

# Exhibition Place to showcase sustainable energy solutions

City of Toronto, Ontario



## Green Municipal Fund Case Study



### City of Toronto's Energy Self-Sufficiency Plan for Exhibition Place (GMEF 9066)

Date project completed: July 2007

Total project value: \$125,000

GMF grant: \$50,000

- Exhibition Place studied how to achieve electrical energy self-sufficiency
- Electricity loads to be reduced through improved energy efficiency
- Existing trigeneration system could switch to biogas for fuel, and solar photovoltaic panel installation could be expanded
- Greenhouse gas emissions would be reduced by about 5,600 tonnes annually

Developing an energy action plan pointed the way to making 11 key buildings in Exhibition Place self-sufficient in electrical energy use (Photo: Exhibition Place).

**OVERVIEW** The Board of Governors of Exhibition Place in Toronto developed an energy self-sufficiency action plan for Exhibition Place. The goal was to achieve net electricity self-sufficiency for 11 key buildings by 2010 and to make Exhibition Place a world-class public showcase of sustainable energy technologies and solutions. The study identified a combination of energy retrofits and operational improvements that would decrease electricity consumption by about one-third and natural gas consumption by about one-quarter by 2010. Further reductions in grid-supplied electricity would be achieved through on-site generation from the existing trigeneration system and the existing and future solar photovoltaic panels. Greenhouse gas emissions would be reduced by about 5,600 tonnes annually. Emissions of nitrogen oxides (NO<sub>x</sub>) would also be reduced by 7 to 20 tonnes per year, while emission of sulphur oxides (SO<sub>x</sub>) would be reduced by 56 to 73 tonnes per year.

### PROJECT TEAM

City of Toronto (Board of Governors of Exhibition Place)  
Energy Profiles Limited

**CONTEXT** Exhibition Place, owned by the City of Toronto, is a 192-acre site west of downtown Toronto. It is home to more than 300 events annually, including the Canadian National Exhibition and the Royal Agricultural Winter Fair. More than 5.2 million people visit the site every year. The city, through the Board of Governors of Exhibition Place, started a number of energy reduction and supply projects in 2006. These included energy-efficiency and lighting retrofits; a trigeneration system that uses natural gas to provide power, heating and cooling; a 100-kilowatt solar photovoltaic system; and a green roof and a ground source heat pump to replace outdated heating, ventilation and cooling systems. The objective of developing an energy self-sufficiency action plan was to identify



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additional measures required to achieve net zero electricity use from the grid by 2010.

**APPROACH** Phase 1 of the study to come up with an energy action plan examined current building loads and load reduction options for each of the 11 buildings. The project team reviewed available energy information about the site, established a 2005 energy load profile, determined energy end uses, reviewed options for reducing the buildings' energy load and proposed retrofits.

Phase 2 looked at integrated solutions and operational strategies to improve energy efficiency across the entire site. This included an inventory of individual building loads; an overview of energy consumption by source, by end use and by peak demand of grid-supplied electricity; a forecast of the cost per kilowatt hour of electricity delivered for renewable technologies; a recommendation of integrated solutions options to meet the electrical loads; and an evaluation of the economic results for each option.

Phase 3 looked at implementation, financing and funding. The project team examined capital funding forecasts and prepared a 25-year capital forecast for building renewal. They developed financing and funding options, priorities, and timelines to meet the 2010 target, taking into consideration the potential savings from energy efficiency measures.

**RESULTS** The study identified energy efficiency as the most cost-effective way to achieve net zero electricity from the grid by 2010. A comprehensive energy management strategy and asset management plan could help Exhibition Place meet the 2010 objective and continue to reduce energy consumption beyond that date.

On-site generation from the trigeneration unit will significantly reduce the consumption of grid-supplied electricity. The operation of this unit could be optimized to reduce the purchase of grid-supplied electricity even further. One

possibility to be explored is the conversion of the trigeneration unit from natural gas to renewable biogas energy to improve the overall sustainability of the site. The solar photovoltaic pilot installation on one of the buildings has shown that this form of electricity generation has considerable potential for Exhibition Place and could be used to provide a significant share of the site's requirements.

**NEXT STEPS** To achieve self-sufficiency in electrical energy, Exhibition Place will decrease building loads by installing building-automation and intelligent lighting systems and by improving building envelopes. On the production side, Exhibition Place is looking at the feasibility of using biogas — and for a possible source of it — for the trigeneration system. It also issued a request for proposals to build one megawatt of solar photovoltaic electricity generation capacity.

**LESSONS LEARNED** Developing the plan provided a framework for reducing the amount of grid-supplied electricity to Exhibition Place. According to Dianne Young, CEO of Exhibition Place, "While the study provided a valuable framework, we still had to 'operationalize' the study in order to determine which projects should go forward and the priority of the projects, which is taking additional time." Young advises municipalities to seriously consider what they want from a study before issuing the request for proposals (RFP). "Municipalities need to understand if they want a broad-based study or a detailed action plan, and write the RFP accordingly."

The study confirmed that energy efficiency is the most cost-effective way to reduce energy consumption and the demand for grid-supplied electricity. But renewable energy, especially solar photovoltaics, can also contribute substantially. Still, according to Young, "without Ontario's Renewable Energy Standing Offer Program, with a guarantee payment of \$0.42 per kilowatt hour for electricity generated from solar PV, this would not be a feasible project. Municipalities in other provinces may not have this option."



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### CONTACTS

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**ADDITIONAL RESOURCES** For other GMF projects of this type or category, or from this municipality, province or territory, please contact the GMF at 613-241-5221 or at [planning@fcm.ca](mailto:planning@fcm.ca). For the complete project report, please visit the GMF website at [www.fcm.ca/gmf](http://www.fcm.ca/gmf).

#### About the Green Municipal Fund

The Government of Canada endowed the Federation of Canadian Municipalities (FCM) with \$550 million to establish the Green Municipal Fund™ (GMF). The Fund provides low-interest loans and grants, builds capacity, and shares knowledge to support municipal governments and their partners in developing communities that are more environmentally, socially and economically sustainable.

#### Federation of Canadian Municipalities Green Municipal Fund

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