## SB1 – Achieve High Building Energy Efficiency

**Work to achieve high building energy efficiency.**

**ROP Policies**

**5.2.20** To work with local municipalities and the development community to achieve the following energy efficiency and conservationsstandards for all new buildings:

a. Grade-related (3 storeys or less) residential buildings achieve a minimum performance level that is equal to an ENERGY STAR® standard.
b. Mid and high-rise (4 storeys and greater) residential and non-residential buildings, with the exception of industrial buildings, shall be designed to achieve 25% greater energy efficiency than the Model National Energy Code for Buildings.

ENERGY STAR® qualified homes

**Synergies**

**Supporting Themes**

**Objective:** To achieve high building energy efficiency

**Grade-related Residential Energy Efficiency**

**What is Energy Star for New Homes?**
The ENERGY STAR® for New Homes initiative promotes energy efficiency guidelines that enable new homes to be approximately 25 percent more energy efficient than those built to minimum provincial building codes. The increased efficiency of these homes translates into reduced energy costs for homeowners.

**What is an EnerGuide Rating?**
EnerGuide is a Government of Canada initiative that rates the energy consumption and efficiency of new homes. The rating is calculated based on standard operation assumptions and creates a standardized measure of energy performance for homes on a scale of 0 to 100.

**TYPICAL ENERGY EFFICIENCY**

| Type of House | EnerGuide Rating |
|---|---|
| New House built to building code standards | 65 - 72 |
| New House with some energy-efficiency improvements | 73 - 79 |
| Energy-efficient New House | 80 - 90 |
| Towards a Net Zero House | 91 - 100 |

Source: Natural Resources Canada

**What is the Relationship between EnerGuide Rating and Energy Star?**
If newly constructed homes were evaluated through the EnerGuide Rating System, most would receive an EnerGuide rating of 68 or higher. ENERGY STAR qualified new homes would rate at 80 on the EnerGuide scale.

**Do I have to use Energy Star program?**
No, the labelling program isn't necessary but the level of energy performance must be achieved. Energy modelling can be used to demonstrate that the proposed development will achieve an EnerGuide Rating of 80 or higher. However, there are advantages to participating in the Energy Star Program including third party testing and certification, consumer awareness and brand recognition. Many builders in the York Region area already have experience building to this standard.

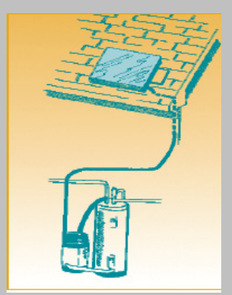
**What are the potential strategies that can be used to achieve a rating of EnerGuide 80?**
A suite of options can be used to achieve an EnerGuide rating, including:

- Drain water heat recovery
- Improved building envelope performance (air tightness)
- Improved insulation including increasing wall, ceiling assembly and foundation insulation
- Efficient hot water distribution system
- Insulate domestic hot-water piping
- Energy Star HVAC and appliances
- Heat recovery ventilation
- Reduce vaulted to flat roof ratio
- Design and install Energy Star-certified windows
- Improved lighting

**What are the potential strategies that can be used to achieve to achieve an energy efficiency rating of EnerGuide 83?**

- Further improved building envelope performance (air tightness)
- Enhanced windows
- Very high efficiency HVAC and appliances
- Solar assisted domestic hot water
- Very high efficiency windows
- Heat pump systems



# SB2 – Encourage Very High Building Energy Efficiency

**Encourage very high building energy efficiency.**

**ROP Policies**

**5.2.22** To encourage the following energy efficiency and conservation standards for new buildings.

a. Grade-related (3 storeys or less) residential buildings achieve performance level that is equal to a rating of 83 or more when evaluated in accordance with Natural Resources Canada's EnerGuide for New Houses: Administrative and Technical Procedures.

b. Mid- and high-rise residential (4 storeys and greater) and non-residential buildings be designed to achieve 40% greater efficiency than the Model National Energy Code for Buildings.

c. Industrial buildings be designed to achieve 25% greater energy efficiency than the Model National Energy Code for Buildings.

**Synergies**

**Supporting Themes**

**Objective:** To encourage very high energy efficiency in new buildings

**What is the Model National Energy Code for Buildings?**
The Model National Energy Code for Buildings contains minimum requirements for energy efficiency for all new mid- to high-rise residential and industrial, commercial and institutional (ICI) development. The Model National Energy Code for Buildings sets minimum standards of construction for features such as building envelope, lighting, electrical power, and heating, ventilating and air conditioning (HVAC) systems that affect energy efficiency.

**What potential strategies and products can be used to achieve energy efficiency?**
A suite of options can be used to achieve energy savings, including:

- High-efficiency fixtures, appliances and pumps
- Variable speed drives on fans and pumps
- Heat recovery ventilation
- Connect to a district energy system
- Demand control ventilation
- Drain water heat recovery
- Solar/renewable energy strategies
- Individual metering and system sub-metering

**How do builders/developers demonstrate that buildings achieve intended energy efficiency targets?**
There are several strategies that can be used to demonstrate achievement of energy efficient targets for grade-related residential, mid to migh-rise Residential and non-residential development:

**Grade-Related Residential Development**

- Energy simulation and modelling
- Blower door test
- Certification through Green Building Rating System or Incentive Program that reference Energy Star standards for energy efficiency

**Mid to High-rise Residential and Non-Residential Development**

- Energy simulation and modelling
- Building Commissioning
- Certification through a Green Building Rating System or Incentive Program that promotes energy efficiency (LEED NC, York Region's Sustainable Development through LEED).

**How will these requirements be implemented through the municipal planning approval process?**
It is intended that conditions of approval for planning applications in new community areas will identify the energy efficiency targets specified in the York Region Official Plan and respective Community Energy Plan. Prior to receiving planning approval, builders and developers will have to provide a sustainability report that identifies how the sustainable building policies of the Regional Official Plan have been implemented. Specifically, this report should outline the technologies that will be employed to achieve energy efficiency. For grade-related development a copy of the Energy Star qualified homes certificate can be submitted. For those builders not wishing to pursue Energy Star qualified homes, each home will have to be evaluated in accordance with National Resources Canada's *EnerGuide for New Houses: Administrative and Technical Procedures* and will have to submit an Evaluation Report prior to occupancy.

For all other building types, the local municipalities will be able to verify that these efficiency targets have been met by requiring the submission of energy modelling and building commissioning reports.

**Additional Resources:**
Model National Energy Code for Buildings, Natural Resources Canada
Water and Energy Saving Tips for Multi-Unit Residential Buildings, Canadian Mortgage and Housing Corporation
A Guide to Innovation in the Design and Construction of High-Rise Residential Buildings, Canadian Mortgage and Housing Corporation
ASHRAE Standard 90.1-1999, Energy Standard for Buildings Except Low-Rise Residential Buildings, American Society of Heating, Refrigerating and Air-Conditioning Engineers
TECHNICAL BULLETIN No.27 – 031011 - Changes the Canadian Building and Energy Codes, Logix Insulated Concrete Forms
EnerGuide and Energy Star, Natural Resources Canada website

## SB3 – Onsite renewable Energy

**Buildings are designed to enable the installation of on-site renewable energy generation and are designed to be solar ready.**

**ROP Policies**

**5.2.26** That *development* shall be designed to maximize solar gains and be constructed in a manner that facilitates future solar installations (i.e. solar ready).

**5.6.9** To design communities to maximize passive solar gains, and to ensure that all buildings are constructed in a manner that facilitates future solar installations.

**Objective:** To achieve the installation of on-site renewable energy and the development of solar ready buildings

**What are solar orientation, passive solar gain and solar ready homes?**

**Solar orientation**
Passive solar orientation places a home on the building site in such a way that the home takes full advantage of the sun's natural heat. By facing the long side of a home to the south and the short sides to the east and west, the building will capture solar heat in the winter and block solar gain in the summer. Although it is best to face the home directly into the sun, it can be oriented up to 30 degrees away from due south and lose only 5 percent of the potential savings.

There are some physical constraints, such as steep lots, shading from buildings and trees, and existing street patterns, when orienting a home on a lot. However, the 30 degree flexibility makes it much easier for builders to think about solar orientation when siting a home.

While there is no need to change the house design, moving windows to the home's south side will enhance its solar performance. If the south-facing window area reaches eight to ten percent of floor area, the home can be called "sun tempered."

A full-fledged "passive solar" home has a south facing glass area of 15 to 20 percent of its floor area. With this much glass, additional features must be added, such as thermal storage mass and summer shading.

**Passive solar gain**
Using properly sized and oriented windows with thermal mass flooring to use solar power to heat buildings.

**Solar ready**
Homes that can be readily retrofitted to incorporate solar technologies are referred to as being solar ready. Strategies to ensure the possibility of future solar retrofits include properly oriented roof surfaces, a conduit from the roof to a mechanical room, and additional electrical requirements.

ROOF ORIENTATION AND DIRECTION

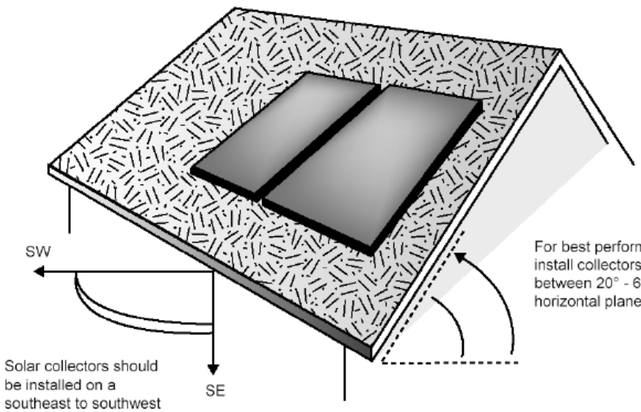



Image from Cansia Website

**Synergies**

**Supporting Themes**

**Additional Resources:**
Solar Ready Technical Guidelines, Canadian Solar Industries Association and Natural Resources Canada
Solar Energy for Buildings, Introduction Solar Design Issues, Keith Robertson and Andreas Athienitis, Canadian Mortgage and Housing Corporation

## SB4 – Water Efficiency

**Work to achieve high building water efficiency.**

**ROP Policies**

**5.2.21** To work with local municipalties and the development community to achieve 10% greater water conservatrion than the Ontario Building Code for all new buildings.

**5.2.23** To encourage that all new buildings achieve 20% greater water conservation than the Ontario Building Code.

**Objective:** To achieve high water efficiency in buildings

**How to achieve water conservation in grade-related development?**

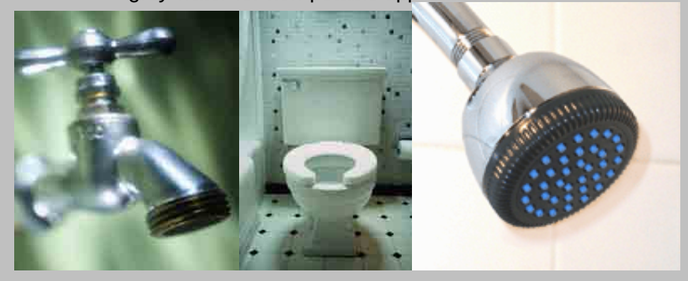
| 10% water conservation in grade-related residential development | 20% water conservation in grade-related residential development |
|---|---|
| • 4.85 litres per flush (LPF) high efficiency single flush toilets shall be installed in 100% of bathrooms or water closets<br>• Low flow lavatory faucets (max flow of 5.87 litres per minute)<br>• Low flow shower faucets (max flow of 7.5 litres per minute)<br>• Water efficient dishwasher (≤20.0 litres per cycle)<br>• Water efficient clothes washer (water factor of ≤ 7.5)<br>• Hot water recirculation system<br>• Whole-home water and energy-saving humidifiers | • 4.85 LPF high efficiency single flush toilets shall be installed in 100% of bathrooms or water closets<br>• Low flow lavatory faucets (max flow of 5.87 litres per minute)<br>• Low flow shower faucets (max flow of 7.5 litres per minute)<br>• Water efficient dishwasher (≤20.0 litres per cycle)<br>• Water efficient clothes washer (water factor of ≤ 7.5)<br>• Hot water recirculation system<br>• Whole-home water and energy-saving humidifiers.<br>• Additionally, can build to *Watersense for New Homes Technical Specifications* and achieve 20% water efficiency |

**How to achieve 10% to 20% water conservation in high-rise residential, industrial, commercial and institutional development?**
Employ strategies that in aggregate use 20% less water than the water use baseline calculated for the building (not including irrigation). Calculate the baseline according to the commercial and/or residential baselines outlined below. Calculations are based on estimated occupant usage and must include only the following fixtures and fixture fittings (as applicable to the project scope): water closets, urinals, lavatory faucets, showers, kitchen sink faucets and pre-rinse spray valves.

| Commercial Fixtures, Fittings and Appliances | Current Baseline |
|---|---|
| Commercial Toilets | 6.0 Litres per flush (LPF) |
| Commercial Urinals | 8.3 L/min at 414 kilopascals (kPa) – private applications |
| Commercial Lavatory | 1.9 LPF at 414 kPa – except private applications<br>0.95 Litres per cycle (metering faucet) |
| Commercial Showerheads | 9.5 LPM |
| Pre-rinse Spray Valves | ≤6.0 LPM |
| **Residential Fixtures, Fittings and Appliances** | **Current Baseline** |
| Residential Toilets | 6.0 LPF at 414 kPa |
| Residential Lavatory Faucets | 8.3 LPM at 414 kPa |
| Residential Kitchen Faucets | |
| Residential Showerheads | 9.5 LPM at 552 kPa per shower stall |

**Are there common approaches to water conservation in buildings?**
Yes, the following approaches can be considered in any building type:

- use WaterSense fixtures and fittings where available
- utilize high-efficiency and dry fixtures
- alternative on-site sources of water (eg. rainwater, stormwater and condensate)
- grey water for non-potable applications.



**Synergies**

**Supporting Themes**

**Additional Resources:**
York Region Water for Tomorrow Program – Industrial Water Audits
York Region Long Term Water Conservation Strategy, 2010
York Region Sustainable Development Through LEED 2010, 2007
York Region Sustainable Home Incentive Program Implementation Guide

## SB5 – Encourage LEED® Certified Buildings

**Buildings designed and certified to LEED® Silver, Gold or Platinum are encouraged.**

**ROP Policies**

**5.2.24** To encourage that new buildings be designed and certified to LEED® Silver, Gold or Platinum standards, and to provide complementary incentive programs to achieve the successful implementation of LEED® buildings across York Region.

**Synergies**

**Supporting Themes**

**Objective:** To encourage buildings to be designed and certified to LEED® Standards

**What is LEED®?**

The Leadership in Energy and Environmental Design (LEED) Green Building Rating System® encourages and accelerates global adoption of sustainable green building and development practices through the creation and implementation of universally understood and accepted tools and performance criteria.

LEED® is a third-party certification program and an internationally accepted benchmark for the design, construction and operation of high performance green buildings. It provides building owners and operators the tools they need to have an immediate and measurable impact on their buildings' performance. Projects must meet a number of prerequisites as well as earn a minimum number of points, which are awarded through specific credits. A minimum number of points are required for LEED® certification, with additional points needed to achieve silver, gold, bronze, or platinum status.

There are a variety of programs to address a wide range of building types and purposes including:

- LEED® Canada 2009: New construction and major renovation
- LEED® Canada for Homes
- LEED® Canada for Commercial Interior design
- LEED® Canada for Existing Buildings - Operations and Maintenance
- LEED® for Neighbourhoods

Canada Green Building Council

Each program promotes a holistic approach to sustainability by recognizing performance in five key areas of human and environmental health, including:

- sustainable site development
- water efficiency
- energy efficiency
- materials selection
- indoor environmental quality

**York Region committed to LEED® buildings?**
York Region has adopted a policy to require that all new regional facilities are constructed to a minimum LEED® Silver certification standard and have developed incentive programs based on the LEED® certification programs, applicable to private residential developments.

**Other green building programs?**
York Region is supportive of any green building program that promotes the development of more sustainable buildings. Participation in these programs, however, does not provide eligibility to the York Region Sustainable Development incentive programs:

- Energy Star for New Homes
- Water Sense for New Homes
- Boma BESt
- R-2000
- EnerGuide
- Green Globes
- GreenHouse Certified Construction
- Living Building Challenge

York Region EMS – Operations and Administration Facility

## SB6 – Improved Indoor Air Quality

**Buildings have improved indoor air quality**

**ROP policies**

**5.2.29** To encourage enhanced indoor air quality in buildings, including the use of low or no volatile compound products; minimizing the leakage of combustion gases; reducing exposure to indoor pollutants by ventilating with outdoor air; and indoor moisture controls.

**Objective:** To encourage enhanced indoor air quality in buildings

**Why is indoor air quality important?**
As Canadians, we spend 90% of our time indoors[1]. The level of pollution in the air we breathe indoors can be significantly greater than levels outside. It is well known that poor indoor air quality increases the severity and the frequency of respiratory symptoms experienced by asthmatics. Pollutants that can aggravate asthma include the biological pollutants, such as mould and house dust mites, and irritating chemical pollutants, such as nitrogen dioxide, ozone and formaldehyde. Many of the materials and products found in the indoor environment have the potential to emit air pollutants. Implementing building design strategies that improve indoor air quality can reduce the incidence of respiratory disease, allergies and asthma, increase productivity and learning and lead to improved quality of life for building occupants.

**What are the sources of indoor air pollution?**
There are several pollutants that can affect indoor air quality. They include:

- mould resulting from dampness and humidity
- products of combustion e.g. carbon monoxide, nitrogen dioxide and wood smoke
- pollutants from household products and building materials e.g. asbestos, urea formaldehyde foam insulation, lead, and volatile organic compounds
- environmental tobacco smoke (numerous toxic chemicals)
- naturally produced pollutants e.g. radon

**What strategies can be used to control indoor air quality?**

- Ensure adequate ventilation with outdoor air:
  - mechanical ventilation (HVAC)
  - natural ventilation (passive design)
  - mixed ventilation (mechanical and natural)
- Install high-efficiency air filters
- Enhanced combustion venting measures
- Monitor carbon dioxide levels, consider demand-control ventilation based on carbon dioxide levels
- Specify low-emitting materials
- Implement an indoor air quality management plan during construction

**How will this be implemented?**
Applications for development will have to address how the proposed development is fulfilling the sustainability objectives of the Regional Official Plan, local official plans and associated secondary plans. Included will be a report on the measures being undertaken to ensure indoor air quality. Participation in a green building rating program that addresses indoor air quality and environmentally preferable products will address this component.

**Synergies**

**Supporting Themes**

**Additional Resources:**
Exposure Guidelines for Residential Indoor Air Quality (1987), Health Canada
[1] The Canadian Lung Association website - http://www.lung.ca/protect-protegez/pollution-pollution/indoor-interieur/index_e.php

**Objective:** Provide incentive programs to support the construction of sustainable buildings.

## SB7 – Incentive Programs

**Incentive programs**

**ROP Policies**

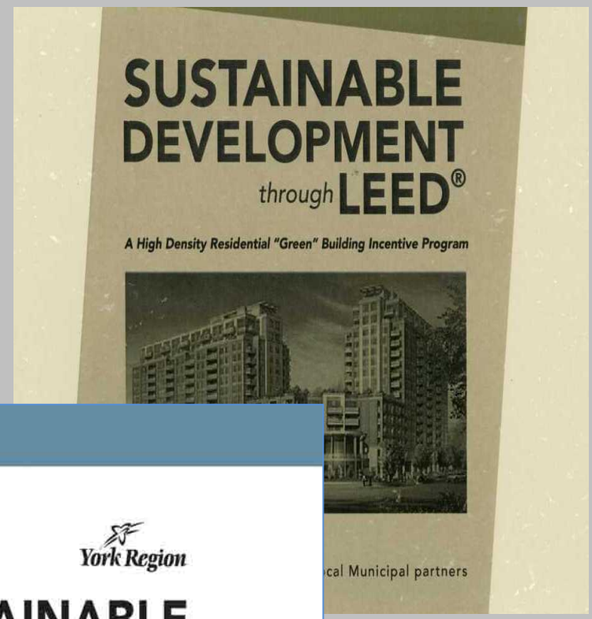
**5.2.24** To encourage that new buildings be designed and certified to LEED© Silver, Gold or Platinum standards, and to provide complementary incentive programs to achieve the successful implementation of LEED© buildings across York Region.

York Region has developed two incentive programs to encourage sustainable building construction programs.

**Sustainable Development through LEED**

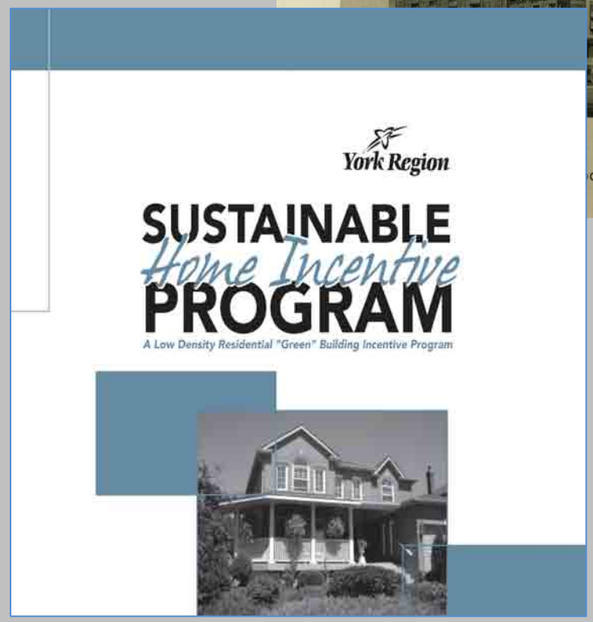
- Voluntary participation
- Applies to high rise residential developments (4 or more storeys)
- Program focused on achieving water conservation
- Development must achieve four sustainability objectives:
    1. Achieve Significant Water Conservation
    2. Conform with the York Region Transit-Oriented Development (TOD) Guidelines
    3. Incorporate a Three Stream Solid Waste Management System
    4. LEED Certification

- Program offers three levels of incentive
    1. 20% Incentive Level (Silver)
    2. 35% Incentive Level (Gold)
    3. 40% Incentive Level (Gold)




**Sustainable Home Incentive Program**

- Voluntary participation
- Applies to grade related development (3 or less storeys)
- Program focused on achieving water conservation
- Developments must achieve six sustainability objectives
    1. Water Conservation
    2. Energy Conservation
    3. Indoor Air Quality
    4. Renewable Energy
    5. Resource Management
    6. Homeowner Education
- Program offers two incentive levels
    1. 10% incentive level (Certified)
    2. 20% incentive level (Silver)




**Synergies**

**Supporting Themes**

**Additional Resources:**
York Region Sustainable Development Through LEED 2010,
York Region Sustainable Home Incentive Program Implementation Guide

## EE1 – Community Energy Plans

**Development conforms to the approved Community Energy Plan.**

**ROP Policies**

**5.6.10** That the local municipality shall develop a Community Energy Plan for each *new community area* to reduce community energy demands, optimize passive solar gains through design, and make use of renewable, on-site generation and district energy options including but not limited to solar, wind, water, biomass, and geothermal energy.

**Objective:** To ensure the preparation of a Community Energy Plan

**What is a Community Energy Plan?**
A Community Energy Plan is a high level method of evaluating land use and community design options for the more efficient consumption of energy. A Community Energy Plan considers the existing and potential energy use within a community including:

- land use planning (zoning, densities and land use patterns)
- transportation (pedestrian and cycling infrastructure and services, transit and traffic management)
- site design and building performance (energy efficiency, alternative energy supply, passive solar energy)
- infrastructure (including solid and liquid waste management)
- energy supply and delivery systems (including district energy, renewable energy and alternative energy systems)

**Why undertake a Community Energy Plan?**
York Region recognizes that a community's quality of life and economic competitiveness will be significantly influenced by how effectively they manage their energy needs. A Community Energy Plan can provide not only a roadmap for reducing energy use, but also for improving resiliency to climate change, promoting economic development and job creation. Local municipalities will produce a community energy plan for the New Communities Areas as a component of the Secondary Plan process.

**How do you develop a Community Energy Plan?**
The Natural Resources Canada, Community Energy Planning Guide – 2007, provides detailed information on the development of a Community Energy Plan through a 5 step process, as outlined below:

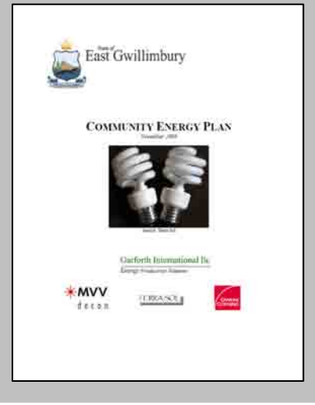
Step 1: Develop a **Community Vision** that allows the community to express itself in terms of its economic, environmental and social ambitions as an expression of its sustainability goals. The outcomes of this visioning exercise should express what the community should look like, how it should perform and the timeframe over which this vision is to be achieved (20, 30, $50^{+}$ years).

Step 2: Determine the **baseline condition** of the community by doing a data inventory for a particular point in time. This snapshot of the community can be used to spot trends and areas of high energy or resource use. At a minimum, the baseline conditions should provide a breakdown of primary energy users, consumption patterns and areas of concern. In the case of New Community Areas, the baseline could be the average base in the local municipality or a comparable area.

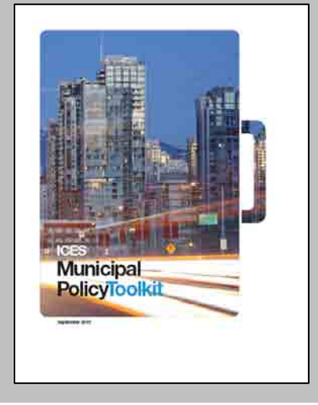
Step 3: **Quantify the vision** by establishing realistic and achievable goals and targets for the community

Step 4: CEP should be seen as a strategy, a mechanism that leads the community to **identify the actions, programs and projects** necessary to achieve the community vision.

Step 5: **Implementation and Monitoring** of the Community Energy Plan requires that consideration needs to be given to cross-linking the plan with processes and procedures currently in place throughout the community. The Community Energy Plan is an umbrella plan and has connections to others, hopefully assisting them to use their authority and legislative powers to enact long term change.







## EE1 – Community Energy Plans Con't

**Development conforms to the approved Community Energy Plan.**

**ROP Policies**

**5.6.10** That the local municipality shall develop a Community Energy Plan for each *new community area* to *reduce* community energy demands, optimize passive solar gains through design, and make use of renewable, on-site generation and district energy options, including but not limited to solar, wind, water, biomass, and geothermal energy.

**What is solar energy?**
There are two common types of technology that harness solar energy in Canada today: Solar Photovoltaic or PV (converting light to electricity) and Solar Thermal (heating and cooling water and air). Solar PV is used primarily for grid-connected electricity to operate residential appliances, commercial equipment, lighting and air conditioning for all types of buildings. Solar energy can heat air that is to be used in an industrial, institutional, commercial or residential application.
- CANsia


Markham District Energy Plant

**What is wind energy?**
The sun heats the planet to different temperatures in different places and at different times. This unequal distribution of heat is what creates wind as warm air rises and cooler air descends to fill the void. Wind is the ongoing movement of this air. Modern wind turbines use this mechanical power to turn a generator and produce electricity which is then used on site or contributed to the electrical grid. - CanWEA

**What is water energy?**
Hydropower is electrical energy derived from falling or running water. The water pressure that is created by water is used to turn the blades of a turbine. The turbine is connected to a generator, which converts the mechanical energy into electricity. -Pembina

**What is biomass energy?**
Biomass energy, or bioenergy, is the energy stored in non-fossil organic materials such as wood, straw, vegetable oils and wastes from the forest, agricultural and industrial sectors. can be burned directly, or converted into a gas or oil, to generate electricity (biopower) and heat. It can also be converted into liquid fuels (biofuels) for our transportation needs. There are several ways of turning biomass into electricity and heat, including direct combustion, co-firing, gasification, pyrolysis and anaerobic digestion.

**What is geothermal energy?**
In its simplest terms, geothermal means earth-heat or the thermal energy of Earth's interior. The main uses of geothermal energy are:
- direct use and district heating systems use hot water from springs or reservoirs near the surface
- electricity generation power plants require water or steam at very high temperature (300° to 700°F)

Geothermal heat pumps use stable ground or water temperatures near the Earth's surface to control building temperatures above ground.


Illustration of a District Energy System

**What is District Energy?**
"District Energy refers to a community scale network of buried pipes that with the aid or steam, hot or chilled water carry thermal (i.e. heating and/or cooling) energy services to a collection of buildings in a defined geographic area. This thermal energy can be created using a variety of input feedstock fuels including biomass (forest, agricultural, municipal solid waste), biogas, renewable energy forms (eg. geo-exchange), natural gas, and cool water. As such, it provides the opportunity to utilize locally available fuels to generate hot and cool space heating at a community scale and-importantly-the opportunity to centrally substitute feedstock fuels over time. This is an important way for communities to create sustainable, resilient energy delivery systems and manage risks of being dependent on any one fuel or technology." Canada District Energy Association

**Have any local municipalities in York Region undertaken community energy plans?**
Yes, the Town of Markham, Town of East Gwillimbury and City of Vaughan have undertaken Community Energy Plans. Markham has an operating district energy plant that is currently servicing six million square feet of mixed-use development. In 2010, Markham District Energy started construction on a second district energy system in East Markham.

**How will the community energy plan be implemented?**
Local municipalities will prepare the community energy plans as a component of the Secondary Plan for new community areas. The Secondary Plan and associated official plan amendment will contain policies that require the implementation of the Community Energy Plans.

**Synergies**

**Supporting Themes**

**Additional Resources:**
Natural Resources Canada Community Energy Planning Guide – 2007, Canmet Energy Technology Centre
COMMUNITY ENERGY PLANNING, A Guide for Communities Volume 1, and A Guide for Communities, Volume 2 Canmet Energy Technology Centre, Natural Resources Canada
Technical Series 02-112, Community Energy Management – Foundation paper, Canada Mortgage and housing Corporation
Town of East Gwillimbury Community Energy Plan, Garforth International, 2009

## EE2 – Passive Solar Gain

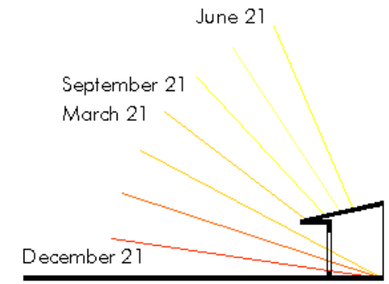
**Development is oriented to maximize passive solar gains. Landscaping is provided that minimizes solar gain in the summer and maximizes solar gain in the summer**

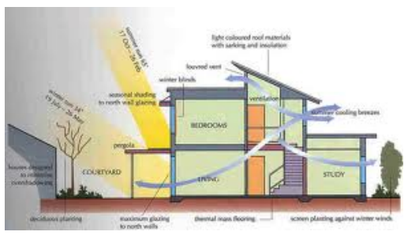
**ROP Policies**

**5.6.9** To design communities to maximize passive solar gains, and to ensure that all buildings are constructed in a manner that facilitates future solar installations.

**Related ROP Policies**

**5.2.26** To *development* shall be designed to maximize solar gains and be constructed in a manner that facilitates future solar installations (i.e. solar ready).




**Synergies**

**Supporting Themes**

**Objective:** To ensure communities and building are designed to maximize passive solar gains

**What is passive solar design?**
Passive Design is an approach to development that minimizes energy consumption by optimizing interaction with the local micro-climate. Building shape, orientation and composition can greatly reduce building energy requirements by harnessing renewable energy. The primary objective of passive design is to greatly reduce or eliminate the need for mechanical systems such as heating, ventilation, cooling and lighting systems.

**What are the passive solar design elements at the community scale?**
Orientation

- Street layout – optimize street layout to maximize good solar access
- Lot layout - lots aligned along an east-west axis are ideal. There is some flexibility, lots can be oriented up to 30 degrees away from due south with a small lose in energy potential. For lots not ideally suited, consider alternative lot designs and roof orientations to ensure solar access.

Ensuring Solar Access

- Establish solar setbacks are established on lots so that homes are not overshadowed by neighbouring properties.
- Use modelling software to determine impact of a variety of community development scenarios

Buildings:

- Encourage a mix of housing types arranged to maximize take advantage of views and of passive solar gain (use topography to your advantage)
- Concentrate the highest densities on sites with the greatest potential for good solar access and locate larger lots where solar access is poorer
- Buildings should be articulated (stepped back) from the street to minimize the impact of height and facilitate views and solar exposure.

**What are the passive solar design elements at the buildings scale?**
Individual building design contributes to ensuring a passive solar community design. At the building scale, the following design elements should be considered:

| | |
|---|---|
| **Site and Orientation** | A building orientation determines the amount of solar orientation received. Orientations that allow winter solar gains is desirable provided that the façade can be well-shaded during the summer months to avoid increased cooling requirements |
| **Building Shape and Geometry** | A compact building shape significantly reduces a buildings energy intensity and reduces the need for mechanical systems |
| **Landscape Considerations** | Landscape strategies can assist in achieving energy goals by reducing solar intensity, cooling load and the urban heat island. |
| **Buffer Spaces** | Improve building energy performance by creating another insulation layer in front of the building envelop slowing the rate of heat loss |
| **Windows** | The size, location, type and detailing of windows affects the heating and cooling energy needs of the building |
| **Solar Shading** | External and internal shading absorb/reflect solar radiation |
| **Thermal Mass** | Thermal mass materials absorb heat and release that heat slowly when ambient air temperatures are cooler than the mass |
| **Thermal Insulation** | Insulating materials are poor conductor which slow the rate of heat losses and gain |
| **Air and Moisture Tightness** | Air and moisture-tight building envelopes improve energy performance and prevents condensate |

**Solar Orientation, Passive Solar Gain, Solar Ready concepts are discussed further in SB3 of this guideline.

**Additional Resources:**
City of Vancouver, Passive Design Toolkit, Best Practices

## EE3 - On-site Renewable Energy

**All buildings are encouraged to include on-site renewable or purchase grid-source renewable energy.**

**ROP Policies**

**5.2.28** To encourage all new buildings to include on-site *renewable or alternative energy systems* which produce 25% of building energy use. Where on-site *renewable or alternative energy systems* are not feasible, consideration of purchasing grid-source renewable energy is encouraged.

**Synergies**

**Supporting Themes**

**Objective: 25% On-site Renewable Energy Generation**

**What is on-site renewable energy?**
Renewable energy is energy that is derived from natural sources that can be replenished. Technologies designed to capture and store this renewable energy include:

- photovoltaic solar panels that convert sunlight directly into electricity
- wind turbines capture wind to turn rotors, which turns a generator and creates electricity
- transpired solar collectors that use sunlight to preheat air for heating purposes
- solar hot water heaters use the sun to heat water for domestic applications
- small-scale hydroelectric power plants flow water over turbines, which turn a generator to create energy
- fuel cells combine hydrogen and oxygen to produce electricity and heat
- ground source heat pumps transfer heat to the ground in summer and extract heat from the ground in winter.

Photograph by Jack Dempsey, Associated Press

**Are there any incentive programs to encourage on-site renewable energy projects?**
The Ontario Power Authority has two programs:

- Micro-fit Program – applies to renewable energy projects under 10 kilowatts
- FIT Program - projects over 10 kilowatts

Both of these programs are intended to encourage renewable energy projects in Ontario. Owners of these projects are paid a fixed price for the energy produced. The fixed price is intended cover the costs of the project and provides a return on investment of the term of the program contract.

**How do you measure energy use?**
For the purpose of this guideline energy use should be measured by average yearly energy consumption (kilowatt/hour) and not by price.

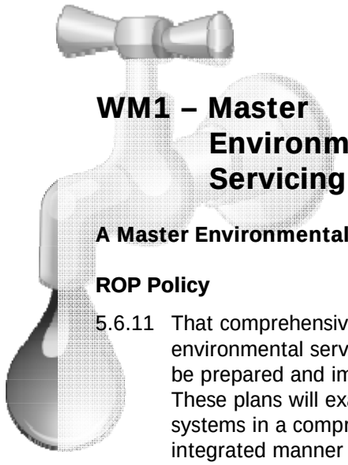
**What if on-site renewable energy technologies are not appropriate for my site?**
You are encouraged to consider the purchase of green electricity or green power certificates.

**Purchased grid-sourced renewable energy**?
"Green electricity" is electricity that has been generated from renewable resources with minimal adverse environmental effects. By paying a premium for green energy, you help make renewable energy more economically feasible by creating consumer demand.

**York Region is committed to renewable energy**
Renewable energy is an important aspect of the Region's energy supply strategy. Current initiatives include:

- tendering and renewal of contract in early 2011 for electricity from low-impact green power generators in Ontario.
- installation of a solar air heating SolarWall® at Mount Albert Water Pollution Control Plant.
- installation of small solar photovoltaic systems at Stouffville Zone 2 Pumping Station, YRT transit shelters and the new EMS Operations Centre in East Gwillimbury.
- feasibility study and related due diligence for large solar photovoltaic arrays at selected Regional facilities.

**Additional Resources:**
Green Electricity: A Buyer's Guide, North American Green Purchasing Initiative, Commission for Enviromental Cooperation, 2008
Renewable Energy Certificates, EPA's Green Power Partnership, Environmental Protection Agency, 2008
Feed-In-Tariff Program, Micro Feed-in Tariff Program – Program Overview, Ontario Power Authority



## WM1 – Master Environmental Servicing Plan

**A Master Environmental Servicing Plan.**

**ROP Policy**

5.6.11 That comprehensive master environmental servicing plans shall be prepared and implemented. These plans will examine all water systems in a comprehensive and integrated manner to:

a. understand the integration of all water systems to increase efficiencies;

b. maximize water conservation in buildings and municipal infrastructure, including water-efficient landscaping and rainwater collection for reuse; and,

c. minimize stormwater volume and contaminant loads, and maximize infiltration through an integrated treatment approach, which may include techniques such as rainwater harvesting, runoff reduction of solids and materials at source, phosphorus reduction, constructed wetlands, bioretention swales, green roofs, permeable surfaces, clean water collection systems, and the preservation and enhancement of native vegetation cover.

**Synergies**

**Supporting Themes**

**Objective:** To require the preparation of a Comprehensive Master Environmental Servicing Plan

**What is a Comprehensive Master Environmental Servicing Plan?**
A master environmental servicing plan is a plan prepared in during the secondary plan process in support proposed development. The Servicing Plan must identify the required municipal infrastructure necessary to support proposed development including water, wastewater, stormwater and transportation systems. A Comprehensive Master Environmental Servicing Plan examines all infrastructure and the associated impacts on all water systems in a comprehensive and integrated manner.

**What should the Comprehensive Master Environmental Servicing Plan include?**
A comprehensive master environmental servicing plan should address the following areas:

**Water and Wastewater**
- demonstrate how the proposed development is to be serviced including connections to the existing local and regional systems
- identification of any environmentally significant areas (e.g. wellhead protection and aquifer vulnerability areas)
- description of issues surrounding require regulatory approvals (e.g. requirements for source water protection under the Clean Water Act)
- alignment with regional and local master and capital plans
- water conservation measures being implemented at the system, community and building scale (i.e. avoiding dead ends within the water system that would require regular flushing to ensure water quality)
- measures being undertaken at the system and community scale to reduce wastewater production (i.e. sanitary sewer connections to temporary storm ponds during construction)

**Stormwater**
- demonstration of methods and technologies that will be used to reduce stormwater volumes and improve water quality
- demonstration of the methods and technologies that will be used to maximize infiltration utilizing a treatment train approach
- alignment with regional and local master and capital plans
- low impact development practices should be incorporated at the community and individual lot scale
- impact of proposed storm water on the natural heritage and hydrologic features that the system interconnects

**Climate Change**
- identification of the adaptive measures implemented at the community and systems scale to mitigate against climate change
- evaluation of the community's and infrastructure system's resilience to the impacts of climate change

**Transportation**
- identification of any required natural heritage or hydrologic features including stream and open space crossings
- identification of any trail connections required through the natural heritage systems to facilitate the regional cycling and pedestrian master plan
- alignment with the Regional and local transportation master plans.

**Phasing and Sequencing Plans**
- identification of infrastructure phasing required to service the development within the secondary plan that respects the regional and local master plans and 10 year capital plans

**Additional Resources:**
The Soft Path for Water in a Nutshell, Oliver M. Brandes and David B. Brooks, University of Victoria, Victoria, BC, Revised Edition August 2007
Low Impact Development Strategies and Tools for NPDES Phase II Communities, U.S. EPA Office of Water
Master Environmental Servicing Plan Requirements In support of Secondary Plans, 2007, Toronto and Region Conservation Authority

## WM2 – Integrated Treatment Train Approach to Stormwater Management

**Integrated approach to stormwater management.**

**ROP Policy**

**5.6.11** That comprehensive master environmental servicing plans shall be prepared and implemented. These plans will examine all water systems in a comprehensive and integrated manner to:

c. minimize stormwater volume and contaminant loads, and maximize infiltration through an integrated treatment approach, which may include techniques such as rainwater harvesting, runoff reduction of solids and materials at source, phosphorus reduction, constructed wetlands, bioretention swales, green roofs, permeable surfaces, clean water collection systems, and the preservation and enhancement of native vegetation cover.

**Related ROP Policy**

**2.3.27** To require the preparation of comprehensive master environmental servicing plans as a component of secondary plans and major development or re-development to minimize stormwater volume and contaminant loads, and maximize infiltration through an integrated treatment approach, which may include techniques such as rainwater harvesting, runoff reduction of solids and materials at source, phosphorus reduction, constructed wetlands, bioretention swales, green roofs, permeable surfaces, clean water collection systems, and the preservation and enhancement of native vegetation cover.

**Objective:** To utilize innovative techniques for stormwater management

**Why do we need an integrated treatment train approach to stormwater management?**
Environmental monitoring undertaken by the Toronto and Region Conservation Authority has shown that the environmental health of watersheds continues to decline as a result of urbanization, despite the use of conventional stormwater management techniques. Increasingly, watershed plans are identifying the need for low impact development practices to protect the health and increase the resiliency of these systems.

**What is a treatment train approach to stormwater management?**
A treatment train approach to stormwater utilizes a series of practices that meets stormwater management objectives of water quality, water balance, erosion and flood control for a particular watershed. The treatment train approach employs a hierarchy of stormwater management techniques to achieve improved stormwater quality and quantity, including:

- source controls (eg. soak-away pits, rain gardens, and green roofs, etc.)
- conveyance controls (eg. roadside ditches, subsurface pipes, or combinations of these measures designed to provide storage and promote infiltration)
- end-of-pipe measures (eg. dry ponds, wet ponds, constructed wetlands, etc.)

**What is low impact development?**
Low impact development includes a range of source control techniques for stormwater management that attempt to reproduce the predevelopment hydrologic conditions of an area. This is accomplished through implementation of innovative site design and engineering practices applied in a distributed manner. The principles of low impact development include:

- use ecosystem (landscape) based approach to planning
- focus on preventing runoff
- treat stormwater as close to source as possible
- create multi-functional landscapes
- education and maintenance

**What are the benefits of utilizing this approach?**
There are many benefits of implementing LID techniques including

- reduced pollution and improved water quality
- reduced downstream impacts resulting from stormwater run-off including erosion
- creation of habitat
- recharged groundwater systems


Toronto Homeowners' Guide to Rainfall

Typical low impact development designs incorporate more than one type of practice or technique to provide integrated treatment of runoff from a site. The precise type and number of LID practices varies depending on proposed land use, soils, geology, groundwater levels, groundwater uses and sensitivity of the receiving water body. Planning for this type of stormwater management approach requires a comprehensive look as early as possible in the planning process. Flexibility and innovation are necessary ingredients to ensure that the stormwater management solution is comprised of a suite of practices that are fully integrated into the landscape a proposed development.

**Additional Resources:**
Understanding Stormwater Management: An Introduction to Stormwater Management Planning and Design, Ministry of Environment, 2003
Stormwater Management Guidelines, Lake Simcoe Region Conservation Authority, November 2010
Low Impact Development Stormwater Management Planning and Design Guide, Credit Valley Conservation and Toronto Region Conservation Authority, 2010
Stormwater Management Planning and Design Manual, 2003, Ministry of Environment

# WM2 – Integrated Treatment Train Approach to Stormwater Management Con't

**Integrated approach to stormwater management.**

**ROP Policy**

5.6.11 That comprehensive master environmental servicing plans shall be prepared and implemented. These plans will examine all water systems in a comprehensive and integrated manner to:

c. minimize stormwater volume and contaminant loads, and maximize infiltration through an integrated treatment approach, which may include techniques such as rainwater harvesting, runoff reduction of solids and materials at source, phosphorus reduction, constructed wetlands, bioretention swales, green roofs, permeable surfaces, clean water collection systems, and the preservation and enhancement of native vegetation cover.

**What are some of the techniques that can be employed?**
There are a wide range of low impact development techniques that can be employed to maximize infiltration and minimize stormwater volume and contaminant loads, including:

**Rainwater Harvesting**
Rainwater harvesting is the ancient practice of collecting rainwater and storing it for later use. Rainwater harvesting systems are comprised of a roof catchment, conveyance network, rainwater storage tank, pump, and fixtures where rainwater is utilized. Most systems also incorporate treatment technologies to improve the quality of rainwater before and/or after storage, and include provisions for periods of insufficient rainfall (a water make-up supply) and times of excessive rainfall (overflow provisions). For the purposes of the New Communities Guidelines, rainwater harvesting and reuse will be used to offset outdoor use of potable water. The rainwater harvesting systems that can be employed are scalable depending on the development context (ie. detached home vs. apartment building). See W4 for further discussion on rainwater harvesting.

**Constructed Wetlands**
Constructed wetlands are shallow pools developed specifically for storm or waste water treatment that create growing conditions suitable for wetland plants. Constructed wetlands differ from other artificial wetlands in that they are not typically intended to replace all of the functions of natural wetlands. Rather, they are designed to provide water quality benefits by minimizing point source and nonpoint source pollution prior to its entry into streams, natural wetlands, and other receiving waters. They can also play a water quantity management role.

**Bioretention Swales**
Bioretention swales provide both stormwater treatment and conveyance functions and consist of a soil bed planted with suitable non-invasive (preferably native) vegetation. Bioretention swales are used to remove a wide range of pollutants, such as suspended solids, nutrients, metals, hydrocarbons, and bacteria from stormwater runoff.

**Green Roofs**
A green roof is a roofing system that includes a layer of vegetation and growing medium installed on top of a conventional roof.
There are two types of green roofs: intensive roofs, which are thicker and can support a wider variety of plants (including trees) but are heavier and require more maintenance, and extensive roofs, which are covered in a light layer of vegetation and are lighter than an intensive green roof.

**Permeable Surfaces**
The vast area of impermeable surfaces created by urbanization interferes with water catchment systems, reducing the quantity of water reaching the aquifers and increasing water runoff and the risk of erosion and flooding. The use of permeable surfaces can mitigate against these impacts by allowing rainwater to be absorbed into the earth. Permeable pavements allow stormwater to infiltrate into underlying soils promoting pollutant treatment and recharge, as opposed to producing large volumes of rainfall runoff requiring conveyance and treatment.

**Clean Water Collection System**
A community based rainwater harvesting system that collects run-off from residential roof areas for conveyance through perforated pipes within the municipal right-of-way. The perforated pipes are used to enhance safe groundwater recharge in lands undergoing increased imperviousness due to urbanization by using relatively clean water from roof areas.

**Synergies**

**Supporting Themes**

**Additional Resources:**
Low Impact Development Stormwater Management Planning and Design Guide, Credit Valley Conservation and Toronto Region Conservation Authority, 2010
Ontario Guidelines for Residential Rainwater Harvesting Systems, Christopher Despins, 2010
Sustainable Technologies Evaluation Program Website, Toronto and Region Conservation Authority
Residential Rainwater Harvesting Design And Installation Best Practices Manual, City of Guelph, 2011
Clean Water Collector (CWC) System Implementation Report, Clarifica Water Resources and Environmental Consulting and Schaeffers Consulting Engineers

## WM3 – Outdoor Use of Potable Water

**To restrict the use of potable water for outdoor watering.**

**ROP Policy**

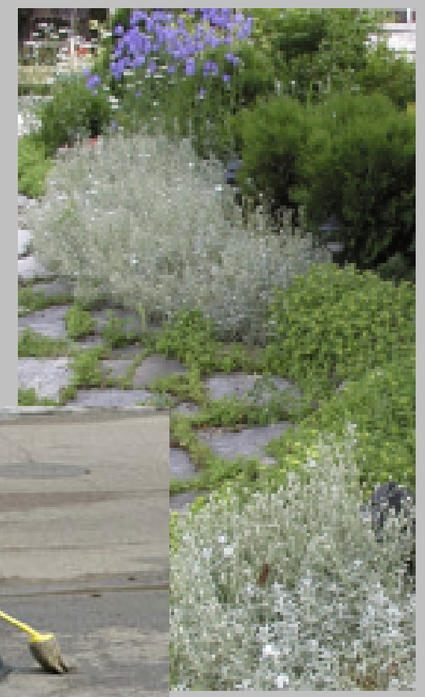
5.2.31 To restrict the use of potable water for outdoor watering.

**Objective:** To restrict the use of potable water for outdoor watering

**What is potable water?**
Drinking water or potable water is municipally treated water that is safe for human consumption. York Region's water supply sources are from groundwater and surface water. The source water is pumped to a treatment facility where it is treated to remove impurities and to ensure that it meets Ontario's stringent water quality levels. It is then pumped to water towers and reservoirs for use throughout our communities.

**York Region Long Term Water Conservation Strategy**
The Long Term Water Conservation Strategy provides overarching guidance for Regional water conservation and efficiency programming for the next 40 years. The Long Term Water Conservation Strategy enhances and extends, to 2051, the Region's commitment to innovative water conservation and efficiency programming, water resource protection, energy conservation and greenhouse gas reduction. Specifically, the Long Term Water Conservaton Strategy contemplates activities to reduce per capita water consumption including outdoor water use.

**Why restrict outdoor use of potable water?**
During hottest periods in the summer months, demand on municipal water supplies almost doubles. This increased demand places a tremendous strain on municipal water supply. Municipalities often use outdoor water restrictions to manage this increased demand and to ensure a sufficient supply of water for emergency services. In York Region, each of York Region's nine municipalities have adopted an Outdoor Water Use Bylaw, which regulates the outdoor use of municipal drinking water.



**Are there alternatives to using potable water?**
There are a variety of alternatives to reduce or eliminate the use of potable water outdoors, such as:

- Landscaping
  - Drought tolerant landscaping can reduce the demand for water through drought tolerant design and native plant selection. Landscaping can also contribute to stormwater management by promoting infiltration.
- Outdoor Cleaning Methods
  - Clean driveway with broom instead of hose
  - Cleaning car with a bucket and sponge
- Alternative sources of water
  - Rainwater Harvesting Systems can be used to collect and store larger volumes of rainwater that can be used for irrigation and watering

**Synergies**

**Supporting Themes**

**Additional Resources:**
York Region Water Efficiency: An At Home Guide, Water for Tomorrow
Long Term Water Conservation Strategy, York Region

## WM4 – Rainwater Harvesting and Reuse

**Installation of rainwater harvesting and reuse systems on all new residential buildings for outdoor water use.**

**ROP Policy**

5.2.32 To require the installation of rainwater harvesting and re-circulation/re-use systems on all new residential buildings for outdoor irrigation and outdoor water use.

**Objective:** To encourage the installation of rainwater harvesting systems

**What is rainwater harvesting?**
Rainwater harvesting is the process of intercepting, diverting and storing rainfall for future use. In new community areas, York Region is promoting the reuse of rainwater for outdoor water use and irrigation.

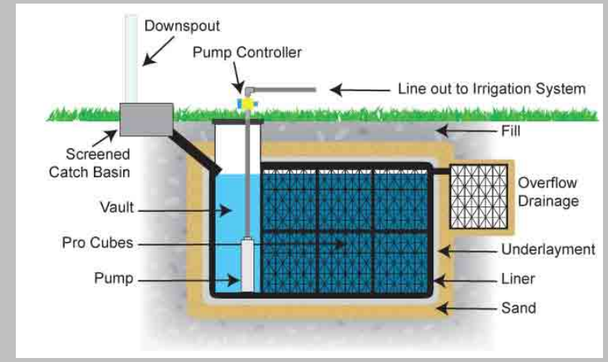
**What are the benefits of rainwater harvesting?**

1. Reduces demand on municipal water supply.
2. Allows for storage of seasonal rains for use in off peak times of droughts and urban water bans.
3. Manages site runoff and potentially avoiding erosion, flooding and contamination by capturing runoff from a house.

**What are the components of a rainwater harvesting system?**

1. Catchment surface – is the surface from which rainfall is collected. Rooftops are the preferred catchment surface for rainwater harvesting systems.
2. Pre-treatment - a filter screen that removes debris, dust, leaves, and other material that accumulates on rooftops from being introduced into the rainwater harvesting system.
3. Delivery systems – consist of gutters, downspouts and pipes that carry stormwater runoff into storage tanks.
4. Storage tank –container used to store harvested rainwater. The required size of storage tank is dictated by several variables: rainfall and snowfall frequencies and totals, the intended use of the harvested water and the catchment surface area.
5. Distribution – the system used to move the harvested rainwater to final destination for reuse. Typical outdoor applications use gravity to feed hoses via a tap and spigot. For underground cisterns or large sites, a water pump may be needed.
6. Overflow and diversion – direct rainwater away from storage tank to a permeable surface when storage capacity is exceeded.

**Rainwater harvesting systems are feasible on all new residential buildings**
The size of the storage tanks range in size from small storage tanks for residential land uses to large cisterns for high density residential land uses. Designs and styles can be found to suite almost any application.

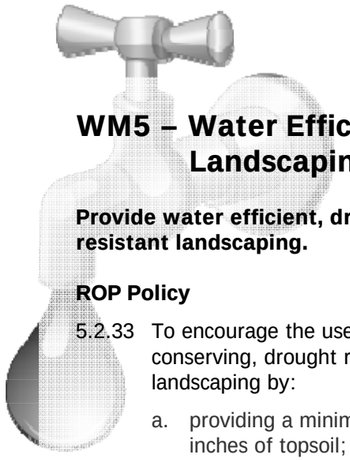



http://enviroscapela.com/rainwater-harvesting/underground-rwh/

**Synergies**

**Supporting Themes**

**Additional Resources:**
CVC/TRCA SWM DESIGN GUIDELINE MANUAL: Rainwater Harvesting
CSA Standards
Rainwater Harvesting Guidelines for Ontario,
Evaluating the Feasibility and Developing Design Requirements and Tools for Large-scale Rainwater Harvesting in Ontario, Canadian Mortgage and Housing Corporation, Research Highlight, 2009



## WM5 – Water Efficient Landscaping

**Provide water efficient, drought resistant landscaping.**

**ROP Policy**

5.2.33 To encourage the use of water conserving, drought resistant landscaping by:

a. providing a minimum of 6 inches of topsoil;

b. installing drought resistant sod;

c. providing landscape features that minimize the demand for water and synthetic chemicals by utilizing native and drought resistant species; and,

d. installing permeable driveway surfaces.

**Synergies**

**Supporting Themes**

**Objective:** Provide water efficient, drought resistant landscaping and encourage less sod

**What is water efficient landscaping?**
Water efficient landscaping is a design approach that results in landscapes and gardens with low water needs.

**A minimum of 6 inches of topsoil?**
Topsoil requirements for new development including subdivisions should be a minimum of six inches. This requirement ensures that there is sufficient soil depth to promote root growth and a healthier lawn. Encouraging deeper root growth will also result in reduced watering needs of any turfed areas.

**What is drought resistant sod**
Drought-resistant sods are those sods that have a high tolerance to drought conditions and therefore do not have the same watering needs as a traditional sod.

**What is xeriscaping?**
Xeriscaping is landscaping and gardening in ways that reduce or eliminate the need for supplemental water from irrigation.

**What are the elements of water efficient landscaping?**
1. Planning and design that take into account the regional and microclimate conditions, existing vegetation and topographical conditions.
2. Soil Analysis - proper selection of plants for soil type. When appropriate, enhance soil by improving drainage or water holding capacity.
3. Appropriate Plant Selection - based on the plants adaptability to the landscape, desired effect, color, texture and plant size.
4. Practical Turf Areas – how and where it is used can significantly reduce water use especially when drought-tolerant varieties are incorporated into the design.
5. Efficient Irrigation - watering only when plants need water with non-potable water supply. Watering deeply encourages deeper root growth, resulting in a healthier drought-tolerant landscape.
6. Appropriate Maintenance - proper landscape and irrigation maintenance will preserve and enhance a quality water efficient landscape.

**What are permeable driveway surfaces?**
Permeable pavements can be used as alternatives to traditional hard surface paving systems that create expanses of impervious surface such as parking lots, driveways, access roads, plazas, and walkways. Examples of permeable pavement types include: open joint permeable pavers, pervious concrete and porous asphalt. Permeable paving allows for filtration, storage, or infiltration of runoff, which can reduce stormwater flows compared to traditional impervious paving surfaces like concrete and asphalt.



**How will this be implemented in new communities areas?**
1. Policies in the Secondary Plan that require water efficient landscaping practices
2. Development applications will be accompanied by landscaping plans demonstrating how water efficiency has been considered.
3. Regional and local municipalities should continue to specify native species for street trees
4. Developers who offer landscaping packages should provide only water-efficient options

**Additional Resources:**
York Region Water Efficient Plants Selection Guide, Water for Tomorrow Program
A Selection of Native Plants for your Garden, Toronto and Region Conservation Authority
Beautiful Lawns and Gardens Through Water-Efficient Landscaping, Ontario Clean Water Agency.
Water Efficient Landscaping: Preventing Pollution and Using Resources Wisely, Environmental Protection Agency

## WM6 – Green Roofs

**Development incorporates green roofs into building design.**

**ROP Policy**

5.2.34 To encourage all *development* to incorporate green roofs into building design.

**Objective:** To encourage all development to incorporate green roofs into building design

**What are green roofs?**
Green rooftops are comprised of a layer of vegetation and soil installed on top of a conventional roof.
There are two basic types of green roofs: intensive and extensive. Intensive/active green roofs have a deep growing medium that supports a variety of landscape design and growth. An extensive green roof has a shallow growing medium and the landscaping is designed to be more self-sustaining and require less maintenance.
Extensive green roofs can be less expensive than intensive systems, since they are lighter and require less structural support and need less frequent maintenance.

**What are the benefits of green roofs?**
Green roofs provide a number of benefits in urban areas; they are beneficial to water conservation, stormwater management and source protection, they can improve energy efficiency, reduce heat island effects, support local food production and create urban green space for passive recreation or aesthetics.

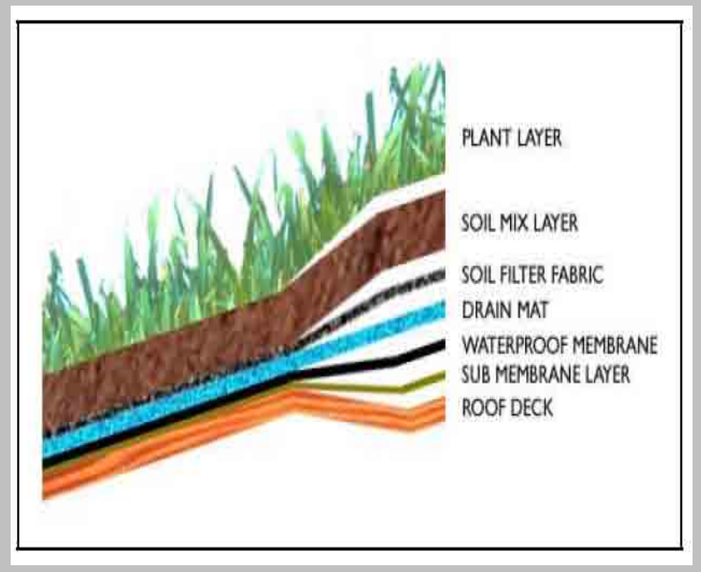
**What are the components of a green roof system?**

1. A roof structure capable of supporting the weight of a green roof system
2. A waterproofing system designed to protect the building and roof structure
3. A drainage layer that consists of a porous medium capable of water storage for plant uptake
4. A geosynthetic layer to prevent fine soil media from clogging the porous media
5. Soil with appropriate characteristics to support selected green roof plants
6. Plants with appropriate tolerance for harsh rooftop conditions and shallow rooting depths

**What are the design principles for a green roof?**

1. Roof Structure – sufficient load bearing capacity to support the green roof
2. Waterproofing system – protects structural elements of the roof from exposure to moisture
3. Drainage Layer – a porous drainage layer and filter to prevent soil from clogging drainage layer – ensures that excess moisture isn't contained by the green roof
4. Conveyance and Overflow – a system that conveys stormwater to a rooftop drain system
5. Growing Medium - the medium is usually a mixture of sand, gravel, crushed brick, compost or organic matter combined with soil
6. Landscaping - the use of native plants on green roofs is encouraged. Root size and depth should also be considered during plant selection to ensure that the plant will stabilize the shallow depth of soil media

**Green Roof Cross-Section**




Source: Northwest EcoBuilding Guild, Assemblies, Green roof project. 2001. http://www.hadj.net/green-roofs/

**Synergies**

**Supporting Themes**

**Additional Resources:**
Low impact Development Manual, 2010 Toronto and Region Conservation Authority and Credit Valley Conservation Authority
Toronto Green Roof Construction Standard Supplementary Guidelines, City of Toronto

# RM1 – Construction Waste Diversion

**Development diverts construction waste from landfill.**

**ROP policy**

7.4.14 To encourage the diversion of construction and demolition waste to meet or exceed the Region's diversion targets of policy of 7.4.2.

**Related ROP Policy**

7.4.2 To surpass waste management regulatory requiems by:

a. achieving at least 80% diversion from landfill by 2010;

b. achieving over 90% diversion from landfill by 2016; and,

c. eliminating the disposal of unprocessed waste in landfill by 2020

Pictures Came from
http://www.wrap.org.uk/construction/tools_and_guidance/site_waste_management_planning/
Metro Vancouver, DLC Waste

**Synergies**

**Supporting Themes**

**Objective:** To encourage the diversion of construction and demolition waste.

**Why is waste diversion important?**
The Ontario Ministry of the Environment reported that in 2002, 9.4 million tonnes of waste was generated in Ontario and sent to either landfills in Ontario and the United States, or to incineration facilities. Much of this waste could have been reduced, reused, or recycled. By diverting reusable or recyclable wastes from landfills or incinerators, we can extend the life of landfills, reduce airborne emissions, reduce the potential for groundwater and land contamination and conserve valuable natural resources.

**York Region's Integrated Waste Management Master Plan**
Responsible waste management is a key priority to ensure York Region's growth is managed sustainably. York Region is undertaking a Master Plan to ensure the right decisions are made in waste management based on York Region's strategic plans and regulatory requirements. By developing a long-term plan for waste management the Region makes a commitment to sustainability for the community. One of the key themes of the Master Plan will be reduction through advocacy and collaboration and includes actions that:

- encourage the Province to require waste reduction programs in the industrial, commercial and institutional sectors
- encourage the diversion of construction and demolition waste to meet or exceed the Region' diversion targets of ROP policy 7.4.2

SM4RT LIVING will guide York Region's waste management decisions over a 25 year time frame with recommended solutions to be implemented during the period 2012 -2017 and beyond. The master planning exercise commenced in the Spring of 2011 and will continue until late 2012.

In new communities, developers are encouraged to prepare an integrated waste management plan that outlines how construction and demolition waste is going to be managed to achieve waste diversion targets. The Plan should include the following elements:

1. Analysis of Expected Job-site Waste: Summarize the general categories of waste likely to be produced on the project.
2. Measurement and Documentation: Estimate rough quantities in each waste category and document
3. Removal Methods.
4. Removal Costs and Revenues: Generate a table of likely materials and their costs/credits per unit.
5. Options for Disposal: Mention any specific methods that are special or unusual opportunities.
6. Handling Procedures: Summarize the roles of the contractor and trades participating. A site plan with space allocated and receptacles indicated etc.
7. Personnel: a list that describes individuals and their responsibilities.
8. Hazardous Wastes: Summarize any special material, WHMIS and HAZMAT procedures.
9. New Opportunities: Continue throughout the project to explore opportunities to recycle, reuse, or minimize (in other ways) the project's negative impacts on people and the environment.

**Techniques to Consider for Diverting Waste:**

- re-use
- material selection–Recycled content
- end of lifecycle disposal
- salvageable or recyclable
- enabling source separation
- design features that promote recycling
- on-site composting and biodegrading


Source separation


Recycled content


Salvage

**Additional Resources:**
A Guide to Waste Audits and Waste Reduction Work Plans for Construction and Demolition Project, Ministry of Environment
Construction Management Plan, Unites Stated Environmental Protection Agency
DLC Waste Management Toolkit, Greater Vancouver Regional District

## RM2 – Three Stream Waste

**Provides facilities necessary for three-stream waste separation and collection**.

**ROP policy**

7.4.9 To require that all new multi-unit residential buildings incorporate three-stream waste collection capabilities.

**Related ROP Policies**

7.4.10 To work with local municipalities to require existing multi-unit residential buildings to participate in three-stream waste collection.

7.4.11 To work towards three-stream waste collection in Regional facilities.

**Synergies**

**Supporting Themes**

**Objective:** To implement three-stream waste collection capabilities in all multi-residential buildings.

**Three Stream Waste is required in all multi-unit residential buildings.**
As the Region intensifies, higher density residential buildings will become an increasingly larger proportion of the housing stock. It is important that all new residential buildings are designed to include the internal structures and space needed to manage three stream wastes (recycling, organics and residual waste). Currently, Markham, Newmarket, Richmond Hill and Vaughan all require new high-rise residential construction to include three-stream waste management capabilities.

**3-stream collection systems include the following:**

- single chute systems with tri-sorting equipment and lock-out chute doors
- triple chute systems
- recycling rooms with no chutes (for smaller buildings)

**How will this be implemented?**
At a minimum, all municipalities must include the following three-stream waste collection components in site plan approval conditions for multi-residential building units:

- provide three-stream sorting and collection systems for organics, recyclable materials and residual waste.
- design and construct internal material storage room(s) with sufficient space to store organics, recyclable materials and residual waste for a minimum of one week.
- design and construct the system so that it promotes access to diversion services (organics and recycling) that are as convenient as disposal (residual waste).

**What design considerations should I be aware of?**

| Internal Building Design Considerations | External Building Design Considerations |
|---|---|
| • multi-sort on every floor<br>• adequate internal storage must be provided<br>• internal location must be sized appropriately for size of building and collection frequency<br>• separate ventilation (odour control) required<br>• must have equal access to Recycling and Green bin, as tenants have for garbage<br>• design of internal storage must be carefully designed (don't want waste sitting next to any air intake vents) | • concrete loading area and adequate curbs<br>• pick up Time needs to correspond with noise by-laws and be reasonable<br>• access routes, truck turning radius for three-stream pick up |

Owner and occupant education and signage is important to ensuring successful three stream waste collection program in multi-residential buildings. Many of the local municipalities have developed resources that can be used in educational campaigns for residents.

**Additional Resources:**
THREE-STREAM WASTE MANAGEMENT IN NEW HIGH-RISE RESIDENTIAL BUILDINGS, Planning and Economic Development Committee, June 24th, 2010, York Region
City of Vaughan Waste Collection Standards, City of Vaughan

# RM3 – Environmentally Preferable Products

**Objective:** To encourage increased use of environmentally preferable products in York Region

**Encourage the use of environmentally preferable products in all new development.**

**ROP policy**

5.2.30 To encourage the use of environmentally preferable materials including low volatile organic compound products, adhesives and finishes, high-renewable and recycled content products and certified sustainably harvested lumber in all new development.

**Related ROP Policy**

5.2.29 To encourage enhanced indoor air quality in buildings, including the use of low or no volatile organic compound products; minimizing the leakage of combustion gases, reducing exposure to indoor air pollutants by ventilating with outdoor air; and indoor moisture controls

**What are environmentally preferable products?**
Environmentally preferable products and services have a lesser or reduced negative on human health and the environment when compared with competing products or services that serve the same purpose. This comparison applies to raw materials, manufacturing, packaging, distribution, use, reuse, operation, maintenance and disposal. Environmentally preferable products can often possess more then one environmentally friendly attribute.

**What are volatile organic compounds (VOC's) and off-gassing?**
Volatile organic compounds are organic (containing carbon) chemicals that can easily evaporate into the air. The release of volatile organic compounds can negatively impact indoor air quality which in turn can impact the health of occupants.

**Recycled Content Products**
Recycled content products are defined as the percentage of a material in a product that is recycled from the manufacturing waste stream or consumer waste stream and used to make new materials; recycled content is expressed as a percentage of the total material volume or weight. Recycled content products can contain pre-consumer and/or post-consumer materials.

**Post - Consumer Recycled Content** – materials that are recycled after used for its intended purpose (ex. gysum)
**Pre-Consumer Recycled Content –** material that is recycled from waste generated during the manufacturing process (ex. sawdust)

**High-renewable materials and products –** are agricultural building products (fibre or animal) that take 10 or less years to grow or raise. Rapidly renewable materials such as bamboo, cork, and straw are considered sustainable in the construction and renovation industry because they have the capacity to regenerate quickly. The recycled content is expressed as a percentage of the total material cost.

**Certified wood –** wood that has been issued a certificate from an independent organization with developed standards of good forest management. This certificate verifies that wood products come from responsible management forests.

**Synergies**

**Supporting Themes**

**Additional Resources**
EcoLogo, Canadian third party eco-labelling Program for environmentally preferable products
OntarioGreenSpec.ca, Ontario Green Building Products and Services Website
Database of Environmental Information for Products and Services, Environmental Preferable Purchasing, Environmental Protection Agency

# RM4 – Locally Sourced Materials

**Use of locally sourced materials, building products and finishes to support the Regional economy.**

**ROP policy**

5.2.36 To encourage the use of building materials sourced within York Region, and to support the building and land development industry on the availability of local building materials.

**Objective:** To encourage increased use of locally and regionally-sourced materials

**What are locally sourced/regional materials?**
Locally sourced materials are building materials that are extracted, processed, and manufactured close to a project site, expressed as a percentage of the total materials cost. In the LEED Rating System, regional materials are defined as materials that have been extracted, harvested or recovered and manufactured within 800 kilometre of the project site for a minimum of 10% or 20%, based on cost, of the total materials value.

**What does extraction, harvested and manufactured mean?**

- extraction is the removal of natural materials from the earth for the purposes of human use
- harvested refers to an activity where all or part of a plant that has been collected and removed from the location of its growth
- manufactured are those are activities associated with the production of materials, goods, or products

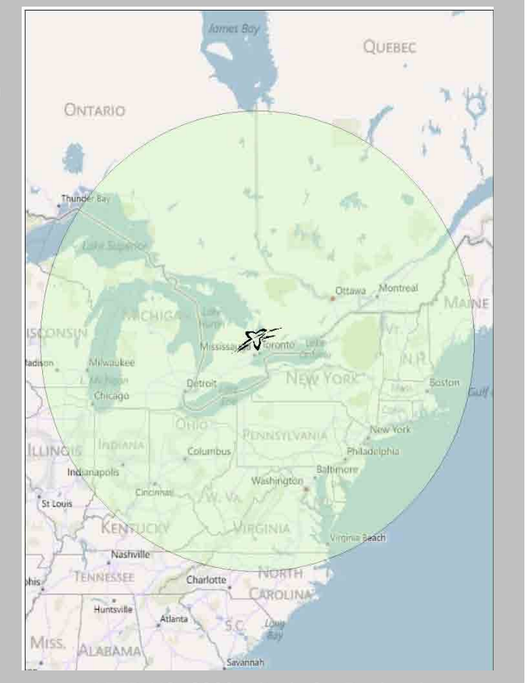
It's important to know where the product has been extracted, harvested and manufactured when determining if a material is locally/ regionally-sourced.

**What are the benefits of locally sourced/regional materials?**
There are benefits to choosing local/regional building materials in construction projects, including:

1. Reduced environmental impacts associated with transportation
2. Reduced costs associated with transportation
3. Support for the local economy

**How to incorporate locally sourced/regional materials into your project?**

1. Be familiar with local policies that promote local materials
2. Establish and maintain a library of regional materials and manufacturers
3. Set goals early in the design process for the use of locally produced wood and other materials
4. Assess the availability of regional materials and determine the best available products to minimize the project's environmental impacts
5. The use of life cycle assessment tools in the decision-making process because local materials may have a significantly lower carbon footprint than imported alternatives
6. Set appropriate local materials targets based on the project's budget and ensure related requirements are captured in the construction documents along with approved alternatives
7. Examine case studies on green building projects in your area for information on the use of local/regionally-sourced materials.



LEED NC, 2009 criteria for Regional Materials
(800 metre radius)

Source: Adapted from Wood Specification: Locally Produced Materials, prepared by Light House Sustainable Building Centre for naturallywood.com

**Synergies**

**Supporting Themes**

**Additional Resources:**
LEED Rating Systems, Canadian Green Building Council Website
OntarioGreenSpec.ca, Ontario Green Building Products and Services Website
Restoration Services Buildings, Toronto and Region Conservation Authority, SAB Magazine, March/April 2008, Jim Taggart

# RM5 – Comprehensive Building Owner/ Operator Training

**Objective:** To ensure comprehensive building owner/operator training

**Comprehensive building owner/operator training on water and energy efficiency features of their building.**

**ROP Policy**

5.2.39 To work with local municipalities and the building and land development industry to develop resident, building owner and operator educational materials and training on sustainable buildings.

**Related ROP Policy**

5.2.40 To work with local municipalities and the building and land development industry to provide each resident, worker, and employer with information on the sustainability features of their communities including water and energy conservation, transit information, ride share, car share, and carpooling options.

**Why is comprehensive building owner/operator training important?**
How the building is operated and maintained influences the sustainability of the building over its entire life. The performance of a building can be greatly impacted by how it is operated and maintained. Education of homeowners and building operators is essential to ensuring the highest level of building performance.

**What information should be included in the Building Owner/Operator Training Manual?**
An operations and maintenance manual or binder that includes all the following items:

1. The product manufacturers' manuals for all installed equipment, fixtures, and appliances.

2. General information on efficient use of energy, water, and natural resources.

3. Operations and maintenance guidance for any mechanical systems installed in the building including:
   - space heating and cooling equipment
   - mechanical ventilation equipment
   - humidity control equipment
   - radon protection system
   - renewable energy system
   - irrigation, rainwater harvesting, and/or greywater system

4. Guidance on occupant activities and choices, including the following:
   - cleaning materials, methods, and supplies
   - water-efficient landscaping
   - impacts of chemical fertilizers and pesticides
   - irrigation
   - lighting selection
   - appliance selection

5. Walkthrough of building with the occupant(s), featuring the following:
   - Identification of all installed equipment
   - Instruction on how to use the measures and operate the equipment
   - Information on how to maintain the measures and equipment

**Synergies**

**Supporting Themes**

**Additional Resources:**
LEED Canada for Homes, 2009, Canadian Green Building Council