



## Report To Joint Planning & Executive Committee

Report Number: OS 02-10

Date: September 7, 2010

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**From:** Thomas Melymuk  
Director, Office of Sustainability

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**Subject:** Partners for Climate Protection Program  
- Status Update  
- File: D-1100-006

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**Recommendation:**

1. That Council receive Report OS 02-10 providing an update on the City's Partners for Climate Protection Program.
2. That Council endorse the Five Year Corporate Emissions Reduction Strategy outlined in Attachment 1 to this Report and direct staff to proceed as set out in that Strategy.
3. That a copy of this Report be forwarded to the Federation of Canadian Municipalities' Partners for Climate Protection Office.

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**Executive Summary:** In 2007, Pickering completed the first three (of five) milestones of the Partners for Climate Protection (PCP) program. The PCP program is promoted by the Federation of Canadian Municipalities to help local municipalities reduce energy use and greenhouse gas (GHG) emissions. In completing the first three milestones of the program, the City committed to reducing GHG emissions by 50% per capita for municipal (i.e. corporate) emissions and by 35% per capita for community emissions. The reductions are to be achieved by 2016 using 1995 as our baseline year.

In late 2009 and early 2010 Durham Sustainability (DSA) reviewed the City's progress in reducing energy consumption and GHG emissions both corporately and on a community-wide basis. The results of DSA's review for corporate emissions are presented in this Report. A staff report on community emissions will be completed separately and submitted to Council at a later date.

Although the City has made some progress towards achieving our corporate GHG emissions reduction target, much work remains to be done. To help accelerate and focus our efforts, it is recommended that Council endorse the Five Year Corporate Emissions Reduction Strategy outlined in Attachment 1 to this Report and direct staff to proceed as set out in that Strategy.

**Financial Implications:** There are no new financial implications related to the recommendations contained in this Report. Many of the Priority Actions included in the attached Five Year Corporate Emissions Reduction Strategy either have no budget implications or can be implemented this year in accordance with the Council approved 2010 budget. For those Priority Actions that are not within the existing approved budget, the financial implications (costs and savings) will be identified for Council's consideration through future budget submissions.

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**Sustainability Implications:** Energy conservation is one of the cornerstones of the City's Sustainable Pickering program. Reducing corporate energy consumption provides economic, social and environmental benefits. Using less energy saves money, improves air quality and helps address climate change by reducing greenhouse gas emissions. By taking action to meet its corporate GHG and energy reduction targets, the City would also set a positive example for businesses and residents, potentially resulting in even further energy and GHG reductions across the municipality than might otherwise be achieved if the City did not lead by example.

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**Background:** The Partners for Climate Protection (PCP) program is supported and promoted by the Federation of Canadian Municipalities. It has been established to assist municipalities in reducing greenhouse gas emissions from community and municipal (i.e. corporate) operations. The PCP program has five milestones as follows:

1. Creating a greenhouse gas emissions inventory and forecast
2. Setting GHG emissions reduction targets
3. Developing a local action plan
4. Implementing the local action plan
5. Monitoring progress and reporting results

In 2007, the City of Pickering became only the fifth municipality in Ontario to complete milestones 1, 2 and 3 of the PCP Program (there are now over 10 municipalities in Ontario that have completed at least the first three milestones). The City is now working through Milestones 4 and 5 of the program.

This Report provides an update on the City's progress in relation to corporate emissions, and recommends a number of Priority Actions for Council's consideration. The data gathered for this Report was derived from a review of the City's corporate and community greenhouse gas emissions completed by Durham Sustain Ability in late 2009 and early 2010 (see Attachment 2).

Through the City's PCP program Council established the following corporate and community GHG emissions reduction targets.

- **50 percent per capita reduction for corporate emissions by 2016**  
(from 1995 levels)
- **35 percent per capita reduction for community emissions by 2016**  
(from 1995 levels)

It should be noted that these emissions targets were determined assuming a constant relationship between energy use and GHG levels. However, the approved protocol for measuring GHG emissions under the PCP program requires municipalities to measure GHG levels on the basis of an annually fluctuating "electricity equivalent carbon dioxide coefficient" (eCO<sub>2</sub> coefficient). In Ontario (as in all provinces), the eCO<sub>2</sub> coefficient varies from year to year depending on the average annual amount of fossil fuel used to generate energy in the Province. When power is generated mostly from fossil fuels such as coal, natural gas and oil, higher levels of GHG emissions are produced. When power is generated mostly from other sources such as hydroelectric, nuclear and renewable sources, there are fewer GHG emissions.

Depending on Ontario's fuel mix, GHG emissions in Pickering could drop in a given year even if the City did nothing to change its energy usage. Likewise, in another year, the City could complete a number of energy conservation initiatives, but GHG emissions could still rise if the provincial fuel mix in that year was weighted more heavily toward the burning fossil fuels.

In 1995 (our baseline year) the provincial fuel mix was relatively "clean" compared to subsequent years (i.e. fewer fossil fuels were part of the provincial energy mix). Since 1995 however, Ontario's fuel mix has become slightly "dirtier," raising the provincial eCO<sub>2</sub> coefficient. To account for the annual fluctuations in the provincial eCO<sub>2</sub> coefficient (over which the City has no control), the GHG reduction targets approved by Council can be "adjusted" and restated as follows:

- **22 percent per capita reduction for corporate emissions by 2016**  
(from 1995 levels)
- **19 percent per capita reduction for community emissions by 2016**  
(from 1995 levels)

### **Corporate Energy Management Priorities**

There are a number of possible initiatives the City can implement to reduce energy consumption and lower greenhouse gas emissions, from the "low hanging fruit" to the "hard to reach" projects. Given cost and resource limitations, the City needs to be strategic in selecting projects for future implementation.

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To help prioritize projects, the City's potential energy management initiatives have been grouped and evaluated in relation to Pickering's three broad sustainability objectives, as shown in Table 1 below.

The Table organizes the City's potential corporate energy management projects into three categories (municipal facilities, municipal fleet and municipal lighting) and provides a high-level qualitative assessment of the potential sustainability benefits of the various projects within each of these categories considering:

- economic objectives (i.e. the likelihood of saving costs)
- environmental objectives (i.e. the potential to reduce GHG emissions)
- social objectives (i.e. the opportunity to enhance municipal service delivery)

**Table 1 – Energy Management Projects and Sustainability Objectives**

Energy Management Projects (by category/subcategory)	Sustainability Objectives		
	Economic (cost-savings)	Environmental (GHG reductions)	Social (service enhancements)
<b>Municipal Facilities</b>			
• City Hall	High	High	High
• Recreation Facilities	High	High	High
• Libraries	High	High	High
• Fire Halls	Medium	Medium	Medium
<b>Municipal Fleet</b>			
• Light Duty	High	High	High
• Medium Duty	Medium	Medium	High
• Heavy Duty	Low	Low	High
<b>Municipal Lighting</b>			
• Traffic Lights	High	High	High
• Park/Walkway Lights	Medium	Low	High
• Street Lights	Medium	Low	High

This high-level analysis shows that Pickering's sustainability objectives would be best served if the City focuses its corporate energy conservation efforts in the following areas:

1. Municipal Facilities (especially higher-occupancy/higher-use facilities)
2. Light duty vehicles
3. Traffic lights

### Corporate Energy Use and GHG Emissions

A summary of Pickering's corporate energy use and GHG emissions from 1995 through 2008 is provided in Table 2 below. The City's 2016 target for energy use and GHG emissions is also shown in the Table, as is a "business as usual" (BAU) forecast.

The BAU forecast represents the growth in energy use and GHG emissions that would occur to 2016 if the City did not undertake any significant energy management and GHG emissions reduction efforts. Based on the data, **if the City did nothing different, total corporate energy use and total corporate GHG emissions would rise between 2008 and 2016 by more than 55 percent.**

To meet our corporate PCP target, it is estimated that the City's total energy use would need to be reduced by almost 24% between 2008 and 2016. Accounting for anticipated population growth, this would result in a 22% reduction by 2016 in our per capita GHG emissions from 1995 levels (which matches our "adjusted" GHG target for corporate emissions). If achieved, it would also result in a savings of more than \$2.0 million in annual energy costs compared to the BAU scenario.

**Table 2 – Corporate Energy Use and GHG Emissions  
 (1995 to 2008 and 2016 BAU<sup>1</sup> Forecast and PCP<sup>2</sup> Target)**

Summary	1995	2004	2007	2008	2016 BAU Forecast	2016 PCP Target
Energy Use (gigajoules)	104,442	116,852	124,471	123,531	191,757	93,957
Per Capita Energy (gigajoules)	1.33	1.28	1.36	1.35	1.36	0.67
GHG Emissions (tonnes eCO <sub>2</sub> )	5,032	6,865	6,864	6,803	10,575	7,083
Per Capita GHG (tonnes eCO <sub>2</sub> )	0.064	0.075	0.075	0.074	0.075	0.050
Energy Cost (\$'000)	\$1,435	\$2,233	\$2,478	\$2,644	\$3,997	\$1,958

1. BAU = Business as Usual
2. PCP = Partners for Climate Protection

Also noteworthy from Table 2 is that total energy consumption by the City rose steadily from 1995 to 2007, generally in line with population growth, before falling slightly as a result of a variety of corporate energy management initiatives that were undertaken by the City in late 2007.

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### Recent and Planned Energy Management Projects

Between late 2007 and the end of 2010 the City will have completed over 20 energy management projects. These projects are listed in Appendix B of the June 2010 Durham Sustain Ability Report (see Attachment 2). A summary of the energy and GHG savings attributable to these projects broken down by facilities, fleet and street lighting is shown on Table 3 below.

**Table 3 – Energy and GHG Savings for Municipal Projects  
 (from 2007 to end of 2010)**

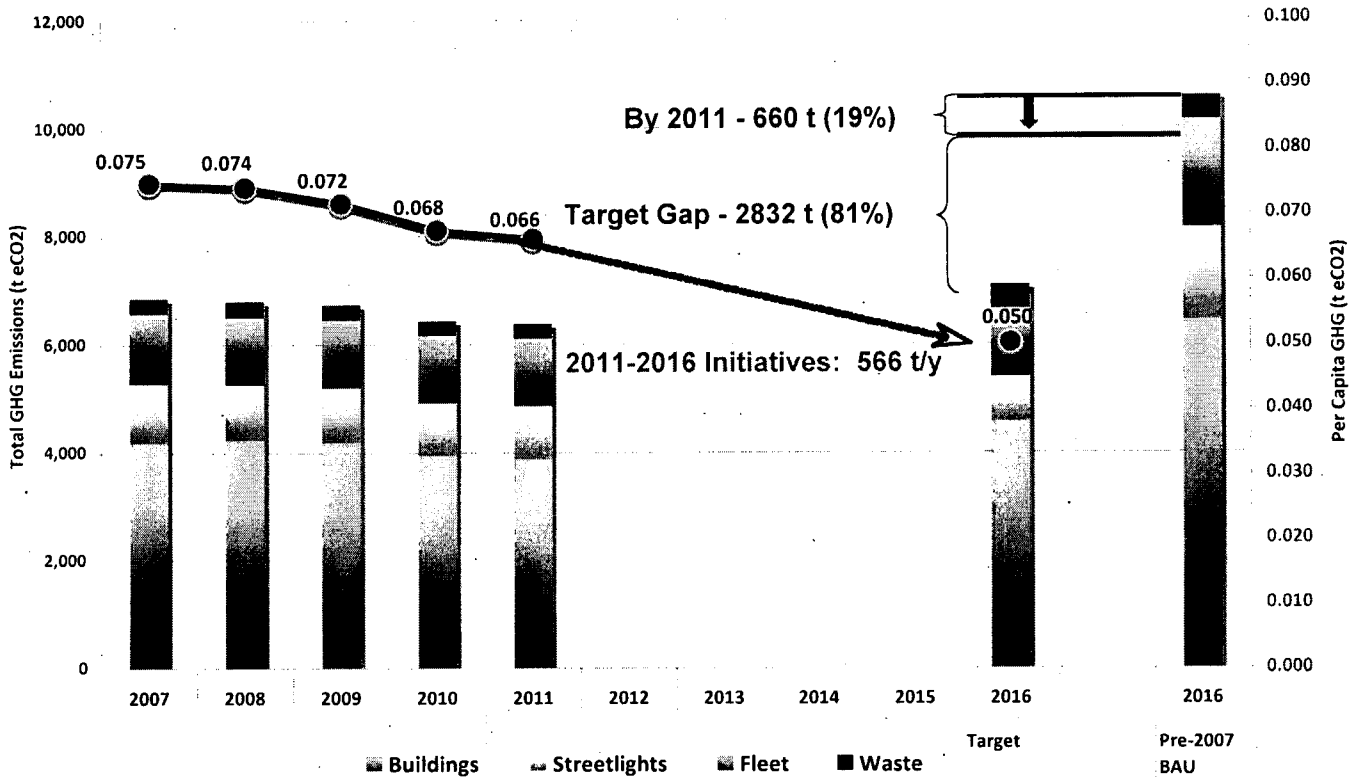
Project Category	Energy Savings (GJ / year)	GHG Savings (tonnes / year)	Operating Cost Savings (\$ per year)	Simple Payback (in years)
<b>Municipal Facilities</b>	11,428	609	\$249,853	5.4
<b>Municipal Fleet</b>	102	11	\$3,233	20.1
<b>Street Lighting</b>	794	40	\$23,118	2.2
<b>TOTAL</b>	<b>12,324</b>	<b>660</b>	<b>\$276,204</b>	<b>5.3</b>

Collectively, these energy management projects will provide an estimated savings of approximately \$276,000 annually. It should also be noted that:

- **facility projects (by far) produce the greatest energy and GHG savings**
- **fleet savings (both energy and GHG) are due mainly to the replacement of older City vehicles with five hybrids. However, operating savings for the City's hybrid vehicles are relatively small, and payback periods relatively long**
- **although GHG savings are relatively small, the conversion of the City's traffic lights to high efficiency LED's provides an excellent payback of just over 2 years**

Figure A on the next page is a trend analysis of the City's GHG emissions between 2007 and 2016, taking into consideration anticipated population increases as well as the growth in municipal facilities and services expected to occur over this time period. The figure shows GHG emissions both on an absolute basis (the bars) and per capita basis (the line).

**Figure A – GHG Corporate Emissions Trend Analysis  
 (2007 to 2016)**



A number of conclusions can be reached from Figure A.

1. The City's first major energy management project (re-lamping City Hall) was completed in late 2007 and began to show an impact on GHG emissions in 2008.
2. The City's initiatives undertaken in 2009 will begin to show an impact on GHG emissions in 2010, with a total projected GHG savings of 284 tonnes per year. This corresponds to a 5.4% reduction in GHG emissions compared to 2007.
3. The 2010 approved projects will have a slightly lower impact than the 2009 projects with projected savings of 234 tonnes per year, commencing in 2011.
4. The energy management initiatives through 2010 have reduced the City's corporate GHG emissions, but in terms of our corporate PCP target, the reduction in emissions only closes our GHG emissions gap by 19%.
5. Commencing in 2011, the City will need to enact measures that allow us to close the remaining 81% of our GHG emissions gap if we are going to meet our 2016 PCP target for corporate emissions. Annually this translates into a reduction target of 566 tonnes GHG emissions per year, which is more than double the annual impact of the initiatives implemented by the City in 2009 and 2010.

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### **Toward an Integrated and Sustainable Energy Management Strategy**

Although some progress has been made in reducing corporate GHG emissions, much more work needs to be done. The corporate initiatives undertaken by the City starting in late 2007 and continuing through 2010 have made a difference. **However, in order to meet our 2016 corporate GHG emissions reduction target, the City will have to more than double its efforts starting in 2011.**

Doubling our efforts could present some challenges. Yet it could also provide significant benefits, not only in terms of climate change and air quality, but also financially. If we are successful in meeting our 2016 corporate GHG emissions target, it is estimated that the City could save over \$2.0 million annually in energy costs.

To help focus and direct the City's efforts in this regard, it is recommended that Council endorse the Five Year Corporate Emissions Reduction Strategy outlined in Attachment 1 to this Report and direct staff to proceed as set out in that Strategy.

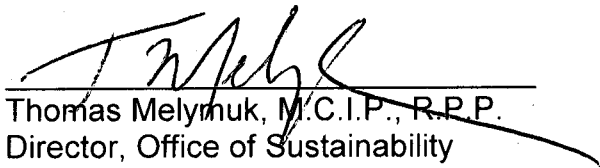
A broad and integrated approach is needed. Below are examples of the types of Priority Actions that are identified in Attachment 1 as part of our Five Year Strategy.

- Require all new municipal buildings and facilities greater than 500 sq. m. to be constructed to a minimum LEED silver standard.
- Select through a Request for Proposals process, appropriate business partners to work with the City on the review and installation of sustainable energy technologies on one or more City buildings, such as solar PV panels and geothermal systems.
- Investigate and report to Council on the use of alternative vehicle fuels, including natural gas, propane, ethanol, biodiesel and electricity.
- Initiate a pilot/demonstration project involving LED lighting and/or street light dimming on City roadways to assess the feasibility of implementing these technologies on a broader scale.
- Launch a "Staff Energy Conservation Campaign" to encourage and promote staff to reduce their energy use and carbon footprint:
  - in the workplace, by turning-off lights, powering off computers, taking stairs rather than using the elevator, etc.; and
  - when driving, by improving driving habits, adopting anti-idling practices, reducing vehicle trips (especially single occupancy trips), etc.

**Attachments:**

1. City of Pickering Five Year Corporate Emissions Reduction Strategy
2. Durham Sustain Ability report entitled: "*City of Pickering, Corporate and Community Energy Consumption and Greenhouse Gas Emission Sustainability Indicators*" dated June 2010

**Prepared and Approved/Endorsed By:**

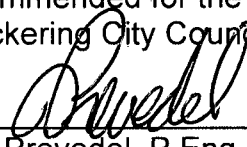


Thomas Melynhuk, M.C.I.P., R.P.P.  
Director, Office of Sustainability

TM:ljb

Copy: Chief Administrative Officer  
Directors

Recommended for the consideration  
of Pickering City Council



Aug. 12, 2010

Tony Prevedel, P.Eng.  
Chief Administrative Officer

**City of Pickering  
Five Year Corporate Emissions Reduction Strategy**

	<b>Priority Actions</b>
<b>1.0 City Facilities</b>	<p>1.01 Require all new municipal buildings and facilities greater than 500 sq. m. to be constructed to a minimum LEED silver standard (“Leadership in Energy and Environmental Design”).</p> <p>1.02 Select through a Request for Proposals process, appropriate business partners to work with the City on the review and installation of sustainable energy technologies on one or more City buildings, such as solar PV panels and geothermal systems.</p> <p>1.03 Conduct energy audits of City Hall / Central Library, Petticoat Creek Community Centre, East Shore Community Centre, West Shore Community Centre, and Clarendon Community Centre and include for Council’s consideration the priority energy efficiency projects identified in these audits in future City budget submissions.</p> <p>1.04 Investigate and where practical install “low-cost” energy efficiency retrofit devices in all City facilities. Low-cost devices may include (but are not limited to) motion-detectors, occupancy sensors, automatic timers, light dimmers, low flow toilets and showerheads.</p> <p>1.05 Include in future budget submissions, the energy efficiency projects identified in the 2008 Recreation Complex Energy Audit that have not yet been implemented.</p>
<b>2.0 City Vehicles</b>	<p>2.01 Adopt the principle of “right-sizing” as a basis for future vehicle purchasing decisions (whereby the most fuel efficient vehicle is used for the assigned job or task requirement).</p> <p>2.02 Investigate the use of alternative vehicle fuels, including natural gas, propane, ethanol, biodiesel and electricity.</p>

**City of Pickering  
 Five Year Corporate Emissions Reduction Strategy (cont'd)**

	<b>Priority Actions (cont'd)</b>
<p><b>3.0 City Lighting</b></p>	<p>3.01 Initiate a pilot/demonstration project involving motion sensors, solar lighting and/or LED lighting in City parks or walkways to assess the feasibility of implementing these technologies on a broader scale.</p> <p>3.02 Initiate a pilot/demonstration project involving LED lighting and/or street light dimming on City roadways to assess the feasibility of implementing these technologies on a broader scale.</p>
<p><b>4.0 General</b></p>	<p>4.01 Launch a "Staff Energy Conservation Campaign" to encourage and promote staff to reduce their energy use and carbon footprint:</p> <ul style="list-style-type: none"> <li>• in the workplace, by turning-off lights, powering off computers, taking stairs rather than using the elevator, etc.; and</li> <li>• when driving, by improving driving habits, adopting anti-idling practices, reducing vehicle trips (especially single occupancy trips), etc.</li> </ul> <p>4.02 Investigate the feasibility of purchasing low or no GHG emission energy from a recognized and viable provider of green power.</p> <p>4.03 Investigate and acquire appropriate energy/GHG emission management software systems.</p> <p>4.04 Review the City's purchasing policies and establish explicit provisions that support energy-efficiency and GHG emission reductions in all City purchases.</p>



**City of Pickering**

**Corporate and Community Energy  
Consumption and Greenhouse Gas Emission  
Sustainability Indicators**

**June 2010**

Prepared By

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City of Pickering – Energy and GHG Sustainability Indicators

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## 1. Introduction

In 2007, the City successfully completed milestones 1, 2 & 3 of the Partners for Climate Protection (PCP) program for both the corporation and the community, which includes establishing a greenhouse gas (GHG) baseline inventory, setting reduction targets and developing a local action plan.

The remaining milestones 4 & 5 in the PCP framework are the implementation of the local action plan initiatives and development of a monitoring and reporting system to verify GHG reductions, respectively.

The established local GHG emission reduction targets (milestone 2) are as follows:

- 35 percent per capita reduction in community GHG emissions by 2016 (from 1995 community emission levels)
- 50 percent per capita reduction in municipal operational GHG emissions by 2016 (from 1995 corporate operational emission levels)

As part of the Sustainable Pickering benchmarking program, 32 community and corporate sustainability indicators have been developed of which the baseline analysis of an initial number will be reported in early 2010. Two key sustainability indicators that are relevant to the PCP program are total and per capita energy consumption and total and per capita GHG emissions for corporate operations and the community at large.

Since 2007, the City of Pickering has engaged in several key initiatives within the corporation to reduce energy consumption and GHG emissions such as relamping the Civic Complex and implementing a number of energy efficiency projects at the Recreation Complex and other facilities. These PCP Milestone 4 corporate initiatives need to be documented and quantified (as part of Milestone 5) such that they can be included in future sustainability reports to show how the City is leading by example.

In 2008, the “Sustainable Pickering Challenge” was created to focus on a number of broad initiatives including the “Corporate Challenge”. The Corporate Challenge provides an opportunity for the City to lead by example, which includes the development of an Energy Management Strategy as both a long-term and short-term decision-making tool with established and focused priorities.

In 2009, the Corporate Challenge gained momentum as a growing number of corporate energy efficiency and GHG reduction projects have been or are in the process of being implemented.

This report provides:

- i) an update and discussion of both corporate and community energy consumption and GHG emissions through 2008 as part of both the sustainability indicator program and PCP requirements;
- ii) a summary of recent and planned corporate sustainability initiatives with quantified energy consumption and GHG emission savings;
- iii) a preliminary assessment of an automated monitoring and reporting system for corporate energy and GHG emissions; and
- iv) a set of recommendations for both corporate and community near term actions

## 2. Corporate Operations

### 2.1 Energy and GHG Emissions Inventory and Trends Update

As part of the PCP program, the City established a corporate GHG emissions target of 7,083 t eCO<sub>2</sub> and 0.050 t eCO<sub>2</sub> per capita by 2016. The year 1995 was used as the baseline for measuring progress and converting these targets into percent changes.

The 1995 baseline year GHG emissions were calculated using two methods due to issues regarding the electricity equivalent carbon dioxide (eCO<sub>2</sub>) coefficient. This coefficient for electricity is based on the annual average amount of fossil fuel (coal, natural gas, oil) used at Ontario's electricity power plants. Other sources such as hydropower, nuclear and renewable energy do not directly produce eCO<sub>2</sub> emissions. As Ontario's electrical generation mix changes from year to year so does the eCO<sub>2</sub> electricity coefficient. This means that the GHG emissions associated with electricity consumption in Pickering can vary year to year even if there is no significant change in energy usage, in fact when a municipality reduces its energy consumption, its GHG emissions may even increase if the provincial fossil fuel mix significantly increases. All municipalities participating in the PCP program use this GHG calculation methodology (PCP Protocol) in Canada and throughout the world.

The following two methods were used for calculating the 1995 baseline GHG emissions inventory:

- i) PCP Protocol method – based on absolute changes in GHG emissions with annually fluctuating provincial eCO<sub>2</sub> electricity coefficients. This was required for PCP approval.

1995 Baseline: 5,032 t eCO<sub>2</sub> (using 1995 eCO<sub>2</sub> coeff.)

% Absolute Change: 41% increase between 1995 and 2016

% Per Capita Change: 22% reduction between 1995 and 2016

- ii) Constant eCO<sub>2</sub> electricity coefficient – this provides consistency in comparing the baseline with the target year as well as intermediate years.

1995 Baseline: 7,874 t eCO<sub>2</sub> (using then latest eCO<sub>2</sub> coeff. for 2000)

% Absolute Change: 10% reduction between 1995 and 2016

% Per Capita Change: 50% reduction between 1995 and 2016

The second method has been the preferred way of referencing the corporate target as a 50% per capita reduction, however it is becoming clear that the first method is preferable for several reasons:

- It is the only method approved by PCP and if the City wishes to continue with the PCP framework and milestones 4 & 5, it will need to comply with this method of measuring GHG emissions.
- Using the year 2000 electricity coefficient is becoming less relevant as more current annual coefficients become available.
- As the City is tracking energy consumption as well, this is a means by which one can remove the affect of annually fluctuating coefficients as a complimentary measure to GHG emissions.

Table 1 provides a summary of energy and GHG emissions on an absolute and per capita basis from 1995 baseline through 2008 based on the PCP protocol for GHG emissions inventory. The 2016 target for energy and GHG emissions and the pre-2007 "Business As Usual" (BAU) forecast is also included. The 2016 BAU forecast provides the energy use and GHG emissions that would occur through normal growth of services if there were no concerted focus on sustainable initiatives (as per pre-2007 outlook).

The difference between the 2016 target and the 2016 BAU forecast is the gap that needs to be met through these initiatives: 3,492 t of eCO<sub>2</sub> emissions. By meeting the 2016 target, it is forecasted that the City would save over \$2.0 million per year in energy costs.

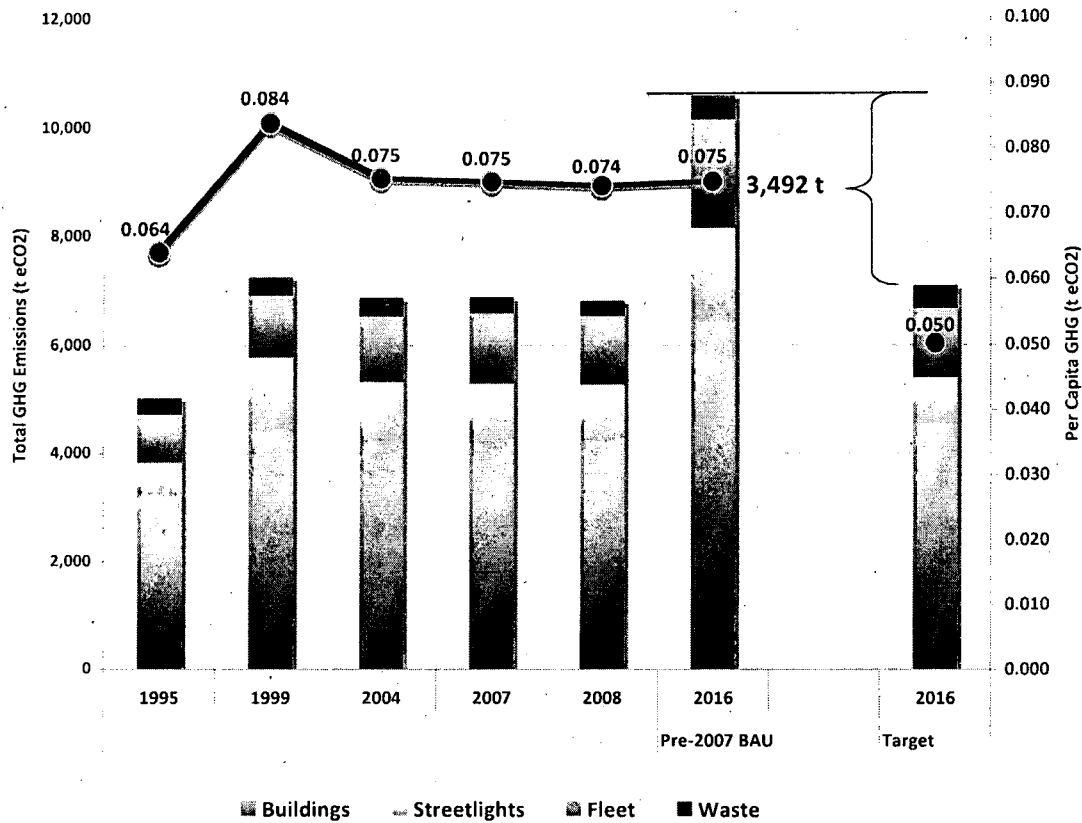
**Table 1 – Corporate Energy and GHG Inventory, Forecast and Target**

Summary	1995	1999	2004	2007	2008	2016 BAU Forecast (Pre-2007)	2016 Target
Energy Use (GJ)	104,442	104,414	116,852	124,471	123,531	191,757	93,957
Per Capita Energy (GJ)	1.33	1.21	1.28	1.36	1.35	1.36	0.67
GHG Emissions (t eCO <sub>2</sub> )	5,032	7,252	6,865	6,864	6,803	10,575	7,083
Per Capita GHG (t eCO <sub>2</sub> )	0.064	0.084	0.075	0.075	0.074	0.075	0.050
Energy Cost (\$'000)	\$1,435	\$1,487	\$2,233	\$2,478	\$2,644	\$3,997	\$1,958

City of Pickering – Energy and GHG Sustainability Indicators

Figure A provides the GHG emissions by sector (facilities, streetlights, fleet and waste) and the per capita trend line. The sector data is provided in Appendix A. The BAU forecast is based on the per capita emissions level of 0.075 t/person in 2006 and 2007. The gap of 3,492 t of eCO<sub>2</sub> between the 2016 BAU forecast and 2016 target is also shown schematically.

**Figure A – GHG Emissions By Sector with Per Capita Trend Line**



The GHG emissions for 1995 through 2008 use fluctuating annual electricity eCO<sub>2</sub> coefficients to correspond with each year as per the PCP protocol. Using this method, the per capita GHG reduction target of 0.050 t eCO<sub>2</sub> corresponds to a 22% per capita GHG reduction and a 50% per capita energy consumption reduction from 1995.

The trends show that both streetlights and fleet vehicles have used more energy both on an absolute basis and on a per capita basis in 2008 versus the baseline of 1995, although streetlight energy consumption was reduced by about 10% from 2007 to 2008 partially as a result of a traffic light relamping program started in 2008.

Facility energy use has fared better on a per capita basis in comparison to 1995, yet is showing a trend towards higher per capita consumption since 1999. This trend should reverse by 2010 based on the energy efficient projects being completed in 2009.

Total corporate energy consumption has increased steadily from 1999 to 2007 on both an absolute and per capita basis. In 2008, this trend has reversed as both absolute and per capita energy usage has been reduced slightly.

Total corporate GHG emissions have been declining on an absolute and per capita basis from 1999 through 2008 mainly as a result of declining provincial electricity eCO<sub>2</sub> coefficients through 2007. The reduction in GHG emissions in 2008 was mainly due to energy reductions from corporate initiatives.

## 2.2 Corporate Initiatives

As part of the “Corporate Challenge” to lead by example, an increasing number of energy efficiency and GHG reduction projects have been initiated. The slightly better performance in 2008 in terms of both energy consumption and GHG emissions is a result of corporate initiatives in late 2007 and throughout 2008.

Table 2 provides a summary of projects by sector that have been implemented since late 2007 including those in the planning stages for implementation in 2010. Twenty-six initiatives have been quantified for energy, cost and GHG savings, % GHG savings versus 2007 baseline, incremental capital cost of energy/GHG elements of projects, and simple payback and ROI to measure financial returns.

These initiatives provide an estimated annual savings of \$276K/y with an average return of 19%. Its environmental performance includes GHG emissions savings of 660 t/y corresponding to a 12.5% savings of total 2007 emissions.

**Table 2 – Impact of 26 Initiatives To-Date plus Budgeted for 2010**

Sector	Energy Savings (GJ/y)	GHG Savings (t/y)	Total GHG Emissions - 2007 Baseline (t eCO <sub>2</sub> )	% GHG Savings Within Sector	Op. Cost Savings (\$/y)	Incremental Capital Cost (\$)	Simple Payback (years)	Simple ROI (%)
Facilities	11,428	609	4,176	14.6%	\$249,853	\$1,341,717	5.4	18.6%
Fleet	102	11	1,221	0.9%	\$3,233	\$64,976	20.1	5.0%
Streetlights	794	40	1,107	3.6%	\$23,118	\$50,531	2.2	45.8%
<b>Total</b>	<b>12,324</b>	<b>660</b>	<b>5,283</b>	<b>12.5%</b>	<b>\$276,204</b>	<b>\$1,457,224</b>	<b>5.3</b>	<b>19.0%</b>

## City of Pickering – Energy and GHG Sustainability Indicators

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The facility projects have produced the majority of the energy and GHG savings impact to-date accounting for 92% of GHG savings, while providing good economic returns averaging an estimated ROI of 18.6%.

The conversion of traffic lights to high efficiency LED's provides an excellent payback of 2.2 years although GHG savings impact of 11 t/y is relatively small.

Fleet energy and GHG savings is mainly due to the replacement of older vehicles with 5 hybrids, however the economic performance is relatively poor with an estimated 5% ROI to-date.

Table 3 provides the impact of the initiatives by year starting with a large impact project: the relamping of the Civic Complex in late 2007 with first full year impact in 2008. The initiatives ramped up in 2009 (first full year impact in 2010) with a total GHG savings of 284 t/y corresponding to a 5.4% reduction versus the 2007 GHG baseline. The 2010 budgeted projects (first full year impact in 2011) have a slightly lower impact than 2009 projects with projected savings of 234 t/y of GHG corresponding to a 4.4% reduction from 2007 baseline.

**Table 3 – Impact of Corporate Initiatives by Year**

	<b>First Full Year Impact</b>	<b>Energy Savings (GJ/y)</b>	<b>Cost Savings (\$/y)</b>	<b>GHG Savings (t/y)</b>	<b>% GHG Savings from 2007</b>
<b>Initiatives by Year</b>	2008	2,106	\$36,668	107	<b>2.0%</b>
	2009	640	\$17,335	34	<b>0.7%</b>
	2010	5,543	\$139,593	284	<b>5.4%</b>
<b>Initiatives To-date</b>		<b>8,289</b>	<b>\$193,597</b>	<b>426</b>	<b>8.1%</b>
Projects in 2010	2011	4,035	\$82,607	234	<b>4.4%</b>
<b>Total Projects thru 2010</b>		<b>12,324</b>	<b>\$276,204</b>	<b>660</b>	<b>12.5%</b>

Figure B shows the impact of the 26 initiatives on both an absolute basis (bars) and a per capita basis (red trend line). The full impact of the initiatives by 2011 is a reduction 660 t eCO<sub>2</sub>/y which corresponds to a 14% per capita reduction from 0.075 t in 2007 to 0.064 t/capita in 2011.

The figure shows a trend line that is likely to meet the 2016 target, however it does not take into account the adverse effect of growth in facilities and services as population grows.

Figure B – GHG Emissions Impact of Initiatives Only in Meeting Target

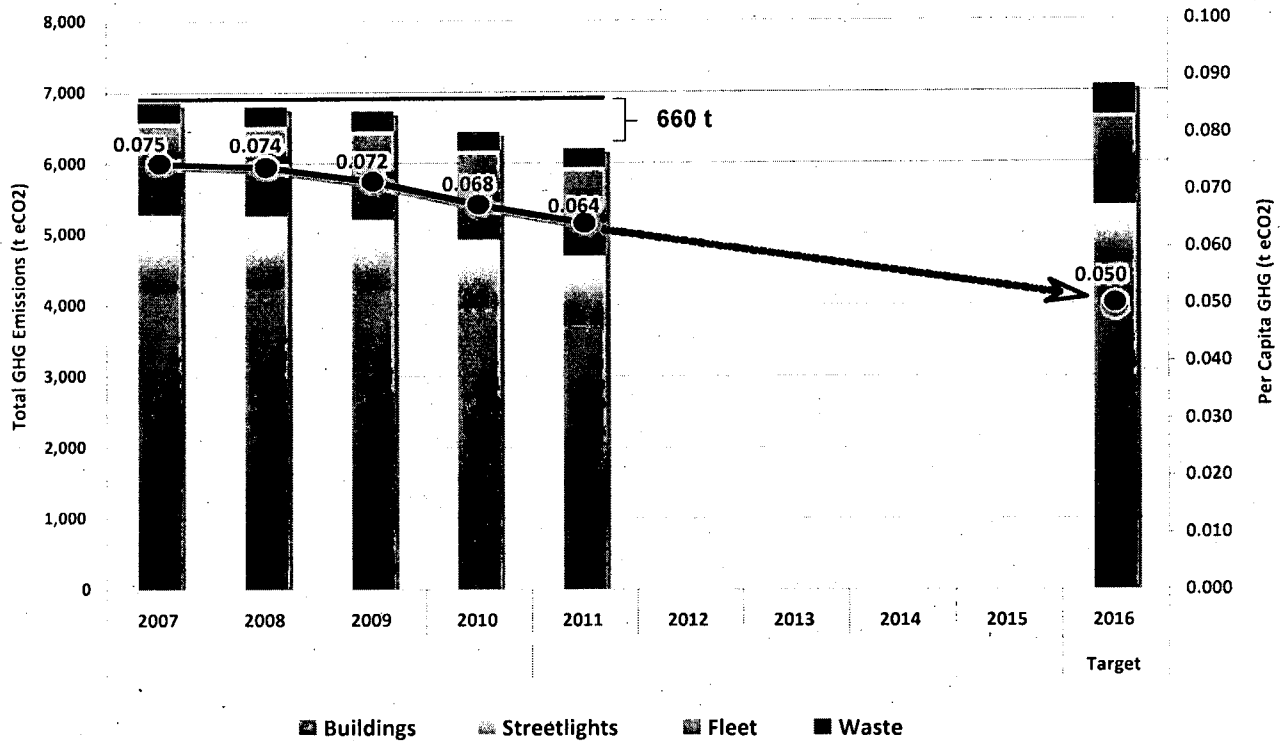
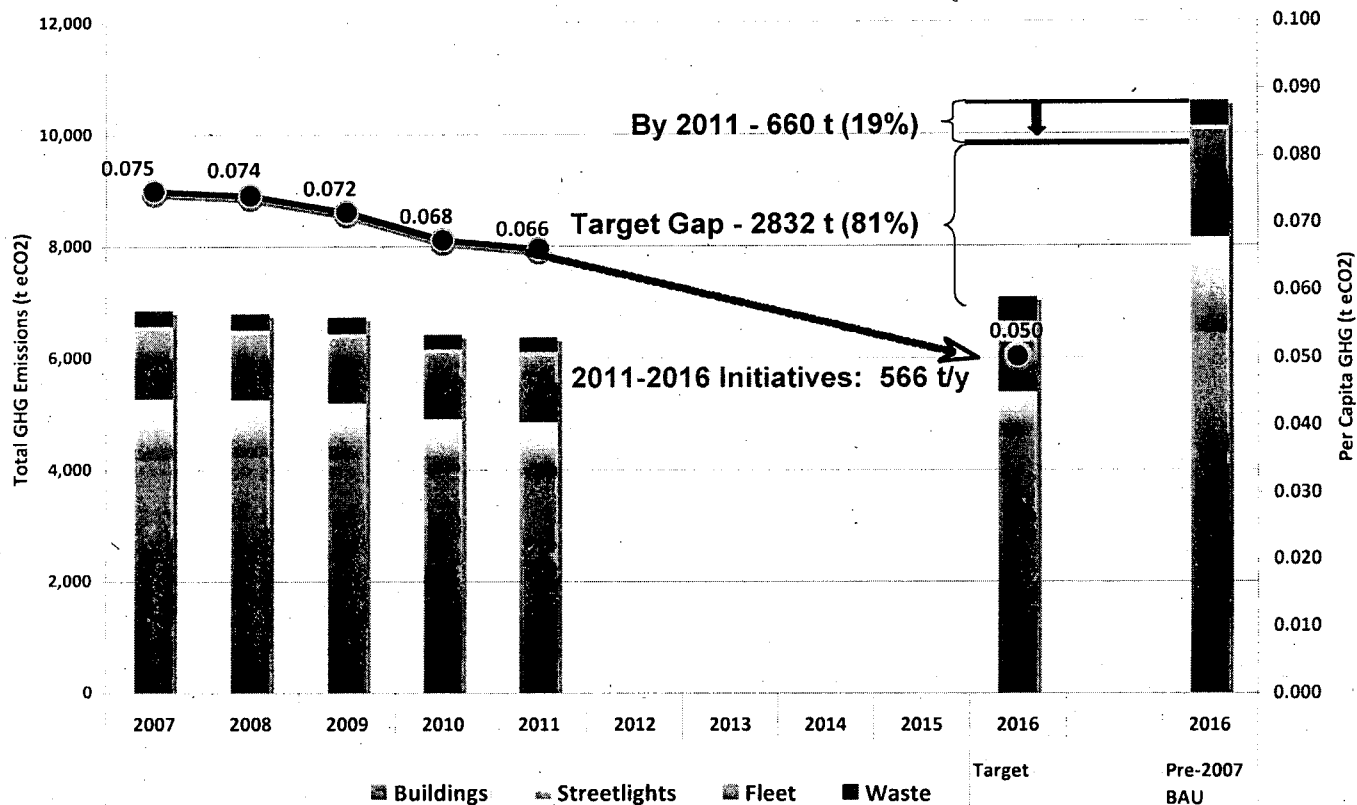


Figure C provides a more realistic picture with the impact of growth in municipal facilities and services and therefore growth in energy consumption and GHG emissions as provided in the BAU forecast.

In 2011, the impact of the Recreation Complex expansion in 2010 is taken into account, which increases the per capita GHG emissions from 0.064 t as shown in Figure B to 0.066 t as shown in Figure C. The slope of the per capita trend line starts to flatten in 2011 as a result of this expansion.

**Figure C – GHG Emissions – Meeting the Target with Growing Municipal Operations (BAU Effect)**



The initiatives through 2010 have reduced the target gap of 3492 t of GHG emissions by 19%. The remaining gap of 2832 t of GHG emissions corresponds to an annual reduction target of 566 t/y from 2011 to 2016. This is over double the annual impact of the initiatives being implemented in 2009 and 2010 (260 t/y).

By 2011, the Corporation will need to step-up its corporate sustainability initiatives to a new level to meet its 2016 target.

One missing element that is crucial in supporting this new level of attention and focus is an automated energy and GHG emission monitoring and monthly reporting system.

## 2.3 Energy and GHG Monitoring and Reporting

It is recommended that the City utilize an energy management system that accurately monitors and reports corporate energy consumption and corresponding GHG emissions on a monthly basis. This reporting will provide the operational and management information required to bring the needed attention to this crucial corporate challenge and to support decision-making utilizing a sustainability lens.

An energy and GHG management system can provide additional benefits for the City including:

- Automated comparison of facility energy performance and potential benchmarking to other similar municipal facilities
- Monthly reports to both Operations staff and management provides the visibility and attention required to ignite a sense of urgency to reduce energy and operating costs and to improve processes
- Savings verification of energy efficiency and GHG reduction projects
- Baseline data for calculating energy savings for obtaining government and utility incentives
- Third party data entry of invoices (as well as interface with smart meter data and electronic invoices) to ensure accurate and detailed energy information is in the system.
- Meets future requirements of the Green Energy Act that require all public agencies including municipalities to prepare energy plans including annual progress updates
- Meets requirements of PCP Milestone 5

There are several software packages available from private contractors, which tend to be very costly (over \$100k) and may have risks concerning future service and support.

There are at least two options that are more economical and are backed by secure organizations.

### **Option 1 - “Energy and Environment Management System” (EEMS) developed, licensed and supported by York Region**

This software was developed by a municipality for municipalities. York Region and a network of GTA municipal licensees (including Markham, Oakville, Halton) regularly share best practices.

The program provides comprehensive coverage of all energy consumption including facilities, streetlighting, and fleet fuels along with performance indicators.

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Its major disadvantage is that it has no benchmarking capability for similar facilities at other municipalities, so there is no automated mechanism for comparing energy performance such as energy use per square foot to other similar facilities.

#### **Option 2 – LAS Energy Management Tool (EMT) – developed and supported by AMO**

Pickering was part of their pilot program last year. Software is newer and is currently focused on facilities only. It has drastically improved its service capability from a year ago and now has a viable product and service including extensive benchmarking capability.

**Table 4 - Cost Comparison Between EEMS and EMT Systems**

System	Purchase Price (capital cost)	Annual Fee	Option 1 Third Party Electronic Inputting Fee	Option 2 Third Party Paper Invoice Inputting Fee	Option 2 Optional Account Maintenance and Report Generation	Total Annual Costs – Self-Service (option 1)	Total Annual Costs – Full Service (option 2)
York EEMS	\$20,000	\$2,000	\$3,600	\$5,400	Not offered	\$ 5,600	\$ 7,400
LAS EMT	Nil	\$3,600	\$3,600	\$5,400	\$9,000	\$ 7,200	\$18,000

Table 4 shows that the EMT “self-service” option (option 1) is an “apples to apples” comparison to EEMS. The EMT self-service option is more economically attractive as the simple payback on the EEMS capital outlay is prohibitively high at 12.5 years in comparison to EMT.

The EMT “full-service” option (option 2) provides an important service that EEMS does not in that it verifies data accuracy and generates and distributes different levels of reports depending on the needs of operations and management. On an economic basis, the EEMS system has a payback of less than 2 years when compared to the full service LAS EMT option however the service levels are quite different.

A problem with the self-service option is that manual invoice copies cannot be processed so electronic information needs to be sent by the City’s accounting department. There were a number of problems arising from this method during the pilot project, which include information accuracy and limited information (only energy consumption and cost data are available electronically). Other relevant information on the invoice is not inputted into the accounting system such as the invoice period start and end dates and electricity power/demand information.

With this preliminary analysis it's not fully apparent which system will best meet the needs of the corporation. It is recommended that both systems be further investigated by Operations and that they recommend the best option taking into economic considerations, operational decision-making and data verification requirements, and management reporting needs. Key considerations between the two systems include whether facility benchmarking capability and reporting beyond facilities (i.e. fleet software replacement) are important needs of the corporation.

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**3. Community Energy and GHG Inventory Update****3.1 Community Summary**

In 2006, the Pickering community GHG inventory was developed for the years 1995 and 2004. In 2009, as part of a Durham Region wide initiative, community energy and GHG inventories have been gathered for the years 2005 through 2008. This data has been segregated by municipality at the request of Pickering and other Durham municipalities.

Table 3 summarizes the annual energy consumption, energy cost and GHG emissions on an absolute and per capita basis from the 1995 baseline to 2008 as well as the original PCP targets for 2016. The 2016 per capita targets for GHG emissions and energy consumption are reductions of 19% and 35%, respectively, from the 1995 baseline.

The GHG emissions have been calculated for each year with corresponding eCO<sub>2</sub> electricity coefficients as per PCP protocol.

**Table 5: Community Energy Consumption, Cost and GHG Emissions**

Summary	1995	2004	2005	2006	2007	2008	Target 2016
Energy Use (GJ)	9,264,042	9,786,980	10,562,086	10,278,757	10,793,743	10,652,834	10,948,967
Per Capita Energy	118.3	107.6	116.1	112.5	117.9	114.8	77.60
Energy Cost (\$'000)	N/A	\$170,444	\$224,401	\$224,490	\$231,163	\$246,852	\$261,124
Per Capita Energy Cost	N/A	\$1,874	\$2,466	\$2,456	\$2,524	\$2,660	\$1,851
eCO <sub>2</sub> Emissions (t)	511,839	597,821	632,930	586,779	611,092	604,436	744,634
Per Capita eCO <sub>2</sub>	6.54	6.57	6.96	6.42	6.67	6.51	5.28

From 1995 to 2008, absolute GHG emissions have risen by 18% while per capita emissions have fluctuated without a clear trend. The 2008 per capita emissions are essentially the same as the baseline year of 1995 at 6.5 t/person, and per capita energy consumption has declined slightly by 3% from 118 GJ/person to 115 GJ/person. This difference quantifies the effect of the variable eCO<sub>2</sub> electricity coefficient.

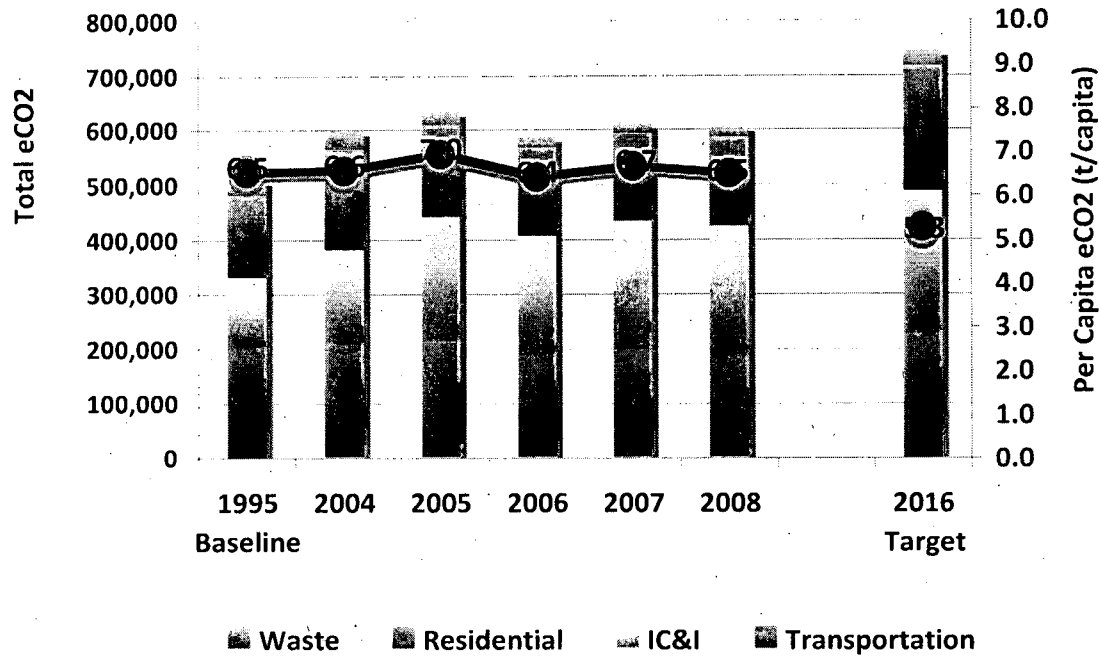
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Although per capita energy consumption has declined slightly, the per capita energy cost has risen significantly from \$1874/person in 2004 to \$2660/person in 2008, a 42% increase.

Figure D provides total GHG emissions by sector with the total per capita GHG emissions trend line in red. Section 3.2 will provide further discussion on each sector.

The GHG emission targets in 2016 of 744,634 t eCO<sub>2</sub> and 5.28 t eCO<sub>2</sub> per capita correspond to a 45% absolute increase and a 19% per capita reduction from the 1995 baseline.

Figure D: Absolute GHG Emissions by Sector and Per Capita Trend Line



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### 3.2 Trends By Sector

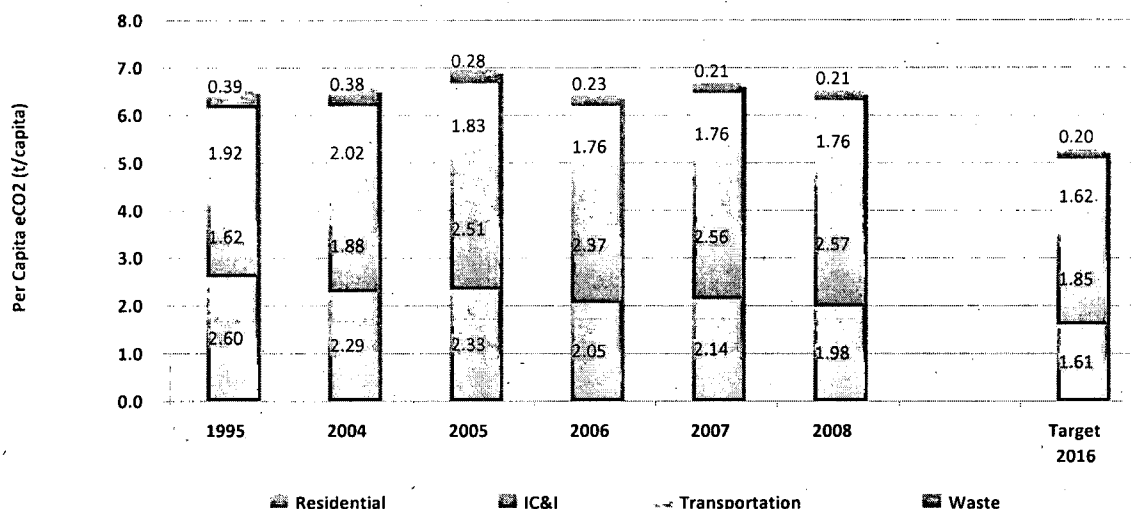
Table 6 provides a summary of absolute and per capita GHG emissions by sector. Each sector will be discussed in the following sections.

**Table 6 – GHG Emissions by Sector**

<b>GHG Emissions (t)</b>	<b>1995</b>	<b>2004</b>	<b>2005</b>	<b>2006</b>	<b>2007</b>	<b>2008</b>	<b>Target 2016</b>
Residential	203,900	208,306	212,239	187,801	195,897	183,433	226,938
Residential Per Capita	2.60	2.29	2.33	2.05	2.14	1.98	1.61
IC&I	127,020	171,437	228,462	217,037	234,773	238,640	261,507
IC&I Per Capita	1.62	1.88	2.51	2.37	2.56	2.57	1.85
Transportation	150,048	183,591	166,760	160,872	161,203	163,338	227,904
Transportation Per Capita	1.92	2.02	1.83	1.76	1.76	1.76	1.62
Waste	30,872	34,487	25,469	21,069	19,219	19,026	28,285
Waste Per Capita	0.39	0.38	0.28	0.23	0.21	0.21	0.20
<b>Total eCO2 Emissions</b>	<b>511,839</b>	<b>597,821</b>	<b>632,930</b>	<b>586,779</b>	<b>611,092</b>	<b>604,436</b>	<b>744,634</b>
<b>Total eCO2 Per Capita</b>	<b>6.54</b>	<b>6.57</b>	<b>6.96</b>	<b>6.42</b>	<b>6.67</b>	<b>6.51</b>	<b>5.28</b>

Figure E provides the per capita GHG emissions by sector. Yearly fluctuations in all sectors have essentially cancelled each other out as the 2008 total per capita GHG emissions is the same as the 1995 baseline emissions at 6.5 t/capita.

**Figure E – Per Capita GHG Emissions By Sector**



### 3.2.1 Residential

The residential sector for purposes of this analysis is comprised of single-family detached and semi-detached homes. Condominiums and apartments are generally on single meters and as such are regarded by the electricity local distribution companies (LDC's) as commercial accounts and cannot be readily segregated from other IC&I customers.

The residential sector accounted for 30% of total community GHG emissions in 2008. Table 7 shows the residential energy consumption, energy cost and eCO<sub>2</sub> emissions on an absolute and per capita basis.

From 1995 to 2008, the population grew by 19% while the number of households increased by 20%. Despite the increase in population and households, the energy consumption has dropped by 15% and the eCO<sub>2</sub> emissions have decreased by 10%. The difference between the two measures can be attributed to the change to the provincial electricity eCO<sub>2</sub> coefficient from 1995 to 2006. The eCO<sub>2</sub> coefficient for the year 2006 has also been used for the years 2007 and 2008 as it's currently the last published figure.

Changes in annual weather will also effect annual energy consumption and eCO<sub>2</sub> emissions. Drops in per capita energy consumption from 2005 to 2006 and from 2007 to 2008 may be partially due to relatively warmer winters in 2006 and 2008 versus 2005 and 2007, respectively.

**Table 7: Residential Energy Consumption, Cost and GHG Emissions**

<b>Residential</b>	<b>1995</b>	<b>2004</b>	<b>2005</b>	<b>2006</b>	<b>2007</b>	<b>2008</b>	<b>Target 2016</b>
Energy Use (GJ)	4,258,460	3,988,936	4,024,425	3,705,436	3,877,248	3,630,088	3,780,860
Per Capita Energy	54.4	43.8	44.2	40.5	42.3	39.1	26.8
Energy Costs (\$'000)	N/A	\$63,702	\$70,522	\$68,457	\$66,931	\$65,441	\$68,159
Per Capita Energy Costs	N/A	\$700	\$775	\$749	\$731	\$705	\$483
eCO <sub>2</sub> Emissions (t)	203,900	208,306	212,239	187,801	195,897	183,433	226,938
Per Capita eCO <sub>2</sub>	2.60	2.29	2.33	2.05	2.14	1.98	1.61

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**3.2.2 Institutional, Commercial and Industrial (IC&I)**

The IC&I sector comprises of institutions (government, schools, hospitals, churches, museums, and other public buildings), office buildings, retail and food service establishments, and industrial facilities. It also includes apartments and condominiums in this analysis for reasons discussed in residential Section 3.2.1.

This sector accounts for the largest portion of total community GHG emissions. In 2008, it generated 40% of emissions. Table 8 shows the IC&I energy consumption, energy cost and eCO<sub>2</sub> emissions on an absolute and per capita basis.

From 1995 to 2008, total energy consumption and eCO<sub>2</sub> emissions have significantly increased by 65% and 88%, respectively. As in the residential sector, the difference between the two measures can be attributed to the change to the provincial electricity eCO<sub>2</sub> coefficient from 1995 to 2006.

Per capita energy consumption and GHG emissions seems to have leveled out between 2007 and 2008. This may be due to the effects of the recession starting in 2008 when some businesses started to reduce production and occupancy rates for commercial space declined, all of which affect energy consumption.

**Table 8: IC&I Energy Consumption, Energy Cost and GHG Emissions**

IC&I	1995	2004	2005	2006	2007	2008	Target 2016
Energy Use (GJ)	2,824,208	3,129,453	4,116,109	4,237,261	4,575,631	4,650,879	3,855,410
Per Capita Energy	36.1	34.4	45.2	46.4	50.0	50.1	27.3
Energy Costs (\$'000)	N/A	\$50,790	\$93,297	\$94,532	\$100,659	\$106,403	\$88,204
Per Capita Energy Costs (\$/capita)	N/A	\$558	\$1,025	\$1,034	\$1,099	\$1,147	\$625
eCO <sub>2</sub> Emissions (t)	127,020	171,437	228,462	217,037	234,773	238,640	261,507
Per Capita eCO <sub>2</sub>	1.62	1.88	2.51	2.37	2.56	2.57	1.85

### 3.2.3 Transportation

The transportation sector includes travel by all Pickering residents in personal vehicles and public transportation vehicles, but not rail, marine or air transportation as per PCP protocol. It also includes commercial vehicles used by Pickering businesses and institutions based on provincial proxy data. The total vehicle kilometers traveled is then used to calculate fuel and emission data based on average fuel efficiencies for different classes of vehicles.

In 2008, transportation accounted for the third largest portion of total community GHG emissions generating 27% of emissions. Table 9 shows the transportation consumption, energy cost and eCO<sub>2</sub> emissions on an absolute and per capita basis.

From 1995 to 2008, total transportation fuel consumption and eCO<sub>2</sub> emissions increased by 9%. However, on a per capita basis, energy and eCO<sub>2</sub> emissions declined by 8% showing a reversal of an increasing per capita trend from 1995 to 1994.

Total energy costs in the transportation sector have risen significantly. On a per capita basis, costs have risen by 31% from 2004 to 2008, a large portion of which is attributable to the high fuel prices in the first three quarters of 2008.

**Table 9: Transportation Energy Consumption, Cost and GHG Emissions**

Transportation	1995	2004	2005	2006	2007	2008	Target 2016
Energy Use (GJ)	2,181,374	2,668,590	2,421,552	2,336,059	2,340,864	2,371,867	3,312,696
Per Capita Energy	27.9	29.3	26.6	25.6	25.6	25.6	23.5
Energy Costs (\$'000)	N/A	\$55,952	\$60,582	\$61,501	\$63,573	\$75,008	\$104,761
Per Capita Energy Costs (\$/capita)	N/A	\$615	\$666	\$673	\$694	\$808	\$742
eCO <sub>2</sub> Emissions (t)	150,048	183,591	166,760	160,872	161,203	163,338	227,904
Per Capita eCO <sub>2</sub>	1.92	2.02	1.83	1.76	1.76	1.76	1.62

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**3.2.4 Waste**

The community waste sector includes all waste collected by Durham Region from residents, institutions and businesses within Pickering. It also includes waste collected by private companies from institutions and businesses except industrial waste and construction and demolition waste as very little of the organic portion of this waste ends up in municipal landfills and industrial landfill conditions do not foster decay. As little data is available on private collection, provincial proxy data was used to add to Durham Region records.

In 2008, waste accounted for 3% of total community GHG emissions. Table 10 shows the waste tonnage to landfill and eCO<sub>2</sub> emissions on an absolute and per capita basis.

From 1995 to 2008, total waste to landfill and eCO<sub>2</sub> emissions were reduced by 38% through successful diversion programs. The improvements in this sector are generally permanent systemic changes based on improvements in diversion rates.

**Table 10 - Waste to Landfill and eCO<sub>2</sub> Emissions**

<b>Waste</b>	<b>1995</b>	<b>2004</b>	<b>2005</b>	<b>2006</b>	<b>2007</b>	<b>2008</b>	<b>Target 2016</b>
Waste to Landfill (t)	64,089	71,594	52,873	43,740	39,899	39,498	60,054
Per Capita Waste	0.82	0.79	0.58	0.48	0.44	0.43	0.43
eCO <sub>2</sub> Emissions (t)	30,872	34,487	25,469	21,069	19,219	19,026	28,285
Per Capita eCO <sub>2</sub>	0.39	0.38	0.28	0.23	0.21	0.21	0.20

## 4. Recommendations

### 4.1 Corporate Actions

The key initiatives starting in late 2007 and continuing through 2010 have been a good start for the Corporation. However, in order to meet its 2016 target the City will need to more than double its annual GHG emissions reduction efforts starting in 2011.

In order to meet its 2016 target, it is recommended that the City of Pickering:

- i) Conduct a detailed assessment of the operational and reporting functionality of the two leading energy/GHG emission management software systems (LAS EMT and York Region's EEMS) and acquire such software by mid-2010 (in order to be used for 2011 budget prioritization and decision making).
- ii) Designate responsibility for the energy/GHG emission coordination function.
- iii) Conduct full energy audits in 2010 and 2011 on 7 key facilities as identified in the 2009 Energy Management Strategy.
- iv) Prioritize Recreation Complex projects identified in the audit yet to be implemented and include remaining priority projects in 2011 budget.
- v) Conduct sustainability assessment of light duty fleet vehicles, fleet management software, and fleet procurement policies in 2010.
- vi) Develop a detailed PCP submission report that meets the requirements of PCP milestones 4 & 5 for corporate operations. This will include the corporate section of this report plus the following:
  - a. For milestone 4, a detailed assessment of corporate actions in the Local Action Plan including what has been completed, what needs to be done, and changes in focus.
  - b. For milestone 4, a detailed plan on how to narrow the gap between current status and the 2016 target.
  - c. For milestone 5, a detailed plan for future monitoring and reporting and how this integrates with the sustainability indicators. The submission would be significantly strengthened by the City's commitment to energy and GHG management software.

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## 4.2 Community Actions

Over the last 15 years, the per capita GHG emissions have fluctuated up and down between 6.4 and 7.0 t/person without any sign of real progress. **In fact, the 2008 GHG emissions are the same as the 1995 baseline year at 6.5 t/person.**

Per capita energy consumption shows similar fluctuations with a small reduction in 2008 energy consumption of 3% from the 1995 baseline of 118 GJ/person.

While the emphasis has been placed on corporate initiatives over the last two years, the community requires dedicated focus in order to catalyze and support initiatives to significantly reduce energy consumption and GHG emissions.

In order to successfully engage the community, it is recommended that the City of Pickering:

- i) Research and develop refined performance indicators within each key sector (residential, IC&I, transportation, and waste) in order to measure meaningful performance.
- ii) Report sector performance indicators as part of the community energy and GHG emission sustainability indicator report.
- iii) Develop and prioritize key sector energy and GHG reduction initiatives as part of the Community Challenge.
- iv) Develop a PCP submission report that meets the requirements of PCP milestones 4 & 5 for the community. This will include:
  - a. For milestone 4, a detailed assessment of community actions in the Local Action Plan (milestone 3) including what has been completed, what needs to be done, and changes in focus.
  - b. For milestone 4, a detailed plan on how to narrow the gap between current status and the 2016 target including quantification of major initiatives in (ii) above.
  - c. For milestone 5, a plan for continual future monitoring and reporting and how this integrates with the sustainability indicators report.

## Appendix A – Corporate Energy and GHG By Sector

Sector	Energy and GHG Parameters	Year						
		1995	1999	2004	2007	2008	2016 BAU Forecast	2016 Target
<b>Buildings</b>	Energy Use (GJ)	74,981	69,943	79,509	83,810	85,087	129,117	67,509
	Per Capita Energy	0.96	0.81	0.87	0.92	0.92	0.92	0.48
	GHG (t eCO <sub>2</sub> )	3,242	4,421	4,198	4,176	4,239	6,433	4,694
	Per Capita GHG	0.041	0.051	0.046	0.046	0.046	0.046	0.033
	% Per Capita Change		24%	11%	10%	10%	10%	-20%
<b>Streetlights</b>	Energy Use (GJ)	16,599	18,165	20,224	22,146	20,395	34,118	14,930
	Per Capita Energy	0.21	0.21	0.22	0.24	0.22	0.24	0.11
	GHG (t eCO <sub>2</sub> )	585	1,352	1,124	1,107	1,020	1,706	1,304
	Per Capita GHG	0.007	0.016	0.012	0.012	0.011	0.012	0.009
	% Per Capita Change		110%	65%	62%	47%	62%	24%
<b>Fleet</b>	Energy Use (GJ)	12,862	16,306	17,118	18,514	18,050	28,523	11,518
	Per Capita Energy	0.16	0.19	0.19	0.20	0.19	0.20	0.08
	GHG (t eCO <sub>2</sub> )	897	1,137	1,199	1,293	1,259	1,992	807
	Per Capita GHG	0.011	0.013	0.013	0.014	0.014	0.014	0.006
	% Per Capita Change		15%	15%	23%	18%	23%	-50%
<b>Corporate Waste</b>	Waste to Landfill (t)	641	710	716	598	592	922	576
	GHG (t eCO <sub>2</sub> )	309	342	345	288	285	444	278
	Per Capita GHG	0.004	0.004	0.004	0.003	0.003	0.003	0.002
	% Per Capita Change		1%	-4%	-20%	-22%	-20%	-50%
<b>Total</b>	<b>Energy Use (GJ)</b>	104,442	104,414	116,852	124,471	123,531	191,757	93,957
	% Change from 1995		0.0%	11.9%	19.2%	18.3%	83.6%	-10.0%
	Per Capita Energy	1.33	1.21	1.28	1.36	1.35	1.36	0.67
	% Per Capita Change		-9%	-4%	2%	1%	2%	-50%
<b>Total</b>	<b>GHG (t eCO<sub>2</sub>)</b>	5,032	7,252	6,865	6,864	6,803	10,575	7,083
	% Change from 1995		44.1%	36.4%	36.4%	35.2%	110.2%	40.8%
	Per Capita GHG	0.064	0.084	0.075	0.075	0.074	0.075	0.050
	% Per Capita Change		31%	17%	17%	16%	17%	-22%
<b>Total</b>	<b>Energy Costs (\$'000)</b>	\$1,436	\$1,487	\$2,233	\$2,478	\$2,645	\$3,997	\$1,959
	<b>Est. Savings (\$'000)</b>							<b>\$2,039</b>

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**Appendix B – Corporate Initiatives by Facility / Function**

Location/ Function	Initiative	First Full Year Impact	Energy Savings (GJ/y)	Cost Savings (\$/y)	GHG Savings (t/y)	Total GHG in 2007 (t/y)	% GHG Savings from 2007
<b>Facilities</b>							
<b>Civic Complex</b>	Relamping	2008	1,830	\$31,375	91.7	<b>810</b>	<b>28.4%</b>
	HVAC upgrades (3)	2010	1,122	\$35,605	55.9		
	HVAC upgrades (3)	2011	1,068	\$16,964	82.7		
	<b>Total</b>		<b>4,020</b>	<b>\$83,944</b>	<b>230.3</b>		
<b>Recreation Complex</b>	Auto. Systems (2)	2009	232	\$4,663	11.5	<b>1,654</b>	<b>7.0%</b>
	Catalytic converters	2010	-	\$0	4.8		
	HVAC upgrades (2)	2010	1,602	\$33,220	79.1		
	HVAC upgrades (3)	2011	402	\$11,711	20.1		
	<b>Total</b>		<b>2,236</b>	<b>\$49,594</b>	<b>115.6</b>		
<b>Don Beer</b>	Catalytic converters	2010	-	\$0	4.8	<b>508</b>	<b>20.6%</b>
	HVAC Upgrades	2011	1,448	\$33,357	71.7		
	Green roof	2011	559	\$12,990	27.9		
	<b>Total</b>		<b>2,007</b>	<b>\$46,347</b>	<b>104.4</b>		
<b>West Shore</b>	HVAC upgrade	2008	174	\$2,060	8.6	<b>27</b>	<b>42.0%</b>
	Building upgrade	2011	56	\$1,663	2.8		
	<b>Total</b>		<b>231</b>	<b>\$3,723</b>	<b>11.4</b>		
<b>East Shore</b>	Relamping	2010	17	\$432	0.9	<b>157</b>	<b>16.4%</b>
	Building upgrade	2011	502	\$5,922	24.7		
	<b>Total</b>		<b>519</b>	<b>\$6,354</b>	<b>25.6</b>		
<b>Greenwood Library</b>	Fuel switch	2009	34	\$1,771	4.2	7	<b>56.1%</b>
<b>Dunbarton Pool</b>	Building upgrade	2010	2,381	\$58,120	117.5	235	<b>50.0%</b>
<b>Total Facilities</b>	<b>Initiatives By Year</b>	2008	2,004	\$33,435	100	<b>4,176</b>	<b>2.4%</b>
		2009	265	\$6,434	16		<b>0.4%</b>
		2010	5,123	\$127,377	263		<b>6.3%</b>
	<b>Initiatives To-date</b>		<b>7,393</b>	<b>\$167,246</b>	<b>379</b>		<b>9.1%</b>
	Projects in 2010 <b>Total thru 2010</b>	2011	4,035	\$82,607	230		<b>5.5%</b>
			<b>11,428</b>	<b>\$249,853</b>	<b>609</b>	<b>4,176</b>	<b>14.6%</b>

City of Pickering – Energy and GHG Sustainability Indicators

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Location/ Function	Initiative	First Full Year Impact	Energy Savings (GJ/y)	Cost Savings (\$/y)	GHG Savings (t/y)	Total GHG in 2007 (t/y)	% GHG Savings from 2007
<b>Fleet</b>							
<b>Fuel Efficient Vehicles Emissions Controls</b>	Hybrid Ford Escape-5	2008	102	\$3,233	6.9		0.6%
	Lawn mowers & Snow r	2011			4.2		0.3%
	<b>Total thru 2010</b>		<b>102</b>	<b>\$3,233</b>	<b>11</b>	<b>1,221</b>	<b>0.9%</b>
<b>Streetlights</b>							
<b>Traffic Lights</b>	Relamp with LED's	2009	374	\$10,901	19		40%
	Relamp with LED's	2010	420	\$12,217	21		45%
	<b>Total Traffic Lights</b>		<b>794</b>	<b>\$23,118</b>	<b>40</b>	<b>47</b>	<b>85%</b>
<b>Total</b>	<b>Total Streetlights</b>		<b>794</b>	<b>\$23,118</b>	<b>40</b>	<b>1107</b>	<b>3.6%</b>
<b>Grand Total</b>							
<b>Grand Total</b>	<b>Initiatives by Year</b>	2008	2,106	\$36,668	107		2.0%
		2009	640	\$17,335	34		0.7%
		2010	5,543	\$139,593	284		5.4%
	<b>Initiatives To-date</b>		<b>8,289</b>	<b>\$193,597</b>	<b>426</b>	<b>5,283</b>	<b>8.1%</b>
	Projects in 2010	2011	4,035	\$82,607	234		4.4%
	<b>Total Projects thru 2010</b>		<b>12,324</b>	<b>\$276,204</b>	<b>660</b>	<b>5,283</b>	<b>12.5%</b>