



Green Globes™ Design for New Buildings and Retrofits

Rating System and Program Summary

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Green Globes Design™ Rating System and Program Description

Introduction

Green Globes is an online building assessment tool that evaluates and rates the environmental performance of new and existing buildings, and interior fit-ups. It is used by the federal government and private sector, and the Existing Buildings module is at the heart of BOMA Canada's national environmental program. The following is an explanation of Green Globes Design for New Buildings, which can be accessed at:

www.greenglobes.com

Green Globes Design is both a guide to integrating green design principles and an assessment tool. The program is questionnaire-based and consists of approximately 150 questions that take between 2 to 3 hours to answer. Questions are typically of a YES/NO/NA type and are grouped broadly under seven areas of building environmental performance. Once the questionnaire has been completed, a printable report is automatically generated that provides:

- Percentage eco-ratings for: Project Management; Site; Energy; Water; Resources; Emissions; Effluents & Other Impacts; Indoor Environment
- Highlights of the design
- Suggestions for further improvements to the design
- Hyper-links to information on building systems and management.

Green Globes Design is intended to guide the project through the project delivery stages. Once a building project has been registered, one can choose from eight project stages, starting with the project initiation to commissioning. Percentage ratings are given for two of the eight stages: Concept Design (a preliminary rating) and Construction Documents (the final rating).

Because Green Globes assessment occurs in two stages, it relates to the development approval process: during preliminary assessment at the Concept Design stage (which corresponds with planning approval), and during final assessment at the construction documents stage (which typically corresponds with building permit approval). These phases allow municipal authorities to verify that environmental claims are being met as the project develops.

Once a design has been assessed, a third-party review may be conducted. The verification process takes place during a meeting between the verifier and the design team and consists of a review of the design and construction documentation for the project. A Verifier is either a licensed architect or building engineer with proven knowledge and experience of green building technologies and integrated design. Once the verification is complete, the project is awarded a Green Globes certificate.

Objectives of the Program

The objectives of Green Globes are to:

- Evaluate energy and environmental performance of buildings.
- Encourage peer reviews of design and management practices.

- Increase awareness of environmental issues amongst building owners, designers and managers.
- Provide action plans for improvement at varying stages of project delivery.
- Provide certification and awards for green building design and management.

Green Globes assists in the design of buildings that are energy and resource efficient, achieve operational savings and which are healthier and more comfortable to work and live in.

Operation and Review

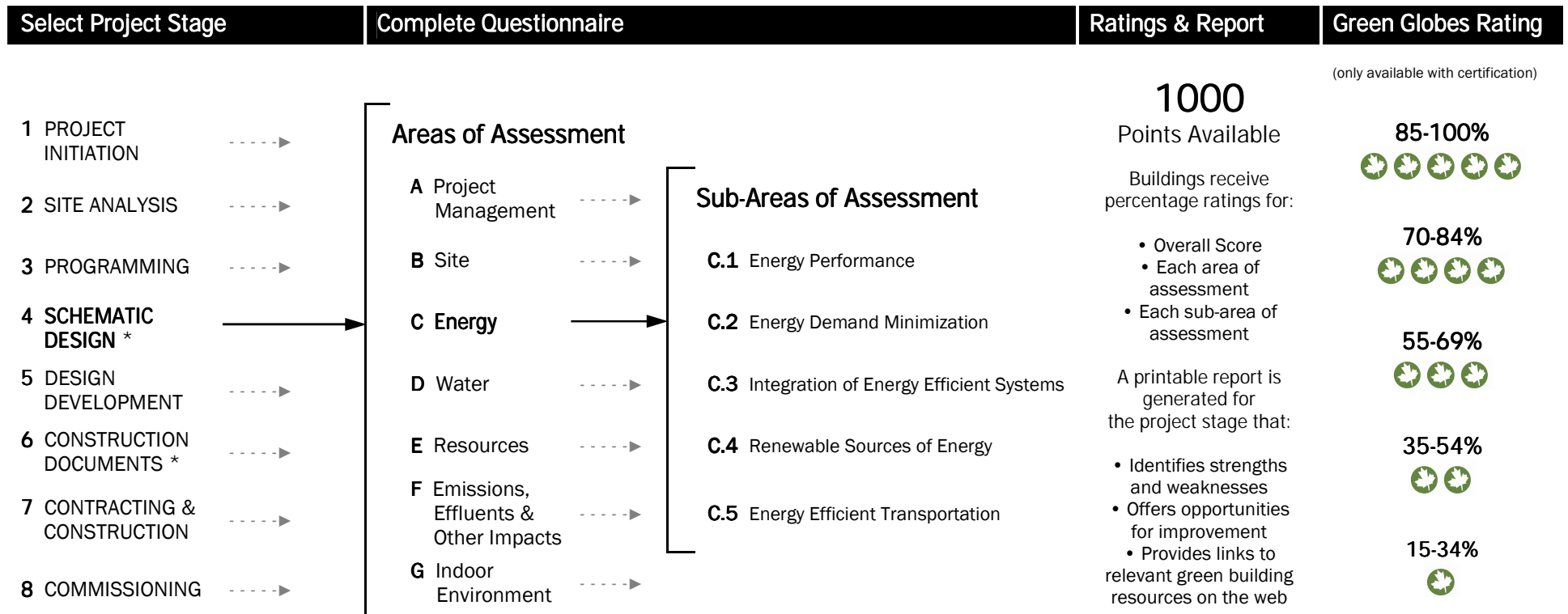
Green Globes Design™ is a registered trademark of ECD Energy & Environment Canada Ltd., which operates and maintains the assessment tool. ECD takes guidance from the Green Globes Technical and Advisory Committee, a group that develops rules and procedures concerning the integrity of Green Globes ratings and verifiers. Reviews of the program occur during the regular updating of Green Globes criteria and program delivery protocol. Decisions are made by consensus.

Disclaimer

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The Green Globes Design™ Organizational Structure



* Green Globes ratings are given at two stages: The Schematic Design stage and the Construction Documents stage.

The two stage assessment is harmonized with the development approval process. The preliminary rating given at the schematic design stage coincides with planning approval, and the final rating given at the construction documents stage corresponds with building permit approval.

Green Globes also encourages and supports an integrated design process.

Green Globes users can tailor the questionnaire to suit their role in the project so that the assessment pertains only to their duties. The available roles are:

All (no role distinction)
 Architect
 Commissioning Agent/Authority
 Contractor
 Client/User
 Environmental Consultant
 Electrical Engineer
 Economic Feasibility Specialist
 Energy Engineer
 Facility Planner
 Green Design Facilitator

Geotechnical Specialist
 Interior Designer
 Landscape Architect
 Mechanical Engineer
 Other Specialists (Acoustics, Envelope etc.)
 Project Leader
 Project Manager
 Estimating and Cost Consultant
 Structural Engineer
 Transportation Planner

The report also provides a template for a client design report.

Once the building has been completed it can be assessed using Green Globes Existing Buildings. This tool encourages comparisons between design and as-built performance ratings and assists in the monitoring of performance levels over time.

The Green Globes Design Points System

Percentage Score	Points Score	Areas and Sub-Areas of Assessment
5%	50	A - Project Management
	20	A.1 - Integrated design process
	10	A.2 - Environmental purchasing (including energy efficient products)
	15	A.3 - Commissioning
	5	A.4 - Emergency response plan
11.5%	115	B - Site
	30	B.1 - Development area (site selection, development density, site remediation)
	30	B.2 - Ecological impacts (native planting and vegetation, heat islands, night sky)
	20	B.3 - Watershed features (site grading, stormwater management, pervious cover, rainwater capture)
	35	B.4 - Site ecology enhancement
38%	380	C - Energy
	100	C.1 - Energy performance
	114	C.2 - Reduced energy demand (space optimization, microclimatic response to site, day-lighting, envelope design, metering)
	66	C.3 - Integration of energy efficient systems
	20	C.4 - Renewable energy sources (on-site renewable energy technologies)
	80	C.5 - Energy-efficient transportation (public transportation, cycling facilities)
8.5%	85	D - Water
	30	D.1 - Water performance
	45	D.2 - Water conserving features (sub-metering, devices, cooling towers, landscaping and irrigation strategies)
	10	D.3 - On-site treatment of water (greywater system, on-site wastewater treatment)
10%	100	E - Resources
	40	E.1 - Low impact systems and materials (selection of building materials based on the low environmental impact)
	15	E.2 - Minimal consumption of resources (reused, recycled, local, low-maintenance materials, certified wood)
	15	E.3 - Reuse of existing buildings
	15	E.4 - Building durability, adaptability and disassembly
	5	E.5 - Reduction, reuse and recycling of demolition waste
	10	E.6 - Recycling and composting facilities
7%	70	F - Emissions, Effluents & Other Impacts
	15	F.1 - Air emissions (low emission burners)
	20	F.2 - Ozone depletion
	10	F.3 - Avoiding sewer and waterway contamination
	25	F.4 - Pollution minimization (storage tanks, PCBs, radon, asbestos, pest management, hazardous materials)
20%	200	G - Indoor Environment
	55	G.1 - Ventilation system (intakes, ventilation rates, delivery, CO ₂ monitoring, controls, parking areas, ease of maintenance)
	45	G.2 - Control of indoor pollutants (mould, AHU, humidification, Legionella cooling towers/ hot water, building materials, local exhaust)
	50	G.3 - Lighting (visual access, heights & depths of perimeter spaces, daylight factor, ballasts, glare, task lighting, controls)
	20	G.4 - Thermal comfort (thermal conditions meet ASHRAE 55)
	20	G.5 - Acoustic comfort (zoning, transmission, vibration control, acoustic privacy, reverberation, mechanical noise)
100%	1000	TOTAL POINTS AVAILABLE

Green Globes Design™

Assessment Criteria Overview

Intended Use of the Following Criteria

The following pages provide basic information explaining the seven areas of Green Globes assessment. This information is intended to be a distillation of the web-site questionnaire down to its core objectives and requirements and is to act as a guide to the Green Globes web site. The criteria are also intended to be used for educational purposes, to inform both students and professionals about principles of sustainable design.

Any required documentation listed in the criteria (such as a site plan) is necessary to obtain Green Globes certification.

TOTAL POINTS
AVAILABLE

50 /1000

Green Globes Design™ **A**

Project Management

20 points

A.1 – Integrated Design Process

Objective

To meet the environmental and functional priorities and goals of the project in an effective and cost-efficient manner.

Requirements

- Use an integrated design process for the design development to identify functional and environmental priorities at the initiation of the project, evaluate options, and develop the design.
- Solicit input from all members of the design team at each stage of the design process.
- Use green design facilitation to support the integrated design process and involve team members throughout each stage of project delivery.

10 points

A.2 – Environmental Purchasing

Objective

To select materials, products and equipment that have minimal impact on the environment in terms of resource use, production of waste and energy use.

Requirements

- Apply environmental purchasing criteria or integrate the green aspects of the National Master Specification (NMS).
- Specify energy-saving, high-efficiency equipment based on NMS and/or Energuide.

15 points

A.3 – Commissioning

Objective

To design, construct and calibrate building systems so they operate as intended.

Requirements

- Engage an independent Commissioning Authority.
- Provide “Design Intent” and “Basis of Design” documentation.
- Include commissioning requirements in the Construction Documentation.
- Develop a Commissioning Plan.

5 points

A.4 – Emergency Response Plan

Objective

To minimize the risk of injury and the environmental impact of emergency incidents

Requirements

- Include in Division1 the project's environmental goals and procedures with regard to emergency response.

TOTAL POINTS
AVAILABLE

115 /1000

Green Globes Design™ **B** Site

30 points

B.1 – Development Area

Objective

To protect important land uses, lower demands on municipal infrastructure services, and reduce the impact on the site's biodiversity.

Requirements

- Demonstrate on the site plan, how any portion of the site identified as being a wetland or wildlife corridor, agricultural land, parkland, or an area notable for its scenic beauty, will be fully preserved. Carry out all required environmental assessments.
- Select a site which meets one of the following criteria:
 - *An existing serviced site.*
 - *Existing minimum development density of 14,000 m²/ha (60,000 ft²/acre).*
 - *Remediated, previously contaminated site.*
- Minimize the disturbance of undeveloped areas of the site. Minimize the area of the site for the building, parking, and access roads, and locate new buildings on previously disturbed parts of the site. Preserve significant trees and natural slopes to maintain the existing direction of groundwater flow. Map all the existing site vegetation.

30 points

B.2 – Ecological Impacts

EROSION CONTROL 9 points

Objective

To avoid the negative effects of erosion on air and water quality and to maintain the ecological integrity of the site.

Requirements

- Provide a drainage, and erosion/sediment control plan that includes measures such as limiting grading, leaving steeper slopes undisturbed, avoiding soil compaction, and providing vegetative ground cover. Include measures for the construction stage.

REDUCED HEAT ISLAND EFFECT

14 points

Objective

To minimize impact on the microclimate and habitat.

Requirements

- Provide natural cover including trees that within 5 years will shade at least 30% of impermeable surfaces. At minimum, there should be one tree for every 100 m² (1,000 ft²) of impermeable surface including parking, walkways and plazas. Where natural shading is not possible, install artificial shading such as covered walks, or light-coloured, high-albedo materials (reflectance of at least 0.3) over the site's impervious surfaces.
- Specify measures to reduce heat build-up on the roof (i.e. either high-albedo roofing materials (reflectance of at least 0.65 and emissivity of at least 0.9 for a minimum of 75% of the roof surface), OR a green roof, OR a combination of both high-albedo materials and green roof).

MINIMAL LIGHT POLLUTION

7 points

Objective

To reduce the impact on the nocturnal environment of fauna and flora.

Requirements

- Minimize the obtrusive aspects of exterior lighting (e.g. glare, light trespass and sky glow) as per the optical design recommendations of the Royal Astronomical Society of Canada such that:
 - *no light is emitted above a horizontal plane passing through the bottom of the fixture; and*
 - *less than 10% of the emitted light shines within 10 degrees below the horizontal plane passing through the bottom of the fixture.*

20 points

B.3 – Watershed Features

Objective

To reduce the quantity of stormwater run-off entering storm sewers and increase ground infiltration of stormwater without negatively affecting the building or on-site vegetation.

Requirements

- Provide a stormwater management plan to prevent damage to project elements, including vegetation, on both the project site and those adjacent to it. Include an engineering design of the site drainage pattern, including volume calculations and site management strategies. Aim for no increase in run-off. Or, if the site already consists of more than 50% impervious surface in its pre-development state, aim for a reduction of 25% in storm water run-off.

35 points

B.4 – Site Ecology Enhancement

Objective

To increase the natural biodiversity of the site.

Requirements

- Specify a naturalized landscape using native trees, shrubs and ground cover, with minimal lawn.
- Create a biophysical inventory of on-site plants to be retained or salvaged and re-planted.

TOTAL POINTS
AVAILABLE

380 /1000

Green Globes Design™ **C** **Energy**

100 points

C.1 – Energy Performance

Objective

To minimize the energy consumption for building operations.

Requirements

- Achieve levels of performance (i.e. 30%, 40% and 50%) better than that of a building that meets the base Model National Energy Code for Buildings (MNECB).
- Employ a design that meets energy performance targets of:

< 36 kWh/sf-yr	less than 1,395 MJ/m2yr	5% or more	10 points
< 32 kWh/sf-yr	less than 1,240 MJ/m2yr	10% or more	20 points
< 28 kWh/sf-yr	less than 1,085 MJ/m2yr	15% or more	30 points
< 24 kWh/sf-yr	less than 930 MJ/m2yr	20% or more	40 points
< 20 kWh/sf-yr	less than 775 MJ/m2yr	25% or more	50 points
< 18 kWh/sf-yr	less than 698 MJ/m2yr	30% or more	60 points
< 16 kWh/sf-yr	less than 620 MJ/m2yr	35% or more	70 points
< 14 kWh/sf-yr	less than 543 MJ/m2yr	40% or more	80 points
< 12 kWh/sf-yr	less than 465 MJ/m2yr	45% or more	90 points
< 10 kWh/sf-yr	less than 388 MJ/m2yr	50% or more	100 points

114 points

C.2 – Reduced Energy Demand

SPACE OPTIMIZATION

10 POINTS

Objective

To achieve efficient utilization of space, minimize the amount of space that will need to be heated or cooled, and provide flexibility for future occupant growth.

Requirements

- Design the floor area efficiently to fulfill the building's functional and spatial requirements, including circulation and services. Identify spaces that can accommodate more than one function or can be adapted to more or less intensive occupancy.
- Where a building design is based on future projections of increased occupant population, phase the construction process, distinguishing between immediate functional needs versus long-term projected needs. Provide adaptable structure and services, and load-bearing capacity for future building expansion.

RESPONSE TO MICROCLIMATE AND TOPOGRAPHY

24 POINTS

Objective

To take advantage of site and microclimate opportunities to reduce energy requirements for heating, cooling and ventilation.

Requirements

- Use orientation and site features to optimize local microclimatic conditions for heating and cooling.
- Basing decisions on wind and snow control studies for areas where this could be a problem, develop strategies - including location, use of site topography and orientation - to minimize the exposure to wind and the accumulation of snow.
- Develop a building form that, site permitting, can benefit from natural or hybrid ventilation to provide natural cooling during the time of the year when outdoor air is cooler than indoor air.

INTEGRATION OF DAYLIGHTING

35 POINTS

Objective

To reduce the need for electrical lighting.

Requirements

- Implement a fenestration strategy - through building orientation, and window-to-wall size ratios - that maximizes daylighting.
- Install window glazing which optimizes daylight (high visible transmittance (VT)).
- Integrate electrical lighting design with daylighting, with controls to adjust the electrical lighting in response to available daylight, taking into account daily and seasonal variations in each lighting zone of the building.

BUILDING ENVELOPE

35 POINTS

Objective

To minimize the energy that is gained or lost through the envelope, prevent condensation and avoid water damage.

Requirements

- Design the building's thermal resistance of the exterior enclosure to meet the Model National Energy Code for Buildings (MNECB) for the walls.
- Design the building's thermal resistance of the exterior enclosure to meet the Model National Energy Code for Buildings (MNECB) for the roof.
- Design the building to prevent groundwater and/or rain penetration.
- Use best air and vapour barrier practices to assure integrity of building envelope with respect to:
 - *Detailing of roof to wall air barrier connections.*
 - *Mock-ups and mock-up testing for air and vapour barrier systems.*
 - *Field review and testing for air and vapour barrier systems. (Air barrier materials should meet Part 5 of NBC)*
- Prevent unwanted stack effect by appropriate sealing of the top, bottom and vertical shafts of the building.

INTEGRATION OF ENERGY SUB-METERING 10 POINTS

Objective

To encourage energy efficiency by monitoring energy consumption.

Requirements

- For a building greater than 500 m², specify the sub-metering of processes which are major energy consumers such as: lighting, motors, hot water heaters, boilers, fans, cooling and humidification plant, computers, and catering facilities.

66 points

C.3 – Integration of Energy Efficient Systems

Objective

To reduce energy needed for building systems and equipment.

Requirements

- Specify energy efficient technologies, such as:
 - *High-efficiency lamps, and luminaries with electronic ballasts*
 - *Lighting controls*
 - *Energy-efficient HVAC equipment.*
 - *High efficiency or condensing type boilers or other higher-efficiency heating systems (e.g. infrared heating in industrial buildings)*
 - *High efficiency chillers*
 - *Energy-efficient hot water service systems*
 - *Building automation systems*
 - *Variable speed drives*
 - *Energy-efficient motors on fans/pumps*
 - *Energy-efficient elevators*
 - *Other energy-saving systems or measures (i.e. displacement ventilation, cogeneration systems, heat recovery system, etc)*

20 points

C.4 – Renewable Energy Sources

Objective

To minimize the consumption of non-renewable energy resources, and to minimize green house gas emissions.

Requirements

- Integrate renewable energy sources such as solar, wind, biomass, or photovoltaics:
 - *For more than 5% and less than 10% of the total load.*
 - *For more than 10% of the total load*

20 points

C.5 – Energy Efficient Transportation

Objective

To reduce fossil fuel consumption for commuting.

Requirements

- Provide access to public transport within 500 m of the building with service at least every 15 minutes during rush hour.
- Designate areas for the following:
 - *Preferred parking for car/van pooling*
 - *Shelter from weather at pick-up and drop-off locations*
- Include an alternative-fuel re-fueling facility on-site or in the general vicinity.
- Provide safe, covered storage areas with fixed mountings for bicycles.
- Provide changing rooms or large washrooms for occupants to change from cycling wear to office-working apparel.

30 points

D.1 – Water Performance

Objective

To maximize water efficiency and reduce the burden on municipal supply and treatment systems.

Requirements

- Achieve one of the following water performance targets:

<i>Offices</i>	Less than 1.5 m ³ /m ² /year Less than 1.0 m ³ /m ² /year Less than 0.5m ³ /m ² /year
<i>MURBs</i>	Less than 300 m ³ /apartment/year Less than 150 m ³ /apartment/year Less than 50 m ³ /apartment/year

45 points

D.2 – Water Conserving Features

SUB-METERING **4 POINTS**

Objective

To encourage water conservation by measuring and monitoring water consumption.

Requirements

- Where appropriate, provide sub-metering of water uses for high water-usage operations or occupancies such as boilers, cooling tower make-up lines, water-cooled air-conditioning units or special laboratory operations.

INTEGRATION OF WATER EFFICIENT EQUIPMENT **26 POINTS**

Objective

To minimize the burden on municipal water supply and waste water treatment systems.

Requirements

- Increase water-efficiency through the use of the following technologies:
 - *Low flush (LF) toilets (less than or equal to 6 liters)*
 - *Water-saving fixtures on faucets (7.5 L/min) and showerheads (9.0 L/min)*
 - *Urinals with proximity detectors or waterless urinals where applicable (e.g. offices)*
 - *Other appliances such as water efficient (H-axis) washing machines + low water dishwashers (38 L) where applicable (e.g. in MURBs)*
- Where applicable, install features to minimize the consumption of make-up water for wet-cooling towers.

MINIMAL USE OF IRRIGATION WATER 15 POINTS

Objective

To eliminate the use of potable water required for landscape irrigation.

Requirements

- Provide landscaping that can withstand extreme local weather conditions and requires minimal irrigation.
- Specify a water-efficient irrigation system.
- Specify irrigation using non-potable water (i.e. captured rainwater or recycled site water).

10 points

D.3 – On-Site Treatment of Water

Objective

To reduce the burden on municipal water supply and wastewater systems.

Requirements

- Where feasible, integrate a graywater collection, storage and distribution system to collect, store, treat and redistribute laundry and bathing effluent for toilet flushing, irrigation, janitorial cleaning, cooling and car washing.
- Where feasible, integrate a biological waste treatment system for the site and building such as peat moss drain fields, constructed wetlands, aerobic treatment systems, solar aquatic waste systems (or living machines), and composting or ecologically-based toilets.

TOTAL POINTS
AVAILABLE

100 /1000

Green Globes Design™ **E**

Resources

40 points

E.1 – Low Impact Systems & Materials

Objective

To select materials with the lowest life cycle environmental burden and embodied energy.

Requirements

- Select materials that reflect the results of a "best run" life cycle assessment for the following:
 - *Foundation and floor assembly and materials*
 - *Column and beam or post and beam combinations, and walls*
 - *Roof assemblies*
 - *Other envelope assembly materials (cladding, windows, etc.)*

15 points

E.2 – Minimal Consumption of Resources

Objective

To conserve resources and minimize the energy and environmental impact of extracting and processing non-renewable materials.

Requirements

- Specify used building materials and components.
- Specify materials with recycled content.
- Specify materials from renewable sources that have been selected based on a life-cycle assessment (LCA)
- Specify locally manufactured materials that have been selected based on a LCA.
- Use lumber and timber panel products which originate from certified and sustainable sources (certified by the CSA (Canadian Standards Association), the FSC (Forestry Stewardship Council), or the SFI (Sustainable Forestry Initiative)) and avoid use of tropical hardwoods.

15 points

E.3 – Reuse of Existing Buildings

Objective

To conserve resources and minimize the energy and environmental impact of extracting and processing non-renewable materials.

Requirements

- Retain 50% - 100% of existing façades in fully renovated buildings.
- Retain a minimum of 50% of the existing major structures (other than the shell i.e. walls, floors and ceilings).

15 points

E.4 – Building Durability, Adaptability and Disassembly

Objective

To extend the life of a building and its components, and to conserve resources by minimizing the need to replace materials and assemblies.

Requirements

- Specify durable and low-maintenance building materials and assemblies that can withstand the following: sunlight, temperature and humidity changes; condensation; and wear-and-tear associated with the amount and type of traffic expected.
- Implement a building design that promotes building adaptability.
- Specify fastening systems that allow for easy disassembly.

5 points

E.6 – Reduction, Reuse & Recycling of Demolition Waste

Objective

To divert demolition waste from the landfill.

Requirements

- Develop and implement a construction, demolition and renovation waste management plan.

10 points

E.7 – Recycling and Composting Facilities

Objective

To minimize landfill waste generated by occupants.

Requirements

- Provide adequate handling and storage facilities for future occupants to recycle materials and compost organic waste.

TOTAL POINTS
AVAILABLE

75 /1000

Green Globes Design™ **F**

Emissions, Effluents & Other Impacts

15 points

F.1 – Air Emissions

Objective

To minimize air emissions.

Requirements

- Use low-NOx boilers and furnaces, which comply with ASME codes.

20 points

F.2 – Ozone Depletion

Objective

To minimize the emission of ozone-depleting substances.

Requirements

- Select refrigeration systems that avoid the use of ozone-depleting substances (ODS) and potent industrial greenhouse gases (PIGGs).
- Select refrigerants that have an ozone-depleting potential (ODP) equal to 0, or at a minimum, less than 0.05.
- Ensure the air-conditioning system complies with the requirements of the Federal Halocarbon Regulations under CEPA and the Safety Code for Mechanical Refrigeration ASHRAE 15 -1994.

10 points

F.3 Avoiding Sewer and Waterway Contamination

Objective

To avoid contamination of water ways and reduce the burden on municipal waste water treatment facilities.

Requirements

- Prevent storm or wastewater discharges of toxic or harmful materials (solids or sludge, floating debris and oil or scum) into public utilities.

F.4 Pollution Minimization

Objective

To minimize risk to occupants' health and impacts on the local environment.

Requirements

- Ensure compliance with the federal *Technical Guidelines for Underground Storage Tank Systems Containing Petroleum and Allied Petroleum Products and Technical Guidelines for Aboveground Storage Tank Systems Containing Petroleum*.
- In the case of a retrofit, comply with regulations for all PCBs present in the building.
- In the case of a retrofit, contain, remove or eliminate asbestos and asbestos-containing materials in compliance with all applicable provincial and local regulations.
- Prevent the accumulation of harmful chemicals and gases such as radon and methane in spaces below the substructure, and their penetration into the building.
- Design the facility and landscaping to avoid the need for toxic volatile pesticides.
- Protect components, materials and structural openings to avoid infestation by pests such as rodents and insects including termites.
- Design secure and appropriately-ventilated areas for storage of hazardous and flammable materials.

55 points

G.1 – Ventilation System

Objective

To provide effective ventilation thereby helping to ensure occupant well-being and comfort.

Requirements

- Avoid entraining pollutants into the ventilation air path by:
 - *positioning air intakes and outlets at least 10 m apart, and inlets and not downwind of outlets.*
 - *locating inlets more than 20 m from major sources of pollution and at least the minimum recommended distances from lesser sources of pollution.*
 - *Protecting air intake openings.*
 - *Specifying ventilation lining that will avoid the release of pollution and fibres into the ventilation air path.*
- Provide ventilation in accordance with ANSI/ASHRAE 62 - 2001?
- Verify that the ventilation system provides effective air exchange (that the outdoor air delivered to the space actually reaches the occupants).
- Monitor indoor air quality either with CO₂ monitoring or electronic airflow monitoring.
- Provide a mechanical ventilation system that has the capability of flushing-out the building with 100% outside air at ambient temperatures above 0 °C.
- Provide mechanical ventilation in enclosed parking areas.
- Specify personal controls over the ventilation rates, or, in naturally ventilated buildings, operable windows or trickle vents on windows.
- Specify a minimum filter efficiency of 65% arrestance, or 40% atmospheric dust-spot efficiency for air distributed to occupied spaces.

45 points

G.2 – Control of Indoor Pollutants

Objective

To minimize contaminants in the indoor air thereby helping to ensure occupant well-being and comfort.

Requirements

- Implement design measures to prevent the growth of fungus, mold, and bacteria on building surfaces and in concealed spaces.
- Ensure easy access to the air-handling units (AHUs) for regular inspection and maintenance.
- Design a humidification system to avoid the growth of microorganisms.
- Implement measures to mitigate pollution at source such as physical isolation of the spaces, separate ventilation, or a combination of isolation and ventilation for areas that generate contaminants.

- Design and locate wet cooling towers to avoid the risk of *Legionella*.
- Design a domestic hot water system to minimize the risk of *Legionella*.
- Use interior materials, including paints, sealants, adhesives, carpets and composite wood products that are low-VOC emitting, non-toxic, and chemically inert (i.e. contain concentrations of VOC as per Environmental Choice Program limits).
- Provide CO monitoring in enclosed parking garages.

50 points

G.3 – Lighting

DAYLIGHTING 20 points

Objective

To provide occupants with exposure to natural light, thereby helping to ensure their well-being and comfort.

Requirements

- Provide ambient daylight to 80% of the primary spaces.
- Achieve a minimum daylight factor of 0.2 for work places or living/dining areas that require moderate lighting, and 0.5 for work areas requiring good lighting.
- Provide views to the building exterior, or to atria from all primary interior spaces.
- Specify solar shading devices to enable occupants to control brightness from direct daylighting.

LIGHTING DESIGN 25 points

Objective

To reduce the energy needed for electrical lighting.

Requirements

- Provide light levels no less than those recommended in *IESNA Lighting Handbook, 2000*, for the types of tasks that are anticipated in the various building spaces (regardless of daylighting).
- Avoid excessive direct or reflected glare, as per *IESNA RP-5, 1999, Recommended Practice of Daylighting*.
- Specify lighting controls that relate to room occupancy, circulation space, daylighting and the number of workstations in office areas.

20 points

G.4 – Thermal Comfort

Objective

To provide thermally comfortable environment, thereby helping to ensure the well-being and comfort of occupants.

Requirements

- Achieve compliance with ASHRAE 55 - 1992, Addenda 1995 for thermal comfort.

G.5 – Acoustic Comfort

Objective

To provide a good acoustic environment, thereby helping to ensure the well-being and comfort of occupants.

Requirements

- Site the building and zone spaces within the building to provide protection from undesirable outside noise.
- Specify an appropriate sound transmission class rating of perimeter walls in response to external noise levels.
- Provide noise attenuation of the structural systems and implement measures to insulate primary spaces from impact noise.
- Mitigate acoustic problems associated with mechanical equipment and plumbing systems noise and vibration.
- Specify acoustic controls to meet the acoustic privacy requirements.
- Specify measures to meet speech intelligibility requirements for the various spaces and activities.