RENEWABLE ENERGY POLICY FOR CITY FACILITIES

At its meeting of July 16-19, 2013, City Council adopted an update to the Toronto Green Standard - http://insideto.toronto.ca/uds/city_planning/tgs.htm. Among the revisions is the requirement for all *new* City-owned buildings to generate at least five percent of total modeled energy use from renewable technologies. The Toronto Renewable Energy Office (TREO) is committed to working with all stakeholders to ensure that the design and installation of renewable energy systems is as seamless as possible. We can provide City Divisions, Agencies and Corporations (DACs) with additional information on a case by case basis if needed.

Although we will do our best to reach out to you well before the planning phase for any new project, we encourage you to alert us to new building projects as soon as possible in order to maximize integration and avoid possible design conflicts or obstacles.

Questions and Answers:

1. *What does the Policy require me to do?*

   The Toronto Green Standard now requires new City buildings to generate at least 5% of their modelled energy consumption through renewable energy technologies. As part of the City's Planning process, applications are circulated by City Planning to TREO via the Energy and Environment Division (E&ED) for comment on the renewable energy requirements of the TGS. As part of the energy model which is already required by the TGS, applicants will be required to submit a feasibility study demonstrating the potential for a renewable energy installation(s) as part of the project. If an installation(s) is determined to be technically and financially feasible, a design study will then be required.

   TREO can provide technical and financial assistance for many City renewable energy projects, so it is important that DACs communicate with us early in the development of a project. Our approach is to work with you to resolve issues well in advance of the Planning process.

2. *How will projects be financed? (see Appendix 1 for more details):*

   Tax-supported DACs whose projects meet financial requirements will have access to the Recoverable Debt Program via TREO's capital budget to borrow the funds from Reserves for their renewable installations. This program provides up to 100% of the incremental cost of renewable energy projects (the difference between the cost of a renewable energy system and a conventional system). Loans are repayable within a maximum of twenty years. Energy savings or revenues generated by the renewable energy project are paid back to Reserves.

   Because funding for renewable projects comes from TREO's capital budget, it is important to communicate with us early in the project development process.

3. *Which renewable technologies are most commonly installed?*

   Currently, the most cost effective renewable energy technologies are Solar PV and Geothermal. A number of these systems have been installed in municipal buildings already. Solar PV installations can either generate electricity that can be sold back to the Ontario Power Authority (OPA), or power the building itself. Geothermal systems use thermal energy from the ground to directly heat and cool a building. In some circumstances, wind turbines and solar thermal installations may also be viable options.

   The feasibility study will help determine the best technology for your location. TREO is continually monitoring advances in the renewable energy field. If other technologies emerge as more efficient/cost effective solutions we will consider these for future projects.

4. *What are the differences between integrated and non-integrated systems?*

   Renewable systems will fall into one of these two categories.

   a) **Non-Integrated**: Non-integrated systems (typically solar PV) generate electricity which is then sold back to the OPA through their Feed-in Tariff (FIT) program. These systems operate independently from a building's main source of electricity. Systems can typically be installed after the building is completed if the building is designed and built to be "solar-ready" (see Appendix 2 for details). TREO will apply for Feed-in Tariff contracts with the Ontario Power Authority for these systems prior to their construction, and will retain responsibility for them during the life of the FIT contract.

   b) **Integrated**: Integrated systems provide a building directly with electricity or heating/cooling, and should be installed when the building is constructed. With an integrated system the savings generated come from the reduced costs of operation and power generation. Geothermal installations are an example of an integrated system. Solar PV may become viable as an integrated system in the near future, as the cost of conventionally-generated electricity increases and the cost of PV installations decreases.

5. *How are technical practicality and financial feasibility determined?*

   As part of the Energy Model that is already required by the TGS[1], your consultants should conduct an assessment of opportunities for renewable energy options to determine if a renewable energy installation is technically practical as part of your project. TREO can assist your consultants with this assessment. The requirements for feasibility and design studies are outlined in Appendix 2 below. By consulting with TREO early in the capital budget process, you can ensure renewable energy opportunities are identified.

[1] http://insideto.toronto.ca/uds/city_planning/tgs.htm

To determine financial feasibility, a business case should be prepared which demonstrates that the project will generate energy savings sufficient to offset a debt service schedule over the performance life of the asset (but no more than twenty years), inclusive of all financing costs at 2.0% above the corresponding Bank of Canada bond yield at the time of approval. More information on financial criteria is included in Appendix 1.

In most cases, solar PV and geothermal projects that are technically practical will also be financially feasible.

6. *Will the Recoverable Debt Program cover the entire cost of the renewable energy system including the feasibility study, design, and installation?*

DACs are responsible for incorporating the feasibility study into the currently-required energy model for their building, but the cost will not likely be significant. For tax-supported DACs, the Recoverable Debt Program will cover the incremental design and installation costs of the renewable energy system vs. a conventional system.

TREO will be responsible for applying to the Ontario Power Authority for a Feed-in Tariff contract for solar PV projects.

7. *What is the cost of operating and maintaining renewable energy systems?*

Operation and maintenance costs will vary depending on the renewable technology used. The operating and maintenance cost for a 50kW solar PV installation is approximately $1,500/year. The operating and maintenance cost for a geothermal system is dependent on the system and can be highly variable. If a feasibility study determines that a site is an ideal candidate for a geothermal system, up to fifty percent in annual savings could be achieved. For example, for a 50 ton geothermal system at the McGregor Community Centre, the operating and maintenance cost would be approximately $45,000, while the operating and maintenance cost for a conventional heating and cooling system would be approximately $84,000.

As long as the system is operating correctly, our experience with these projects has shown preliminary cost/savings estimates to be accurate. We will work with you to ensure that the renewable energy system is operating correctly and will continue to monitor all of the projects that we are involved with.

8. *What training and hands-on maintenance/operation is required to run these systems?*

Depending on the system type, the level of training and maintenance will vary.

Non-integrated systems require minimal training and very little is required of operations staff. Typically, TREO will be responsible for maintaining these types of systems.

Integrated systems will require a more hands on approach from operations staff. We will provide training sessions to initially educate all staff involved and we will work with you to provide ongoing training

9. *How will monitoring and reporting on the performance of the installations be addressed?*

   Monitoring and reporting on the renewable energy installations is important to meet the requirements of the Green Energy Act and to ensure the systems are operating properly. Automated remote monitoring will be required for all projects. This will involve little if any on-site staff attention. TREO will support DACs if there are any technical requirements for their monitoring and verification systems.

10. *Are there any exemptions to the policy?*

    a) Buildings under 600 square metres in size.
    b) Where renewable installations are technically not practical. Examples could be buildings that are heavily shaded (not suitable for solar installations), or have limited lot sizes (might be unsuitable for geoexchange). These exemptions will be determined by TREO on a case-by-case basis, using the Feasibility Study.
    c) Buildings that don't have electrical or thermal loads. However, if the building is capable of hosting a renewable energy installation that generates heat or electricity that is sold into the grid or utilized in another building, a technical and financial feasibility study should be undertaken, and the size of on-site renewable energy systems maximized in accordance with the study.
    d) Energy used for industrial-type processes, unrelated to the operation of the building in which they occur, is exempt from the calculation of percentage of the building's energy consumption. An example of industrial energy is the energy used to pump water at a Toronto Water facility. The building would still be required to meet the 5% target for its building-related energy consumption.
    e) Where the business case for a renewable energy system does not meet financial criteria. In such instances, where technically practical (see Exemption "b" above), the building must be designed and built to accommodate a solar installation in the future.
    f) Where a renewable energy installation is technically practical and meets the financial criteria, but can't technically achieve the full 5% energy cost threshold, an exemption may be granted for the shortfall.
    g) Purchased renewable energy, such as deep lake water cooling, can be used in place of an on-site renewable energy system.

We recognize that the updated Toronto Green Standard will require some changes to the current process of building design and construction, as well as operations and maintenance. We encourage anyone with questions to contact Rob Maxwell at (416) 395-6927; email rmaxwel@toronto.ca. You can also visit our webpage at TREO.

We are excited to begin making these changes in order to help Toronto become a greener, more cost-effective and energy-independent city. We look forward to working with you in incorporating the new Toronto Green Standard requirements as seamlessly as possible, and welcome your feedback on measures to improve this process.

APPENDIX 1

Eligibility Criteria for Energy Loans for City Divisions, Agencies, and Corporations*

See http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2012.EX25.2

1. Capital Budget Review & Approval

   a. Projects eligible for energy loans will be included in the capital budget submission of Facilities Management (FM) – *now Environment and Energy Division (E&ED)*
   b. Projects will go through the various stages of budget review and approval – EMT/Standing Committee/Council review and approval and quarterly variance reporting
   c. Projects financed from net operating cost savings will not impact the annual debt target for each program
   d. If operating cost savings are not sufficient to finance a project, the project may be considered for funding as part of the program's regular capital works and will be included in the debt target for the program
   e. When Council approves the project it becomes part of the Program's capital budget
   f. Accountability for the assets and post-retrofit performance rest with FM *(E&ED)*

2. Project Financing

   a. Energy projects to be considered shall be limited to tax supported, nongrowth related projects that are projected to generate energy savings sufficient to offset a debt service schedule over the performance life of the asset but no more than twenty years, inclusive of all financing costs at 2.0% above the corresponding Bank of Canada bond yield at the time of approval
   b. Project financing will come from the City's working capital
   c. The division that experiences the energy savings will incorporate repayment obligations in their operating budget

3. Project Evaluation

   a. Projects will be evaluated using net present value based on the Net Present Value.
   b. The total project cost including capital maintenance, monitoring and reporting should be equal to or less than the total present value of the net cost savings over the useful life of the project, discounted at the cost of borrowing.

4. Monitoring and Reporting

   FM *(E&ED)* will be responsible for monitoring and reporting energy consumption and associated savings through the City's annual budget process.

** these criteria are being reviewed and may be revised by Financial Planning*

APPENDIX 2

REQUIREMENTS FOR FEASIBILITY AND DESIGN STUDIES

Solar PV

Feasibility Study:

As part of the scope of work, the Vendor should conduct a long-term shading study incorporating existing *and* permitted building heights and other obstructions to the south-east, south and south-west of the site.

The Vendor should also provide an estimate of the potential maximum PV system size, taking into account the set-back from roof edges, mechanical equipment, and green roof requirements.

Design Study:

As part of the Vendor's scope of work, the roof should be designed to:

- be structurally capable of accommodating the additional dead and live loads of a ballasted solar PV system, which typically adds 3-6 lbs./sq. ft. Include roof loads, and potential location of solar PV system into roof plan tender drawings
- be free of obstructions that create self-shading (e.g. from rooftop mechanical units) on the south facing portion, to maximize sun exposure
- incorporate the remote monitoring of the PV system
- contain conduits from the proposed site of the PV system to the electrical room for electrical and communication cables
- ensure safe roof access to the PV system during and after construction
- have a 20-year minimum life
- address potential roof warranty issues

In addition, the electrical room should have a designated area on the wall for the future solar equipment - disconnects, metering cabinet.

The Vendor should estimate the size of the proposed PV system based on available roof space and should also conduct net present value (NPV), return on investment (ROI), and simple payback calculations based on current Feed-in Tariff rates for rooftop solar PV.

Geoexchange System

As part of the Vendor's scope of work, provide a geoexchange system feasibility study and detailed design services. To incorporate a geoexchange system, the Vendor is to design an optimally sized system to serve at least the base load of the modeled building energy use.

Feasibility Study

- Analyze the technical and financial feasibility of implementing a geoexchange system, and identify the most cost effective approach
- Conduct a high level energy modelling for system sizing and financial calculations
- Describe the proposed system, including the approximate system size, location and sizing of vertical/horizontal geoexchange field, building connection point, heat pump configuration, monitoring system and sequence of controls
- Determine site geological/hydrogeological conditions using Geological Survey of Canada maps, the results of geotechnical investigation, and the consultant's knowledge of the area
- High level identification of ground loop impact on local water source and the environment, if any
- Estimate annual energy performance, greenhouse gas emissions reduction of the geoexchange system compared to the standard HVAC system
- Estimate annual and lifetime operating cost savings of the geoexchange system compared to the standard HVAC system
- Conduct net present value (NPV), return on investment (ROI), and simple payback calculations over the standard HVAC system
- Identify applicable utility incentives
- Consultant's overall conclusion and recommendations

Design Study

- Should the project proceed to Phase 2, the Vendor is to prepare a detailed design of either a horizontal or vertical (in consultation with the City) geoexchange system, based on the completed feasibility study, and in accordance to industry standards
- Conduct load and energy modeling to predict building energy use, in order to design an optimally sized geoexchange system
- Prepare specifications such as General Requirements, Mechanical, Electrical, Geoexchange System, Controls and monitoring system, and its respective drawings
- Detailed list of equipment, parts, and materials including the geothermal heat pump schedule
- Geoexchange system controls to be incorporated into the BAS system, if any
- Monitoring system to have remote access and data logging capabilities
- Updated financial analysis of the system cost (capital and operating), net present value, payback, and return on investment, based on final design
- Submit applications for financial incentives on behalf of the City
- Identify permit approvals required
- Provide detailed working design drawings in PDF of: mechanical, electrical and geoexchange system
- Coordinate with Architect, Electrical and Mechanical Engineer (on building tie-in, and back-up system if necessary) as required