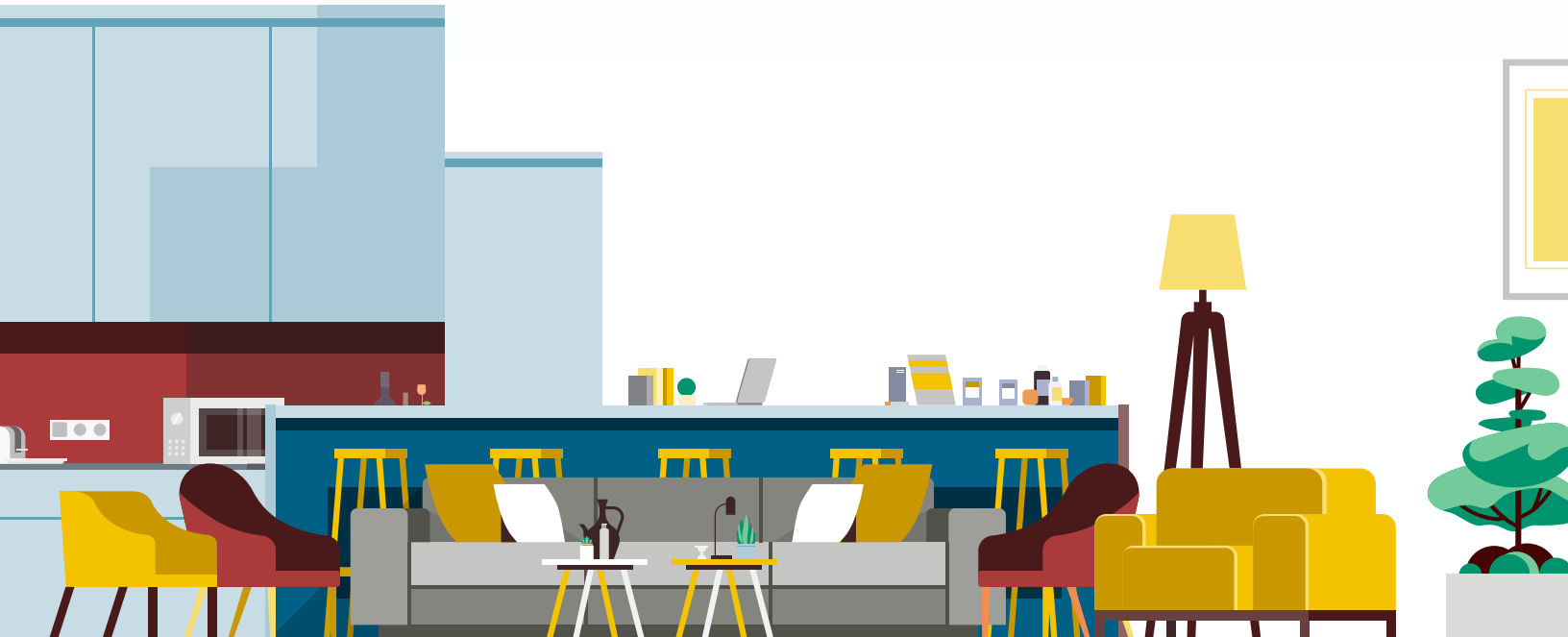


GREEN GLOBES FOR SUSTAINABLE INTERIORS 2014

LEARNING OBJECTIVES

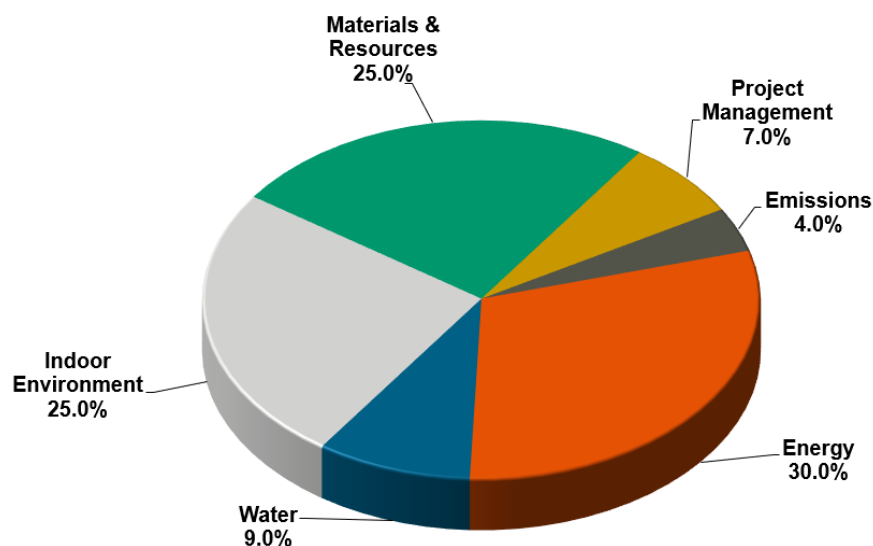
- Understand the Environmental Assessment Areas and point allocations for Sustainable Interiors 2014
- Review Case Studies for Sustainable Interiors 2014



ENVIRONMENTAL ASSESSMENT AREAS

SI	NC (CS)	EB
Project Management	Project Management	N/A
N/A	Site	N/A (Included with Resources)
Energy	Energy	Energy
Water	Water	Water
Materials & Resources	Materials & Resources	Resources
Emissions	Emissions	Emissions, Effluents, & Pollution Controls
Indoor Environment	Indoor Environment	Indoor Environment
N/A	N/A	Environmental Management

As previously mentioned, there are 1000 total points possible within Green Globes which are allocated differently for the assessments of projects/buildings under the New Construction, Sustainable Interiors and Existing Buildings programs. The diagram displays the point distribution for the seven assessment areas within the SI program. Energy has the largest percentage of points followed by Indoor Environment and Materials and Resources.



PROJECT MANAGEMENT

Green Globes addresses management topics as critical aspects of assessment, incorporating them under a major topical section rather than as innovative or extra credit. Sound management practices inevitably lead to positive outcomes. The SI program enhances management concepts by measuring adherence to the incorporation of an integrated design process (IDP), including the use of pre-

design and progress meetings as well as the establishment of IDP performance goals. It also incorporates measurement of the use of environmental management during construction which includes the requirement of the General Contractor to utilize and document specific policies, practices, and strategies. Other topics covered include building materials and envelope that prevent and control mold, and practices to maintain good indoor air quality (IAQ).

PROJECT MANAGEMENT		MAXIMUM POINTS: 50
1.1	Integrated Design Process (IDP)	20
1.1.1	Integrated Design Meetings	6
1.1.2	IDP Performance Goals	11
1.1.3	IDP Progress Meeting for Design	3
1.2	Environmental Management During Construction	10
1.2.1	Building Materials and Building Envelope	2
1.2.2	IAQ During Construction	8
1.3	Environmental Purchasing	10
1.4	Commissioning	30
1.4.1	Commissioning Requirements	24
1.4.2	Training	3
1.4.3	Operations and Maintenance Manual	3

Suggested Documentation:

- Owner's Project Requirements (OPR)
- Division 01 specifications
- List of written performance goals
- Progress meeting agendas and meeting minutes
- List of key personnel and a description of their major tasks
- EMS plan covering mold control, IAQ, and environmental purchasing as incorporated in the contract
- Construction documents*
- Manufacturer's specifications, cut sheets and performance documentation (needed for a significant number of criteria in the other Environmental Assessment Areas)
- Photographs of protected building materials
- IAQ Management Plan as submitted by general contractor and approved by Owner's PM
- Basis of Design (BOD) documents
- Commissioning Plan
- Commissioning reports (including field testing results)
- Operations and maintenance manual (including all plans, protocols, strategies and contracts)

CASE STUDY

The first case study we will review is the Mackenzie at the Hudson Building, which achieved a Four Green Globes rating under Green Globes for SI.

The Mackenzie at the Hudson project earned 60 out of 60 applicable points for 100% credit in the Project Management environmental assessment area.

A few initiatives that contributed to this achievement were that:

- The project team consisted of 8 key disciplines that were involved in an integrated design process.
- Qualitative green design goals were established during the pre-design phase and discussed during several subsequent progress meetings.
- Building materials were protected during transport to the site and while in storage onsite.
- Commissioning was provided for its beneficial value to the construction outcomes and operations efficiencies.



This area addresses, primarily on a prescriptive basis, energy demand, metering, building opaque envelope, HVAC systems and controls.

ENERGY		MAXIMUM POINTS:
		300
2.1	Energy Metering	65
2.2	Building Envelope	25
2.3	Lighting	95
2.3.1	Lighting Power Density	6
2.3.2	Interior Automatic Light Shut-Off Controls	11
2.3.3	Light Reduction Controls	3
2.4	Daylighting	30
2.4.1	Controls for Daylighted Zones	2
2.5	HVAC System Controls	35
2.5.1	Automation System	15
2.5.2	Domestic Hot Water Heaters	20
2.6	Plug Loads	50
2.6.1	Plug Load Inventory	16
2.6.2	Plug Load Limiting	12
2.6.3	Plug Load Management	22

Suggested Documentation:

- Energy design, modeling and simulation program's input and results
- Construction documents*
- Manufacturer's specifications, cut sheets, and performance documentation
- Current telecommuting and meeting plan and policy
- Design documentation for lighting and integration
- Energy metering reporting plan
- Measurement and verification program details
- Energy certifications or labels
- Manufacturer's programming data, schematics, and sequence of operation for BAS and Energy Monitoring equipment
- References to specifications and drawings of sub-metering equipment
- Cut sheets for meters and meter reading equipment
- Effective aperture for vertical fenestration calculations
- Equipment specifications, control schedules and diagrams
- Results of leak and continuity testing

CASE STUDY

At Mackenzie at the Hudson Building, innovative measures and technology were used to achieve 96% of the applicable points in the Energy assessment area. These innovative measures included:

- Lighting load reduction of at least 50% through occupancy sensors and photocell lighting controls coordinated with available daylight.
- Comprehensive training on sensors, systems and equipment.
- Energy sub-metering for lighting, plug loads and electricity used for HVAC (through independent high-efficiency fans tied into the rooftop's HVAC system).
- Monitoring features, which allow the tenant to evaluate electricity usage in real time.



WATER

Green Globes SI addresses water consumption prescriptively through water conserving fixtures and equipment.

WATER		MAXIMUM POINTS: 90
3.1	Plumbing Fixtures	54
3.2	Residential and Commercial Food Service Fixtures and Equipment	20
3.2.1	Commercial Food Service Equipment	20
3.2.2	Laboratory and Medical Equipment	20

WATER		MAXIMUM POINTS: 90
3.3	Water Intensive Applications	16
3.3.1	Laboratory and Medical Equipment	7
3.3.2	Laundry Equipment	4
3.3.3	Special Water Features	2
3.3.4	Metering	3

Suggested Documentation:

- Construction documents*
- Manufacturer's specifications, cut sheets, and performance documentation for all plumbing fixtures, fittings and appliances (if finished restrooms and/or kitchens are part of project)
- Plumbing plans
- Manufacturer's specifications, cut sheets, and performance documentation for pre-rinse spray valves, ice machines, food steamers, dishwashers and combination ovens
- Manufacturer's specifications, cut sheets, and performance documentation for all meters
- Manufacturer's specifications, cut sheets and performance documentation for filtration systems, pressure drop gauges, reverse osmosis systems, water softeners, and recharge controls (if part of project)
- Manufacturer's specifications, cut sheets and performance documentation for the Meter Data Management System and meters

CASE STUDY

D92 Korean BBQ in Decatur, GA achieved a Three Green Globes rating under the Sustainable Interiors program.

The project achieved 95% of the applicable points in the Water assessment area due to:

- Plumbing fixtures in the restrooms and commercial kitchen equipment save water.
- High efficiency tankless water heaters reduce hot water use and reduce energy consumption.





MATERIALS & RESOURCES

Green Globes SI covers materials within the Interior Fit-Out (the interior partitions, finishes, and furnishings used within the Building Assembly). This area looks at the whole building life cycle including recycled content in addition to construction waste management and operational waste.

MATERIALS & RESOURCES		MAXIMUM POINTS: 250
4.1	Interior Fit-Outs (including Finishes and Furnishings)	60
4.1.1	Path A: Performance Path for Interior Fit-Outs	60
4.1.2	Path B: Prescriptive Path for Interior Fit-Outs	50
4.2	Minimized Use of Interior Materials	10
4.3	Deconstruction and Dissassembly	60
4.4	Waste	80
4.4.1	Construction and Operational Waste	80
4.5	Building Service Plan	20
4.6	Reuse of Non-Structural Elements	20

Suggested Documentation:

- Construction documents*
- Input and results from any BEES or other LCA instrument
- Manufacturer's specifications, cut sheets and performance documentation
- List of recycled content materials and percentage calculation
- Wood-based products certification documentation
- Manufacturer's description and specifications for flooring as applies to maintenance and serviceability
- Waste minimization plan

CASE STUDY

ABC Headquarters achieved a Three Green Globes rating under Green Globes SI.

When Associated Builders and Contractors (ABC) decided to move its national office, the association wanted its new commercial interior fit-out to contribute to employee well-being and to create an environment that was socially sustainable.

The ABC office project received points in the Materials & Resources assessment area for:

- Exposed materials throughout the space, which reduces raw material extraction and production for finishes and minimizes landfill waste
- Low VOC-specified materials and products and implementation of a green cleaning program
- and many project elements were constructed for disassembly to facilitate reuse and recycling



EMISSIONS

Emissions addresses the storage for hazardous materials, storage, management, and pest control.

EMISSIONS AND OTHER IMPACTS		MAXIMUM POINTS: 40
5.1	Integrated Pest Management	10
5.2	Leak Detection in Commercial Refrigeration	20
5.3	Janitorial Equipment	10

Suggested Documentation:

- Construction documents* and specifications
- Manufacturer's specifications, cut sheets, and performance documentation
- Hazardous Materials Survey Document
- Implemented Pest and Contamination Control Plan

CASE STUDY

We will revisit D92 Korean BBQ in Decatur, GA for its achievements in the Emissions assessment area.

- The space used to house janitorial equipment is equipped with mechanical ventilation to exhaust pollutants to the exterior.
- The project team implemented Integrated Pest Management practices, with a pest contract that includes requirements for qualifications, inspections, preventative action, treatment, monitoring and documentation.



INDOOR ENVIRONMENT

Within Indoor Environment, Green Globes SI reviews the ventilation; air quality, air exchange intakes and exhausts, source control and the measurement of indoor pollutants including VOCs, fungus, mold, CO₂, tobacco, and radon. Also covered is the use of an integrated pest management strategy, as well as thermal and acoustic comfort.

IEQ

Indoor Environmental Quality (IEQ) plays a large role in a person's life as people are reported to spend the majority of their time in buildings, averaging **85-90% of time indoors within a 24 hour span**.

The four largest contributors to indoor pollution are building materials, household electrical appliances, heating and the pollution from cooking. Buildings and decorative materials can also be main sources of indoor pollution as they can produce radioactive and chemical pollution.

The impacts of buildings on indoor environment quality are addressed by several factors during the design stage, as discussed in the introduction to Sustainable Interiors, an Integrated Design Process allows project teams to:

- Assemble the right team with individuals from the necessary disciplines
- Fully engage client in the design decision process
- Align team around basic aspirations, a core purpose, and core values
- Identify key systems to be addressed that will most benefit the environment and project
- Commit to specific measurable goals for key systems
- Optimize the design of systems
- Follow through during the construction process

- Commission the project, as appropriate for a Sustainable Interiors project
- Maintain the systems
- Measure performance and respond to feedback – adjust key aspects of the systems accordingly

IEQ measures should also be addressed in the construction and operation stages.

It is important to note that occupants' activities and behaviors such as: heating, personal hygiene, and decoration affect IEQ in buildings too. There are many factors which can influence indoor environment quality.

Indoor air pollutants (IAP) are categorized as chemical and biological pollutants. Chemical pollutants which potentially affect occupants' health include VOCs, asbestos, radon, carbon monoxide (CO), carbon dioxide (CO₂), nitrogen oxides (NO_x), respirable suspended particulates (RSPs), construction chemicals, and ozone. Biological pollutants include molds, dust mites, certain animals, cockroaches, endotoxins, houseplants, pollen, etc.

When IEQ and IAP are considered and addressed in the design and construction of a building there are quantifiable results in terms of occupant health and productivity.

Studies have shown that access to natural views, proper ventilation, and temperature controls in working environment positively influence employee's performance and productivity.

Data also demonstrates that higher IEQ in U.S buildings resulted in 6-14 billion annually, and an additional 1-4 billion is gained from reduced allergies and asthma cases among the workforces.

Ghodrati, Nariman et al. Green Building Impacts on Occupants' Health and Productivity. Journal of Applied Sciences Research, 2012.

INDOOR ENVIRONMENT		MAXIMUM POINTS: 250
6.1	Ventilation	30
6.1.1	Ventilation Air Quality	15
6.1.2	CO ₂ Sensing and Ventilation Control Equipment	5
6.2	Source Control of Indoor Pollutants	80
6.2.1	Volatile Organic Compounds (VOCs)	60
6.2.2	Moisture and Vapor Control Methods	10
6.2.3	Ventilation and Physical Isolation for Specialized Activities	10
6.3	Lighting	52
6.3.1	Daylighting	22
6.3.2	Lighting Design	30
6.4	Thermal Comfort	40
6.4.1	Thermal Comfort Design	18
6.4.2	Thermal Comfort Strategies	22
6.5	Acoustic Comfort	48

Suggested Documentation:

- Construction documents* and specifications
- Manufacturer's specifications, cut sheets, and performance documentation
- Ventilation design and schedules, including integration of mechanical and natural ventilation
- Manufacturing specifications for ventilation systems, CO2 sensing and ventilation control equipment
- Ventilation air quantity design data
- Local ventilation codes or standards
- Manufacturer's specifications, cut sheets, and performance documentation for HVAC systems, humidification/dehumidification systems, CO2 monitoring devices, wet cooling towers and domestic hot water systems list of mold resistant materials
- Documentation demonstrating compliance with ASHRAE 62.1-07: section 5.14, "HVAC Duct Construction Standards: Metal and Flexible"
- Materials Safety Data Sheets or proof of certification for low-VOC products or materials
- Manufacturer's data and specification for mold resistant materials
- Percentages and calculations for occupied areas with daylight illumination levels
- Percentages and calculations for views to building exterior or atria
- Design documentation showing daylighting integration
- Percentages and calculations for primary occupied spaces with IESNA recommended task lighting levels
- Specifications for solar shading devices and luminaires
- Lighting plans
- Documentation demonstrating compliance with ANSI/ASHRAE Standard 55-2010
- Design documentation indicating thermal comfort strategies employed
- Description of acoustic design strategies and all design targets
- FIIC value for flooring assemblies
- Specification that includes Annex E of ANSI S12.60 – 2006
- Test report indicating compliance with ANSI S12.60 – 2006

CASE STUDY

The Vinyl Institute in Washington D.C. achieved Two Green Globes under Green Globes for Sustainable Interiors.

The project team achieved credit in the Indoor Environment assessment area for:

- Installed products met or exceeded low VOC requirements.
- Materials and finishes were used that are resistant to mold growth.
- A combination of exterior windows and interior borrowed lights.

- Offices are separated by partitions and are located sufficiently far from loud, high activity areas.



**Construction documents are defined as all of the written and graphic documents prepared or assembled by the architect/engineer for communicating the design and administering the project. The term "Construction Documents" also includes the Project Manual that contains the bidding forms and instructions, contract forms and conditions, and specifications as well as documentation of all modifications made after the construction agreements are signed.*

ASSESSMENT GUIDANCE

TENANT RULES

One challenge specific for SI projects is consideration of policies that impact the entire building but may be outside of the control of the tenant. The client may need to meet with the facility manager to answer some questions and get documentation regarding the tenant rules. For example, policies that impact products used in housekeeping and pest control, as well as recycling practices. Another example is regarding a policy that requires all new equipment purchases to be based on energy efficient criteria, such as ENERGY STAR® or other applicable standards.