TORONTO BOTANICAL GARDEN

Toronto Botanical Garden and Environmental Responsibility

Among the core values of Toronto Botanical Garden is a commitment to environmental responsibility. Our project combines artistry and ecological awareness in order to inspire passion, respect and understanding of gardening, horticulture, the natural landscape and a healthy environment. As one means of expressing this commitment, **Toronto Botanical Garden has designed a building that was awarded LEED® Canada Certification with a Silver rating on August 16, 2006**. Toronto Botanical Garden has incorporated numerous aspects of green design into its project including a green roof to help reduce heating and cooling costs and to manage stormwater runoff, reuse of materials in the building, a rainwater cistern that collects water from around the site and stores it for use in a variety of locations and a green education plan including an interactive kiosk. The finished building will be a 21st century example of ecologically conscious design and position Toronto Botanical Garden for leadership in this area.

What is LEED?

The LEED (Leadership in Energy and Environmental Design) Green Building Rating System,® administered by the United States Green Building Council (USGBC), is a voluntary, consensus-based national standard for developing high-performance, sustainable buildings.

Certifying a project with LEED contributes toward the goals of the program:

- defining "green building" by establishing a common standard of measurement
- promoting integrated, whole-building design practices
- recognizing environmental leadership in the building industry
- stimulating green competition
- raising consumer awareness of green building benefits
- transforming the building market

LEED provides a complete framework for assessing building performance and meeting sustainability goals. Based on well-founded scientific standards, LEED emphasizes state of the art strategies for sustainable site development, water savings, energy efficiency, materials selection and indoor environmental quality. LEED recognizes achievements and promotes expertise in green building through a comprehensive system offering project certification, professional accreditation, training and practical resources.

- From the USGBC website

In Canada, the Canada Green Building Council has recently been set up to administer a Canadian adaptation of the LEED System, tailored specifically for Canadian climates, construction practices and regulations**. Toronto Botanical Garden was one of the first to register a project with the new Canadian version of LEED and the first not-for-profit to achieve LEED certification in the city of Toronto.**

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Toronto Botanical Garden Building and LEED Certification

By following the LEED Rating System for our building renovation, TBG will limit the energy used in constructing the building and the overall impact it will have on the environment. There are a number of exciting features of our Green Building, such as a green roof, a green education program, a reduction of CO2 emissions, and the use of energy from renewable sources ("Green Tags").

Green Roof
Green roofs have been attracting an increasing amount of attention, as a result of the wide variety of environmental and social benefits they offer. A green roof is a vegetated roof cover – an extension of the existing roof – unlike a roof garden, which generally consists simply of a variety of containerized planting situated on a rooftop. In Europe, green roof technology has been established for some time, and is now a multi-million dollar industry in addition to providing tangible and intangible benefits to society.

Benefits of green roofs include the following:

- Improved air quality
  - Plants convert carbon dioxide, water and sunlight/energy into oxygen and glucose
  - 1 m^2 (10.76 ft^2) of grass roof can remove between 0.2 kg of airbourne particulates from the air every year
- Temperature regulation
  - In the process of evapotranspiration, plants use heat energy from their surroundings (approximately 592 kcal per L of water) when evaporating water. This process reduces the 'Urban Heat Island Effect' in the summer. This will also reduce the distribution of dust and particulate matter throughout the city and the production of smog, which can play a role in reducing greenhouse gas emissions.
- Building insulation
  - Shading the external surface of the building envelope has been shown to be more effective than internal insulation. Green roofs insulate buildings by preventing heat from moving through the roof.
- Stormwater retention
  - Water is stored by the substrate and then taken up by the plants from where it is returned to the atmosphere through transpiration and evaporation. Green roofs not only retain the rainwater, but also moderate the temperature of the water and act as natural filters for any of the water that happens to run off.
- Aesthetics
  - Urban greening has long been promoted as an easy and effective strategy for beautifying the built environment and increasing investment opportunity.

This is just the beginning – the possible benefits are endless. This information was found on the Green Roofs for Healthy Cities website at www.greenroofs.org.

Today in North America, green roofs are attracting attention. In 2003, the City of Toronto created a Green Roof Task Force, which performed research on the potential benefits of green roofs for our city. It was estimated that a "greening" of 6% of the total roof area in Toronto (6.5 million m^2) would result in:

- A reduction in the urban heat island effect of 1-2°
- A reduction in annual greenhouse gas emissions of 1.56 Mega tones
- A reduction in the incidence of smog advisories of 5-10% per year
- 30 Tonnes per year of particulate matter captured by plants
- 3.6 million cubic metres per year of stormwater retention capability

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Green Education Program
The finished building will have a Green Education Program, set up through LEED, which will help to educate the public on the issues our building design addresses. The education program includes:

- Case study pamphlet
- Permanent signage
- Electronic Kiosk
- Children's education programs

CO_2 Savings

- A base case building (MNECB) emits 49.7 tonnes of CO_2/year (based on Ontario Fuel Mix)
- Our building will generate an energy savings of approximately 30%, a reduction of 16.8 tonnes of CO_2/year
- We will have the opportunity to purchase "Green Tags"
    - By following the LEED program, we will be required to purchase 50% of our electricity from renewable sources for two years, which will be accomplished by purchasing Green Tags
    - Green Tags will give an additional annual savings of 6.7 tonnes of CO_2

For more information, please contact:
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Resources

USGBC LEED website http://www.usgbc.org/DisplayPage.aspx?CategoryID=19
Canada Green Building Council LEED website http://www.cagbc.ca/index.php
Green Roofs for Healthy Cities www.greenroofs.org
The Greenroof Industry Resource Portal www.greenroofs.com
Green Tags Ontario http://www.greentagsontario.com
Report: Green roof policies: Tools for Encouraging Sustainable Design, by Goya Ngan, Landscape Architect, BCSLA, December 2004
www.gnla.ca/assets/Policy report.pdf

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