Becoming Carbon Neutral

A Guidebook for Local Governments in British Columbia

BRITISH COLUMBIA

UBCM

Becoming Carbon Neutral v.3

This is the third version of the *Becoming Carbon Neutral* guidebook, a living document that may be amended or refined in the future based on local government feedback and emerging best practices. In addition, data and formulas contained in the project profile spreadsheets will be updated periodically to reflect ongoing changes in emission factors and best practices. To this end, when applying Option 1 project profiles, local governments should ensure that they are using the most up to date version of *Becoming Carbon Neutral* and the project profile spreadsheets. The most current version of the document will be located on the Climate Action Toolkit website at http://www.toolkit.bc.ca/cnlg.

Local government feedback is an important part of ensuring that the approach to carbon neutrality meets the needs of its users, and we look forward to receiving feedback. All comments and questions on this document can be directed to irpd@gov.bc.ca.

Acknowledgements

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Preface

Governments around the world, from powerful nations to individual towns and villages, are taking steps to reduce their greenhouse gas (GHG) emissions and minimize the long-term impacts of climate change. In British Columbia (B.C.), many local governments are taking action and leading the way in showing how reducing GHGs fosters the local green economy, advances technological innovation and saves money through reduced energy costs for communities, as well as helping to reduce the impacts of global climate change.

Becoming carbon neutral[1] is a powerful way for local governments to demonstrate leadership. When local government leaders work to reduce GHG emissions in their own corporate operations, they lead by example and set the stage for citizens, business and industry to take action and help move whole *communities* towards greater energy efficiency and sustainability. Local governments from across B.C. have demonstrated a strong desire to take action on climate change and are already making significant progress on measuring and reducing their corporate and community emissions.

Since 2007, the majority[2] of B.C.'s local governments have voluntarily signed the British Columbia Climate Action Charter,[3] committing to take actions and develop strategies to achieve three goals:

- Being carbon neutral in respect of their corporate operations by 2012;
- Measuring and reporting on their community GHG emissions; and
- Creating complete, compact and energy-efficient rural and urban communities.

To assist local governments in achieving their Climate Action Charter commitments, the Province joined with the Union of British Columbia Municipalities (UBCM) to create the Green Communities Committee (GCC). The GCC is working with local governments to provide tools and resources, develop guidance materials and implement pilot projects that assist rural and urban communities as they work towards these goals.

Part of GCC's mandate is to "*develop a common approach to determining carbon neutrality for the purposes of the Climate Action Charter*". As part of this work, the GCC, in collaboration with local government practitioners, has developed the Green Communities Carbon Neutral Framework,[4] outlining steps and options that enable local governments to achieve carbon neutrality under the Climate Action Charter. The draft Carbon Neutral Framework was presented at the 2010 UBCM convention and since that time has continued to be informed and refined by feedback received from local government elected officials and staff as well as sustainability practitioners, through multiple venues including a series of carbon neutral webinars and workshops held throughout the Province in June 2011.

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[1] Items in orange are included in the Glossary

[2] As of July 2011, 179 local governments have signed the Climate Action Charter.

[3] http://toolkit.bc.ca/resource/climate-action-charter

[4] http://www.toolkit.bc.ca/cnlg Carbon Neutral Framework

This *Becoming Carbon Neutral* guidebook reflects the results of this collaborative effort. The guidebook outlines ways for local governments to achieve their goal to become carbon neutral, using options that have been specifically designed to meet local government needs and their desire to invest in locally-based GHG reduction projects. It has been prepared for use by local government staff who are responsible for measuring and reporting on carbon neutrality.

Glossary[5]

Balance and / or offset: A way to meet carbon neutrality under the Carbon Neutral Framework by finding reductions in GHG emissions either through purchase of offsets and / or achieving reductions in community emissions, such that they make up for a local government's corporate GHG emissions.

B.C. Climate Action Charter: A voluntary agreement signed by local governments in British Columbia. Signatories commit to working to achieve three goals: becoming carbon neutral in respect of their operations; measuring and reporting on community GHG emissions; and creating compact, complete and energy-efficient communities.

Carbon dioxide equivalent (CO_2e): A unit that expresses any greenhouse gas in terms of its global warming potential, using carbon dioxide as the baseline measure. This is usually expressed as tonnes of CO_2e.

Carbon neutral local government: For the purposes of the Climate Action Charter, a local government is carbon neutral if it has (1) calculated the total emissions for which it is responsible, (2) pursued actions to minimize those emissions, (3) balanced and / or offset all remaining emissions, and (4) reported publicly on their results.

Carbon offset: A reduction in GHG emissions for which the ownership of those verifiable GHG emission reductions can be transferred and used to meet an emission reduction obligation elsewhere. Usually measured in tonnes CO_2e.

Carbon market: a market-based approach to achieve reductions in greenhouse gas emissions, through the purchase and sale of offset credits resulting from greenhouse gas emission reduction projects and supply-limited permits to emit. The carbon market establishes a price on carbon that results from the intersection of the supply of offsets and permits and the demand and cost for emitters to reduce their emissions.

Compliance carbon market: Participation, compliance and adherence to prescribed standards is required as defined by government regulation or legislation.

Voluntary carbon market: Participants who have chosen to make commitments in a voluntary market may choose from a range of standards and offsets available.

Climate Action Revenue Incentive Program (CARIP): A grant program available to local governments who have signed the B.C. Climate Action Charter that provides a grant equal to one hundred percent of the carbon tax paid by local governments as a direct expenditure. Local governments are required to make their CARIP reports public.

Corporate: See local government corporate emissions boundary.

Credible offset provider: A company that sells carbon offsets on the carbon market and meets recognized high standards, such as the *Greenhouse Gas Reduction Targets Act* Offset Regulation.

Green Communities Carbon Neutral Framework: A B.C.-specific Carbon Neutral Framework developed by the Green Communities Committee to enable local governments to meet their Climate Action Charter goal of carbon neutrality.

[5] Definitions from Environment Canada http://www.ec.gc.ca/creditscompensatoires-offsets/default.asp?lang=en&n=6E08A3B3-1#glossaryc and LiveSmart BC http://www.livesmartbc.ca/learn/glossary.html

Green Communities Committee: A committee of the Province of British Columbia and the Union of BC Municipalities that provides tools and supports to assist local governments to meet their Climate Action Charter goals.

Greenhouse gas (GHG): A gas emitted to the atmosphere from natural sources and as the result of human activity. Greenhouse gases both absorb and reflect the sun's radiation. Greenhouse gases include carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulphur hexafluoride.

Greenhouse gas emissions:

Community Emissions**:** GHG emissions generated from community activities.

Corporate Emissions: GHG emissions generated through local government operations (see also local government corporate emissions boundary).

Local government: In British Columbia, a term that includes both regional districts and incorporated municipalities.

Local government corporate emissions boundary: As defined in the *Carbon Neutral Workbook*, GHG emissions produced as a result of a local government's delivery of "traditional services", including fire protection, solid waste management, recreational / cultural services, road and traffic operations, water and wastewater management, and local government administration.

Low emission vehicle (LEV): A vehicle which emits little or no carbon pollution when compared to vehicles with conventional internal combustion engines. This includes hybrid-electric, full electric and high-efficiency internal combustion engines.

Net emission reduction: The amount of reduction in GHG emissions when comparing the baseline emissions with project emissions.

Baseline emissions: The GHG emissions that would have occurred in the absence of the emission reduction project.

Project emissions: The GHG emissions resulting from a community project designed to reduce GHG emissions (when compared to conventional activities).

Solar thermal (solar hot water): A technology that uses the sun's energy to heat water.

Solar photovoltaic (solar PV): A technology that uses the sun's energy to create electricity.

SMARTTool LG (for Local Government): SMARTTool is a web-based GHG emissions inventory and reporting tool which provides a standardized approach to calculating and reporting an organization's corporate GHG emissions. SMARTTool for Local Governments has been customized to meet the needs of local governments under the Carbon Neutral Framework.

1 The Green Communities Carbon Neutral Framework

Local governments produce greenhouse gas (GHG) emissions as part of their daily and annual operations—for example to heat buildings, run vehicle fleets, and manage waste and water. These are the local government's corporate emissions.[6] At the same time, residents, businesses and industry in the community are creating GHG emissions as part of their daily lives as they drive around, heat and cool buildings, wash dishes, etc. These are referred to as community emissions.

"Carbon neutral local government" is about showing leadership and taking responsibility for the corporate emissions generated through local government operations. Almost all of British Columbia (B.C.) local governments have signed the Climate Action Charter,[7] voluntarily committing to the goal of becoming carbon neutral in respect of their corporate operations by 2012. The joint Provincial–UBCM Green Communities Committee (GCC) has a mandate to support the efforts of local government as they work towards their Climate Action Charter goals, including carbon neutrality.

GHG emissions are measured in tonnes of "carbon dioxide equivalent" (tonnes CO_2e). Some GHGs have a much greater impact on climate change than others—for example, methane is about 21 times more potent than carbon dioxide as a greenhouse gas.

Green Communities Committee Approach to Carbon Neutrality

The Green Communities Committee (GCC) has developed the **Green Communities Carbon Neutral Framework** as part of its mandate to develop a common approach to determine carbon neutrality for local governments under the Climate Action Charter. This Carbon Neutral Framework is exclusive to B.C.'s local governments and customized to their needs.

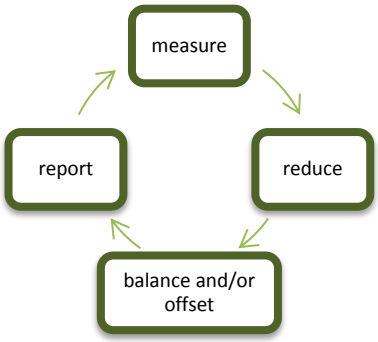
GCC recognizes and commends the many local governments that are already taking action and investing in GHG reduction initiatives in their communities. The Carbon Neutral Framework provides options that enable local governments to use the measurable emission reductions resulting from these community investments as a means to make up for—balance— their corporate emissions. It meets the following important local government interests:

- Offers choice in terms of the offsets that can be purchased;
- Provides options for investments in local GHG reduction projects that are practical and flexible for B.C. local governments; and
- Ensures that the approach to becoming carbon neutral is credible and that GHG reductions are measureable, reflecting real GHG reductions.

To ensure credibility, the Carbon Neutral Framework requires corporate emissions be balanced on a tonne for tonne basis to achieve carbon neutrality— every tonne of reduced emissions from eligible GHG reduction projects under the Carbon Neutral Framework can be used to balance a corporate tonne of emissions that the local government produces. (The amount of money invested in the project is not taken into account—it is the tonnes of emission reduction that are measured and counted.)

[6] The local government corporate emissions boundaries of these corporate emissions, and how they can be measured, are detailed in the Carbon Neutral Workbook (available from www.toolkit.bc.ca)

[7] http://toolkit.bc.ca/resource/climate-action-charter



1.1 Four Steps to Implementing the Carbon Neutral Framework

The GCC's Green Communities Carbon Neutral Framework (Carbon Neutral Framework) describes the four key steps along the path to carbon neutrality: *Measure, Reduce, Balance and / or Offset, and Report*.

1.1.1 Step 1: Measure

***Measure** annual corporate emissions, as defined in the Carbon Neutral Workbook (corporate emissions boundary).*

The Carbon Neutral Workbook[8] provides guidance on which emissions local governments should measure. The local government corporate emissions boundaries described in that Workbook are based on the operation and maintenance of the following traditional services:

- Fire protection;
- Solid waste collection, transportation and diversion;
- Arts, recreational and cultural services (provided by the local government);
- Road and traffic operations;
- Drinking, storm and waste water; and
- Administration and governance.

Once the energy consumption data is gathered, local governments can calculate the GHG emissions related to the energy consumed using an appropriate emissions measurement tool, and report publicly on total corporate emissions from these traditional services.

Local governments looking for an emissions measurement tool may wish to use SMARTTool for Local Governments (SMARTTool LG)[9] or an equivalent methodology. SMARTTool is a web-based carbon inventory, measurement and reporting tool which provides a standardized approach to calculating and reporting an organization's GHG emissions. Originally developed to enable the Provincial Government and British Columbia's public sector organizations to meet their legislated requirements to be carbon neutral by 2010, *SMARTTool for Local Governments* has been adapted to meet the unique needs of local governments. For more information on SMARTTool, its benefits and how to sign up, go to the Climate Action Toolkit website.[10]

SMARTTool Incentive

As an incentive, local governments who sign on to SMARTTool before October 14, 2011 will receive a 50% reduction in the cost of SMARTTool for the first year of its use. The initial year of setting up the GHG inventory tracking is the most time-consuming and GCC recommends that local governments take advantage of the SMARTTool subsidy to assist them in the initial set up of an inventory.

[8] *Workbook – Helping Local Governments Understand How to be Carbon Neutral in Their Corporate Operations.* Green Communities Committee, in development. The most recent version is available from http://toolkit.bc.ca/

[9] http://toolkit.bc.ca/smarttool-recommendation

[10] http://toolkit.bc.ca/

1.1.2 Step 2: Reduce

***Reduce** corporate emissions as much as possible using a range of actions and strategies.*

There are many different ways for local governments to reduce their corporate GHG emissions, for example by improving energy efficiency in local government-owned buildings and reducing fuel consumption in their vehicle fleets. The good news is that many of these initiatives reduce energy bills and save money for local taxpayers, as well as reducing emissions. Every action a local government takes to reduce its corporate GHG emissions will help towards achieving its goal of carbon neutrality.

The Climate Action Toolkit is a web-based resource with many ideas for local governments and their communities to reduce GHG emissions, and includes many examples from local governments in B.C. who have taken a leadership role in reducing emissions. For more information see the Toolkit website.[11]

1.1.3 Step 3: Balance and / or Offset

***Balance and / or offset** remaining corporate emissions using one of the options outlined in this guidebook.*

A tonne of emissions

One tonne of carbon dioxide equals 556 m^3 (about the volume of a three bedroom house).

Even after reducing emissions as much as possible, local governments will still be producing GHG emissions from their ongoing operations. In order to achieve carbon neutrality, a local government must balance and / or offset the tonnes of corporate GHGs it produces with an equivalent reduction in tonnes of GHGs from credible, measureable, emission reduction projects undertaken *outside* its corporate emissions boundary.

This *Becoming Carbon Neutral* guidebook provides information on three options to achieve this, by investing in local GHG reduction projects to balance emissions (Options 1 and 2) or purchasing carbon offsets (Option 3). See *Section 2: Balancing and Offsetting Corporate GHG Emissions: Three Options for Local Governments* for more detail.

[11] http://toolkit.bc.ca/

1.1.4 Step 4: Report

***Report** publicly on annual corporate emissions and actions taken to reduce these emissions.*

Finally, to ensure transparency and accountability, the local government should report annually to their public on progress towards its commitment to carbon neutrality.

To simplify the process, carbon neutral reporting will be harmonized with the annual reporting requirements under the Climate Action Revenue Incentive Program (CARIP). For more information on the reporting requirements, see *Section 3: Reporting on Carbon Neutrality*.

Table 1: The Green Communities Carbon Neutral Framework

What	How	Resources for more information (available from http://www.toolkit.bc.ca/cnlg)
1. **Measure** corporate GHG emissions	♦ Identify local government operations that fall within the corporate emissions boundaries ♦ Determine a tool for measuring emissions (e.g., SMARTTool) ♦ Measure corporate emissions annually	The Carbon Neutral Workbook SMARTTool for Local Governments Guidance on using Alternative Carbon Measurement Tools
2. **Reduce** corporate emissions	♦ Implement GHG reduction projects within corporate emissions boundaries, e.g., by improving energy efficiency in local government buildings, switching to cleaner fuels for vehicle fleets, and switching to solar-powered street lighting	B.C. Climate Action Toolkit (www.toolkit.bc.ca)
3. **Balance and / or Offset** remaining emissions	♦ Invest in GCC-supported community emission reduction projects (Option 1) ♦ Invest in alternate community emission reduction projects (Option 2) ♦ Purchase offsets (Option 3)	*Becoming Carbon Neutral* Guidebook (Section 2)
4. **Report** annually	♦ Complete a project specific report for community emission reduction projects ♦ Complete the annual CARIP Report which will be revised to include:. ○ Total annual corporate GHG emissions for the local government; ○ The amount of GHG reductions being claimed in that year from Option 1 or 2 projects; and / or ○ Option 3 offsets purchased ♦ Make all of this information available publicly (e.g., on the local government website) ♦ Keep records on file in accordance with local government administrative practices	*Becoming Carbon Neutral* Guidebook (Section 3) B.C. Ministry of Community, Sport and Cultural Development website http://www.cscd.gov.bc.ca/lgd/greencommunities/carip.htm

1.2 Making Progress Towards Carbon Neutrality

As more and more B.C. local governments adopt "greener" policies and practices and move toward carbon neutrality, all British Columbians benefit from cleaner, healthier and more livable communities. The options outlined in this document help local governments to work towards—and achieve—their carbon neutral goal.

Achieving carbon neutrality is a challenging endeavour that requires leadership and capacity. Each of the four steps to achieve carbon neutrality under the Carbon Neutral Framework, as outlined above, take time and resources to implement. Some local governments are already well on their way to meeting their carbon neutral commitments, while others may need additional time to build their capacity to achieve all four steps. All local governments are to be commended for their commitment and leadership in taking on this challenging task.

Recognizing that achieving carbon neutrality by the 2012 target date may be challenging for some communities, as part of a series of regional workshops and webinars held throughout the province in June 2011, local governments were invited to comment on the idea of a "making progress toward carbon neutrality" proposal. The intent of this approach would be to provide some flexibility for those signatories who may not be able to achieve carbon neutrality by the 2012 target date. Following from these consultations, the GCC has determined that the "making progress towards" proposal will be supported as part of the common approach to carbon neutrality under the Climate Action Charter.

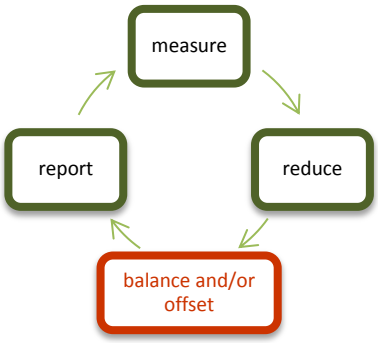
The “making progress towards” approach provides that, in the short term, if some communities are only able to focus on some of the steps to carbon neutrality (for example, measuring, reducing and reporting) this will be sufficient to demonstrate “making progress towards” carbon neutrality. Although local governments who choose to take the “making progress toward” approach in the short term would not be considered “carbon neutral” for the purposes of the Climate Action Charter, achievement of any of the four steps demonstrates local government progress toward carbon neutrality and is worth publicly reporting on and celebrating.

In addition, many actions that local governments undertake—such as encouraging cycling and walking, promoting “green” developments and implementing anti-idling bylaws—lead to community-wide GHG reductions and make communities more sustainable over the long term. While the GHG emission reductions from these projects may be hard to quantify under the Carbon Neutral Framework, undertaking these projects and activities demonstrates leadership and commitment and meets the spirit of the Climate Action Charter. Communities that are unable to achieve carbon neutrality in the short term are asked to report publicly on the full range of climate actions that they are taking as part of demonstrating that they are “making progress towards” carbon neutrality.

1.2.1 Climate Action Reserve Fund

As part of their strategy towards meeting the goals of the Climate Action Charter, some local governments have chosen to set aside the dollars that they would use to purchase offsets under Option 3 of the Carbon Neutral Framework, and put them into a climate action reserve fund to support local climate actions. While a climate action reserve fund will not (of itself) get a local government to carbon neutrality, it is a creative way of budgeting for emission reduction projects and is also worth publicly reporting on as a way to demonstrate progress towards carbon neutrality under the Climate Action Charter.

2 Balancing and Offsetting Corporate GHG Emissions: Three Options for Local Governments



To achieve carbon neutrality, local governments must find a way to make up for—*balance*—their ongoing corporate emissions. Many local governments have expressed a desire to do this by investing locally, rather than by purchasing carbon offsets that support emission reductions elsewhere. The Green Communities Carbon Neutral Framework provides local governments with options to invest in local emission reduction projects and to use these reductions to balance their corporate emissions on a tonne for tonne basis.

This Carbon Neutral Framework is designed to meet the following important local government interests:

- Ensuring that the approach offers choice in terms of the offsets that can be purchased;
- Providing options for investments in local GHG reduction projects that are practical and flexible for the varied B.C. local governments; and
- Ensuring that the approach is credible and that emission reductions are measureable, reflecting real GHG reductions.

In developing the Carbon Neutral Framework, the GCC has attempted to weigh these various interests and to provide practical, flexible, credible, and local options. The Carbon Neutral Framework is unique to B.C.'s local governments and customized to their needs.

The approach recognizes that local governments are in a unique position, as they can make investments to reduce their *corporate* emissions but can also invest in community projects *outside* their corporate boundaries that have measurable GHG reductions. The approach provides options (Options 1 and 2) that enable local governments to use these measurable community reductions to balance their corporate emissions. These are not true "offsets"[12] but they are credible emission reductions that provide a mechanism to make up for ongoing corporate emissions. Local governments also have the option (Option 3) to purchase validated offsets from a credible offset provider.

[12] Offsets are rigorously defined for the compliance carbon market and can be traded in the carbon market.

2.1 The Three Options

The Carbon Neutral Framework offers three options for local governments to achieve carbon neutrality. Depending on the amount of corporate emissions a local government needs to balance in any given year, it may choose to use one or more of the three options outlined below (Figure 1).

- Option 1—*Invest in a GCC Supported Project*—allows local governments to invest locally while also ensuring that the projects are credible and result in measurable GHG reductions. The GCC has identified five types of emission reduction projects (energy efficient building retrofits / fuel switching, solar hot water, household organic waste composting, low emission vehicles and forestry) that local governments could undertake and has provided simplified formulas to assist in measuring the GHG reductions from these projects.
- Option 2—*Invest in Alternate Community GHG Reduction Projects*—recognizes that local governments will have additional ideas (beyond Option 1) for measurable emission reduction projects that could be undertaken outside their corporate emissions boundary.
- Option 3—*Purchase Offsets from a Credible Provider*—is a simple and cost effective way for most local governments to offset their corporate emissions.

Figure 1: Three Options to Balance and / or Offset Corporate Carbon Liability

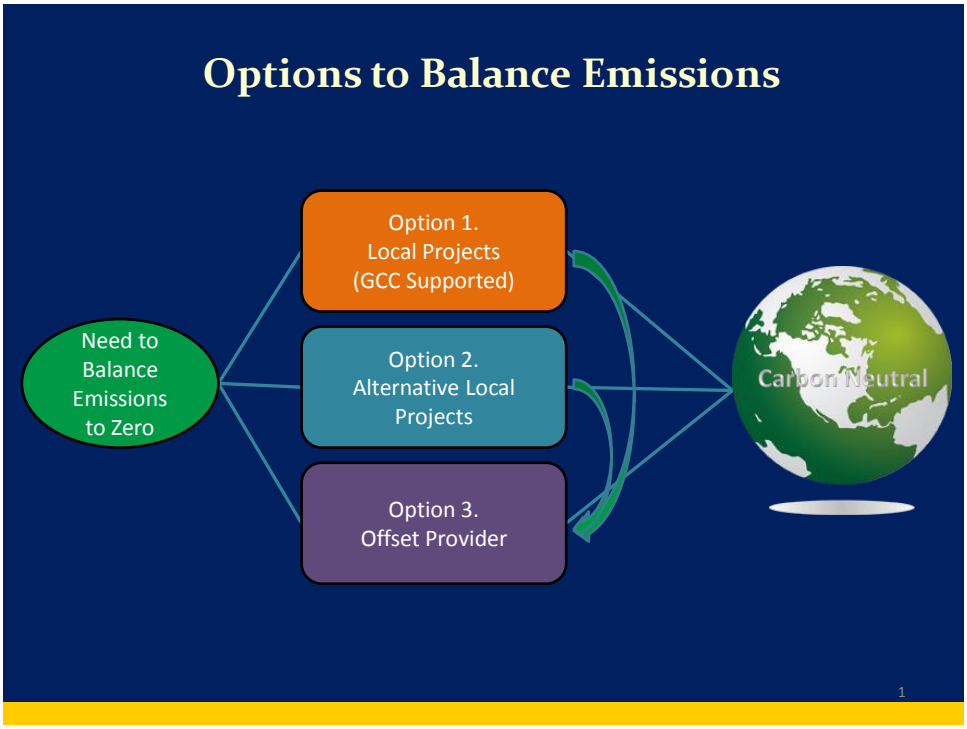


Table 2: Comparison of the Three Options

	Option 1: GCC-supported project	Option 2: Alternative project	Option 3: Purchase
Ease of implementation	Requires some effort Project profiles already developed by the GCC Project has to be implemented and self-certified	Requires considerable effort and third party assistance Project profiles have to be developed by local government Project has to be implemented and third party verified	Simple
Cost	Varied cost, depending on project Minimal validation and certification costs, as they have been largely pre-established by the GCC	Varied cost, depending on project Local government required to pay for all costs to develop, implement and verify the project	Least cost Purchase tonnes at market rate (which will vary depending on the provider and standard that they use)
Reduction in local/regional GHG emissions	Community emissions reduced	Community emissions reduced	Uncertain impact on community emissions unless offset provider invests locally or regionally; however, climate change is not geographically bound so investments in credible offsets still reduce overall GHG emissions.
Co-benefits	Investment in local green economy; raises local awareness; fosters local / regional technological innovation; supports the creation of green jobs	Investment in local green economy, raises local awareness; fosters local / regional technological innovation; supports the creation of green jobs	Investment in British Columbia; fosters broader technological innovation; reduces GHG emissions; cost effective

Implementing Option 1 and 2 projects will balance some (but likely not all) of the local government's corporate emissions. Although offset purchases may still be required to become fully carbon neutral, there are additional benefits associated with Options 1 and 2. These projects enable communities to invest in local projects that have broader community benefits, such as supporting green jobs and technological innovation, conserving energy, reducing operating costs, enhancing community sustainability, and raising public awareness regarding climate change.

Table 2 provides a simple comparison of the three Carbon Neutral Framework options.

2.1.1 Carbon Neutral Framework Project Eligibility Requirements

There are many different types of GHG emission reduction projects. All are laudable, but only some of them can be sufficiently measured and scrutinized to ensure that they result in credible, real and measureable emission reductions. The Carbon Neutral Framework addresses this by describing seven Project Eligibility Requirements (see box) and requiring that the Option 1 and 2 emission reduction projects meet these requirements in order to qualify as reductions for local governments under the Carbon Neutral Framework. More detail is provided in Appendix 1.

Note that Option 1—*GCC Supported Projects* are already considered to meet Project Eligibility Requirements three and four below. To demonstrate how an Option 1 project meets the five remaining eligibility requirements, simply complete and make public an Option 1 Project Plan Template (see Appendix 7).

In contrast, Option 2—*Alternate Community GHG Reduction Projects* need to meet all seven Project Eligibility Requirements. To demonstrate how an Option 2 project meets the seven eligibility requirements, simply complete and make public an Option 2 Project Plan Template (see Appendix 10).

Project Eligibility Requirements

1. *Emission reductions are outside the local government corporate emissions boundary:* GHG reduction projects must be outside of the local government's corporate emissions boundary, as defined in the *Carbon Neutral Workbook.*
2. *Emission reductions have occurred before they are counted:* the amount of emission reductions being claimed in a given year must have occurred by the end of that year.
3. *Emission reductions are credibly measured:* emission reductions must be credibly measured to ensure that emission reductions are real and have a climate benefit.
4. *Emission reductions projects are beyond business as usual (BAU):* projects must have started after September 26, 2007; must not be required to fulfill a federal or provincial government's legislated or regulatory requirement; and meet one of three tests (financial, other barriers or common practice).
5. *Accounting of emission reductions is transparent:* public reporting is required to ensure transparency and accountability.
6. *Emission reductions are counted only once:* reductions must only be claimed once, so local governments must be able to demonstrate that the reductions have not been previously committed or sold as emission reductions.
7. *Project proponents have clear ownership of all emission reductions:* the local government must demonstrate that it has exclusive rights to legal and commercial benefits of reductions associated with GHG reduction project.

Part of the reporting process includes certifying or verifying that these requirements have been met. See Section 3 of this guidebook.

2.2 Calculating Carbon Neutrality

Carbon neutrality is achieved by calculating[13] the local government's corporate emissions (tonnes CO_2e), subtracting the tonnes of CO_2e reductions from Option 1 and / or 2 projects, and then purchasing sufficient offsets (Option 3) to bring this to zero (Figure 2).

Figure 2: Carbon Neutrality Equation

Local government emissions (after corporate reductions made)	**— Option 1 & 2 Project reductions (balance)**	**— Option 3 offsets (offset)**	**= ZERO (carbon neutrality)**

It is important to note that the cost per tonne of GHG reductions achieved through a local project under Option 1 or 2 may be significantly more than purchasing the same number of tonnes of GHG reductions from an offset provider (Option 3). As a result, many local governments may choose to achieve carbon neutrality by purchasing offsets as described in Option 3. In fact, for many communities, purchasing offsets under Option 3 will be the most cost effective and administratively simple way to achieve carbon neutrality.

Example

The City of Townsville has reduced their annual corporate emissions to 370 tonnes CO_2e. They have also invested in significant retrofits to a social housing project (Option 1), that has reduced GHG emissions by 120 tonnes per year. They then purchase 250 tonnes of offsets from a credible offset provider (Option 3).

370 tonnes (corporate) — 120 tonnes (Option 1) — 250 tonnes (Option 3) = ZERO

Townsville invested $200,000 in the retrofit project, and only $6,000 buying offsets. However, they considered that the investment in the social housing project brought many other benefits, including reducing annual energy costs for the building, supporting community sustainability and creating local jobs.

Emission reductions must be measured and publically reported so that the local government can be seen to investing in real and credible GHG reductions.

[13] For example by using a measurement tool such as SMARTTool.

2.3 Option 1: Invest in a GCC-Supported Project

2.3.1 Overview

Option 1 community emission reductions are not tradable 'offsets' (which can be sold on the carbon market), however they do provide high value emission reductions and also support local government goals of reducing community GHG emissions.

Option 1 projects provide an opportunity for local governments who wish to invest in GHG emission reduction projects in their *community* to use these reductions to help balance their *corporate* emissions.

There are five steps to implementing an Option 1 GHG reduction project (Table 3).

Table 3: Implementing Option 1

Step	For more information
1. **Review** the information on Option 1 projects and determine if any of these are valid options for your community.	Appendices 2 – 6
2. Complete, sign and make public a **Project Plan Template** to undertake one (or more) of these four GCC-supported projects.	See sample template in Appendix 7
3. **Implement the project** and **calculate** the project GHG emission reductions.	Appendices 2 – 6 include methodologies for detailed calculations
4. Complete, sign and make public a **Self-Certification Template** to certify that the required work was completed in the specified time frame to result in the GHG reductions being claimed.	See sample template in Appendix 8
5. Prepare the annual **Climate Action Revenue Incentive Program (CARIP) Report** and include information on progress towards carbon neutrality. Retain all project paperwork on file in accordance with local government administrative policy and procedures.	See Section 3 and Appendix 12 for information on revised CARIP reporting

Option 1 Pros and Cons

Option 1 offers the following advantages:

- It offers local governments the choice to invest in local emission reduction projects; keeping money and economic opportunity in the community;
- It reduces the number of offsets that a local government would need to purchase to be carbon neutral in respect of their operations;
- The GCC has provided project profiles and calculation spreadsheets to simplify the computation of emission reductions, reducing the cost of validation;
- Local governments can self-certify reductions achieved through the project rather than paying for a third party verification process; and
- Local governments can be confident that these projects will lead to credible emission reductions in their communities.

Option 1 has the following disadvantages:

- It will likely cost more per tonne to achieve carbon neutrality when compared to Option 3 (purchase of offsets), although less than Option 2 (which has additional validation and verification costs); and
- Local government staff will require time and resources to gather the necessary data and complete the project profiles (although GCC has tried to simplify this as much as possible).

2.3.2 Project Profiles and Templates

Developing and quantifying emission reduction projects can be a costly and complex process. In order to reduce costs and simplify calculations for local governments, the GCC has selected five types of community projects (Option 1 projects) that will qualify for emission reductions under the Carbon Neutral Framework, and has developed "project profiles" that local governments can use to measure GHG reductions resulting from these projects. These five project types were chosen because they are relatively straightforward to measure, can be undertaken outside a local government's corporate emissions boundary and are suitable for use by a variety of local governments.

Projects already underway may also qualify for emissions credits, as long as they started after September 2007, i.e., they were implemented to achieve Climate Action Charter goals. Emission reductions achieved between 2007 and the end of 2011 cannot be banked and applied against 2012 emissions. However, the any GHG reductions earned and not used in a given year on or after 2012 can be carried over to subsequent years.

The five GCC-supported projects are:

- **Energy efficient** building retrofits and fuel switching (for privately owned buildings and other buildings outside of a local government's corporate emissions boundary);
- **Solar thermal** (hot water heating) retrofits (for privately owned buildings and other buildings outside of a local government's corporate emissions boundary);
- **Household organic waste composting;**
- **Low-emission vehicles** (e.g., for public transportation, police departments and airports); and
- **Avoided forest conversion.**

All projects have to meet the seven Project Eligibility Requirements (see Appendix 1). Avoided Forest Conversion projects must meet 4 additional requirements specific to that project. All GCC-supported projects meet requirements 3 and 4, i.e., they are credibly measured and "beyond business as usual".

Ideas for Other Option 1 Projects?

Does your local government has ideas for other GHG reduction projects that could meet the seven Project Eligibility Requirements? If a local government has developed or is interested in developing a credible yet simple methodology to measure the emission reductions from the project (i.e., similar to the Option 1 methodologies), they may wish to explore the possibility of adding the project to the Option 1 GCC-supported projects list, for use by all B.C. local governments. Initial inquiries should be sent to irpd@gov.bc.ca

The GCC has designed Option 1 specifically for B.C. local governments and has tried to make this a relatively simple and flexible approach, while still ensuring the credibility of the measured emission reductions. If a local government undertakes an Option 1 project and fulfils the administrative and public reporting requirements, the emission reductions achieved through the project can be used to help achieve carbon neutrality. In addition to the project profiles, the GCC has developed sample reporting templates to assist local governments in their public reporting processes.

Additional information on the four GCC-supported projects, and how to measure and account for emission reductions, are provided in Appendices 2 – 6. A sample *Project Plan Template* and *Self-Certification Template* for Option 1 projects are provided in Appendices 7 and 8. Local governments may choose another format for their project reports; however the substance of these reports must be the same as provided in the samples.

2.4 Option 2: Invest in Alternate Community GHG Reduction Projects

2.4.1 Overview

Local governments may prefer to support community GHG reduction projects other than those described in Option 1. Measurable and credible emission reductions from these alternate community projects could be used to balance corporate GHG emissions. Under the Carbon Neutral Framework, these are "Option 2 projects". These projects must meet the seven Project Eligibility Requirements (see Appendix 1).

There are six steps to implementing an Option 2 GHG reduction project (Table 4).

Table 4: Implementing Option 2

Step	For more information
1. **Review** the information on Option 2 Projects and the seven Project Eligibility Requirements.	Section 2.3 and Appendix 1
2. (Optional) Complete a **Preliminary Review Template** to assist in determining if the project is likely to generate measurable GHG reductions under the Carbon Neutral Framework.	See sample in Appendix 9
3. Complete, sign and make public a **Project Plan Template** for the project. As part of this process, the local government will need to engage qualified professionals to provide **third party validation** of the project approach and methodology, to sign off on the Project Plan Template ensuring that it meets all seven Project Eligibility Requirements.	See sample in Appendix 10
4. **Calculate** the project GHG emission reductions as determined by third party validated approach and methodology outlined in the Project Plan Template.	Appendix 10
5. Complete, sign and make public a **Third Party Verification Template** to verify that the required work was completed in the specified time frame to result in the GHG reductions being claimed.	See sample in Appendix 11
6. Prepare the annual **Climate Action Revenue Incentive Program (CARIP) Report** and include information on progress towards carbon neutrality. Retain all project paperwork on file in accordance with local government administrative policy procedures.	See Section 3 and Appendix 12 for information on revised CARIP report

Option 2 Pros and Cons

Option 2 offers the following advantages:

- It offers local governments the choice to invest in local emission reduction projects; keeping money and economic spin-offs in the community;
- It reduces the number of offsets that the local government would need to purchase to be carbon neutral in respect of their operations; and
- Local governments can be confident that these projects will lead to credible emission reductions in their communities.

Option 2 has the following disadvantages:

- It will likely cost more per tonne to achieve carbon neutrality when compared to Option 1 (which has lower validation and certification costs) or Option 3 (purchase of offsets); and
- Local government staff will require time and resources to gather the necessary data and complete the project profiles, and it will be necessary to hire a qualified professional to validate the approach.

2.4.2 Preliminary Review Template for Option 2 Projects

Option 1 and 2 community emission reductions are not tradable 'offsets' (which can be sold on the carbon market), however they do provide high value emission reductions and also support local government goals of reducing community GHG emissions.

Local governments considering an Option 2 project are advised to prepare a Preliminary Review Template (see sample in Appendix 9). This assists the local government in determining the credibility and feasibility of the proposed project in terms of being able to meet the seven Project Eligibility Requirements, and helps to ensure that local governments do not invest a lot of time and / or resources in developing projects that do not meet the eligibility requirements. The Preliminary Review Template gathers basic information about the proposed project and the proposed approach to measuring GHG reductions. It identifies the proposed approach to measurement and the qualified professional (see below) who will verify the measurement approach.

2.4.3 Third Party Validation of Option 2 Projects

The local government will need to engage qualified professionals to validate that the Option 2 project meets all seven Project Eligibility Requirements.

The role of this third party validation is to confirm that project planning is sound, and that it will meet the specified project standard (the seven Project Eligibility Requirements). Validation provides the local government with upfront confirmation that if the project is implemented according to the project design, it will generate credible emission reductions in the projected amounts that can be used to balance corporate GHG emissions under the Carbon Neutral Framework.

The validating body must be from outside of the local government, i.e., third party validators who are able to provide assurance on the project conditions before it is initiated. Third party validation should be conducted by a team of qualified professionals including:

- A professional engineer under the *Engineers and Geoscientists Act;* and
- A chartered accountant under the *Accountants (Chartered) Act.*

Some projects may also require a registered professional subject matter expert, such as a registered professional forester or professional agrologist.

Depending on the uptake of Option 2 among local governments, the GCC anticipates that it may develop a list of qualified suppliers who could provide validation services for local governments to use on Option 2 projects. In the interim, however, qualifications could be established by the local government through a Request for Qualifications process.

The validation team must complete and sign off on the Project Plan Template (see sample in Appendix 10) which will need to be completed, signed and made public.

2.4.4 Third Party Verification of Option 2 Projects

Questions on the Options and completing project templates should be directed to irpd@gov.bc.ca

The emission reductions for Option 2 projects will also need to be third party verified.

Prior to claiming GHG reductions from the project, the local government must complete and sign a Third Party Verification Template (see sample template in Appendix 11), These templates show that the required project work was completed in the specified time frame and has resulted in the amount of GHG reductions being claimed.

Local governments may choose alternate formats for their reports; however the substance of these reports must be the same as those provided in the sample templates.

2.5 Option 3: Purchase Offsets from a Credible Provider

2.5.1 Overview

Under Option 3 of the Carbon Neutral Framework, local governments can offset their corporate carbon emissions by purchasing carbon offsets from a credible offset provider. Climate change is not a geographically bound issue and investing in credible offsets is a relatively straightforward and cost-effective way for communities to meet their carbon neutral commitment and help combat global warming. This section provides guidance to local governments on choosing offsets for their communities. There are three simple steps to implementing Option 3 (Table 5).

Table 5: Implementing Option 3

Step	For more information
1. **Review** the information on offsets and offset providers	Section 2.4
2. **Choose** an offset provider based on your local preference, and purchase the appropriate number of offsets.	Section 2.4
3. Prepare the annual **Climate Action Revenue Incentive Program (CARIP) Report** and include information on progress towards carbon neutrality. Retain all project paperwork on file in accordance with local government administrative policy procedures.	See Section 3 and Appendix 12 for information on revised CARIP report

Option 3 Pros and Cons

Option 3 offers the following advantages.

- Simplicity. The local government only has to measure its total emissions (in CO_2e), select the most appropriate provider for their community, and then purchase the appropriate number of tonnes of offsets.
- It is relatively inexpensive. For many local governments, this option may be the cheapest way to be carbon neutral. For example, a local government that produces 250 tonnes CO_2e annually might have to pay $6,250 to purchase offsets (at $25 per tonne), but might have to invest much more than for a community project that would save 250 tonnes CO_2e.

Option 3 has some disadvantages.

- Money paid to offset providers will support credible GHG reductions (including some British Columbia projects), however unless the provider has local or regional projects, the money paid to the provider may not directly reduce that community's emissions. However, climate change is not a geographically bound issue and all GHG reductions, no matter where they occur, help combat global warming.

2.5.2 The Carbon Market

Offsets are bought and sold as part of a "carbon market". The carbon market can be divided into:

- The compliance carbon market, which covers carbon offset sales and purchases that are **required** by government regulation or legislation. For example, the provincial government and public sector organizations are legislated to be carbon neutral and are therefore required by law to purchase offsets to the standard described in the *Greenhouse Gas Reduction Targets Act* Offset Regulation (GGRTA-EOR); and
- The voluntary carbon market, which covers offset sales and purchases by individuals or organizations wanting to reduce their carbon impact, but are **not required** to do so by government regulation or legislation. Under the Climate Action Charter, local governments are participants in the voluntary market.

Offsets created for the compliance market are typically developed to a very high standard. Offsets created for the voluntary market can vary widely in terms of quality as they may not have been developed with the same rigour, resulting in sub-standard, less reliable offsets. As participants in the voluntary market, local governments can purchase offsets created for either the compliance or voluntary carbon market. However, with this choice comes responsibility. Local governments will want to assure themselves that offset vendors are selling high-quality product in order to ensure that their purchases are resulting in real emission reductions.

Local governments may also want to find out if the offset provider can offer regional offsets in their area.

2.5.3 Offset Standards

Offset standards are tools used by offset providers in both markets to guide the development, measurement and certification of offsets. There are three core components of a carbon offset standard:

1. Robust accounting methods;
2. Monitoring, verification and validation; and
3. Registration and enforcement / compliance.

For more information on these components see http://www.co2offsetresearch.org/policy/StandardsPrograms.html

Offsets developed to a high standard are created using rules and clear guidance on accounting, quantification, monitoring, verification, and registration of offsets.

Offset providers who adhere to these standards allow buyers of carbon offsets to be confident that they are buying real, additional and permanent emission reductions. High standards ultimately provide local government buyers with greater transparency and confidence in the integrity of the offsets they are purchasing and using to declare carbon neutrality.

2.5.4 Recommended Standards

Carbon offsets need to be high quality in order to ensure emission reductions are real and help lessen the effects of global warming. There are inherent risks in the procurement of carbon offsets[14] so it is important to have a robust procurement process to ensure sufficient quality.

To assist local governments in choosing offset providers who sell offsets that meet high standards, Table 6 provides a list of recommended standards that can help local governments ensure that key quality criteria are met. All standards listed fulfill the three core components of high quality offset standards.

Table 6: Standards for Offset Providers

Standard	B.C.-based Projects	Compliance or Voluntary Market
Greenhouse Gas Reduction Targets Act/Offset Regulation (GGRTA-EOR) http://www.env.gov.bc.ca/cas/mitigation/ggrta/pdf/offsets-reg.pdf	Yes	Compliance
Clean Development Mechanism (CDM) http://cdm.unfccc.int/index.html	No	Compliance
Gold Standard (GS) http://www.cdmgoldstandard.org/Current-GS-Rules.102.0.html	Not at this time	Voluntary
Verified Carbon Standard (VCS) – IETA/WBCSD http://www.v-c-s.org/docs/VCS%20Program%20091910.pdf	Not at this time but expected	Voluntary
Climate Action Reserve (CAR) – California http://www.climateactionreserve.org/wp-content/uploads/2009/04/Climate_Action_Reserve_Program_Manual_031610.pdf	Not at this time	Voluntary

Guidance on *Selling* Offsets to an Offset Provider

As indicated in this guidebook, GHG reduction projects developed under Options 1 and 2 of this Carbon Neutral Framework are not considered 'market offsets' and are not tradable or transferable between local governments or to any other entity outside this Carbon Neutral Framework.

Some local governments may have emission reduction projects that they would be interested in developing in order to *sell* the resulting emission reductions to an offset provider. Developing a project to the standards required for a qualified offset project can lead to saleable GHG reduction credits or "offsets". This process will require an investment of time and money on the part of local governments. If a local government is considering selling offsets from its own projects to an offset provider, the local government should also discuss the option of "holding back" a portion of the offsets from the projects, in order to use these offsets to balance its own corporate emissions to achieve carbon neutrality.

[14] Auditor General for British Columbia. 2009. "Observations on Financial Reporting: Summary Financial Statements 2009/10." http://www.bcauditor.com/pubs/2009/report3/observations-financial-reporting-audit-findings-report-20

2.5.5 Additional Considerations

In addition to requiring offset providers to adhere to a certain standards, local governments are encouraged to take into consideration the following best practices and investment strategies to ensure offsets meet the needs and interests of their local communities.

- Does the offset provider have several projects and/or several project types? (This provides diversification to protect against the failure of an individual project.)
- Is the provider a B.C.-based company? (This supports growth of the B.C. green economy.)
- Does the provider provide the opportunity to invest in a portfolio of regional B.C.-based projects? (This keeps investments as local as possible.)

For many communities Option 3 will be the most cost effective and administratively straightforward approach to achieving carbon neutrality under the Climate Action Charter.

Note that the price charged per tonne of offsets may vary between providers. As well, some B.C. providers are currently working towards 'packaging' their offsets on a regional basis so that local governments can ensure that their offset purchase will be re-invested as locally as possible.

Note that at this time[15], local governments wanting to purchase offsets based in B.C. would be limited to projects that are developed to the GGRTA / EOR standard (see Table 6) and available through the Pacific Carbon Trust[16] and Offsetters[17]. However, new providers are constantly developing projects for the carbon market, and by the time that local governments are looking to purchase offsets (end of 2012 and beyond), additional B.C.-based providers may meet these standards.

[15] July 2011
[16] http://www.pacificcarbontrust.com/
[17] http://www.offsetters.ca/

3 Reporting on Carbon Neutrality

The fourth step to achieving carbon neutrality under the Carbon Neutral Framework is to **publicly report** on total corporate GHG emissions produced and how the local government has become carbon neutral by purchasing offsets (Option 3) and / or using measurable GHG reductions from Option 1 or Option 2 projects. Public reporting on climate actions and carbon neutrality supports open and transparent government. It also provides an opportunity for local governments to celebrate their climate action achievements and raise public awareness on the good work being done in their communities to reduce GHG emissions and create greener, more sustainable communities.

3.1 Revised CARIP Public Reports

Local governments should begin reporting on their progress towards carbon neutrality starting in 2013 (reporting on outcomes for fiscal year 2012). Local governments demonstrating a "net zero" balance of carbon emissions on an annual basis will be able to claim carbon neutrality for the purposes of the Climate Action Charter for that reporting year (i.e., 2012).

To streamline administration for local governments, carbon neutral public reporting requirements will be harmonized with the public reporting requirements under the *Climate Action Revenue Incentive Program* (CARIP). Starting in 2013 (reporting on outcomes for fiscal year 2012), the CARIP public reporting requirements will be amended to include a carbon neutral reporting section.[18] CARIP reports already provide a summary of the reduction activities that the local government has undertaken to reduce corporate emissions. Combining these two aspects in a single report will simplify the administrative process for local governments and result in a more comprehensive report to the public on climate actions undertaken and planned. The new carbon neutral information that will be included in the revised CARIP reports will include:

- Total annual corporate GHG emissions for the local government;
- The amount of GHG reductions being claimed in that year from Option 1 or 2 projects; and / or
- Option 3 offsets purchased.

An example of the new carbon neutral information that will be requested when the CARIP public reporting template is revised for 2013 is provided in Appendix 12.

It is anticipated that the first revised CARIP public reports will be due in early 2013, allowing time for local governments to complete their carbon neutral measurement and data gathering activities related to 2012. More information on the revised CARIP public reporting templates will be made available in the coming months.

3.2 Program Evaluation

The GCC may undertake an evaluation of the approach to achieving carbon neutrality as provided in this guidebook to support continuous program improvement.

[18] The revised CARIP reporting template will be made available to local governments prior to the carbon neutral public reporting requirements coming into effect. A sample is provided in Appendix 12.

Appendix 1. Project Eligibility Requirements

The Green Communities Carbon Neutral Framework: Project Eligibility Requirements for Option 1 and 2 GHG Reduction Projects

Eligibility Requirement and Objective	Requirement Details	Meeting the Requirement
1. **GHG reductions must be from projects undertaken outside the LG (local government) corporate emissions boundary, within the local government's jurisdiction and BC.** ⇒ Eligible projects are undertaken by (or done on behalf of) B.C. LGs only; ⇒ GHG reductions resulting from projects *within* a LG's corporate emissions boundary (as defined in the *Carbon Neutral Workbook)* are **not** included as GHG reductions under this Carbon Neutral Framework.	a) Option 1 and 2 GHG reductions must be from projects **outside** of the local government's (LG) corporate emissions boundary, as defined in the *Carbon Neutral Workbook*; b) Projects must be undertaken by one or more local governments (or done on behalf of a local government, e.g., through a grant program or P3); c) "Reductions" include reduction, removal or avoidance of GHG emissions which are defined as carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulphur hexafluoride; d) GHG reductions from Option 1 and 2 projects developed in accordance with the seven Project Eligibility Requirements under this Carbon Neutral Framework cannot be sold or traded to other local governments and have no value outside of the Carbon Neutral Framework; and e) In the case where two or more local governments undertake a joint project, they must agree among themselves as to how the emission reductions from the project will be allocated between the participating local governments.	As part of the Option 1 or Option 2 Self Certification / Third Party Verification Template(s), a local government official (e.g., CAO, CFO) or third party validator must attest that they have read and understood the Option 1 and 2 Project Eligibility Requirements under this Carbon Neutral Framework and that the GHG reduction project outlined in the Project Plan Template is outside the LG's corporate emissions boundary as defined in the *Carbon Neutral Workbook*. Templates must completed and made public prior to claiming emission reductions from a project.
2. GHG reductions must have occurred in order to qualify as a reduction under this Carbon Neutral Framework. ⇒ GHG reductions being claimed in a given year have already occurred (or be recognized as an emission avoidance in the case of household organic waste composting); and ⇒ The balance of GHG reductions earned and not used in a given year are eligible for carry over to subsequent years (starting in 2012).	a) Only those emission reductions that occur after January 1, 2012 (the start date of the LG's carbon neutral commitment) can be used as a GHG reduction under this Carbon Neutral Framework; b) The amount of GHG reductions being claimed in a particular year must have occurred by the end of that year. If the annual GHG reductions from a project in a given year is greater than the amount required by the LG to offset its corporate emissions for that year, the balance of the GHG reductions that have occurred may be carried forward and used to balance that LG's corporate emissions in future years.	As part of the Option 1 or Option 2 Project Plan Template(s), a local government official (e.g., CAO, CFO) or third party verifier must attest to the amount of GHG reductions being claimed and that the project work required to achieve the GHG reduction was completed by the end of the year in which the GHG reduction is being claimed. Templates must be completed and made public prior to claiming emission reductions from a project.
3. GHG reductions have been credibly measured ⇒ GHG reductions from LG projects under this Carbon Neutral Framework are calculated in a way that is flexible, administratively streamlined and credible.	**Option 1 Projects:** GHG reductions from Option 1 projects can be credibly measured using the reduction formulas outlined in the project profiles. a) If a LG undertakes a GCC-supported project and measures the GHG reductions in accordance with the projects profiles provided, the project measurement is deemed to be credible under this Carbon Neutral Framework; b) Consistent emission factors will be used and updated as required for all GCC-	LGs must measure the project GHG reductions in accordance with the GCC project profiles and must complete and make public a Self Certification Template attesting to the amount of GHG reductions being claimed and that the GHG reductions were achieved by the end of the year for which the GHG reductions are being claimed. Templates must be completed and made public prior to

Eligibility Requirement and Objective	Requirement Details	Meeting the Requirement
	supported project profiles; c) By applying the project profiles, a LG can calculate the GHG reductions for a particular project that can be used annually to balance the LG annual corporate emissions; and d) The project profiles identify the length of time over which GHG reductions will be produced by a project. This will vary by project type. e) For Option 1 Avoided Forest Conversion Projects (AFCP) only, eligible project lands must be: • owned by the local government, • reserved or dedicated as park under section 30 of the *Community Charter* after the initial signing of the Climate Action Charter in 2007, and; • a Forest Management Plan, to be updated every 10 years or more frequently, must be in place within six months of making public the first completed Self Certification Template.	claiming emission reductions from a project.
	Option 2 Projects: Option 2 projects require third party validation of the project to ensure credibility. In completing the Option 2 Project Plan Template, third party validators are required to confirm that: a) The project planning is sound; and b) The proposed project meets all seven Project Eligibility Requirements, including that: i. the approach to measurement of the projected GHG reductions from the project is robust; and ii. based on their professional opinion, the projected GHG reductions are credible and reasonable.	Prior to implementation, a LG is encouraged to complete an *Option 2 Project: Preliminary Review Template* to assist the local government in determining if the proposed project would meet all seven Project Eligibility Requirements. If the local government is satisfied that the project is eligible under the Carbon Neutral Framework and the projected GHG reductions can be credibly measured by a third party validator and verified, the LG could proceed with the project by completing an Option 2 Project Plan Template. Note that unlike Option 1, Option 2 Project Plan Templates require third party validation and sign off. Prior to claiming a GHG reduction from an Option 2 project, the LG must also complete a Third Party Verification Template to attest that the necessary project work was completed and the estimated GHG emissions from the project were achieved. Templates must completed and made public prior to claiming emission reductions from a project.
4. GHG Reductions are beyond Business as usual (BAU) ⇒ Offset dollars invested in projects are beyond what would be expected under the 'business as usual' scenario; ⇒ Option 1 projects are deemed to be beyond BAU	Projects must demonstrate that the GHG reductions achieved through the project are in addition to what would have occurred in the absence of the project (i.e., 'beyond Business as Usual' (BAU). To be considered beyond BAU a project must meet the following criteria: a) Have commenced after the initial signing of the Climate Action Charter on September 26th, 2007;	**Option 1 Projects:** Option 1 Projects are all considered 'beyond BAU' for all LGs for the purpose of criterion (c). As part of the Option 1 Project Plan Template, the LG has to attest that the project is not required to meet a legislative or regulatory requirement and that the project commenced after September 26th, 2007.

Eligibility Requirement and Objective	Requirement Details	Meeting the Requirement
for all local governments for the purposes of criterion (c); ⇒ Option 2 projects must demonstrate that the project is beyond BAU for the purposes of all three criteria (i.e., a, b, and c).	b) Not be required to fulfill federal or provincial government legislative or regulatory requirements; excludes local government regulations/bylaws except in the case of Avoided Forest Conversion Projects (AFCP) (see d) below); and c) Meet one of the following tests (note that all GCC Option 1 Projects are *deemed to* meet criteria "c".): i. *Financial Test:* A project can only be considered 'beyond BAU' if it is not financially viable without investment from the local government(s) that will use the resulting emission reductions to balance its / their corporate carbon emissions; ii. *Barriers Test*: A project can only be considered 'beyond BAU' if there are barriers, such as significant local resistance, lack of know-how, institutional barriers, etc., that prevent its being implemented regardless of its profitability; or iii. *Common Practice Test*: A project can only be considered beyond BAU if it employs technologies or practices that are not already in common use. d) In addition to the above BAU criteria, GCC Option 1 - Avoided Forest Conversion Projects (AFCPs) must also demonstrate that local government zoning that would have permitted the conversion of project lands to a non-forest use was in place just prior to the project start date and before lands are reserved or dedicated as park under section 30 of the *Community Charter.*	**Option 2 Projects:** As part of the Option 2 Project Plan Template, a third party validator must attest that they have read and understood the requirements under the Carbon Neutral Framework and attest that the project meets all seven Project Eligibility Requirements, including demonstrating that the project is 'beyond BAU' for the purposes of a, b and c criteria.
5. Reporting requirements are transparent and accountable ⇒ Public reporting ensures transparency and accountability. ⇒ The GCC may undertake a program evaluation of the Carbon Neutral Framework outlined in this guidance to support continuous improvement.	**Option 1 and 2 project plan and certification reporting:** a) Project plan templates for Option 1 and Option 2 projects must be completed, signed and kept on file in accordance with the local government's administrative policies and procedures. b) Project self-certification templates for Option 1 and verification templates for Option 2 projects must be completed and signed, prior to a GHG reduction being claimed, to demonstrate that the projected GHG reductions have occurred by the time they are being claimed. **Carbon Neutral Public Reports (included in CARIP Report):** a) The LG must also make public (on an annual basis) a carbon neutral report which includes, at a minimum: i. Total annual corporate GHG emissions for the LG; ii. The amount of GHG reductions being claimed in that year from Options 1, 2 and / or 3; b) LGs demonstrating a 'net zero' balance of carbon emissions in their carbon neutral reports can claim carbon neutrality for the purposes of the Climate Action Charter for that reporting year.	As part of the Option 1 or Option 2 Project Plan Template (s), a local government official (e.g., CAO, CFO) or third party validator must attest that they have read and understood the Option 1 and 2 Project Eligibility Requirements under this Carbon Neutral Framework and that they are aware of the annual public reporting and audit requirements. The carbon neutral public reporting requirements will be harmonized with the public reporting requirements under the Climate Action Revenue Incentive Program (CARIP). CARIP reports already provide a summary of the reduction activities that the local government has undertaken to reduce corporate emissions. Combining these two reports will not only ease the administrative burden for local governments but will result in a more comprehensive report to the public that indicates climate actions undertaken to reduce corporate and community-wide emissions and demonstrate progress toward carbon neutrality as well as actions taken to achieve carbon neutrality including the

Eligibility Requirement and Objective	Requirement Details	Meeting the Requirement
	The carbon neutral public reporting requirements outlined above will be harmonized with the public reporting requirements under the Climate Action Revenue Incentive Program (CARIP). The revised CARIP reports template will be made available to local governments prior to the carbon neutral public reporting requirements coming into effect. It is anticipated that the first carbon neutral public reports will be due in early 2013 to provide time for LGs complete their carbon neutral measurement and data gathering activities related to 2012. The GCC may undertake a program evaluation of the Carbon Neutral Framework outlined in this guidance to support continuous improvement.	undertaking Option 1 and / or 2 GHG reductions projects and / or purchasing offsets (Option 3).
6. GHG emission reductions are counted only once ⇒ GHG emission reductions are not "double counted".	The GHG reductions being claimed by a local government under this Carbon Neutral Framework must not have been previously committed or sold as an emission reduction under any other alternate emission-offset scheme.	As part of the Option 1 or Option 2 Project Plan Template(s), a LG official for Option 1 projects or third party validator for Option 2 projects must attest that they have read and understood the Option 1 and 2 Project Eligibility Requirements under this Carbon Neutral Framework and that the GHG reductions being claimed have not, and will not, be committed or sold outside this Framework.
7. The LG has clear ownership of the emission reductions ⇒ The local government has exclusive right to the the GHG reductions from the project; ⇒ Demonstrating carbon ownership is necessary, particularly in multi-entity service arrangements, to ensure that 100% of the emissions from the project are accounted for, i.e., 'owned' and to guard against the reductions being sold to multiple buyers.	A local government must demonstrate that they have exclusive right to the GHG reductions from the project. Demonstrating carbon ownership is necessary, particularly in multi-entity service arrangements to ensure that 100% of the emissions from the project are accounted for (i.e., 'owned') and to guard against the reductions being sold to multiple buyers. The issue of carbon ownership is currently being reviewed by the Ministry of the Environment and further guidance on the approach to carbon ownership may be forthcoming as a result of that review. However, in the interim, the approach to demonstrating carbon ownership under the Carbon Neutral Framework is as follows: a) If the proposed GHG reduction project is solely funded and owned by the local government and ownership of the GHG reductions from the project is explicit and unlikely to be challenged, the local government would be required to attest to ownership of the GHG reductions from the project; b) If the GHG reduction project is funded under an agreement with the Federal government, Provincial government, Crown Corporations or other government agency, in principle, if the agreement is silent on carbon ownership, the local government can claim ownership of the GHG reductions from the project; c) In all other cases where a third party is involved in project under an agreement (e.g., P3, LG grant to a non-profit), the agreement must clearly set out who has the exclusive right to the GHG reductions from the project. For a project with multiple local governments involved in developing / implementing the GHG reduction project / program, once the carbon ownership is established as outlined above, consensus agreement needs to be reached between the local governments on how the carbon reduction benefits from the project / program will be apportioned.	As part of the Option 1 or Option 2 Project Plan Template(s), a LG official for option 1 projects or third party validator for Option 2 projects must attest that they have read and understood the Option 1 and 2 Project Eligibility Requirements under this Carbon Neutral Framework and that they have exclusive right to the GHG reductions from the project.

Appendix 2. Calculating Emission Reductions for Building Retrofits/Fuel Switching (Option 1A)

GREEN COMMUNITIES CARBON NEUTRAL FRAMEWORK
OPTION 1: PROJECT PROFILE
ENERGY EFFICIENT BUILDING RETROFITS AND FUEL SWITCHING

Project Profile Overview

This document provides guidance on estimating the emission reductions potential associated with increasing the energy efficiency of existing building envelopes and the technologies used for space heating / cooling and hot water, as well as for switching building systems to allow the use of lower carbon fuels. One of the greatest opportunities within communities for reducing greenhouse gas (GHG) emissions is the existing building stock. This project involves retrofitting non-government owned buildings in the community or local government owned / operated buildings that are outside the boundaries of "traditional local government services" (such as social housing).

There is a broad array of retrofit options available to building owners that can result in reductions of GHG emissions. The retrofit options include measures that (1) increase the efficiency of building shells through better insulation and windows, (2) increase the efficiency of building equipment (e.g., furnaces, air conditioners, boilers, hot water heaters), and (3) cause fuel switching from a high carbon energy source (e.g., light oil) to a low carbon energy source (e.g., electricity).

All retrofit measures that result in GHG emission reductions using the guidance below are included in this project type. Lighting and other non-heating / cooling retrofit projects are not covered by this project description because of challenges developing a simplified calculation.

Calculating Emission Reductions

In order to meet the heat and hot water needs of a building, energy (e.g., natural gas, fuel oil, electricity) is used to achieve a desired room or water temperature. The emissions from these sources (Baseline Emissions) depend on the type of energy used, the efficiency of the furnace or heater, and the efficiency of the building envelope or water system. A project addressing any of these factors can improve the GHG performance of an existing building. The equation for estimating emission reductions is as follows:

Annual Net Emission Reductions = Annual Baseline Emissions – Annual Project Emissions

This summary provides a high level outline of the most important variables involved in determining emission reductions from a project compared to a baseline situation. Successful projects will require complete information and clear documentation of calculations that conform to the Carbon Neutral Framework's Methodology Standards and Reporting Requirements.

There are multiple accepted approaches for quantifying emission reductions among building energy efficiency carbon credit protocols. To simplify data provisions for building owners, a "simple, whole facility" quantification approach is used for this project type. Under this approach energy use for the entire building is included in the baseline and project calculations utilizing conservative assumptions and methods for determining energy use and calculating energy reductions.[19] The accounting methodologies used here were designed with the data that building managers have available to them in mind. Calculating energy use and GHG reduction is based on utility data.

Spreadsheet Direction

The embedded spreadsheet simplifies the calculations needed to determine the annual emission reductions associated with an energy efficiency project.

EERETROFITS.xlsx

Project Example

The spreadsheet demonstrates the following example.

A local government decides to retrofit 25 households within the community. The retrofits include replacing oil furnaces with air source heat pumps and sealing all gaps and cracks with new weather stripping.

Task	Input/Output
Step 1: Enter dates	
Enter the dates for the baseline and project years.	In the example, the baseline years are 2009 to 2011, and the project year is 2012.
Step 2: Calculate baseline consumption	
Enter the baseline energy consumption from the last three years' of utility bills (electric and heating oil). Total electricity consumption (kWh) and heating fuel consumption (GJ) are entered for each year to establish a three-year average.	In this example, the average annual electricity consumption over three years for the 25 households used for appliances, lighting, and hot water heating totalled 280,000 kWh. The average annual heating oil consumption for space heating in the 25 households over the same three years totalled 1,900 GJ.
Step 3: Calculate project consumption	
Enter the energy consumption for the project year from utility bills. In this example the oil furnaces are replaced with air source heat pumps so there is not just an electricity bill.	Total electricity use goes up in the project year to 320,000 kWh due to the new air source heat pumps.
Step 4: Estimate energy use for heating and cooling	
Estimate the share of electricity consumed for space heating and cooling. This step is required to determine what portion of an electricity bill is due to space heating and cooling	In this example, electricity was not used for space heating in the baseline. However, the air source heat pumps use electricity in the project year. The amount of electricity used by the air sourced heat pumps is estimated to be 140,000 kWh, or 33% of total electricity use in the project year. The total electricity used by the heat pumps was determined by using manufacturers' specifications that are provided with the product.

[19] This approach is based on a synthesis of guidance provided by: Government of Alberta (2010). *Quantification protocol for energy efficiency in commercial and institutional buildings*. Version 1.0. October 2010.

Step 5: Enter heating degree days	
Enter heating degree days to calculate the "weather-adjusted" project energy consumption. This step is needed to correct for annual average temperatures that are colder or warmer than average. Heating degree days are used to estimate how cold it was over the year and how much energy may be needed to keep buildings warm.	In this example, the project year was slightly colder than the baseline years
Step 6: Calculate emission reductions	
The spreadsheet does the calculations to estimate the total annual net emission reductions.	In this example, the net annual emission reductions from all 25 households are 168.2 tonnes.

Project Calculation Guidance

Information Requirements & Sources	Energy usage for each energy type (electricity, natural gas, heating oil, etc) for one year ♦ Source: Utility data Number of heating-degree-days for the calendar year ♦ Source: Government of Canada weather service; http://www.degreedays.net Emission factor for each energy type ♦ Source: The Climate Registry and Natural Resources Canada: http://www.theclimateregistry.org/resources/protocols/general-reporting-protocol/ ; http://www.theclimateregistry.org/downloads/2010/08/Default-Emissions-Factors.xls
Calculations	The energy calculation for the project year will need to be adjusted to account for potential differences in weather and building uses with the baseline year. Weather Correction Total energy consumption x ((1-heating dependent share of energy) + (heating dependent share x heating degree days in the baseline year/heat degree days in project year) = weather adjusted energy consumption Multiply by an adjustment factor of 0.9 to account for potential overestimation of GHG reductions as a result of assumptions and simplified calculation methodology After annual energy use is estimated, annual GHG emissions can be calculated: CO_2e = Total annual energy use x emission factor
Notes	Total baseline emissions should be calculated based on one calendar year of activity

Note on Energy Audit GHG Quantification: Alternate methodologies that rely on pre- and post-project energy audits could also be used to quantify energy and GHG emission reductions. The set of assumptions used by energy auditing companies to forecast post retrofit energy usage would be need to be specified and standardized for different building typologies.

Carbon Neutral Framework Compliance

The following checklist outlines seven Project Eligibility Requirements under the Carbon Neutral Framework. Option 1—*GCC Supported Projects* — are already considered to meet project eligibility requirements three and four below. To demonstrate how an Option 1 project meets the five remaining eligibility requirements, simply complete and make public an Option 1 Project Plan Template (see Appendix 6).

For more information on the project eligibility requirements please refer to section 2.1.1 and Appendix 1 of the *Becoming Carbon Neutral* guidebook.

Checklist:

1. Emission reductions are outside of the local government corporate emissions boundary
2. Emission reductions have occurred before they are counted
3. Emission reductions are credibly measured
4. Emissions reductions are beyond business as usual
5. Accounting of emission reductions is transparent
6. Emission reductions are only counted once
7. Project proponents have clear ownership of all emission reductions

Local Applicability and Cost Factors

Building Ownership, Control and Data

The biggest factor in determining whether a local government will be able to successfully implement an energy efficiency retrofit program in their community and receive carbon reduction credits under the Carbon Neutral Framework will be its ability to establish a mechanism through which it facilitates or oversees the retrofit program, is able to establish ownership of the carbon reductions, and collects the necessary data for establishing baseline energy use and measuring / reporting / estimating post-project reductions. This mechanism could take a number of different forms, including retrofit program organizer, provision of a financial subsidy to assist residents (or a sub-section, such as low-income households) to conduct retrofits, or the creation of a website to chart collective community emission reductions or emission reductions by neighbourhood.

If a local government exerts operational or financial control over social housing buildings, this presents a clear opportunity for undertaking a retrofit project within this Carbon Neutral Framework because the project facilitation and data collection barriers mentioned above can be avoided.

Community and Sustainability Co-Benefits

Building energy retrofit projects have a number of significant community co-benefits. These include energy cost savings that begin to accrue as soon as the retrofit is completed; the stimulation of the local economy through the creation of demand for new types of expertise, services and products; educating residents and businesses about the benefits of energy efficiency and reduction; improved quality of indoor environments through better heating / cooling; and reduction in vulnerability to rising energy costs.

Precedents

Currently in Canada, most building energy efficient retrofit programs are administered by federal and provincial agencies and energy utilities, with local governments mainly assisting in the dissemination of information through their websites. There are a few examples of local governments playing a more direct role in retrofit programs within Canada and elsewhere in North America.

- The City of Edmonton's CO2RE program, in partnership with the federal Residential Rehabilitation Assistance Program is offering $2,000 rebates to low income households that install high-efficiency furnaces. http://www.edmonton.ca/environmental/documents/LowIncomeFAQ-200-12-07.pdf

- The City of Chula Vista, California has obtained funding from the federal government and has partnered with San Diego Gas and Electric Utility to offer residents and business owners' performance based rebates for building energy efficiency retrofits. http://www.ci.chula-vista.ca.us/clean/conservation/Climate/documents/CVEEIncentive_ProgramPlanFINAL.pdf
- The Better Buildings Partnership (BBP) was created by the City of Toronto's Energy Efficiency Office to provide resources including financial assistance for both energy efficient retrofits and new construction. BBP is currently partnered with the Ontario Power Authority to deliver attractive energy savings incentives for multiple building types. http://bbptoronto.ca/
- The City of Bellingham, Washington has created the "Community Energy Challenge" in partnership with local non-profit organizations, Puget Sound Energy and Cascade Natural Gas to promote community-wide energy efficiency improvements. This program will offer resources for energy efficient improvements to commercial and residential facilities; reduce barriers to implementing energy efficiency technology, train a workforce to implement building improvements; and raise awareness of energy-conservation opportunities through social marketing. The EECBG funds will be used to develop the program and create a financing mechanism, which will leverage private investment from local lenders for energy efficiency projects. http://www.cob.org/government/departments/pcd/eecbg-program.aspx

Resources

Quantification Protocols and Methods

- Energy Efficiency in Commercial and Institutional Buildings Quantification Protocol, Government of Alberta, October 2010: http://environment.gov.ab.ca/info/library/8295.pdf
- International Performance Measurement and Verification Protocol, Volume I, II and III. AMS-II.E.: Energy efficiency and fuel switching measures for buildings --- Version 10, CDM-UNFCCC: http://cdm.unfccc.int/UserManagement/FileStorage/CDMWF_AM_LAVBAV8STPGYPWVKGQJLBCNEC8APNP

Grants, Rebates and Information on Technologies

- LiveSmart BC Efficiency Incentive Program: http://www.livesmartbc.ca/homes/h_rebates.html
- NRCAN ecoENERGY Retrofit Incentives for Commercial/Institutional Buildings: http://oee.nrcan.gc.ca/commercial/financial-assistance/existing/retrofits/index.cfm
- NRCAN ecoENERGY Retrofit Incentives for Homes: http://oee.nrcan.gc.ca/residential/personal/grants.cfm
- BC Hydro PowerSmart: http://www.bchydro.com/powersmart/
- FortisBC Gas Energy Efficiency Programs:
    - For homes: http://www.fortisbc.com/NaturalGas/Homes/Offers/Pages/default.aspx
    - For businesses: http://www.fortisbc.com/NaturalGas/Business/Offers/Pages/default.aspx
- FortisBC Powersense program: http://www.fortisbc.com/powersense/powersense_main.html

Appendix 3. Calculating Emission Reductions for Solar Thermal (Hot Water) Retrofits (Option 1B)

GREEN COMMUNITIES CARBON NEUTRAL FRAMEWORK
OPTION 1: PROJECT PROFILE
SOLAR THERMAL (HOT WATER) RETROFITS

Project Profile Overview

This project profile provides guidance on estimating the amount of greenhouse gas (GHG) emissions that can be avoided by using solar thermal (hot water) systems to pre-heat the hot water supply. It covers installations on social housing buildings and on buildings not owned by the local government.

Rooftop solar hot water is a mature technology that has been successfully used in a variety of climate zones for decades. Around the world and in British Columbia, the number of solar hot water installations is increasing rapidly. Financial incentives are offered by LiveSmart BC.

Calculating Emission Reductions

Annual Net Emission Reductions = Annual Baseline Emissions – Annual Project Emissions

Solar hot water projects achieve GHG emission reduction through a zero carbon and renewable resource in place of conventional energy used to heat water. This profile includes projects where the installed solar hot water system partially or completely replaces the use of natural gas or fuel oil for hot water heating. The calculation does not cover solar electricity generation or the use of solar thermal energy for space heating.

To establish the emission reductions that result from installations, the amount of energy collected by the solar equipment is determined. This total is then used to calculate baseline avoided natural gas or fuel oil emissions.

$$\text{Emission Reduction} = \frac{\text{Energy collected (Solar water heater)}}{\text{Efficiency (Displaced Equipment)}} \times \text{GHG emission factor (Displaced Energy)}$$

Spreadsheet Directions

The embedded spreadsheet calculates the avoided GHG emissions from multiple solar water heater installations. Recognizing that the performance of installations can vary due to hot water usage, geographical location, and system installation and operating parameters, the spreadsheet includes room to calculate five distinct aggregations of project types. For example, a group of residential homes that have a similar type of solar hot water system installed can be calculated under project type #1, and then the next group of similar type of solar hot water system installations can be calculated under project type #2 and so on.

SWH & Efficient Vehicle Actions (Mar 9

The directions below lay out the steps for calculating multiple project types.

Step 1: Project name and capacity	
Project Name. The spreadsheet includes a series of separate project types to allow for variations in usage, performance, and equipment.	Choose a name common to the project type.
Total Installed Capacity. Calculate the total area of solar collectors for the project type.	Total Installed Capacity (m^2) = Total of installed systems x Average area of solar collector (m^2)
Step 2: Calculate average performance	
Average performance of the project type will depend on hot water usage, geographic location, aspect of the system, and system installation and operating parameters. It is recommended that the estimated performance of each installation be provided by the building owner. Otherwise software such as RETScreen can be utilized to calculate a general project average.	In the absence of a project specific average, the spreadsheet contains default performance averages for typical building types ($GJ/m^2/yr$)
Total Water Heating Provided (GJ/yr)	Total Water Heating Provided (GJ/yr) = Average Performance ($GJ/m^2/yr$) x Total Area Installed Capacity (m^2)
Step 3: Calculate baseline and emission reductions	
Displaced Water Heater Average Efficiency.	Calculate the average efficiency of displaced water heaters for each energy type - natural gas or light fuel oil (%).
Proportion of Energy Sources Displaced. This identifies the proportion of energy types that have been displaced.	100% = (natural gas systems displaced/total systems)% + (light fuel oil systems displaced/total systems)%
Calculate Baseline Energy Displaced.	For each energy source calculate: Energy displaced (GJ/yr) = Total Water Heating Provided (GJ/yr) x proportion energy displaced (%)/Displaced Water Heater average efficiency (%)
GHG emission reduction	GHG avoided (tonnes CO_2e/yr) = (natural gas energy displaced x 0.06 tonnes CO_2e/yr) + (light fuel oil energy displaced x 0.09 tonnes CO_2e/yr) + (electricity energy displaced x 0.01 tonnes CO_2e/yr)
Step 4: Repeat Steps 1 through 3 for Remaining Project Types	
Step 5: Calculate Total Avoided GHG Emissions	
Avoided Emissions = Sum of Project Type #1, #2, #3, #4, and #5 emission reductions	Spreadsheet output

Baseline and Project Calculation Guidance

Information Requirements & Sources	Energy type Water temperature Hot water demand volume or Size and energy rating of hot water heater Number of building occupants Number of showers and sinks ♦ Source: Building owner / manager / tenant Emission factor for each energy type ♦ Source: The Climate Registry and Natural Resources Canada: http://www.theclimateregistry.org/resources/protocols/general-reporting-protocol/ ; http://www.theclimateregistry.org/downloads/2010/08/Default-Emissions-Factors.xls
Calculations	Except in rare cases where a building has a meter that monitors energy use from its hot water heater, it will be necessary to use energy modeling software to estimate total energy use over the course of a year. A few software options include: ♦ Retscreen – Free to register and download. Allows for energy and economic analysis. www.retscreen.net ♦ Watsun – Free to register and download. Allows for energy and economic analysis. Many customizable options for advanced users and detailed analysis. http://canmetenergy-canmetenergie.nrcan-rncan.gc.ca/eng/software_tools/watsun.html ♦ Polysun Solarthermal Simulation – Design tool for solar installation professionals. Approximately $800 to buy. http://www.velasolaris.com/vs2/index.php?article_id=8&clang=1 ♦ Transol 3 – Based on the widely used TRNSYS modeling platform. Detailed analysis for system designers and engineers. Approximately $800 to buy. http://www.aiguasol.coop/index.php?page=662 ; http://sel.me.wisc.edu/trnsys/features/ After annual energy use is estimated, annual GHG emissions can be calculated: CO_2e = Total annual energy use x emission factor
Notes	Total baseline emissions should be calculated based on one calendar year of activity
	Total project emissions should be calculated based on one calendar year of activity Documenting the assumptions used in calculating energy use and GHG emissions for this project will be important, because of the large number of variables involved. The calculation tools listed above provide summary tables of the inputs and outputs that can be used for the purpose of documentation.

Carbon Neutral Framework Compliance

The following checklist outlines seven Project Eligibility Requirements under the Carbon Neutral Framework. Option 1—*GCC Supported Projects* — are already considered to meet Project Eligibility Requirements three and four below. To demonstrate how an Option 1 project meets the five remaining eligibility requirements, simply complete and make public an Option 1 Project Plan Template (see Appendix 6).

For more information on the project eligibility requirements please refer to section 2.1.1 and Appendix 1 of the *Becoming Carbon Neutral* guidebook.

Checklist:

1. Emission reductions are outside of the local government corporate emissions boundary
2. Emission reductions have occurred before they are counted
3. Emission reductions are credibly measured
4. Emissions reductions are beyond business as usual

5. Accounting of emission reductions is transparent
6. Emission reductions are only counted once
7. Project proponents have clear ownership of all emission reductions

Local Applicability and Cost Factors

- **Local Government Role as Project Facilitator:** The applicability of this project is dependent on the local government having the capacity to play a facilitation role. Each local government will need to determine an appropriate role to play in the promotion of solar hot water heaters. If a local government owns social housing, then it could directly install or fund the installation of solar thermal systems. Alternatively, the local government could potentially create development permit area guidelines, provide technical assistance, or find other means of helping residents and businesses install solar systems.
- **Energy Source Used in Conventional Hot Water Heaters:** In some jurisdictions, the norm among developers over the years has been to install electric hot water heaters. Because of the low carbon content of electricity in British Columbia, replacing an electric hot water heater with a solar hot water heater will result in a very small reduction in GHG emissions.
- **Project Monitoring and Reporting Effort and Costs:** Collecting and reporting data on baseline and project energy use and GHG emissions could present logistical challenges when the buildings are not owned or operated by the local government. This will be the situation in all cases except for government owned social housing projects. The local government will need to identify a mechanism to obtain data necessary to complete the GHG emission reduction calculations (details of the specific data needs are covered in the GHG Accounting Summary section). This may necessitate email, web, telephone or mail-based outreach in combination with social marketing tools to secure the participation of community members / groups and to provide a convenient mechanism for reporting data. For example, an estimate of annual average performance for each installation is required to accurately estimate emission reductions.

Community and Sustainability Co-Benefits

Solar hot water systems decrease monthly energy costs through a reduction in natural gas and electricity use and they create local jobs through the demand for new services and expertise.

Precedents

There are many examples of solar hot water projects throughout the Province. These include:

- The City of Campbell River has installed solar hot water heating at Timberline Secondary School as a community pilot project (http://www.solarbc.ca/news/2010/12/10/let-there-be-solar-powered-light).
- The City of Fort St. John is one of many communities that have adopted the BC Solar Ready Guidelines and will building permit rebates for houses that include solar hot water systems or are solar ready. (http://www.solarbc.ca/solar-communities/fort-st-john)
- The Okanagan Shuswap Solar Project is funded by the Government of Canada ecoENERGY for Renewable Heat Program and will support the installation of 600 solar hot water systems in new single-family homes – 470 targeted for the Central Okanagan.

Project Variations

Other projects that could potentially meet the Carbon Neutral Framework's criteria with some basic adjustments in the methodology include:

- Solar Thermal Space Heating – There are a variety of technologies and building designs that can be utilized to capture the energy of the sun for building space heating.
- Solar Electricity Generation – Solar photovoltaic (PV) panels can be placed on roofs and walls to generate electricity for in-building use.

Resources

- Solar BC: http://www.solarbc.ca
    - Directory of Installers
    - Director of Systems
    - Incentives and Costs
    - Map of Installations in the Province
- CanmetENERGY Performance Directory of Solar Domestic Hot Water Systems: http://canmetenergy-canmetenergie.nrcan-rncan.gc.ca/eng/renewables/solar_thermal/sdhw_directory.html
- ecoENERGY list of accepted solar collectors: http://www.ecoaction.gc.ca/ecoenergy-ecoenergie/heat-chauffage/v2008/collectors-capteurs-eng.cfm
- Solar Rating Online - www.solarrating.ca. Obtain an online assessment of the solar thermal generation potential for your building
- Government of Canada ecoENERGY for Renewable Heat program: http://www.ecoaction.gc.ca/ecoenergy-ecoenergie/heat-chauffage/index-eng.cfm
- Vancity Eco-efficiency Loans (Information on receiving a business loan for the installation of solar hot water system): https://www.vancity.com/MyBusiness/BusinessFinancing/GreenBusiness/EcoEfficiencyLoans/
- United Nation Clean Development Mechanism (CDM) approved methodology for thermal energy carbon credit projects: http://cdm.unfccc.int/methodologies/DB/NECVHRT26U32SARZYYLD3E8J4UE590/view.html

Appendix 4. Calculating Emission Reductions for Household Organic Waste Composting (Option 1C)

GREEN COMMUNITIES CARBON NEUTRAL FRAMEWORK
OPTION 1: PROJECT PROFILE
HOUSEHOLD ORGANIC WASTE COMPOSTING

Project Profile Overview

This project profile provides guidance on estimating the amount of greenhouse gas (GHG) emissions that can be reduced by diverting household[20] organic waste into a centralized community composting system rather than sending it to a landfill. When organic waste is placed in a landfill it decomposes gradually over decades and creates a significant amount of methane due to the absence of oxygen. In contrast, when organic waste is composted it decomposes within one year and predominantly creates carbon dioxide because oxygen is made available.

Because methane is 21 times more potent than carbon dioxide on a 100-year global warming potential basis, composting can reduce GHG emissions by over 90% in contrast to sending the same waste to a landfill.

Management practices and systems for centralized composting programs have had many years of advancement in communities of all sizes across North America. Composting systems that local governments can choose from include turned windrows, covered aerated static piles and in-vessel composting. See the "Technology Options Overview" section for further information on composting systems that are eligible under this profile.

There many composting technology options that vary in terms of complexity and the kinds of organic waste that can be processed. This project profile category does not cover anaerobic digestion—a contained process that produces a gas that can be combusted to generate heat and / or power—due to the complexity of assessing emission reductions. Backyard composting is also not covered by this project profile because of the onerous data collection and administration challenges associated with a very large number of small systems that would be difficult to monitor.

Although the exact number will vary by community, this project profile estimates that every tonne of organic waste that is diverted from a landfill into a centralized composting system will result in roughly a tonne of GHG emission reductions. Note that very rough estimate could be higher or significantly lower depending on a number of community factors. Specifically, an existing or planned landfill gas capture system at the landfill site will decrease the emission reduction potential.

Calculating Emission Reductions

Annual Net Emission Reductions = Annual Baseline Emissions – Annual Project Emissions

[20] Household organic waste can include household food waste and organic yard waste such as grass clippings, but not branches and other woody debris. This is because woody material does not decompose at the same rate.

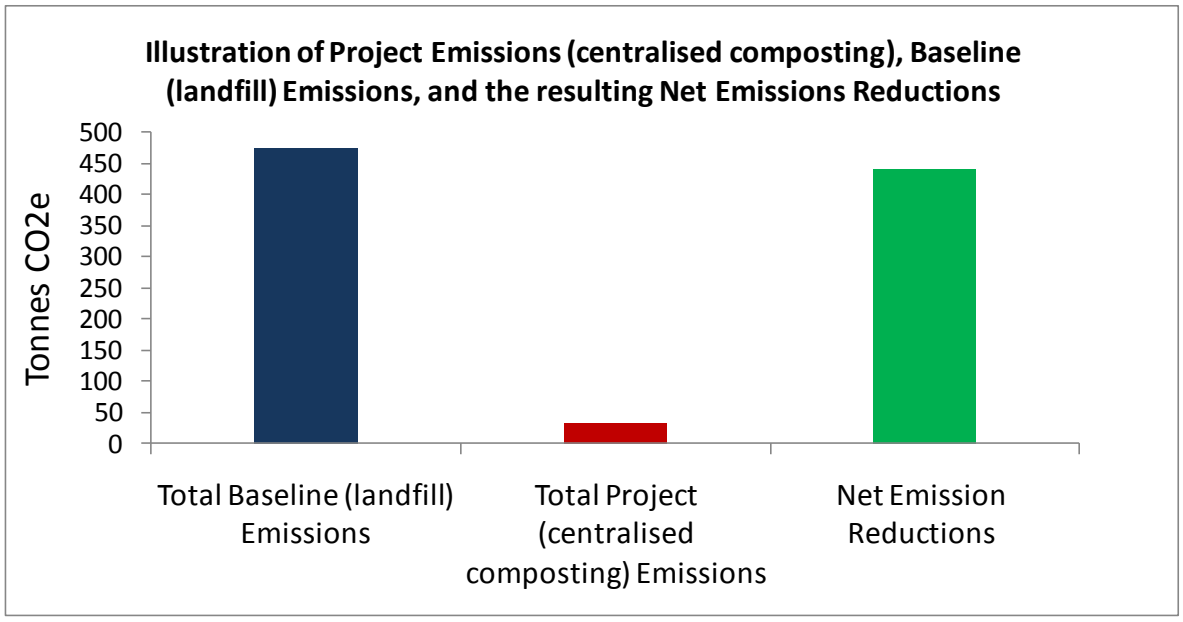
When organic waste is placed in a landfill, methane emissions occur gradually over 30 to 100 years as the material gradually decays (Baseline Emissions). In contrast, placing the same amount of organic waste in a centralized composting facility involves a rapid aerobic decay that generates far fewer emissions within a single year (Project Emissions). So when organic material is composted instead of going to a landfill, there is a reduction of emissions that would have occurred at the landfill in the future. This project profile provides an accounting approach to measuring these reductions over time in each year that they would have occurred.

Project Example:

The following example illustrates the steps needed to estimate the Net Emission Reductions associated with diverting organic waste out of a landfill and into a centralized composting facility. The example is fictional and all of the calculations can be found in the spreadsheet that is embedded below.

In 2012, a local government with a community population of 10,000 people implemented an organic waste composting system that diverts 339 tonnes of organic waste out of the landfill. Using this example, the figure below illustrates the Baseline Emissions that would have occurred if the waste was sent to a landfill, represented by the blue bar. In contrast the red bar represents the Project Emissions that would be generated by instead diverting the 339 tonnes to a centralized composting facility. The green bar represents the Net Emission Reductions of 441 tonnes, which is equal to the Baseline Emissions (474 tonnes) minus the Project Emissions (33 tonnes).

Illustration of the Net Emission Reductions from diverting 441 tonnes of organic waste from a landfill into a centralized composting facility in 2012.



The example above illustrates the Net Emission Reductions of 441 tonnes achieved from diverting organic waste in one year only—2012 in this example. The process would be repeated for each year that a project is in place. To ensure that emission reductions are not overestimated, the Total Baseline Emissions are limited to 10 years of emissions that would have occurred at a landfill. This approach is consistent with the offset protocol for organic waste diversion developed by Alberta.

Landfill Gas Capture and the Landfill Gas Management Regulation

This project profile requires an estimate of the amount of landfill gas that is captured at the local landfill. This is because landfill gas capture reduces the baseline emissions, and will therefore reduce the amount of reductions that can be achieved with a centralized composting example. As an extreme example, if the local landfill has 100% landfill gas capture there would be no opportunity to reduce emissions with a centralized composting system. This is because all of the methane associated with sending the organic material to the landfill would be captured and turned into carbon dioxide via combustion. This is an illustrative example only as 100% landfill gas capture is not practical.

Landfill gas capture systems reduce landfill emissions by capturing methane and then combusting it to create energy and carbon dioxide. Combusting one tonne of methane generates one tonne of carbon dioxide, which is a 95% reduction in landfill emissions. Due to this reduction potential, landfill gas capture is an effective and relatively low cost method of reducing GHG emissions.

If the landfill used in the above example had a gas capture system in place that captured 50% of annual methane emissions and turned it into carbon dioxide by combustion, the Net Emission Reductions would be reduced. In the above example, Net Emission Reductions would be reduced to 204 tonnes. The calculation for this would be: Baseline Emissions (474 tonnes x 50% = 237 tonnes) – Project Emissions (33 tonnes) = Net Emission Reductions (204 tonnes).

The Landfill Gas Management Regulation[21] requires all landfills that generate 1,000 tonnes or more of methane annually to have (1) a landfill gas management facilities design plan and (2) to install the designed landfill gas management facilities outlined in the plan within four years of submitting the design plan. For any given year, the baseline emissions will need to be updated with the new landfill gas capture rate. The embedded spreadsheet below provides guidance on how this should be done.

The embedded spreadsheet simplifies the calculations needed to determine the annual emission reductions associated with a centralized composting facility for household organic waste.

Spreadsheet directions

Note: Macros must be enabled for the spreadsheet to function properly.

Local Government Framework Compostir

[21] http://www.env.gov.bc.ca/epd/codes/landfill_gas/index.htm

Note: Steps 1 through 8 below are only required for estimating the future amount of organic material to be diverted into the centralized composting facility. These estimates will be replaced with the actual measured amount of organic waste that is diverted into the centralized composting facility each year.

Step 1: Program population	
The number of people who will have access to the program.	Total Population x Program Availability (%). Example assumes a population of 10,000 with 75% access, resulting in 7500 people having access.
Step 2: Total annual compostable food waste	
Total annual compostable food waste generation per resident.	73 kg [This is the Provincial average, adjust if you have community-specific data and provide reference]
Step 3: Baseline compost diversion rate	
Estimate the average proportion (%) of household organics that are currently composted – either backyard or centralized.	22% [This is the Provincial average, use community-specific data if available and provide reference[22]]
Step 4: Program compost diversion rate	
Calculate the amount (%) of household organics being diverted into the composting program.	Program Diversion Rate (%) = This is the proportion of the total annual food waste that is diverted into the centralized system. In the example it is assumed to be 80%.
Step 5: Net program compost diversion rate	
Net program compost diversion rate.	Net Program Diversion Rate (%) = Program Compost Diversion Rate (%) – Baseline compost diversion rate (%). In the example, this would be 58% (80% - 22%).
Step 6: Total organic material diverted	
Calculate the net household organic material (tones) that is diverted out of the landfill and into the centralized composting system.	Total Organic Material Diverted (tonnes) = total annual composted food waste generated per person (Kg) x program availability population (# of people) x net program compost diversion rate (%). In the example this is 339 tonnes (7,500 people x 78 kg/person x 58% net diversion rate)
Note: Once the total amount of organic material diverted is known, it can be entered into the above spreadsheet in the "Input" tab. To finalize the calculation, you are also required to enter the "Landfill Location" and "Landfill Gas Collection Efficiency" in the same tab.	
Step 7: Landfill Gas Collection Efficiency	
Estimate the % of landfill gas that is captured for each year that is being assessed	Discuss with landfill operator. All large landfills are required to report the landfill gas collection system collection efficiency annually under the Landfill Gas Management Regulation. For the example, it is assumed that there is not landfill gas collection in place (0%).
Step 8: Landfill Location	
If your local landfill is not listed in the spreadsheet, select a landfill with similar annual precipitation.	See spreadsheet for a listing of landfills. For example, it is assumed that the Comox Valley landfill is the local landfill.
Note: Once the information from 6,7 and 8 is entered into the spreadsheet in the "User Input Here" tab, the Baseline Emissions, Project Emissions, and Net Emission Reductions are automatically provided in the "Spreadsheet Output" tab.	

[22] http://www.statcan.gc.ca/pub/16-002-x/2008001/tables/5008082-eng.htm

Carbon Neutral Framework Compliance

The following checklist outlines seven Project Eligibility Requirements under the Carbon Neutral Framework. Option 1—*GCC Supported Projects* — are already considered to meet Project Eligibility Requirements three and four below. To demonstrate how an Option 1 project meets the five remaining eligibility requirements, simply complete and make public an Option 1 Project Plan Template (see Appendix 6).

For more information on the project eligibility requirements please refer to section 2.1.1 and Appendix 1 of the *Becoming Carbon Neutral* guidebook.

Checklist:

1. Emission reductions are outside of the local government corporate emissions boundary
2. Emission reductions have occurred before they are counted
3. Emission reductions are credibly measured
4. Emissions reductions are beyond business as usual
5. Accounting of emission reductions is transparent
6. Emission reductions are only counted once
7. Project proponents have clear ownership of all emission reductions

Technology Options Overview

Composting technologies vary in terms of complexity and the kinds of organic waste that can be processed. Another option is anaerobic digestion that produces a gas that can be combusted to generate heat and / or power, providing a revenue stream and displacing additional GHGs. While technically superior in many ways, backyard composting is not featured because of the onerous data collection challenges, and the typically lower rates of penetration.

Technology	Type of feedstock	Typical Capacity	Processing duration	Typical capital cost ($ /tonne of waste annual capacity)	Typical operating costs ($/tonne of waste input)	Sample Technology	Issues
Compost: Turned windrows	Yard and garden waste, typically no food waste	Can be any size. Limited by space available	6 to 12 months	75	40	No proprietary technology. 100s of plants in North America. Well understood, mature.	Process is accessible to vectors and climate. Labour, space and time intensive.
Compost: Covered Aerated Static Piles	All	20,000 tonne per year modules	3 to 6 months	250	40	GORE™ Cover system with plants in Edmonton, Toronto, Seattle, Chemainus, and 100s worldwide. Variations include AgBag, Dupont, Texel	Covers not using breathable membrane require odour management. Cold winter conditions may slow processing time since piles are outside.
Compost: In-vessel	All	10,000 to 200,000 tonnes per year	3 to 6 months	300 to 550	50 to 100	Wide variety of technologies, e.g., Bedminster, Ebara, Wright, ICC. Facilities in place in Comox, Nanaimo and Whistler.	Most operate well, but there may be operational problems with odours related to material handling and corrosion of interior structure.

[a] Revenue varies significantly by location and technology type and is not listed.

Design Considerations

- There is a diversity of technologies suiting projects of different scales and other conditions. Capital and operating costs, as well as revenue potential vary widely. The most capital intensive is anaerobic digestion, rather than composting. It also generates a biogas which can be combusted to generate heat and power, digestate by-product that can be composted and used as a soil amendment, and wastewater that must be managed and / or used for fertilizer.
- Space availability is one of the factors influencing technology preference. Siting must also consider proximity of residents, businesses or other uses that may be affected by odour, noise and trucking.
- In metropolitan areas, significant organic waste comes from multi-family residential and commercial buildings. These buildings are not typically serviced by local government curbside collection. Many do not have space allocated for composting / recycling. A local government may chose to phase in a space requirement and subsequently a ban on organic waste disposal in landfills.
- All GHG emissions associated with waste collection and transportation to the processing site should be calculated in the baseline and project GHG calculation to help determine the project's viability. Even though transportation emissions are not included in the reduction project, an increase in transportation emissions would increase corporate emissions. Integrated collection will reduce or eliminate any incremental emissions over business-as-usual in collection.
- Markets for compost can take time and effort to develop. Maximum GHG / environmental benefits are achieved when the compost is used to build soil quality and support additional vegetative growth.
- Facilities processing organic waste are required to comply with the B.C. Organic Matter Recycling Regulation.[23] If the finished product meets the outlined standards, the product can be used for agricultural and other uses.

GHG Calculation Notes

- Yard waste has a methane generation potential significantly less than food waste. The recommended emission factors in formula (2) of the project emissions above are generic numbers for a mixed stream of food waste and garden/yard waste.
- The method described accounts for situations where the organic diversion rate in the baseline is not zero, i.e., some organic waste is already being composted.
- The other factor that influences the emission reductions is the type of composting technology used. Different technologies will require different inputs in the form of diesel (to power equipment such as grinders and front end loaders) and electricity (to power aeration systems).

[23] The regulation is available online at: http://www.bclaws.ca/EPLibraries/bclaws_new/document/ID/freeside/18_2002. A plain language guideline is also online at: http://www.env.gov.bc.ca/epd/codes/omr/pdf/compost.pdf and land application guidelines are available at: http://www.env.gov.bc.ca/epd/industrial/regs/codes/soil_amend/pdf/land-app-guide-soil-amend.pdf

Community and Sustainability Co-Benefits

Over and above reductions in GHGs and local government carbon liability, composting has a number of broader community and sustainability co-benefits:

- Improved environmental performance of the waste management system by recycling organic material rather than disposing of it as waste;
- Extended landfill life, delaying the cost associated with landfill closure and siting / constructing a new landfill;
- In jurisdictions with limited disposal capacity, composting can reduce reliance on waste export and its associated transportation emissions; and
- Support to local agricultural and landscaping sectors by providing soil amendment. Compost may also reduce dependence on chemical fertilizers.

Precedents

A number of local governments have very recently started food waste composting programs in B.C.:

- The Town of Ladysmith initiated the first curbside collection program for food waste in B.C. This program uses an integrated collection model to reduce GHG emissions and costs associated with collection. Early adoption was possible by the existence of a private sector composting facility in the Regional District of Nanaimo (RDN).
- Metro Vancouver signed an agreement with a private compost facility operator in 2009 to accept up to 50,000 tonnes of mixed food and yard waste. The facility uses an aerated static pile. Costs are $45-55/tonne and several municipalities are rolling out collection programs for single family residents (e.g., City of Port Coquitlam and City of Vancouver).

There are also offset precedents for this project type. These precedents have informed this project profile and would be useful in maximizing emission reduction opportunities and calculation accuracy.

- Alberta has defined a methodology for calculating GHG emission reductions for composting: http://environment.gov.ab.ca/info/library/7905.pdf. An online calculator supports calculations: http://carbonoffsetsolutions.climatechangecentral.com/files/microsites/OffsetProtocols/Calculators/CompostCalculator.xls
- The Climate Action Reserve has developed a protocol for the quantification of GHG emission reductions from composting. http://www.climateactionreserve.org/how/protocols/adopted/organic-waste-composting/current/
- The United Nations Clean Development Mechanism has a composting methodology that includes steps for GHG emission reduction quantification: http://cdm.unfccc.int/EB/047/eb47_repan24.pdf

  An example of a Project Design Document (in the CDM) utilizing this methodology to quantify GHG emissions: http://cdm.unfccc.int/UserManagement/FileStorage/A145D6PXBCKV82RNZUEYWMF07O9HQG

Project Variations

Other projects that could potentially meet the Carbon Neutral Framework's criteria with some basic adjustments in the methodology include:

- **Paper recycling**: Paper is the second largest waste type in B.C. comprising almost 20% of all waste. A targeted paper recycling and reduction project could potentially yield cost effective emission reductions with a wide range of co-benefits.
- **Waste wood composting or energy generation**: Wood is the largest waste category in construction / demolition comprising 30% of waste in this sector. A targeted project to divert wood for composting or using it as a feedstock for heat and power generation could potentially yield cost effective emission reductions with a range of co-benefits.[24] Tree trimmings could supplement this waste wood.
- **Anaerobic digestion**: This is an alternative to composting. It is a more elaborate solution with higher capital costs. However, the biogas can be used to generate heat and / or power.
- **Biosolid composting**: Biosolids procured from sewage treatment can also be composted.

Resources

B.C. Organic Matter Recycling Regulation

- Regulation: http://www.bclaws.ca/EPLibraries/bclaws_new/document/ID/freeside/18_2002.
- Plain language guideline: http://www.env.gov.bc.ca/epd/codes/omr/pdf/compost.pdf
- Land application guidelines: http://www.env.gov.bc.ca/epd/industrial/regs/codes/soil_amend/pdf/land-app-guide-soil-amend.pdf

Quantifying GHG Emissions from Landfills

- Landfill Gas Generation Procedure Guidance, CRA, 2009, http://www.env.gov.bc.ca/epd/codes/landfill_gas/index.htm
- Landfill Gas Management Facilities Design Guideline and Estimation Tool for annual reporting: http://www.env.gov.bc.ca/epd/codes/landfill_gas/index.htm

[24] Using waste wood for energy generation would require a management practice and technology that addresses air pollution issues.

Appendix 5. Calculating Emission Reductions for Low Emission Vehicles (Option 1D)

GREEN COMMUNITIES CARBON NEUTRAL FRAMEWORK
OPTION 1: PROJECT PROFILE
LOW EMISSION VEHICLES

Project Profile Overview

This document provides guidance on estimating the emission reductions potential associated with replacing conventional vehicles with low emission vehicles (LEVs), such as those used by public transit, police departments and airports. Significant advancements in vehicle technology have been made in the past decade, providing many options across multiple vehicle classes for improving fuel efficiency. Hybrid-electric, full electric and high efficiency internal combustion engines all represent a clear opportunity for fuel savings and emission reductions over conventional vehicle counterparts. Because of these benefits, an increasing number of fleet operators are switching to LEVs.

With the complexities associated with comparing emissions between different sizes of vehicles and the embodied emissions of different fuel types, the scope of eligible vehicle types under this project type is limited to high efficiency internal combustion engines that use fossil fuels, hybrid-electric engines, plug-in hybrid electric engine systems, and full battery electric systems. Electric airport conveyors are also included in this project due to the significant emission reduction potential for switching away from gas- or diesel-powered conveyors.

Calculating Emission Reductions

Annual Net Emission Reductions = Annual Baseline Emissions – Annual Project Emissions

To determine Annual Net Emission Reductions, a local government must determine the Baseline Emissions and Project Emissions on an annual basis. Given the amount of distance travelled or time in use within one year, this is basically a comparison of the emissions that would have been created if a conventional vehicle was used instead of an LEV.

The Annual Baseline Emissions represent those that would have been created if the decision was to purchase a conventional vehicle. For example, for a police department replacing patrol vehicles, this would be the standard model that most police departments are using at that time. The Baseline Emissions do not represent the emissions that were generated in the past with older vehicles.

The Annual Project Emissions represent the emissions generated by the LEV in the year of assessment.

To calculate the Annual Baseline Emissions and Annual Project Emissions for any given year, the following information is needed:

- Vehicle Emissions Intensity (kg CO_2e/100km or kg CO_2e/hr). These intensities can be derived from the fuel economy for each vehicle provided by manufacturers; and

- Total Vehicle Usage (km or hours). This can be easily collected from odometers or timers.

The Annual Net Emission Reductions in any given year is therefore a function of the level of improvement in vehicle emissions intensity and the amount the vehicle is used.

Project Examples

The following are illustrative examples of how to estimate the emission reductions potential associated with replacing conventional vehicles with LEVs.

- **Police Vehicle Example:** Hybrid police cars are beginning to be used in cities across North America and use about half as much fuel per kilometre as conventional vehicles used by police departments. Two conventional police cars that consume 11 litres per 100 km and travel 30,000 km per year would emit 21.59 tonnes CO_2e annually. If these two vehicles were replaced with hybrid police cars, consuming 5.5 litres per 100 km of E10 (gasoline blended with 10% ethanol), emissions would be 10.48 tonnes CO_2e annually. The annual avoided emissions associated with replacing the conventional two conventional police cars would therefore be 11.11 tonnes CO_2e. *(See spreadsheet for details of calculations.)*
- **Airport Example:** A conventional, gasoline-powered belt loader consumes 2 litres of fuel per hour. If three loaders operate for 1,750 hrs per year each, they will emit 34.35 tonnes CO_2e annually. An electric belt loader uses 0.7 kWh/hr; if three operate for the same amount of time, they will generate 0.07 tonnes CO_2e annually. By switching to the electric belt loader, emissions would be reduced by 34.27 tonnes CO_2e annually. *(See spreadsheet for details of calculations.)*

Spreadsheet Direcions

The embedded spreadsheet simplifies the calculations needed to determine the annual emission reductions associated with switching to LEVs.

LEVProjectSpreadsheet

Annual emission reductions can be determined using either published fuel consumption ratings (Option 1) or community-estimated fuel consumption (Option 2). Option 1 is preferred and Option 2 should only be used if manufacturer-specified fuel consumption ratings are unavailable, or otherwise unsuitable for the application.

Option 1: Published fuel consumption ratings (Preferred)

Fuel consumption ratings are typically based on distance. However, for certain applications (such as for airport vehicles), time may be a more accurate measure of fuel consumption and emissions. For distance-based calculations, use Option 1A; for time-based calculations, use Option 1B. *Where differences occur between the two methodologies, actions required for Option 1B are in italics.*

Description of Task	Input/Output
Step 1: Determine fuel consumption rating	
Fuel consumption rating. Determine the fuel consumption rating of both the LEV (project) and conventional new vehicle (baseline). Fuel consumption ratings can be found through various sources, including: ♦ The manufacturer ♦ Natural Resources Canada http://oee.nrcan.gc.ca/transportation/tools/fuelratings/ If no fuel consumption ratings are available, use Option 2.	The amount and type of fuel required to travel 100 km *(or one hour)*, both in the city and on the highway.
Step 2: Estimate share of city and highway driving	
City/highway driving. Estimate the share of city and highway driving, over the entire year.	Share of city and highway driving, by distance (%). *Not required for Option 1B.*
Combined city / highway fuel consumption. The spreadsheet calculates a combined city / highway fuel consumption rating.	Spreadsheet output.
Step 3: Specify renewable fuel blends if applicable	
Ethanol. If an ethanol fuel blend is used in either the baseline or project, specify the grade. For example, for E10, specify 10%. If no ethanol is used, enter 0%.	Ethanol fuel blend (% ethanol mixed with gasoline).
Biodiesel. If a biodiesel fuel blend is used in either the baseline or the project, specify the grade. For example, for B20, specify 20%. If no biodiesel is used, enter 0%.	Biodiesel fuel blend (% biodiesel mixed with diesel).
Blended fuel required. The spreadsheet calculates the volume of blended gasoline and / or diesel required, accounting for the lower energy density of biofuels.	Spreadsheet output.
Step 4: Calculate total fuel consumption and emissions intensity	
Total fuel consumption. The spreadsheet summarizes total fuel consumption, including renewable fuels, per distance *(time)* travelled.	Spreadsheet output.
GHG emissions intensity. The spreadsheet calculates GHG emissions per distance *(time)* travelled based on fuel consumption estimates and emission factors for each fuel.	Spreadsheet output.
Step 5: Enter annual travel estimates and fleet size	
Distance *(time)* traveled. Enter the average annual distance *(time)* traveled per vehicle.	Average distance per vehicle (km/yr). *Average operation time per vehicle (hrs/yr).*
Fleet size. Enter the number of vehicles included in the project.	Fleet size (number of vehicles).
Total distance *(time)* travelled. Total distance *(time)* travelled equals the distance *(time)* traveled per vehicle multiplied by fleet size.	Spreadsheet output.
Step 6: Calculate annual baseline and project emissions	
Baseline emissions. Baseline emissions are equal to baseline emissions intensity multiplied by total distance *(time)* traveled per year.	Spreadsheet output.
Project emissions. Project emissions are equal to project emissions intensity multiplied by total distance *(time)* traveled per year.	Spreadsheet output.
Step 7: Calculate annual avoided emissions	
Avoided annual emissions are equal to baseline emissions minus project emissions. Avoided emissions are equivalent to Emission Reduction Credits, and are shown for the total project and per vehicle.	Spreadsheet output.

Option 2: Community-estimated fuel consumption (Alternative)

Option 2 is identical to Option 1, except that Step 1 requires the community to measure fuel consumption over a representative period of time. All other steps remain the same. As with Option 1, provisions are made for both time-based and distance-based measures. For distance-based calculations, use Option 2A; for time-based calculations, use Option 2B. Where differences occur between the two methodologies, *actions required for Option 2B are in italics*.

Note: Because this option requires fuel consumption to be tracked over a period of time that is representative of typical usage patterns, Emission Reduction Credits cannot be calculated until after the project has been implemented.

Description of Task	Input/Output
Step 1: Estimate fuel consumption rating	
Odometer readings. Enter the odometer readings at the beginning and end of the measurement period. This period should be as long as practicable to ensure it encompasses a representative period of use.	Start and end odometer readings (km) *(hours)*.
Fuel consumption data. Enter the amount of fuel consumed that corresponds to the odometer measurement period. If any biofuels are used, these should be entered here. For example, if 100 litres of B20 (20% biodiesel) is consumed, enter 20 litres as "biodiesel" (20% x 100 litres) and 80 litres as "diesel" (1-20% x 100 litres).	Fuel consumption and type (various units).

Carbon Neutral Framework Compliance

The following checklist outlines seven Project Eligibility Requirements under the Carbon Neutral Framework. Option 1—*GCC Supported Projects* — are already considered to meet Project Eligibility Requirements three and four below. To demonstrate how an Option 1 project meets the five remaining eligibility requirements, simply complete and make public an Option 1 Project Plan Template (see Appendix 6).

For more information on the project eligibility requirements see section 2.1.1 and Appendix 1 of the *Becoming Carbon Neutral* guidebook.

Checklist:

1. Emission reductions are outside of the local government corporate emissions boundary
2. Emission reductions have occurred before they are counted
3. Emission reductions are credibly measured
4. Emissions reductions are beyond business as usual
5. Accounting of emission reductions is transparent
6. Emission reductions are only counted once
7. Project proponents have clear ownership of all emission reductions

Local Applicability and Cost Factors

- **Age of Fleet and Timing of Vehicle Purchases.** This project type will make the most economic sense if fleet vehicles are replaced according to their normal capital budgeting cycles. Replacing older, less fuel efficient vehicle fleets with new low carbon vehicles will present the best economic and GHG reduction business case.
- **Project Monitoring and Reporting Effort and Costs.** The data needed to complete the monitoring and reporting requirements is typically already collected by fleet managers. This includes kilometres traveled and litres of fuel consumed for transit and police vehicles. For airport vehicles, data that needs to be tracked includes kilometres traveled or hours operated, and the total or typical loads carried (for vehicles that move equipment, luggage and planes). Most fleet managers will be able to complete project monitoring and reporting without assistance from an external consultant.

Community and Sustainability Co-Benefits

In addition to reducing GHG emissions, LEVs emit fewer criteria air contaminants (CACs). In most cases, LEVs also reduce operational costs. Hybrid and electric vehicles are quieter, reducing noise pollution. Electric cars, because they do not use any petroleum products for propulsion or engine lubrication, nor toxic chemicals for engine cooling, reduce impacts to streams, lakes and other water-bodies. The visible demonstration of leadership can also strengthen institutional credibility.

Precedents

There are many precedents for airports and police detachments switching to LEVs, e.g.:

- New York City Police Department: 400 alternative fuelled vehicles, and 70 hybrid patrol cars http://www.greencarreports.com/blog/1044586_ford-hybrids-tough-enough-to-be-police-cars-in-new-york-city
- Salt Lake City: Hybrids and personal electric vehicles http://www.government-fleet.com/Channel/Green-Fleet/News/Story/2009/01/Salt-Lake-Police-Fight-Crime-and-Fuel-Costs-with-Hybrid-Cars.aspx
- Dallas Fort Worth Airport: http://www.airport-technology.com/features/feature2102/
- Phoenix Sky Harbour Airport: http://skyharbor.com/community/green-initiatives.html

There are also offset precedents for this project type. The quantification guidance in the GHG Accounting Summary section below is informed by a methodology approved by the Executive Board of the UN Kyoto Protocol Clean Development Mechanism (CDM), "Introduction of low-emission vehicles/technologies to commercial vehicles fleets" (http://cdm.unfccc.int/UserManagement/FileStorage/BYAL7E0GFD1MPNU5T3ZR42K89IJVQO).

Technology Options Overview

Technology	Suitable Application	Typical capital cost ($ per vehicle)	Typical operating cost savings versus conventional vehicle	Sample Technology	Issues
Hybrid-Electric Police Car	Complete replacement of some traditional police vehicles	$23,000 - $40,000	Payback period based on fuel savings can be as short as one year	Toyota Prius, Toyota Camry Hybrid, Nissan Altima Hybrid, Ford Fusion Hybrid, Ford Escape Hybrid	Unfamiliar technology for most police forces
Electric ground vehicles at airports	Replacement of diesel and CNG vehicles	Wide cost range	Payback period based on fuel savings of 3 to 7 years		Unfamiliar technology for airport operators
Bicycles for Police Patrols	Alternate to conventional vehicles for *some* patrols	$2000	Payback period based on fuel savings can be as short as one year		Unfamiliar technology for many police forces; a different methodology would be required to calculate emission reductions

Project Variations

There are a number of actions and technologies similar to the LEV project described in this document that could meet the eligibility criteria of the Carbon Neutral Framework. Separate quantification methodologies would need to be developed for these projects. Examples include:

- **Personal electric vehicles**: A number of personal electric vehicles are gaining popularity among police forces across North America. Manufacturers have dedicated police lines, e.g., the T3 Motion Law Enforcement Vehicle and the Segway X2 Police, and lines that are common in airports. These vehicles could not replace all the activities of a traditional patrol car, however, they could replace many of the activities. An activity-oriented, vs. vehicle oriented methodology could be developed.
- **Bikes**: Bikes are playing an increasingly important role in many institutional environments, including police forces and airports. As with alternative motorized vehicles (above), they cannot replace all the activities of a traditional patrol car, so an activity-oriented vs. vehicle-oriented methodology could be developed.
- **Low carbon fuels**: Many local governments in B.C. are already using biodiesel blends in fleet vehicles. Some biofuels based on high input agricultural crops or transported long distances have minimal carbon gains. However, other biofuels, such as those created from second generation oils are very low carbon and additionally support community-based processing—they are also clearly not business as usual activities, easily meeting additionality tests. A different methodology would have to be developed with defensible emission factors for different fuels to support an alternative fuels project.
- **Green Fleet Program**: LEVs. are just one component of more comprehensive green fleet programs which typically involve route planning, right sizing for activities, activity-sizing (e.g., using bikes or Segways for certain applications), idle reduction, and driver education amongst other strategies. Airports that have dramatically reduced ground-based transportation fuels have focused as much on baggage and air traffic flows as LEVs. Communities considering this could benefit from collecting data on current activities now. Typically, these programs save money and yield a range of other benefits including strengthening employee morale.

Resources

- Natural Resources Canada Vehicle Fuel Consumption Guides and Tools: http://oee.nrcan.gc.ca/transportation/personal/choose_vehicle.cfm?attr=8
- Natural Resources Canada Alternative Fuel Vehicle Guide: http://oee.nrcan.gc.ca/transportation/tools/afvGuide/index.cfm?attr=28
- The E3 Green Fleet Program provides more comprehensive guidance for emission performance: http://www.e3fleet.com
- Ford is introducing a specifically designed hybrid police vehicle: http://seattletimes.nwsource.com/html/businesstechnology/2012789215_apusfordpolicesuv.html?prmid=obinsite
- Hybrid Experience lifecycle cost and cost comparison downloadable spreadsheets: http://hybridexperience.com/content/view/29/42/
- Natural Resources Canada vehicle life-cycle cost comparison web forms: http://www.oee.nrcan.gc.ca/transportation/tools/life-cycle.cfm?attr=28
- Clean Airport Partnerships analysis of LEVs/AFVs. (alternative fuel vehicles): http://www.cleanairports.com/reports.htm
- Electric Ground Support Vehicles for Airports Research Initiative, Idaho National Laboratory, US DOE
    - Cost-Benefit Analysis Model
    - Testing Reports http://avt.inel.gov/groundsupport.shtml
- Personal electric vehicles in law enforcement: http://www.policeone.com/police-products/vehicles/specialty/articles/1798925-Specialty-LE-vehicles-get-rolling-T3-Motion-and-Segway-X2/

Appendix 6. Calculating Avoided Emissions from Avoided Forest Conversion (Option 1E)

GREEN COMMUNITIES CARBON NEUTRAL FRAMEWORK
OPTION 1: PROJECT PROFILE
AVOIDED FOREST CONVERSION

Project Profile Overview

This document provides guidance on estimating the emission reductions potential associated with preventing the conversion of existing forested lands to a non-forest land use (e.g. residential development, golf course, etc.). Although land development may have positive economic and socials benefits for communities, it can also lead to an increase in greenhouse gas emissions (GHG) due to the loss of trees, the burning or composting of the wood, and the decay of the carbon in the forest floor.

This project profile outlines the steps required to develop an Avoided Forest Conversion Project (AFCP), an Option 1 project under the Green Communities Committee (GCC) Carbon Neutral Framework. Developing an AFCP requires local governments to demonstrate that they are conserving eligible forested lands and meeting all other requirements specified in this profile. A typical AFCP could involve a local government (municipality or regional district) working with a land developer to conserve eligible forested lands, that would otherwise be available for development, in exchange for density bonusing or flexibility in other zoning provisions. The project would also involve transferring ownership of the lands to the local government. The conserved lands, above any existing senior government regulatory requirement, may be eligible as an AFCP as described in this profile. Local governments may use the carbon benefit generated from an AFCP to balance their corporate emissions in accordance with the GCC Carbon Neutral Framework (see *Becoming Carbon Neutral: A Guide for Local Governments in British Columbia* for more information).

Eligible lands for the purposes of a GCC AFCP are lands owned by the local government that are greater than one hectare (ha) and less than 650ha in size and subject to zoning that allows the conversion of existing forested lands to a non-forest land use (e.g. residential development, golf course, etc.).

There are two pathways to quantify forest carbon under the GCC AFCP:

- Pathway 1 – Local governments use the default values in the GCC Carbon Calculator to obtain a conservative estimate of the avoided GHG emissions – also referred to as the carbon benefit – from the project lands. Because local governments are using default values, they are not required to engage a Registered Professional Forester (RPF) to obtain modeled "forest data". Under Pathway 1 the GCC Carbon Calculator tracks compliance with eligibility requirements and uses a simplified spreadsheet to estimate the avoided GHG emissions or carbon benefit (Figure 1).
- Pathway 2 – Rather than using the default values under Pathway 1, local governments may choose to model the carbon benefit by engaging a Registered Professional Forester (RPF) to obtain "forest data", which

includes doing a timber appraisal and stand health assessment and modeling the carbon benefit using the Forest Carbon Offset Protocol (FCOP) methodology. Under Pathway 2, local governments will obtain a more robust estimate of the avoided GHG emissions and carbon benefit than under Pathway 1. Under this pathway, local governments can use the GCC Carbon Calculator to track eligibility requirements, enter their annual modeled gross carbon benefit, and generate the annual net carbon benefit (Figure 1).

GCC Option 2 Forest Carbon Projects

Option 1 forest carbon projects under the GCC Carbon Neutral Framework are currently limited to Avoided Forest Conversion Projects (AFCP). Alternative types of forest carbon projects such as manicured parkland and urban forest tree planting (e.g. trees along streets) or improved forest management practices are not eligible under this project profile but may be eligible as a GCC Option 2 project (for additional details on eligibility requirements for GCC Option 2 projects, see *Becoming Carbon Neutral: A Guide for Local Governments in British Columbia*).

FCOP Marketable Carbon Offsets Alternative

The carbon benefit generated from an AFCP has no monetary value and is not to be considered a market based offset. Local governments with eligible land holdings over 650ha may choose to develop marketable carbon offsets under the BC Forest Carbon Offset Protocol (FCOP), and are encouraged to consider doing so before committing to a GCC-approved Option 1 AFCP or a GCC Option 2 alternate forest carbon project because of the opportunity to generate a revenue stream from the sale of a marketable carbon offset (Figure 1).

Figure 1 depicts local government options for the treatment of forested land under a GCC Option 1 AFCP, a GCC Option 2 forest carbon project and the development of carbon offsets under the BC Forest Carbon Offset Protocol (FCOP).

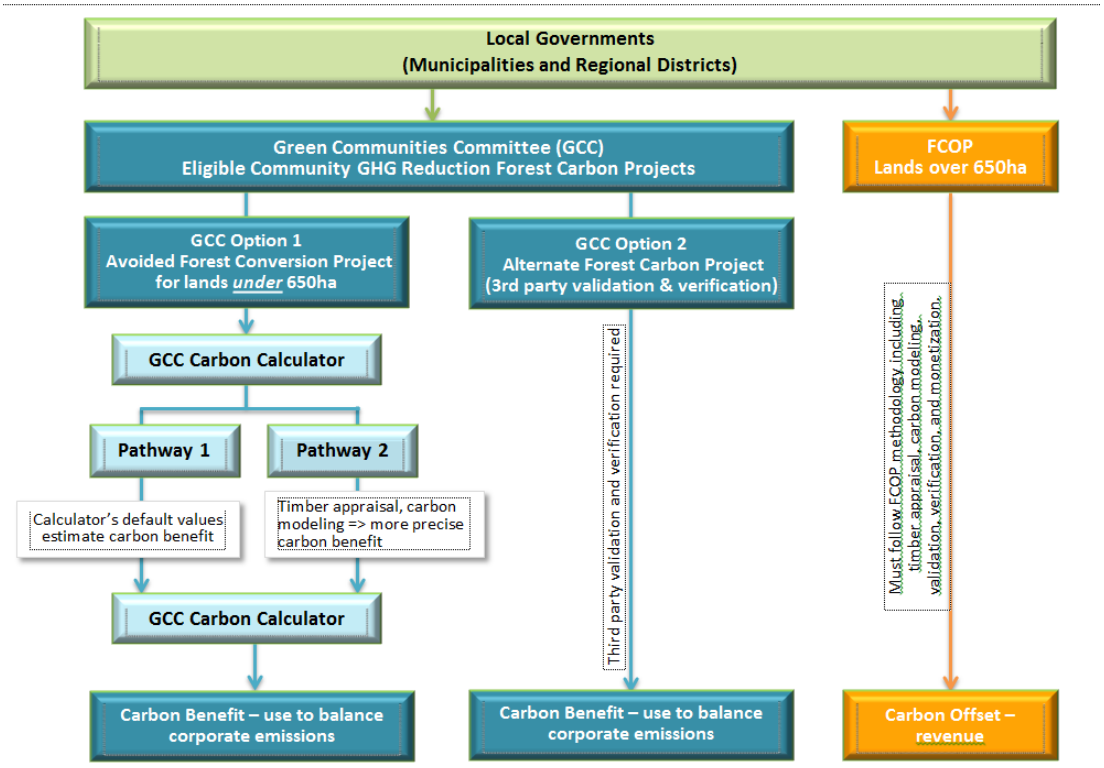


Figure 3.Overview of GCC AFCP and FCOP Treatment Options

Calculating the Carbon Benefit

The carbon benefit generated using the calculation methodology provided under this profile takes into consideration risk and uncertainty and represents emission reductions that are real, measurable and additional under the GCC Carbon Neutral Framework. The resulting carbon benefit, calculated on an annualized basis for each year that the project is in place, can be used by local governments to balance their corporate emissions and assist them in meeting their carbon neutral commitment under the *Climate Action Charter.*

Annual Net Carbon Benefit = Baseline Emissions – Project Emissions

Baseline emissions are the emissions that would be generated if the lands were deforested and developed to the full extent permitted under local government land use planning and development legislation (e.g. zoning, Development Permit Area guidelines, Riparian Area Regulations, steep slope guidelines etc.). Project emissions are the emissions that would be generated as a result of the reduced level of development on the AFCP project lands due to the local government actions taken to conserve the lands. Baseline emissions less project emissions equal the annual net carbon benefit from the AFCP.

In order to calculate the carbon benefit from an AFCP it is necessary to determine the percentage of land that would have been developed in the baseline scenario and would be developed in the project scenario. A carbon benefit is generated when the project scenario develops less land than the baseline scenario would have developed, and conserves more land than the baseline scenario would have conserved. For instance, if the baseline scenario would have deforested 70% of the eligible lands for development, and the project scenario would only deforest 30% of the lands, then 40% of the lands would be conserved resulting in the carbon benefit. Local governments should have a Registered Professional Planner (RPP) determine, document and sign-off on the percentage of land that would have been developed under the baseline scenario and project scenario. An RPP with the appropriate experience and expertise will help ensure the credibility of these baseline and project scenario assessments. The percentage of land conserved under the project scenario is entered into the calculator to estimate the carbon benefit from the AFCP.

The carbon benefit from an AFCP will be “front-loaded” in that most of the benefit will occur during the first two years, reflecting the way a typical baseline “development” scenario plays out (i.e. the trees are cut immediately as the first step in the development process).

Carbon Neutral Framework and AFCP Compliance

The checklist below summarizes the seven Project Eligibility Requirements under the GCC Carbon Neutral Framework (for additional details see *Becoming Carbon Neutral: A Guidebook for Local Governments in British Columbia, Appendix 1, GCC Project Eligibility Requirements*).

1. Emissions reductions are from projects undertaken in BC and are outside of the local government corporate boundaries
2. Emission reductions have occurred before they are counted
3. Emission reductions are credibly measured
4. Emissions are beyond business as usual
5. Accounting of emission reductions is transparent
6. Emission reductions are only counted once
7. Project proponents have clear ownership of all emission reductions

Note that for all other profiles, GCC Project Eligibility Requirement #4 provides that the project not be required to fulfill provincial or federal legislative requirements, and considers local government regulations/bylaws to be excluded. Under the AFCP profile, local government regulations/bylaws are not excluded, and therefore any regulations/bylaws in place before 2007 to protect the project lands mean that the lands would not be eligible under the beyond business as usual criterion.

In addition to meeting these seven eligibility requirements, local governments implementing AFCPs must meet four additional 'AFCP specific' eligibility requirements as outlined below. These additional requirements further support eligibility requirements three and four above and have been integrated into the overarching *GCC Project Eligibility Requirements):*

- ✓ **Demonstrate ownership of the conserved forest lands**
  - The local government must own the conserved forest lands to comply with the project requirements (e.g. this could result from an arrangement with the developer who would agree not to develop a portion of the land and transfer those lands to the local government for protection).
- ✓ **Reserve or dedicate the conserved forest lands as park**
  - Local governments are required to reserve or dedicate the conserved forest lands as park using the authority of the *Community Charter*, section 30. This reservation/dedication must occur after the initial signing of the Climate Action Charter in 2007.
- ✓ **Prepare a Forest Management Plan**
  - Local governments must prepare a Forest Management Plan for the project lands and have a Registered Professional Forester (RPF) with carbon expertise sign-off on the plan.
  - The Forest Management Plan must be in place within six months of making public the first completed annual Self-Certification Template (for further details see the Demonstrating Compliance, Public Reporting & Claiming the Carbon Benefit section below).
  - The plan must be updated every 10 years or more frequently.
  - The plan must include a section on "carbon" that considers the likelihood that the forest carbon may be lost due to an unforeseen event (e.g. fires) (see the Forest Management Plan section below).
- ✓ **Confirm the Baseline Land Use**
  - Confirm and attest (by completing the *Project Plan Template* also available in Appendix 7) that local government zoning that would have permitted the conversion of the project lands to a non-forest use was in place just prior to the project start date and before the land was dedicated/reserved as park under *the Community Charter,* section 30.

Note: If an unforeseen event such as a fire occurs at any time over the term of the project, the project would become ineligible and no further annual carbon benefit could be claimed, however there would be no penalty for past annual benefits claimed.

To demonstrate that the AFCP meets the all eligibility requirements, local governments need to complete and make public a Project Plan Template as provided in the *Becoming Carbon Neutral: A Guidebook for Local Governments in British Columbia* (see Demonstrating Compliance, Public Reporting & Claiming the Carbon Benefit section below) .

Project Start Date

The project start date must be after the initial signing of the Climate Action Charter (September 26, 2007) and may only be on or after the date that the eligible project lands have been reserved or dedicated as park under section 30 of the *Community Charter*. Local governments will be required to record and attest to the project start date when completing the Project Plan Template as required under the GCC Carbon Neutral Framework.

Using a Section 219 Covenant as Optional Additional Protection

To strengthen protection of the conserved forest lands, local governments may place a section 219 covenant on the lands. This is optional and not a project eligibility requirement. If a local government does place a section 219 covenant on the eligible lands using the authority of the *Land Title Act,* the GCC Carbon Calculator will add a ten percent increase to the estimated carbon benefit from the project to account for this higher level protection against reversal of the lands to a non-forested use.

Purpose and Content of a Forest Management Plan

The Forest Management Plan describes how local governments will maintain the project lands to ensure the carbon benefit is retained and not released back into the atmosphere. The intent of the Forest Management Plan is to support the credibility of the measurement approach by minimizing risk/uncertainty of maintaining project lands (e.g. that the project will be neglected due to lack of clear guidelines and accountability). Local governments undertaking an AFCP will be required to attest to having prepared a Forest Management Plan when completing the *Project Plan Template* (also available in Appendix 7) required under the Carbon Neutral Framework.

A typical Forest Management Plan would include fire and pest management planning, and identify those areas that may potentially be developed (deforested) to accommodate infrastructure such as parking lots, buildings and picnic areas. These areas of potential development indicate the maximum extent to which park lands may be converted over the long term. The plan will also indicate any areas where existing disturbed lands will be reforested or otherwise restored.

Demonstrating Compliance, Public Reporting & Claiming the Carbon Benefit

To demonstrate how a GCC Option 1 — ACFP meets all eligibility requirements, local governments must complete and make public an *Option 1 Project Plan Template* (see Appendix 7 of the *Becoming Carbon Neutral Guidebook*) and prior to claiming the carbon benefit in any given year, complete and make public a Self–Certification Template to certify that the GHG reductions being claimed for that year have occurred. In addition, local governments that apply for the annual Climate Action Revenue Incentive Program (CARIP) grant must complete and make public a CARIP Report that includes a section for local governments to demonstrate their progress toward carbon neutrality. To claim the carbon benefit from an AFCP, simply enter the annual carbon benefit provided by the calculator into the CARIP Report section on carbon neutrality and publicly report your progress!

GCC Carbon Calculator Directions

The *GCC Carbon Calculator is available online here*.

The following table describes the steps that the calculator takes to estimate the annual net project carbon benefit that local governments can claim in the CARIP reports towards achieving carbon neutrality. In addition to helping local governments track their compliance with the eligibility requirements, the calculator quantifies the annual project net carbon benefit under Pathway 1 or Pathway 2 as described above.

GCC CARBON CALCULATOR STEPS	
Steps 1-9 and 11-12: Confirm Eligibility of Project	
Answer these yes or no questions about the project's compliance with the eligibility requirements.	A project ineligibility message will pop up if the answer to any of the twelve questions means that the proposed project is not eligible to be used as an Option 1 GCC project towards the local government's achievement of carbon neutrality.
Step 10: Indicate Covenant Protection	
Indicate whether a Land Title Act s. 219 covenant has been placed on the preserved lands to provide additional protection.	If a s. 219 covenant has been placed on the lands, the calculator adds 10% to the carbon benefit estimates under both Pathway 1 and Pathway 2 sequences to reflect this additional level of protection and security of the preserved lands.
Step 13: Eligible Forest	
Enter the number of hectares of eligible forest.	Eligible Forest is the total forested area, in hectares, that is currently undeveloped but zoned for development to a more intensive use. This value should exclude the upper limit of the 5% park land requirement set out in section 941 of the *Local Government Act*.
Step 14: Choose Pathway 1 or Pathway 2	
Indicate whether you will be using Pathway 1 or 2.	**Pathway 1** – means you will be using the calculator's modelled gross carbon values and "project net down variables" to estimate reductions. The next step for Pathway 1 is Step 14. **Pathway 2** – means you will not be using the calculators' modelled values because you have engaged a Registered Professional Forester with Carbon expertise to model the gross carbon values. The calculator will apply the "project net down variables" after you have input your modelled values. The next step for Pathway 2 is to enter modeled carbon values into a pop-up table.
PATHWAY 1	
Step 15: Select Project Location	
Use the drop down menu to choose a region for your project location.	The calculator will provide a conservative estimate of your annual average CO2e carbon benefit per hectare based on the region chosen.
Step 16: Enter % Lands Protected from Development	
Enter the % of land protected from development and preserved = % land that would have been developed under the baseline scenario – % land that will be developed under the project scenario.	The calculator uses this information to estimate the total project gross carbon benefit.
Output: Total Project Gross Carbon Benefit	
The calculator calculates and reports the Total Project Gross Carbon Benefit, which is an estimate of the quantity of GHG emission reductions from the AFCP.	The calculator deducts 27% from calculated emissions to account for "Harvested Carbon Assumed Stored" – which includes emissions that are not released as a result of harvested wood products – in its calculations of the Total Project Gross Carbon Benefit.
Output: Total Project Net Carbon Benefit	
The calculator deducts/adds percentage amounts from/to the Total Project Gross Carbon Benefit to calculate and report the Total Project Net Carbon Benefit.	The calculator makes deductions to account for risk, leakage and uncertainty as follows: - 20% - Risk Deduction Value to Account for Political, Environment and

	Natural Risks That May Occur And Cause a Release of the Carbon Benefit - 20% - Leakage Deduction Value to Account for the Displaced Activity Occurring Elsewhere - 10% - Model Uncertainty Value to Account for the Errors or Omissions in the Calculation of the Gross Carbon Benefit
Output: Annual Project Net Carbon Benefit	
The calculator calculates the annual project net carbon benefit that will occur over 20 years and displays it in table and graph form.	Note that the majority of the benefit is realized in the first five years to reflect the way a typical development scenario would play out – the trees are cut down after the purchase of land and as the first step in the development of the project.
PATHWAY 2	
Step 14: Choose Pathway 1 or Pathway 2	
If you have chosen Pathway 2, the calculator will prompt you to enter the annual gross carbon benefit (in tCO2e) from your forest carbon model.	The 27% deduction applied as part of the calculator's default calculations is not included in Pathway 2. Any modeled data should be net of project derived Harvested Wood Product (HWP) before being entered in the calculator.
Output: Total Project Net Carbon Benefit	
The calculator deducts/adds percentage amounts from/to the Total Project Gross Carbon Benefit to calculate and report the Total Project Net Carbon Benefit.	The calculator makes deductions and additions as follows: + 10% for placement of s. 219 covenant on lands (GCC-CC Step 10) - 20% - Risk Deduction Value to Account for Political, Environment and Natural Risks That May Occur And Cause a Release of the Carbon Benefit - 20% - Leakage Deduction Value to Account for the Displaced Activity Occurring Elsewhere - 10% - Model Uncertainty Value to Account for the Errors or Omissions in the Calculation of the Gross Carbon Benefit +5% - Higher level of accuracy from the timber appraisal and model simulation.
Output: Annual Project Net Carbon Benefit	
The calculator calculates the annual project net carbon benefit that will occur over 20 years and displays it in table and graph form.	Note that the majority of the benefit is realized in the first five years to reflect the way a typical development scenario would play out – the trees are cut down after the purchase of land and as the first step in the development of the project.

Additional Information for Users of Pathway 2

Local governments with land areas under 650ha that choose Pathway 2 – modeling the carbon benefit using the Forest Carbon Offset Protocol (FCOP) methodology to get a more robust estimate of the carbon benefit – are strongly advised to engage a Registered Professional Forester (RPF) with carbon expertise to complete the required timber appraisals, undertake stand health assessments, and assess the forest carbon benefit. Once the timber appraisal and stand health assessment have been completed, they will be used, in conjunction with acceptable forest models to model the gross carbon benefit. The information required to undertake carbon modeling includes:

- **Timber appraisal:** a timber appraisal consists of identification of the types and age of trees present, the extent and location of the forested areas, and the health of the stands. Information from the timber assessment would be used as input to forest carbon modeling work, which will provide the carbon benefit each year over the project lifetime.
- **Forest growth and yield tables:** these tables support the carbon modeling work and may be acquired from the Research Scientist at the Province of British Columbia's Ministry of Forest, Lands and Natural Resources-Operations Tenures, Competitiveness and Innovation Branch.

- **Process for tree removal:** a description of how trees would be removed if land conversion went ahead is also required, (i.e. percent of volume sent to a mill, whether or not stumps are pulled, if/how the debris is removed.)

These RPF's will typically also have the capacity to conduct the required forest carbon modelling. Carbon modeling involves virtually growing the trees using an accepted forest carbon model (e.g. CBM-CFS3, etc.). The modelling must occur over a minimum of 20 years longer than the time it takes for the land conversion activities to occur and must take into account the various carbon sinks and sources (e.g. deadwood, litter fall, harvested wood products, etc.) as well as how the land disturbances would have occurred over time. A 20-year timeframe is used for the purposes of this profile as it captures most of the avoided emissions and is also used in the Community Energy Emissions Inventory (CEEI) when deforestation (conversion) emissions are estimated.

Benefits and Cost Factors

- **Timing of land purchases or negotiations with developers.** The AFCP has been designed to recognize and reward local governments who work with developers to minimize the overall footprint of greenfield developments and avoid the conversion of forested lands to a non-forest use.
- **Additional benefits from forested lands.** In addition to the benefits that AFCPs create, forested lands generate ecosystem goods and services benefits such as improvements in air and water quality, richer terrestrial and aquatic habitats, opportunities for educational program and recreation and preserved cultural heritage.
- **Project Monitoring and Reporting Effort and Costs.** The cost of successfully implementing an AFCP is estimated to range between $5,000 - $20,000 depending on the pathway chosen. In comparison, developing and generating marketable carbon offsets under FCOP is estimated to cost upwards of $100,000.

The AFCP option requires fewer financial resources than the FCOP option, but does not generate revenue streams to cover future sampling and/or monitoring costs as FCOP does through the sale of marketable offsets. For local governments with lands over 650ha this will be an important consideration when evaluating the business case between FCOP and a GCC Option 1 AFCP.

Precedents

Due to the complexity and costs associated with developing forest-based carbon offsets, there are a limited number of precedents. At present, the following municipality is actively exploring these opportunities.

- **The Resort Municipality of Whistler** is currently working with the Lil'wat and Squamish First Nations on generating forest-based carbon offsets from the Cheakamus Community Forest (CCF) which consists of more than 33,000 ha of forested lands. http://www.cheakamuscommunityforest.com/

Forest Carbon Project Options

Framework	Available Project Types	Example Estimated Costs	Benefits	Drawbacks
FCOP	Afforestation Reforestation Improved Forest Management Avoided Conversion (includes avoided logging)	$100,000+	Marketable commodity that can be sold to offset buyers for revenue Multiple project types allowed.	Strict data, monitoring and reporting requirements. Substantive financial resources required to meet carbon emission savings. Substantive time to complete work required.
GCC Option 1: Avoided Forest Conversion Project	Avoided Conversion	$5,000-$20,000	Project can provide an annual carbon benefit over 20 years. This enables a local government to achieve carbon neutrality. Lower cost and risk approach (compared to FCOP) Less time required to complete work.	Carbon emissions created by project cannot be sold to generate revenue for local government. Limited to one project type.
GCC Option 2*	Afforestation Reforestation Improved Forest Management Avoided Conversion (includes avoided logging)	Wide cost range (typically higher than Option 1 as Option 2 requires both validation and verification) $25,000+	Project can provide an annual carbon benefit over 20 years. This enables a local government to achieve carbon neutrality. Multiple project types allowed.	Carbon emissions created by project cannot be sold to generate revenue for local government.

* *Option 2 projects recognize that local governments will have additional ideas (beyond Option 1) for measurable emission reduction projects that could be undertaken outside their corporate emissions boundary. Option 2 projects require considerable effort and third party assistance as project profiles have to be developed, and the project has to be third party verified.*

Resources

Quantifying Emissions from Forestry Projects in BC

- Greenhouse Gas Reduction Targets Act Emission Offsets Regulation

  http://www.env.gov.bc.ca/cas/mitigation/ggrta/offsets_reg.html
- Protocol for the Creation of Forest Carbon Offsets in British Columbia (FCOP)

  http://www.env.gov.bc.ca/cas/mitigation/fcop.html

Ecosystem Valuation

- **The UN Millennium Ecosystem Assessment (MEA).** The Millennium Ecosystem Assessment reviewed and assessed the changing conditions of global ecosystems and their services and provides management recommendations. For local governments, there are a number of useful synthesis reports ecosystems which can be of use to identify specific ecosystem services, determine boundaries and changes and generate ecosystem specific data.

  http://www.unep.org/maweb/en/index.aspx

- **UK National Ecosystem Assessment.** Using the Millennium Ecosystem Assessment (MEA) findings and approach, this assessment is the most recent and second largest detailed valuation study of natural capital globally.

  http://uknea.unep-wcmc.org/

- **The Economics of Ecosystems and Biodiversity (TEEB).** TEEBs objective is to highlight the growing cost of biodiversity loss and ecosystem degradation and to establish an objective global standard basis for ecosystem valuation / accounting. TEEB has provided a number of reports and documents regarding the management and valuation of ecosystems.

  http://www.teebweb.org/

- **The Natural Capital Project**. The Natural Capital Project has developed publically available software tool called InVEST (Integrated Valuation of Environmental Services and Tradeoffs). InVEST enables decision-makers to quantify the importance of natural capital, to assess the tradeoffs associated with alternative choices, and to integrate conservation and human development. It is a GIS based tool that relies heavily on biophysical and economic models - experience in GIS and ecosystem based flow information will be required to run the tool.

  http://www.naturalcapitalproject.org/

- **i-Tree**. i-Tree is a software suite from the USDA Forest Service that provides urban forestry analysis and ecosystem service valuation tools. i-Tree has been designed to help communities strengthen their urban forest management by quantifying the structure of community trees and the environmental services that trees provide. A number of Canadian centers have used the tool: Toronto, Town of Caledon, Sherwood Park, Edmonton, etc.

  http://www.itreetools.org/

- **Payments for Ecosystem Services (PES).** This is the practice of offering incentives to landowners in exchange for managing their land to provide some sort of ecological service. These programs emerge in the form of carbon markets (e.g. BC), and wetland and conservation banking.

  http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/ENVIRONMENT/EXTEEI/0,,contentMDK:20487926~menuPK:1187844~pagePK:210058~piPK:210062~theSitePK:408050,00.html

Appendix 7. Sample Project Plan Template (Option 1 Projects)

This form is also available online at www.toolkit.bc.ca/cnlg (Under the HOW tab). Local governments may choose alternate formats to the templates provided; however the substance must be the same as those provided in the sample templates.

Project Proponent Information	
Name of Local Government Project Proponent(s)	Provide the name of the local government(s) involved in the project and that will be claiming GHG reductions from the project under Option 1. _____
Project Designate appointed to sign off on Project Plan	Provide the name, phone and e-mail of the Project Designate duly authorized and having the legal capacity to sign off on this Template (e.g., CAO, CFO) Name_____ Title _____ Phone_____ Email_____
Project Contact	Provide a Project Contact name if different from above Name_____ Title _____ Phone_____ Email_____
Project Information	
Project title	Provide project title _____
Option 1 Project Profile	Confirm which Option 1 project and project profile you are implementing. Check only one per Project Plan Template submitted: ❑ Project 1A: Low Emission Vehicles ❑ Project 1B: Energy Efficient Building Retrofits and Fuel Switching ❑ Project 1C: Solar Thermal ❑ Project 1D: Household Organic Waste Composting ❑ Project 1E: Avoided Forest Conversion Project (AFCP)
Project description and objectives	Briefly summarize the project in terms of what, where, how when and why (max 4-5 sentences or bullets).
Project co-benefits (Optional)	Beyond the reducing GHG emissions, describe any anticipated community and/or sustainability co-benefits that this project will provide (*e.g., energy cost savings, stimulation of the local economy through green job growth, foster technological innovation, raise public awareness of climate change/energy conservation)*
Project start date	Indicate the project start date:_____

Project Transparency: Accountability and Reporting	
Scope	❑ The Project Designate certifies that the project outlined in this Project Plan is outside the LG (local government) corporate emissions boundary (as defined in the Carbon Neutral Workbook), within the local government's jurisdiction and BC, as per the Project Eligibility Requirements outlined in Appendix 1 of the *Becoming Carbon Neutral* guidebook.
Counted Once	❑ The GHG reductions claimed from this project under the Carbon Neutral Framework have not been, and will not be, committed or sold as an emission reduction under any other alternate emission-offset scheme, as per the Project Eligibility Requirements outlined in Appendix 1 of the *Becoming Carbon Neutral* guidebook.
Measurement (*For Project 1E: AFCPs only)*	❑ The Project Designate certifies that in the case of a Project 1E: Avoided Forest Conversion Project (AFCP) the eligible projects lands are owned by the local government and have been reserved or dedicated as park under section 30 of the *Community Charter* after the initial signing of the Climate Action Charter in 2007, and that a Forest Management Plan, to be updated every 10 years or more frequently, must be in place within six months of making public the first completed annual Self-Certification Template.
Ownership	❑ The local government proponent(s) claiming emission reductions from the Option 1 project outlined in this Project Plan have exclusive right to the legal and commercial benefits that arise from the GHG reductions from the Option 1 project, as per the Project Eligibility Requirements outlined in Appendix 1 of the *Becoming Carbon Neutral* guidebook.
Verification	❑ The Project Designate understands that he/she will be required to sign off the annual Verification Template Report for this project to verify that the estimated GHG reductions from this project actually occurred during the year in which they will be claimed, as per the Project Eligibility Requirements outlined in Appendix 1 of the *Becoming Carbon Neutral* guidebook.
BAU	❑ The Project Designate certifies that the Project meets Beyond Business as Usual (BAU) requirements a , b and c as per the GCC Project Eligibility Requirements outlined in Appendix 1 of the *Becoming Carbon Neutral* guidebook. If the Project referred to in this Project Plan is an Option 1, Avoided Forest Conversion Project, the Project Designates certifies that in addition, the AFCP meets criteria "d" of the BAU requirements.
Reports	❑ The Project Designate, is aware of the public reporting requirements under the Climate Action Revenue Incentive Program (CARIP) and that after January 1, 2012, the CARIP reports will be revised to include information on total annual corporate emissions , the reductions being claimed from GHG projects undertaken under the Carbon Neutral Framework (Option 1 and 2) , and purchased offsets (Option 3) in order demonstrate carbon neutrality for any given year, as the Project Eligibility Requirements outlined in Appendix 1 of the *Becoming Carbon Neutral* guidebook.

Project Plan: Authorization and Sign Off

Project Designate

The information provided in this Project Plan, including the accountability and reporting requirements, is to the best of my knowledge correct and complete.

_____ _____

Designate Signature Date

_____

Title

Appendix 8. Sample Self-Certification Template (Option 1 Projects)

This form is also available online at www.toolkit.bc.ca/cnlg (Under the HOW tab). Local governments may choose alternate formats to the templates provided; however the substance must be the same as those provided in the sample templates.

Project Proponent Information	
Name of Local Government Project Proponent(s)	Provide the name of the local government(s) involved in the project and claiming GHG reductions from the project described in this Template. _____
Project Designate appointed to sign off on the Self-Certification Template	Provide the name, phone and e-mail of the Project Designate duly authorized and having the legal capacity to sign off on this Template (e.g., CAO, CFO) Name_____ Title _____ Phone_____ Email_____
Project Contact	Provide a Project Contact name if different from above Name_____ Title _____ Phone_____Email_____
Project Information	
Project title	Provide project title and attach a copy of the original Project Plan previously made public. _____ ❑ Copy of Project Plan attached
Timing and Amount of reductions being claimed	Indicate the amount of GHG reductions, expressed in tonnes, being claimed from the project and the timeframe during which the emission reductions being claimed occurred. Amount of GHG reductions: _____ tonnes Timeframe: From _____ to _____
Certification that the required work occurred	❑ I declare that the project work required to achieve the GHG reductions from this project as estimated by the project profile used, actually occurred during the year in which they are being claimed, as per the Project Eligibility Requirements outlined in Appendix 1 of the *Becoming Carbon Neutral* guidebook.
Self Certification Template: Authorization and Sign off	
Project Designate *The information provided in this Self Certification Template is to the best of my knowledge correct and complete*. _____ Designate Signature _____ Date _____ Title	

Appendix 9. Sample Preliminary Review Template (Option 2 Projects)

This form is also available online at www.toolkit.bc.ca/cnlg (Under the HOW tab). Local governments may choose alternate formats to the templates provided; however the substance must be the same as those provided in the sample templates.

Project Proponent Information	
Name of Local Government Project Proponent(s)	Provide the name of the local government(s) involved in the project and that will be claiming GHG reductions from the project under Option 2. _____
Project Designate appointed to sign off on Project Plan	Provide the name, phone and e-mail of the Project Designate duly authorized and having the legal capacity to sign off on this Template (e.g., CAO, CFO) Name_____ Title _____ Phone_____ Email_____
Project Contact	Provide a Project Contact name if different from above Name_____ Title _____ Phone_____ Email_____
Project Information	
Project title	Provide project title _____
Project description and objectives	Briefly summarize the project in terms of what, where, how when and why (max 4-5 sentences or bullets).
Project Measurement	Describe the proposed approach to measuring the GHG reductions from the project. If available include detailed formulas, methodologies and assumptions and anticipated GHG reductions from the project.
Third party validation of formulas and methodologies	Identify who will provide third party validation of the proposed project formulas and methodologies (see Section 2.4.3 for a description of qualified third party validators) Name_____ Title _____ Phone_____ Email_____

Beyond Business as Usual	1) Proposed project start date._____ 2) Is the project required to meet a legislative or regulatory requirement? ❑ Yes ❑ No 3) Indicate how the Project meets one of the following tests (see Appendix 1): ❑ *Financial Test: A project can only be considered additional if it is not financially viable without investment from the local government(s) that will use the resulting emission reductions to balance its/their corporate carbon emissions.* ❑ *Barriers Test: A project can only be considered additional if there are barriers, such as significant local resistance, lack of know-how, institutional barriers, etc, that prevent its being implemented regardless of its profitability.* ❑ *Common Practice Test: A project can only be considered additional if it employs technologies or practices that are not already in common use.*
Project co-benefits (Optional)	Beyond the reducing GHG emissions, describe any anticipated community and/or sustainability co-benefits that this project will provide (*e.g., energy cost savings, stimulation of the local economy through green job growth, foster technological innovation, raise public awareness of climate change / energy conservation, etc.)*
Project Transparency: Accountability and Reporting	
Scope	Describe how this Project is outside of the scope of the local governments' corporate emissions boundary as defined in the Carbon Neutral Workbook.
Counted Once	Describe how project proponent (s) will demonstrate that the GHG reductions being claimed from the project will not be committed or sold as an emission reduction under any other alternate emission-offset scheme.
Ownership	Describe how the project proponent (s) will demonstrate that exclusive right to the GHG reductions that arise from the Project.
Verification	Third party verification is required for all Option 2 Projects (see Section 2.4.4 for a description of qualified third party verifiers).
Reports	GHG reductions from Option 2 projects will be subject to public reporting requirements. After January 1, 2012, the public reporting requirements under the Climate Action Revenue Incentive Program (CARIP) will be revised to include information on total annual corporate emissions , the reductions being claimed from GHG projects undertaken under the Carbon Neutral Framework (Option 1 and 2) , and purchased offsets (Option 3) in order demonstrate carbon neutrality for any given year, as per the Project Eligibility Requirements outlined in Appendix 1 of the *Becoming Carbon Neutral* guidebook.
Preliminary Review Template: Authorization and Sign Off	
Project Designate *The information provided in this Preliminary Review Template is to the best of my knowledge correct and complete*. _____ _____ Designate Signature Date _____ Title	

Appendix 10. Sample Project Plan Template (Option 2 Projects)

This form is also available online at www.toolkit.bc.ca/cnlg (Under the HOW tab). Local governments may choose alternate formats to the templates provided; however the substance must be the same as those provided in the sample templates.

Project Proponent Information	
Name of Local Government Project Proponent(s)	Provide the name of the local government(s) involved in the project and that will be claiming GHG reductions from the project under Option 2. _____
Project Designate appointed to sign off on Project Plan	Provide the name, phone and e-mail of the Project Designate duly authorized and having the legal capacity to sign off on this Project Plan (i.e., third party validator) Name_____ Title _____ Phone_____ Email_____
Project Contact	Provide a Project Contact name if different from above Name_____ Title _____ Phone_____ Email_____
Project Information	
Project title	Provide project title. _____ ❑ Copy of Preliminary Review Template attached (optional)
Project description and objectives	Briefly summarize the project in terms of what, where, how when and why (max 4-5 sentences or bullets).
Project Measurement	Describe the approach to measuring the GHG reductions from the project. The following documentation must be attached: ❑ detailed formulas ❑ methodologies and assumptions ❑ anticipated GHG reductions from the project
Third party validation of formulas and methodologies	Identify who will provide third party validation of the proposed project formulas and methodologies (see Section 2.4.3 for a description of qualified third party validators) Name_____ Title _____ Phone_____ Email_____
Beyond Business as Usual	1) Proposed project start date._____ 2) Is the project required to meet a legislative or regulatory requirement? ❑ Yes ❑ No 3) Indicate how the Project meets one of the following tests (see Appendix 1): *Financial Test: A project can only be considered additional if it is not financially viable without investment from*

	the local government(s) that will use the resulting emission reductions to balance its / their corporate carbon emissions. *Barriers Test: A project can only be considered additional if there are barriers, such as significant local resistance, lack of know-how, institutional barriers, etc, that prevent its being implemented regardless of its profitability.* *Common Practice Test: A project can only be considered additional if it employs technologies or practices that are not already in common use.*
Project co-benefits (Optional)	Beyond the reducing GHG emissions, describe any anticipated community and/or sustainability co-benefits that this project will provide (*e.g., energy cost savings, stimulation of the local economy through green job growth, foster technological innovation, raise public awareness of climate change / energy conservation, etc)*
Project Transparency: Accountability and Reporting	
Scope	Describe how this Project is outside of the scope of the local governments' corporate emissions boundary as defined in the Carbon Neutral Workbook.
Counted Once	Describe how project proponent (s) will demonstrate that the GHG reductions being claimed from the project will not be committed or sold as an emission reduction under any other alternate emission-offset scheme.
Ownership	Describe how the project proponent (s) will demonstrate that they have exclusive right to the GHG reductions that arise from the Project.
Verification	Third party verification of all Option 2 projects is required (see Section 2.4.4 for a description of qualified third party verifiers).
Reports	GHG reductions from Option 2 projects will be subject to public reporting requirements. After January 1, 2012, the public reporting requirements under the Climate Action Revenue Incentive Program (CARIP) will be revised to include information on total annual corporate emissions , the reductions being claimed from GHG projects undertaken under the Carbon Neutral Framework (Option 1 and 2), and purchased offsets (Option 3) in order demonstrate carbon neutrality for any given year, as per the Project Eligibility Requirements outlined in Appendix 1 of the *Becoming Carbon Neutral* guidebook.
Project Plan Template: Authorization and Sign Off	
Project Designate *The information provided in this Project Plan Template is to the best of my knowledge correct and complete.* _____ _____ Designate Signature Date _____ Title	

Appendix 11. Sample Third Party Verification Template (Option 2 Projects)

This form is also available online at www.toolkit.bc.ca/cnlg (Under the HOW tab). Local governments may choose alternate formats to the templates provided; however the substance must be the same as those provided in the sample templates.

Project Proponent Information	
Name of Local Government Project Proponent(s)	Provide the name of the local government(s) involved in the proposed project and claiming GHG reductions from the project described in this Template. _____
Name of Third Party Verification Organization	Provide the name of the third party verification organization duly authorized and having the legal capacity to sign off on this Template. _____
Project Contact	Provide a Project Contact name and contact information: Name_____ Title _____ Phone_____ Email_____
Project Information	
Project title	Provide project title and attach a copy of the original Project Plan previously made public. _____ ❑ Copy of Project Plan attached
Timing and Amount of reductions being claimed	Please indicate the amount of GHG reductions, expressed in tonnes, being claimed from the project and the timeframe during which the emission reductions being claimed occurred. Number of tonnes _____ Timeframe from _____ to _____
Certification that the required work occurred	❑ I declare that the project work required to achieve the GHG reductions from this project, as estimated by the validated Option 2 project formulas/methodologies, actually occurred during the year in which they are being claimed, as per the *Becoming Carbon Neutral* guidebook
Self Verification Template: Authorization and Sign off	
Third Party Verifier *The information provided in this Project Plan Template is to the best of my knowledge correct and complete*. _____ _____ Designate Signature Date _____ Title	

Appendix 12. Carbon Neutral Reporting and the CARIP Reporting Template

Starting in 2013, the CARIP Public Report Template will be amended to include information on local government progress towards carbon neutrality. The table below provides an example of the new information that will be requested as part of the revised CARIP Public Reports. Figures provided in the right hand column are for example only.

***New:* Carbon Neutral Progress Reporting Section**	
	Tonnes CO_2e
Total corporate emissions using SMARTTool or equivalent measurement tool	1000
Subtract: GHG reductions being claimed for this reporting year from the following option 1 GHG reductions projects implemented under the Green Communities Carbon Neutral Framework	
❑ Project 1A: Energy Efficient Building Retrofits and Fuel Switching	0
❑ Project 1B: Solar Thermal	(200)
❑ Project 1C: Household Organic Waste Composting	0
❑ Project 1D: Low Emission Vehicles	(200)
❑ Project 1E: Avoided Forest Conversion	0
Subtract: GHG reductions being claimed for this reporting year from Option 2 GHG reduction(s) projects implemented under the Green Communities Carbon Neutral Framework: ❑ Option 2 Projects implemented: (*insert title of the project(s) as per project plan template)*	(100)
Subtract: Offsets purchased for this reporting year as per the Green Communities Carbon Neutral Framework (Option 3)	(500)
Balance of Corporate Emissions for this Reporting Year. (*If the corporate emissions balance is zero, your local government is carbon neutral for this reporting year.*)	0