

EXHIBITION PLACE

February 9, 2005

To: The Board of Governors of Exhibition Place

From: Dianne Young, General Manager & CEO

Subject: **Site Visit, Environmental Programs – Travel Expenses for the Chair**

Purpose:

This report recommends approval of travel expenses for the Chair of the Board.

Financial Implication and Impact:

Funding for this site visit is contained in the Board's 2005 Operational Budget managed by the Corporate Secretary.

Recommendation:

It is recommended that the Board authorize travel expenses for the Chair of the Board to conduct site visits to Woking (England) and London (England) on March 19 to 25 at a cost not to exceed \$2,755.00.

Background:

The Board's travel policy states that travel by the Chair of the Board over \$2,500 must be approved in advance by the Board.

Comments

In its review and revisit of the 1988 Development Concept Plan in June 2004 the Board has committed to advance its environmental agenda as part of the overall development to make Exhibition Place a "showcase" within the City of Toronto. Part of this commitment is a 2010 energy sustainability target for the grounds to be energy efficient.

Mr. Phil Jessup, Executive Director, Toronto Atmospheric Fund, has recently been seconded to the Greater London Authority Climate Change Agency. Mr. Jessup has been instrumental in assisting Exhibition Place to set and achieve its environmental agenda and projects such as the Tri-Generation project. In his new capacity, Phil Jessup has made arrangements for the Chair and I to conduct site visits in England to the following:

1. Woking Borough – is the only local authority in the UK to supply customers with electricity on private wire combined heat and power and renewable energy networks. It has also implemented energy and environmental services in both the public and private sectors.

Woking has installed UK's first small-scale combined heat and power(CHP)/heat fired absorption chiller system, the first condensing boiler scheme for private sector housing, the first local authority private wire residential CHP systems, the largest domestic photovoltaic/CHP installation, the first local sustainable community energy system, and the first fuel cell CHP system.

The above has resulted in savings of nearly 4.7M Pounds for the council and further savings for householders living in the Borough.

2. Crystal Palace Park

The Climate Change Agency (CCA) and Crystal Palace Park are in the process of integrating. The approach is to take advantage of the Crystal Palace site and its potential use for innovative technological "green" applications and as an educational centre and tourist attraction while respecting its historical context. Crystal Palace is an exhibition grounds similar to Exhibition Place.

3. The recently-turned "pedestrian-only" area in the central part of London.
4. The aquarium being built at Canary Wharf; and
5. Return the Toronto and Exhibition Place exchange visit made by Nicki Gavron, Deputy Mayor, City of London, in late spring 2002.

Aside from the Chair of the Board of Governors, this site visit will include Mr. Richard Morris, Manager, Energy Efficiency Office, CAO's Department, who will conduct groundwork for an exchange program he will be doing with the Climate Change Agency later this year, and the undersigned.

Conclusion:

This report seeks approval of travel expenses for the Chair of the Board as outlined in this report and as required pursuant to the By-Law of the Board.

Contact:

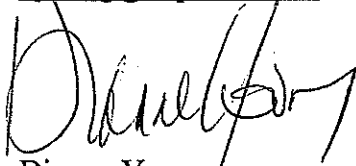
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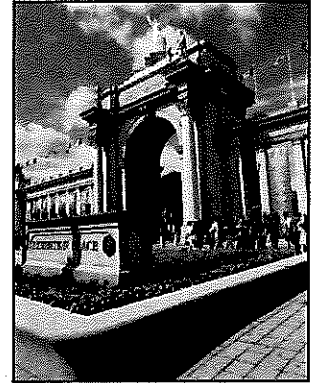
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Dianne Young

General Manager & CEO

Exhibition Place Environmental Plan

Exhibition Place is a significant public asset on Toronto's waterfront. Governed by The Board of Governors of Exhibition Place, a local board of the City of Toronto, Exhibition Place hosts over 5.0 million visitors a year to its 192-acre site. In 2004, the Board of Governors adopted its **Development Concept** to provide an overall framework for new initiatives at Exhibition Place. An **Environmental Plan** was a key part of this framework.



A guiding principle fundamental to the **Environmental Plan** is the promotion of sustainable development and environmental initiatives. Exhibition Place has throughout its 126-year history, been a showcase for innovation and this Plan establishes the principle of continuing to pursue leading edge green technologies and practices. Partnerships between Exhibition Place, the City of Toronto, other levels of government, not-for-profit climate change organizations and the private sector will be instrumental to the achievement of the Environmental Plan.

Bold directions set by the Board of Governors in the Environmental Plan include a commitment for Exhibition Place to:

- Be a leader in the use of energy-efficient technologies and the technical and financial strategies used to develop site sustainability
- Seek all opportunities for improving sustainability of the site through initiatives in energy supply and use, solid waste management, building system improvement, transportation improvements and greening initiatives
- Achieve energy self-sufficiency by 2010
- Achieve 100% waste diversion by 2010
- Integrate sustainability principles in the procurement and capital works policies
- Establish an annual "environmental" capital budget

Actions taken by the Board of Governors to implement its 2010 energy self-sufficiency target include:

- Construction of the first urban Wind Turbine in Canada producing 1.2 million kilowatt-hours of energy annually
- Participation in a Hydrogen Fuel Cell demonstration project which includes the installation of a hydrogen refueling station and the deployment of two fuel powered John Deere work vehicles
- Introduction of a S-M-A-R-T (Saving Money and the Air by Reducing Trips) program for employees
- Construction of a Trigeneration Project within The National Trade Centre that will generate 30% of the energy needs of that Complex
- Implementation of a Green Roof pilot project on the historic Horse Palace
- Multiple forestry initiatives including tree plantings and a naturalized garden
- Planning for a Photovoltaic Power Generation Plant pilot project
- Undertaking Energy Efficiency Retrofit projects in five buildings in 2005/06

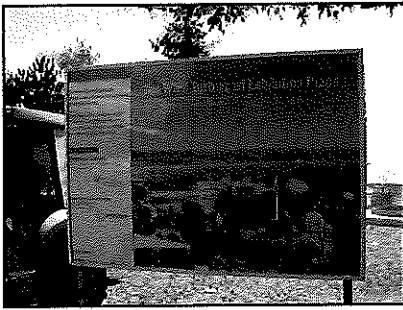
The Capital commitment made by the Board of Governors will total almost \$7.4 million over the next three years

The annual production of energy and/or reduction in energy use resulting from these initiatives will be approximately 13.7 million kilowatt-hours

The annual reduction in carbon dioxide emissions resulting from all these measures will be approximately 10,970 tonnes

For more information on Exhibition Place visit: www.explace.on.ca

Wind Turbine

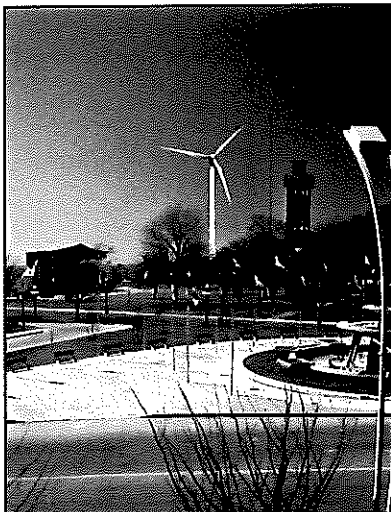
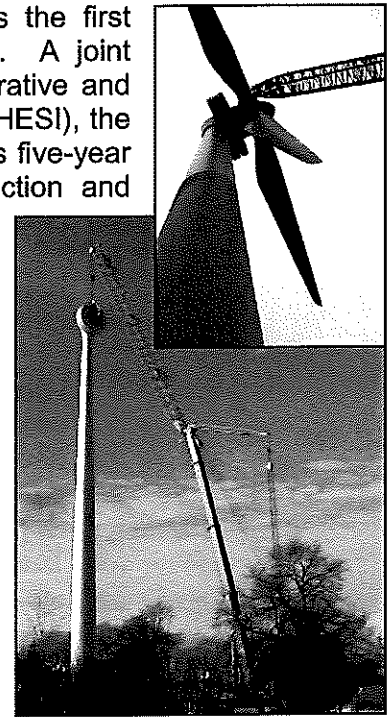


The Exhibition Place Wind Turbine is the first urban wind turbine in North America. A joint venture project of WindShare Co-Operative and Toronto Hydro Energy Services Inc. (THESI), the Wind Turbine went through an arduous five-year incubation period prior to its construction and commissioning in 2002. It has become an icon in the City of Toronto symbolizing clean green energy. The Wind Turbine consists of a three-

bladed 750 kilowatt gearless generator capable of producing 1.2 million kilowatt-hours of energy each year. Not only does the Wind Turbine produce enough green energy to power approximately 250 homes, it has helped educate the public and dispel the myths about wind energy.

Facts about the Exhibition Place Wind Turbine:

- The turbine's blades are each 26 metres in length
- From the ground to the tip the Wind Turbine is 91 metres tall, about as tall as the Royal York Hotel in downtown Toronto
- There are approximately 150 cubic meters of concrete and 21 tonnes of reinforcing steel in the turbine's foundation
- Eight rock anchors are drilled almost 33 feet into the bedrock to hold the foundation in place
- The Wind Turbine generates sound levels of only 43 decibels at a distance of 250 meters which is less than the noise levels typical of a residential neighbourhood
- As demonstrated by a 2003 study, the Wind Turbine has had no negative impact on the bird population of the surrounding parkland or shores of Lake Ontario



Benefits of Wind Energy

- Produces pollution-free energy
- Quiet green energy technology
- The Exhibition Place Wind Turbine displaces approximately 1,180 tonnes of carbon dioxide (CO₂) annually; 8,400 kilograms of sulphur dioxide; 5,600 kilograms of nitrous oxide
- Since 1995, world wind-generating capacity has increased by 487%

For more information on wind turbines visit: www.windshare.ca and www.torontohydro.com

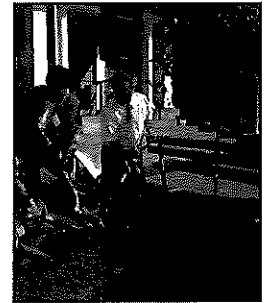
Urban Forestry Initiatives



Exhibition Place, as a local board of the City of Toronto, is playing its part in the urban forestry initiatives being spearheaded by the City's Tree Advocacy Planting Program (TAPP). TAPP has the mandate to cultivate and care for the City's urban forest by planting trees, spreading awareness, lobbying for increased protection for trees and fostering partnership. Exhibition Place is "doing its share" to preserve and renew the City's urban forest. In a special ceremony in 2004, Exhibition Place paid tribute to the oldest -- over 100 years old -- elm tree still standing in the City of Toronto. With 2,570 trees on the site and over 51 acres of parkland, Exhibition Place, on an annual basis, earmarks \$50,000 for its forestry program.



Recently, Exhibition Place has also been part of two very special initiatives - one is the Sakura Tree Project and the other is a naturalized garden. The Sakura project was undertaken in partnership with the Sakura Committee of the Japanese Consul General's Office in Toronto and resulted in the planting of 68 Sakura (Japanese cherry) trees at Exhibition Place. The naturalized garden, which will be officially opened in the



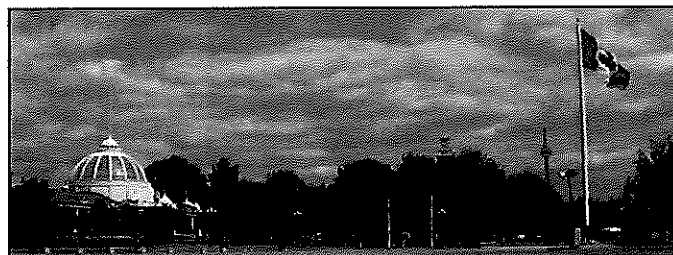
Spring 2005, will surround the base of the Wind Turbine and the Hydrogen Fuel Plant and will feature low maintenance native plants and trees.



A further aim of the reforestation commitment at Exhibition Place is the "greening" of hard surfaces that cover much of Exhibition Place and are necessary to support the trade and consumer show/event business. Through the strategic planting of trees, however, these surfaces can be shaded thus reducing or eliminating the "urban heat island" effect.

Benefits of the Urban Forest

- Trees improve the air quality – each tree can reduce air borne dust particles by as much as 7,000 particles per litre of air
- Trees absorb carbon
- Trees help prevent soil erosion and provide effective insulation against noise
- One large tree can provide a day's oxygen for up to 4 people
- Trees help reduce energy costs by shading buildings in the summer and protect against winter winds



For further information on Tree Advocacy, visit: www.toronto.ca/tapp

Photovoltaic Power Generation Plant

In partnership with the Toronto Atmospheric Fund (TAF) and the City of Toronto's Energy Efficiency Office & Fleet Services Division, Exhibition Place will be constructing a 50 – 100 kilowatt Pilot Solar Photovoltaic Power Generation Plant in the Fall 2005 on the roof of the historic Horse Palace at a capital cost of \$0.5 million. This initiative will install, test and evaluate at least 2 types of photovoltaic systems and based on the evaluation results, the project will inform the design of a much larger 1 – 2 million kilowatt generation system for the grounds.



The pilot phase of the Photovoltaic Plant will reduce the annual carbon dioxide (CO₂) emissions of the Horse Palace by approximately 94.7 tonnes per year. When the project is fully built in 2006/07, it will be the largest photovoltaic plant in Canada and one of the largest in North America. It will displace up to 2 million kilowatt-hours per year of electricity and will reduce carbon dioxide (CO₂) emissions annually by approximately 1,906 tonnes. Essentially, this project will be a

net exporter of clean emission-free electricity for Exhibition Place.

How does Solar Photovoltaic Plants produce Energy?

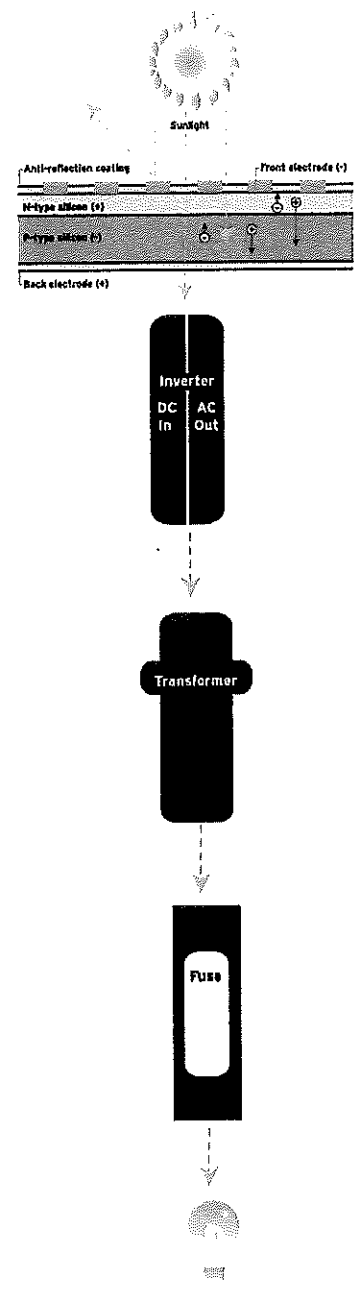
Solar Photovoltaic Plants convert sunlight into electricity. Literally translated "photovoltaic" means "light energy". Photovoltaic (PV) panels are often referred to as "solar panels" because they are made up of several small sections called "solar cells". Most "solar cells" are made of silicon and each cell is designed with a positive and a negative layer to create an electric field, just like in a battery.

Every minute enough sunlight reaches the earth to meet the whole world's energy demand. Sunlight is made up of tiny particles called "photons". A stream of these "photons" shine on the solar cells, are absorbed in the cells and cause the electrons in the silicon layers to move, and through this movement create electrical current. The current then passes through the electrode at the back of the solar cell and exits through the connecting wire. The connecting wire is attached to an inverter where the power is converted from DC (direct current) to AC (alternating current) power. The AC power is routed to a transformer where the voltage is increased from 208 to 600 volts to match the building's electrical service. The electrical lines are then attached to the building fuse panel.

Benefits of a Solar Photovoltaic Plant

- Produces pollution free electricity
- Reducing fuel consumption (ie gas) will displace fossil fuels, lower energy bills & cushion the user against increasing energy prices
- Noise free "green energy"
- Provides energy security for Exhibition Place
- Pilot project will help create new markets for this technology

For more information on Solar Photovoltaic Plants visit: www.cansia.ca



Energy Efficiency Retrofits

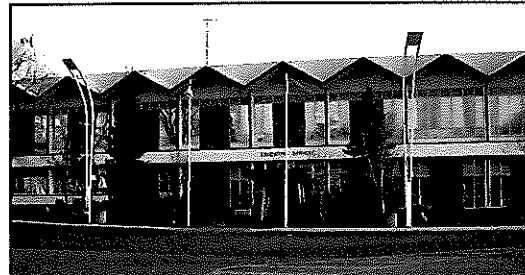
While exploring new technologies for energy production, Exhibition Place is also committed to decreasing energy demands through building retrofits. In 2005 and 2006, Exhibition Place in partnership with the City of Toronto will be investing \$2.2 million in energy efficiency projects within 5 of its 22 buildings: the Press Building, Queen Elizabeth Building, Horse Palace, the General Services Building and The National Trade Centre Complex.



Press Building



National Trade Centre



Queen Elizabeth Building

These energy efficiency measures include: Lighting Improvements; Heating, Ventilation and Cooling System Improvements; Water Conservation Measures; Building Envelope Upgrades; and Infrastructure Upgrades/Enhancements.

Once implemented, these measures will result in the reduction of energy use by 2.32 million kilowatt-hours; achieve annual operating savings in gas and hydro consumption and maintenance costs of \$122,000; and reduce carbon dioxide (CO₂) emissions by 2,290 tonnes.

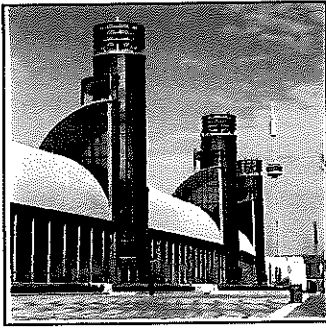
Retrofitting the present building stock to become more energy efficient is not only good for the environment but is good for business. For instance, the proposed project for The National Trade Centre Complex is a lighting retrofit in Exhibit Halls A, B, C and D and Heritage Court costing \$800,000.00. This upgrade will not only decrease energy consumption and save money but will also improve the overall light levels in these exhibit halls which will benefit the trade and consumer show clients and the 3.0 million customers who visit this facility each year. The expected results of this project will improve the Color Retention Index and increase light levels by 5% to 10%. The high intensity discharge modifications will yield substantial savings by reducing the kilowatt-hour consumption of hydro yet maintaining equal or better light levels.

Benefits of Energy Retrofits

- Improves building efficiencies, operations and building climate
- Decreases energy use resulting in energy savings
- Reduction of carbon dioxide (CO₂) emissions which are a source of greenhouse gases

For more information on City of Toronto Programs related to energy retrofits visit: www.torontobbp.on.ca

Trigeneration System in The National Trade Centre Complex



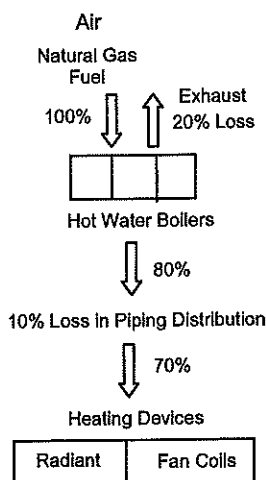
In partnership with the Toronto Atmospheric Fund (TAF), the City of Toronto and the Federation of Canadian Municipalities Green Municipal Funds, the Trigenation System will become the sole source of power, heat and most of the cooling for The National Trade Centre at Exhibition Place. The National Trade Centre is the 6th largest trade centre in North America and the construction of the Trigenation System represents a \$4.4 million investment in the Centre. The Exhibition Place Trigenation System will be one of the largest in Canada and the first municipally-owned system. It is estimated that when this System is in operation in January 2006, it will produce an estimated 12.0 million kilowatt-hours of electricity

per year; displace 7,400 tonnes of carbon dioxide (CO₂) emissions; and supply approximately 30% of the energy needs of Exhibition Place. This project is just the first phase of a "district energy system" that will be expanded across the 192-acre Exhibition Place site and can serve as a unique model for other campus locations.

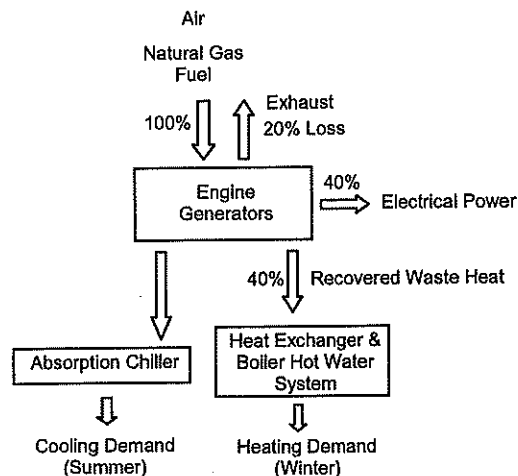
How does a Trigenation System produce energy?

Trigenation is a system that utilizes natural gas combustion engines to generate three forms of secondary energy – space heating and cooling and electricity. The Exhibition Place project consists of one 1.6 million kilowatt natural gas-fired generator with a heat-recovery package and a new hot-water driven absorption chiller. The waste heat produced by the engine is recovered and supplied in the form of hot water to the absorption chiller, which in turn provides cooling (through a chemical process) for The National Trade Centre in the summer or is supplied to augment the heating boilers in the winter. The recovered heat improves overall plant efficiency from 40% that is typical of a standard engine to an 80% level in the Trigenation System.

Present Heating System



Trigenation System



Benefits of the Trigenation System

- Energy Security – More than 30% of the energy needs of Exhibition Place will be met by the Trigenation System
- Energy Cost Savings – It is estimated that there will be net energy savings of approximately \$30.0 million to Exhibition Place over the life of the Trigenation System being installed
- Reduction in carbon dioxide (CO₂) emissions of 7,400 tonnes per year

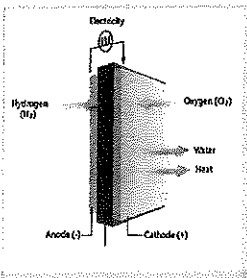
Greater Toronto Area Hydrogen Village Hydrogen Fuel Cell Demonstration Project

In partnership with Hydrogenics Corporation (a Canadian leader in hydrogen fuel cell technology) and the City of Toronto's Energy Efficiency Office & Fleet Services Division, Exhibition Place launched the Fuel Cell Demonstration Project in the Summer 2003 and in 2004/2005 will be demonstrating the following hydrogen fuel cell products:

- 50 kilowatt hour HySTAT Fuel Cell Generator adding to the existing electricity sources within The National Trade Centre (during 3 week-period in August 2003)
- John Deere Fuel Cell Work ProGator (in permanent operation within The National Trade Centre)
- Class I Fuel Cell Forklift (during 3-week period in August 2004)
- The GEM – small urban vehicle (during 3-week period in August 2004)
- Hydrogen Refueling Station located next to the Wind Turbine (in permanent operation)
- Fuel Cell Bus (planned for 2005)

This Hydrogen Fuel Cell Demonstration Project is part of the City of Toronto's Hydrogen Village Initiative.

How do Hydrogen Fuel Cells Work?



A Hydrogen Fuel Cell is an electrochemical device that produces energy without combustion by combining hydrogen and oxygen. Hydrogen enters the fuel cell on the anode side and is split into protons and electrons by a catalyst (platinum). When split, the electrons are forced to flow one way creating an electrical current that can be captured before the electrons reach the cathode side of the catalyst. When the protons and electrons join again on the cathode side of the fuel cell, they are mixed with oxygen to produce water and heat.

By putting a number of individual fuel cells together in a stack and then building an operating system around the stack, you can make enough power to turn a motor which can drive a vehicle. Hydrogen is a colourless, odourless gas that is 14 times lighter than air. It does not exist in its pure state in nature but must be extracted from other compounds. Hydrogen is the ultimate fuel with zero carbon content. It is the carbon content in fuels that contributes greatly to air pollution.

The **Exhibition Place Hydrogen Refueling Station** adjacent to the Wind Turbine is the first such refueling station located within the City of Toronto. The Hydrogenics HyLYZER 65 Electrolyzer uses the renewable energy produced by the Wind Turbine and with water produces hydrogen and oxygen. The pressurized hydrogen generated is then stored in a specially designed cylinder. The John Deere ProGators can drive up to the Hydrogen Dispenser and just like a "gas station" they can be refueled with hydrogen and ready to go!



Benefits of Hydrogen Fuel Cells

- It is clean – using hydrogen in an energy conversion device produces zero emissions – only electricity and water are produced
- It is abundant – hydrogen is the most abundant element in the universe
- It promotes energy security – hydrogen can be produced in a variety of ways, from water, natural gas, biomass, ethanol to name only a few

For more information on Hydrogen Fuel Cells visit: www.hydrogenics.com

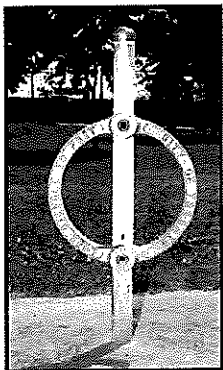
S-M-A-R-T Movement

Saving Money and the Air by Reducing Trips



In the Fall 2002, Exhibition Place partnered with Pollution Probe to introduce the S-M-A-R-T Movement initiative to its employees to minimize single occupancy vehicle (SOV) trips. S-M-A-R-T provides employees with resources and incentives to help change commuting habits, and in doing so, reduce air pollution. Employees are encouraged to S-M-A-R-T commute to improve their health and the environment. Participants in the program are offered a "Guaranteed Ride Home" that provides taxi fare in case of family emergency or illness, or in the case of unexpectedly having to work late.

The S-M-A-R-T program at Exhibition Place is headed by a "volunteer" coordinator and has expanded into an environmental umbrella group of Exhibition Place employees responsible for many different initiatives on the grounds. Under the program, Exhibition Place participates in the City of Toronto's Annual Bike Week. Employees take part in the City's Group Commute that sees hundreds of cyclists riding together to City Hall. S-M-A-R-T hosts an annual Bike Week BBQ celebration at Bandshell Park called "Let's Bike to the Ex!"



In cooperation with the City of Toronto, 35 new post and ring bicycle stands have been installed on the grounds to add to the existing network of 130 spots of bicycle parking for employees and visitors. Priority parking spaces for carpoolers will be introduced in 2005.

A new project spearheaded by the S-M-A-R-T program, in conjunction with "Moving the Economy" will see a multi-modal hub introduced to the grounds that will include a City Bike-Share facility. Funding for this project was approved by Transport Canada in the Summer of 2004. In addition to this future resource, S-M-A-R-T operates an on-site communal bike fleet that employees may use to travel between locations on the grounds.

Additional programs provided by S-M-A-R-T include informative e-mails, a commuter book club, walk to lunch, carpooling and transit information, as well as social events. Learning seminars are provided at lunch hour on such topics as home energy efficiency and bicycle repair. In the Fall of 2004, a follow up survey of the program was completed and new initiatives are being launched to promote the S-M-A-R-T Movement at Exhibition Place.

For further general information about the S-M-A-R-T Program visit: <http://www.pollutionprobe.org/whatwedo/Smart.htm>

Green Roof at the Horse Palace



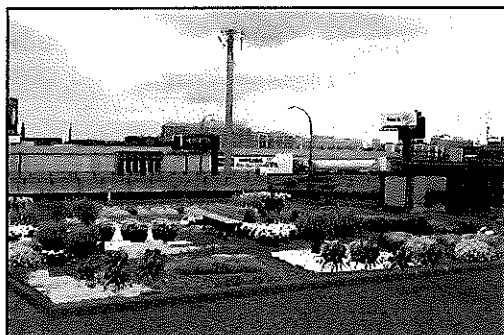
In Summer 2004, Exhibition Place constructed a Green Roof on the historic Horse Palace at a cost of \$44,000. This 2,500 square foot "meadow" roof is a demonstration project for Exhibition Place with the intent to expand or incorporate this type of initiative into new buildings on the grounds such as the proposed Conference Centre Facility.

In a highly urbanized municipality such as the City of Toronto, a significant portion of the natural landscape has been replaced by hard, non-permeable surfaces creating the "urban heat island effect". These hard, reflective surfaces absorb the solar radiation and re-radiate it as heat. At Exhibition Place, 139 acres of the 192 acres falls into this "hard non-permeable category" of which 49 acres is attributable to roofing.

Recent studies have indicated that greening just 6% of the City of Toronto's rooftops could reduce summer temperatures by 1 – 2 degrees Celsius, resulting in a 5% decrease in electricity demand for cooling. This would save an estimated \$1.0 million in energy costs per year and an estimated reduction in the incidence of smog days by 5 – 10%.

Benefits of Green Roofs

- **Improves Air Quality** – A green roof filters particles from the air moving across it and through photosynthesis, the plants and grasses convert carbon dioxide (CO₂) into oxygen. 1.0 m² (10.76 ft²) of uncut grass produces enough oxygen per year to supply one human with their yearly oxygen intake requirement and 1.0 m² (10.76 ft²) can also remove approximately 0.2 Kilograms of particulates from the air every year.
- **Temperature Regulation** – Reduces the "urban heat island effect". Through the evaporation cycle, plants on green roofs use heat energy and cool cities at the same time. 1.0 m² (10.76 ft²) of foliage can evaporate over 0.5 liters of water on a hot day and on an annual basis the same area can evaporate up to 700 litres.
- **Building Insulation** – Green roofs insulate buildings by preventing heat from moving through the roof. They also provide shade to a building envelop which is found to be more effective than internal insulation for cooling a building. On a summer day, the temperature of a gravel roof can increase by from 25 degrees Celsius to as much as 60 – 80 degrees Celsius. Covered with grass, the temperature of the roof would not rise above 25 degrees Celsius.
- **Stormwater Retention** – Water is stored on a green roof in the soil and taken up by the plants rather than running off the building into the storm sewer system. In summer, depending on the type of plants, green roofs retain 70 – 80% of the precipitation that falls on them and in the winter they retain between 25 – 40%. Green roofs also act as a natural filter for any stormwater that runs off them.



For further information on Green Roofs visit: www.greenroofs.org