



**REACHING MILESTONE 5:**

Monitoring and Reporting Guidelines



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PCP Milestone Five – Monitoring and Reporting Guidelines

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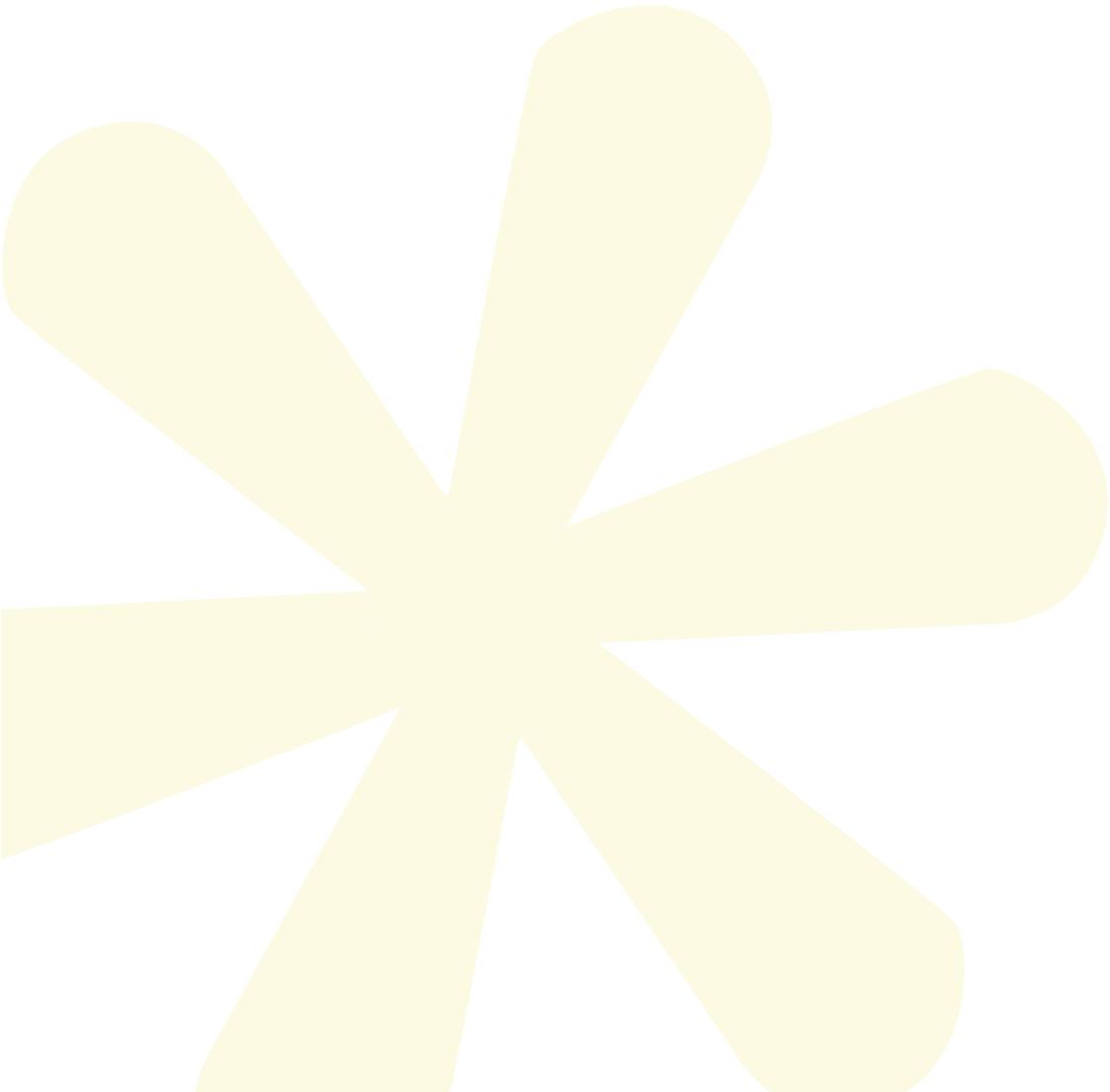
Federation of Canadian Municipalities

24 Clarence Street

Ottawa, Ontario K1N 5P3

[www.fcm.ca/pcp](http://www.fcm.ca/pcp)





Milestone Five provides municipalities with the opportunity to assess progress towards their set emission reduction goals (Milestone Two) and to reassess the strategic direction of their local action plan (Milestone Three). The process also provides an opportunity to highlight achievements, assess best practices, and provide direction for greenhouse gas (GHG) mitigation actions in the future.

There are three main criteria that PCP members must demonstrate before Milestone Five recognition is issued. These criteria include: completing an updated GHG emissions inventory, documenting the results achieved by notable projects and initiatives, and describing how stakeholders and decision makers have been engaged throughout the Milestone process.

# 1. UPDATE THE GHG EMISSIONS INVENTORY



To fully understand whether or not the municipality is moving towards its corporate and community emission reduction targets, it is necessary to complete an updated emissions inventory to compare and assess performance relative to the municipality's baseline (Milestone One).

PCP recommends that this process be undertaken every three to five years, if possible, and at least once between the municipality's baseline and target years. Conducting regular re-inventories can help to identify important trends and factors that influence annual emission levels (e.g. price of energy, weather, community developments, etc.), and will also help to ensure there is adequate time to assess progress and refine the local action plan should additional actions or initiatives be required.

## Conducting GHG Emissions Inventories on a Regular Basis



Several PCP municipalities have established internal processes to update their corporate emissions inventories on an annual basis, and although less common, some have also begun the process of inventorying com-

munity emissions annually as well. Updating a corporate emissions inventory is generally more time-consuming and resource-intensive than conducting a community-wide re-inventory, as it requires compiling energy consumption and other activity data from multiple corporate accounts. That being said, corporate emissions inventories generally do not require use of sensitive information from local energy providers, since the municipality is the owner of its operations and facilities and can reference existing billing records.

In contrast, conducting regular community emissions inventories generally does not involve as detailed or numerous data inputs, but often requires good relations and/or data-sharing agreements with local energy utilities in order to obtain accurate and reliable energy consumption data for the community. Engaging local energy providers in the climate action planning process and communicating the municipality's intentions with respect to community energy consumption data can help to assuage utility concerns surrounding privacy and confidentiality, and may lead to a better data-sharing arrangement over the medium to long term.

Though not a requirement of the PCP program, inventorying corporate or community GHG emissions on a regular basis has several advantages. Adding multiple data points, or inventories, to a series provides a more accurate representation of corporate and community emission trends over time, and can help to reveal the impact that external factors, such as changing weather patterns, electricity supply or energy prices, have on the generation of GHG emissions at the local level. In the same vein, a more robust data series reduces the likelihood of having to rely on a single data point that is not representative of the general trend—for example, if the updated GHG inventory is undertaken for a year that was abnormally hot or cold. As noted above, conducting regular emissions inventories also enables municipalities to more closely monitor their progress towards emission reduction goals and targets, and in so doing, allows for greater flexibility should a local action plan need to be modified or supplemented with additional emission reduction initiatives.

# Ensuring Methodological Consistency Between Inventory Years



When conducting an updated corporate or community emissions inventory, it is important to ensure that inventory methodologies (e.g. data sources, accounting and quantification methods, etc.) are

consistent and comparable to those used in the baseline emissions inventory. GHG emissions accounting is an evolving field that tends to operate according to the principle of continuous improvement: as access to data and quantification methodologies improve over time, GHG inventory practices and guidelines are often updated or revised to encourage greater accuracy and methodological rigour. Prior to developing an updated emissions inventory, municipalities should therefore review the data sources and methods used to compile the original inventory baseline (see Figure 1). If the original inventory was developed following best practices, and the baseline methodologies are deemed relatively accurate and replicable, these methods can be applied to develop the updated emissions inventory. If, on the other hand, the inventory baseline uses methods that are out of date or that cannot be easily reproduced, the municipality should consider updating the inventory baseline to enable more accurate comparisons between inventory years.

Common issues and challenges encountered by PCP members in the past include:

- The baseline emissions inventory does not explain how the original inventory data was obtained or converted to GHG emissions (unknown data sources and quantification approaches);
- The baseline emissions inventory uses data or assumptions from a source that is no longer available (e.g. Canadian Vehicle Survey, household waste generation or composition study, statistical reports, etc.); or

- The baseline emissions inventory contains partial or missing data (e.g. corporate inventory does not account for all municipal vehicles or facilities, GHG emissions from the solid waste sector were not calculated, etc.).

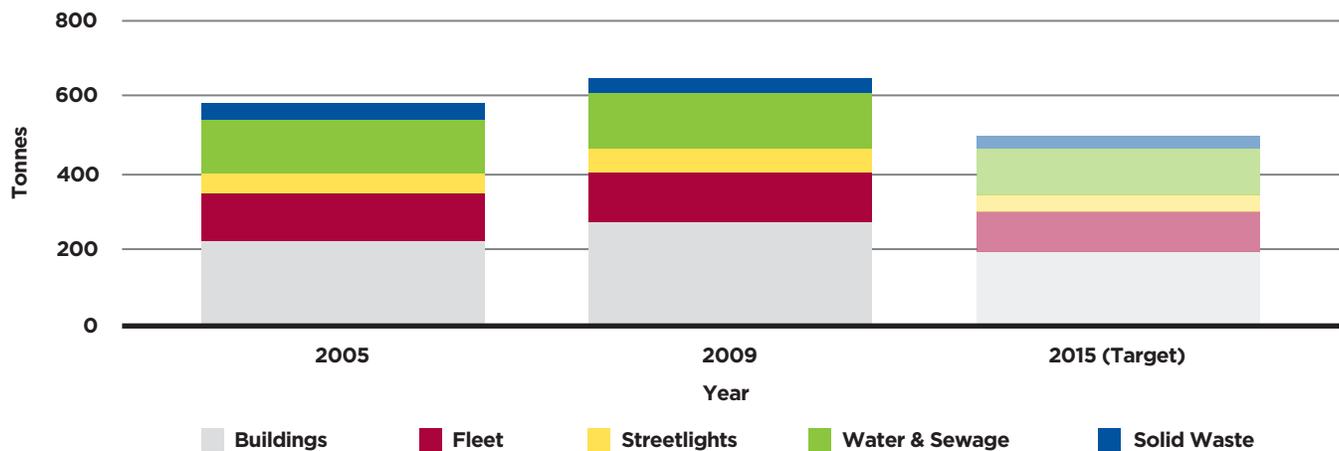
In these cases, the re-inventory process should be used as an opportunity to review and update the municipality's GHG inventorying practices. Maintaining consistency between inventory methodologies is paramount to ensuring that any observable changes in annual emissions levels are the results of changes "on the ground" (e.g. behavioural change, energy conservation and demand management initiatives, etc.) and not due to methodological discrepancies between inventory years.

In some cases, it may not be possible or practical to maintain absolute consistency between inventory years. For example, if real consumption data used to develop a baseline emissions inventory were to become unavailable for subsequent inventories (e.g. due to a change in a utility's data sharing policy), the municipality may decide to use an activity estimate for the updated inventory until more accurate consumption data can be obtained. Revising the inventory baseline would not be recommended in this particular case as it would result in a less accurate inventory baseline. In cases where methodological discrepancies between inventories cannot be resolved, this information should be outlined in the updated inventory report along with an assessment on the degree to which the change in methodology will impact overall inventory results.

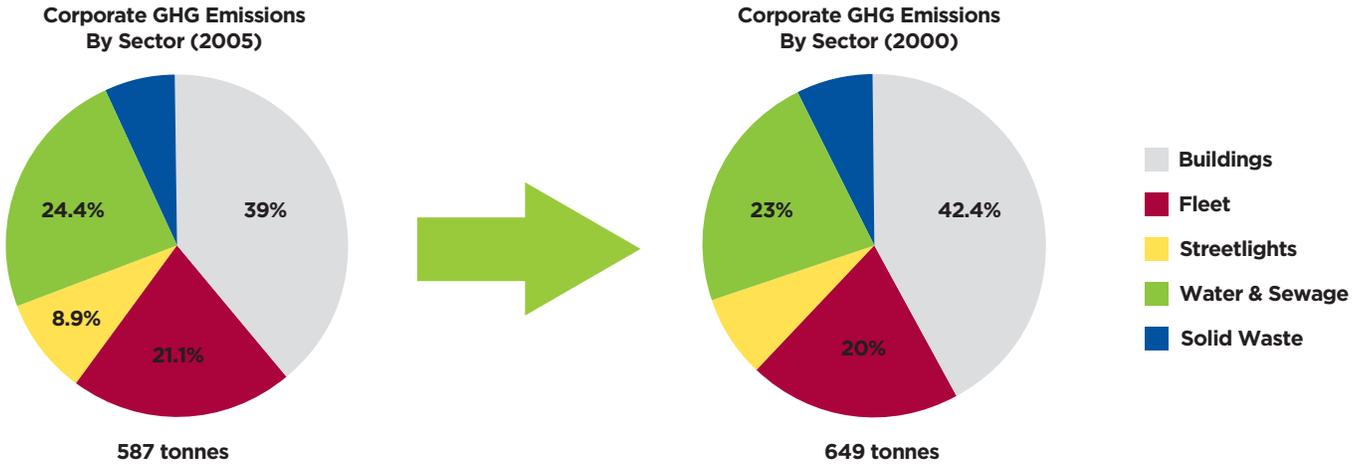
**FIGURE 1:  
SAMPLE REVIEW OF BASELINE COMMUNITY INVENTORY METHODOLOGIES AND DATA SOURCES**

Activity Sector	Data Source	Notes
<b>Residential Energy Consumption</b>	Electricity: Real consumption data obtained from Local Electricity Distribution Co. Natural Gas: Real consumption data obtained from Natural Gas Distribution Co.	GHG emissions calculated using provincial emission factors outlined in Environment Canada's National Inventory Report
<b>ICI Energy Consumption</b>	Fuel Oil/Propane: Estimated using electricity consumption rates and provincial energy consumption breakdown outlined in Natural Resources Canada's Comprehensive Energy Use Database	
<b>Transportation</b>	Retail fuel sales data for gasoline and diesel obtained from Kent Marketing Services	GHG emissions calculated using emission factors for light-duty gasoline and diesel vehicles (Tier 1 controls) outlined in Environment Canada's National Inventory Report
<b>Solid Waste</b>	Historic community waste tonnages obtained from municipal Waste Management Division based on scale records at community landfill	GHG emissions calculated using Scholl-Canyon/IPCC first order decay methodology (Waste-in-Place)

**FIGURE 2:  
GRAPHIC COMPARISON OF CORPORATE GHG EMISSIONS INVENTORIES RELATIVE TO TARGET**



**FIGURE 3:  
UPDATED SUMMARY OF CORPORATE GHG EMISSIONS BY SECTOR**



Sector	Corporate GHG Emissions (tonnes CO <sub>2</sub> e)		Change Relative to Baseline (2005)
	2005	2009	
Buildings	229	275	+20%
Fleet Vehicles	124	130	+5%
Streetlights	52	54	+4%
Water & Sewage	143	149	+4%
Solid Waste	39	41	+5%
<b>Total</b>	<b>587</b>	<b>649</b>	<b>+10.5%</b>

In the above example, the municipality's corporate GHG emissions have increased in every sector relative to the baseline, culminating in an overall 10.5 per cent increase in corporate GHG emissions.

The municipality may need to explore additional emission reduction opportunities in order to achieve its 2015 reduction target.



## 2. DOCUMENT RESULTS ACHIEVED BY NOTABLE PROJECTS AND INITIATIVES



The second requirement for Milestone Five recognition is to document results achieved by any notable projects or initiatives implemented through the local action planning process.

Projects can be monitored and evaluated using a variety of metrics; however, PCP strongly encourages members to include the following when reporting on specific projects and initiatives:

- Description of project;
- Cost of implementation (money invested);
- Project partners or supporting organizations;
- Environmental results (e.g. annual energy savings, waste diverted, increase in active transportation, etc.);
- Social and/or economic co-benefits;
- Annual cost savings (where applicable); and
- GHG reduction (where quantifiable);

Although it can be time-consuming to monitor and collect this type of information at the project level, doing so will help the municipality determine whether projects and initiatives are performing as intended, and may help to inform future local action planning efforts by revealing notable or cost-effective initiatives. Reporting on the success of particular projects and initiatives also enhances the transparency of the local action planning process, and provides municipalities with an opportunity to share their achievements with corporate and community stakeholders.

### Quantifying Emission Reductions at the Project Level



Though similar in nature to the GHG inventory process, measuring emission reductions at the project level is a separate exercise that can present municipalities with unique reporting

challenges. Prior to assessing the benefits of a particular project or initiative, the municipality must first establish a project baseline or business-as-usual reference case that will form the basis for comparison. For example, if a municipality is attempting to assess the benefits associated with a facility energy retrofit, it will first need to determine the amount of energy consumed by that facility prior to the energy retrofit. Once a performance baseline has been established, the municipality can then compare energy performance at the facility following the retrofit to determine the annual energy savings achieved as a result of the project. In some cases, the project baseline will be an actual point in time involving real performance metrics, whereas in other cases, the municipality will need to establish a theoretical business-as-usual scenario that estimates what would have occurred had specific environmental features not been incorporated into the project. The latter category is most commonly applied to new developments, such as the construction of a high-performance new facility or the use of district energy for a new residential subdivision, where an actual project baseline does not exist. In these cases, environmental benefits are typically

assessed by comparing the project’s environmental impact to what would likely have occurred under a business-as-usual scenario (e.g. a new facility built to current building code, a residential subdivision where heat is generated individually in each home).

GHG quantification at the project level is a valuable exercise for highlighting notable projects and their contribution toward local emission reduction

goals and targets. In some cases, however, it may not be possible or practical to assess projects in terms of the quantity of GHG emissions reduced. In this context, it can be helpful to distinguish between “quantitative” projects that result in a direct and measurable emissions reduction and “qualitative” or “unquantifiable” projects where GHG measurement is not applicable or prohibitively difficult to undertake. Examples for each of these categories are provided below.

### SAMPLE QUANTITATIVE PROJECTS:

Quantitative Project 1:	LED Streetlight Retrofit
<b>Description</b>	Replaced 4,000 high-pressure sodium (HPS) streetlights with energy-efficient LED fixtures
<b>GHG Quantification (Approach 1)</b>	<p>Determine annual electricity consumption for the lighting systems prior to the retrofit; compare with electricity consumption post-retrofit to identify annual electricity savings attributable to the project. Convert electricity savings to an annual GHG emission reduction using the provincial grid-intensity (emission factor) for the year the project was undertaken.</p> <p>Baseline performance: 4,337,542 kWh electricity consumed per year</p> <p>Project performance: 907,534 kWh electricity consumed per year</p> <p>Annual electricity savings attributable to project: 4,337,542 kWh - 907,534 kWh = 3,430,008 kWh</p> <p>GHG Reduction: 3,430,008 kWh * 0.00013 tonnes CO<sub>2</sub>e/kWh = 446 tonnes per year</p>
<b>GHG Quantification (Approach 2)</b>	<p>If actual electricity consumption data is unavailable, annual electricity savings attributable to the project can be estimated based on installed wattage and average daily operating hours of the lighting systems.</p> <p>Baseline performance: 4,000 HPS streetlights @ 250 W per fixture = 1,000,000 W ÷ 1,000 W/kW = 1,000 kW installed wattage * 11 hours operating time per day * 365 days per year = 4,015,000 kWh electricity consumed annually</p> <p>Project performance: 4,000 LED streetlights @ 56 W per fixture = 224,000 W ÷ 1,000 W/kW = 224 kW installed wattage * 11 hours operating time per day * 365 days per year = 899,360 kWh electricity consumed annually</p> <p>Annual electricity savings attributable to project: 4,015,000 kWh - 899,360 kWh = 3,115,640 kWh</p> <p>GHG Reduction: 3,115,640 kWh * 0.00013 tonnes CO<sub>2</sub>e/kWh = 405 tonnes per year</p>
Quantitative Project 2:	Use of Biodiesel for Municipal Fleet Vehicles
<b>Description</b>	Incorporated use of B20 biodiesel as an alternative fuel source for municipal fleet vehicles
<b>GHG Quantification</b>	<p>Determine quantity of biodiesel used annually; multiply total biodiesel fuel consumption by emission factor for standard petro-diesel and then by emission factor for B20 biodiesel blend. The difference in GHG emissions is the reduction attributable to the project.</p> <p>Baseline reference case: 165,700 L petro-diesel consumed per year * 0.002733 tonnes CO<sub>2</sub>e/L = 453 tonnes CO<sub>2</sub>e generated per year</p> <p>Project performance: 165,700 L B20 biodiesel consumed per year * 0.002200 tonnes CO<sub>2</sub>e/L = 365 tonnes CO<sub>2</sub>e generated per year</p> <p>GHG Reduction: 453 tonnes - 365 tonnes = 88 tonnes per year</p>

### SAMPLE QUALITATIVE PROJECTS:

<b>Qualitative Project 1:</b>	<b>Keep Cool! Climate Change Theatre for Elementary Students</b>
<b>Description</b>	Organized and supported the delivery of two climate change themed plays for elementary school students in the community
<b>Results</b>	The plays were well-received and supported by the local school district. They were attended by 13 elementary school classrooms, representing approximately 325 students. Following the play, students were given an opportunity to make pledges to reduce energy consumption and GHG emissions at home and in their activities in the community.

<b>Qualitative Project 2:</b>	<b>Compost Awareness Week</b>
<b>Description</b>	The City partnered with the local zoo to offer a week-long open house event to educate residents and promote the benefits of backyard composting.
<b>Results</b>	The open house attracted 172 visitors over the course of the week. Participants had an opportunity to learn about the different types of composting (e.g. backyard composting, vermicomposting, etc.), and were able to purchase a backyard composting unit at a discounted rate. In total, 55 composting units were sold.

### SAMPLE UNQUANTIFIABLE PROJECT:

<b>Unquantifiable Project:</b>	<b>Bicycle Parking Zoning By-law Amendment</b>
<b>Description</b>	As a supplement to the Zoning and Development Bylaw's Parking and Loading Standards for motorized vehicles, the City introduced a Bicycle Parking Zoning Bylaw Amendment, which creates minimum standards for short term bicycle parking, secure bicycle parking and accessory end destination facilities for new construction in the City.
<b>Rationale</b>	<p>Provision of accessible and secure bicycle parking facilities supports the City's goals to reduce single-occupancy vehicle (SOV) usage and encourage mode shifting to active forms of transportation, such as cycling. As an incentive, the new bylaw will support and contribute indirectly toward GHG emission reductions from the transportation sector in the community.</p> <p>GHG reductions attributable to this particular initiative are likely unquantifiable as the municipality would first need to establish causality—that the provision of minimum bicycle parking facilities in new developments were a primary factor in changing resident commuting behaviour. Undertaking such an assessment would likely require a comprehensive survey of resident commuting behaviour, which is neither feasible nor practical for this particular initiative.</p>

## Tracking Measures on an Ongoing Basis



A good practice used by several PCP municipalities is to develop an internal project monitoring framework to track the status of specific projects and initiatives as they are implemented. The most common format for

this type of project monitoring is to develop a simple spreadsheet using Microsoft Excel. In

many cases, these spreadsheets will form the basis of a municipality's Milestone Four (Implementation) submission as they provide an itemized overview of specific actions outlined in the municipality's local action plan (LAP) along with their implementation status and any deviations from the original LAP. As noted above, projects can be monitored and evaluated using a variety of metrics; PCP recommends including the following as part of any project monitoring framework: name of project, year implemented, project description, implementation cost, external funding sources, environmental results and cost savings (where applicable), and GHG reduction (where quantifiable). A sample project monitoring framework is provided in the figure below.

**FIGURE 4:  
SAMPLE PROJECT MONITORING FRAMEWORK**

Community Initiatives							
Measure Name	Year	Sector	Measure Description	Cost	Results	Annual Cost Savings	GHG Reduction (tonnes CO <sub>2</sub> e/yr)
<b>Anti-Idling Bylaw and Campaign</b>	2009	Transp.	Introduced an anti-idling bylaw and public awareness campaign to reduce average idling times from 7 mins to 3 mins per day.	\$45,000	Estimated to have reduced annual consumption of gasoline by 1,300,000 L	N/A	3,170
<b>Community Bike Share Program</b>	2008	Transp.	Implemented a community bicycle sharing pilot program with 100 bicycles available at 10 different stations.	\$125,000	2,000 L in annual gasoline savings as a result of avoided SOV trips	N/A	5
<b>Hybrid Taxis</b>	2008	Transp.	Developed an incentive program to shift taxis operating within the community to hybrid models.	\$980,000	Conversion of 250 taxi vehicles has resulted in annual gasoline savings of approx. 980,000 L	N/A (annual fuel savings accrue to taxi vehicle operators)	2,260
<b>Residential Solar Hot Water Initiative</b>	2007	Res.	Developed an innovative financing and delivery mechanism that has allowed the municipality to provide turn-key installations for up to 1,000 solar water heating systems to homeowners.	\$8.3 M	Over 300 assessments have been completed and more than 70 homeowners have accepted offers for solar water heating systems as part of the program.	N/A	2,000 (anticipated upon program completion)

Community LAP Implementation Summary				
Sector	No. of Measures	Measures in Progress	Measures Completed	Estimated GHG Reductions (tonnes CO <sub>2</sub> e/yr)
<b>Residential</b>	3	1	2	6,670
<b>ICI</b>	13	8	2	1,580
<b>Transp.</b>	7	5	2	5,590
<b>Solid Waste</b>	2	1	1	6,880
<b>Total</b>	<b>25</b>	<b>15</b>	<b>7</b>	<b>20,720</b>

### 3. REPORT ON STAKEHOLDER ENGAGEMENT AND PUBLIC PARTICIPATION



As with any local initiative, it is important to engage stakeholders and decision makers throughout the planning and implementation process.

The third requirement for Milestone Five recognition is therefore to report on how corporate and community stakeholders have been engaged and have had an opportunity to participate in the PCP Milestone process. PCP members often use a variety of public engagement practices, ranging from public awareness campaigns and newspaper advertisements promoting the municipality's climate action plans to in-person workshops and community open houses that solicit input from residents, not-for-profit groups and members of the business community. Increasingly, many municipalities are also using social media and

interactive climate action websites as a means to promote certain initiatives or to poll community members on their ideas for local GHG reduction projects (e.g. crowd-sourcing or wiki sites).

In cases where the municipality established specific task forces or a project steering committee to guide the climate action planning process, the structure and members of these committees should be outlined clearly within the Milestone Five report. Supporting documents, such as meeting minutes or workshop summaries, can also be included as separate annexes where relevant.

### 4. SUBMIT YOUR DOCUMENTATION OR MILESTONE FIVE REPORT



As a voluntary program, PCP accepts Milestone Five submissions in a variety of formats.

In some cases, municipal governments will have already prepared climate action updates or progress reports for internal reporting purposes (e.g. council updates, project monitoring spreadsheets, PowerPoint presentations, etc.), which can often be leveraged or used to document achievement of the Milestone Five criteria outlined above. However, to ensure a timely and successful review, PCP strongly encourages municipalities seeking Milestone Five recognition to prepare a structured report that clearly outlines how the municipality has worked with corporate and community

stakeholders to plan and implement actions, and that documents progress toward corporate or community emission reduction goals. Although Milestone Five has a strong focus on measurement and performance, it is also intended to provide municipalities with an opportunity to share their experience and to tell a larger story—one that highlights the role of the local government in responding to the challenges of climate change, and that demonstrates how the municipality has worked with community partners to reduce GHG emissions generated at the local level.

## 5. EXAMPLES OF MILESTONE FIVE REPORTS



- Region of Waterloo's "Progress Report/Revised Target: Corporate Greenhouse Gas Action Plan" (October 2013).
- City of Surrey's "EnergyShift Update: Progress Report on the Implementation of the Corporate Emissions Action Plan" (March 2012).

- City of Guelph's "Annual Community and Corporate Energy Activity Report" (June 2013).

To download a copy of these and other PCP member submissions, visit the Members section of the PCP website at [www.fcm.ca/pcp](http://www.fcm.ca/pcp).



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# MEMBERSHIP IS ONLY FIVE STEPS AWAY:

- 1** After reviewing this document, contact the secretariat for more details, and to ask questions.
- 2** Download a sample council resolution at [www.fcm.ca/pcp](http://www.fcm.ca/pcp) or contact the PCP secretariat.
- 3** Appoint one staff member and one elected official to be your main contacts with PCP.
- 4** Fax, mail or e-mail your adopted council resolution, along with the staff member's and elected official's contact information, to the PCP secretariat. (See contact information below.)
- 5** The PCP secretariat will send you a PCP information package, including a list of resources and the PCP Milestone Framework. Apply to GMF for a grant to cover up to 50% of the costs of completing milestones 1, 2 and 3.

## CONTACT PCP

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PCP is a partnership between the Federation of Canadian Municipalities and ICLEI - Local Governments for Sustainability. It is the Canadian component of ICLEI's international Cities for Climate Protection program.

