

LEED® Canada  
for Existing Buildings:  
Operations and Maintenance 2009

RATING SYSTEM

LEED® Canada





## PREFACE FROM THE CAGBC

The built environment has a profound impact on our natural environment, economy, health, and productivity. Breakthroughs in building science, technology, and operations are now available to designers, builders, operators, and owners who want to build green and maximize both economic and environmental performance.

The green building movement offers an unprecedented opportunity to respond to the most important challenges of our time, including global climate change, dependence on non sustainable and expensive sources of energy, and threats to human health. The work of innovative building professionals is a fundamental driving force in the green building moment. Such leadership is a critical component to achieving the Canada Green Building Council's (CaGBC's) vision of a transformed built environment leading to a sustainable future.

### CaGBC Membership

The CaGBC's greatest strength is the diversity of our membership. CaGBC is a balanced, consensus based not-for-profit with more than 2,100 member companies and organizations. Since its inception in 2002, CaGBC has played a vital role in providing a leadership forum and a unique, integrating force for the building industry. CaGBC's programs have three distinguishing characteristics:

#### Committee-based

The heart of this effective coalition is our committee structure, in which volunteer members work with staff and expert consultants to design and implement strategies. Our committees provide a forum for members to resolve differences, build alliances, and forge cooperative solutions for influencing change in all sectors of the building industry.

#### Member-Driven

Membership is open and balanced and provides a comprehensive platform for carrying out important programs and activities. We target the issues identified by our members as the highest priority. We conduct an annual review of achievements that allows us to set policy, revise strategies, and devise work plans based on members' needs.

#### Consensus-Focused

We work together to promote green buildings, and in doing so, we help to foster greater economic vitality and environmental health at lower costs. We work to bridge ideological gaps between industry segments to develop balanced policies and programs that benefit the entire industry.

For more information:

Contact the Canada Green Building Council  
47 Clarence St., Suite 202  
Ottawa, Ontario K1N 9K1

phone: 1-866-941-1184  
fax: (613) 241-4782  
info@cagbc.org  
www.cagbc.org

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## TRADEMARK

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## ACKNOWLEDGEMENTS

The *LEED® Canada for Existing Buildings: Operations and Maintenance* Green Building Rating System has been made possible only through the efforts of many dedicated volunteers, staff members, and others in the CaGBC community. Development of the Rating System was led by CaGBC's LEED Technical Manager, Ian Theaker, P.Eng., and the CaGBC's Senior Development Coordinator, Joe Stano. Doug Webber, Adrien Deveau, Jani Loots, Dani Marino, and Priscilla Chew, of Halsall Associates Ltd., were the authoring consultants. The work was guided by input and advice of the CaGBC's LEED Development Committee, *LEED Canada for Existing Buildings: Operations and Maintenance* Adaptation Task Force, Technical Advisory Group volunteers, and LEED Canada Management Committee.

The Rating System was approved by the USGBC for compatibility and equivalent stringency of the U.S. and Canadian versions; and endorsed by a ballot of the CaGBC membership.

A countless number of unpaid volunteer hours went in to developing this Canadian system; it is truly a joint effort by many design professionals, consultants, building scientists, utility providers, property owners and facility managers. The following is a list of contributors and volunteers who made *LEED Canada for Existing Buildings: Operations and Maintenance* possible; apologies are due to those we have missed. The Canada Green Building Council extends our genuine gratitude to all these individuals for their extraordinary volunteer efforts and constant support of the CaGBC's mission:

## LEED CANADA FOR EXISTING BUILDINGS: OPERATIONS AND MAINTENANCE ADAPTATION TASK FORCE

### COMMITTEE MEMBERS

Edwin Lim (Chair)  
Alan Munn  
Beata Domanska  
Brian Miltimore  
Candice Holmstrom  
Graham Henderson  
Karen Jalon  
Kim Rishel  
Laurie Blondeau  
Mark Steane  
Guy Lamarre  
Phil Renaud  
Randy Van Straaten

Michael Tiffe

### ORGANIZATION

Brookfieldw Lepage Johnson Controls  
Zeidler Architects  
Beata Domanska Consulting and Design  
Tech-More Operations Resources  
CH Designs  
BC Hydro  
The Cadillac Fairview Corporation Ltd.  
EllisDon Corporation  
Cameco Corporation  
Aecon Buildings  
SITQ  
London Health Sciences Centre  
previously EnermodalEngineeringLtd.,  
now University of Western Ontario  
TAB Mechanical

**LEED DEVELOPMENT COMMITTEE**

## COMMITTEE MEMBERS

Alex Zimmerman (Co-Chair)  
 Joanne Perdue (Co-Chair)  
 Noel Cheeseman  
 Stephen Pope  
 Stephen Carpenter  
 Andrew Pride  
 Edwin Lim  
 Monica Walter  
 Catherine Nickerson  
 Kathy Wardle

## ORGANIZATION

Applied Green Consulting Ltd.  
 University of Calgary  
 Enerlife Consulting  
 Natural Resources Canada  
 Enermodal Engineering Ltd.  
 Minto Energy Management  
 Brookfield Lepage Johnson Controls  
 BC Government - Ministry of Labour and Citizen Services  
 BC Government - Ministry of Labour and Citizen Services  
 Busby Perkins + Will

**ENERGY AND ENGINEERING TECHNICAL ADVISORY GROUP**

## COMMITTEE MEMBERS

Steve Kemp (Chair)  
 Jim Clark  
 Curt Hepting  
 Robin Hutchison  
 Bohdan Kosteckyj  
 Wendy Macdonald  
 Martin Roy  
 Jim Sawers  
 Gordon Shymko  
 Eric Van Benschoten

## ORGANIZATION

Enermodal Engineering Ltd.  
 Natural Resources Canada, Office of Energy Efficiency  
 EnerSys Analytics Inc.  
 Arborus Consulting  
 Simon Fraser University  
 Advicas Group Consultants Inc.  
 Martin Roy & Associés Groupe Conseil Inc.  
 University of Calgary  
 G. F. Shymko & Associates Inc.  
 Van- Fort Inc.

**SITES, WATER, AND MATERIALS TECHNICAL ADVISORY GROUP**

## COMMITTEE MEMBERS

Stephen Carpenter (Chair)  
 Robert Blakeney  
 Sheila Brown  
 Sebastien Garon  
 Jennifer Hum  
 Ron Kato  
 Brenda Martens  
 Rambod Nasrin  
 Keith Robertson  
 Lyle Scott

## ORGANIZATION

Enermodal Engineering Ltd.  
 Morrison Hershfield Ltd.  
 Stantec  
 previously Busby, Perkins +Will, now Halsall Associates Ltd.  
 Halsall Associates Ltd.  
 Larry McFarland Architects Ltd.  
 Recollective  
 Tridel  
 Solterre Design  
 Previously Minto Green Team, now Cohos Evamy

## LEED CANADA MANAGEMENT COMMITTEE

### COMMITTEE MEMBERS

Mark Lucuik (Chair)  
Stephen Carpenter  
Lyle Scott  
Steve Kemp  
Jackie Evans  
Shenshu Zhang  
Eric Stephenson

### ORGANIZATION

Morrison Hershfield Ltd.  
Enermodal Engineering Ltd.  
Previously Minto Green Team, now Cohos Evamy  
Enermodal Engineering Ltd.  
Interface  
Diamond and Schmitt Architects Inc.  
Clean Energy Developments

## LEED CANADA FOR EXISTING BUILDINGS: OPERATIONS AND MAINTENANCE PROJECT CHECKLIST

SUSTAINABLE SITES		26 POSSIBLE POINTS
<input type="checkbox"/>	Credit 1	LEED Certified Design and Construction 4
<input type="checkbox"/>	Credit 2	Building Exterior and Hardscape Management Plan 1
<input type="checkbox"/>	Credit 3	Integrated Pest Management, Erosion Control, and Landscape Management Plan 1
<input type="checkbox"/>	Credit 4	Alternative Commuting Transportation 3 - 15
<input type="checkbox"/>	Credit 5	Site Development: Protect or Restore Open Habitat 1
<input type="checkbox"/>	Credit 6	Stormwater Quantity Control 1
<input type="checkbox"/>	Credit 7.1	Heat Island Reduction: Non-Roof 1
<input type="checkbox"/>	Credit 7.2	Heat Island Reduction: Roof 1
<input type="checkbox"/>	Credit 8	Light Pollution Reduction 1
WATER EFFICIENCY		14 POSSIBLE POINTS
<input type="checkbox"/>	Prerequisite 1	Water Metering and Minimum Indoor Plumbing Fixture and Fitting Efficiency Required
<input type="checkbox"/>	Credit 1.1 & 1.2	Water Performance Measurement 1 - 2
<input type="checkbox"/>	Credit 2	Additional Indoor Plumbing Fixture and Fitting Efficiency 1 - 5
<input type="checkbox"/>	Credit 3	Water Efficient Landscaping 1 - 5
<input type="checkbox"/>	Credit 4.1	Cooling Tower Water Management: Chemical Management 1
<input type="checkbox"/>	Credit 4.2	Cooling Tower Water Management: Non-potable Water Source Use 1
ENERGY & ATMOSPHERE		35 POSSIBLE POINTS
<input type="checkbox"/>	Prerequisite 1	Energy Efficiency Best Management Practices: Planning, Documentation, and Opportunity Assessment Required
<input type="checkbox"/>	Prerequisite 2	Minimum Energy Efficiency Performance Required
<input type="checkbox"/>	Prerequisite 3	Refrigerant Management: Ozone Protection Required
<input type="checkbox"/>	Credit 1	Optimize Energy Efficiency Performance 1 - 18
<input type="checkbox"/>	Credit 2.1	Existing Building Commissioning: Investigation and Analysis 2
<input type="checkbox"/>	Credit 2.2	Existing Building Commissioning: Implementation 2
<input type="checkbox"/>	Credit 2.3	Existing Building Commissioning: Ongoing Commissioning 2
<input type="checkbox"/>	Credit 3.1	Performance Measurement: Building Automation System 1
<input type="checkbox"/>	Credit 3.2 & 3.3	Performance Measurement: System-Level Metering 1 - 2
<input type="checkbox"/>	Credit 4	On-Site and Off-Site Renewable Energy 1 - 6
<input type="checkbox"/>	Credit 5	Enhanced Refrigerant Management 1
<input type="checkbox"/>	Credit 6	Emissions Reduction Reporting 1

## MATERIALS &amp; RESOURCES

10 POSSIBLE POINTS

<input type="checkbox"/>	Prerequisite 1	Sustainable Purchasing Policy	Required
<input type="checkbox"/>	Prerequisite 2	Solid Waste Management Policy	Required
<input type="checkbox"/>	Credit 1	Sustainable Purchasing: Ongoing Consumables	1
<input type="checkbox"/>	Credit 2.1	Sustainable Purchasing: Durable Goods - Electric-Powered Equipment	1
<input type="checkbox"/>	Credit 2.2	Sustainable Purchasing: Durable Goods - Furniture	1
<input type="checkbox"/>	Credit 3	Sustainable Purchasing: Facility Alterations and Additions	1
<input type="checkbox"/>	Credit 4	Sustainable Purchasing: Reduced Mercury in Lamps	1
<input type="checkbox"/>	Credit 5	Sustainable Purchasing: Food	1
<input type="checkbox"/>	Credit 6	Solid Waste Management: Waste Stream Audit	1
<input type="checkbox"/>	Credit 7	Solid Waste Management: Ongoing Consumables	1
<input type="checkbox"/>	Credit 8	Solid Waste Management: Durable Goods	1
<input type="checkbox"/>	Credit 9	Solid Waste Management: Facility Alterations and Additions	1

## INDOOR ENVIRONMENTAL QUALITY

15 POSSIBLE POINTS

<input type="checkbox"/>	Prerequisite 1	Minimum IAQ Performance	Required
<input type="checkbox"/>	Prerequisite 2	Environmental Tobacco Smoke (ETS) Control	Required
<input type="checkbox"/>	Prerequisite 3	Green Cleaning Policy	Required
<input type="checkbox"/>	Credit 1.1	IAQ Best Management Practices: IAQ Management Program	1
<input type="checkbox"/>	Credit 1.2	IAQ Best Management Practices: Outdoor Air Delivery Monitoring	1
<input type="checkbox"/>	Credit 1.3	IAQ Best Management Practices: Increased Ventilation	1
<input type="checkbox"/>	Credit 1.4	IAQ Best Management Practices: Reduce Particulates in Air Distribution	1
<input type="checkbox"/>	Credit 1.5	IAQ Best Management Practices: IAQ Management for Facility Alterations and Additions	1
<input type="checkbox"/>	Credit 2.1	Occupant Comfort: Occupant Survey	1
<input type="checkbox"/>	Credit 2.2	Controllability of Systems: Lighting	1
<input type="checkbox"/>	Credit 2.3	Occupant Comfort: Thermal Comfort Monitoring	1
<input type="checkbox"/>	Credit 2.4	Daylight and Views	1
<input type="checkbox"/>	Credit 3.1	Green Cleaning: High-Performance Cleaning Program	1
<input type="checkbox"/>	Credit 3.2	Green Cleaning: Custodial Effectiveness Assessment	1
<input type="checkbox"/>	Credit 3.3	Green Cleaning: Purchase of Sustainable Cleaning Products and Materials	1
<input type="checkbox"/>	Credit 3.4	Green Cleaning: Sustainable Cleaning Equipment	1
<input type="checkbox"/>	Credit 3.5	Green Cleaning: Indoor Chemical & Pollutant Source Control	1
<input type="checkbox"/>	Credit 3.6	Green Cleaning: Indoor Integrated Pest Management	1

## INNOVATION IN OPERATIONS

6 POSSIBLE POINTS

<input type="checkbox"/>	Credit 1	Innovation in Operations	1-4
<input type="checkbox"/>	Credit 2	LEED Accredited Professional	1
<input type="checkbox"/>	Credit 3	Documenting Sustainable Building Cost Impacts	1

## REGIONAL PRIORITY

4 POSSIBLE POINTS

<input type="checkbox"/>	Credit 1	Regional Priority	1-4
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## LEED CANADA FOR EXISTING BUILDINGS: OPERATIONS AND MAINTENANCE

100 base points; 6 possible Innovation in Operations and 4 Regional Priority Points.

Certified	40 – 49 points
Silver	50 – 59 points
Gold	60 – 79 points
Platinum	80 points and above

(Note that projects must meet all prerequisites and achieve 40 points from other credits before they may earn any points from Regional Priority credits)

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# INTRODUCTION

## I. LEED GREEN BUILDING RATING SYSTEM

### HISTORY

Growing awareness and concern with the environmental and health impacts of buildings in Canada has led to widespread demand for a common method of independently certifying the merits of a given building. In response to this demand, the Canada Green Building Council has adapted several rigorous Canadian green rating systems based on the U.S. Green Building Council's LEED® system. The aim has been to create rating tools that both recognize high health, energy and environmental performance, while being practical and easy to apply by Canadian building projects.

The first LEED rating system adapted for Canada-wide use was *LEED® Canada for New Construction and Major Renovations* version 1.0 (LEED Canada-NC, launched in December 2004). This system was adapted from the USGBC's LEED-NC version 2.1, tailored specifically for Canadian climates, construction practices and regulations. In 2004, the USGBC released a LEED rating system catering to Existing Buildings – LEED-EB. Since the release of LEED-EB, the USGBC has released LEED for Existing Buildings: Operations and Maintenance (April 2008), and most recently, LEED 2009 for Existing Buildings: Operations & Maintenance (April 2009). *LEED Canada for Existing Buildings: Operations and Maintenance* is an adaptation of this latest system.

The green design field is growing and changing daily. New technologies and products are coming into the marketplace, and innovative designs are proving their effectiveness. The rating systems and the reference guides are evolving as well. Teams wishing to certify their projects with LEED should use the version of the rating system that is current at the time of their registration. CaGBC will highlight new developments on its website on a continual basis; see [www.cagbc.org](http://www.cagbc.org).

### FEATURES OF LEED

The LEED Green Building Rating Systems are voluntary, consensus-based, and market-driven. Based on existing and proven technology, they evaluate environmental performance from a whole building perspective over a building's life cycle, providing a definitive standard for what constitutes a green building in design, construction, and operation.

The LEED rating systems are designed for rating new and existing commercial, institutional, and residential buildings. They are based on accepted energy and environmental principles and strike a balance between known, established practices and emerging concepts. Each rating system is organized into 5 environmental categories: Sustainable Sites, Water Efficiency, Energy and Atmosphere, Materials and Resources, and Indoor Environmental Quality. An additional category, Innovation in Design (or Operations), addresses sustainable building expertise as well as measures not covered under the 5 environmental categories. Regional bonus points are another feature of LEED and acknowledge the importance of local conditions in determining best environmental design and construction practices.

## THE LEED CREDIT WEIGHTINGS

In LEED 2009, the allocation of points between credits is based on the potential environmental impacts and human benefits of each credit with respect to a set of impact categories. The impacts are defined as the environmental or human effect of the design, construction, operation, and maintenance of the building, such as greenhouse gas emissions, fossil fuel use, toxins and carcinogens, air and water pollutants, indoor environmental conditions. A combination of approaches, including energy modeling, life-cycle assessment, and transportation analysis, is used to quantify each type of impact. The resulting allocation of points among credits is called credit weighting.

LEED 2009 uses the U.S. Environmental Protection Agency's TRACI<sup>1</sup> environmental impact categories as the basis for weighting each credit. TRACI was developed to assist with impact evaluation for life-cycle assessment, industrial ecology, process design, and pollution prevention. LEED 2009 also takes into consideration the weightings developed by the National Institute of Standards and Technology (NIST); these compare impact categories with one another and assign a relative weight to each. Together, the 2 approaches provide a solid foundation for determining the point value of each credit in LEED 2009.

The LEED 2009 credit weightings process is based on the following parameters, which maintain consistency and usability across rating systems:

- All LEED credits are worth a minimum of 1 point.
- All LEED credits are positive, whole numbers; there are no fractions or negative values.
- All LEED credits receive a single, static weight in each rating system; there are no individualized scorecards based on project location.
- All LEED rating systems have 100 base points; Innovation in Design (or Operations) and Regional Priority credits provide opportunities for up to 10 bonus points.

Given the above criteria, the LEED 2009 credit weightings process involves 3 steps:

1. A reference building is used to estimate the environmental impacts in 13 categories associated with a typical building pursuing LEED certification.
2. The relative importance of building impacts in each category are set to reflect values based on the NIST weightings.<sup>2</sup>
3. Data that quantify building impacts on environmental and human health are used to assign points to individual credits.

Each credit is allocated points based on the relative importance of the building-related impacts that it addresses. The result is a weighted average that combines building impacts and the relative value of the impact categories. Credits that most directly address the most important impacts are given the greatest weight, subject to the system design parameters described above. Credit weights also reflect a decision by LEED to recognize the market implications of point allocation. The result is a significant change in allocation of points compared with previous LEED rating systems. Overall, the changes increase the relative emphasis on the reduction of energy consumption and greenhouse gas emissions associated with building systems, transportation, the embodied energy of water, the embodied energy of materials, and where applicable, solid waste.

The details of the weightings process vary slightly among individual rating systems. For example, *LEED Canada for Existing Buildings: Operations and Maintenance* includes credits related to solid waste management within the building but *LEED Canada for New Construction and Major Renovations* does not. This results in a difference in the portion of the environmental footprint addressed by each rating system and the relative allocation of points. The weightings process for each rating system is fully documented in a weightings workbook. The credit weightings process will be reevaluated over time to incorporate changes in values ascribed to different building impacts and building types, based on both market reality and evolving scientific knowledge related to buildings. A complete explanation of the LEED credit weightings system is available on the USGBC website, at [www.usgbc.org](http://www.usgbc.org).

#### REGIONAL PRIORITY CREDITS

To provide incentive to address geographically specific environmental issues, CaGBC is providing an opportunity for LEED Canada project teams to propose existing credits as Regional Priority credits. For a list of eligible credits and guidance regarding Regional Priority, refer to the CaGBC website ([www.cagbc.org](http://www.cagbc.org)).

## II. OVERVIEW AND PROCESS

The LEED Canada Green Building Rating System for Existing Buildings: Operations and Maintenance is a set of performance standards for certifying the operations and maintenance of existing commercial or institutional buildings and high-rise residential buildings of all sizes, both public and private. The intent is to promote high-performance, healthful, durable, affordable, and environmentally sound practices in existing buildings.

Prerequisites and credits in the *LEED Canada for Existing Buildings: Operations and Maintenance Rating System* address seven topics:

- Sustainable Sites (SS)
- Water Efficiency (WE)
- Energy & Atmosphere (EA)
- Materials & Resources (MR)
- Indoor Environmental Quality (EQ)
- Innovation in Operations (IO)
- Regional Priority

*LEED Canada for Existing Buildings: Operations and Maintenance* certifications are awarded according to the following scale:

Certified	40 – 49 points
Silver	50 – 59 points
Gold	60 – 79 points
Platinum	80 points and above

The CaGBC will recognize buildings that achieve one of these ratings with a formal letter of certification.

## WHEN TO USE LEED CANADA FOR EXISTING BUILDINGS: OPERATIONS AND MAINTENANCE

*LEED Canada for Existing Buildings: Operations and Maintenance* was designed to certify the sustainability of ongoing operations of existing commercial and institutional buildings, i.e. buildings regulated by Subsection 2.1.2 (i.e. Parts 3, 4, 5 and 6) of Canada's National Building Code. All such buildings are eligible for certification under *LEED Canada for Existing Buildings: Operations and Maintenance*. They include but are not limited to offices, retail and service establishments, institutional buildings (libraries, schools, museums, churches, etc.), hotels, and residential buildings of four or more habitable stories.

*LEED Canada for Existing Buildings: Operations and Maintenance* provides owners and operators of existing buildings an entry point into the LEED certification process and is applicable to the following:

- building operations, processes, systems upgrades, minor space-use changes, and minor facility alterations or additions; and
- buildings new to LEED certification as well as buildings previously certified under *LEED Canada for New Construction and Major Renovations* or *LEED Canada for Core & Shell*; these may be either ground-up new construction or existing buildings that underwent major renovations.

*LEED Canada for Existing Buildings: Operations and Maintenance* encourages owners and operators of existing buildings to implement sustainable operations and maintenance practices and to reduce the environmental impact of their buildings over their functional life-cycles. Specifically, the rating system addresses exterior building site maintenance programs, water and energy use, environmentally preferred products and practices for cleaning and alterations, sustainable purchasing policies, waste stream management, and ongoing indoor environmental quality. *LEED Canada for Existing Buildings: Operations and Maintenance* is targeted at single buildings, whether owner occupied, multi-tenanted, or multiple-building campus projects. It is a whole-building rating system applicable to the entire building; individual tenant spaces are ineligible.

Many projects neatly fit the defined scope of only one LEED rating system; others may be eligible for two or more. The project is a viable candidate for LEED certification if it can meet all prerequisites and achieve the minimum points required in a given rating system. If more than one rating system applies, the project team can decide which one to pursue. For further assistance in choosing the most appropriate LEED rating system, please e-mail [info@cagbc.org](mailto:info@cagbc.org).

## LEED CANADA PROJECT REGISTRATION

Projects teams interested in earning *LEED Canada for Existing Buildings: Operations and Maintenance* certification for their buildings must first register the project with the CaGBC. Projects can be registered on the CaGBC website ([www.cagbc.org](http://www.cagbc.org)). Registering early in the development process ensures the maximum potential for achieving high building performance, and establishes contact with the CaGBC.

Registration of a *LEED Canada for Existing Buildings: Operations and Maintenance* project provides online access to essential information, software tools and communications for LEED users, such as the *LEED Canada for Existing Buildings: Operations and Maintenance* Letter Templates and Scorecard spreadsheet, and allows the team to submit Credit Interpretation Requests (CIRs).

The CaGBC web site ([www.cagbc.org](http://www.cagbc.org)) contains additional registration details, a fee calculator, and the online form used to register projects.

## LEED CANADA FOR EXISTING BUILDINGS: OPERATIONS AND MAINTENANCE CERTIFICATION

To earn LEED certification, the applicant project must satisfy all the prerequisites and credits worth the minimum number of points to attain the desired project rating under *LEED Canada for Existing Buildings: Operations and Maintenance*. Projects will need to comply with the version that is current at the time of project registration.

Applications for certification (submittals) should follow the requirements noted on the CaGBC website and within the *LEED Canada for Existing Buildings: Operations and Maintenance Rating System*, Reference Guide and Letter Templates.

### III. PERFORMANCE PERIOD

Some credits in *LEED Canada for Existing Buildings: Operations and Maintenance* require that performance data and other documentation be submitted for the performance period. The performance period is the continuous, unbroken time interval during which sustainable operations performance is being measured. The performance period may not have any gaps, defined as any period of time longer than one full week. The LEED project team may define the duration and timing of the performance period as it sees fit for each prerequisite and credit, subject to the following limitations:

- For the initial *LEED Canada for Existing Buildings: Operations and Maintenance* certification, the performance period is the most recent period of operations preceding certification application and must be a minimum of three months for all prerequisites and credits except Energy & Atmosphere Prerequisite 2 and Credit 1, which have longer minimum durations. At the project team's option, the performance period for any prerequisite or credit may be extended to a maximum of 24 months preceding certification application. Consistent start times and durations of the performance periods for each prerequisite and credit are preferred but not strictly necessary. However, all performance periods must overlap and terminate within one week of each other.
- For *LEED Canada for Existing Buildings: Operations and Maintenance* recertification, the performance period depends on whether the credit is newly pursued. For prerequisites and all credits earned in the initial *LEED Canada for Existing Buildings: Operations and Maintenance* certification, the performance period is the entire period between the previous certification and the current application. For all credits not earned in the initial *LEED Canada for Existing Buildings: Operations and Maintenance* certification, the performance period is the same as for initial certification. The performance period for recertification applications can be as short as 1 year and as long as 5 years.

For more information regarding the Performance Period requirements, refer to the *LEED Canada for Existing Buildings: Operations and Maintenance Reference Guide*.

## IV. MULTITENANT BUILDINGS

*LEED Canada for Existing Buildings: Operations and Maintenance* certification applies only to whole buildings. Multitenant buildings (single buildings that contain floor area under the ownership or tenancy of more than one entity) must involve at least 90% of the total gross floor space. Calculate project scope floor space by dividing the project's floor space by the total gross floor space.

For more information regarding Multitenant Buildings, refer to the *LEED Canada for Existing Buildings: Operations and Maintenance Reference Guide*.

## V. FACILITY ALTERATIONS AND ADDITIONS

Although *LEED Canada for Existing Buildings: Operations and Maintenance* focuses mainly on sustainable ongoing building operations, it also embraces sustainable alterations and new additions to existing buildings. In general parlance, alterations and additions may range from a complete gutting, major renovation, or large new wing to the replacement of an old window, sheet of drywall or section of carpet.

In *LEED Canada for Existing Buildings: Operations and Maintenance*, however, alterations and additions has a specific meaning. It refers to changes that affect usable space in the building. Mechanical, electrical or plumbing system upgrades that involve no disruption to usable space are excluded.

Only alterations and additions within the following limits are eligible for inclusion in a *LEED Canada for Existing Buildings: Operations and Maintenance* certification:

- **Maximum.** For alterations, those that affect no more than 50% of the total building floor area or cause relocation of no more than 50% of regular building occupants. For additions, those that increase the total building floor area by no more than 50%. Buildings with alterations or additions exceeding these limits should pursue certification under the *LEED Canada for New Construction and Major Renovations* program.
- **Minimum.** For alterations, projects that include construction activity by more than one trade specialty, make substantial changes to at least one entire room in the building and require isolation from regular building occupants for the duration of construction. For additions, those that increase the total building floor area by at least 5%. Alterations or additions below these limits are considered repairs, routine replacements or minor upgrades and are ineligible to earn points in *LEED Canada for Existing Buildings: Operations and Maintenance*. The minimum applies to Materials & Resources (MR) Credits 3 and 9, and Indoor Environmental Quality (EQ) Credit 1.5.

## VI. POLICY MODEL

Any policies required by the *LEED Canada for Existing Buildings: Operations and Maintenance* Rating System must, at a minimum, contain the following components of the *LEED Canada for Existing Buildings: Operations and Maintenance* policy model:

1. Scope
  - a. Describe the facility management and operations processes to which the policy applies.
  - b. Describe the building components, systems and materials to which the policy applies.
2. Performance Metric
  - a. Describe how performance will be measured and/or evaluated.
3. Goals
  - a. Identify the sustainability goals for the building.
  - b. Note: Although applicants are required to set goals, documentation of actual achievement is not required to demonstrate compliant policies; stating the goal is enough. Applicants are encouraged to adopt policies that set high goals, and work toward their achievement.
4. Procedures and Strategies
  - a. Outline the procedures and strategies in place to meet the goals and intent of the policy.
5. Responsible Party
  - a. Identify the teams and individuals involved in activities pertaining to the policy, and responsible for their execution.
  - b. Identify and outline key tasks for the above teams and individuals.
6. Time Period
  - a. Identify the time period over which the policy is applicable.

Applicants are not required to develop separate policies in this format for the purposes of achieving prerequisites and credits; highlighting these components in their existing operations policies is acceptable.

## VII. EXEMPLARY PERFORMANCE STRATEGIES

Exemplary performance strategies result in performance that greatly exceeds the performance level or expands the scope required by an existing *LEED Canada for Existing Buildings: Operations and Maintenance* credit. To earn exemplary performance credits, teams must meet the performance level defined by the next step in the threshold progression. For credits with more than one compliance path, an Innovation in Operations point can be earned by satisfying more than one compliance path if their benefits are additive.

The credits for which exemplary performance points are available through expanded performance or scope are noted in the *LEED Canada for Existing Buildings: Operations and Maintenance* Reference Guide and also in the *LEED Canada for Existing Buildings: Operations and Maintenance* Letter Templates.

### ENDNOTES

<sup>1</sup>Tools for the Reduction and Assessment of Chemical and Other Environmental Impacts (TRACI). U.S. Environmental Protection Agency, Office of Research and Development. <http://www.epa.gov/nrmrl/std/sab/traci/>.

<sup>2</sup>Relative impact category weights based on an exercise undertaken by NIST (National Institute of Standards and Technology) for the BEES program. <http://www.bfrl.nist.gov/oe/software/bees/>.



# SUSTAINABLE SITES

## LEED® CERTIFIED DESIGN AND CONSTRUCTION

SS	WE	EA	MR	EQ	IO	RP
<b>Credit 1</b>						

**4 Points**

### INTENT

Reward environmentally sensitive building design and construction, thereby enabling high-performance building operations to be achieved more easily.

### REQUIREMENTS

Choose one of the following options:

#### **OPTION A**

Show that the building has previously been certified under *LEED® for New Construction and Major Renovations*.

#### **OR**

#### **OPTION B**

Show that the building has previously been certified under *LEED® for Core & Shell*, and at least 75% of the floor area has also been certified under *LEED® for Commercial Interiors*.

### POTENTIAL TECHNOLOGIES & STRATEGIES

Pursue and earn LEED® certification for new buildings or major renovations.

SS	WE	EA	MR	EQ	IO	RP
<b>Credit 2</b>						

**1 Point**

## SUSTAINABLE SITES

### BUILDING EXTERIOR AND HARDSCAPE MANAGEMENT PLAN

#### INTENT

Encourage environmentally sensitive building exterior and hardscape management practices that provide a clean, well-maintained and safe building exterior while supporting high-performance building operations.

#### REQUIREMENTS

Employ an environmentally sensitive, low-impact building exterior and hardscape management plan that helps preserve surrounding ecological integrity. The plan must employ best management practices that significantly reduce harmful chemical use, energy waste, water waste, air pollution, solid waste and/or chemical runoff (e.g., gasoline, oil, antifreeze, salts) compared with standard practices. The plan must address all of the following operational elements that occur on the building and grounds, as applicable:

- maintenance equipment
- snow and ice removal
- cleaning of building exterior
- paints and sealants used on building exterior
- cleaning of sidewalks, pavement and other hardscape

#### POTENTIAL TECHNOLOGIES & STRATEGIES

During the performance period, have in place a low-impact site and green building exterior management plan that addresses overall site management, chemicals, snow and ice removal, and building exterior cleaning and maintenance. Include green cleaning and maintenance practices and materials that minimize environmental impacts. An outline of acceptable material for a low-impact plan is available in the *LEED® Canada for Existing Buildings: Operations and Maintenance Reference Guide*. Replace conventional gas-powered machinery with electric-powered equivalents (either battery or corded). Examples include, but are not limited to, maintenance equipment and vehicles, landscaping equipment and cleaning equipment.

# SUSTAINABLE SITES

## INTEGRATED PEST MANAGEMENT, EROSION CONTROL AND LANDSCAPE MANAGEMENT PLAN

SS	WE	EA	MR	EQ	IO	RP
<b>Credit 3</b>						

**1 Point**

### INTENT

Preserve ecological integrity, enhance natural diversity and protect wildlife while supporting high-performance building operations and integration into the surrounding landscape.

### REQUIREMENTS

Have in place, and implement, an environmentally sensitive management plan for the site's natural components. The plan must employ best management practices that significantly reduce harmful chemical use, energy waste, water waste, air pollution, solid waste and/or chemical runoff (e.g., gasoline, oil, antifreeze, salts) compared with standard practices. The plan must address all of the following operational elements:

#### Outdoor Pest Management

Develop, implement and maintain an outdoor integrated pest management (IPM) plan, defined as managing outdoor pests in a way that protects human health and the surrounding environment and that improves economic returns through the most effective, least-risk option. IPM calls for using least-toxic chemical pesticides, minimum use of chemicals, use only in targeted locations and use only for targeted species. IPM requires routine inspection and monitoring. The plan must include the following elements, integrated with any indoor IPM plan used for the building as appropriate:

- Integrated methods, site or pest inspections, pest population monitoring, evaluation of the need for pest control and one or more pest control methods, including sanitation, structural repairs, mechanical and living biological controls, other nonchemical methods, and if nontoxic options are unreasonable and have been exhausted, a least-toxic pesticide.
- Specification of the circumstances under which an emergency application of pesticides in a building or on surrounding grounds being maintained by building management can be conducted without complying with the earlier provisions.
- A communications strategy directed to building occupants that addresses universal notification, which requires advance notice of not less than 72 hours under normal conditions and 24 hours in emergencies before a pesticide, other than a least-toxic pesticide, is applied in a building or on surrounding grounds that the building management maintains.

The outdoor IPM plan must be coordinated and compatible with the IPM requirements of EQ credit 3.6 – Green Cleaning: Indoor Integrated Pest Management.

SS	WE	EA	MR	EQ	IO	RP
<b>Credit 3</b>						

**1 Point****Erosion and Sedimentation Control**

For ongoing landscape operations (where applicable) and future construction activity, the plan must address both site soil and potential construction materials. The plan must also include measures that prevent erosion and sedimentation, prevent air pollution from dust or particulate matter and restore eroded areas.

The ESC Plan shall conform to the erosion and sedimentation requirements of the 2003 U.S. EPA Construction General Permit OR local erosion and sedimentation control standards and codes, whichever is more stringent. The Construction General Permit (CGP) outlines the provisions necessary to comply with Phase I and Phase II of the National Pollutant Discharge Elimination System (NPDES) program. While the CGP only applies to construction sites greater than 1 acre, the requirements are applied to all projects for the purposes of this prerequisite. Information on the U.S. EPA CGP is available at: <http://cfpub.epa.gov/npdes/stormwater/cgp.cfm>.

As well, the plan should specify that construction materials listed categorized as "Prohibited" in the Society for *Organic Urban Land Care's Organic Land care Standard*, Fourth Edition, 2007, List 3 are not to be used on site.

**Landscape Waste Diversion:**

Divert a minimum of 95% of landscape waste from the waste stream via mulching, composting or other low-impact means. Provide an area dedicated to the collection of landscape waste.

**Reduction of Chemical Fertilizer:**

Minimize the use of artificial chemicals by using locally adapted plants that need no fertilizer, less polluting alternatives to artificial chemicals, or other low-impact maintenance. Specify that fertilizers listed as prohibited in the Society for Organic Urban Land Care's *Organic Land Care Standard*, Fourth Edition, 2007 List 1 are not to be used on site.

**POTENTIAL TECHNOLOGIES & STRATEGIES**

During the performance period, have in place a low-impact site and green building exterior management plan that addresses overall site management, chemicals, fertilizers, landscape waste and pest management. Include such green landscape management practices as reducing the use of power equipment, improving storm water control, using fertilizer only as needed, composting landscape waste, applying integrated pest management, creating wildlife habitat, removing or not installing invasive plants, protecting natural areas and using plants to reduce heating and cooling needs. Use mulching mowers to significantly reduce yard waste generation, fertilizer needs and water consumption through retention of organic matter.

# SUSTAINABLE SITES

## ALTERNATIVE COMMUTING TRANSPORTATION

SS	WE	EA	MR	EQ	IO	RP
<b>Credit 4</b>						

**3 - 15 Points**

### INTENT

Reduce pollution and land development impacts from conventional automobile use for commuting trips.

### REQUIREMENTS

Reduce the number of commuting round trips made by regular building occupants using single-occupant, conventionally powered and conventionally fueled vehicles. For the purposes of this credit, alternative transportation includes, but is not limited to, telecommuting, compressed workweeks, mass transit, walking, bicycles or other human-powered conveyances, carpools, vanpools, and fuel-efficient\* or alternative-fuel vehicles.

Conduct an occupant survey over the performance period to demonstrate the extent to which alternative transportation methods are used by building occupants. Performance calculations are made relative to a baseline case that assumes all regular occupants commute alone in conventional automobiles. The calculations must account for seasonal variations in the use of alternative commuting methods and, where possible, indicate the distribution of commuting trips using each type of alternative transportation.

Points are earned for reductions in conventional commuting trips during the performance period according to the following schedule:

DEMONSTRATED % REDUCTION IN CONVENTIONAL COMMUTING TRIPS	POINTS
10.00%	3
13.75%	4
17.50%	5
21.25%	6
25.00%	7
31.25%	8
37.50%	9
43.75%	10
50.00%	11
56.25%	12
62.50%	13
68.75%	14
75.00%	15

SS	WE	EA	MR	EQ	IO	RP
<b>Credit 4</b>						

**3 -15 Points****POTENTIAL TECHNOLOGIES & STRATEGIES**

When developing an alternative transportation program, consider the opportunities and limitations of different options, based on the building's location.

Provide space and infrastructure features, such as bicycle racks, changing facilities, preferred parking, access to mass transit (within 800 meters of a commuter rail, light rail or subway station and rail or 400 meters of 2 or more public bus lines offering frequent service) or alternative-fuel refueling stations. Offer employees incentives for using alternative transportation, such as additional vacation days, cash rewards or pretax options. Distribute free or discounted public transportation passes, bicycling equipment or telecommuting equipment to individuals committed to using them.

Encourage the use of alternative commuting methods by guaranteeing free rides home for employees who must unexpectedly leave work early or late. Utilize organization resources to communicate with building occupants about alternative transportation options and benefits, and facilitating communication among building occupants for coordinating ride sharing.

\* For the purposes of this credit, fuel-efficient vehicles are defined as vehicles that achieve an average fuel efficiency (45% highway, 55% city) of 6.5 L or less per 100 km.

# SUSTAINABLE SITES

## SITE DEVELOPMENT: PROTECT OR RESTORE OPEN HABITAT

SS	WE	EA	MR	EQ	IO	RP
<b>Credit 5</b>						

**1 Point**

### INTENT

Conserve existing natural site areas and restore damaged site areas to provide habitat and promote biodiversity.

### REQUIREMENTS

During the performance period, have in place native or adapted vegetation\* covering a minimum of 25% of the total site area (excluding the building footprint) or 5% of the total site area (including the building footprint), whichever is greater.

Improving and/or maintaining off-site areas with native or adapted plants can contribute toward earning SS Credit 5. Every 2 square meters off-site can be counted as 1 square meter on-site. If off-site areas are used to contribute to the credit, at least half of the on-site soft landscaping shall comply with the credit requirements. Off-site areas must be documented in a minimum 5-year contract with the owner of the offsite area that specifies the required improvement and maintenance of the off-site area. The off-site area must be located within an 800km radius of the project site.

The off-site area must meet the Canadian Land Trust Alliance (CLTA) member land trust requirements by either being donated to a CLTA member land trust, or the property owner must enter into a conservation agreement with a CLTA member land trust. If the *LEED® Canada for Existing Buildings: Operations and Maintenance* applicant is not the off-site property owner prior to the arrangement with a land trust, the *LEED® Canada for Existing Buildings: Operations and Maintenance* applicant must be contractually responsible for any endowment funds that the land trust requires and for any required improvement and/or maintenance activities.

Other ecologically appropriate features that contribute to this credit are natural site elements beyond vegetation that maintain or restore the ecological integrity of the site, including water bodies, exposed rock, unvegetated ground or other features that are part of the historic natural landscape within the region and provide habitat value.

Projects using vegetated roof surfaces may apply the vegetated roof surface to this calculation if the plants meet the definition of native/adapted and provide the habitat and biodiversity intent of the credit.

SS	WE	EA	MR	EQ	IO	RP
<b>Credit 5</b>						

**1 Point**

### POTENTIAL TECHNOLOGIES & STRATEGIES

Perform a site survey to identify site elements and adopt a master plan for management of the building site. Activities may include removing excessive paved areas and replacing them with landscaped areas or replacing excessive turf grass area with natural landscape features. Work with local horticultural extension services or native plant societies to select and maintain indigenous plant species for site restoration and landscaping. Coordinate with activities, technologies and strategies under SS Credit 3.

\* For purposes of this credit, native/adapted vegetation or plants are indigenous to a locality or cultivars of native plants that are adapted to the local climate and are not considered invasive species or noxious weeds.

# SUSTAINABLE SITES

## STORMWATER QUANTITY CONTROL

SS	WE	EA	MR	EQ	IO	RP
<b>Credit 6</b>						

**1 Point**

### INTENT

Limit disruption of natural hydrology by reducing impervious cover, increasing on-site infiltration, reducing or eliminating pollution from stormwater runoff, and eliminating contaminants.

### REQUIREMENTS

Implement a stormwater management plan that, during the performance period, infiltrates, collects and reuses runoff or evapotranspirates runoff from at least 15% of the precipitation falling on the whole project site (including the roof area) both for an average weather year and for the two-year, 24-hour design storm.

Implement an annual inspection program of all stormwater management facilities to confirm continued performance. Maintain documentation of inspection, including identification of areas of erosion, maintenance needs and repairs. Perform all routine required maintenance, necessary repairs or stabilization within 60 days of inspection.

### POTENTIAL TECHNOLOGIES & STRATEGIES

Collect and reuse stormwater for non-potable uses such as landscape irrigation, toilet and urinal flushing and custodial uses. During facility or site alterations or additions, specify the use alternative surfaces (e.g., vegetated roofs, pervious pavement or grid pavers) and nonstructural techniques (e.g., rain gardens, vegetated swales, disconnection of imperviousness, rainwater recycling) to improve perviousness, thereby restoring or maintaining natural stormwater flows. Incorporate stormwater management facilities into routine preventive and corrective maintenance programs.

SS	WE	EA	MR	EQ	IO	RP
<b>Credit 7.1</b>						

1 Point

# SUSTAINABLE SITES

## HEAT ISLAND REDUCTION: NON-ROOF

### INTENT

Reduce heat islands (thermal gradient differences between developed and undeveloped areas) to minimize impacts on microclimates and human and wildlife habitat.

### REQUIREMENTS

Choose one of the following options:

#### OPTION A

Use any combination of the following strategies for 50% of the site hardscape (including roads, sidewalks, courtyards and parking lots):

- Provide shade from existing tree canopy or within five years of landscape installation; landscaping (trees) must be in place at the time of certification application.
- Provide shade from structures covered by solar panels that produce usable energy used to offset some non-renewable resource use.
- Provide shade from architectural devices or structures that have a solar reflectance index (SRI) of at least 29. Implement a maintenance program that ensures these surfaces are cleaned at least every two years to maintain good reflectance.
- Have paving materials with an SRI of at least 29 and implement a maintenance program that ensures these surfaces are cleaned at least every two years to maintain good reflectance.
- Have an open-grid pavement system (at least 50% pervious).

#### OR

#### OPTION B

Place a minimum of 50% of parking spaces under cover (defined as underground, under deck, under roof or under a building). Any roof used to shade or cover parking must have an SRI of at least 29, be a vegetated green roof, or be covered by solar panels. Implement a maintenance program that ensures all SRI surfaces are cleaned at least every two years to maintain good reflectance. The top parking level of a multilevel parking structure is included in the total parking spaces calculation but is not considered a roof and is not required to be an SRI surface.

#### OR

#### OPTION C

Projects in urban sites with little or no building setbacks (i.e. zero lot line), no site hardscape or on-site parking, and that comply with SS Credit 7.2 will be deemed to meet the requirements of SS Credit 7.1.

To meet SS Credit 7.1 Options A or B requirements, the total area of parking used in the credit calculation must include on-site and off-site parking.

## POTENTIAL TECHNOLOGIES & STRATEGIES

Employ strategies, materials and landscaping techniques that reduce heat absorption of exterior materials. Use shade (calculated on June 21, noon solar time) from native or adapted trees and large shrubs, vegetated trellises or other exterior structures supporting vegetation. Consider the use of new coatings and integral colorants for asphalt to achieve light-colored surfaces instead of blacktop. Position photovoltaic cells to shade impervious surfaces.

Consider replacing constructed surfaces (i.e. roof, roads, sidewalks, etc.) with vegetated surfaces such as vegetated roofs and open grid paving or specify high-albedo materials, such as concrete, to reduce the heat absorption.

SS	WE	EA	MR	EQ	IO	RP
<b>Credit 7.1</b>						

**1 Point**

SS	WE	EA	MR	EQ	IO	RP
<b>Credit 7.2</b>						

1 Point

# SUSTAINABLE SITES

## HEAT ISLAND REDUCTION: ROOF

### INTENT

Reduce heat islands (thermal gradient differences between developed and undeveloped areas) to minimize impacts on microclimates and human and wildlife habitat.

### REQUIREMENTS

Choose one of the following options:

#### OPTION A

Use roofing materials having a solar reflectance index (SRI) equal to or greater than the values in the table below for a minimum of 75% of the roof area.

Roofing materials having a lower SRI value than those listed below may be used if the weighted rooftop SRI average meets the following criteria:

$$\frac{\text{Area Roof Meeting Minimum SRI} \times \text{SRI of installed Roof}}{\text{Total Area of Roof}} \geq \text{Required SRI} \geq 75\%$$

Implement a maintenance program that ensures all SRI surfaces are cleaned at least every two years to maintain good reflectance.

**OR**

#### OPTION B

Install and maintain a vegetated roof covering at least 50% of the roof area.

**OR**

#### OPTION C

Install high-albedo and vegetated roof surfaces that, in combination, meet the following criteria:  
 $(\text{Area Roof Meeting Minimum SRI} / 0.75) + (\text{Area of Vegetated Roof} / 0.5) \geq \text{Total Roof Area}$

ROOF TYPE	SLOPE	SRI
Low-sloped roof	≤ 2:12	78
Steep-sloped roof	> 2:12	29

## POTENTIAL TECHNOLOGIES & STRATEGIES

Consider installing high-albedo and vegetated roofs to reduce heat absorption. SRI is calculated according to ASTM E 1980. Solar reflectance is measured according to ASTM E 903, ASTM E 1918 or ASTM C 1549. Emissivity is measured according to ASTM E 408 or ASTM C 1371. Default values are available in the *LEED® Canada for Existing Buildings: Operations and Maintenance Reference Guide*. Product information is available from the Cool Roof Rating Council website, at : [www.coolroofs.org](http://www.coolroofs.org). Also, visit the ENERGY STAR website, [www.energystar.gov](http://www.energystar.gov). to research compliant products.

SS	WE	EA	MR	EQ	IO	RP
<b>Credit 7.2</b>						

**1 Point**

SS	WE	EA	MR	EQ	IO	RP
<b>Credit 8</b>						

1 Point

# SUSTAINABLE SITES

## LIGHT POLLUTION REDUCTION

### INTENT

Eliminate light trespass from the building and site, improve night sky access and reduce development impact on nocturnal environments.

### REQUIREMENTS

#### Interior Lighting.

All nonemergency built-in lighting with a direct line of sight to any openings in the envelope (translucent or transparent, wall or ceiling) must be automatically controlled to turn off during all after-hours periods during the performance period. The total duration of all programmed after-hours periods annually must equal or exceed 2,190 hours per year (50% of annual nighttime hours, eg. the hours between 11pm and 5am). Manual override capability may be provided for occasional after-hours use.

Implement a program to ensure that the lighting control system is being properly used to adjust lighting levels during all after-hours periods.

#### Exterior and Site Lighting

Choose one of the following options:

#### OPTION A

If the project is certified under *LEED® for New Construction and Major Renovations*, show that SS Credit 8 was earned. If the project is certified under *LEED® for Core and Shell* and 75% of the floor area is *LEED® for Commercial Interiors*, show that Light Pollution Reduction was earned for both systems.

#### OR

#### OPTION B

Partially or fully shield all exterior luminaries with 1000 initial lamp lumens or more; all exterior luminaries with more than 3500 initial lamp lumens to meet the Illuminating Engineering Society of North America (IESNA) Full Cutoff Classification, as defined by the IESNA Recommended Practice Manual: Lighting for Exterior Environments (RP-33-99), so they do not directly emit light to the night sky.

**OR****OPTION C**

Measure the night illumination levels at regularly spaced points around the perimeter of the property, taking the measurements with the building's exterior and site lights both on and off. The building's interior lights must be in the same state during both measurements. At least eight measurements are required at a maximum spacing of 30 m (100 feet) apart, so as to be representative of the illumination levels at the perimeter of the property. The illumination level measured with the lights on must not be more than 20% above the level measured with the lights off. This requirement must be met for each measurement point; averaging of all points is prohibited.

SS	WE	EA	MR	EQ	IO	RP
<b>Credit 8</b>						

**1 Point****POTENTIAL TECHNOLOGIES & STRATEGIES**

Implement site lighting criteria to maintain safe light levels while avoiding off-site lighting and night sky pollution. Minimize site lighting where possible and use a computer model to predict impacts when changing lighting. Technologies to reduce light pollution include full-cutoff luminaires and low-reflectance surfaces.



# WATER EFFICIENCY

## WATER METERING AND MINIMUM INDOOR PLUMBING FIXTURE AND FITTING EFFICIENCY

SS	<b>WE</b>	EA	MR	EQ	IO	RP
<b>Prerequisite 1</b>						

**Required**

### INTENT

Reduce indoor fixture and fitting water use within buildings to reduce the burdens on potable water supply and wastewater systems.

### REQUIREMENTS

Have in place a permanently installed water meter(s) that measures the total potable water use for the entire building and associated grounds. Meter data must be recorded on a regular basis and compiled into monthly and annual summaries. Develop a water-use breakdown for water consuming systems as described in the *LEED® Canada for Existing Buildings: Operations and Maintenance Reference Guide*.

### AND

Reduce potable water usage of indoor plumbing fixtures and fittings to a level equal to or below the *LEED® Canada for Existing Buildings: Operations and Maintenance* baseline, calculated as a percentage of the water usage that would result if 100% of the building's indoor plumbing fixtures and fittings meet the fixture performance requirements listed in Table 1. Fixtures and fittings included in the calculations for this credit are water closets, urinals, showerheads, faucets, faucet replacement aerators and metering faucets.

The *LEED® Canada for Existing Buildings: Operations and Maintenance* baseline water usage is set depending on the year of substantial completion of the building's indoor plumbing system. Substantial completion is defined as either initial building construction or the last plumbing renovation of all or part of the building that included 100% retrofit of all plumbing fixtures and fittings as part of the renovation. Set the *LEED® Canada for Existing Buildings: Operations and Maintenance* baseline as follows:

### OPTION A

For a plumbing system substantially completed in 1996 or later throughout the building, the baseline is 120% of the water usage that would result if all fixtures met the requirements listed in Table 1.

SS	<b>WE</b>	EA	MR	EQ	IO	RP
<b>Prerequisite 1</b>						

**Required**

**OR**

**OPTION B**

For a plumbing system substantially completed before 1996 throughout the building, the baseline is 160% of the water usage that would result if all fixtures met the requirements listed in Table 1.

If indoor plumbing systems were substantially completed at different times for different parts of the building because the plumbing renovations occurred at different times, set a whole-building average baseline by prorating between the above limits. Prorate based on the proportion of plumbing fixtures installed during the plumbing renovations in each date period, as explained in the *LEED® Canada for Existing Buildings: Operations and Maintenance Reference Guide*. Pre-1996 buildings that have had only minor fixture retrofits (aerators, showerheads, flushing valves) but no other plumbing renovations after 1995 may use the 160% baseline for the whole building.

Demonstrate fixture and fitting performance through calculations to compare the water use of the as-installed fixtures and fittings with the use of fixtures and fittings that comply with Table 1, as explained in the *LEED® Canada for Existing Buildings: Operations and Maintenance Reference Guide*.

Develop and implement a policy requiring economic assessment of conversion to high-performance plumbing fixtures and fittings as part of any future indoor plumbing renovation. The assessment must account for potential water supply and disposal cost savings and maintenance cost savings.

TABLE 1. BASELINE WATER FIXTURE REQUIREMENTS

FIXTURES, FITTINGS AND APPLIANCES	BASELINE COMMERCIAL WATER FIXTURE REQUIREMENTS	
	METRIC	IMPERIAL
Toilets	6.0 L/flush	1.6 gal/flush
Urinals	3.8 L/flush	1.0 gal/flush
Showerheads	9.5 L/min	2.5 gal/min
Faucets – Private	8.3 L/min at 414 kilopascals (kPa) private applications only (hotel-motel, guest rooms, hospital patient rooms)	2.2 gal/min at 60 psi private applications only (hotel-motel, guest rooms, hospital patient rooms)
Faucets – Public	1.9 L/min at 414 kilopascals (kPa) all others except private applications	0.5 gal/min at 60 psi all others except private applications.
Faucets – Metering	0.95 L/cycle for metering faucets	0.25 gal/cycle for metering faucets
FIXTURES, FITTINGS AND APPLIANCES	BASELINE RESIDENTIAL WATER FIXTURE REQUIREMENTS	
	METRIC	IMPERIAL
Toilets	6.0 L/flush at 414 kPa	1.6 gal/flush
Showerheads	9.5 L/min at 552 kPa per shower stall	2.5 gal/min at 80 psi per shower stall
Lavatory Faucets	8.3 L/min at 414 kPa	2.2 gal/min at 60 psi
Kitchen Faucets	8.3 L/min at 414 kPa	2.2 gal/min at 60 psi

## POTENTIAL TECHNOLOGIES & STRATEGIES

Reduce indoor plumbing fixture and fitting water usage through automatic controls and other actions. Specify water-conserving indoor plumbing fixtures and fittings that exceed the performance requirements listed in WE Prerequisite 1 Table 1, in combination with high efficiency or dry fixture and control technologies.

SS	<b>WE</b>	EA	MR	EQ	IO	RP
<b>Prerequisite 1</b>						

**Required**

SS	<b>WE</b>	EA	MR	EQ	IO	RP
<b>Credit 1.1 &amp; 1.2</b>						

1—2 Points

# WATER EFFICIENCY

## WATER PERFORMANCE MEASUREMENT

### INTENT

Measure building and subsystem water performance over time to understand consumption patterns and identify opportunities for additional water savings.

### REQUIREMENTS

Based on the water-use breakdown developed under WE Prerequisite 1, employ permanent system-level metering covering at least 40% or 80% of the total annual water consumption of the building. To achieve the credit threshold, have in place permanently installed metering for one or more of the following water subsystems:

#### **Irrigation.**

Meter water systems serving at least 80% of the irrigated landscape area on the grounds. The percentage of irrigated landscape area served must be calculated as the total metered irrigated landscape area divided by the total irrigated landscape area. All landscaping areas fully covered with xeriscaping or native vegetation that requires no routine irrigation must be excluded from the calculation entirely.

#### **Indoor plumbing fixtures and fittings.**

Meter water systems serving at least 80% of the indoor plumbing fixtures and fittings described in WE Prerequisite 1, either directly or by deducting all other measured water use from the measured total water consumption of the building and grounds.

#### **Cooling towers.**

Meter replacement water use of all cooling towers serving the facility.

#### **Domestic hot water.**

Meter water use of at least 80% of the installed domestic hot water heating capacity (including both tanks and on-demand style heaters).

#### **Reclaimed water use.**

Meter at least 80% of reclaimed water used in the building. Although reclaimed water use is not included in the water-use breakdown developed under WE Prerequisite 1, applicants can include metering of reclaimed water use to meet the requirements of this credit

#### **Other process water.**

Meter at least 80% of expected daily water consumption for process-type end uses, such as humidification systems, dishwashers, clothes washers, pools and other systems using process water.

**WE Credit 1.1** (1 point):

Demonstrate that system-level metering is in place covering at least 40% of the total expected annual water consumption of the building.

**WE Credit 1.2** (1 point):

Demonstrate that system-level metering is in place covering at least 80% of the total expected annual water consumption of the building.

Metering must be continuous and data-logged to allow for an analysis of time trends. The project must compile monthly and annual summaries of results for each subsystem metered.

Meters must be calibrated within the manufacturer's recommended interval if the building owner, management organization or tenant owns the meter. Meters owned by third parties (e.g., utilities or governments) are exempt.

SS	<b>WE</b>	EA	MR	EQ	IO	RP
<b>Credit 1.1 &amp; 1.2</b>						

**1—2 Points**

## POTENTIAL TECHNOLOGIES & STRATEGIES

Install subsystem-level water metering to measure and track potable water consumption by specific building systems; prioritize metering for those systems that use the most potable water.

SS	<b>WE</b>	EA	MR	EQ	IO	RP
<b>Credit 2</b>						

1—5 Points

## WATER EFFICIENCY

### ADDITIONAL INDOOR PLUMBING FIXTURE AND FITTING EFFICIENCY

#### INTENT

Maximize indoor plumbing fixture and fitting efficiency within buildings to reduce the use of potable water and consequent burden on municipal water supply and wastewater systems.

#### REQUIREMENTS

During the performance period, have in place strategies and systems that in aggregate produce a reduction in indoor plumbing fixture and fitting potable water use from the calculated *LEED®Canada for Existing Buildings: Operations and Maintenance* baseline established in WE Prerequisite 1.

The minimum water savings percentage for each point threshold is as follows:

PERCENTAGE REDUCTION	POINTS
10%	1
15%	2
20%	3
25%	4
30%	5

#### POTENTIAL TECHNOLOGIES & STRATEGIES

Reduce indoor plumbing fixture and fitting water usage through automatic controls and other actions. Specify water-conserving indoor plumbing fixtures and fittings that exceed the performance requirements listed in WE Prerequisite 1 Table 1, in combination with high efficiency or dry fixture and control technologies.

# WATER EFFICIENCY

## WATER EFFICIENT LANDSCAPING

SS	<b>WE</b>	EA	MR	EQ	IO	RP
<b>Credit 3</b>						

**1—5 Points**

### INTENT

Limit or eliminate the use of potable water or other natural surface or subsurface resources available on or near the project site for landscape irrigation.

### REQUIREMENTS

Reduce potable water or other natural surface or subsurface resource consumption for irrigation compared with conventional means of irrigation. If the building does not have separate water metering for irrigation systems, the water-use reduction achievements can be demonstrated through calculations.

The minimum water savings percentage for each point threshold is as follows:

PERCENTAGE REDUCTION	POINTS
50%	1
62.5%	2
75%	3
87.5%	4
100%	5

For buildings without vegetation or other ecologically appropriate features on the grounds, points can be earned by reducing the use of potable water for watering any roof and/or courtyard garden space or outdoor planters, provided the planters and/or garden space cover at least 5% of the building site area (including building footprint, hardscape area, parking footprint, etc). If the planters and/or garden space cover less than 5% of the building site area, the project is ineligible for this credit.

Three options are available to demonstrate compliance with the above requirements. Project teams that do not separately meter their actual irrigation water use during the performance period must choose Option B.

Choose one of the following options:

SS	<b>WE</b>	EA	MR	EQ	IO	RP
<b>Credit 3</b>						

**1—5 Points****OPTION A**

Calculate the mid-summer baseline irrigation water use by determining the water use that would result from using an irrigation system typical for the region and compare this with the building's actual irrigation potable water use, which can be determined through submetering. Use the baseline and actual water use values to calculate the percentage reduction in potable water or other natural surface or subsurface resource use. More detail about completing this calculation is available in the *LEED® Canada for Existing Buildings: Operations and Maintenance Reference Guide*.

**OR****OPTION B**

Calculate the estimated mid-summer irrigation water use by determining the landscape area for the project and sorting this area into the major vegetation types. Determine the reference evapotranspiration rate ( $ET_0$ ) for the region and determine the Species Factor ( $k_s$ ), Density Factor ( $k_d$ ) and Microclimate Factor ( $k_{mc}$ ) for each vegetation type. Use this information to calculate the Landscape Coefficient ( $K_L$ ) and irrigation water use for the design case. Calculate the baseline case irrigation water use by setting the above factors to average values representative of conventional equipment and design practices. Use the estimated and baseline case to determine the percentage reduction in potable water or other natural surface or subsurface resource use. Factor values and other resources for completing these calculations are available in the *LEED® Canada for Existing Buildings: Operations and Maintenance Reference Guide*.

**OR****OPTION C**

If independent irrigation performance and ranking tools are available from local, regional, provincial or national sources, use such tools to demonstrate reductions in potable water or other natural surface or subsurface resource for irrigation purposes.

**POTENTIAL TECHNOLOGIES & STRATEGIES**

Specify water-efficient, climate-tolerant native or adapted plantings. Implement or maintain high-efficiency irrigation technologies, such as micro irrigation, moisture sensors or weather data-based controllers. Feed irrigation systems with captured rainwater, gray water (on-site or municipal), municipally reclaimed water or on-site treated wastewater. Consider not operating an irrigation system. Consider use of xeriscaping principles in arid climates.

# WATER EFFICIENCY

## COOLING TOWER WATER MANAGEMENT

SS	<b>WE</b>	EA	MR	EQ	IO	RP
<b>Credit 4.1 &amp; 4.2</b>						

1—2 Points

### INTENT

Reduce potable water consumption for cooling tower equipment through effective water management and/or use of non-potable makeup water.

### REQUIREMENTS

#### **CREDIT 4.1: CHEMICAL MANAGEMENT** (1 POINT):

Develop and implement a water management plan for the cooling tower that addresses chemical treatment, bleed-off, biological control and staff training as it relates to cooling tower maintenance.

Improve water efficiency by installing and/or maintaining a conductivity meter and automatic controls to adjust the rate and maintain proper concentration at all times.

#### **CREDIT 4.2: NON-POTABLE WATER SOURCE USE** (1 POINT):

Use makeup water that consists of at least 50% non-potable water, such as harvested rainwater, harvested stormwater, air-conditioner condensate, swimming pool filter backwash water, cooling tower blow down, pass-through (once-through) cooling water, recycled treated wastewater for toilet and urinal flushing, foundation drain water, municipally reclaimed water or any other appropriate on-site water source that is not naturally occurring groundwater or surface water.

Have a measurement program in place that verifies makeup water quantities used from non-potable sources. Meters must be calibrated within the manufacturer's recommended interval if the building owner, management organization or tenant owns the meter. Meters owned by third parties (e.g., utilities or governments) are exempt.

### POTENTIAL TECHNOLOGIES & STRATEGIES

Work with a water treatment specialist to develop a water management strategy addressing the appropriate chemical treatment and bleed-off to ensure proper concentration levels in the cooling tower. Also, develop a biocide treatment program to avoid biological contamination and the risk of Legionella in the building.

Identify non-potable water sources that may be suitable for use in the cooling tower makeup water. Ensure that the water meets the cooling tower manufacturer's guidelines in terms of water purity and adjust the chemical treatment program accordingly.



# ENERGY & ATMOSPHERE

## ENERGY EFFICIENCY BEST MANAGEMENT PRACTICES - PLANNING, DOCUMENTATION AND OPPORTUNITY ASSESSMENT

SS	WE	EA	MR	EQ	IO	RP
<b>Prerequisite 1</b>						

**Required**

### INTENT

Promote continuity of information to ensure that energy-efficient operating strategies are maintained and provide a foundation for training and system analysis.

### REQUIREMENTS

Document the current sequence of operations for the building.

Develop a building operating plan that provides details on how the building is to be operated and maintained. The operating plan must include, at a minimum, an occupancy schedule, equipment run-time schedule, design set points for all HVAC equipment, and design lighting levels throughout the building. Identify any changes in schedules or set points for different seasons, days of the week and times of day. Validate that the operating plan has been met during the performance period.

Develop a systems narrative that briefly describes the mechanical and electrical systems and equipment in the building. The systems narrative must include all the systems used to meet the operating conditions stated in the operating plan, including, but not limited to, heating, cooling, ventilation, lighting and any building controls systems.

Create a narrative of the preventive maintenance plan for equipment described in the systems narrative and document the preventive maintenance schedule during the performance period.

Conduct an energy audit that meets the requirements of the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) Level I walk-through assessment as described in ASHRAE's *Procedures for Commercial Building Audits*.

The energy audit must be certified by a Professional Engineer and must have been completed within the *LEED® Canada for Existing Buildings: Operations and Maintenance* performance period to ensure that the documentation reflects the current operation of the building.

### POTENTIAL TECHNOLOGIES & STRATEGIES

Prepare a building operating plan that specifies the current operational needs of the building and identify building systems and other practices necessary to meet those needs. Outline the current sequence of operations to identify and eliminate any inefficiency.

Develop and implement a preventive maintenance program to regularly monitor and optimize the performance of mechanical equipment regulating indoor comfort and the conditions delivered in occupied spaces.

SS	WE	<b>EA</b>	MR	EQ	IO	RP
<b>Prerequisite 2</b>						

Required

## ENERGY & ATMOSPHERE

### MINIMUM ENERGY EFFICIENCY PERFORMANCE

#### INTENT

Establish the minimum level of operating energy efficiency performance relative to typical buildings of similar type to reduce environmental impacts associated with excessive energy use.

#### REQUIREMENTS

Choose one of the following options:

##### OPTION A

For buildings eligible to receive an energy performance rating using the U.S. EPA's ENERGY STAR® Portfolio Manager tool, achieve an energy performance rating of at least 69. If the building is eligible for an energy performance rating using Portfolio Manager, Option A must be used.

##### OR

##### OPTION B

For buildings not eligible to receive an energy performance rating using Portfolio Manager, demonstrate energy efficiency at least 19% better than the average for typical buildings of similar type by benchmarking against national average source energy data provided in the Portfolio Manager tool as an alternative to energy performance ratings. Follow the detailed instructions in the *LEED® Canada for Existing Buildings: Operations and Maintenance Reference Guide*.\*

##### OR

##### OPTION C

For buildings not eligible to receive an energy performance rating using Portfolio Manager and also not suited for Option B, use the alternative method described in the *LEED® Canada for Existing Buildings: Operations and Maintenance Reference Guide*.

In addition to Option A, B or C, meet all the requirements below:

- Have energy meter(s) that measure all energy use, for both building and site energy use, throughout the performance period of each building to be certified. Each building's energy performance must be based on actual metered energy consumption for both the LEED® project building(s) and all comparable buildings used for the benchmark. A full 12 months of continuous measured energy data is required.
- Calibrate meters within the manufacturer's recommended interval if the building owner, management organization or tenant owns the meter. Meters owned by third parties (e.g., utilities or governments) are exempt.

\*Projects should use the Portfolio Manager tool available on the ENERGY STAR web site to benchmark their building even when it is not eligible for an energy performance rating: <http://www.energystar.gov/benchmark>

## POTENTIAL TECHNOLOGIES & STRATEGIES

Existing building commissioning and energy audits will help identify areas of building operations that are not efficient. Implement energy-efficient retrofits and energy-saving techniques to reduce the building's energy use. Energy efficient equipment such as office equipment, maintenance equipment and appliances will aid in the reduction of energy waste. Employ the use of meters on major mechanical systems to effectively monitor the energy consumption of each.

In addition to efficiency improvements, consider renewable energy options as a way to minimize the building's environmental impact.

SS	WE	EA	MR	EQ	IO	RP
<b>Prerequisite 2</b>						

**Required**

SS	WE	<b>EA</b>	MR	EQ	IO	RP
<b>Prerequisite 3</b>						

Required

# ENERGY & ATMOSPHERE

## REFRIGERANT MANAGEMENT: OZONE PROTECTION

### INTENT

Reduce stratospheric ozone depletion.

### REQUIREMENTS

#### For Base Building Systems:

Do not use CFC-based refrigerants in HVAC&R base building systems unless the building demonstrates that a phase out plan for CFC-based refrigerants is in place. If a phase-out plan is implemented, the phase-out must be completed within 5 years of first *LEED® Canada for Existing Buildings: Operations and Maintenance* certification or at least 3 years prior to date when regulatory bans come into effect, whichever is sooner. The phase-out plan must include, at a minimum, an inventory and measurement of CFC and HCFC usage at the building. Annual leakage must be reduced to 1% or less and the leakage over the remainder of the unit life must be maintained below 30% using the U.S. EPA's Clean Air Act, Title VI, Rule 608 procedures governing refrigerant management and reporting during the phase-out period.

#### For Campus Projects using District Chilled Water Plants:

The CFC phase out must be completed by 2015 and either comply with the requirements of the authority having jurisdiction or meet the following conditions, whichever is more stringent:

- The replacement or upgrade to alternative refrigerants, as determined by a third party assessment, is not economically viable (e.g. simple payback of the replacement is greater than 10 years).
- Operation complies with the U.S. EPA's Clean Air Act Title VI, Rule 608 governing refrigerant management and reporting.
- A comprehensive preventative maintenance program is established to minimize CFC leaks to less than 1% annually and the leakage over the remainder of the unit life is maintained below 30%.
- The CFC based chillers are used as the lag chillers and do not deliver more than 25% of the total cooling from the plant.

Small HVAC&R units (defined as containing less than 0.23 kilograms (0.5 pounds) of refrigerant), standard refrigerators, small water coolers and any other cooling equipment that contains less than 0.23 kilograms (0.5 pounds) of refrigerant are not considered part of the base building system and are exempt

### POTENTIAL TECHNOLOGIES & STRATEGIES

Specify only non-CFC-based refrigerants in all new building HVAC&R systems. Identify all existing CFC-based refrigerant uses and upgrade the equipment and/or develop a phase-out plan that identifies a schedule for future replacement.

# ENERGY & ATMOSPHERE

## OPTIMIZE ENERGY EFFICIENCY PERFORMANCE

SS	WE	<b>EA</b>	MR	EQ	IO	RP
<b>Credit 1</b>						

**1—18 Points**

### INTENT

Achieve an increased level of operating energy efficiency performance relative to typical buildings of similar type to reduce environmental impacts associated with excessive energy use.

### REQUIREMENTS

Choose one of the following options:

#### OPTION A

For buildings eligible to receive an energy performance rating using the U.S. EPA's ENERGY STAR® Portfolio Manager tool, achieve an energy performance rating of at least 71. If the building is eligible for an energy performance rating using Portfolio Manager, Option A must be used. The building only requires an ENERGY STAR rating, whereas an official ENERGY STAR label is not required.

#### OR

#### OPTION B

For buildings not eligible to receive an energy performance rating using Portfolio Manager, demonstrate energy efficiency at least 21% better than the average for typical buildings of similar type by benchmarking against national average source energy data provided in the Portfolio Manager tool as an alternative to energy performance ratings. Follow the detailed instructions in the *LEED® Canada for Existing Buildings: Operations and Maintenance Reference Guide*.

#### OR

#### OPTION C

For buildings not eligible to receive an energy performance rating using Portfolio Manager and also not suited for Option B, use the alternative method described in the *LEED® Canada for Existing Buildings: Operations and Maintenance Reference Guide*.

In addition to OPTIONS A, B or C, achieve energy efficiency performance better than the minimal listed above; points are awarded according to the table below:

SS	WE	<b>EA</b>	MR	EQ	IO	RP
<b>Credit 1</b>						

**1—18 Points**

OPTION A		OPTION B AND C	
U.S. EPA ENERGY STAR ENERGY PERFORMANCE RATING	LEED® CANADA FOR EXISTING BUILDINGS: OPERATIONS AND MAINTENANCE POINTS	PERCENTAGE BETTER THAN NATIONAL AVERAGE (FOR BUILDINGS NOT ELIGIBLE FOR AN ENERGY STAR ENERGY PERFORMANCE RATING) *	LEED® CANADA FOR EXISTING BUILDINGS: OPERATIONS AND MAINTENANCE POINTS
71	1	21%	1
73	2	23%	2
74	3	24%	3
75	4	25%	4
76	5	26%	5
77	6	27%	6
78	7	28%	7
79	8	29%	8
80	9	30%	9
81	10	31%	10
82	11	32%	11
83	12	33%	12
85	13	35%	13
87	14	37%	14
89	15	39%	15
91	16	41%	16
93	17	43%	17
95	18	45%	18

\* Projects should use the Portfolio Manager tool available on the ENERGY STAR web site to benchmark their building even when it is not eligible for an energy performance rating: <http://www.energystar.gov/benchmark>

**POTENTIAL TECHNOLOGIES & STRATEGIES**

Existing building commissioning and energy audits will help identify areas of building operations that are not efficient. Implement energy-efficient retrofits and energy-saving techniques to reduce the building’s energy use. Energy efficient equipment such as office equipment, maintenance equipment and appliances will aid in the reduction of energy waste. Employ the use of meters on major mechanical systems to effectively monitor the energy consumption of each.

In addition to efficiency improvements, consider renewable energy options as a way to minimize the building’s environmental impact.

# ENERGY & ATMOSPHERE

## EXISTING BUILDING COMMISSIONING: INVESTIGATION AND ANALYSIS

SS	WE	EA	MR	EQ	IO	RP
<b>Credit 2.1</b>						

**2 Points**

### INTENT

Through a systematic process, develop an understanding of the operation of the building's major energy-using systems, options for optimizing energy performance and a plan to achieve energy savings.

### REQUIREMENTS

Conduct one of the following:

#### OPTION A. COMMISSIONING PROCESS

- Develop a retrocommissioning, recommissioning or ongoing commissioning plan for the building's major energy-using systems.
- Conduct an investigation and analysis phase.
- Document the breakdown of energy use in the building.
- List the operating problems that affect occupants' comfort and energy use, and develop potential operational changes that will solve them.
- List the identified capital improvements that will provide cost-effective energy savings and document the cost-benefit analysis associated with each.

#### OR

#### OPTION B. ASHRAE LEVEL II ENERGY AUDIT

- Conduct an energy audit that meets the requirements of ASHRAE, Level II, Energy Survey and Analysis as described in ASHRAE's *Procedures for Commercial Building Audits*.
- Document the breakdown of energy use in the building.
- Perform a savings and cost analysis of all practical measures that meet the owner's constraints and economic criteria, along with a discussion of any effect on operations and maintenance procedures.
- List the identified capital improvements that will provide cost-effective energy savings and document the cost-benefit analysis associated with each.

### POTENTIAL TECHNOLOGIES & STRATEGIES

Based on the building operating plan and systems narrative, confirm that all building systems and equipment are functioning as appropriate according to the equipment schedule. Conduct analysis and testing to ensure that building systems and equipment are functioning correctly. Identify opportunities to make no- or low-cost capital improvements to enhance building performance.

SS	WE	<b>EA</b>	MR	EQ	IO	RP
<b>Credit 2.2</b>						

2 Points

## ENERGY & ATMOSPHERE

### EXISTING BUILDING COMMISSIONING: IMPLEMENTATION

#### INTENT

Implement minor improvements and identify planned capital projects to ensure that the building's major energy-using systems are repaired, operated and maintained effectively to optimize energy performance.

#### REQUIREMENTS

Implement no- or low-cost operational improvements and create a capital plan for major retrofits or upgrades.

Provide training for management staff that builds awareness and skills in a broad range of sustainable building operations topics; this could include energy efficiency and building, equipment and systems operations and maintenance.

Demonstrate the observed and/or anticipated financial costs and benefits of measures that have been implemented.

Update the building operating plan as necessary to reflect any changes in the occupancy schedule, equipment run-time schedule, design set points and lighting levels.

#### POTENTIAL TECHNOLOGIES & STRATEGIES

Implement no- and low-cost operational improvements that will immediately enhance building performance. Develop a capital plan for the completion of any major retrofits identified through the investigation and analysis phase.

# ENERGY & ATMOSPHERE

## EXISTING BUILDING COMMISSIONING: ONGOING COMMISSIONING

SS	WE	EA	MR	EQ	IO	RP
<b>Credit 2.3</b>						

**2 Points**

### INTENT

Use commissioning to address changes in facility occupancy, use, maintenance and repair. Make periodic adjustments and reviews of building operating systems and procedures essential for optimal energy efficiency and service provision.

### REQUIREMENTS

Implement an ongoing commissioning program that includes elements of planning, system testing, performance verification, corrective action response, ongoing measurement and documentation to proactively address operating problems.

Create a written plan that summarizes the overall commissioning cycle for the building by equipment or building system group. The ongoing commissioning cycle must not exceed 24 months. This plan must include a building equipment list, performance measurement frequency for each equipment item and steps to respond to deviation from expected performance parameters.

Complete at least half of the scope of work in the first commissioning cycle (as indicated by the percentage of the plan's total budget) prior to the date of application for *LEED® Canada for Existing Buildings: Operations and Maintenance* certification. Only work completed within two years prior to application may be included to show progress in the ongoing commissioning cycle.

Update the building operating plan and/or systems narrative as necessary to reflect any changes in the occupancy schedule, equipment run-time schedule, design set points, lighting levels or system specifications.

### POTENTIAL TECHNOLOGIES & STRATEGIES

Develop an ongoing commissioning program that addresses the ongoing changes and maintenance needs in an existing building.

SS	WE	<b>EA</b>	MR	EQ	IO	RP
<b>Credit 3.1</b>						

1 Point

## ENERGY & ATMOSPHERE

### PERFORMANCE MEASUREMENT: BUILDING AUTOMATION SYSTEM

#### INTENT

Provide information to support the ongoing accountability and optimization of building energy performance and identify opportunities for additional energy-saving investments.

#### REQUIREMENTS

Have in place and use a computer-based building automation system (BAS) that monitors and controls key building systems, including, but not limited to, heating, cooling, ventilation and lighting.

Have a preventive maintenance program in place that ensures BAS components are tested and repaired or replaced according to the manufacturer's recommended interval. Demonstrate that the BAS is being used to inform decisions regarding changes in building operations and energy-saving investments.

The BAS shall, at a minimum, have the following features:

- Runtime totalizers adding the hours of operation for all major HVAC domestic water heaters and lighting equipment, with operator notices for maintenance tasks or out-of-nominal runtimes and storing trends of totalized runtime values. For example, set up a totalized value for the hours of operation of the main supply fan, and the rest on a weekly basis. Set alarm value for operation above the expected value, such as 70 hours.
- Annual and weekly operation schedules based on a "standard" or base schedule that reflects actual occupancy trends and statutory holidays.
- Setback of occupied and unoccupied heating and cooling set points, adjusted for energy efficiency.
- Static pressure set points adjusted to the lowest pressure feasible to meet space requirements.
- Confirm operation of outdoor air temperature sensor.
- Confirm operation of outdoor air dampers and minimum position.
- Automatic lighting controls should default to 'off' state during unoccupied hours (local independent automatic lighting controls that perform this function will be deemed to comply).

#### POTENTIAL TECHNOLOGIES & STRATEGIES

Install and/or maintain a BAS to automatically control key building systems. Ensure that all relevant staff is adequately trained to use the system, analyze output, make necessary adjustments and identify investment opportunities to improve energy performance.

# ENERGY & ATMOSPHERE

## PERFORMANCE MEASUREMENT: SYSTEM-LEVEL METERING

SS	WE	EA	MR	EQ	IO	RP
<b>Credit 3.2 &amp; 3.3</b>						

1—2 Points

### INTENT

Provide accurate energy-use information to support energy management and identify opportunities for additional energy-saving improvements.

### REQUIREMENTS

Develop a breakdown of energy use in the building, either through EA Credits 2.1 and 2.2 or by using energy bills, spot metering or other metering to determine the energy consumption of major mechanical systems and other end-use applications. This analysis of major energy-use categories must have been conducted within two years prior to the date of application for *LEED® Canada for Existing Buildings: Operations and Maintenance* certification.

Based on the energy-use breakdown, employ system-level metering covering at least 40% or 80% of the total expected annual energy consumption of the building. Permanent metering and recording are required. All types of submetering are permitted.

#### **Credit 3.2** (1 point):

Demonstrate that system-level metering is in place covering at least 40% of the total expected annual energy consumption of the building. Further, at least one of the two largest energy-use categories from the breakdown report must be covered to the extent of 80% or more (i.e., if energy use in the two largest categories is each 1000 kilowatt-hours/year, at least 800 kilowatt-hours/year in one of them must be metered).

#### **Credit 3.3** (1 point):

Demonstrate that system-level metering is in place covering at least 80% of the total expected annual energy consumption of the building. Further, at least two of the three largest energy-use categories from the breakdown report must be covered to the extent of 80% or more.

Metering must be continuous and data logged to allow for an analysis of time trends. The project must compile monthly and annual summaries of results for each system covered. Meters must be calibrated within the manufacturer's recommended interval if the building owner, management organization or tenant owns the meter. Meters owned by third parties (e.g., utilities or governments) are exempt.

SS	WE	<b>EA</b>	MR	EQ	IO	RP
<b>Credit 3.2 &amp; 3.3</b>						

**1—2 Points**

### POTENTIAL TECHNOLOGIES & STRATEGIES

Identify, through an energy audit, building commissioning or some other means, how the building systems are consuming energy. Based on the energy-use profile, develop a metering plan to capture the most significant building loads. Use output from the meters to identify any changes in consumption and opportunities for energy-saving improvements. Have a plan for periodically inspecting the data.

# ENERGY & ATMOSPHERE

## ON-SITE AND OFF-SITE RENEWABLE ENERGY

SS	WE	EA	MR	EQ	IO	RP
<b>Credit 4</b>						

**1—6 Points**

### INTENT

Encourage and recognize increasing levels of on-site and off-site renewable energy to reduce environmental impacts associated with fossil fuel energy use.

### REQUIREMENTS

During the performance period, meet some or all of the building's total energy use with on-site or off-site renewable energy systems. Points are earned according to the following table, which shows the percentages of building energy use met by renewable energy during the performance period.

Off-site renewable energy sources are defined by the Environment Canada Environmental Choice Program's EcoLogo requirements for green power suppliers, or the equivalent. Green power may be procured from an EcoLogo certified power marketer or an EcoLogo accredited utility program, or through Green-e-certified tradable renewable energy certificates (RECs), or the equivalent. For on-site renewable energy that is claimed for *LEED® Canada for Existing Buildings: Operations and Maintenance* credit, the associated environmental attributes must be retained or retired and cannot be sold.

If the green power is not EcoLogo certified, equivalence must exist for the following program components: 1) current green power performance standards, and 2) independent third-party verification that those standards are being met by the green power supplier over time.

Up to the six-point limit, any combination of individual actions is awarded the sum of the points allocated to those individual actions. For example, one point would be awarded for implementing 3% of on-site renewable energy, and three additional points would be awarded for meeting 50% of the building's energy load with renewable power or certificates during the performance period. Projects must submit proof of a contract to purchase RECs for a minimum of two years and must also make a commitment to purchase RECs on an ongoing basis beyond that.

TABLE 1: RENEWABLE ENERGY POINT ALLOCATION THRESHOLDS

POINTS	ON-SITE RENEWABLE ENERGY		OFF-SITE RENEWABLE ENERGY CERTIFICATES
1	3%	OR	25%
2	4.5%	OR	37.5%
3	6%	OR	50%
4	7.5%	OR	62.5%
5	9%	OR	75%
6	12%	OR	100%

SS	WE	<b>EA</b>	MR	EQ	IO	RP
<b>Credit 4</b>						

**1—6 Points**

## POTENTIAL TECHNOLOGIES & STRATEGIES

Design and specify the use of on-site nonpolluting renewable technologies to contribute to the total energy requirements of the building. Consider and employ solar, wind, biomass (other than unsustainably harvested wood) and biogas technologies.

Purchase renewable energy or tradable renewable energy certificates to meet some or all of the building's energy requirements. Review the building's electrical consumption trends. Research power providers in the area and select a provider that guarantees that a portion of its delivered electric power is derived from net non-polluting renewable technologies. If the project is in an open-market province, investigate green power and power marketers licensed to provide power in that province. Grid power that qualifies for this credit originates from solar, wind, high-temperature geothermal, biomass or low-impact hydro sources.

# ENERGY & ATMOSPHERE

## ENHANCED REFRIGERANT MANAGEMENT

SS	WE	<b>EA</b>	MR	EQ	IO	RP
<b>Credit 5</b>						

**1 Point**

### INTENT

Reduce ozone depletion and support early compliance with the Montreal Protocol while minimizing direct contributions to global warming.

### REQUIREMENTS

Do not operate or install fire suppression systems that contain ozone-depleting substances (CFCs, HCFCs or Halons).

#### AND EITHER

##### OPTION A

Do not use refrigerants in base building HVAC&R systems.

##### OR

##### OPTION B

Select refrigerants and HVAC&R equipment that minimize or eliminate the emission of compounds that contribute to ozone depletion and global warming. The base building HVAC&R equipment must comply with the following formula, which sets a maximum threshold for the combined contributions to ozone depletion and global warming potential:

$$LCGWP + LCODP \times 10^5 \leq 100$$

Where:

$$LCODP = [ODPr \times (Lr \times Life + Mr) \times Rc] / Life$$

$$LCGWP = [GWPr \times (Lr \times Life + Mr) \times Rc] / Life$$

LCODP: Lifecycle Ozone Depletion Potential (lbCFC11/Ton-Year)

LCGWP: Lifecycle Direct Global Warming Potential (lbCO<sub>2</sub>/Ton-Year)

GWPr: Global Warming Potential of Refrigerant (typically 0 to 12,000 lbCO<sub>2</sub>/lbr)

ODPr: Ozone Depletion Potential of Refrigerant (typically 0 to 0.2 lbCFC11/lbr)

Lr: Refrigerant Leakage Rate (typically 0.5% to 2.0%; default of 2% unless otherwise demonstrated)

Mr: End-of-life Refrigerant Loss (typically 2% to 10%; default of 10% unless otherwise demonstrated)

Rc: Refrigerant Charge (typically 0.5 to 5.0 lbs of refrigerant per ton of gross ARI rated cooling capacity)

SS	WE	<b>EA</b>	MR	EQ	IO	RP
<b>Credit 5</b>						

**1 Point**

Life: Equipment Life (default based on equipment type, unless otherwise demonstrated)

For multiple types of equipment, a weighted average of all base building level HVAC&R equipment must be applied using the following formula:

$$[\sum(LCGWP + LCODP \times 10^5) \times Q_{unit}] / Q_{total} \leq 100$$

Where:  $Q_{unit}$  = Gross ARI rated cooling capacity of an individual HVAC or refrigeration unit (tons)

$Q_{total}$  = Total Gross ARI rated cooling capacity of all HVAC or refrigeration

Small HVAC units (defined as containing less than 0.23 kilograms [0.5 pounds] of refrigerant), standard refrigerators, small water coolers and any other cooling equipment that contains less than 0.23 kilograms (0.5 pounds) of refrigerant are not considered part of the base building system and are exempt from Option A and Option B.

### POTENTIAL TECHNOLOGIES & STRATEGIES

Operate the facility without mechanical cooling and refrigeration equipment. Where mechanical cooling is needed, use for the refrigeration cycle base building HVAC and refrigeration systems that minimize direct impact on ozone depletion and global warming. Select HVAC&R replacement equipment with reduced refrigerant charge and increased equipment life. Maintain equipment to prevent leakage of refrigerant to the atmosphere. Utilize fire-suppression systems that do not contain HCFCs or halons.

# ENERGY & ATMOSPHERE

## EMISSIONS REDUCTION REPORTING

SS	WE	EA	MR	EQ	IO	RP
<b>Credit 6</b>						

**1 Point**

### INTENT

Document the emissions reduction benefits of building efficiency measures.

### REQUIREMENTS

Identify building performance parameters that reduce conventional energy use and emissions, quantify those reductions and report them to a formal tracking program:

- Track and record emissions reductions delivered by energy efficiency, renewable energy and other building emissions reduction measures, including reductions from the purchase of renewable energy credits.
- Participate in a voluntary Greenhouse Gas (GHG) Registry that requires third-party verification, such as The Climate Registry or Canadian Standards Association's (CSA) GHG Registries. Report emissions reductions using a corresponding third-party voluntary reporting or certification protocol (such as World Resources Institute (WRI) GHG Inventory Protocol, or CSA/ISO 14064).
- Reductions to be documented include carbon dioxide (CO<sub>2</sub>), sulfur dioxide (SO<sub>2</sub>), nitrogen oxides (NO<sub>x</sub>), nitrous oxide (N<sub>2</sub>O), methane (CH<sub>4</sub>), mercury (Hg), small particulate matter (PM<sub>2.5</sub>), large particulate matter (PM<sub>10</sub>), volatile organic compounds (VOC<sub>s</sub>), and nuclear waste.

### POTENTIAL TECHNOLOGIES & STRATEGIES

Address all of the significant types of pollutants reduced by energy efficiency. This is important because negative health effects and other environmental impacts result from many pollutants, including carbon dioxide (CO<sub>2</sub>), sulfur dioxide (SO<sub>2</sub>), nitrogen oxides (NO<sub>x</sub>), nitrous oxide (N<sub>2</sub>O), methane (CH<sub>4</sub>), mercury (Hg), small particulate matter (PM<sub>2.5</sub>), large particulate matter (PM<sub>10</sub>), volatile organic compounds (VOC<sub>s</sub>) and nuclear waste generated due to the building's energy consumption. Energy efficiency, renewable energy and other building emissions reduction measures make important contributions toward improving human and environmental health.



# MATERIALS & RESOURCES

## SUSTAINABLE PURCHASING POLICY

SS	WE	EA	MR	EQ	IO	RP
<b>Prerequisite 1</b>						

**Required**

### INTENT

Reduce the environmental impacts of materials acquired for use in the operations, maintenance and upgrades of buildings.

### REQUIREMENTS

Have in place an Environmentally Preferable Purchasing (EPP) policy that includes, at a minimum, product purchasing policies for the building and site addressing the requirements of MR Credit 1, Sustainable Purchasing: Ongoing Consumables. This policy must adhere to the *LEED® Canada for Existing Buildings: Operations and Maintenance* for policy model (see *Introduction*)

At a minimum, the policy must cover those product purchases that are within the building and site management's control.

Additionally, extend the EPP policy to include product purchasing policies for the building and site addressing the requirements of at least one of the credits listed below. This extended policy must also adhere to the *LEED® Canada for Existing Buildings: Operations and Maintenance* policy model and specifically address the goal, scope and performance metric for the respective credit:

**MR Credit 2:** Sustainable Purchasing – Durable Goods

**MR Credit 3:** Sustainable Purchasing – Facility Alterations and Additions

**MR Credit 4:** Sustainable Purchasing – Reduced Mercury in Lamps

This prerequisite requires only policies, not ongoing actual sustainable performance.

### POTENTIAL TECHNOLOGIES & STRATEGIES

Evaluate the items that are purchased for the building, identify more environmentally friendly alternatives and establish a policy to purchase these alternatives when economically feasible. Work with suppliers to identify environmentally preferable products that meet the needs of the building.

SS	WE	EA	MR	EQ	IO	RP
Prerequisite 2						

Required

# MATERIALS & RESOURCES

## SOLID WASTE MANAGEMENT POLICY

### INTENT

Facilitate the reduction of waste generated by building occupants that is hauled to and disposed of in landfills or incineration facilities.

### REQUIREMENTS

Have in place a solid waste management policy for the building and site addressing the requirements of the waste management credits listed below as well as recycling of all mercury-containing lamps. This policy must adhere to the *LEED® Canada for Existing Buildings: Operations and Maintenance* policy model (see Introduction).

At a minimum, the policy must cover the waste streams that are within the building and site management's control.

**MR Credit 7:** Solid Waste Management – Ongoing Consumables

**MR Credit 8:** Solid Waste Management – Durable Goods

**MR Credit 9:** Solid Waste Management – Facility Alterations and Additions

This prerequisite requires only policies, not ongoing actual sustainable performance.

### POTENTIAL TECHNOLOGIES & STRATEGIES

Evaluate the building's waste stream and establish policies to divert materials from disposal in landfills or incineration facilities by encouraging the reuse and recycling of items, where possible.

# MATERIALS & RESOURCES

## SUSTAINABLE PURCHASING: ONGOING CONSUMABLES

SS	WE	EA	MR	EQ	IO	RP
<b>Credit 1</b>						

**1 Point**

### INTENT

Reduce the environmental and air quality impacts of the materials acquired for use in the operations and maintenance of buildings.

### REQUIREMENTS

Maintain a sustainable purchasing program covering materials with a low cost per unit that are regularly used and replaced through the course of business. These materials include, but are not limited to, paper (printing or copy paper, notebooks, notepads, envelopes), toner cartridges, binders, batteries and desk accessories but exclude food and beverages (see MR Credit 5). For materials that may be considered either ongoing consumables or durable goods (see MR Credit 2), the project team is free to decide which category to put them in as long as consistency is maintained with MR Credit 2, with no contradictions, exclusions or double-counting. Consistency must also be maintained with MR Credit 7.

A template calculator for MR Credit 1 is available in the *LEED® Canada for Existing Buildings: Operations and Maintenance Reference Guide*. One point is awarded to projects that achieve sustainable purchases of at least 60% of total purchases (by cost) of ongoing consumables during the performance period. Sustainable purchases are those that meet one or more of the following criteria:

- Purchases contain at least 10% postconsumer and/or 20% postindustrial recycled content material.
- Purchases contain at least 50% rapidly renewable materials.
- Purchases contain at least 50% materials that meet the requirements listed below:
- The final manufacturing location of the product is within 800km of the project site; and
- The product (or component) did not leave the 800km (500 mile) radius surrounding the final manufacturing location (2,400km or 1,500 miles if shipped by rail or water). This includes all extraction, harvesting, recovery, and processing.
- The purchases consist of at least 50% Forest Stewardship Council (FSC)–certified paper products.
- Batteries are rechargeable.

Each purchase can receive credit for each sustainable criterion met (i.e., a \$100 purchase that contains both 10% postconsumer recycled content and 50% rapidly renewable counts twice in the calculation, for a total of \$200 of sustainable purchasing).

Ongoing consumables must be purchased during the performance period to earn points in this credit.

SS	WE	EA	<b>MR</b>	EQ	IO	RP
<b>Credit 1</b>						

**1 Point**

### POTENTIAL TECHNOLOGIES & STRATEGIES

Specify those that meet one or more of the criteria when purchasing materials, supplies or equipment.

# MATERIALS & RESOURCES

## SUSTAINABLE PURCHASING: DURABLE GOODS

SS	WE	EA	MR	EQ	IO	RP
<b>Credit 2.1 &amp; 2.2</b>						

1—2 Points

### INTENT

Reduce the environmental and air quality impacts of the materials acquired for use in the operations and maintenance of buildings.

### REQUIREMENTS

Maintain a sustainable purchasing program covering items available at a higher cost per unit and durable goods that are replaced infrequently and/or may require capital program outlays to purchase. Materials that may be considered either ongoing consumables (see MR Credit 1) or durable goods can be counted under either category provided consistency is maintained with MR Credit 1, with no contradictions, exclusions or double-counting. Consistency must also be maintained with MR Credit 8.

#### **MR Credit 2.1 ELECTRIC-POWERED EQUIPMENT** (1 Point):

One point is awarded to projects that achieve sustainable purchases of at least 40% of total purchases of electric-powered equipment (by cost) during the performance period. Examples of electric-powered equipment include, but are not limited to, office equipment (computers, monitors, copiers, printers, scanners, fax machines), appliances (refrigerators, dishwashers, water coolers), external power adapters, and televisions and other audiovisual equipment. Sustainable purchases are those that meet one of the following criteria:

- The equipment is ENERGY STAR labelled (for product categories with developed specifications).
- The equipment (either battery or corded) replaces conventional gas-powered equipment. Examples include, but are not limited to, maintenance equipment and vehicles, landscaping equipment and cleaning equipment.

SS	WE	EA	MR	EQ	IO	RP
<b>Credit 2.1 &amp; 2.2</b>						

1—2 Points

**MR Credit 2.2 FURNITURE** (1 Point):

One point is awarded to projects that achieve sustainable purchases of at least 40% of total purchases of furniture (by cost) during the performance period. Sustainable purchases are those that are GREENGUARD certified or that meet one or more of the following criteria:

- Purchases contain at least 10% postconsumer and/or 20% postindustrial recycled content material.
- Purchases contain at least 70% material salvaged from off-site or outside the organization.
- Purchases contain at least 70% material salvaged from on-site, through an internal organization materials and equipment reuse program.
- Purchases contain at least 50% rapidly renewable material.
- Purchases of wood-based furniture products contain at least 50% Forest Stewardship Council (FSC)–certified wood.
- Purchases contain at least 50% material that meet the requirements listed below:
- The final manufacturing location of the product is within 800 km of the project site; and the product (or component) did not leave the 800km (500 mile) radius surrounding the final manufacturing location (2,400km or 1,500 miles if shipped by rain or water). This includes all extraction, harvesting, recovery, and processing.

Each furniture purchase can receive credit for each sustainable criterion met (i.e., a \$100 purchase that contains both 10% post consumer recycled content and 50% rapidly renewable counts twice in the calculation, for a total of \$200 of sustainable purchasing).

Durable goods must be purchased during the performance period to earn points in this credit.

**POTENTIAL TECHNOLOGIES & STRATEGIES**

When purchasing materials, supplies or equipment specify products that meet one or more of the criteria for credit. This credit is eligible for exemplary performance if the project team uses Electronic Product Environmental Assessment Tools (EPEAT)–rated desktop computers, monitors and notebooks.

# MATERIALS & RESOURCES

## SUSTAINABLE PURCHASING: FACILITY ALTERATIONS AND ADDITIONS

SS	WE	EA	MR	EQ	IO	RP
<b>Credit 3</b>						

**1 Point**

### INTENT

Reduce the environmental and air quality impacts of the materials acquired for use in the upgrade of buildings.

### REQUIREMENTS

Maintain a sustainable purchasing program covering materials for facility renovations, demolitions, refits and new construction additions. This applies only to base building elements permanently or semi-permanently attached to the building itself. Examples include, but are not limited to, building components and structures (wall studs, insulation, doors, windows), panels, attached finishings (drywall, trim, ceiling panels), carpet and other flooring material, adhesives, sealants, paints and coatings. Materials considered fixtures, furniture and equipment (FF&E) are not considered base building elements and are excluded from this credit. Mechanical, electrical and plumbing components and specialty items such as elevators are also excluded from this credit.

A sample calculation for this credit is available in the *LEED® Canada for Existing Buildings: Operations and Maintenance Reference Guide*. One point is awarded to projects that achieve sustainable purchases of 50% of total purchases (by cost) during the performance period. Sustainable purchases are those that meet one or more of the following criteria:

- Purchases contain at least 10% postconsumer and/or 20% postindustrial recycled content material.
- Purchases contain at least 70% material salvaged from off-site or outside the organization.
- Purchases contain at least 70% material salvaged from on-site, through an internal organization materials and equipment reuse program.
- Purchases contain at least 50% rapidly renewable material.
- Purchases contain at least 50% Forest Stewardship Council (FSC)–certified wood.

SS	WE	EA	MR	EQ	IO	RP
<b>Credit 3</b>						

**1 Point**

- Purchases contain at least 50% material that meet the requirements listed below:
  - The final manufacturing location of the product is within 800km of the project site; and
  - The product (or component) did not leave the 800km (500 mile) radius surrounding the final manufacturing location (2,400km or 1,500 miles if shipped by rail or water). This includes all extraction, harvesting, recovery, and processing.
  - Adhesives and sealants have a VOC content less than the current VOC content limits of South Coast Air Quality Management District (SCAQMD) Rule #1168, or sealants used as fillers meet or exceed the requirements of the Bay Area Air Quality Management District Regulation 8, Rule 51.
  - Paints and coating have VOC emissions not exceeding the limits of Green Seal's Standard GS-11 requirements.
  - Noncarpet finished flooring is FloorScore-certified and constitutes a minimum of 25% of the finished floor area.
  - Carpet meets the requirements of the CRI Green Label Plus Carpet Testing Program.
  - Carpet cushion meets the requirements of the CRI Green Label Testing Program.
  - Composite panels and agrifiber products contain no added urea-formaldehyde resins.

Composite wood and agrifiber products include particleboard, medium-density fiberboard (MDF), plywood, oriented-strand board (OSB), wheat board, strawboard, panel substrates and door cores.

Each purchase can receive credit for each sustainable criterion met (i.e., a \$100 purchase that contains both 10% postconsumer recycled content and 50% rapidly renewable counts twice in the calculation, for a total of \$200 of sustainable purchasing).

Materials for alterations or additions must be purchased during the performance period to earn points in this credit.

## POTENTIAL TECHNOLOGIES & STRATEGIES

When purchasing materials, supplies or equipment, specify products that meet one or more of the credit criteria.

# MATERIALS & RESOURCES

## SUSTAINABLE PURCHASING: REDUCED MERCURY IN LAMPS

SS	WE	EA	MR	EQ	IO	RP
<b>Credit 4</b>						

**1 Point**

### INTENT

Establish and maintain a toxic material source reduction program to reduce the amount of mercury brought onto the building site through purchases of lamps.

### REQUIREMENTS

Develop a lighting purchasing plan that specifies maximum levels of mercury permitted in mercury-containing lamps purchased for the building and associated grounds, including lamps for both indoor and outdoor fixtures, as well as both hard-wired and portable fixtures. The purchasing plan must specify a target for the overall average of mercury content in lamps of 90 picograms per lumen-hour or less. The plan must include lamps for both indoor and outdoor fixtures, as well as both hard-wired and portable fixtures. The plan must require that at least 90% of purchased lamps comply with the target (as measured by the number of lamps). Lamps containing no mercury may be counted toward plan compliance only if the lamp's lumens per watt are at least as good as their mercury-containing counterparts.

Implement the lighting purchasing plan during the performance period such that all purchased mercury-containing lamps comply with the plan. One point is awarded to projects for which at least 90% of all mercury-containing lamps purchased during the performance period (as measured by the number of lamps) comply with the purchasing plan and meet the overall targets for mercury content.

Exception: Screw-based, integral compact fluorescent lamps (CFLs) may be excluded from both the plan and the performance calculation if they comply with the voluntary industry guidelines for maximum mercury content published by the National Electrical Manufacturers Association (NEMA), as described in the *LEED® Canada for Existing Buildings: Operations and Maintenance Reference Guide*. Screw-based, integral CFLs that do not comply with the NEMA guidelines must be included in the purchasing plan and the performance calculation.

Performance metrics for lamps – including mercury content (mg/lamp), mean light output (lumens) and rated life (hours) – must be derived according to industry standards, as described in the *LEED® Canada for Existing Buildings: Operations and Maintenance Reference Guide*. Mercury values generated by toxicity characteristic leaching procedure (TCLP) tests do not provide the required mercury information for *LEED® Canada for Existing Buildings: Operations and Maintenance* and cannot be used in the calculation.

SS	WE	EA	MR	EQ	IO	RP
<b>Credit 4</b>						

**1 Point**

*LEED® Canada for Existing Buildings: Operations and Maintenance* addresses only the lamps purchased during the performance period, not the lamps installed in the building. Similarly, *LEED® Canada for Existing Buildings: Operations and Maintenance* does not require that each purchased lamp comply with the specified mercury limit; only the overall average of purchased lamps must comply.

Mercury-containing lamps (or their high-efficiency counterparts) must be purchased during the performance period to earn points in this credit.

Collect and appropriately dispose of all the discarded fluorescent lamps used in the building, including those that contain mercury and other hazardous waste.

**POTENTIAL TECHNOLOGIES & STRATEGIES**

Establish and follow a lamp-purchasing program that sets a maximum level of mercury content and life for all mercury-containing lamp types. Work with suppliers to specify these requirements for all future purchases.

A template calculator to aid in documenting performance for MR Credit 4 is available in the *LEED® Canada for Existing Buildings: Operations and Maintenance Reference Guide*.

# MATERIALS & RESOURCES

## SUSTAINABLE PURCHASING: FOOD

SS	WE	EA	MR	EQ	IO	RP
<b>Credit 5</b>						

**1 Point**

### INTENT

Reduce the environmental and transportation impacts associated with food production and distribution.

### REQUIREMENTS

Achieve sustainable purchases of at least 25% (by cost) of the total combined food and beverage purchases by food services hired or controlled by base building management during the performance period. Sustainable purchases are those that meet at least one of the following criteria:

- Canadian Food Inspection Agency (CFIA) Organic Products Regulations.
- Purchases are labelled USDA Certified Organic, Food Alliance Certified, Rainforest Alliance Certified, Protected Harvest Certified, Fair Trade or Marine Stewardship Council's Blue Eco-Label.
- Purchases are produced within a 160 kilometre (100-mile) radius of the site.

Each purchase can receive credit for each sustainable criterion met (i.e., a \$100 purchase that is both USDA Certified Organic and is produced on a farm within 160 kilometres (100 miles) of the project counts twice in the calculation, for a total of \$200 of sustainable purchasing).

Food or beverages must be purchased during the performance period to earn points in this credit.

### POTENTIAL TECHNOLOGIES & STRATEGIES

When purchasing food and beverages, specify that the items meet one or more of the criteria in this credit. Consider using catering companies that purchase locally grown and/or organic foods.

SS	WE	EA	MR	EQ	IO	RP
<b>Credit 6</b>						

1 Point

## MATERIALS & RESOURCES

### SOLID WASTE MANAGEMENT: WASTE STREAM AUDIT

#### INTENT

Facilitate the reduction of ongoing waste and toxins generated by building occupants and building operations that are hauled to and disposed of in landfills or incineration facilities.

#### REQUIREMENTS

Conduct a waste stream audit of the building's entire ongoing consumables waste stream (not durable goods or construction waste for facilities alterations and additions). Use the audit's results to establish a baseline that identifies the types of waste making up the waste stream and the amounts of each type by weight or volume. Identify opportunities for increased recycling and waste diversion. The audit must be conducted during the performance period.

#### POTENTIAL TECHNOLOGIES & STRATEGIES

Understanding waste production patterns in a building is an important first step to waste reduction. Work with your waste hauler or service provider to collect and analyze information on the amounts and types of waste generated by the facility.

# MATERIALS & RESOURCES

## SOLID WASTE MANAGEMENT: ONGOING CONSUMABLES

SS	WE	EA	MR	EQ	IO	RP
<b>Credit 7</b>						

**1 Point**

### INTENT

Facilitate the reduction of waste and toxins generated from the use of ongoing consumable products by building occupants and building operations that are hauled to and disposed of in landfills or incineration facilities.

### REQUIREMENTS

Maintain a waste reduction and recycling program that addresses materials with a low cost per unit that are regularly used and replaced through the course of business. These materials include, but are not limited to, paper, toner cartridges, glass, plastics, cardboard and old corrugated cardboard, food and packaging waste and metals. Materials that may be considered either ongoing consumables or durable goods (see MR Credit 8) can be counted under either category provided consistency is maintained with MR Credit 8, with no contradictions, exclusions or double-counting. Consistency must also be maintained with MR Credits 1 and 5.

Reuse, recycle or compost 50% of the ongoing consumables waste stream (by weight or volume).

Have a battery recycling and toxic waste management program in place consistent with the policy adopted in MR Prerequisite 2. The program must have a target of diverting at least 80% of discarded batteries and all toxic waste from the trash, and actual diversion performance must be verified at least annually. The program must cover all portable dry-cell types of batteries, including single-use and/or rechargeable batteries used in radios, phones, cameras, computers and other devices or equipment.

Collect and appropriately dispose of all discarded fluorescent lamps used in the building, including those that contain mercury and other hazardous waste.

### POTENTIAL TECHNOLOGIES & STRATEGIES

Maintain a waste reduction and recycling program that addresses materials with a low cost per unit that are regularly used and replaced through the course of business. Encourage a high level of recycling by building occupants.

SS	WE	EA	<b>MR</b>	EQ	IO	RP
<b>Credit 8</b>						

1 Point

## MATERIALS & RESOURCES

### SOLID WASTE MANAGEMENT: DURABLE GOODS

#### INTENT

Facilitate the reduction of waste and toxins generated from the use of durable goods by building occupants and building operations that are hauled to and disposed of in landfills or incineration facilities.

#### REQUIREMENTS

Maintain a waste reduction, reuse and recycling program that addresses durable goods that are replaced infrequently and/or may require capital program outlays to purchase. Examples include, but are not limited to, office equipment (computers, monitors, copiers, printers, scanners, and fax machines), appliances (refrigerators, dishwashers, and water coolers), external power adapters, televisions and other audiovisual equipment. Materials that may be considered either ongoing consumables (see MR Credit 7) or durable goods can be counted under either category provided consistency is maintained with MR Credit 7, with no contradictions, exclusions or double-counting. Consistency must also be maintained with MR Credit 2.

Reuse or recycle 75% of the durable goods waste stream (by weight, volume or replacement value) during the performance period.

Consistent with the policy developed in MR prerequisite 2, all materials deemed toxic waste or unsuitable for landfill by the local municipality shall be disposed of as required.

#### POTENTIAL TECHNOLOGIES & STRATEGIES

Maintain a waste reduction, reuse and recycling program that addresses durable items that are replaced infrequently and/or may require capital program outlays to replace. Consider taking part in a leasing or donation program to help maintain waste reduction. In addition to any government run electronic recycling efforts, consider using StEP (<http://www.step-initiative.org/>) for guidance in disposing of electronic waste or for manufacturer and provider take back options.

# MATERIALS & RESOURCES

## SOLID WASTE MANAGEMENT: FACILITY ALTERATIONS AND ADDITIONS

SS	WE	EA	MR	EQ	IO	RP
<b>Credit 9</b>						

**1 Point**

### INTENT

Divert construction and demolition debris from disposal to landfills and incineration facilities. Redirect recyclable recovered resources to the manufacturing process. Redirect reusable materials to appropriate sites.

### REQUIREMENTS

Divert at least 70% of waste (by volume) generated by facility alterations and additions from disposal to landfills and incineration facilities. This applies only to base building elements permanently or semi-permanently attached to the building itself that enter the waste stream during facility renovations, demolitions, refits and new construction additions. Examples include, but are not limited to, building components and structures (wall studs, insulation, doors, and windows), panels, attached finishings (drywall, trim, ceiling panels), carpet and other flooring material, adhesives, sealants, paints and coatings. Furniture, fixtures and equipment (FF&E) are not considered base building elements and are excluded from this credit. Mechanical, electrical and plumbing components and specialty items such as elevators are also excluded.

### POTENTIAL TECHNOLOGIES & STRATEGIES

Maintain waste management policies applicable to any facility alterations and additions occurring on the site. Identify licensed haulers and processors of recyclable materials. Identify markets for salvaged materials. Employ deconstruction, salvage and recycling strategies and processes. Document the cost for recycling, salvaging and reusing materials. Make source reduction on the job site an integral part of the plan to reduce solid waste. Investigate salvaging or recycling lighting fixture pans when retrofitting.



# INDOOR ENVIRONMENTAL QUALITY

## MINIMUM IAQ PERFORMANCE

SS	WE	EA	MR	<b>EQ</b>	IO	RP
<b>Prerequisite 1</b>						

**Required**

### INTENT

Establish minimum indoor air quality (IAQ) performance to enhance indoor air quality in buildings, thus contributing to the health and well-being of the occupants.

### REQUIREMENTS

Choose one of the following options:

#### OPTION A

Modify or maintain each outside air intake, supply air fan and/or ventilation distribution system to supply at least the outdoor air ventilation rate required by ASHRAE 62.1–2007 Ventilation Rate Procedure (with errata but without addenda\*) under all normal operating conditions.

#### OR

#### OPTION B

If meeting ASHRAE 62.1–2007 Ventilation Rates (with errata but without addenda\*) is infeasible because of the physical constraints of the existing ventilation system, modify or maintain the system to supply at least 5L/s (10 cubic feet per minute (cfm)) of outdoor air per person under all normal operating conditions. Demonstrate through design documentation, measurements or other evidence that the current system cannot provide the flow rates required by ASHRAE 62.1–2007 under any operating condition even when functioning properly.

Each air-handling unit in the building must comply with either Option A or Option B above. If some air-handling units can provide the outside air flow required by ASHRAE 62.1–2007 (with errata but without addenda\*) and others cannot, those that can must do so. Buildings that cannot provide at least 5L/s (10 cfm) per person of outside air at each air-handling unit under all normal operating conditions cannot earn this prerequisite.

Additionally, meet all the requirements below:

- Show compliance with the applicable requirement above (Option A or Option B) through measurements taken at the system level (i.e., the air-handling unit). For variable air volume systems, the dampers, fan speeds, etc. must be set during the test to the worst-case system conditions (minimum outside air flow) expected during normal ventilation operations. Each air-handler must be measured; sampling or grouping of air-handlers is prohibited.
- Implement and maintain an HVAC system maintenance program to ensure the proper operations and maintenance of HVAC components as they relate to outdoor air introduction and exhaust.
- Test and maintain the operation of all building exhaust systems, including bathroom, shower, kitchen and parking exhaust systems.

Naturally ventilated buildings shall comply with ASHRAE 62.1–2007, paragraph 5.1 (with errata but without addenda\*).

SS	WE	EA	MR	<b>EQ</b>	IO	RP
<b>Prerequisite 1</b>						

**Required**

## POTENTIAL TECHNOLOGIES & STRATEGIES

Conduct a visual inspection of outside air vents and dampers and remove any outside air vent or louver obstructions that restrict full outside air capacity from entering the distribution system. Conduct airflow monitoring to document outside air cfm. Compare measured flow with designed flow for each unit. Test the operation of each exhaust fan and verify that exhaust airflow meets design requirements or intentions. The U.S. EPA's *Guidelines for HVAC System Maintenance* provides guidance on developing, implementing and maintaining an HVAC system maintenance program to ensure the proper operations and maintenance of HVAC components as they relate to IAQ.

\*Project teams wishing to use addenda approved by ASHRAE for the purposes of this prerequisite may do so at the project team's discretion. Addenda must be applied consistently across all LEED® credits.

# INDOOR ENVIRONMENTAL QUALITY

## ENVIRONMENTAL TOBACCO SMOKE (ETS) CONTROL

SS	WE	EA	MR	<b>EQ</b>	IO	RP
<b>Prerequisite 2</b>						

**Required**

### INTENT

Prevent or minimize exposure of building occupants, indoor surfaces and systems to Environmental Tobacco Smoke (ETS).

### REQUIREMENTS

Choose one of the following options:

#### OPTION A

Prohibit smoking in the building and smoking must be prohibited within 7.5 meters (25 feet) from entries, outdoor air intakes and operable windows.

#### OR

#### OPTION B

Prohibit smoking in the building except in designated smoking rooms and establish negative pressure in the rooms with smoking.

Smoking must be prohibited within 7.5 meters (25 feet) from building entries, outdoor air intakes and operable windows.

Design indoor designated smoking room(s) to effectively contain, capture and remove ETS from the building. At a minimum, the smoking room must be directly exhausted to the outdoors, away from air intakes and building entry paths, with no recirculation of ETS-containing air to the nonsmoking area of the building; enclosed with impermeable deck-to-deck partitions; and operated at a negative pressure compared with the surrounding spaces of at least an average of 5 Pa (0.02 inches water gauge) and a minimum of 1 Pa (0.004 inches water gauge) when the door(s) to the smoking room are closed.

Verify performance by conducting 15 minutes of measurement, with a minimum of one measurement every 10 seconds, of the differential pressure in the smoking room with respect to each adjacent area and in each adjacent vertical chase with the doors to the smoking room closed. Conduct the testing with each space configured for worst-case conditions for transport of air from the smoking room (with closed doors) to adjacent spaces.

Note: Option B is intended for isolated smoking rooms. For residential buildings where smoking is allowed in all residential suites (i.e. adjacent rooms/suites cannot be operated at negative pressure with respect to each other) then compliance path Option C must be used.

SS	WE	EA	MR	<b>EQ</b>	IO	RP
<b>Prerequisite 2</b>						

**Required****OR****OPTION C**

Option C is for residential buildings only.  
Reduce air leakage between smoking and nonsmoking areas.  
Prohibit smoking in all common areas of the building, and in all areas not designated as smoking areas.

Smoking must be prohibited within 7.5 meters (25 feet) from common area entries, outdoor air intakes and operable windows opening to common areas.

Weather-strip all doors in the residential units leading to common hallways, or (in cases where air transfer from the corridor is an intentional ventilation or makeup air strategy) have corridor air supply systems that pressurize common hallways to minimize air transfer from dwelling units. In the absence of weather stripping, verify pressure differential performance of the corridor/dwelling unit (an average of 5 Pa (0.02 inches water gauge) and a minimum of 1 Pa (0.004 inches water gauge)) by conducting 15 minutes of measurement, with a minimum of one measurement every 10 seconds, of the differential pressure in the dwelling unit relative to the corridor, with the dwelling unit door closed. The testing will be conducted with each space configured for worst case conditions for transport of air from the dwelling unit to adjacent spaces.

Minimize uncontrolled pathways for ETS transfer between individual residential units by sealing penetrations in each unit's walls, ceilings and floors and by sealing adjacent vertical chases.

Acceptable sealing of residential units shall be demonstrated by blower door tests conducted in accordance with ANSI/ASTM-E 779-03 using the progressive sampling methodology defined in Chapter 7 (Home Energy Rating Systems (HERS) Required Verification and Diagnostic Testing) of the California Low-Rise Residential Alternative Calculation Method Approval Manual. Residential units must demonstrate an Equivalent Normalized Leakage Area of less than 1.65cm<sup>2</sup>/m<sup>2</sup> of enclosure area (2.37in<sup>2</sup>/100ft<sup>2</sup>) when calculated using the equivalent leakage area as per the Can/CGSB-149.10-M86 calculation methodology (i.e., 10 Pa, Cd = 0.61). This typically converts to an Effective Normalized Leakage Area of 0.875cm<sup>2</sup>/m<sup>2</sup> (1.25in<sup>2</sup> per 100ft<sup>2</sup>) when calculated using the effective leakage area as per the ASTM methodology (i.e., 4 Pa, Cd = 1.0).

If the leakage area target for EQp2 Option C is NOT met, prepare a "lessons learned" report that includes the following:

- Blower door test results
- A description of how the blower door test was used to identify leakage sites.
- A narrative explaining the mitigative or remedial activities undertaken to seal uncontrolled air leakage sites to and from individual dwelling units and other areas.

**POTENTIAL TECHNOLOGIES & STRATEGIES**

Prohibit smoking in the building or provide negative-pressure smoking rooms. For residential buildings, a third option is to provide very tight construction to minimize the transfer of ETS among dwelling units.

# INDOOR ENVIRONMENTAL QUALITY

## GREEN CLEANING POLICY

SS	WE	EA	MR	<b>EQ</b>	IO	RP
<b>Prerequisite 3</b>						

**Required**

### INTENT

Reduce the exposure of building occupants and maintenance personnel to potentially hazardous chemical, biological and particulate contaminants, which adversely affect air quality, human health, building finishes, building systems and the environment.

### REQUIREMENTS

Have in place a green cleaning policy for the building and site cleaning materials within the building and site management's control that addresses the following green cleaning credits and other requirements:

- Purchase of sustainable cleaning and hard floor and carpet care products meeting the sustainability criteria outlined in EQ Credits 3.3.
- Purchase of cleaning equipment meeting the sustainability criteria outlined in EQ Credit 3.4.
- Establish standard operating procedures (SOPs) addressing how an effective cleaning and hard floor and carpet maintenance system will be consistently utilized, managed and audited. Specifically address cleaning to protect vulnerable building occupants.
- Develop strategies for promoting and improving hand hygiene, including both hand washing and the use of waterless hand sanitizers.
- Develop guidelines addressing the safe handling and storage of cleaning chemicals used in the building, including a plan for managing hazardous spills or mishandling incidents.
- Develop requirements for staffing and training of maintenance personnel appropriate to the needs of the building. Specifically address the training of maintenance personnel in the hazards of use, disposal and recycling of cleaning chemicals, dispensing equipment and packaging.
- Specify provisions for collecting occupant feedback and continuous improvement to evaluate new technologies, procedures and processes.

This policy must adhere to the *LEED® Canada for Existing Buildings: Operations and Maintenance* policy model (see *Introduction*).

At a minimum, the policy must cover the green cleaning procedures and materials that are within the building and site management's control.

### POTENTIAL TECHNOLOGIES & STRATEGIES

During the performance period, establish a written green cleaning policy addressing SOPs, sustainable products and equipment, chemical handling and storage and staff training.

SS	WE	EA	MR	<b>EQ</b>	IO	RP
<b>Credit 1.1</b>						

1 Point

# INDOOR ENVIRONMENTAL QUALITY

## IAQ BEST MANAGEMENT PRACTICES: IAQ MANAGEMENT PROGRAM

### INTENT

Enhance indoor air quality (IAQ) by optimizing practices to prevent the development of indoor air quality problems in buildings, correcting indoor air quality problems when they occur and maintaining the well-being of the occupants.

### REQUIREMENTS

Develop and implement on an ongoing basis an IAQ management program based on the U.S. EPA's *Indoor Air Quality Building Education and Assessment Model (I-BEAM)*, EPA Reference Number 402-C-01-001, December 2002, available at: <http://www.epa.gov/iaq/largebldgs/i-beam/index.html>.

### POTENTIAL TECHNOLOGIES & STRATEGIES

Operate a program to enhance IAQ by optimizing practices to prevent the development of indoor air quality problems in buildings and maintain the well-being of the occupants. Survey and evaluate building systems to identify potential IAQ problems and implement an ongoing program to prevent these problems from occurring and to maintain a high level of IAQ. Include in the program a plan for preventing moisture accumulation and mold in the building. For additional information, see the U.S. EPA website on indoor air quality: <http://www.epa.gov/iaq/largebldgs/baqtoc.html>.

# INDOOR ENVIRONMENTAL QUALITY

## IAQ BEST MANAGEMENT PRACTICES: OUTDOOR AIR DELIVERY MONITORING

SS	WE	EA	MR	EQ	IO	RP
<b>Credit 1.2</b>						

**1 Point**

### INTENT

Provide capacity for ventilation system monitoring to help sustain occupants' comfort and well-being.

### REQUIREMENTS

Install permanent, continuous monitoring systems that provide feedback on ventilation system performance to ensure that ventilation systems maintain minimum outdoor airflow rates under all operating conditions.

#### **For all mechanical ventilation systems:**

Provide an outdoor airflow measurement device capable of measuring (and, if necessary, controlling) the minimum outdoor airflow rate at all expected system operating conditions within 15% of the design minimum outdoor air rate. Monitoring must be performed for at least 80% of the building's total outdoor air intake flow serving occupied spaces.

The outdoor airflow measurement device(s) must take measurements at the system level (i.e., the air-handling unit). The device must be monitored by a control system that is configured to trend outdoor airflow in intervals no longer than 15 minutes for a period of no less than 6 months.

The control system must be configured to generate an alarm visible to the system operator if the minimum outdoor air rate falls more than 15% below the design minimum rate.

All measurement devices must be calibrated within the manufacturer's recommended interval, or at least once a year, whichever is shorter.

SS	WE	EA	MR	<b>EQ</b>	IO	RP
<b>Credit 1.2</b>						

**1 Point****For mechanical ventilation systems that predominantly serve densely occupied spaces:**

Have a CO<sub>2</sub> sensor or sampling location for each densely occupied space and compare it with outdoor ambient CO<sub>2</sub> concentrations. Each sampling location must be between 0.9 meters (3 feet) and 1.8 meters (6 feet) above the floor.

Test and calibrate CO<sub>2</sub> sensors to have an accuracy of no less than 75 ppm or 5% of the reading, whichever is greater. Sensors must be tested and calibrated at least once a year or per the manufacturer's recommendation, whichever is shorter.

Monitor CO<sub>2</sub> sensors with a system configured to read CO<sub>2</sub> concentrations in intervals no longer than 30 minutes, and record results to allow trend analysis.

The system must generate an alarm visible to the system operator and, if desired, to building occupants if the CO<sub>2</sub> concentration in any zone rises more than 15% above that corresponding to the minimum outdoor air rate required by ASHRAE Standard 62.1-2007 (with errata but without addenda\*) (see EQ Prerequisite 1).

CO<sub>2</sub> sensors may be used for demand-controlled ventilation provided the control strategy complies with ASHRAE Standard 62.1-2007 (with errata but without addenda\*) (see EQ Prerequisite 1), including maintaining the area-based component of the design ventilation rate.

**Exemptions:**

If the total area of all dense space is less than 5% of the total occupied area, the project is exempt from the requirements of this section. Rooms smaller than 14 square meters (150 square feet) are also exempt.

**For natural ventilation systems:**

Locate CO<sub>2</sub> sensors in the breathing zone of every densely populated room and every natural ventilation zone.

CO<sub>2</sub> sensors must provide an audible or visual alarm to the occupants in the space and to the system operator if CO<sub>2</sub> conditions are greater than 530 parts per million above outdoor CO<sub>2</sub> levels or 1,000 parts per million absolute. The alarm signal must indicate that ventilation adjustments (e.g. opening windows) are required in the affected space.

All measurement devices must be calibrated within the manufacturer's recommended interval, or at least once a year, whichever is shorter.

Permanently open areas must meet the requirements of ASHRAE 62.1-2007, Section 5.1 (with errata but without addenda\*).

**Exemptions:**

If the total area of all space served by natural ventilation is less than 5% of the total occupied area, the project is exempt from the requirements of this section. Rooms smaller than 14 square meters (150 square feet) are also exempt.

## POTENTIAL TECHNOLOGIES & STRATEGIES

Install and maintain permanent ventilation monitoring systems that provide feedback on system performance to ensure minimum ventilation rates.

\* Project teams wishing to use addenda approved by ASHRAE for the purposes of this prerequisite may do so at the project team's discretion. Addenda must be applied consistently across all LEED® credits.

SS	WE	EA	MR	<b>EQ</b>	IO	RP
<b>Credit 1.2</b>						

**1 Point**

SS	WE	EA	MR	<b>EQ</b>	IO	RP
<b>Credit 1.3</b>						

1 Point

# INDOOR ENVIRONMENTAL QUALITY

## IAQ BEST MANAGEMENT PRACTICES: INCREASED VENTILATION

### INTENT

Provide additional outdoor air ventilation to improve indoor air quality for occupants' comfort, well-being and productivity.

### REQUIREMENTS

#### **For mechanically ventilated spaces:**

Set outdoor air ventilation rates for all air-handling units serving occupied spaces by at least 30% above the minimum required by ASHRAE 62.1–2007 (with errata but without addenda\*).

#### **For naturally ventilated spaces:**

Confirm that natural ventilation systems for occupied spaces meet the recommendations set forth in the UK Carbon Trust's *Good Practice Guide 237: Natural Ventilation in Non-domestic Buildings* (1999). Determine whether natural ventilation is an effective strategy for the project by following the flow diagram process in Figure 2.8 of CIBSE Applications Manual 10: 2005, *Natural Ventilation in Non-domestic Buildings*.

#### **AND EITHER**

- Use diagrams and calculations to show that the natural ventilation systems meet the recommendations set forth in CIBSE Applications Manual 10: 2005, *Natural Ventilation in Non-domestic Buildings*.

#### **OR**

- Use a macroscopic, multizone, analytic model to confirm that room-by-room airflows will effectively naturally ventilate, defined as providing the minimum ventilation rates required by ASHRAE Standard 62.1-2007 Chapter 6 (with errata but without addenda), at least 90% of occupied spaces.

## POTENTIAL TECHNOLOGIES & STRATEGIES

For mechanically ventilated spaces, adjust ventilation systems to provide ventilation rates at least 30% above the minimum rates prescribed by the referenced standard. Ensure that the additional ventilation does not adversely affect building humidity control during all expected operating conditions. Consider using energy recovery technologies, which can be advantageous in Canadian climates.

For naturally ventilated spaces, follow the eight design steps described in the CIBSE *Good Practice Guide 237*: 1) develop design requirements, 2) plan airflow paths, 3) identify building uses and features that might require special attention, 4) determine ventilation requirements, 5) estimate external driving pressures, 6) select types of ventilation devices, 7) size ventilation devices and 8) analyze the design.

Use public domain software, such as NIST's CONTAM, Multizone Modeling Software, along with LoopDA, Natural Ventilation Sizing Tool, to analytically predict room-by-room airflows.

\* Project teams wishing to use addenda approved by ASHRAE for the purposes of this prerequisite may do so at the project team's discretion. Addenda must be applied consistently across all LEED® credits.

SS	WE	EA	MR	EQ	IO	RP
<b>Credit 1.3</b>						

**1 Point**

SS	WE	EA	MR	<b>EQ</b>	IO	RP
<b>Credit 1.4</b>						

1 Point

# INDOOR ENVIRONMENTAL QUALITY

## IAQ BEST MANAGEMENT PRACTICES: REDUCE PARTICULATES IN AIR DISTRIBUTION

### INTENT

Reduce exposure of building occupants and maintenance personnel to potentially hazardous particulate contaminants, which adversely affect air quality, human health, building systems and the environment.

### REQUIREMENTS

Have in place filtration media with a minimum efficiency reporting value (MERV) greater than or equal to 13 for all outside air intakes and inside air recirculation returns during the performance period. Establish and follow a regular schedule for maintenance and replacement of these filters according to the manufacturer's recommended interval.

MERV 13 filtration of supply air is required for all air handling equipment with a maximum flow rate of more than 283 L/s (600 cfm), particularly air handlers supplying outdoor air or supplying a mixture of outdoor ventilation and recirculated air.

Terminal air handling equipment such as fan coils, fan-powered VAV boxes, or heat pumps, are exempt from the filtration requirements provided that the primary air or ventilation air handlers are equipped with MERV 13 filtration of supply air as above, and that the terminal devices are equipped with the highest air filtration level commercially available for the specific equipment under consideration.

Air handlers with heat recovery, sensible and/or latent, with a maximum supply volume of 283 L/s (600 cfm) or less are exempt from the filtration requirements of this credit provided that they are equipped with the highest supply air filtration level commercially available for the specific equipment under consideration up to and including MERV 13.

Fan units that provide no outdoor air or serve only a single zone are exempt from filtration requirements (e.g., unit heaters and vestibule heaters).

### POTENTIAL TECHNOLOGIES & STRATEGIES

Install and maintain filtration media with a particle removal effectiveness of MERV 13 or greater for all outside air intakes and returns for the recirculation of inside air. Establish and follow a regular schedule for maintenance and replacement of these filters.

# INDOOR ENVIRONMENTAL QUALITY

## IAQ BEST MANAGEMENT PRACTICES: IAQ MANAGEMENT FOR FACILITY ALTERATIONS AND ADDITIONS

SS	WE	EA	MR	EQ	IO	RP
<b>Credit 1.5</b>						

1 Point

### INTENT

Prevent indoor air quality problems resulting from any construction or renovation projects and thus help sustain the comfort and well-being of construction workers and building occupants.

### REQUIREMENTS

Develop and implement an indoor air quality (IAQ) management plan for the construction and occupancy phases.

During construction, meet or exceed the recommended design approaches of the Sheet Metal and Air Conditioning National Contractors Association (SMACNA) *IAQ Guidelines for Occupied Buildings under Construction*, 2nd Edition 2007, ANSI/SMACNA 008-2008.

Develop and implement an IAQ management plan for the preoccupancy phases as follows:

#### **Flush-out procedure:**

After construction ends and all interior finishes have been installed, install new filtration media and flush-out the affected space. The flush-out must be done by supplying a total outdoor air volume of 4,300 cubic meters per square meters (14,000 cubic feet per square foot) of floor area while maintaining an internal temperature of at least 16 degrees C (60 degrees F) and maintaining a relative humidity no higher than 60% where cooling mechanisms are operated. The affected space may be occupied only after the delivery of at least 1,100 cubic meters per square meters (3,500 cubic feet of outdoor air per square foot) of floor area and the space has been ventilated at a minimum rate of 1.5 L/s per square meter (0.30 cfm per square foot) of outdoor air or the design minimum outside air rate (whichever is greater) for at least three hours prior to occupancy until the total of 4,300 cubic meters per square meters (14,000 cubic feet per square foot) of outdoor air has been delivered to the space. The flush-out may continue during occupancy.

#### **OR**

#### **IAQ testing prior to occupancy:**

Conduct baseline IAQ testing, after construction ends and prior to occupancy, using testing protocols consistent with the United States Environmental Protection Agency *Compendium of Methods for Determination of Air Pollutants in Indoor Air* and demonstrate that the contaminants listed in Table 1 are not exceeded, taking remedial actions and repeating procedure until all requirements have been met.

SS	WE	EA	MR	<b>EQ</b>	IO	RP
<b>Credit 1.5</b>						

**1 Point**

TABLE 1: MAXIMUM CONCENTRATION OF CRITERIA OF IAQ POLLUTANTS

CONTAMINANT	MAXIMUM CONCENTRATION
Formaldehyde	27 parts per billion
Particulate Matter (PM10)	50 micrograms per cubic meter
Total Volatile Organic Compounds	500 micrograms per cubic meter
* 4-Phenylcyclohexene (4-PC)	6.5 micrograms per cubic meter
Carbon Monoxide	9 parts per million and no greater than 2 parts per million above outdoor levels

\*Required only if carpets with Styrene Butadiene (SB) latex backing material are installed.

Protect stored on-site or installed absorptive materials from moisture damage.

If permanently installed air-handlers must be used during construction, filtration media with MERV 8 must be used at each return air grille, as determined by ASHRAE 52.2-1999 (with errata but without addenda\*).

Replace all filtration media immediately prior to occupancy.

Upon the completion of construction, HVAC and lighting systems must be returned to the designed or modified sequence of operations.

### POTENTIAL TECHNOLOGIES & STRATEGIES

Specify containment control strategies that include protecting the HVAC system, controlling pollutant sources, interrupting pathways for contamination, enforcing proper housekeeping and coordinating schedules to minimize disruption.

Specify the construction sequencing to install absorptive materials after the prescribed dry or cure time of wet finishes to minimize adverse impacts on IAQ materials that are susceptible to microbial contamination and are directly exposed to moisture through precipitation, plumbing leaks or condensation from the HVAC system. Sequence the application of building materials such that any significant sources of contaminants (e.g., composite wood products, adhesives, paints and coatings, glazing) dissipate most emissions prior to the introduction of products that would absorb or trap contaminants (e.g., carpet and padding, fabric wall covering, acoustic tiles, upholstered furniture). Where protection cannot be provided by sequence of installation, protect absorbing surfaces with vapor barriers and provide air exchange through temporary or permanent ventilation systems.

Appoint an indoor air quality manager with owner’s authority to inspect potential problems and require mitigation, as necessary.

\*Project teams wishing to use addenda approved by ASHRAE for the purposes of this prerequisite may do so at the project team’s discretion. Addenda must be applied consistently across all LEED® credits.

# INDOOR ENVIRONMENTAL QUALITY

## OCCUPANT COMFORT: OCCUPANT SURVEY

SS	WE	EA	MR	<b>EQ</b>	IO	RP
<b>Credit 2.1</b>						

**1 Point**

### INTENT

Provide for the assessment of building occupants' comfort as it relates to thermal comfort, acoustics, indoor air quality, lighting levels, building cleanliness and any other comfort issues.

### REQUIREMENTS

Implement an occupant comfort survey and complaint response system to collect anonymous responses about thermal comfort, acoustics, indoor air quality, lighting levels, building cleanliness and other occupant comfort issues. The survey must be collected from a representative sample of building occupants making up at least 30% of the total occupants, and it must include an assessment of overall satisfaction with building performance and identification of any comfort-related problems.

Document survey results and corrective actions to address comfort issues identified through the surveys.

Conduct at least one occupant survey during the performance period.

### POTENTIAL TECHNOLOGIES & STRATEGIES

Conducting an occupant survey is a valuable tool for identifying and addressing occupants' comfort and building performance issues. Develop a plan for corrective action to address any identified problems or concerns. Alternative survey ideas are available in the *LEED® Canada for Existing Buildings: Operations and Maintenance Reference Guide*.

SS	WE	EA	MR	<b>EQ</b>	IO	RP
<b>Credit 2.2</b>						

1 Point

# INDOOR ENVIRONMENTAL QUALITY

## CONTROLLABILITY OF SYSTEMS: LIGHTING

### INTENT

Provide a high level of lighting system control by individual occupants or specific groups in multi-occupant spaces (e.g., classrooms or conference areas) to promote the productivity, comfort and well-being of building occupants.

### REQUIREMENTS

For at least 50% of building occupants, use lighting controls that enable adjustments to suit the task needs and preferences of individuals for at least 50% of individual workstations, and for groups sharing a multi-occupant space or working area for at least 50% of multi-occupant space in the building.

### POTENTIAL TECHNOLOGIES & STRATEGIES

Implement system and occupant control of ambient and task lighting to suit individual preferences and the needs of specific tasks.

# INDOOR ENVIRONMENTAL QUALITY

SS	WE	EA	MR	<b>EQ</b>	IO	RP
<b>Credit 2.3</b>						

**1 Point**

## OCCUPANT COMFORT: THERMAL COMFORT MONITORING

### INTENT

Support the appropriate operations and maintenance of buildings and building systems so that they continue to meet target building performance goals over the long term and provide a comfortable thermal environment that supports the productivity and well-being of building occupants.

### REQUIREMENTS

Have in place a system for continuous tracking and optimization of systems that regulate indoor comfort and conditions (air temperature, humidity, air speed and radiant temperature) in occupied spaces. Have a permanent monitoring system to ensure ongoing building performance to the desired comfort criteria as determined ASHRAE Standard 55-2004, Thermal Comfort Conditions for Human Occupancy (with errata but without addenda\*).

The building must establish the following:

- Continuous monitoring of, at a minimum, air temperature and humidity in occupied spaces. The sampling interval cannot exceed 15 minutes.
- Periodic testing of air speed and radiant temperature in occupied spaces and should focus on likely problem areas. Using handheld meters is permitted.
- Alarms for conditions that require system adjustment or repair.
- Procedures that deliver prompt adjustments or repairs in response to problems identified.

All monitoring devices must be calibrated within the manufacturer's recommended interval.

### POTENTIAL TECHNOLOGIES & STRATEGIES

Implement systematic monitoring of the actual performance of the building to the comfort criteria defined by ASHRAE Standard 55-2004 (with errata but without addenda\*).

As appropriate, monitoring may include measurement and trending of temperatures, relative humidity, air speed and radiant temperatures at locations selected according to their variability and effect on occupants' comfort.

\* Project teams wishing to use addenda approved by ASHRAE for the purposes of this prerequisite may do so at the project team's discretion. Addenda must be applied consistently across all LEED® credits.

SS	WE	EA	MR	<b>EQ</b>	IO	RP
<b>Credit 2.4</b>						

1 Point

# INDOOR ENVIRONMENTAL QUALITY

## DAYLIGHT AND VIEWS

### INTENT

Provide a connection between indoor spaces and the outdoor environment through use of daylight and views in the occupied areas of the building.

### REQUIREMENTS

Achieve the performance thresholds in either the daylight or views requirements below (1 point):

#### For daylight

Choose one of the following options:

#### OPTION A . SIMULATION

Demonstrate through computer simulations that 50% or more of all regularly occupied spaces areas achieve daylight luminance levels of a minimum of 250 Lux (25 foot candles (fc)) and a maximum of 5400 Lux (500 fc) in a clear sky condition on September 21 at 9:00 am and 3:00 pm; areas with luminance levels below or above the range do not comply. However, designs that incorporate view-preserving automated shades for glare control may demonstrate compliance for only the minimum 250 Lux (25 fc) luminance level.

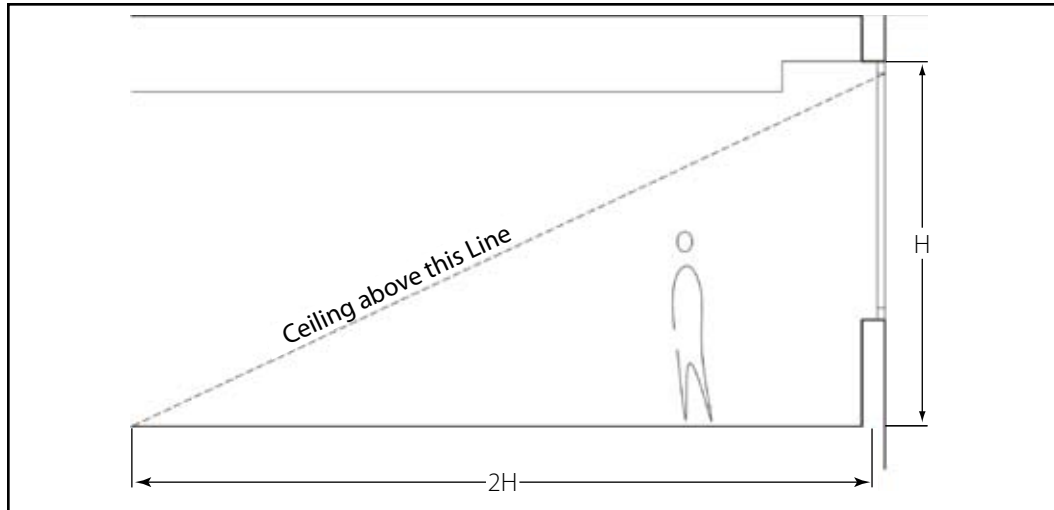
#### OR

#### OPTION B. PRESCRIPTIVE

Use a combination of side-lighting and/or top-lighting to achieve a total Day lighting Zone (that floor area meeting the following requirements) that is at least 50% of all the regularly occupied spaces.

#### Sidelighting Daylight Zone:

- Achieve a product of the visible light transmittance (VLT) and window to floor area ratio (WFR) of daylight zone between the values of 0.150 and 0.180. Window area included in the calculation must be of the portion of the window at least 0.76m (2'-6") above the floor.
- $0.150 < VLT \times WFR < 0.180$
- Ceiling should not obstruct a line in section that joins the window-head to a line on the floor that is parallel to the plane of the window and is, in distance from the plane of the glass as measured perpendicular to the plane of the glass, two times the height of the window head above the floor. See diagram below.
- Provide sunlight redirection and/or glare control devices to ensure daylight effectiveness.



SS	WE	EA	MR	EQ	IO	RP
<b>Credit 2.4</b>						

**1 Point**

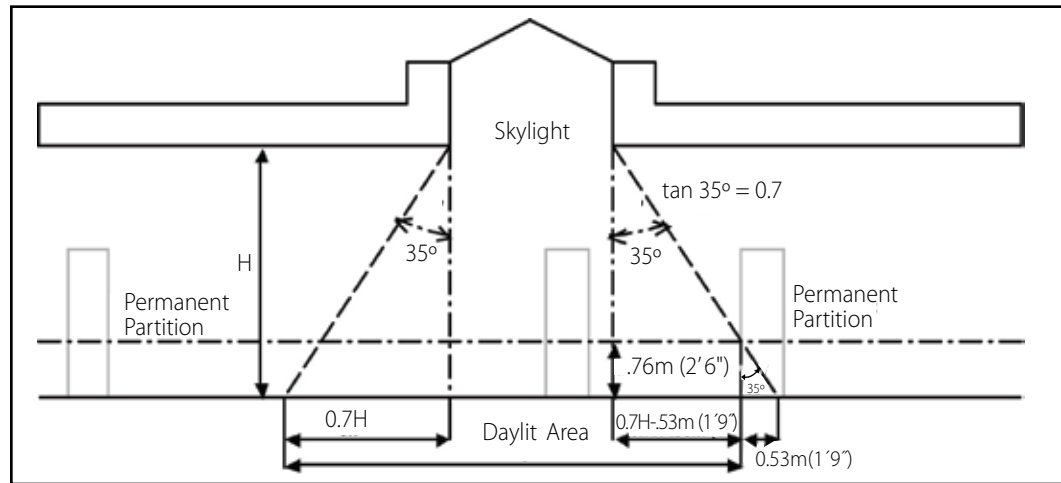
### Toplighting Daylight Zone:

- The day lit zone under a skylight is the outline of the opening beneath the skylight, plus in each direction the lesser of: 70% of the ceiling height, one half of the distance to the edge of the nearest skylight, or the horizontal distance from the edge of the skylight to the foot of any permanent opaque partition taller than 0.76 metres (2'-6") is  $0.7 \cdot H$  (in metres) – 0.525 metres. See diagram below.
- Achieve a skylight roof coverage that is between 3% and 6% of the roof area with a minimum 0.5 visible light transmittance (VLT) for the skylights.
- The distance between the skylights shall not be more than 1.4 times the ceiling height.
- Skylight diffuser with a measured haze value of greater than 90% when tested according to ASTM D1003. Avoid direct line of sight to skylight diffuser.

SS	WE	EA	MR	<b>EQ</b>	IO	RP
<b>Credit 2.4</b>						

1 Point

Exceptions for areas where tasks would be hindered by the use of daylight will be considered on their merits.



OR

**OPTION C**

Any of the above calculation methods may be combined to document the minimum daylight illumination in at least 50% of all regularly occupied spaces. The different methods used in each space must be clearly recorded on all building plans.

In all cases, only the area associated with the portions of rooms or spaces meeting the requirements can be applied towards the 50% of total area calculation required to qualify for this credit.

In all cases, provide glare control devices to avoid high-contrast situations that could impede visual tasks. Exceptions for areas where tasks would be hindered by the use of daylight will be considered on their merits.

OR

**OPTION D . MEASUREMENT**

Demonstrate, through records of indoor light measurements, taken in a clear sky condition during spring or autumn, that a minimum daylight illumination level of 250 Lux (25 foot-candles) has been achieved in at least 50% of all regularly occupied areas. Measurements must be taken on a 3 meter (10-foot) grid for all occupied spaces and must be recorded on building floor plans. Further guidance on measuring illumination levels is given in the *LEED® Canada for Existing Buildings: Operations and Maintenance Reference Guide*.

Only the area associated with the portions of rooms or spaces meeting the minimum illumination requirements can be counted in the calculations.

In all cases, provide daylight redirection and/or glare control devices to avoid high-contrast situations that could impede visual tasks. Exceptions for areas where tasks would be hindered by daylight will be considered on their merits.

**For views:**

Achieve direct line of sight to the outdoor environment via vision glazing between 0.76m (2'6") and 2.3m (7'6") above the finished floor for building occupants in 45% of all regularly occupied areas. Determine the area with direct line of sight by totaling the regularly occupied square footage that meets the following criteria:

- In plan view, the area is within sight lines drawn from perimeter vision glazing.
- In section view, a direct sight line can be drawn from the area to perimeter vision glazing.

Line of sight may be drawn through interior glazing. For private offices, the entire square footage of the office can be counted if 75% or more of the area has direct line of sight to perimeter vision glazing. For multi-occupant spaces, the actual square footage with direct line of sight to perimeter vision glazing is counted.

SS	WE	EA	MR	EQ	IO	RP
<b>Credit 2.4</b>						

**1 Point**

**POTENTIAL TECHNOLOGIES & STRATEGIES**

Achieve a minimum daylight factor of 2% (excluding all direct sunlight penetration) in space occupied for visual tasks. Design alterations or additions to maximize interior day lighting and outdoor view opportunities in a glare-free way. Strategies to consider include using vision panels, lower partition heights, exterior sun shading, interior light shelves and window treatments. Additionally, automatic photocell-based controls can help reduce energy use. Predict daylight factors via manual calculations or model day lighting strategies with a physical or computer model to assess foot-candle levels and daylight factors achieved.

SS	WE	EA	MR	EQ	IO	RP
<b>Credit 3.1</b>						

1 Point

# INDOOR ENVIRONMENTAL QUALITY

## GREEN CLEANING: HIGH-PERFORMANCE CLEANING PROGRAM

### INTENT

Reduce the exposure of building occupants and maintenance personnel to potentially hazardous chemical, biological and particulate contaminants, which adversely affect air quality, human health, building finishes, building systems and the environment.

### REQUIREMENTS

Have in place during the performance period a high-performance cleaning program, supported by a green cleaning policy (EQ Prerequisite 3: Green Cleaning Policy), that addresses the following:

- Appropriate staffing plan.
- Implementation of training of maintenance personnel in the hazards, use, maintenance, disposal and recycling of cleaning chemicals, dispensing equipment and packaging.
- Provide regular retraining in green cleaning techniques and products, that addresses custodial staff turnover and rotation, and cleaning by outsourced services.
- Use of chemical concentrates with appropriate dilution systems to minimize chemical use wherever possible.
- Use of sustainable cleaning materials, products, equipment, janitorial paper products and trash bags (including microfiber tools and wipes).
- Use of sustainable cleaning and hard floor and carpet care products meeting the sustainability criteria outlined in EQ Credit 3.3: Green Cleaning - Sustainable Cleaning Products and Materials
- Use of cleaning equipment meeting the sustainability criteria outlined in EQ Credit 3.4: Green Cleaning - Sustainable Cleaning Equipment

### POTENTIAL TECHNOLOGIES & STRATEGIES

Have in place during the performance period a high-performance cleaning program, supported by policy, staffing plans, standard operating procedures and storage procedures that address sustainable and effective cleaning and hard floor maintenance.

# INDOOR ENVIRONMENTAL QUALITY

## GREEN CLEANING: CUSTODIAL EFFECTIVENESS ASSESSMENT

SS	WE	EA	MR	EQ	IO	RP
<b>Credit 3.2</b>						

**1 Point**

### INTENT

Reduce the exposure of building occupants and maintenance personnel to potentially hazardous chemical, biological and particulate contaminants, which adversely affect air quality, human health, building finishes, building systems and the environment, by implementing, managing and auditing cleaning procedures and processes.

### REQUIREMENTS

Conduct an audit in accordance with APPA Leadership in Educational Facilities' (APPA) *Custodial Staffing Guidelines* to determine the appearance level of the facility. To achieve this credit, the facility must score 3 or less.

More information about the audit procedures is provided in the *LEED® Canada for Existing Buildings: Operations and Maintenance Reference Guide*.

### POTENTIAL TECHNOLOGIES & STRATEGIES

Designate an individual or team to conduct a walk-through inspection of a sample of rooms in the building to evaluate the effectiveness of the cleaning program. Identify areas that fall below the owner's expected standard and make improvements to the cleaning program accordingly.

SS	WE	EA	MR	<b>EQ</b>	IO	RP
<b>Credit 3.3</b>						

1 Point

## INDOOR ENVIRONMENTAL QUALITY

### GREEN CLEANING: PURCHASE OF SUSTAINABLE CLEANING PRODUCTS AND MATERIALS

#### INTENT

Reduce the environmental impacts of cleaning products, disposable janitorial paper products and trash bags.

#### REQUIREMENTS

Implement sustainable purchasing for cleaning materials and products, disposable janitorial paper products and trash bags. Cleaning product and material purchases include items used by in-house staff or outsourced service providers.

To achieve this credit, 90% of all disposable janitorial paper and trash bag products (on a cost basis) must meet the minimum requirements of one or more of the following programs for the applicable product category:

- U.S. EPA Comprehensive Procurement Guidelines for Janitorial Paper and Plastic Trash Can Liners.
- Green Seal GS-09, for paper towels and napkins.
- Green Seal GS-01, for tissue paper.
- Environmental Choice CCD-082, for toilet tissue.
- Environmental Choice CCD-086, for hand towels.
- Janitorial paper products derived from rapidly renewable resources or made from tree-free fibres.

In addition, 30% of the total annual purchases of these cleaning and maintenance products (by cost), excluding janitorial paper products, must meet at least one of the following sustainability criteria:

- The cleaning products meet one or more of the following standards for the appropriate category:
  - Green Seal GS-37, for general-purpose, bathroom, glass and carpet cleaners used for industrial and institutional purposes.
  - Environmental Choice CCD-110, for cleaning and degreasing compounds.
  - Environmental Choice CCD-146, for hard surface cleaners.
  - Environmental Choice CCD-148, for carpet and upholstery care.
- Disinfectants, metal polish, floor finishes, strippers or other products not addressed by the above standards meet one or more of the following standards for the appropriate category:
  - Green Seal GS-40, for industrial and institutional floor care products.
  - Environmental Choice CCD-112, for digestion additives for cleaning and odour control.
  - Environmental Choice CCD-113, for drain or grease traps additives.
  - Environmental Choice CCD-115, for odour control additives.
  - Environmental Choice CCD-147, for hard floor care.
  - California Code of Regulations maximum allowable VOC levels for the specific product category.
  - Hand soaps must meet one or more of the following standards:
    - No antimicrobial agents (other than as a preservative) except where required by health codes and other regulations (i.e., food service and health care requirements).
    - Green Seal GS-41, for industrial and institutional hand cleaners.
    - Environmental Choice CCD-104, for hand cleaners and hand soaps.

The materials and products described above must be purchased during the performance period to earn points in this credit.

Applicants are required to conduct random audits to confirm the actual use of purchased sustainable cleaning products and materials on site (at least twice during the performance period). Details of the audit requirements are provided in the *LEED® Canada for Existing Buildings: Operations and Maintenance Reference Guide*.

## POTENTIAL TECHNOLOGIES & STRATEGIES

Specify that the materials meet one or more of the sustainability criteria when purchasing materials or supplies.

SS	WE	EA	MR	EQ	IO	RP
<b>Credit 3.3</b>						

**1 Point**

SS	WE	EA	MR	EQ	IO	RP
<b>Credit 3.4</b>						

1 Point

# INDOOR ENVIRONMENTAL QUALITY

## GREEN CLEANING: SUSTAINABLE CLEANING EQUIPMENT

### INTENT

Reduce the exposure of building occupants and maintenance personnel to potentially hazardous chemical, biological and particulate contaminants, which adversely affect air quality, human health, building finishes, building systems and the environment, from powered cleaning equipment.

### REQUIREMENTS

Implement a program for the use of janitorial equipment that reduces building contaminants and minimizes environmental impact. The cleaning equipment program must require the following, as applicable:

- Vacuum cleaners are certified by the Carpet and Rug Institute “Green Label” Testing Program for vacuum cleaners and operate with a sound level of less than 70dBA.
- Carpet extraction equipment used for restorative deep cleaning is certified by the Carpet and Rug Institute’s “Seal of Approval” Testing Program for deep-cleaning extractors.
- Powered floor maintenance equipment, including electric and battery-powered floor buffers and burnishers, is equipped with vacuums, guards and/or other devices for capturing fine particulates and operates with a sound level of less than 70dBA.
- Propane-powered floor equipment has high-efficiency, low-emissions engines with catalytic converters and mufflers that meet the California Air Resources Board (CARB) or U.S. Environmental Protection Agency (EPA) standards for the specific engine size and operate with a sound level of less than 90dBA.
- Automated scrubbing machines are equipped with variable-speed feed pumps and on-board chemical metering to optimize the use of cleaning fluids. Alternatively, the scrubbing machines use only tap water with no added cleaning products.
- Battery-powered equipment is equipped with environmentally preferable gel batteries.
- Powered equipment is ergonomically designed to minimize vibration, noise and user fatigue.
- Equipment is designed with safeguards, such as rollers or rubber bumpers, to reduce potential damage to building surfaces.

Keep a log for all powered cleaning equipment to document the date of equipment purchase and all repair and maintenance activities and include vendor specification sheets for each type of equipment in use.

## POTENTIAL TECHNOLOGIES & STRATEGIES

Develop, implement and maintain a policy for the use of low impact powered cleaning equipment. Evaluate the powered cleaning equipment currently being used and make a plan for upgrading to powered cleaning equipment that reduces building contaminants and minimizes environmental impact.

SS	WE	EA	MR	<b>EQ</b>	IO	RP
<b>Credit 3.4</b>						

**1 Point**

SS	WE	EA	MR	<b>EQ</b>	IO	RP
<b>Credit 3.5</b>						

1 Point

# INDOOR ENVIRONMENTAL QUALITY

## GREEN CLEANING: INDOOR CHEMICAL & POLLUTANT SOURCE CONTROL

### INTENT

Reduce the exposure of building occupants and maintenance personnel to potentially hazardous chemical, biological and particulate contaminants, which adversely affect air quality, human health, building finishes, building systems and the environment.

### REQUIREMENTS

Utilize entryway systems (grilles, grates, mats) to reduce the amount of dirt, dust, pollen and other particles entering the building at all public entryways, and develop the associated cleaning strategies to maintain those entryway systems as well as exterior walkways. At least 3 meters (10 feet) of mats must be in place immediately inside all public entryways. Public entryways that are not in use or serve only as emergency exits are excluded from the requirements, as are private offices.

Provide containment drains plumbed for appropriate disposal of hazardous liquid wastes in places where water and chemical concentrate mixing occurs for laboratory purposes.

### POTENTIAL TECHNOLOGIES & STRATEGIES

Use grilles, grates or mats to catch and hold dirt particles and prevent contamination of the building interior. Design exterior stone, brick or concrete surfaces to drain away from public building entrances.

At public building entrances, install low-maintenance vegetation within the landscape design and avoid plants, including trees and shrubs that produce fruit, flowers or leaves that are likely to be tracked into the building. Select plants using an integrated pest management (IPM) approach, to eliminate pesticide applications that could be tracked into the building.

Provide a water spigot and electrical outlet at each public building entrance for maintenance and cleaning.

# INDOOR ENVIRONMENTAL QUALITY

SS	WE	EA	MR	EQ	IO	RP
<b>Credit 3.6</b>						

## GREEN CLEANING: INDOOR INTEGRATED PEST MANAGEMENT

1 Point

### INTENT

Reduce the exposure of building occupants and maintenance personnel to potentially hazardous chemical, biological and particulate contaminants that adversely affect air quality, human health, building finishes, building systems and the environment.

### REQUIREMENTS

Develop, implement and maintain an indoor integrated pest management (IPM) plan, defined as managing indoor pests in a way that protects human health and the surrounding environment and that improves economic returns through the most effective, least-risk option. IPM calls for using least-toxic chemical pesticides, minimum use of chemicals, use only in targeted locations and use only for targeted species. IPM requires routine inspection and monitoring. The plan must include the following elements, integrated with any outdoor IPM plan used for the site as appropriate:

- Integrated methods, site or pest inspections, pest population monitoring, evaluation of the need for pest control and one or more pest control methods, including sanitation, structural repairs, mechanical and living biological controls, other nonchemical methods, and if nontoxic options are unreasonable and have been exhausted, a least-toxic pesticide.
- Specification of the circumstances under which an emergency application of pesticides in a building or on surrounding grounds being maintained by building management can be conducted without complying with the earlier provisions.
- A communications strategy directed to building occupants that addresses universal notification, which requires advance notice of not less than 72 hours under normal conditions and 24 hours in emergencies before a pesticide, other than a least-toxic pesticide, is applied in a building or on surrounding grounds that the building management maintains.

Any cleaning products included in the integrated pest management policy must meet the requirements for EQ Credit 3.3.

### POTENTIAL TECHNOLOGIES & STRATEGIES

Use IPM, a safer and usually less costly option for effective pest management. An IPM program employs commonsense strategies to reduce sources of food, water and shelter for pests in buildings and on the grounds and minimizes the use of pesticides.



# INNOVATION IN OPERATIONS

## INNOVATION IN OPERATIONS

SS	WE	EA	MR	EQ	<b>IO</b>	RP
<b>Credit 1</b>						

**1— 4 Points**

### INTENT

Provide building operations, maintenance and upgrade teams with the opportunity to earn points for additional environmental benefits achieved beyond those already addressed by the *LEED® Canada for Existing Buildings: Operations and Maintenance Rating System*.

### REQUIREMENTS

Up to 4 Innovation Credit 1: Innovation in Operations points may be proposed using the following options:

#### **OPTION A** (1 – 3 Points)

Achieve exemplary performance in an existing *LEED® Canada for Existing Buildings: Operations and Maintenance* prerequisite or credit that allows exemplary performance (as specified in the *LEED® Canada for Existing Buildings: Operations and Maintenance Reference Guide*). No more than 3 total points for exemplary performance will be awarded in the Innovation in Operations category.

#### **AND/OR**

#### **OPTION B** (1 – 4 Points)

Achieve significant, measurable environmental performance using an operation, maintenance or system upgrade strategy not addressed in the *LEED® Canada for Existing Buildings: Operations and Maintenance Rating System*.

Specify the exemplary performance achieved (Option A). Alternatively, identify the intent of the proposed innovation credit, the additional environmental benefits delivered, the proposed requirements for compliance, the proposed performance metrics to demonstrate compliance and the approaches (strategies) that might be used to meet the requirements; meet the proposed requirements during the performance period (Option B).

### POTENTIAL TECHNOLOGIES & STRATEGIES

Implement and maintain during the performance period actions that provide added environmental benefits. These can be either actions that substantially exceed an existing *LEED® Canada for Existing Buildings: Operations and Maintenance* performance credit requirement or actions not addressed in *LEED® Canada for Existing Buildings: Operations and Maintenance* that provide substantial added environmental benefits.

SS	WE	EA	MR	EQ	IO	RP
<b>Credit 2</b>						

1 Point

# INNOVATION IN OPERATIONS

## LEED® ACCREDITED PROFESSIONAL

### INTENT

Support and encourage the operations, maintenance, upgrade and project team integration required for LEED® implementation and to streamline the application and certification process.

### REQUIREMENTS

At least one principal participant of the project team must be a LEED® Accredited Professional.

### POTENTIAL TECHNOLOGIES & STRATEGIES

Engage a LEED® Accredited Professional within the organization.

Have someone in your organization study the *LEED® Canada for Existing Buildings: Operations and Maintenance Rating System* and *LEED® Canada for Existing Buildings: Operations and Maintenance Reference Guide* and successfully complete the LEED® Professional Accreditation exam.

Hire a LEED® Accredited Professional to support the project. Consider selecting a LEED® Accredited Professional experienced with sustainable best practices in the operations and maintenance of existing buildings.

# INNOVATION IN OPERATIONS

## DOCUMENTING SUSTAINABLE BUILDING COST IMPACTS

SS	WE	EA	MR	EQ	<b>IO</b>	RP
<b>Credit 3</b>						

**1 Point**

### INTENT

Document sustainable building cost impacts.

### REQUIREMENTS

Document overall building operating costs for the previous five years (or length of building occupancy, whichever is shorter) and track changes in overall building operating costs during the performance period. Document building operating costs and financial impacts of all aspects of *LEED® Canada for Existing Buildings: Operations and Maintenance* implementation on an ongoing basis. Follow the detailed instructions in the *LEED® Canada for Existing Buildings: Operations and Maintenance Reference Guide*.

### POTENTIAL TECHNOLOGIES & STRATEGIES

Track building operating costs to identify any positive impacts related to the sustainable performance improvements to the building and its operations.



# REGIONAL PRIORITY

## REGIONAL PRIORITY CREDIT

SS	WE	EA	MR	EQ	IO	RP
<b>Credit 1</b>						

**1—4 Points**

### INTENT

To provide incentive for the achievement of credits that address geographically-specific environmental priorities.

### REQUIREMENTS

Up to 4 Regional Priority points may be proposed by *LEED® Canada for Existing Buildings: Operations and Maintenance* applicants. The Regional Priority credit is intended to allow adding point emphasis to recognize one or more issues that have additional regional environmental importance. Guidelines on appropriate Regional Priority credit language can be found in the *LEED® Canada for Existing Buildings: Operation and Maintenance Reference Guide*.

### POTENTIAL TECHNOLOGIES & STRATEGIES

Determine the prioritized credits for the project's location. Pursue the prioritized credits for the project's location.