SDO) to develop a set of criteria designed for municipalities to incorporate building performance energy efficiency requirements into local building codes.

LEED-NC is organized into six categories: Sustainable Sites, Water Efficiency, Energy and Atmosphere, Materials and Resources, Indoor Environmental Quality, and Innovation and Design Process. Each category includes prerequisites for any certification level to be achieved, and a flexible series of opportunities to achieve credit points corresponding to the different levels of accomplishment, determined by the number of points obtained through credit interpretation by third-party review:

- LEED Certified: 26–32 points
- LEED Silver: 33–38 points
- LEED Gold: 39–51 points
- LEED Platinum: 52 or more points

LEED certification requires that project teams register and pay a fee to the USGBC, which can be done online. At design completion, project teams submit their compliance documentation to the USGBC for review, also available as an online tool. The USGBC uses an independent third party to review the documentation and may perform an audit, requesting additional supporting documentation. At the end of construction the project team submits the balance of evidence that demonstrates the built project successfully met all LEED goals. Project teams can submit Credit Interpretation Requests for clarification on the LEED intent and documentation requirements during design and construction. A database of Credit Interpretation Request rulings is available to all registered projects. USGBC Membership is not required to register a project for certification.



## LEED® for New Construction version 2.2 | Conclusions

LEED-NC 2.2 is a good example of a rating system that provides a measurement of environmental achievement. Continued development in life cycle assessment, requirements for renewable energy or carbon reduction targets for certified projects will continue to make this system an effective resource for architects.

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1 Developed and renewed on a regular basis through a consensus-based process, in which all interested parties can participate

LEED-NC has been developed and renewed on a regular basis since the initial version was released. Each release is preceded by a pilot review process through which case studies are followed to evaluate procedures and policies. USGBC members can contribute to the development of updates through participation in evaluation teams, member circles, discussion groups, and virtual meetings. Members are invited to vote on final versions of pilot programs before they are released and standards must have approval of two-thirds of the membership. Opportunities for committee membership are advertised on the USGBC Web site. This process continues to refine the LEED process through a consensus-based process in which all interested parties can participate.

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2 Require clearly defined design documentation to demonstrate compliance

LEED-NC uses Web-based templates to demonstrate compliance, which must be submitted to achieve certification. Online documentation through credit templates is clear and reference manuals provide guidance for the submittal process. Resources include connections to case studies and online question-and-answer capability. The USGBC also offers credit interpretation and case study examples are provided on the Web site.

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3 Require compliance to be validated by an independent third party

Although the USGBC is the administrator and developer of LEED-NC, compliance and the award of LEED certification are validated by an independent third-party review system. A LEED certification manager reviews all documentation for compliance and credit approval which is granted or denied within 30 days. A clear procedure for appeals, including a timeline, is provided by the USGBC. Reviews conducted by third-party consultants include an opportunity for a secondary review by a management subcommittee and technical, product, or scientific advisory group.

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4 Require the development of sustainable sites avoiding the conversion of prime agricultural lands or wetlands, regenerating brownfield sites, or those that result in regenerative benefits to the natural environment

LEED-NC encourages and places some requirements on the development of sustainable sites and requires the creation and implementation of an erosion and sedimentation control. LEED-NC encourages the avoidance of conversion of agricultural lands or wetlands and provides a credit for brownfield redevelopment. Additional credits are given for the protection of the natural environment through the preservation of open space.

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5 Require specific goals in the efficient use of water resources that promote application of new wastewater technologies

LEED-NC encourages but does not require the efficient use of water resources and new wastewater techniques. LEED-NC water efficiency credits separate points for indoor and outdoor water consumption. LEED-NC allows for cumulative credit points for water-efficient landscaping, wastewater reduction, regulated water use reduction, and innovative water technologies.

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6 Require specific goals for significant reductions in energy use, especially nonrenewable energy sources, with enhanced performance assured through commissioning of building systems

LEED-NC requires that all projects must exceed ASHRAE 90.1 2004 by at least 14 percent, which can lead to significant energy reduction. LEED-NC requires fundamental commissioning of building systems and provides credit points for enhanced commissioning of building systems.

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7 Promote the use of renewable energy sources

LEED-NC promotes the use of renewable energy sources with many credit opportunities by providing recognition for on-site renewable energy production, for reducing overall energy consumption through supplementing demand through renewable sources, and for purchasing green power to meet a project's electricity demand. Comprehensive definitions and guidelines for a range of renewable resources are provided in the reference guides and through educational resource links.

8	Require reduced use of nonrenewable natural resources through the reuse of existing structures and materials, reductions in construction waste, promotion of recycled content materials, and use of materials independently certified as from sustainable sources	LEED-NC requires the storage and collection of recyclables in all projects contributing to the reduced use of virgin natural resources. The LEED Materials and Resources category encourages reusing existing structures; diverting construction waste from landfills; and incorporating recycled, regional, and salvaged building materials.
9	Require specific goals for improved indoor environmental quality (IEQ) through enhanced indoor air quality (IAQ), thermal comfort, acoustics, daylighting, and pollutant source control and use low-emission materials and building system controls	LEED-NC encourages but does not require the use of materials independently certified to be from sustainable sources. LEED-NC provides credits for certified wood, setting a standard for independent certification practices, including designation of the Forest Stewardship Council (FSC) as the accrediting body for forest management and chain-of-custody certifications. In the Indoor Environmental Quality category many resources and certification programs are referenced and project teams are encouraged to meet high performance standards for product specifications.
10	Promote the development and application of innovative designs and collaborative processes intended to improve environmental performance	LEED-NC's Innovation and Design Process promotes experimentation and innovation. Credit interpretations and case studies are provided on the Web site to encourage design teams to learn from previous innovation credit applications. LEED-NC does not directly address a collaborative design process, other than encouraging working with a LEED-accredited professional.
11	Recognize the life cycle value of a community or project in addition to construction first costs, including assessment of impact on climate change, acid rain, water pollution, resource depletion, and toxicity factors	LEED-NC acknowledges the impact of construction on the life cycle value of a community but does not include credits that assess the specific impact of buildings on climate change. LEED-NC recognizes the impact of the construction of buildings on urban areas and within existing transportation networks, reducing pollution caused by the use of automobiles. LEED credits by encouraging the reduction of building energy consumption, will contribute to the reduction of the impact of buildings on climate change and acid rain. Site selection credits encourage the prevention of water pollution. LEED-NC's Materials and Resources credits foster the reduction of resource depletion and discourage the use of materials that contain environmental toxins. The scope of LEED-NC was crafted to promote buildings that contribute to healthy communities; other LEED products are currently in pilot study which will address community development issues.
12	Utilize life cycle assessment data as the basis for design and construction decision making	LEED-NC does not require the generation of life cycle assessment data for a certified project.
13	Acknowledge national, regional, and bioclimatic differences	LEED-NC does not adjust itself by region or bioclimatic differences but LEED-NC's Energy and Atmosphere credits reference ASHRAE 90.1, which tailors the requirements to some regional requirements, especially relating to envelope design.
14	Reduce (and eventually eliminate) on site and off-site toxic elements in the built environment	LEED-NC promotes the reduction of some toxins on site and elimination of some off-site toxic elements in the built environment through its encouragement of brownfield mitigation.  The use of CFC-based refrigerants, an on-site toxic construction element, is prohibited by LEED-NC. LEED-NC supports ozone protection through the elimination of HCFCs or halons. The toxicity of some elements in construction materials is recognized and LEED-NC encourages the reduction in the use of harmful products through the specification of green products and materials.
15	Require specific measurable reductions in CO <sub>2</sub> production in the built environment	Although LEED-NC requires increased energy efficiency, which will result in some carbon reduction, it does not specifically address or require carbon reduction measures. LEED-NC requires that all projects must exceed ASHRAE 90.1 2004 by at least 14 percent, which in some cases may mean that these buildings will meet the AIA's position statement goals for a 50-percent reduction of a building's energy consumption.
16	Require documentation of actual building energy and operational performance	LEED-NC requires some documentation of the initial building energy and operational performance through fundamental commissioning. LEED-NC encourages enhanced commissioning and measurement and verification credits that document ongoing operational performance and require training and maintenance manuals to assist with continued operational performance.

## SBTool 07 | Overview

*The International Initiative for a Sustainable Built Environment (iiSBE) is an international, nonprofit networking organization created to advance the energy and environmental performance of buildings through research and policy. The board represents members from 16 countries and the organization is based in Ottawa. In 1996 this organization created the Green Building Challenge (now called the Sustainable Building Challenge) as a yearly screening process to develop case study documentation of high performance buildings throughout the world. The main projects of the iiSBE include a multilingual Sustainable Building Information (SBI) system, a Sustainable Building Tool (SBTool), and a database of research and development materials submitted by member organizations.*

*The iiSBE SBI documents are developed by members, representing over 20 countries and participating organizations, including the U.S. Department of Energy, Natural Resources Canada, Public Works and Government Services Canada, Novem (the Netherlands energy agency), International Council for Research and Innovation in Building and Construction (CIB), and CSIR (the South African building research body). Documents are provided in over 12 languages, from Japanese to Spanish, and case studies are assessed at an annual Global Conference on Sustainable Building and Construction.*

[www.iisbe.org](http://www.iisbe.org)

A product of the International Initiative for a Sustainable Built Environment (iiSBE), SBTool 07 is an assessment checklist which provides a means to assess building performance and is tied into regional climate zones, local building codes, and international standards.

SBT07 provides a generic toolkit for any local organization to use to develop a rating system. This system establishes a weighting system for regional parameters such as climate and occupancy. The current system applies to the design phase of a project, includes up to 18 building types, and can be adapted for use by any size project or in new construction or in existing building assessments or renovations.

Members of the iiSBE can input project location and specify performance targets to self-assess the achievement of green building goals. Design performance is measured as compared to chosen benchmark values and/or default benchmark values, and the performance is scored and weighted. International project teams enter completed project assessments at Sustainable Building Challenge conferences; the assessments are audited and reviewed for certification by iiSBE. Benchmarks are structured as subjective, descriptive project goals, such as impacts on biodiversity which has no standard, and also as data that can be calculated, such as energy modeling. Project teams develop benchmarks through a review of local regulations, analysis of local building performance, consensus by local experts, and regional climate analysis. SBT07 only becomes a rating system when an audit is provided by a third-party reviewer, chosen by the project team or provided by iiSBE.

Seven main issue areas include Site Selection, Energy and Resource Consumption, Environmental Loadings, Indoor Environmental Quality, Service Quality, Social and Economic Aspects, and Cultural and Perceptual Aspects. Each issue is subdivided into many categories and criteria. Project performance by criteria is weighted as deficient, minimal, good, or best practice. Category scores are weighted by regional parameters. The total score is affected by the regional factors determining design parameters. A default value is recommended for each criteria, providing the base for a green building performance target.

This tool provides a results analysis which indicates the relative and absolute performance of the project as acceptable, good, or best practice. These scores reflect comparisons to local benchmarks as well as international benchmarks for sustainable building practices. Cultural assessments, development of projects for accessibility, and the assessments of economic impacts of construction on communities extend the parameters of sustainable design beyond building performance. Documentation of the SBT07 process is provided on the Web site as well as in newsletters, announcements, and links to numerous international organizations with a focus on sustainability.

## SBTool 07 | Conclusions

SBTool 07 is a toolkit for designing a rating system. If used as a rating system providing certification, SBT07 would be stronger if there was an increase in the number of “required” items vs. those that are simply “encouraged” and if it required project documentation. Specific requirements in the areas of energy reduction and operational performance would supply any rating system approach that comes out of the use of SBT07 with performance-based requirements necessary for reaching carbon reduction goals.

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1 Developed and renewed on a regular basis through a consensus-based process in which all interested parties can participate

SBT07 is developed and renewed on a regular basis primarily at the biannual technical meetings by members, as well as through continued research initiatives led by the organization. Anyone can join the iiSBE either as an individual member or an organization.

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2 Require clearly defined design documentation to demonstrate compliance

SBT07 does not require documentation but encourages the completion of an online questionnaire which refers to specific tools, documents, and delivery systems that can be used to demonstrate compliance.

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3 Require compliance to be validated by an independent third party

SBT07 cannot be used as a rating system unless it is validated by an independent third party who can be selected by the project teams. SBT07 was developed to provide assistance to a community or organization developing its own rating system and can be modified to incorporate the validation of third-party certifications. The iiSBE organization does provide a quality audit of a submitted assessment and an issues certification system which is associated with reviews at international global conferences on sustainable buildings.

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4 Require the development of sustainable sites avoiding the conversion of prime agricultural lands or wetlands, regenerating brownfield sites, or those that result in regenerative benefits to the natural environment

SBT07 does not require but encourages the development of sustainable sites, which includes the avoidance of the conversion of prime agricultural lands through points for developing in urban areas. The regeneration of a brownfield site is not part of the assessment criteria, nor is the avoidance of wetlands, although there are points for assessing water quality impacts on lakes and streams. SBT07 encourages the development of sites to maintain wildlife corridors; preserve biodiversity; and protect forests, open space, and native vegetation.

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5 Require specific goals in the efficient use of water resources that promote application of new wastewater technologies

SBT07 encourages but does not require specific goals in the efficient use of water resources and the promotion of new wastewater technologies. Points are granted in recognition of the protection of potable water as well as best practice community solid waste systems.

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6 Require specific goals for significant reductions in energy use, especially nonrenewable energy sources, with enhanced performance assured through commissioning of building systems

SBT07 does not require but encourages specific goals for significant reductions in energy use. By weighting and benchmarking performance ratings by local climate conditions, energy operating costs, and case study models, this tool provides targets for the reduction of energy use as well as energy dollars. Points are awarded for enhanced performance through the commissioning of building systems as well as in the Service Quality category.

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7 Promote the use of renewable energy sources

SBT07 promotes the use of renewable energy sources for the use of on-site and off-site renewable resources. Points are also provided for limiting the impact to the solar energy potential of adjacent properties.

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8 Require reduced use of nonrenewable natural resources through the reuse of existing structures and materials, reductions in construction waste, promotion of recycled content materials, and use of materials independently certified as from sustainable sources

SBT07 encourages but does not require the use of nonrenewable natural resources through points awarded for the reuse of existing structures and materials, reductions in construction waste, and the promotion of recycling and recycled content materials. SBT07 provides points for the use of durable materials and encourages the use of materials from sustainable sources. Materials may or may not be certified from sustainable sources, dependant upon the setting of initial targets by project teams.

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9 Require specific goals for improved indoor environmental quality (IEQ) through enhanced indoor air quality (IAQ), thermal comfort, acoustics, daylighting, and pollutant source control and use low-emission materials and building system controls

SBT07 promotes IEQ and strategies for obtaining points for air quality, including an assessment of mechanical efficiencies and behavioral effectiveness. Building system controls, measurements of temperature and relative humidity, daylighting strategies, and acoustic separations are among important criteria in this category. The use of low-emission materials provides points in the Energy and Resource Consumption Materials category.

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10 Promote the development and application of innovative designs and collaborative processes intended to improve environmental performance

SBT07 promotes integrated design collaborative practices through points allocated for project planning. This tool does not specifically grant points for innovative design; however, it encourages the development of new sustainable design initiatives through research and conference presentations.

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11 Recognize the life cycle value of a community or project in addition to construction first costs, including assessment of impact on climate change, acid rain, water pollution, resource depletion, and toxicity factors

SBT07 recognizes the impact of construction to the life cycle value of community development in the Social and Economic Aspects category. Points are also awarded for assessments on the impact on climate change and acid rain in the Environmental Loadings category, encouraging the assessment of CO<sub>2</sub>, and the reduction of water pollution. SBT07 recognizes resource depletion and toxicity factors of project components in the Energy and Resource Consumption category. SBT07 also provides points for the cultural impact of a project as well as the commercial viability of a project. Projects can be assessed as to the impact on the local economy and whether the project provides housing affordability for residents.

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12 Utilize life cycle assessment data as the basis for design and construction decision making

Although the current version of SBT07 offers design-stage assessments only, the system has the capacity to offer assessments at four distinct stages of the life cycle and provides default benchmarks suited to each phase.

SBT07 incorporates many LCA concepts, including points awarded for calculating the embodied energy of materials, and provides flexibility in the design of the structure, adaptability, recyclability, and durability.

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13 Acknowledge national, regional, and bioclimatic differences

SBT07 is designed to acknowledge national, regional, and bioclimatic differences. Users can adjust the weighting of strategies based on specific national or regional priorities, as well as local climate data.

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14 Reduce (and eventually eliminate) on site and off-site toxic elements in the built environment

SBT07 encourages the reductions of toxic elements on site and off site both in the Environmental Loadings category as well as Energy and Resource Consumption category. There are points for the specification of nontoxic substances in building materials. SBT07 is currently considering awarding points for practices that lead to the reduction in toxic materials off site such as mercury or nuclear waste.

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15 Require specific measurable reductions in CO<sub>2</sub> production in the built environment

SBT07 does not require but encourages the assessment of greenhouse gas emissions as well as ozone-depleting substances embodied in construction materials and emissions attributed to the energy used for facility operations. The completed assessment report includes the measure of kilograms of CO<sub>2</sub> that the building will generate annually. High scores in energy and resource consumption may result in the design of a building that will result in measurable reductions of CO<sub>2</sub> and lead to compliance with the AIA's position statement goals for a 50-percent reduction of a building's energy consumption.

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16 Require documentation of actual building energy and operational performance

SBT07 encourages but does not require measurement and verification that documents actual operational performance. Points are awarded in the Service Quality category for commissioning, controllability of systems, and the flexibility and adaptability of mechanical systems. Points are also awarded for assessing the maintenance of a building envelope, the development and implementation of maintenance plans, training of facility operators, and performance incentives provided in leases or sales agreements to encourage continued building operational performance.