



**Corporate Strategic Initiatives Department**

**TO: Budget and Corporate Services Committee**

**SUBJECT: Corporate Energy Management Program Update**

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Report Number: CSI-14-11

File Number(s): 210-09-2

Report Date: May 12, 2011

Ward(s) Affected: 1  2  3  4  5  6  All

Date to Committee: May 31, 2011

Date to Council: June 13, 2011

**Recommendation:** For information only.

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**Purpose:**

- Address goal, action or initiative in strategic plan
- Establish new or revised policy or service standard
- Respond to legislation
- Respond to staff direction
- Address other area of responsibility

To provide an update on the corporate energy management program.

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**Reference to Strategic Plan:**

Excellence in Government

Environmental Stewardship

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**Background:**

Energy costs continue to rise for electricity, natural gas and fuels. In order to protect the corporation from rising costs, effective energy management is imperative.

Recognizing this, council approved funding in 2008 to support a full time staff resource to help develop and implement a corporate energy management program. Prior to this, a corporate staff energy management team worked to oversee energy reduction initiatives within city operations, particularly related to energy efficient lighting retrofits.

In 2009, Council approved a corporate energy policy ([report CSI-3/09](#)), a high level document that provides guidance and direction to staff on the development and implementation of a comprehensive corporate energy management program, with the

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following goal:

*To implement a comprehensive corporate energy management program to reduce consumption, achieve cost savings and meet its greenhouse gas (GHG) emission reduction target (reduce corporate GHG emissions by 20 per cent on a per capita basis from 1994 levels by 2012).*

This report provides an update on the corporate energy management program and steps for moving forward.

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## Discussion:

Quantifying corporate energy consumption is one of the key processes in managing corporate energy consumption and green house gas emissions. Since 1994, staff have been tracking energy use based on multiple data sources. In 2010, staff standardized an Energy Tracking tool process that will be used to quantify energy consumption in corporate facilities. The 2010 data is presented below.

### Current Status:

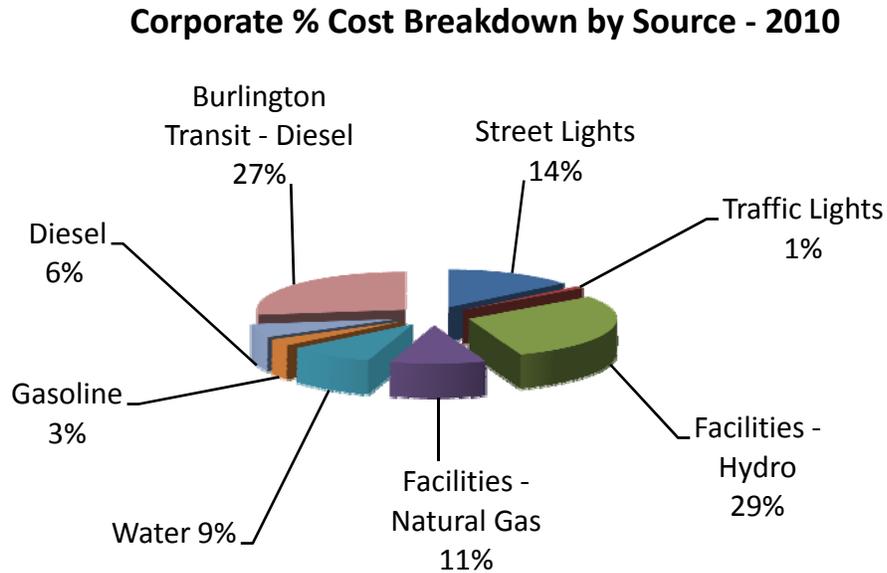
In 2010 the City's total energy cost from all sources was approximately \$ 6,615,000. Table 1 below provides a detailed breakdown of the energy commodity consumption quantity and costs.

**Table 1. Corporate Energy Consumption and Costs for 2010**

Commodity	Quantity	Cost (\$)	Rate per unit
<b>Electricity (kWh)</b>			
Street Lights	9,380,000 kWh	\$ 940,000	0.10 \$/kwh
Traffic Lights	550,000 kWh	\$ 70,000	0.13 \$/kwh
Facilities	18,280,000 kWh	\$ 1,950,000	0.11 \$/kwh
<b>Natural Gas (m<sup>3</sup>)</b>			
	2,325,000 m <sup>3</sup>	\$ 700,000	0.30 \$/m3
<b>Water (m<sup>3</sup>)</b>			
	250,000 m <sup>3</sup>	\$ 560,000	2.4 \$/m3
<b>Vehicle Fuel (litres)</b>			
<b>Corporate vehicles (includes RPM and Fire Department)</b>			
Gasoline	224,300 litres	\$ 197,000	0.88 \$/litres
Diesel	459,300 litres	\$ 385,000	0.88 \$/litres
<b>Community vehicles (Burlington Transit)</b>			
Diesel	2,106,800	\$ 1,811,900	0.86 \$/litres
<b>Total</b>		<b>\$ 6,615,000</b>	

Note: The numbers may not add due to rounding off in accordance with best practices.

Figure 1 provides a visual representation of the percentage cost breakdown by source for the year 2010.



**Figure1. Corporate % Cost breakdown by source – 2010**

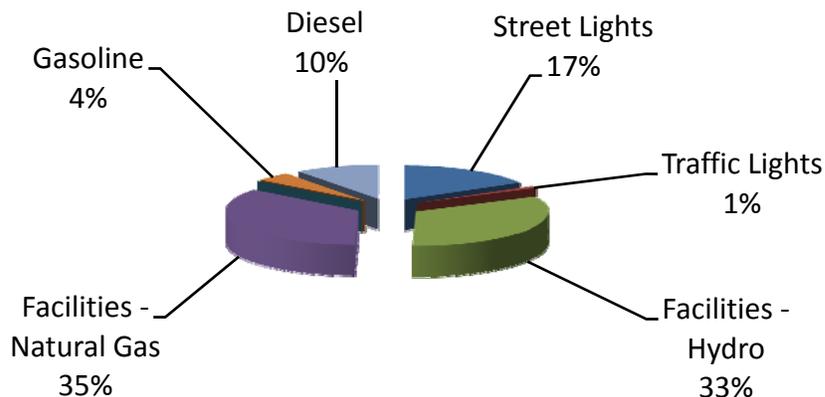
The following table provides a breakdown of total GHG emissions by sector for 2010:

**Table 2. Corporate eCO2 GHG emissions by source – 2010**

Source Category	Total eCO2 (MT)
Street Lights	2,063
Traffic Lights	121
Facilities - Hydro	4,022
Facilities - Natural Gas	4,324
Corporate Fleet - Gasoline	530
Corporate Fleet - Diesel	1,254
<b>Total</b>	<b>12,314</b>

Figure 2 provides a corporate overview of the GHG (eCO<sub>2</sub>) emissions breakdown by source for the year 2010

### Corporate GHG (eCO<sub>2</sub>) Emissions by Source - 2010



**Figure 2. Corporate GHG (eCO<sub>2</sub>) emissions breakdown by source – 2010**

\* All GHG values are **eCO<sub>2</sub>** values in **metric tonnes** and are estimated based on best practices.

\*\* Burlington Transit fuel emissions have not been included in the chart due to its “Community” classification under the PCP (Partners for Climate Protection Program).

\*\*\* As water commodity is supplied by the Halton Region, GHG emissions are not incurred by the City.

#### **Explanation of GHG Variance:**

The 2010 GHG data has indicated a marginal increase in emissions from the 2009 energy management update – CSI 3/09 (2010 – 12,314 tonnes eCO<sub>2</sub> vs. 2008 – 11,500 tonnes eCO<sub>2</sub>). This variance can be explained by the following:

- Implementation of a reputable energy tracking tool software, providing accurate and consistent data for the 2010 utility data. This data will be used as a benchmark for future reductions.
- The above data does not account for weather fluctuation which influences energy consumption. Future reporting will normalize the results with respect to weather factors in order to provide relative yearly comparisons.
- Increase in new facility SQFT – In 2010 Burlington Transit and Appleby Ice facilities were opened.

- Energy consumption reporting factors does not take into consideration operational characteristics of corporate facilities.
- Measurement of annual fleet fuel usage depends on mix of internal vehicles vs. contracted vehicles as contracted vehicles fuel usage is not measured in the GHG corporate inventory.
- Fleet fuel consumption reporting also does not account for weather normalization factors and frequency of vehicle use.

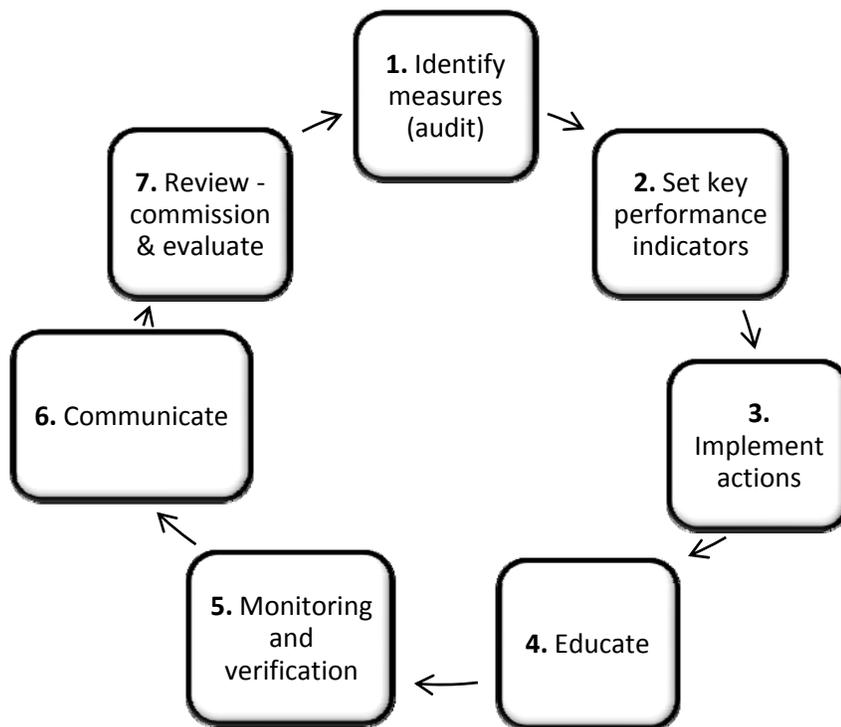
Given these factors it may be more meaningful to track and report on energy usage using additional means such as equivalent kilo watt hour per square foot (ekWh/sqft) for facilities and fuel use per 100km travelled or hour use for vehicles and equipment. The former was presented as a way of benchmarking facilities for energy use in the capital budget overview report (EBC-01-11).

### **Energy Management Process:**

To proactively manage the City's energy usage, costs and environmental emissions energy management must be a continuous cycle of:

1. Audit of existing energy consumers and identification of required measures for improvement
2. Performance targets
3. Implementing of required measures
4. Education and training of staff
5. Monitoring and verification
6. Communication of results
7. Review and evaluation of results.

Figure 3 gives a visual representation of the energy management continuous cycle.



**Figure 3. Energy Management Continuous Cycle**

**Energy Management Process Update:**

The following provides a status update on the 7 key steps of the corporate energy management cycle.

Steps	COB Status	Percent Complete
<p><b>1. Identify measures &amp; requirements (energy audit)</b></p>	<p>An energy audit provides a detailed list of capital and operational projects to improve facility energy efficiency and identify potential savings. An initial energy audit was completed in 2007 for the arenas. A corporate wide energy audit is scheduled for 2011 – Q3.</p>	<p>25% complete</p>
<p><b>2. Set energy key performance indicators</b></p>	<p>Completion of the corporate wide facility assessment has identified facility assets and prioritization of facility renewal, which will allow staff to target energy reduction</p>	<p>25% complete</p>

	<p>strategies on end of life assets. This information would further allow the City to review best practices for energy efficient design standards.</p> <p>Benchmarking for facility energy use against other municipal facilities allows us to focus on energy consumption targets for similar types of municipal buildings. Further details will be defined after completion of the corporate energy audit.</p>	
<p><b>3. Implement actions identified in energy audit</b></p>	<p>The majority of the actions outlined in the 2007 arena energy audit have been implemented. Completion of the 2011 energy audit will focus on remaining corporate facilities portfolio.</p> <p>Best practices identified by municipal peers and external agencies have been implemented including lighting retrofits, traffic signal upgrades and mechanical equipment where renewal is required. See Appendix A for a summary of projects implemented to date.</p>	<p>20% complete</p>
<p><b>4. Educate facility operators (to achieve building performance targets)</b></p>	<p>Modifying behaviour can be one of the most significant challenges in achieving success in an energy management program. Staff training is a key component. Implementation of the corporate wide building automation system has allowed us to train facility users to strategically operate their facility based on user occupancy requirements and corporate standards. Further training will be implemented on completion of the corporate energy audit.</p>	<p>40% complete (Ongoing process)</p>
<p><b>5. Track energy use</b></p>	<p>To successfully manage energy consumption and ensure efficiencies, reliable energy data is essential to help identify areas where improvement is required. An energy tracking system has been acquired.</p>	<p>100% complete (Ongoing process, tracking system is in place for fuel and utilities)</p>

	2010 utility (hydro, water & natural gas) data has been uploaded and is under review.	
<b>6. Communicate results</b>	A process to facilitate ongoing communication with facility operators is under development. Will include monthly updates as well as trending reports on facility systems. Success stories to date have been communicated through the Environmental Quarterly Report.	10% complete Reporting will be an ongoing process.
<b>7. Review - Recommission &amp; evaluate energy targets</b>	Continuous commissioning, to ensure optimal equipment operation, and re-evaluation of buildings' energy consumption would be conducted through the building automation system and preventative maintenance. This will allow us to maintain energy performance standards.	Ongoing process

**Financial Matters:**

A corporate energy conservation account has been set up to fund the majority of the energy conservation projects for existing facilities. In the 2011 capital budget this account would be used to fund the corporate energy audit and associated recommended measures and implementations.

Energy conservation items for new and major renovation projects have been funded by their own funding source as we move towards implementing sustainable building design practices within our asset portfolio.

The City has been proactive in securing Infrastructure Stimulus Funding for major energy conservation projects and upgrades. Staff are active in obtaining further funding sources for energy projects from Union Gas, Burlington Hydro/Ontario Power Authority, Federal and Provincial Agencies.

**Total Financial Impact**

Refer to Appendix B for a listing of completed and active energy conservation projects.

**Environmental Matters:**

Corporate assets can be a significant source of greenhouse gas emissions, directly and indirectly, through heating and cooling needs, as well as the demand for electricity, produced in part in Ontario by fossil fuel burning generating stations. Proper

management and monitoring of energy usage, the implementation of energy conservation measures and renewable energy projects can effectively work to reduce energy consumption as well as greenhouse gas emissions.

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### **Communication Matters:**

Educating, training and communicating are key aspects of this program to modify behaviour and achieve a culture of conservation. Similar programs have been implemented with the anti-idling program to reduce unnecessary idling and the 'Thirsty' campaign to promote tap water and reduce the use of single use disposable water bottles.

Staff will work with Community Relations staff to develop an effective communications plan for the energy management program. Ongoing progress to-date has been generally reported through the Environmental Quarterly Report, as well as environmental displays and articles in City Talk newsletter.

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### **Conclusion:**

An overall corporate energy consumption and associated greenhouse gases (GHG) snap shot has been provided in this report to establish a corporate benchmark which would be used in conjunction with the corporate energy tracking tool to minimize environmental impact from the city's daily operations. There are continuous varying factors that have an effect on energy and fuel usage with our corporate assets that need to be accounted for effective reporting.

Significant progress has been made in the areas of renewable energy, energy conservation, energy efficiency and sustainable building design standards as can be seen in Appendix A.

Ongoing projects, corporate wide energy audit and the energy management plan would establish sustainability goals; prioritize major energy conservation projects and ensure compliance with regulatory requirements of other levels of government.

Effective and accurate Energy reporting requires defined key performance indicators, which must be used to benchmark and trend accurate reports. Staff will further refine the reporting parameters to account for variables in energy consumption.

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Respectfully submitted,

Shahid Naeem

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**Appendices:**

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| A. Overview and description of Energy Management projects to date<br>B. List of Energy Conservation and Efficiency Projects completed to date |
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**Notifications:**  
 (after Council decision)

Name	Mailing or E-mail Address

**Approvals:**

\*required

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 \*Department      City Treasurer      General Manager      City Manager

	To be completed by the Clerks Department
Committee Disposition & Comments	
	01-Approved 02-Not Approved 03-Amended 04-Referred 06-Received & Filed 07-Withdrawn
Council Disposition & Comments	
	01-Approved 02-Not Approved 03-Amended 04-Referred 06-Received & Filed 07-Withdrawn

**APPENDIX A: Overview and description of Energy Conservation projects to date**

<p><b>Summary of conservation projects:</b></p>	<p>Staff have implemented a number of energy conservation projects in city facilities. (See Appendix B for a comprehensive list of Energy conservation projects.)</p> <p>The City of Burlington was one of the first municipalities to update arena lighting to more efficient fixtures that can be staged and turned off and on without any warm-up period required. The city has been used as a case study for other municipalities.</p> <p>Exit signs in facilities have been converted to LED fixtures which are 85% more efficient than incandescent fixtures.</p> <p>The city has converted all of its traffic signals from incandescent to LED fixtures. Estimated overall energy consumption at traffic signals has been reduced by about 88% or by 1,200 megawatt hours (MWh).</p> <p>RPM staff has ongoing as well as completed street light pilot projects that focus on energy reduction strategies. Street lighting is one of the major energy users with the city's utility portfolio.</p> <p>Other conservation initiatives include the installation of tank less water heaters at the Rotary Youth Centre and Skyway Arena; now a standard in new construction.</p> <p>High efficiency condensing pool boilers and a more efficient variable speed pool pump controls have been installed at Tansley Woods Community Centre.</p> <p>Corporate Wide Building Automation System (BAS) is being implemented at twenty seven (27) corporate facilities. This system allows the City to monitor, control, manage, trend and report the operation of energy consuming heating, cooling, ventilation and air-conditioning equipment.</p>
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	<p>Arena refrigeration plants are being retrofitted with energy efficiency improvement controls for better monitoring and control. Arenas are second to street lights when it comes to energy consumption.</p>
<p><b>Renewable energy projects:</b></p>	<p>A seasonal solar thermal system to augment pool water heating at the Tansley Woods community centre was installed in early 2010.</p> <p>Two (2) solar photovoltaic systems are planned as part of the new Alton high school/community centre/public library facility and fire station #8 as part of the Ontario Power Authority FIT program.</p> <p>Air to air heat exchangers would be installed in the new Fire Station #8 which would reduce natural gas consumption.</p>
<p><b>Corporate green building update:</b></p>	<p>In 2009 council approved a corporate green building policy targeting LEED (Leadership in Environmental and Energy Design) silver for new facilities greater than 500 square metres or major retrofits. Two of our LEED facilities have been completed, including the Transit Operations Centre (LEED silver targeted) and the Appleby Ice Arena (LEED certified targeted) expansions. Two other city facilities being built under the LEED program include the Performing Arts Centre (LEED certified targeted) and the new Fire Station #8 (LEED silver targeted). The Alton Secondary School/Community Centre/Public Library is being built with green building measures included.</p> <p>As part of the green building program, the completed facilities will go through an energy commissioning, monitoring and verification process to ensure they are meeting performance targets. It is expected that these green buildings would be approximately 25% more efficient than a standard design building.</p>