

Partners for Climate Protection

National Measures Report 2012

Five Year Edition

Demonstrating Results:
Municipal Initiatives to
Reduce Greenhouse
Gas Emissions

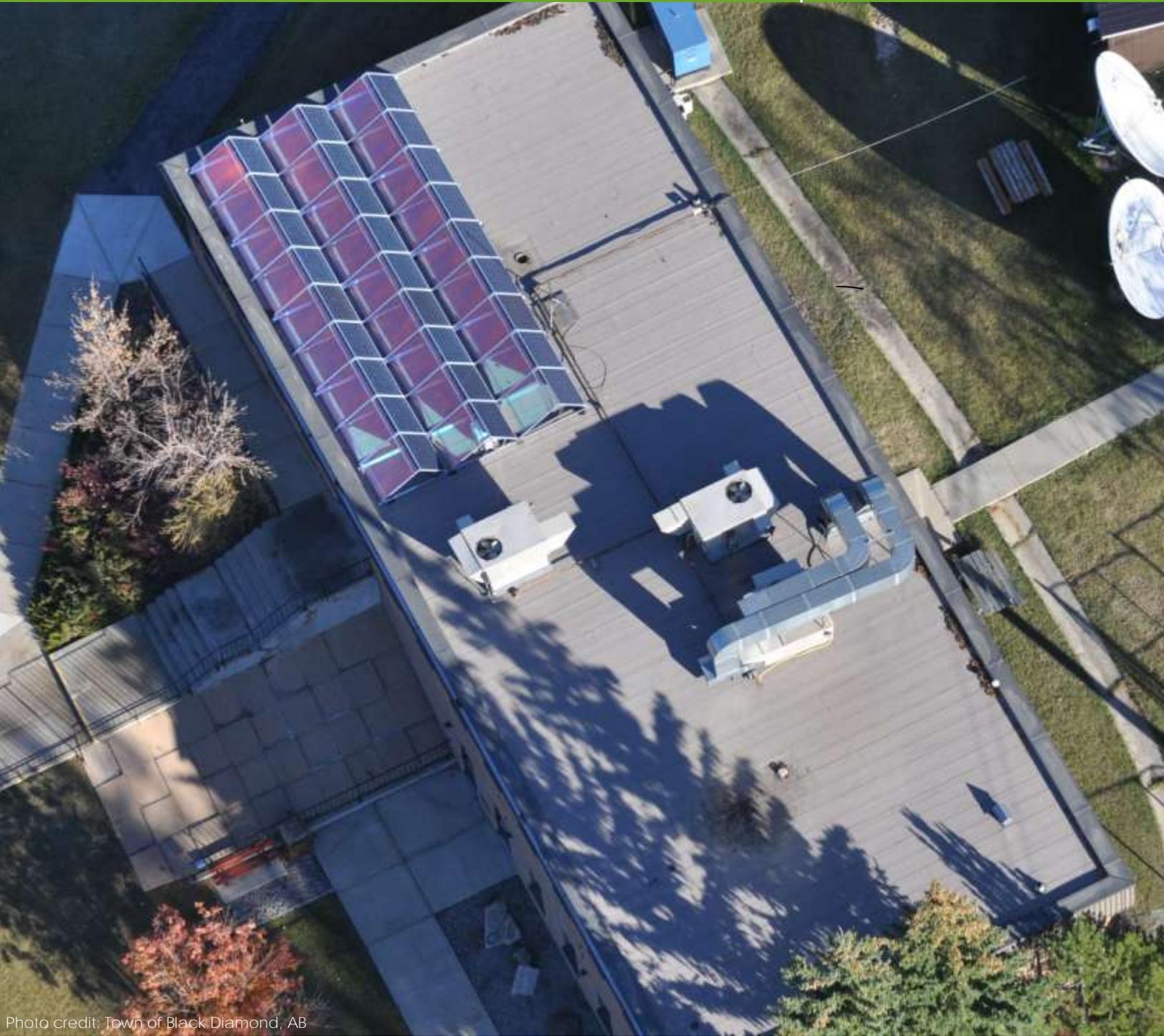


Photo credit: Town of Black Diamond, AB



FEDERATION
OF CANADIAN
MUNICIPALITIES

FÉDÉRATION
CANADIENNE DES
MUNICIPALITÉS



Local
Governments
for Sustainability



About PCP

The Partners for Climate Protection (PCP) program is a network of Canadian municipal governments that have committed to reducing greenhouse gases and acting on climate change. PCP is the Canadian component of ICLEI's Cities for Climate Protection (CCP) network, which involves more than 1,000 communities worldwide. PCP is a partnership between the Federation of Canadian Municipalities (FCM) and ICLEI—Local Governments for Sustainability.

Cover Photo: A 5 kW solar system that is installed on the Town of Black Diamond's Office and tied to the grid.



Photo Credit: City of Ottawa, ON

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INTRODUCTION

The effects of climate change are evident across the country. Impacts include increases in temperature twice the rate of the global average, increased precipitation, and more extreme weather days, as well as decreases in arctic sea ice, snow-cover duration, and glacial melt. **With control over approximately 44 per cent of Canada's greenhouse gas (GHG) emissions,** municipalities are taking the lead and acting locally to mitigate these changes through the integration of smart urban planning, regulations, outreach, and leadership in energy efficiency and renewable energy measures.

In 2008, the Federation of Canadian Municipalities (FCM) and ICLEI–Local Governments for Sustainability began surveying members of the Partners for Climate Protection (PCP) program to determine the types of GHG-reduction initiatives being undertaken by local governments and the cumulative impact of these initiatives nationwide. A National PCP Measures Database was created to track and record key metrics at the project level, including details on project costs, energy and cost savings, and the corresponding GHG impacts. After five years of consecutive data collection, the National PCP Measures database now contains more than 800 individual projects undertaken by PCP municipalities. Together, these initiatives represent more than \$2.3 billion of investments into local mitigation activities and have led to annual GHG reductions totalling more than 1.8 million tonnes. Details about PCP measures reporting methodology and limitations are available on the National Measures Report website: <http://bit.ly/AboutMeasuresReporting>



The **Town of Conception Bay South's T'Railway will stretch the length of the Town** providing vital linkages for pedestrians and bicyclists.

In recognition of five years of data collection and reporting, the *2012 National Measures Report* not only provides details on the projects collected in 2012, but also presents an overview of all the measures that PCP members have reported to date. This special five-year edition provides an in-depth look at the actions and strategies undertaken by Canadian local governments to reduce GHG emissions and mitigate dangerous global climate change. It is intended to serve as a resource that not only recognizes and promotes local climate action, but that can guide and support local governments in identifying and implementing best practices in energy and GHG management.

Highlights

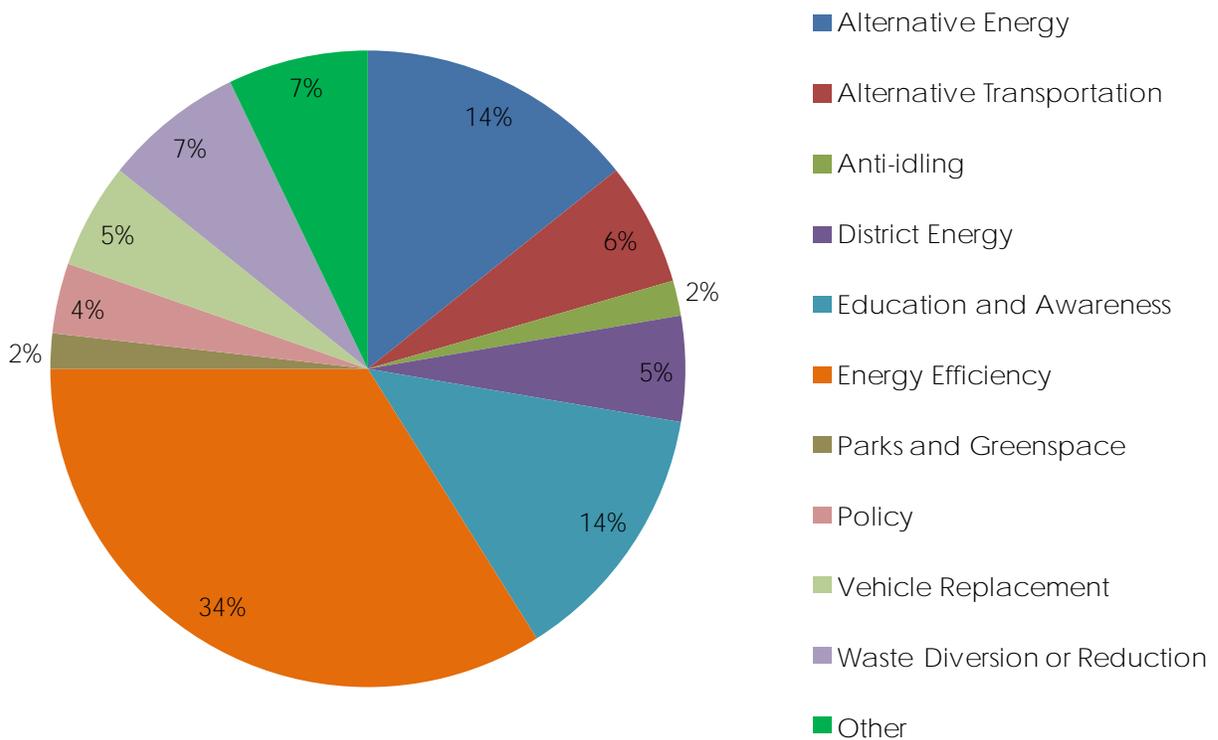
- In 2012, a total of 30 PCP members reported undertaking 112 measures to reduce GHG emissions. These projects represent nearly \$800 million of investments into local mitigation activities, and have resulted in 241,285 tonnes in annual GHG reductions as well as \$1.4 million in annual cost savings.
- Since 2008, PCP members have reported more than 800 individual actions to reduce GHG emissions. These actions represent more than \$2.3 billion in investments and have led to annual GHG reductions totalling 1.8 million tonnes.
- Energy efficiency and alternative energy projects were the most popular types of initiatives reported for both the 2012 and 2008-2012 reporting periods.
- Most of the reported measures in 2012 targeted GHG emissions attributable to local government operations, such as energy consumption in corporate facilities. However, projects targeting emissions from the community at large (e.g. residential, commercial sectors, etc.) resulted in the largest reductions in GHG emissions.
- Two of the projects reported in 2012 figure among the top 10 measures with the highest GHG reductions reported in the last five years. These two projects are Vancouver's Low Carbon District Energy Strategy and Laval's GHG Offset Program (see Top 10 GHG Reductions).
- As of December 2012, the National PCP Measures Database represents projects and initiatives undertaken by 80 local and regional municipalities across Canada, with municipalities in Ontario and British Columbia reporting the most measures to date.

GENERAL FINDINGS AND TRENDS FROM 2012

Projects Reported

A total of 112 projects were added to the National PCP Measures Database in 2012. As in previous rounds of measures reporting, these projects target a wide range of emissions-generating activities—from energy consumption at municipal buildings and facilities to tailpipe emissions from personal vehicles travelling within the community. Consistent with the general five-year trend (see Figure 5), energy efficiency and alternative energy projects were the first and second most popular types of projects implemented, although 2012 saw a slight increase in the share of alternative energy and district energy systems reported, which suggests there is growing interest and perhaps familiarity with these emerging technologies. Feed-in Tariff programs in Ontario and Nova Scotia, which provide standardized program rules, prices and contracts to renewable energy producers, may have also influenced the uptake of renewable energy technologies.

Figure 1: Percentage breakdown of measures by type (2012)



The Edmonton Composting Facility at the Edmonton Waste Management Centre uses organic waste collected from city households and biosolids (sewage sludge) as resources to create compost, a rich soil supplement.



Taken together, the initiatives reported in 2012 represent an investment of nearly \$800 million in mitigation activities. Their aggregate GHG reduction is roughly 241 thousand tonnes—equivalent to removing over 60,000 cars from the road!



Photo Credit: City of Edmonton, AB



Photo Credit: City of North Vancouver, BC

Corporate Initiatives

A local government's corporate operations involve managing a variety of municipal facilities, large fleets of vehicles, solid waste collection and disposal services, water and sewage systems, and traffic and street lighting in their communities. Taking action to reduce the large carbon footprint generated from these activities, municipalities across the country have carried out numerous activities.

Of the 112 measures collected in 2012, 63 per cent were projects targeting municipal operations. The tendency to report on corporate initiatives (as opposed to actions targeting community activities), is fairly well understood in the context of the PCP program. Put simply, municipalities exert a much greater influence over their own operations than they do in the community at large. As such, many prefer to focus on the corporate track of the PCP program before developing plans and policies targeting community-wide GHG emissions. Monitoring specific program achievements (e.g. energy savings) is also generally easier in the context of corporate initiatives because municipal staff can work with facility managers to access site- or project-specific data, such as utility invoices and billing records.

The majority of corporate initiatives reported in 2012 — at 66 per cent — were projects aimed at improving energy efficiency in municipal buildings. The projects ranged from the application of green construction practices in new facilities to upgrades to lighting, building envelope and HVAC-R systems. For example, the City of Laval recently retrofitted their City Hall building by implementing a number of energy efficiency measures such as decommissioning their natural gas-fired boiler, adjusting ventilation to better reflect operating hours, using a central command system for lighting, and controlling heating using electronic thermostats. These improvements have reduced GHG emissions associated with the building by 300 tonnes



The City of North Vancouver purchased a plug-in electric Chevrolet Volt for fleet use in an effort to reduce corporate GHG emissions.

annually—equivalent to heating 60 homes for a year! The project has also resulted in annual cost savings of approximately \$99,800, paying for itself in just five years.

The second most popular type of corporate initiatives reported by PCP members were actions targeting emissions from fleet vehicles. These 'green fleet' initiatives range from adopting preventative maintenance schedules and anti-idling measures to purchasing low-emissions vehicles, such as electric vehicles or fuel-efficient hybrid models. For example, the City of Vancouver recently added StopIdle technology to a select number of fleet engines to reduce idling. StopIdle measures both cabin temperature and battery voltage to maintain battery life, and can be combined with auxiliary-powered space heaters to maintain driver comfort and further reduce engine idle time. The program will be expanding to more departments and vehicles over the next few years and has already achieved annual cost savings of \$80,000 and annual GHG reductions of 1,000 tonnes!

Other notable corporate measures reported in 2012 were upgrades to streetlights and traffic signals as well as improvements to water and wastewater infrastructure. Taken together, corporate initiatives reported in 2012 have reduced annual GHG emissions by over 33,000 tonnes.

Figure 2: Percentage breakdown of corporate measures by sector (2012)

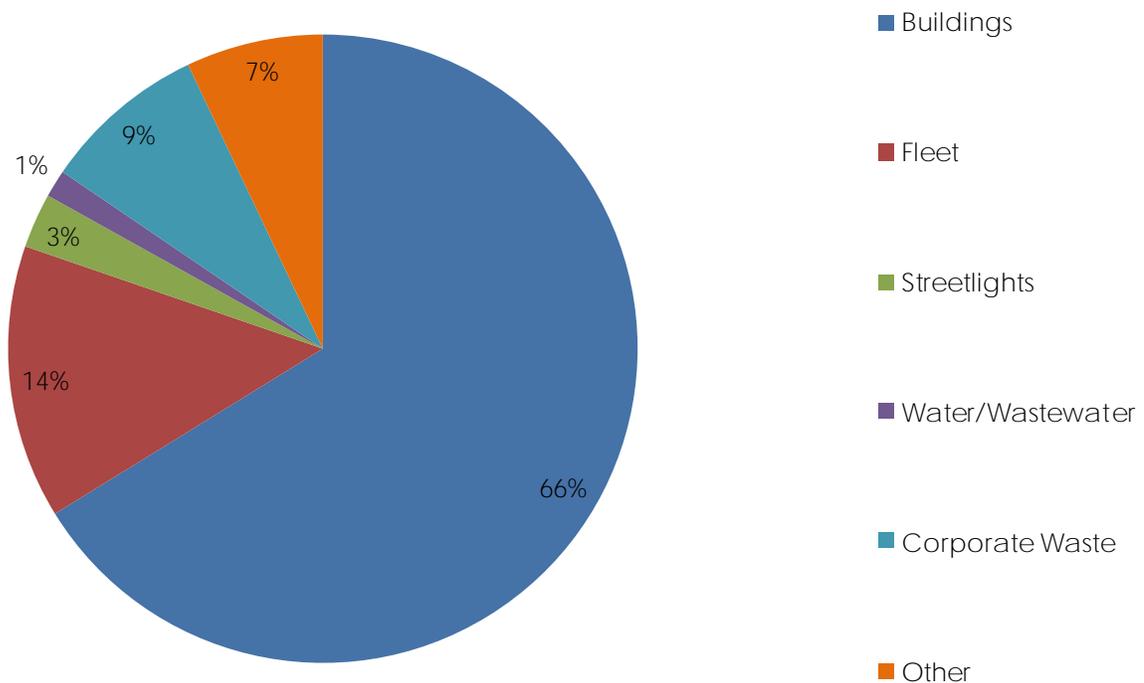




Photo credit: City of London, ON

Community Initiatives

Of the measures collected in 2012, 37 per cent were projects targeting emissions-generating activities within the community at large. These projects spanned a variety of community sectors, including residential dwellings, industrial, commercial and institutional (ICI) buildings, on-road transportation, and generation of community solid waste. Most of the community projects focused on general education and awareness-raising activities within the community, such as educational programs targeting students and youth, and climate-themed websites outlining how individuals can act to reduce their carbon footprint. The City of Whitehorse, for example, promotes the winterization of homes during one weekend every fall by working with home building centres to develop informative displays and packages, promotional programs, sales and discounts.

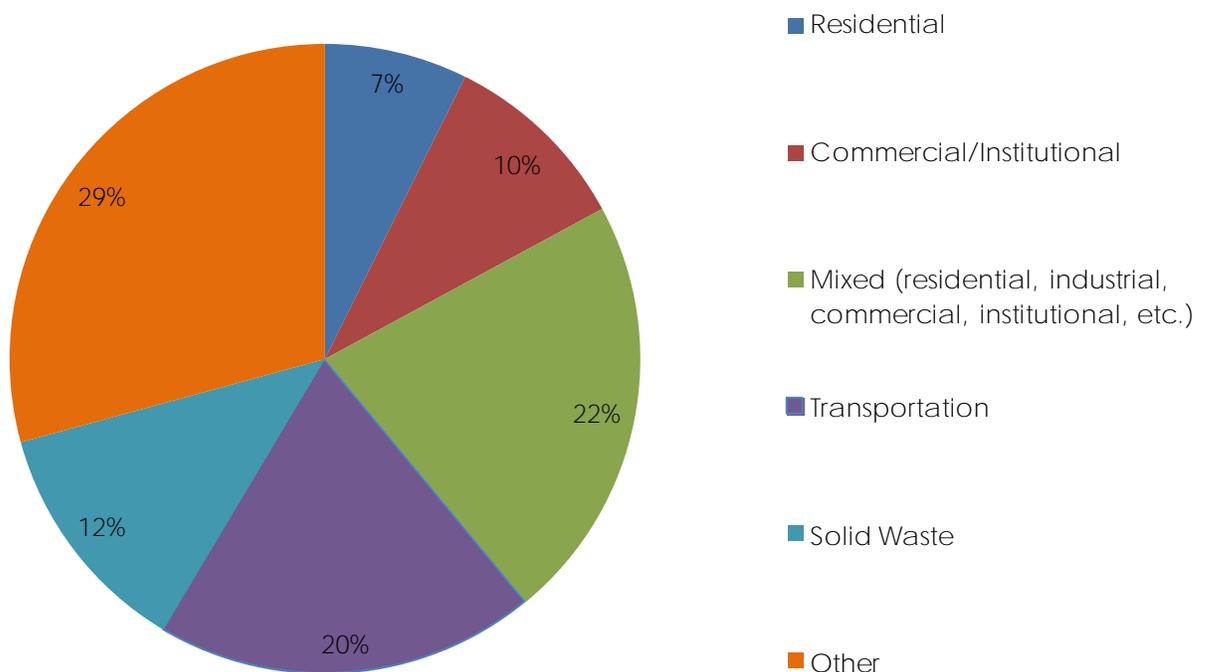
The second most popular type of measure reported in the community category was district energy projects. These are projects that link various community buildings to a centralized heat or cooling source. In 2004, for example, Revelstoke's Community Energy Corporation planned, designed and implemented a district energy system fueled by biomass from a local sawmill. The project consists of a 1.5 megawatt heating plant and approximately 2.5 km of buried super-insulated piping that delivers steam and heat to nearby buildings. Overall, this project reduces 3,211 tonnes of GHG emissions annually! Another district energy project reported in 2012 was the City of North Vancouver's Lonsdale Energy Corporation (LEC) district energy system expansion to Lower and Central Lonsdale. This project ensures that new developments around City Hall use high efficiency hydronic heat since a new city bylaw requires all new buildings to connect to LEC. This expansion connected three buildings, which resulted in 1533 gigajoules of natural gas savings each year and 77 tonnes of GHG emissions reduced annually.

The City of London's Stoney Creek Community Centre, YMCA and Library facility demonstrates LEED building principles and a design approach that maximizes building performance through sustainable measures.

Another type of project reported by PCP members in 2012 involved active transportation initiatives to encourage cycling and walking. For example, the City of Surrey initiated a Safe and Active School Program that aims to increase the number of students walking or cycling to school by making their routes safer. Specifically, the program involves reviewing traffic and pedestrian safety for public and independent elementary and secondary schools in Surrey. It also enables the city to work with schools each year to find even more ways to increase program uptake. Further, the city developed a Walking Plan and a Cycling Plan that sets out Surrey's vision for the expansion of walking and cycling respectively as safe and convenient transportation choices for citizens and visitors.

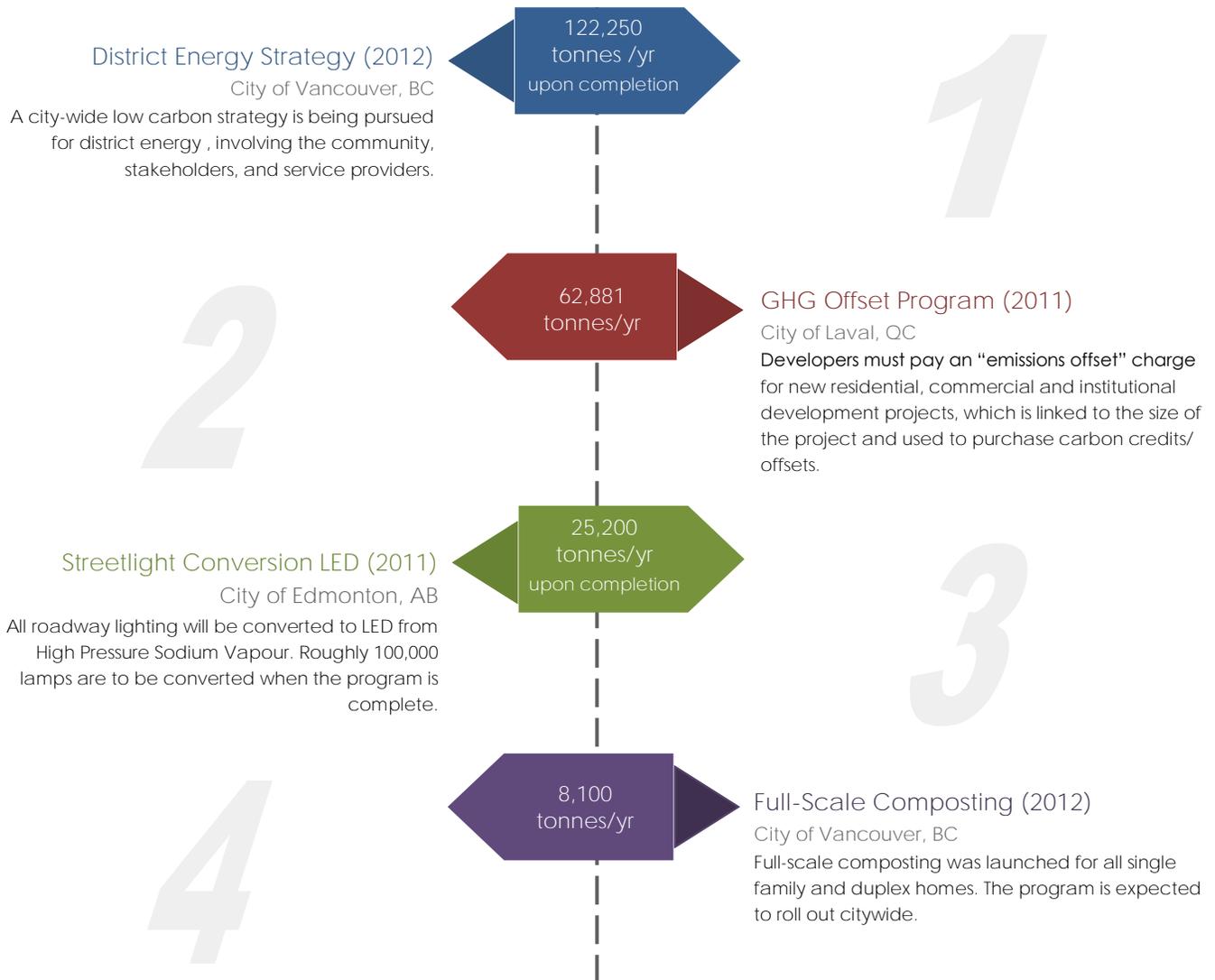
In total, the community projects reported in 2012 amount to 207,998 tonnes in annual GHG reductions, accounting for 86 per cent of the GHG reductions reported that year for both corporate and community-wide initiatives. These findings indicate that while corporate initiatives are more numerous in terms of actions reported, community-oriented initiatives have the potential to achieve much larger absolute emissions reductions given their scope and scale.

Figure 3: Percentage breakdown of community measures by sector (2012)



Top 10 GHG Reductions

Historically, the top measures with the highest reported GHG reductions have been energy efficiency retrofits in commercial and municipal buildings and landfill gas recovery and utilization projects. The top 10 GHG-reducing measures reported in 2012 are slightly more varied. Of note are Vancouver's Low Carbon District Energy Strategy and Laval's GHG Offset Program, which rank among the highest GHG-reducing measures reported to date.



In total, these 10 projects account for over 234,000 tonnes of CO₂e reduced per year!

Organic/Food Waste Collection (2011)
City of Surrey, BC
A new residential waste collection contract collects organic food waste. See the case study on pages 13-14 for more details.

5,750
tonnes/yr

5

3,211
tonnes/yr

Biomass Fired District Energy Project (2004)

City of Revelstoke, BC
The biomass fired district energy project consists of a 1.5 MW combustor in the central heating plant, distribution infrastructure including 2.5 km of buried piping, and energy transfer stations in the various facilities served within the community.

6

Expansion of the T'Railway (Ongoing)
Town of Conception Bay South, NL
The Town is currently working on a multi-phase T'Railway development project. Once completed, it would stretch the length of Conception Bay South, providing vital linkages within the Town for pedestrians and bicyclists.

2,881
tonnes/yr
upon completion

7

1,500
tonnes/yr

Higher Building Policy (2011)

City of Vancouver, BC
Council adopted the Higher Buildings Policy which requires architecture excellence and innovative green building design with a 40 to 50 per cent reduction in energy use, in exchange for additional building height.

8

Transit Building Retrofit (2011)
City of Saint John, NB
A comprehensive retrofit was applied to the City's Transit Building, which involved the installation of high efficiency lighting, heat recovery systems on all the air handling units, new boilers, an energy monitoring optimization system, and other features.

1,403
tonnes/yr

9

1,000
tonnes/yr

StopIdle Technology on Fleet (2010)

City of Vancouver, BC
StopIdle technology was added to a select number of fleet engines to reduce idling. It measures both cabin temperature and battery voltage to maintain battery life, and can be combined with auxiliary-powered space heaters to maintain driver comfort and further reduce engine idle time.

10

The Business Case

Climate protection activities can reduce costs, improve service delivery, create jobs and support local industries, all while protecting human health and the environment. Consequently, there is a strong, profit-based business case for investing in GHG emissions reduction—many activities generate energy and operational cost savings that exceed initial project costs and recover investment, creating a net benefit. These types of projects are ideal investments for local governments that want to meet their fiscal and legal responsibilities as well as protect the environment and quality of life of their citizens. The table below provides a few examples of cost-effective measures collected in 2012, and outlines the total project costs relative to savings in energy and GHG emissions.

PROJECT	COST	ANNUAL ENERGY SAVINGS	ANNUAL COST SAVINGS	GHG REDUCTION	PAYBACK (YEARS)
Installation of a wood pellet boiler that provides heat to the community arena, curling rink and pool facilities through a district heating system. (Yellowknife, NT)	\$529,000	296,000 L Heating oil	\$138,800	79 tonnes/yr	3.1
Lighting retrofit at public library. (Saint John, NB)	\$35,000	144,000 kWh Electricity	\$14,000	116 tonnes/yr	2.5
Mechanical systems at three civic arenas were retrofitted to use waste heat from the ice rink compressors to heat the buildings. (Saskatoon, SK)	\$417,000	108,000 m ³ Natural gas	\$32,400	198 tonnes/yr	12.9
An electric Chevrolet Volt purchased for fleet use. (North Vancouver, BC)	\$42,874	6,688 L Gasoline	\$8,293	16 tonnes/yr	5.2
Electronic entry of hourly employee timesheets initiated for payroll purposes. (Saskatoon, SK)	\$11,000	2.4 tonnes Paper	\$24,300	6 tonnes/yr	0.5
HVAC upgrade in the City Market building. (Saint John, NB)	\$15,000	31,416 m ³ Natural gas	\$25,000	60 tonnes/yr	0.6
Glycol fan cooling system installed to cool City's computer server room. (Yellowknife, NT)	\$69,000	1,070 L Heating oil & 36,829 kWh Electricity	\$8,650	15 tonnes/yr	8

Case Studies

City of Saint John: Municipal Energy Efficiency Program (MEEP)

Upon reviewing a comprehensive energy audit on corporate buildings and their related costs, the Environment Committee of the City of Saint John initiated the Municipal Energy Efficiency Program (MEEP) in 1996 to reduce the energy consumption of municipal operations. MEEP's mission is to promote, advise, develop and implement energy efficiency programs and initiatives on existing and new municipal infrastructures. It also aims to lessen the effects of energy use upon the environment and operating budget as well as showcase the city as a leader in sustainable energy management. MEEP's four main objectives are to: (1) reduce energy use in municipal operations; (2) advise on standards and policies; (3) raise energy awareness; and (4) support similar efforts in other municipalities, communities and businesses.

Some typical MEEP projects include upgrades to lighting and HVAC systems (heating, ventilation, and air conditioning), installation of Energy Management Control System (EMCS) tools that allow for remote energy monitoring of individual buildings, implementation of staff training and energy awareness programs, and performing energy audits and feasibility studies. Since the program's inception, energy retrofit projects have been implemented in approximately 90 corporate buildings and facilities. As of 2011, energy consumed by corporate buildings, streetlights, and water treatment facilities has been



Arena lighting retrofit. Photo credit: City of Saint John, NB

reduced by 16 per cent, resulting in 15 million kilowatt-hours in energy savings, over \$1.8 million in cost savings, and 6,300 tonnes of GHGs reduced annually! The program has not only been deeply entrenched in the municipal practices of the City of Saint John, but has also influenced energy conservation efforts within other public and private sector organizations. Accordingly, MEEP is recognized as a provincial and national best practice for its energy efficiency and conservation efforts as well as GHG emissions reductions.

Some municipal buildings and facilities retrofitted under MEEP, which were added to the PCP Measures database in 2012, include the Canada Games Aquatic Centre, local Police Headquarters, local arenas, waste and water pumping facilities, and community centres. Of note is the Saint John Transit Operation Centre, which is now 65 per cent more energy efficient than similar facilities due in part to energy efficiency retrofits and innovative sustainability features such as a solar wall system and a 100,000 litre underground water storage system that holds rainwater used for washing buses.

For more information about this project you can contact Samir Yammine, Energy Manager City of Saint John, New Brunswick, E: samir.yammine@saintjohn.ca, T: 506-648-4667.

City of Surrey: Sustainable Waste Management

On October 1st, 2012, the City of Surrey, British Columbia unveiled a holistic approach to sustainable waste management. Three interconnected measures were devised to close the loop on waste and aid in achieving a regionally mandated target of 70 per cent waste diversion by 2015.

As a first step, the city sourced a new waste collection provider with a requirement that its fleet be comprised exclusively of alternate fuel vehicles. By partnering with BFI Canada as its waste collection contractor, the city has taken sustainable waste management to new heights with their fleet of Compressed Natural Gas (CNG) waste collection trucks.

As a second and parallel step, the city developed and implemented its Rethink Waste Collection Program which aims to maximize the diversion of household organic waste while significantly reducing landfill-bound garbage. The Program requires residents to place their odorous kitchen and yard waste at curbside on a weekly basis while garbage and recyclables are collected every other week on an alternating basis.

The approach has already proven to be highly effective with respect to both environmental and economic sustainability. In the relative short time since its October 2012 debut, Surrey's Rethink Waste program has resulted in the city achieving its 70% waste diversion goal for residential customers, well ahead of the 2015 target. In addition, the CNG fleet used to carry out collection services emit 23 per cent less carbon emissions as well as 90 per cent less air particulates than traditional diesel trucks. This strategy further reduces the city's GHG emissions by 625 tonnes per year.

In an industry that is predominately and traditionally comprised of diesel trucks, the city of Surrey is one of the few Canadian municipalities to switch to CNG-fuelled vehicles, a move that has also reaped economic benefits. Due to the low cost of natural gas compared to diesel, and the switch to a cart-based collection system with an alternating service schedule, the city will realize up to \$3 million savings per year on its waste collection services.

The third and final step involves the construction of an organic waste biofuel facility in Surrey that will process the collected organic waste into a vehicle grade renewable natural gas (RNG). The RNG will then be used to fuel the CNG waste collection trucks, creating a net-zero carbon impact waste management system. Accordingly, the City will be initiating a call for market proposals to establish the estimated \$68 million dollar facility. To ensure a minimal impact to Surrey's taxpayers, the city's approach is a public-private-partnership model where the city's partner will be responsible to design, build, finance, operate and maintain the facility via a long-term agreement. As an added financial benefit, the Government of Canada has agreed to contribute up to \$16.9 million of the capital costs of the project through its P3 Canada fund.

The sum of these measures is aimed to create a cleaner city, placing Surrey at the global front line of sustainable organic waste diversion practices.

Arriving at this model was certainly not a simple task and involved a number of aligning factors to ensure its success. In Surrey's case, success was based on policy, planning, and the political will to take on measured risk.

From a policy perspective, two key documents were the catalysts to the planning process:

1. The Metro Vancouver Integrated Solid Waste Resource and Management Plan that requires 70% waste diversion by 2015, with organic waste identified as one of the principle waste streams that requires focus; and
2. The City of Surrey's own Sustainability Charter which was ratified by Surrey Council in 2008. This charter provided the overall strategy and direction to staff with respect to governing its operations in a manner that is sustainable from an environmental, economic and social perspective.

The planning process was extensive. It involved:

- a detailed and ongoing measure of the city's waste stream;
- exhaustive research of global best practice waste collect services including an investigation of the most mature alternative fuel technologies for waste collection fleets with a cost analysis for each service model and technology;
- consultation with a number of countries (primarily in Europe) where this same approach is more prevalent; and
- extensive market sounding discussions with technology providers.



Compressed Natural Gas collection trucks. Photo credit: City of Surrey, BC.

The above steps culminated in a detailed business case that analysed the economic viability of carrying out such a plan. The process also included a successful two-year pilot study along with a significant public consultation and education component geared towards determining the level of public acceptance for such a quantum change to the city's waste management practices.

Most important was the political support. In Surrey's case, Surrey Council was, and remains, highly supportive and engaged in ensuring not only that the project succeeds, but that the city demonstrates global leadership in evoking sustainable change.

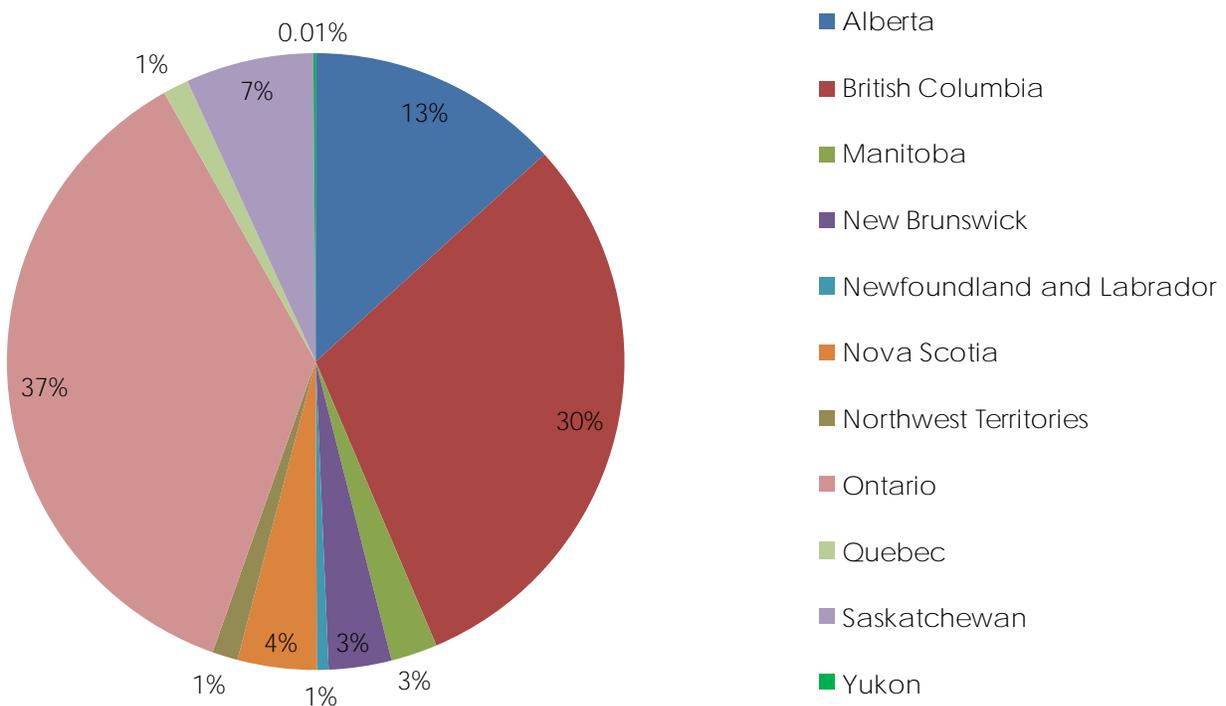
For more information about this project you can contact Rob Costanzo, Deputy Operations Manager Engineering, City of Surrey, British Columbia, E: RACostanzo@surrey.ca, T: 604-590-7287.

GENERAL FINDINGS AND TRENDS FROM 2008-2012

Member Reporting

Local and regional governments across Canada — from small rural communities to large urban centres — have reported measures over the last five years. In total, 80 different municipalities have participated in the PCP Measures Reporting Initiative, representing approximately 34 per cent of the PCP membership. Overall, most of the measures submitted to date have come from municipalities located in British Columbia and Ontario, with strong participation from municipalities in the Lower Mainland and Greater Toronto-Hamilton areas (see Figure 4). Not surprisingly, the number of measures reported per province corresponds closely to the number of municipalities per province that participate in reporting.

Figure 4: Percentage of measures submitted by Province and Territory (2008-2012)



In terms of GHG emissions, however, actions undertaken by municipalities in Ontario and Alberta have resulted in the largest absolute GHG reductions. Although municipalities in British Columbia have reported more than twice as many measures than municipalities in Alberta, these projects tend to result in lower GHG reductions due to the predominance of hydro electricity in British Columbia's electricity grid. Conversely, electricity savings achieved in Alberta tend to generate very large GHG reductions due to Alberta's strong reliance on carbon intensive coal-fired electricity. The top five municipalities with the highest GHG reductions over the five years of measures reporting are presented on the following page with some of their most notable projects.

MUNICIPALITY	TOTAL GHG REDUCTIONS REPORTED TO DATE	NOTABLE PROJECTS
City of Toronto, ON	477,352 tonnes/yr	<ul style="list-style-type: none"> ● The Better Buildings Partnership is a comprehensive city-wide program that works with building owners, managers and builders to ensure that buildings achieve high energy performance and low environmental impact. ● Deep Lake Water Cooling is an innovative system that uses water in Lake Ontario to air condition high-rise buildings in downtown Toronto.
City of Vancouver, BC	399,854 tonnes/yr	<ul style="list-style-type: none"> ● The Southeast False Creek Neighbourhood Energy Utility (NEU) is an environmentally-friendly community energy system that provides space heating and domestic hot water to all new buildings in Southeast False Creek using a combination of sewer heat recovery, natural gas, and solar thermal technology. ● Beginning in 2003, methane gas from the city-operated landfill has been collected and piped to a sophisticated cogeneration facility. There it is burned to provide both electricity and heat.
City of Edmonton, AB	346,707 tonnes/yr	<ul style="list-style-type: none"> ● Since 1992, the Clover Bar Landfill has been mined to produce electricity from landfill gas. Enough gas is captured each year to satisfy the electricity demands of approximately 4,600 homes. ● Energy efficiency retrofits have occurred in several city facilities. ● Streetlights and traffic signals have been upgraded to LED technology.
City of Calgary, AB	125,210 tonnes/yr	<ul style="list-style-type: none"> ● In 2001, Calgary Transit's C-Train became the first public transit system in North America to be powered entirely by wind-generated electricity. ● Energy efficiency upgrades have occurred in 225 city-owned facilities. ● Landfill gas collection systems have been installed at two of the city's landfill sites. The city has also been capturing methane from its wastewater treatment plants to generate heat and electricity.
City of Hamilton, ON	105,211 tonnes/yr	<ul style="list-style-type: none"> ● Since 2005, the city has been replacing sedans and pick-ups with hybrid models, it has introduced biofuels (B5) into the diesel fleet, and adopted a corporate anti-idling bylaw. ● A landfill gas collection system was implemented, comprised of a network of wells, trenches and pipes within the landfill, that collect landfill gas and transport it to a 3.2 MW power plant.

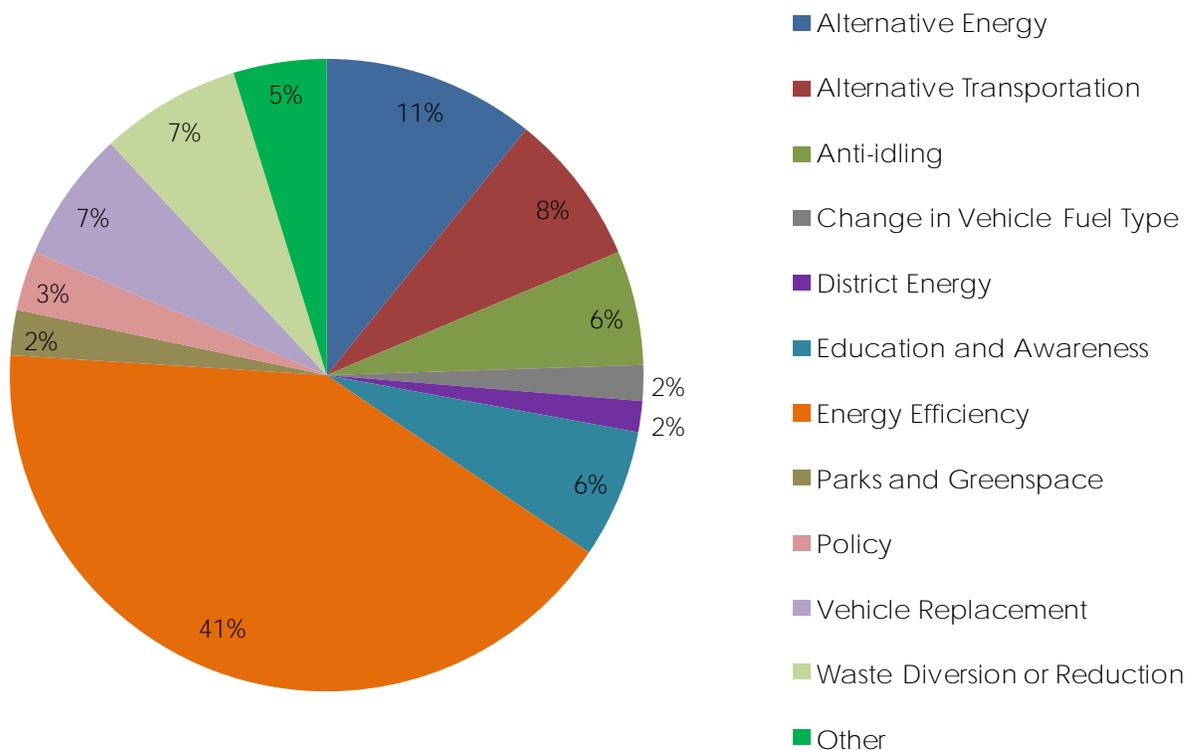


Photo Credit: Patrick Kane

Projects Reported

A total of 821 projects were added to the National PCP Measures Database between 2008 and 2012. Overall, a variety of projects were reported ranging from simple lighting upgrades and educational programs aimed at changing behaviour to far-reaching by-laws influencing the whole community. Projects aimed at improving the energy efficiency of the built environment were the most popular type of initiative reported by PCP members, followed by alternative energy projects, such as solar photovoltaic (PV) installations and geothermal heating systems (see Figure 5).

Figure 5: Percentage breakdown of measures by type (2008-2012)





A heat recovery system was installed in the City of Yellowknife's Multiplex Arena to capture and use waste heat generated by the ice plant. The system was expanded in 2011, connecting it to the Fieldhouse, a neighbouring recreational facility.

Data Reporting

The first year of measures reporting in 2008 revealed that many PCP members were not tracking or quantifying measures implemented because they did not have the resources to monitor specific results and impacts at the project level. To assist municipalities in this area, PCP offered a variety of themed webinars geared toward municipalities at Milestones Three, Four, and Five of the program. PCP also created specific measures reporting templates for to record and monitor key metrics at the project level. These templates have been offered in a variety of formats (Microsoft Word, Excel, web-based, etc.), and have been modified over the years to provide more detailed instructions. Data collection also focused on large cities through FCM's Big City Mayor's Caucus and small and medium municipalities in previous years. In general, efforts have been made to engage and communicate directly with smaller municipalities, which tend to face greater challenges in terms of data collection and conducting GHG impact assessments at the project level.

Despite these resources and ongoing technical support, monitoring and reporting of emission reductions at the project level remains a challenge for many municipalities. Measures submitted to the PCP Secretariat continue to vary in terms of detail and overall level of 'completeness.' Some municipalities are able to provide thorough and accurate information for each of the key fields requested (e.g. costs, energy savings, GHG reduction), whereas others are only able to provide a general description of the project with limited or no data on costs and implementation. These discrepancies are likely indicative of each municipality's internal measuring and monitoring processes. Municipalities that have regular and well-established project monitoring systems in place are generally able to provide more detailed project-level information to the PCP Secretariat. In the absence of these internal reporting practices, access to project-level data is much more limited and municipal staff must spend considerable time contacting colleagues in other business units or departments to acquire such data.

Based on best practices observed from communities participating in measures reporting, PCP recommends that monitoring considerations be incorporated in the planning and pre-implementation project stages. For example, identifying performance indicators and taking note of baseline conditions before a project is carried out allows for the opportunity to collect information that will allow for making proper comparisons to evaluate changes and success. Further, a database to track projects and progress is a good tool for keeping information organized. In fact, the measure reporting data collection forms can be used as a template and modified for these purposes. An online version of the data collection form can be found on the National Measures Report website: <http://bit.ly/SubmitMeasures>



Photo Credit: City of Saint John, NB

Energy Efficiency

Although the term “energy efficiency” can encompass a broad range of activities, it is used specifically in the context of this report to refer to projects targeting stationary energy use, such as energy used in buildings and streetlight applications (figure 6 provides a breakdown of the different types of projects included in this category). These range from retrofits to lighting and HVAC-R (heating, ventilation, air conditioning, and refrigeration) systems, to the application of green building and construction practices (e.g. LEED, ASHRAE, high-energy performance, etc.) in new developments.

Most of the energy efficiency measures reported between 2008 and 2012 were ‘general energy efficiency’ projects involving improvements to several different energy systems within the built environment. The City of Calgary, for example, completed upgrades in 225 city owned buildings between 1999 and 2005 by making improvements to lighting systems, heating, ventilation, air conditioning equipment, and building controls. These combined initiatives have reduced GHG emissions from city facilities by approximately 30,000 tonnes per year!

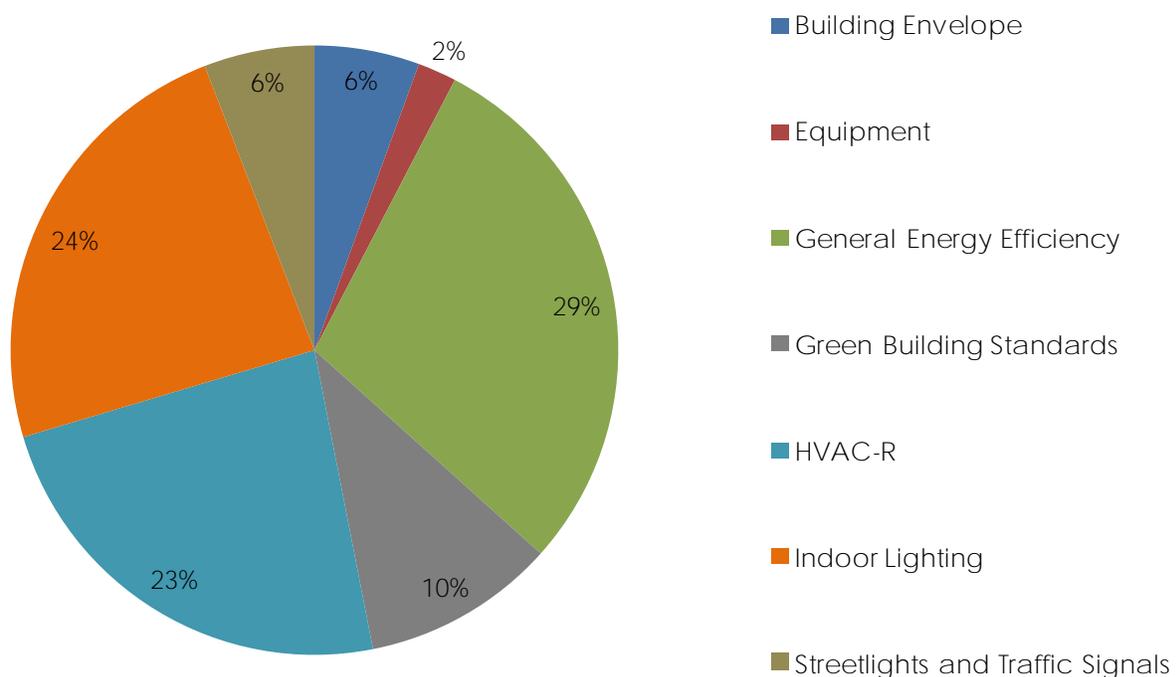
Energy efficiency projects targeting lighting and HVAC-R systems were the second and third most popular types of energy efficiency projects reported respectively. Typical lighting retrofits include replacing older lighting fixtures with more energy-efficient ones (e.g. switching T12 fluorescent fixtures to newer T8 bulbs with electronic ballasts), installing motion detectors and occupancy sensors, and removing unnecessary light fixtures (‘delamping’) in areas producing

greater-than-needed illumination. In 2010, for example, the City of Brampton initiated a two-phase lighting retrofit at its city hall facility. Occupancy sensors were installed in 32 locations, and more than 1,200 fixtures were replaced with energy-efficient T8 lamps. These improvements have reduced GHG emissions associated with the facility by 45 tonnes per year, and have resulted in annual cost savings of approximately \$23,000. With grants from the local electricity distributor, the project will pay for itself in just three years!

Other projects reported in the energy efficiency category include improvements to the building envelope (e.g. insulation, weather stripping, green roofs, etc.), constructing new buildings to environmental standards above the conventional building code, and upgrading equipment, such as computers and servers.

There are a couple of likely reasons why energy efficiency projects are the most popular type of measure reported by local governments. For one, the built environment accounts for approximately 50 per cent of all energy consumed in Canada, and is typically one of the most significant sources of corporate and community GHG emissions. Second, energy efficiency measures often generate significant energy and operational cost savings, which tend to result in a relatively short payback period. Indeed, investing in energy efficiency is one of the most cost-effective ways that municipalities can reduce GHG emissions generated from corporate operations and within the community at large.

Figure 6: Percentage breakdown of energy efficiency projects (2008-2012)





"Lake Ontario - Canada" flicker/Diego3336

Alternative Energy

The "alternative energy" category encompasses all projects that produce or consume energy from any energy source that is an alternative to fossil fuel. A breakdown of the various types of projects included in this category is provided in Figure 7. In general, these projects range from implementing technologies that create energy from renewable resources or waste streams, to simply purchasing renewable energy credits for electricity.

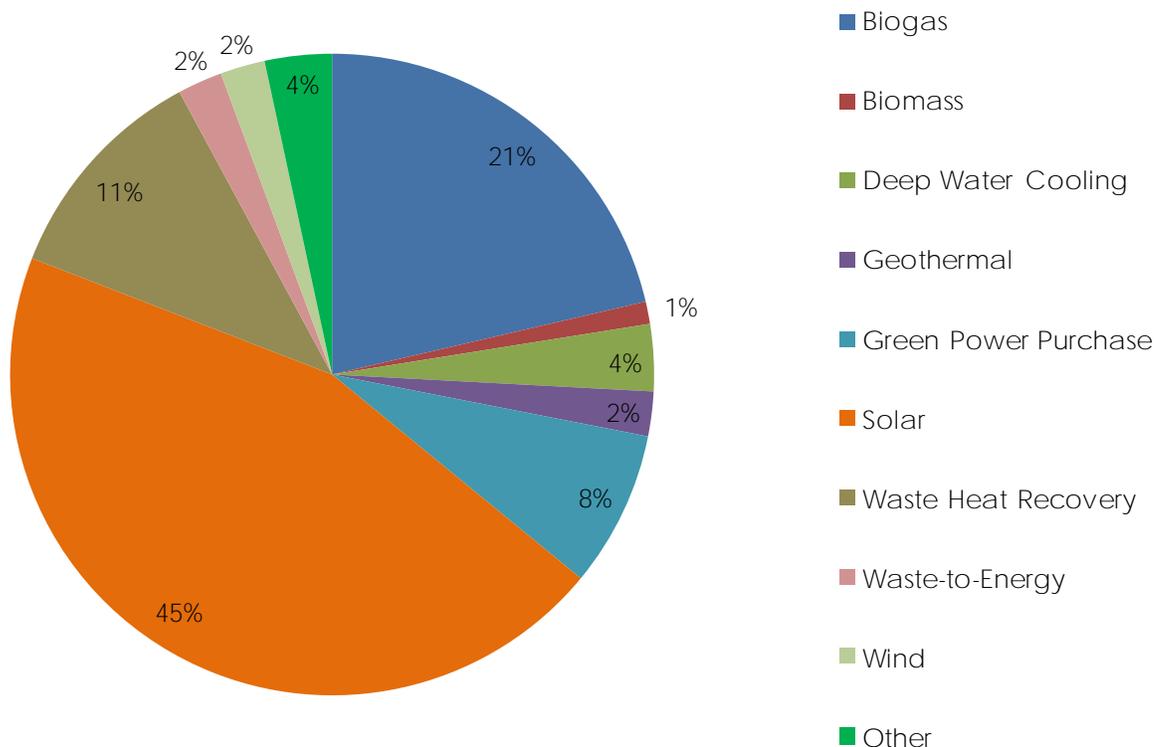
The majority of alternative energy measures reported between 2008 and 2012 were solar initiatives. These include both solar thermal and photovoltaic projects such as hot water heating systems and rooftop solar arrays. The popularity of solar energy projects is due to a number of reasons including advantages that are inherent to its technology. For instance, solar energy systems are relatively simple because they have few moving parts, are modular, and use commonly available materials. They can also meet a wide range of applications for heat and power and its energy production is often monitored with interactive systems that provide real-time feedback to local governments with more control and flexibility over their energy systems.

Other factors that may have encouraged the uptake of solar energy systems include incentives making its implementation more financially feasible. Programs have emerged over the last few years offering attractive financial incentives for implementing solar PV projects such as the Alberta Solar Municipal Showcase and the Ontario Power Authority's Feed-In-Tariff program. The Town of Black Diamond, for example, installed its first two solar PV systems as part of the Alberta Solar Showcase and has consistently been the top producer per month per kilowatt of system out of all of the communities that carried out solar projects under this program.

The second and third most popular types of alternative energy measures reported involved biogas producing projects and waste heat recovery initiatives. In general, biogas is produced from the breakdown of organic matter in the absence of oxygen. Typical biogas projects implemented by municipalities involve landfill gas recovery and utilization as well as anaerobic digestion at waste water treatment plants. The waste heat recovery initiatives that were reported include a variety of systems such as sewage, ice rink, and pool heat recovery technology. Unlike solar PV systems, there really isn't a 'one size fits all' model for waste heat recovery. These systems vary considerably in terms of the technology used and the type of waste heat that is recovered.

Other alternative energy measures involved purchasing renewable energy credits for electricity, deep lake water cooling systems, and geothermal heating projects, as well as initiatives creating energy from wind power, biomass such as wood pellets, or waste through incineration. Geothermal energy, which is a renewable resource generated and stored naturally under the surface of the Earth, can be used in locations where the earth's surface is thin to heat buildings or indirectly to generate electricity. For example, as part of the Kelowna International Airport's Drive to 1.6 Million Passengers development program, the City of Kelowna aims to implement a geothermal system at its International Airport as one of several measures that will help reduce the airport's overall energy consumption and carbon footprint despite planned expansions to the terminal size.

Figure 7: Percentage breakdown of alternative energy project (2008-2012)



ACKNOWLEDGEMENTS

The 2012 Measures Report was made possible through the dedication and hard work of participating municipal governments. Participants invested considerable time and resources collecting the required information and completing the data collection forms. This commitment from municipal staff was essential, and provided a solid foundation on which to build the report.

Many thanks to the following municipalities that contributed data over the last five years:

- Town of Annapolis Royal
- Town of Banff*
- City of Bathurst
- Town of Black Diamond
- City of Brampton
- City of Burlington
- Town of Caledon
- City of Calgary*
- Town of Canmore
- Municipality of Clare
- Town of Conception Bay South
- City of Coquitlam
- Cowichan Valley Regional District
- Municipal Corporation of Delta
- Region of Durham
- Town of East Gwillimbury
- City of Edmonton*
- City of Fernie
- City of Fredericton*
- City of Greater Sudbury
- City of Guelph
- Halifax Regional Municipality
- Town of Halton Hills
- City of Hamilton*
- City of Kamloops
- City of Kingston
- City of Kitchener
- City of Langley
- City of Laval
- City of London
- Town of Markham
- Metro Vancouver
- District of Mission
- City of Mississauga*
- City of Moncton
- City of Montreal
- City of Nanaimo*
- Regional District of Nanaimo
- City of Nelson
- Town of New Glasgow
- Town of Newmarket
- City of New Westminster
- City of North Vancouver*
- District of North Vancouver
- Town of Okotoks
- City of Oshawa
- City of Ottawa*
- Region of Peel
- City of Pickering*
- City of Port Alberni
- City of Prince George
- City of Regina*
- Town of Revelstoke
- City of Richmond
- Town of Richmond Hill
- Municipality of Richot
- District of Saanich
- City of Saskatoon*
- City of Spruce Grove
- District of Squamish
- City of St. John's
- City of Saint John
- Regional Municipality of Stanley
- Strathcona County
- City of Greater Sudbury
- City of Surrey*
- Town of The Blue Mountains
- City of Thompson
- City of Thunder Bay
- City of Toronto*
- City of Vancouver*
- City of Vaughan
- City of Victoria
- Region of Waterloo
- City of Whistler
- City of Whitehorse
- City of Windsor
- City of Yellowknife*
- York Region

* Denotes local governments that have actively engaged in measures reporting for three or more years.

The PCP would like to acknowledge the work of both FCM and ICLEI staff in the production of this report. Thank you to Muni Ahlawat, Devin Causley, Jonathan Connor, Bahareh Toghiani Rizi, and Sarah Sharif for their continuing work in supporting municipalities in their reporting efforts.

All across the country, municipal governments are implementing innovative solutions to reduce GHG emissions and mitigate the effects of global climate change. These efforts are commendable, and should be recognized, shared, and celebrated in order to encourage continued action toward climate change mitigation. It is our sincere hope that the 2012 Measures Report will give credit where credit is due, and provide Canadian municipal governments with the information and motivation required to achieve deep and lasting GHG reductions.

For more information on the PCP Measures Reporting Initiative, please visit our website at: <http://www.fcm.ca/home/programs/partners-for-climate-protection/national-measures-report.htm>



PCP is now accepting data for the 2013 Measures Report. If your municipality has undertaken initiatives to reduce corporate or community GHG emissions, we want to hear about it! Instructions can be found on the National Measures Report website: <http://bit.ly/SubmitMeasures>