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***GREEN CONSTRUCTION:
WHAT IS IT AND WHAT DOES IT COST?***

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Course Materials

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I. WHAT IS LEED

A. *Leadership in Energy & Environmental Design (LEED) is a voluntary, consensus-based standard for designing and constructing high-performance green buildings. LEED uses universally understood and accepted tools and performance criteria to foster sustainable green building and development practices.*

1. Administered by and a trademark of the U.S. Green Building Council (USGBC)
 - a. USGBC's Mission: "To transform the way buildings and communities are designed, built, and operated, enabling an environmentally and socially responsible, healthy and prosperous environment that improves the quality of life."
2. LEED utilizes a third-party certification process
 - a. Must register the project with the Green Building Certification Institute (GBCI)
 - b. Must satisfactorily document achievement of all the prerequisites and a certain number of points for the different certification levels
 - c. The GBCI, an independent third-party, verifies that the building project meets the requirements of (b) above

B. *Green Building by the Numbers (compiled by USGBC, as of March 2009)*

1. Over 5 billion square feet of commercial building space is registered with or certified by the LEED green building certification process
2. By 2010, approximately 10 percent of commercial construction starts are expected to be "green" (according to McGraw Hill Green Building Smart Market Report 2006)
3. Every business day, \$464 million worth of construction registers with LEED
4. As of March 2009, there are 2,384 Certified LEED Projects
 - a. Including 1,577 New Construction, 424 Commercial Interiors, 191 Existing Buildings, 148 Core & Shell, 42 Retail, and 2 Schools
5. As of March 2009, there are 18,468 LEED Registered Projects
 - a. Including 10,964 New Construction, 1,982 Commercial Interiors,

2,346 Existing Buildings, 2,409 Core & Shell, 94 Retail, and 673 Schools

6. There are LEED projects in all 50 states and in 91 countries
7. Sectors expected to have green building growth: education, government, industrial, office, healthcare, hospitality, retail
8. Per USGBC, factors driving green building include:
 - a. Unprecedented levels of government initiatives
 - b. Heightened residential demand for green construction
 - c. Improvements in sustainable building materials

C. *LEED Rating Systems Include:*

1. LEED 2009
 - a. LEED New Construction (LEED – NC)
 - b. LEED for Existing Buildings (LEED – EB)
 - c. LEED for Commercial Interiors (LEED – CI)
 - d. LEED for Core and Shell (LEED – CS)
 - e. LEED for Schools
2. LEED for Homes
3. LEED for Neighborhood Development
4. LEED for Healthcare
5. LEED for Retail

D. *Credit Format*

1. The scoring format allows the participant to choose the areas in which it wants to focus on rather than requiring prescriptive conditions
2. LEED 2009 Scoring is all based on 100 base points, 6 possible Innovation in Design Points and 4 Regional Priority Points
 - a. Platinum: 80+ Points
 - b. Gold: 60 – 79 Points
 - c. Silver: 50 – 59 Points

d. Certified: 40 – 49 Points

II. LEED 2009

A. *According to the USGBC, “LEED 2009 delivers against key environmental and human health impacts, and puts in place a transparent framework for weighting credits accordingly. It proposes to reset the bar for green building to help the building industry move even faster and further than before.”*

1. LEED 2009 affects LEED-NC, LEED-CS, LEED-EB, LEED-CI, and LEED for Schools
2. LEED for Homes and LEED for Neighborhood Development is not modified by LEED 2009

B. *Desire was to reframe the focus towards driving significantly greater outcomes in total building performance while also incorporating technical advancements such as bioregional credits. According to USGBC, LEED 2009:*

1. Realigns and harmonizes the LEED prerequisites and credits
 - a. Allows future growth for changes in the market and incorporates information from the Credit Interpretation Rulings (CIRs) into the text of the point requirements to help clarify the prerequisites/credits
2. Creates a more predictable development cycle
 - a. LEED will evolve on a set schedule
3. Credit Weightings
 - a. With this version, a given credit’s point value will more accurately reflect its potential to mitigate the negative or promote the positive impact of the building
 - b. LEED now awards more points for strategies that will have greater positive impacts on what matters most – energy efficiency and CO₂ reductions
 - c. Credit weightings are based on the US EPA’s “Tools for the Reduction and Assessment of Chemical and Other Environmental Impacts” (TRACI)
4. Recognizes regional environmental priorities in the scoring
 - a. As a component of the Innovation and Design section, projects can select bonus points from a list of eligible credits based on the project’s location

- b. The LEED Steering Committee is collaborating with Regional Councils and Chapters to create a list of the eligible credits
- c. For example:
 - i. Urban Florida: incorporates points to incentivize decreased reliance on fossil fuels, reuse of existing building stock, decreased reliance on insufficient municipal wastewater plants, and utilization of abundant local sunshine
 - ii. Rural Michigan: creates points to incentivize the preservation of prime agricultural land, reduction of light trespass into neighboring natural habitats, and minimize the amount and improve the quality of stormwater into the Great Lakes

C. *Timeline*

- 1. April 27, 2009: LEED 2009 is launched (a.k.a. LEED v.3)
- 2. June 26, 2009: End of the 60-day overlap period during which projects can register under a version 2 rating system or LEED 2009
- 3. October 24, 2009: End of 180-day free migration period, during which currently registered projects can transition to LEED 2009 without paying a new registration fee

III. THE LEED PROCESS

A. *Project Registration (usgbc.org: LEED/Project Certification/Registration)*

- 1. Register projects with the Green Building Certification Institute (GBCI) during the design phase
 - a. Residential
 - i. All single family homes and low-rise residential construction must use the LEED for Homes Rating System
 - ii. Multi-family projects between 4 and 6 stories may use either LEED for Homes or LEED – NC
 - b. Schools: As of April 1, 2007, all new construction and major renovations of K-12 school facilities seeking LEED certification must use the LEED for Schools Rating System. LEED - NC can no longer be used to certify K-12 school building projects
- 2. After registering the project, participant will have access to information and technical support:

- a. Project tracking
- b. Technical support
- c. Credit trends and issues
- d. Registered project profiles
- e. LEED national reports and case studies

B. *Integration*

- 1. Integrate and document green building technologies and strategies early on
 - a. LEED affects decisions made during each phase of the design and construction process: LEED project management, energy and water use modeling, design integration planning, daylight modeling, materials research and specifications, monitoring and verifying system design, etc.
 - b. List the green specifications at the earliest stage possible – avoid “change orders” and re-dos.
- 2. Focus on the design and administrative aspects of the project. A LEED project will require careful management of design components, paperwork, and green building details.
- 3. Include required documentation in the contractor and subcontractor scopes of work

C. *Technical Support throughout the design and construction phase*

- 1. Access to LEED Credit Interpretation Rulings
 - a. Registered project teams also can request a LEED Credit Interpretation Ruling (CIR) for issues that have not already been addressed on the rulings page
 - b. LEED 2009 incorporated into the Rating Systems many of the prior CIRs in an attempt to clarify any ambiguities in earlier rating systems
- 2. Access to LEED Letter Templates
 - a. Letter Templates provide the mechanism to document the LEED credit certification data and are the core of the LEED certification submittal
 - b. The participant submits a Letter Template documenting each credit attained with the Certification Application

D. Documentation Submission

1. Submit project documentation at or near occupancy: submit application form, project scorecard, project narrative, illustrative drawings and photographs, and letter templates

E. Certification by the Green Building Certification Institute (GBCI)

1. Preliminary, final review, then certification
 - a. Preliminary Review: project teams submit all attempted credits and prerequisites. GBCI will return the score card with either “earned,” “clarify,” or “denied” for each credit (this takes approximately 25 business days)
 - b. The project team then responds to any credits marked as “clarify” and resubmits (Team has up to 25 business days to resubmit)
 - c. GBCI then reviews the resubmitted credits and returns a final review of all credits with either a “earned” or “denied” status (this takes approximately 15 business days)
 - d. Project team has 25 days to either accept GBCI’s credit award or file an appeal
 - e. If the project team appeals any denied credits, GBCI has 25 days to review the appealed credits and make a determination
2. Must satisfy all prerequisites and obtain the minimum number of points
3. Projects that achieve LEED Platinum will receive a rebate for all certification fees
4. Project teams can choose to split the certification application into two phases: design and construction
 - a. Documents for design phase credits can be submitted for review at the end of the design phase (i.e., Sustainable Sites Credit 3, Brownfield Redevelopment, can be documented before construction)
 - b. LEED credit, however, will not be awarded until the final review

IV. LEED RATING SYSTEM FOR LEED FOR NEW CONSTRUCTION & MAJOR RENOVATIONS VERSION 3.0

A. Minimum Program Requirements:

1. Must Comply with Environmental Laws

2. Must be a Building
 - a. Projects must include the new, or major renovation to, ground-up design and construction of at least 1 building in its entirety
3. Must use a Reasonable Site Boundary
 - a. All contiguous land area owned by the building owner
 - b. All land that was or will be disturbed during construction
4. Must Comply with Minimum Full Time Equivalent and Floor Area Requirements
 - a. Minimum of 1,000 gross square feet of indoor, enclosed building floor area
5. Must Comply with Minimum Occupancy Rates
 - a. This applies only to LEED 2009 Existing Buildings
6. Registration and Certification Activity Must Comply with Reasonable Timetables and Rating System Sunset Dates
 - a. If project is inactive for 4 years, Green Building Certification Institute (GBCI) reserves the right to cancel the registration
7. Must Allow USGBC Access to Whole-Building Energy and Water Usage Data
8. Must Comply with a Minimum Building Area to Site Area Ratio
 - a. Projects total gross floor area must be no less than 2% of the LEED project's site area

B. Prerequisites - must achieve these minimum requirements to gain certification:

1. Construction Activity Pollution Prevention
 - a. Reduce pollution from construction by controlling soil erosion, waterway sedimentation and dust generation
2. Water Use Reduction
 - a. Increase water efficiency to reduce the burden on municipal water supply and wastewater systems
3. Fundamental Commissioning of the Building Energy Systems
 - a. Designate an individual as the Commissioning Authority (CxA) to

- lead, review and oversee the completion of the commissioning process activities
 - b. Owner must document the Owner's Project Requirements (OPR)
 - c. Construction documents must incorporate commissioning requirements
 - d. Develop and implement a commissioning plan
 - e. Verify the installation and performance of the systems
 - f. Complete a summary commissioning report
4. Minimum Energy Performance
 - a. Demonstrate a 10% improvement in the proposed building performance rating for new buildings or a 5% improvement for major renovations compared with baseline building performance rating
 5. Fundamental Refrigerant Management
 - a. Zero use of chlorofluorocarbon (CFC)-based refrigerants in new base building Heating Ventilation Air Conditioning & Refrigeration (HVAC&R) systems
 6. Storage and Collection of Recyclables
 - a. Provide an easily accessible area that serves the entire building and is dedicated to the collection and storage of non-hazardous materials for recycling (including, at a minimum, paper, corrugated cardboard, glass, plastics, and metals)
 7. Minimum Indoor Air Quality Performance
 - a. Meet the minimum ASHRAE requirements for Ventilation for Acceptable Indoor Air Quality
 8. Environmental Tobacco Smoke (ETS) Control
 - a. Prohibit smoking in the building and locate any exterior designated smoking areas at least 25 feet away; or only allow smoking in designated areas and locate the designated areas to contain, capture and remove ETS from the building

C. *Sustainable Sites (26 Possible Points)*

1. Site Selection (1 point)
 - a. Avoid development on:

- i. Prime farmland
 - ii. Previously undeveloped land with an elevation lower than 5 feet above the elevation of the 100-year flood or within 50 feet of a water body
 - iii. Habitat of threatened or endangered species
 - iv. Within 100 feet of any wetlands or areas of special concern, or
 - v. Land which prior to acquisition was a public parkland
- 2. Development Density & Community Connectivity (5 points)
 - a. Construct development on a previously developed site with existing infrastructure and in a community with a minimum density of 60,000 square feet per acre net.
 - b. Protect greenfields, habitat and natural resources
- 3. Brownfield Redevelopment (1 point)
 - a. Rehabilitate damaged sites that are documented as contaminated (i.e., Phase II or local Voluntary Cleanup Programs)
- 4. Alternative Transportation/Public Transportation Access (6 points)
 - a. Locate project:
 - i. Within ½ mile of an existing, or planned and funded, commuter rail, light rail, or subway station, or
 - ii. Within ¼ mile of one or more stops for two or more public or campus bus lines usable by building occupants
- 5. Alternative Transportation/Bike Storage and Changing Rooms (1 point)
 - a. Provide secure bicycle racks and/or storage, and provide shower and changing facilities
- 6. Alternative Transportation/Low Emitting & Fuel Efficient Vehicles (3 points)
 - a. Provide low-emitting and fuel-efficient vehicles or provide preferred parking for low-emitting and fuel efficient vehicles
- 7. Alternative Transportation/Parking Capacity (2 points)
 - a. Size parking lot to meet, but not exceed, minimum local zoning requirements and provide preferred parking for carpools

8. Protect or Restore Habitat (1 point)
 - a. Conserve existing natural areas and restore damaged areas to provide habitat and promote biodiversity
9. Maximize Open Space (1 point)
 - a. Provide a high ratio of open space to development footprint to promote biodiversity
10. Stormwater Design/Quantity Control (1 point)
 - a. Limit disruption of natural water hydrology by reducing impervious cover, increasing on-site infiltration, reducing or eliminating pollution from stormwater runoff, and eliminating contaminants
11. Stormwater Design/Quality Control (1 point)
 - a. Implement a stormwater management plan that reduces impervious cover, promotes infiltration, and captures and treats the stormwater runoff
12. Heat Island Effect/Non-Roof (1 point)
 - a. Reduce heat islands to minimize impact on microclimate and human and wildlife habitat
 - i. Create shade with landscaping trees or with structures
 - ii. Use paving materials with a Solar Reflectance Index of at least 29, and/or
 - iii. Use an open grid pavement system that is at least 50% pervious
13. Heat Island Effect/Roof (1 point)
 - a. Reduce heat islands to minimize impact on microclimates and human and wildlife habitat
 - i. Use roofing material with a Solar Reflectance Index equal to or greater than 78 (low-sloped roof) or 29 (steep-sloped roof) for 75 percent of the roof surface, or
 - ii. Cover at least 50 percent of the roof with a vegetated roof, or
 - iii. Install high albedo and vegetated roof surfaces that meet the prescribed criteria
14. Light Pollution Reduction (1 point)

- i. Minimize light trespass from the building and site to reduce development impact on nocturnal environments
- ii. Interior Lighting: reduce input power of all non-emergency interior lights with a direct line of sight to any openings by at least 50% between 11pm and 5am or install automatic shielding
- iii. Exterior Lighting: Only light areas as required for safety

D. Water Efficiency (10 Possible Points)

- 1. Water Efficient Landscaping: Reduce by 50 percent (2-4 points)
 - a. Limit or eliminate the use of potable water for landscape irrigation
 - b. Examples: choose water-efficient plant species, use efficient irrigation methods, recapture rainwater, use recycled wastewater, use non-potable water from a public agency
- 2. Innovative Wastewater Technologies (2 points)
 - a. Use water-conserving fixtures (water closets, urinals) or use non-potable water (capture rainwater, recycled grey water) for building sewage conveyance or treat 50 percent of wastewater on-site to tertiary standards
- 3. Water Use Reduction (2-4 points)
 - a. Further increase water efficiency within buildings to reduce the burden on municipal water supply and wastewater systems.
 - b. 30% minimum water savings: 2 points
 - c. 35% minimum water savings: 3 points
 - d. 40% minimum water savings: 4 points

E. Energy and Atmosphere (35 Possible Points)

- 1. Optimize Energy Performance (1-19 points)
 - a. Achieve increasing levels of energy performance above the baseline in the prerequisite standard to reduce environmental and economic impacts associated with excessive energy use
 - b. Demonstrate a percentage improvement in the proposed building performance rating compared to the baseline building performance rating (i.e., 1 point for: New Buildings energy cost savings percentage of 12 percent → 19 points for New Buildings energy cost savings percentage of 48 percent)

2. On-Site Renewable Energy (1-7 points)
 - a. Use on-site renewable energy systems to offset building energy cost
 - b. 1 point for 1percent renewable energy → 7 points for 13 percent renewable energy
3. Enhanced Commissioning (2 points)
 - a. Implement additional commissioning process activities in addition to the requirements in the pre-requisite
4. Enhanced Refrigerant Management (2 points)
 - a. Do not use refrigerants or select refrigerants and HVAC&R that minimize or eliminate the emission of compounds that contribute to ozone depletion and global warming
5. Measurement and Verification (3 points)
 - a. Provide for ongoing accountability of building energy consumption over time
6. Green Power (2 points)
 - a. Provide at least 35 percent of the building’s electricity from renewable sources by engaging in at least a 2-year renewable energy contract

F. Materials and Resources (14 Possible Points)

1. Building Reuse – Maintain Existing Walls, Floors and Roof (1-3 points)
 - a. Maintain the existing structure and envelope as follows:
 - i. 55% building reuse = 1 point
 - ii. 75% building reuse = 2 points
 - iii. 95% building reuse = 3 points
2. Building Reuse – Maintain Interior Nonstructural Elements (1 point)
 - a. Use existing nonstructural elements (e.g., interior walls, doors, floor coverings and ceiling systems) in at least 50% of the completed building
3. 50 Percent Construction Waste Management (1-2 points)
 - a. Divert 50 percent of construction, demolition and land-clearing debris

from disposal in landfills and incinerators and redirect recyclable recovered resources back to the manufacturing process or other appropriate sites

- b. Recycle or salvage 50% of materials = 1 point
 - c. Recycle or salvage 75% of materials = 2 points
4. Materials Reuse (1-2 points)
- a. Reuse building materials and products (i.e. beams and posts, flooring, paneling, doors and frames, cabinetry and furniture, brick and decorative items)
 - b. 5% reused materials = 1 points
 - c. 10% reused materials = 2 points
5. Recycled Content (1-2 points)
- a. Use materials so that the sum of post-consumer recycled content plus one-half of the pre-consumer content constitutes at least 10 percent of the total value of the materials in the project
 - b. 10% recycled content = 1 point
 - c. 20% recycled content = 2 points
6. Regional Materials (1-2 points)
- a. Use building materials and products that are from the region (supporting the use of indigenous resources and reducing the impacts of transporting materials)
 - b. 10% regional materials = 1 point
 - c. 20% regional materials = 2 points
7. Rapidly Renewable Materials (1 point)
- a. Use rapidly renewable building materials and products for 2.5 percent of the total value of all building materials and products
8. Certified Wood (1 point)
- a. Use a minimum of 50 percent of wood-based materials and products for wood building components (can include furniture)

G. Indoor Environmental Quality (15 Possible Points)

1. Outdoor Air Delivery Monitoring (1 point)
 - a. Install permanent monitoring systems that provide feedback on ventilation systems' performance to ensure that ventilation systems maintain design minimum ventilation requirements
2. Increased Ventilation (1 point)
 - a. Provide additional outdoor air ventilation to improve indoor air quality for improved comfort, well-being and productivity
3. Construction Indoor Air Quality Management Plan (1 point)
 - a. Develop and implement an Indoor Air Quality Management Plan for the construction/renovation phases of the building
4. Pre-Occupancy Indoor Air Quality Management Plan (1 point)
 - a. Develop and implement an Indoor Air Quality Management Plan for the pre-occupancy phase
5. Low-Emitting Materials: Adhesive and Sealants (1 point)
 - a. Reduce the quantity of indoor air contaminants that are odorous, irritating and/or harmful by requiring all adhesives and sealants used on the interior of the building to comply with specific requirements
6. Low-Emitting Materials: Paints and Coatings (1 point)
 - a. Reduce the quantity of indoor air contaminants that are odorous, irritating and/or harmful by requiring all paints and coatings used on the interior of the building to comply with specific requirements
7. Low-Emitting Materials: Flooring Systems (1 point)
 - a. Reduce the quantity of indoor air contaminants that are odorous, irritating and/or harmful by requiring all carpet installed in the building interior to meet the testing and product requirements of the Carpet and Rug Institute's Green Label Plus program
8. Low-Emitting Materials: Composite Wood and Agrifiber Products (1 point)
 - a. Reduce the quantity of indoor air contaminants that are odorous, irritating and/or harmful by requiring that all composite wood and agrifiber products used on the interior of the building contain no added urea-formaldehyde resins.
9. Indoor Chemical and Pollutant Source Control (1 point)
 - a. Design to minimize and control pollutant entry into buildings and

later cross-contamination of regularly occupied areas

- b. Place grates, grilles or slotted systems at entryways, exhaust each space where hazardous gases or chemical may be present or used

10. Controllability of Systems: Lighting (1 point)

- a. Provide individual lighting controls for at least 90 percent of the building occupants to enable adjustments and provide lighting system controllability for all shared multi-occupant spaces to enable light adjustment

11. Controllability of Systems: Thermal Comfort (1 point)

- a. Provide individual comfort system control for at least 50 percent of the building occupants and provide comfort system controls for all shared multi-occupant spaces

12. Thermal Comfort: Design (1 point)

- a. Design HVAC systems and the building envelope to meet the requirements of ASHRAE

13. Thermal Comfort: Verification (1 point)

- a. Agree to implement a thermal comfort survey of the building occupants within 6 to 18 months after occupancy.

14. Daylight and Views – 75 Percent of Spaces (1 point)

- a. Provide for the building occupants a connection between indoor spaces and the outdoors through the introduction of daylight and views into the regularly occupied areas of the building

15. Daylight and Views – 90 Percent of Spaces (1 point)

- a. Achieve direct line of sight to the outdoor environment via vision glazing for building occupants in 90 percent of all regularly occupied areas.

H. Innovation and Design Process (6 Possible Points)

1. Innovation in Design (1-5 points)

- a. Provide design teams and projects the opportunity to be awarded points for exceptional performance above the requirements set by the LEED systems and/or innovative performance in green building categories not specifically addressed by the LEED Systems
- b. Achieve significant, measurable environmental performance using a

strategy not addressed in the LEED 2009 for New Construction and Major Renovations Rating System

2. Exemplary Performance (1-3 points)
 - a. Achieve exemplary performance in an existing LEED 2009 prerequisite or credit
 - b. May be awarded for achieving double the credit requirements or achieving the next incremental percentage threshold
3. LEED Accredited Professional (1 point)
 - a. Have at least 1 LEED Accredited Professional (AP) as a principal participant of the project team

I. Regional Priority (4 Possible Points)

1. Regional Priority (1-4 points)
 - a. Provide an incentive for the achievement of credits that address geographically-specific environmental priorities
 - b. Regional priorities are identified by the USGBC regional councils and chapters as having environmental importance for that region

V. ALTERNATIVES TO LEED

A. ENERGY STAR

1. Residential Buildings:
 - a. ENERGY STAR qualified homes are independently verified to meet guidelines for energy efficiency set by the U.S. Environmental Protection Agency
 - b. ENERGY STAR focuses on: an efficient home envelope; efficient air distribution; efficient equipment for heating, cooling and water heating; efficient lighting; and efficient appliances
 - c. According to www.energystar.gov: ENERGY STAR homes “save money on utility bills, provide a more comfortable living environment with better indoor air quality, and help protect the environment”
2. Commercial Buildings:
 - a. Target Finder Tool: helps architects and building owners set realistic but aggressive energy targets based on a building’s design

- b. Benchmark Performance in Operating Buildings: track the building's actual energy use and compare it with the building design's estimated use, historical energy consumption, and other similar buildings in that area

B. *National Association of Home Builders (NAHB) Green Building Program*

1. The NAHB Green Building Program is divided into 7 categories: Lot Design, Resource Efficiency, Energy Efficiency, Water Efficiency, Indoor Environmental Quality, Homeowner Education, and Global Impact
2. There are three levels of green building: Bronze, Silver and Gold
3. There are a minimum number of points for each of the seven categories. After reaching the minimum points, the building must achieve at least an additional 100 points

C. *Green Globes (See: www.thegbi.org)*

1. "An interactive, flexible and affordable approach to environmental design" and includes an "assessment protocol, rating system and guide for integrating environmentally friendly design into commercial buildings." Green Building Initiative (GBI)
2. The Green Globes software tools and ratings/certification system comprehensively assess the environmental impact based on a 1,000 point scale in multiple categories: Energy, Indoor Environment, Site Impact, Water, Resources, Emissions, and Project/Environmental Management.
3. The Green Globe system is questionnaire-driven. At each stage of the design process, users are walked through a sequence of questions that guide their next steps and provide guidance for integrating elements of sustainability.
4. Green Globes uses third party assessors in a two-stage review process to assign Green Globe ratings of One, Two, Three, or Four Globes

D. *ASHRAE Green Guide (www.ashrae.org)*

1. Addresses architectural design impacts, conceptual engineering design, space thermal/comfort delivery systems, energy distribution systems, energy conservation systems, energy/water sources, lighting systems, plumbing and fire protection systems and controls
2. Features 39 ASHRAE GreenTips, which contain information on techniques, processes, measures or systems. The tips contain a list of other sources for reference.

E. *International Initiative for a Sustainable Built Environment's SBTool 07 (www.iisbe.org)*

1. Rating framework designed to allow countries to design their own locally relevant rating systems based on regional climate zones, local building codes, and international standards.
2. This alternative provides an international benchmarking tool that is calibrated to local conditions

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