Corporate Carbon Neutral Plan
District of Sechelt

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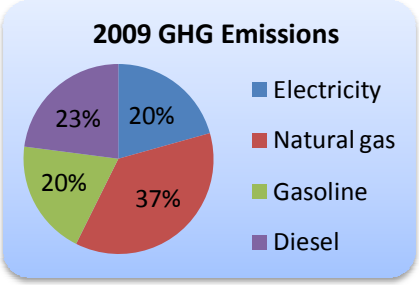
Executive Summary

The District of Sechelt is a signatory to the Climate Action Charter and has committed to being carbon neutral in its own operations by 2012. This entails reducing energy consumption and greenhouse gas (GHG) emissions as much as possible and purchasing offsets for any remaining emissions. This carbon neutral plan broadly identifies opportunities for energy and emissions reductions and recommends reduction targets, policies, and actions for becoming carbon neutral.

2009 Inventory by Emissions Source

	GJ	$	CO2e	%
Electricity	11,391	$ 212,648	70 t	20.6%
Natural gas	2,513	$ 37,388	125 t	36.8%
Gasoline	969	$ 28,324	67 t	19.7%
Diesel	1,115	$ 27,214	78 t	22.9%
Total	**15,987**	**$ 305,574**	**340 t**	**100%**



2009 Inventory by Department

	GJ	$	CO2e (tonnes)	%
Administration	4,686	$ 78,311	147	43.2%
Culture & Recreation	1,631	$ 37,656	44	12.9%
Roads	2,778	$ 96,583	83	24.4%
Wastewater	6,617	$ 86,278	46	13.5%
Solid Waste Collection	275	$ 6,747	19	5.6%
Total	**15,987**	**$305,574**	**340**	**100%**

Reduction Opportunities

An assessment of opportunities for energy and GHG reductions was performed, examining buildings and infrastructure, fleet and equipment, solid waste, renewable energy, policies, and staff awareness. Key opportunities include:

- Building retrofits
- Driver training and vehicle maintenance
- Solid waste recycling
- Solar water heating at the Municipal Hall
- Policies for new and existing buildings, vehicles, and equipment.
- Staff engagement program

Recommended Reduction Targets

- 10% energy reduction and 15% GHG reduction by 2015.
- 15% energy reduction and 30% GHG reduction by 2020.

Budget

To implement the recommended actions, a budget of $220,000 - $325,000 is recommended over the next 2 – 3 years. The cost of offsets through the Pacific Carbon Trust ($25/tonne) will be approximately $8,500 annually at current emissions.

Recommended Actions

Action		Timeframe	Responsibility
1.1	Set a target for energy reductions of 10% by 2015 and 15% by 2020, and GHG reductions of 15% by 2015 and 30% by 2020.	2010	Council
1.2	Set an annual budget for energy efficiency and GHG reduction activities.	2010	Council
1.3	Establish ongoing monitoring and reporting of energy consumption and GHG emissions.	2010	EM
Buildings & Infrastructure			
2.1	Undertake a comprehensive energy efficiency retrofit of all buildings.	2010	EM
2.2	Perform a detailed study of the RCMP building.	2011	EM
2.3	Further investigate energy savings opportunities at the wastewater treatment plants.	2011	EM
2.4	Conduct an audit of existing streetlights.	2011	EM
Fleet & Equipment			
3.1	Implement a driver training program.	2011	KT
3.2	Establish a regular maintenance program and checklist focused on energy efficiency.	2010	KT
3.3	Establish a regular monitoring program to record fuel consumption, kilometres, and maintenance costs by vehicle. Provide feedback to users on performance.	2010	KT
3.4	Request information on emissions and reduction efforts as part of contract negotiations for solid waste and recycling services.	2011	KT
Solid Waste			
4.1	Formalize recycling programs and expand to other facilities and outdoor areas.	2010	EM
4.2	Implement organics recycling with on-site composting at the District hall and RCMP buildings.	2010	EM
4.3	Implement a comprehensive recycling program at the Public Works yard, including recycling of oil, batteries, anti-freeze, metals, etc.	2010	EM
Renewables			
5.1	Install a solar water heating system on the district hall / library.	2011	EM
Policies			
6.1	Develop a green buildings policy for new and existing buildings.	2011	EM
6.2	Update the 2006 vehicle purchasing policy.	2011	EM
6.3	Enact an anti-idling policy.	2011	EM
6.4	Develop an equipment purchasing policy.	2011	EM
Staff Awareness			
7.1	Develop a staff education and awareness plan for energy efficiency, solid waste/recycling/compost, and driver training.	2011	EM

1. Introduction

1.1 Background

The District of Sechelt is a signatory to the Climate Action Charter and has committed to being carbon neutral in its own operations by 2012. This entails reducing energy consumption and greenhouse gas (GHG) emissions as much as possible and purchasing offsets for any remaining emissions.

The District has long been interested in reducing energy consumption within its operations. Some of the achievements include:

- Construction of an award winning “green” RCMP building in 2003.
- Replacement of rooftop units with heat pumps in the municipal hall.
- Undertaking a corporate energy and emissions inventory in 2008.
- Replacement of many incandescent lights with compact fluorescent lamps.
- Applying for membership in the Federation of Canadian Municipalities Partners for Climate Protection (PCP) program.

This carbon neutral plan will build on the efforts to date in order to establish a plan for meeting the District’s commitments. It will broadly identify opportunities for energy and emissions reductions, and recommend reduction targets, policies, and actions for becoming carbon neutral.

2. Inventory & Forecast

2.1 Inventory

The District first undertook a corporate inventory in 2008, using 2007 data. Since then the Province has released guidelines for developing local government inventories, which have different scope and emissions factors than were used for the 2008 inventory. The Province has also developed an online reporting system called SmartTool, for tracking and calculating emissions.

District staff have gathered updated energy consumption data for 2009 and are in the process of entering it into SmartTool. As this is still underway, there may be some minor changes to the inventory from the figures presented here. However, they are not expected to be significant.

Under the provincial guidelines, vehicle emissions from contracted services such as garbage and recycling are to be included. Recognizing the difficulty in obtaining information from contractors, the Province has stated that these emissions do not need to be included until the contract is renewed. However, as this can potentially be a significant component of emissions, an estimate has been included based on the number and weight of garbage and recycling trips. Upon contract renewal, a requirement for the contractor to provide details on distance travelled and fuel used should be included in the contract.

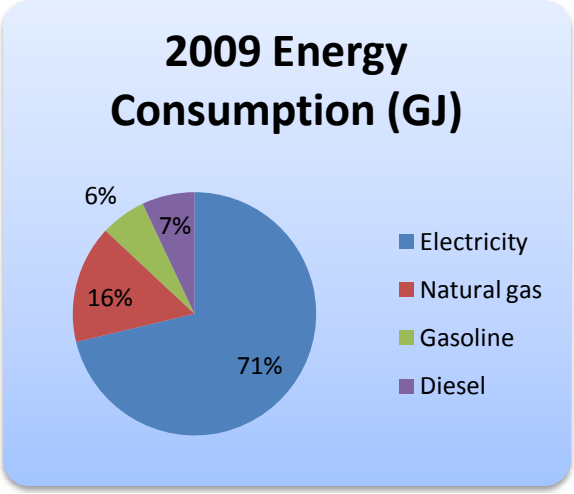
The new provincial guidelines do not include methane emissions from solid waste generated in corporate facilities. This is a required component of the Partners for Climate Protection program and has been included here as an information item.

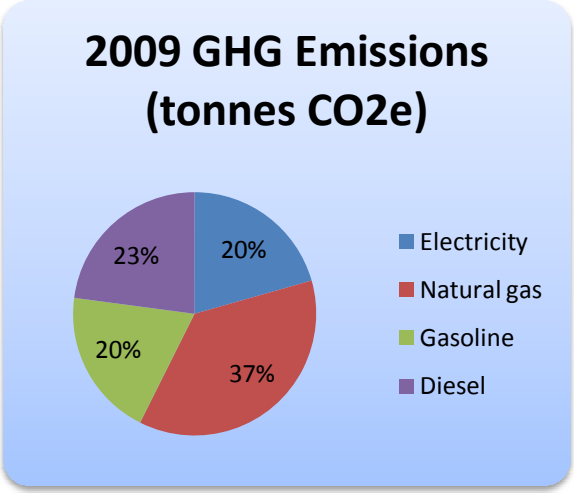
The inventory is summarized below. It can be seen that while electricity is by far the largest source of energy consumption, it accounts for only 20% of GHG emissions. This is due to the low emissions factor from BC Hydro, which has primarily hydro generation. Natural gas is the largest source of emissions, at 37%. Total emissions are 340 tonnes CO2e. At the current price of carbon offsets at the Pacific Carbon Trust, this would require an offset payment of $8,500 annually. Offsets are discussed further in Section 5.2.

Solid waste landfill emissions are provided as an information item and for PCP compliance, and are 114 tonnes CO2e.

2009 Inventory Breakdown by Emissions Source

	Consumption	GJ	$	CO2e (tonnes)	%
Electricity	3,164,047 kWh	11,391	$ 212,648	70	20.6%
Natural gas	2,513 GJ	2,513	$ 37,388	125	36.8%
Gasoline	27,936 L	969	$ 28,324	67	19.7%
Diesel	28,372 L	1,115	$ 27,214	78	22.9%
Total		**15,987**	**$ 305,574**	**340**	**100%**





2009 Solid Waste Landfill Emissions - Information Item Only

	Consumption	GJ	$	CO2e (tonnes)
Solid Waste	237 tonnes	N/A	$20,089	114

When consumption and emissions are broken down by department it can be seen that wastewater accounts for the largest share of energy consumption, followed by administration. However, administration accounts for a much larger share of GHGs, as

wastewater treatment is all electrical consumption. The estimated contracted services for solid waste collection only account for 5% of emissions.

2009 Inventory Breakdown by Department

	GJ	$	CO2e (tonnes)	%
Administration	4,686	$ 78,311	147	43.2%
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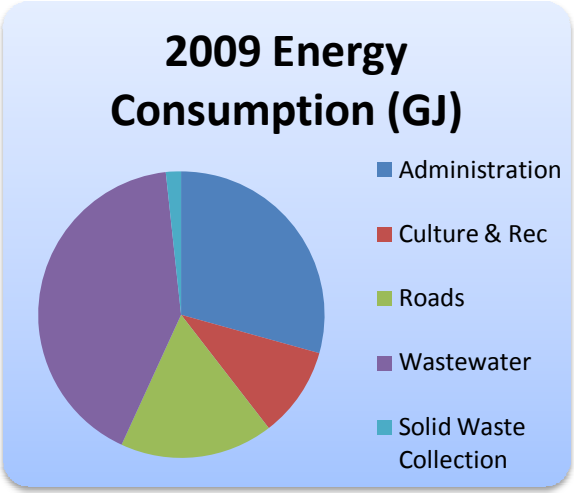
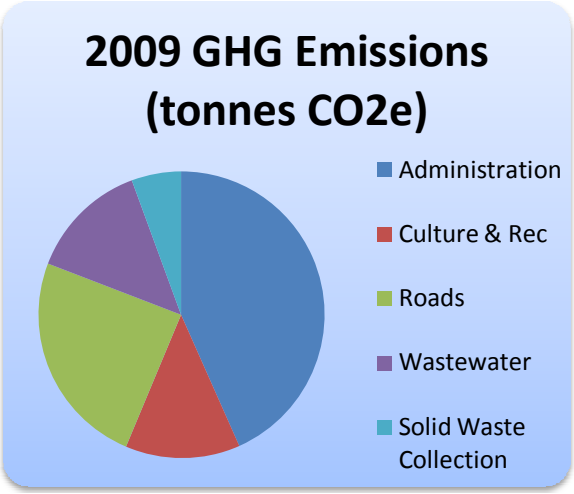


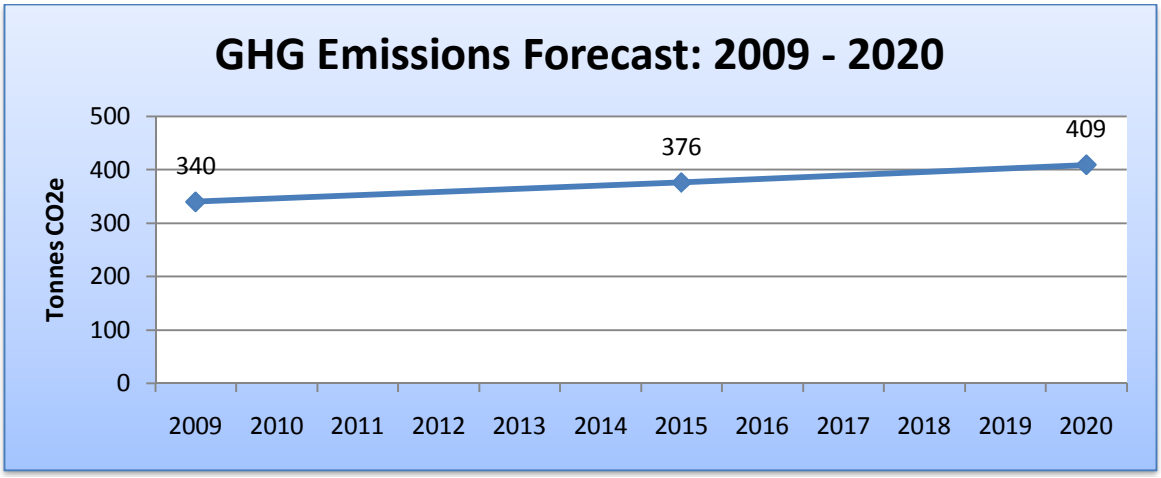


2.2 Business As Usual Forecast

Forecasting corporate emissions is a difficult task. This is because the addition of new facilities can dramatically change the inventory profile, yet details of the projects are often not well developed. In Sechelt there are plans for a new wastewater treatment plant.

However, a business as usual (BAU) forecast may be helpful in showing the effect of continued growth on corporate emissions. It is also a requirement of the Partners for Climate Protection program (PCP). For this plan, no attempt has been made to estimate the impact or timing of proposed new buildings. Instead, it has been assumed that in the long term municipal services will expand to meet the needs of a growing population at roughly the same rate as population growth. This has been estimated at 1.7% in the recently completed community energy and emissions plan for the Sunshine Coast, and the same value has been used here. The forecast is for carbon neutral emissions only, and does not include the solid waste landfill emissions.

At 1.7% annual growth, consumption and emissions can be expected to reach 19,244 GJ and 409 tonnes CO2e by 2020, an overall increase of 20%.



3. Opportunities

3.1 Buildings & Infrastructure

3.1.1 Buildings

Buildings account for about 57% of overall emissions. An opportunity assessment has been performed on the seven largest buildings, which account for over 90% of building energy consumption. The opportunity assessment is included as Appendix A.

The opportunity assessment included an assessment of energy consumption and a site visit to each facility. It identifies cost effective opportunities for each building, along with broad estimates of savings and overall costs.

The main energy conservation opportunity in the buildings is a lighting retrofit, replacing older T12 fluorescent lamps and magnetic ballasts with T8 lamps and electronic ballasts. In addition to saving energy, this will provide better lighting quality and an improved work environment. Other opportunities include improved building controls, adding insulation, and sealing and weatherstripping the building envelope. The measures are summarized below:

Recommended Measures – Opportunity Assessment of Buildings

Building	Recommended	Optional
Airport	Lighting retrofit / new fixtures Occupancy sensors Weatherstripping/sealing Attic insulation Remove or plug old chimney flue Programmable t'stat	

RCMP	Controls re-commissioning Boiler isolation/control Reduce temp in the Sally Port	
Municipal Hall/Library	Lighting retrofit LED exit lights T'stat programming and lock-boxes Boiler control	Building automation system
Public Works	Lighting retrofit Wall and roof insulation Occupancy sensor	
Rockwood Centre	Lighting retrofit Weatherstripping/sealing Programmable t'stat – Written Arts office	
Seaside Centre	Lighting retrofit/redesign Air-source heat pump Cooler-Miser / new refrigerator	
Kirkland House	Lighting retrofit Weatherstripping/sealing Attic insulation Replace faulty t'stats with electronic	

The overall savings from these measures is estimated at 15% of energy consumption, or $12,200. GHG savings would be 27 tonnes, or 19%. The estimated installation cost is $120,000. It should be noted that these are rough estimates, and an appropriate contingency should be included.

Many of the measures can be done in-house by staff, which may help reduce costs. The opportunity assessment also recommends a more detailed study be performed on the RCMP building, which has the highest energy use and some operational problems.

The most cost effective way to implement these measures would be as a comprehensive retrofit project that undertakes all the buildings at one time, particularly for lighting. This will provide economies of scale and reduce contractor time, as well as maximizing savings.

The lighting retrofit is likely to be applicable to the remaining smaller buildings that were not looked at in the opportunity assessment. Some additional budget should be allowed to retrofit those buildings at the same time. These buildings are listed below:

Building	Floor Area (ft)
Parks and Archives Shed	640
Ebbtide STP Control Building	1400
Dusty Road Control Building	1120
Dusty Road Clarifier Building	1120
Public Washrooms – Davis Bay	260
Public Washrroms – Hackett Park	850
Public Washrooms – Kin Park	592

The key to maintaining efficiency in buildings is good maintenance and operation. The best way to ensure that efficiency is being maintained to is to track the energy consumption on a regular basis, and investigate if consumption starts to rise.

Recommendations:

- Undertake a comprehensive project to retrofit all buildings.
- Perform a detailed study of the RCMP building.
- Continue to track energy consumption on a regular basis and provide feedback to operations and maintenance staff.

3.1.2 Wastewater

Wastewater pumping and treatment accounts for 57% of electricity consumption. The District has two wastewater treatment plants – Ebbtide and Dusty Rd. – as well as seven pump stations. The treatment plants account for most of the energy consumption, with the pump stations only contributing about 5%. Both treatment plants are aerobic processes, and do not produce methane.

The bulk of the energy is for sewage aeration and flow. At Dusty there are four surface aerators and a 50 hp aeration blower, which run at all times. Ebbtide has a 15 hp aeration blower. It is interesting to note that Ebbtide uses far less energy for treatment than Dusty, while handling more sewage.

Energy is also used for pumping of sewage. At Ebbtide there are 100 hp sump pumps and lift pumps, which (estimated based on the energy bills) operate about 20-25% of the time. There are also two 40 hp effluent pumps that operate roughly 500 hours a year at Ebbtide

Most of the motors are fairly old and likely not very efficient. However, motor efficiency improvements are generally small (3-5%), so it is usually not cost effective to replace motors unless they are running at all times. This is the case for a number of the aeration motors, and should be considered. For the other motors, they should be replaced with high efficiency motors upon failure.

All the motors are constant volume. Staff indicate this is necessary for treatment. However, many facilities vary the flow of the aeration blowers with variable speed drives based on monitoring of the sewage. Alternative aeration methods may also be possible. Given the high energy consumption at Dusty, it would be worthwhile to have these opportunities looked into further.

The clean effluent can be a source of heat that can be extracted with heat pumps. Unfortunately there are no major buildings close to the treatment plants. A heat pump using effluent could be used to heat the Ebbtide building, although this is a relatively small load. Any future development near the Ebbtide plant should be considered for use with heat pumps and effluent water.

Ebbtide is being charged about $1,700 a year for power factor surcharges. Power factor correction should be installed to eliminate these charges.

Although not related to energy consumption, staff at the treatment plants did indicate there would be considerable water savings by the use of filtered effluent for washdown and chlorine injection, at relatively low cost. The final solids, which are currently disposed of on alder trees at a cost of $100,000 a year, could potentially be used as compost.

Recommendations:

- Further investigate opportunities to reduce energy consumption. Engage a consultant with expertise in wastewater treatment if necessary.
- Install power factor correction equipment.

3.1.3 Streetlights

Streetlights account for 13% of Sechelt's electricity consumption. Roughly two-thirds of the streetlighting is owned by the District, with BC Hydro owning and maintaining the remainder. Most of the BC Hydro fixtures are high pressure sodium (HPS), while the District's fixtures are primarily metal halide. Both are reasonably efficient light sources. While the efficiency of HPS is slightly higher than metal halide, the light quality and colour of metal halide is better. Both BC Hydro and the District now use low cut-off fixtures for new streetlights to reduce glare and improve efficiency, which may reduce energy consumption in new installations.

The District does not have a comprehensive inventory of what streetlights exist in the community or their condition. An audit of streetlights should be conducted to develop an inventory and condition assessment that includes the type of streetlight, wattage, light levels, ownership, and identifies any faulty lights.

Streetlights are characterized by a need to withstand the harsh outdoor environment and relatively poor power quality. They are also difficult to change, so lamp life is a critical factor. Streetlight efficiency improvements are currently focused in four major areas, none of which are yet proven technologies:

Pulse start/electronic ballast metal halides. These higher efficiency lamps and ballasts result in up to 30% lower energy consumption, as well as longer lamp life. Although pulse start MH is relatively common for indoor applications, there are still concerns regarding their use in streetlights.

Dimming systems. There are systems available which allow for streetlights to be dimmed during non-peak hours. Energy savings of up to 40% are claimed, although installation costs are high. These are most applicable to areas where light levels are not as critical, such as pathways or parking lots, rather than intersections or busy roads.

LED lamps. LED lamps are considered by many to be the way of the future for streetlighting. Not only is there significant energy savings potential, but lamp life is much longer. At this time the costs of LED streetlights are very high and they are not cost effective. There are also some questions about reliability. But costs are dropping rapidly and

this will likely be the dominant technology in a few years. The District has tested an LED streetlight in front of the municipal hall for the past year, with no complaints.

Solar power. Solar powered streetlights, in combination with LED lamps, could eliminate streetlight energy consumption. But solar power is still very expensive. Even with solar prices dropping, it is not likely that solar power will be competitive with BC Hydro in the foreseeable future. Several municipalities have tried solar powered streetlights as demonstration projects. There are some concerns around battery life and light output after extended periods of darkness. Where solar powered lights are likely to be cost effective (both now and in the future) is in applications where the cost of providing power to the pole can be eliminated.

At this time there is no obvious technological change to be pursued. The District should continue to research and test technologies until prices come down and reliability improves.

Recommendations:

- Conduct an audit of existing streetlights.
- Continue to monitor developments and cost of new streetlighting technologies.
- Pilot new streetlight technologies where opportunities arise.

3.2 Fleet & Equipment

The vehicle fleet accounts for 13% of energy consumption and about 43% of overall GHG emissions. A review of fleet efficiency has been undertaken through the E3 Fleet review service, a program of the Fraser Basin Council. The full review is included in Appendix B.

Due to a lack of detailed data collection for the fleet in the past, some aspects of the fleet review had to be estimated, including vehicle efficiency. However, the E3 report provides estimates of average fuel efficiency, age, and usage, and highlights vehicles that differ significantly from the average. With increased data collection (now underway), a more detailed analysis will be possible and high consumption vehicles targeted for improvement or replacement.

Up to now there has been little collection of individual data on vehicle usage (e.g. km, fuel consumption, maintenance costs, downtimes, etc.), or a coherent strategy for vehicle usage, maintenance, or purchase. Developing such a strategy and putting in place processes for comprehensive data collection on a regular basis will not only reduce fleet energy consumption but also reduce maintenance costs and capital expenditures.

There are both long term and short term measures for reducing energy consumption and emissions from the fleet. Generally short term measures involve maintenance and operation, while long term measures include the replacement of inefficient vehicles.

3.2.1 Driver Training

Poor driving habits such as aggressive acceleration, speeding, and excessive braking can results in significantly higher fuel consumption. Driver training programs can help reduce consumption, while also reducing vehicle maintenance requirements. Reducing idling is a

particularly important component of improving vehicle operation. Better trip planning can also shorten and reduce unnecessary trips.

Driver training programs should be supported by policies, ongoing staff engagement programs, and regular training updates, so as to avoid slipping back into old habits.

In addition to driver training, there are technical measures that can be taken to improve driving habits, such as speed limiters and fuel consumption feedback to the driver.

3.2.2 Vehicle Maintenance

Regular and correct maintenance of vehicles will reduce energy consumption. Such things as air filters, spark plugs, engine oil, and tire inflation all impact fuel consumption. A regular maintenance program and checklist can improve vehicle performance.

3.2.3 Vehicle Utilization and Replacement

An important component of having an efficient fleet is to ensure the most appropriate vehicle is used each time a vehicle goes out. Often staff will use an inappropriate vehicle because it is more convenient or they are used to that vehicle. It is important to make more efficient vehicles available to staff and that they be aware of the costs of using the wrong vehicle. Newer vehicles are generally more efficient than older vehicles, and should be prioritized.

At a certain point it will be cost effective to replace older inefficient vehicles. The decision to do so should take into account fuel efficiency, maintenance, and insurance costs. The new vehicle should not necessarily be chosen as a direct replacement, but selected based on right-sizing criteria. Right-sizing is making the right choice of vehicle when it comes time for a new vehicle purchase. This decision should include the primary use of the vehicle, number of people and type of equipment it will be carrying, towing requirements, need for four wheel drive, etc. Once the type of vehicle is established, the choice of brand can be made. Attention should also be paid to whether the vehicle is still required, or can be retired without replacement.

3.2.4 Alternative Fuels

Most vehicles can run on alternative fuels blends such as ethanol or biodiesel without modification. The federal and provincial governments will require 5% renewable fuels in gasoline and diesel by 2010. Blends up to 10% ethanol and 20% bio-diesel are common. There is some controversy over the potential for bio-fuels such as ethanol and bio-diesel to divert land from food crops, and this will need to be considered in any decision to use bio-diesel or ethanol.

Electric vehicles are already available for limited uses, and mainstream electric vehicles will be available soon. They are generally limited to short trips and light loads due to battery life. However, there may be certain applications where this type of vehicle could be used in municipal operations.

3.2.5 Monitoring

In order to assess the success of driver training and maintenance programs, as well as to make decisions on right-sizing and vehicle replacement, it is necessary to keep comprehensive records of vehicle use and fuel consumption. While fuel consumption is

currently available by vehicle, vehicle kilometres have not been tracked. Kilometres should be recorded at least once a year. Maintenance costs should also be tracked by vehicle.

The results of monitoring should be provided to the end-users as feedback on the success of their efforts to reduce consumption.

3.2.6 Contracted Services

Much of the emissions from vehicles is a result of contracted services (although these emissions are just estimated at this time). The District has little or no direct control over these emissions. However, they do have considerable influence at the time of selecting a contractor. Asking proponents how they propose to reduce emissions can be part of a request for proposal, and form part of the selection criteria. And the District could ask for an emissions guarantee as part of a contract.

Recommendations:

- Implement a driver training program.
- Establish a regular maintenance program and checklist focused on energy efficiency.
- Establish a regular monitoring program to record fuel consumption, kilometres, and maintenance costs by vehicle. Provide feedback to users on performance.
- Request information on emissions and reduction efforts as part of contract negotiations for solid waste and recycling services.

3.3 Solid waste

Although GHG emissions from solid waste are not considered part of the carbon neutral commitment, solid waste emissions are considered a core part of a Partners for Climate Protection inventory, as well as being an issue of concern for municipalities and the public. When considering solid waste emissions in the context of a corporate plan, only waste produced at Sechelt facilities is included. This includes garbage collected at District faculties such as parks, even though the waste may originate from the public. Emissions from solid waste collected from homes and businesses are considered part of a community plan.

It should be noted that emissions from solid waste can be expected to drop significantly once the SCRD implements landfill gas collection the Sechelt landfill, required by 2016.

There are three main ways of reducing GHG emissions from corporate solid waste – by reducing the amount of waste produced, increasing recycling, and organics diversion.

Reducing the amount of waste produced is perhaps the most difficult issue to address. It relies on staff considering such things as the amount of packaging and re-usability of

products when making purchasing decisions. This is best addressed through staff engagement programs, which are discussed below.

There is recycling occurring at the District Hall. However, there is no organized recycling plan for District facilities, and most do not have any in-house recycling. A comprehensive review of available recycling and provision of recycling containers in all facilities will reduce the amount of garbage produced. Special attention should be paid to recycling of environmentally damaging materials such as oil or batteries at the Public Works yard. Recycling containers should also be provided in public parks.

Organic matter, such as food waste, is a major cause of methane in landfills. Organics recycling allows for such waste to be re-used as compost or other products, keeping it out of the landfill. There is no organics pick-up service available in Sechelt at this time. However, Sechelt could easily use all organics collected as compost in District parks and gardens. Organic matter can be collected within the building and emptied into a larger compost bin outdoors. As the organics collection bin needs to be emptied on a regular basis, organics collection is probably only applicable to buildings with regular usage and a number of staff. The District Hall and RCMP buildings would be the best to trial an organics collection system.

Recommendations:

- Formalize recycling programs and expand to other facilities.
- Reduce the amount of garbage produced through staff awareness programs and policies.
- Initiate organics recycling with on-site composting at the District Hall and RCMP building.
- Implement a comprehensive recycling program at the Public Works yard, including recycling of oil, batteries, anti-freeze, metals, etc.

3.4 Renewables

There is increasing interest in the use of renewable energy for both power generation and heating. Currently the District is not using any form of renewable energy within its facilities. Although renewable energy is more expensive than traditional energy sources, costs have been decreasing while technology has improved. In addition to reducing energy consumption and GHGs, the use of renewable energy by the District can act as a showcase for the community, allowing the District to show leadership.

3.4.1 Solar Thermal

Solar thermal is the use of solar energy for hot water and space heating. While this is the most cost effective use of solar energy, it can still have a fairly long payback in many cases. The best applications for solar thermal are those that have a consistent year round heating requirement and relatively low temperature requirements. Solar is usually used for water heating, as the load is steady year round. Although solar can be

used for space heating, it is not an ideal application as the highest loads occur in the winter, when there is the least solar energy available.

Sechelt has a medium solar resource, according to BC Hydro, with about 1300 sun-hours per year. This is somewhat less than the Okanagan or Peace regions, but similar to much of the province, and certainly adequate for use in solar thermal systems. Sechelt recently applied for funding through SolarBC, committing to a solar demonstration project if selected. Although the application was unsuccessful, there are still a number of incentives available for solar thermal and this is a good way to show leadership in renewable energy. There are several potential candidates for a solar water heating system, but the municipal hall is probably the best candidate for a number of reasons:

- It has a south facing roof.
- There are no significant obstructions or shadowing.
- It has regular occupancy.
- The mechanical room is located on the exterior.
- It has a high public profile.

Energy savings, based on an initial estimate using Retscreen, would be about $200. A solar installation would likely cost around $10,000 before incentives.

3.4.2 Solar Photovoltaics

Solar photovoltaics (PV) is the generation of electricity from solar panels. While the price of PV has come down recently, it is still a very expensive technology. PV will generally not be cost effective versus electricity from BC Hydro, however it may be cost effective for applications that require significant lengths of distribution wiring (e.g. streetlights, remote signage). PV should be considered for these type of applications as opportunities arise.

3.4.3 Wind

The Sunshine Coast is not identified as a major wind resource (such as the Peace region). Small scale wind is also usually not competitive with BC Hydro rates. Therefore any wind projects would likely be done purely as demonstration projects.

3.4.4 Geo-exchange

Geo-exchange (sometimes called geothermal or earth energy) is the extraction of low temperature heat within the ground through the use of heat pumps. The use of this technology has been growing rapidly in BC, with several installations on the Sunshine Coast. Almost any ground can be used for geo-exchange, but the type of soil will impact the cost and effectiveness of the ground field.

Geo-exchange systems are usually not practical or cost effective to retrofit into existing buildings. They should be considered for any new buildings being constructed. Geo-exchange systems are generally most cost effective when horizontal ground fields can be used (rather than vertical drilling). However, this requires a substantial amount of land area.

3.4.5 Biomass

Biomass is the most common form of renewable energy, used mostly in fireplaces and wood stoves in homes. But it can also be used at a larger scale for heating buildings, using waste wood from mills, construction, or logging operations. Biomass systems using waste wood require on-site operators to ensure smooth flow of the feedstock, limiting their application to large facilities. Wood pellets can be used with minimal supervision, but are much more costly, particularly with no local pellet manufacturer. For these reasons the use of biomass is unlikely to be practical or cost effective for Sechelt's facilities, although it could be considered for future buildings.

Recommendations:

- Install a solar water heating system as a showcase on the municipal hall.
- Consider solar photovoltaics, geo-exchange, or biomass when cost-effective opportunities arise.

3.5 Policies

Effective policies are essential to achieving energy reductions and maintaining those reductions over the long term. Policies provide firm guidelines on how energy efficiency is to be achieved and maintained. They give staff the authority to incorporate energy efficiency measures and ensure that efficiency is not forgotten or pushed aside by competing interests.

Good policies should be clear and straightforward to both understand and execute. They should be rigorous enough to have an impact, yet flexible enough to not lock the District into decisions that do not make sense. Policies may cover the operation of existing assets as well as the construction/purchase of new facilities or equipment.

Procedures should be in place to ensure that staff are aware of the policies and are implementing them.

Although this plan deals with energy and GHG emissions, other environmental attributes may also be included. However, a policy should not try to cover so many things as to become unwieldy.

3.5.1 Buildings

New Buildings

Buildings are the largest component of the District's energy consumption, and the construction of a new facility can significantly impact the overall emissions profile. Buildings typically last for 50 years or more, and cumulative energy costs may approach or exceed construction costs over the building lifespan.

There are several standards available for the construction of efficient buildings and it is easiest to link a policy to one or more of these standards. Additional criteria specific to Sechelt's needs can also be included. An important consideration in developing a policy is that the focus be on good, energy-efficient design, not on glamorous technologies that may

be costly or unproven. Recognition must be made of the District's ability to maintain and operate systems efficiently over the long term.

The best known building standard is LEED (Leadership in Energy & Environmental Design). This standard, developed by the Canadian Green Buildings Council (CaGBC), has four certification levels. It addresses energy as well as other environmental attributes such as water, materials, and air quality. There are mandatory as well as optional criteria, and a points system determines the level of certification. Although LEED is highly regarded, there have been criticisms of the cost of achieving certification. Some building owners choose to be "LEED equivalent" – designing to LEED but not certifying their project in order to reduce costs. The 2009 version of LEED, just released, accepts ASHRAE and New Building Institute (NBI) design guidelines for small buildings as a way of simplifying compliance.

The energy standard used within LEED is ASHRAE 90.1. This standard only addresses energy consumption. It is written as a code document, with mandatory and prescriptive requirements that can be met without a great deal of analysis. There is no certification process, so a policy based on 90.1 would rely on an engineer or architect's verification. 90.1-2004 is used by the Province as the energy standard within the building code, but only for Part 3 buildings. 90.1-2007 provides a slightly higher standard than the provincial code and 90.1-2010 will provide a significantly higher standard when released this year.

ASHRAE has recently released Standard 189.1 for the design of high performance buildings. This standard includes all aspects of green buildings, similar to LEED. But it is written with more mandatory and prescriptive requirements, and has no points or rating system. There are various other standards that can be considered, but none have the profile or wide acceptance of LEED and ASHRAE.

The size and usage of a building will also impact the type of policy. For large buildings, the design team will generally be familiar with the various standards and the design and compliance cost will be small relative to the overall building cost. For smaller buildings the cost of LEED compliance will be higher relative to the building cost, and may put a strain on budgets. Very small buildings may be contractor designed, with no knowledge of standards other than building code requirements. The policy should reflect these differences.

Some efficiency measures may not be covered by the standards or may be beyond their requirements. The District can encourage such systems by committing to fund them when cost effective, and within reasonable budget limitations.

Existing Buildings

While energy efficiency retrofits are undertaken to achieve major upgrades in efficiency, an energy efficiency policy for existing buildings can ensure that opportunities are not missed while making changes to the building or performing regular maintenance. An example would be to require light level measurements to be taken and new T8 lamps and electronic ballasts to be used any time a light fixture or ballast is replaced. Other things to be incorporated in the policy would include high efficiency motors, heating and cooling equipment, windows, insulation upgrades, and low flow water fixtures.

3.5.2 Vehicles

Ensuring that new vehicles are efficient is a combination of vehicle fuel efficiency and making sure the most appropriate vehicle is being purchased. The latter issue can be difficult to assess, as exact uses may not be known and staff may have vehicle preferences that are not necessarily the most appropriate vehicle type. However, a policy or purchasing procedure should ensure that the future uses are considered and a rationale for the vehicle being purchased is provided.

Vehicle fuel efficiency is easier to assess and provide a policy for. Vehicle fuel ratings are available for all cars and light trucks. A policy should require that the vehicle being purchased is near the top of its class (e.g. top 10%). This provides flexibility to staff to obtain vehicles that meet their needs and at reasonable cost, while ensuring good fuel efficiency.

For larger vehicles, fuel consumption ratings are not publicly available. However, a purchasing policy can still require staff to consider such things as engine size and vehicle weight in making a decision.

The District adopted a vehicle purchase policy in 2006 that addresses efficiency and GHG emissions. This policy should be reviewed and updated as necessary.

To reduce consumption after purchase, an anti-idling policy should be in place. Not only does this reduce consumption and emissions for the fleet, it also provides leadership should the District wish to enact a community wide anti-idling bylaw.

3.5.3 Equipment

Most major equipment intended for indoor use (computers, printers, refrigerators, etc.) have Energuide consumption ratings, and are also available with EnergyStar ratings. EnergyStar identifies equipment that meets a higher efficiency standard than typical. This is an international standard with very good recognition. EnergyStar ensures cost effectiveness, availability, and is ideal for a purchasing policy.

Gas –fired lawn and garden equipment produces higher GHG emissions than electric equipment, and much higher levels of air contaminants. Where possible, electric equipment should be chosen over gas.

Recommendations:

- Develop a two part policy for medium/large and small buildings that focuses on mandatory and prescriptive energy requirements. For medium/large buildings (>500 m²), compliance could be with ASHRAE 90.1-2010 or ASHRAE/NBI guidelines. Include a core list of other environmental criteria that are considered cost effective and easily implemented and maintained. LEED compliance and/or certification can be required at the discretion of council. For small buildings (<500 m²), develop a core list of energy efficiency requirements (drawn from ASHRAE standards and guidelines). Include a core list of other environmental criteria that are considered cost effective and easily implemented and maintained.
- Develop a policy for existing buildings that outlines equipment and technology upgrades to be undertaken whenever making changes or replacing equipment.
- Include a policy that commits the District to providing funding for additional energy efficiency or renewable energy measures within buildings that are within a certain payback period, to a maximum percentage of project budget.
- Develop a vehicle purchasing policy that requires a written assessment and justification of the vehicle type, and that the vehicle be within the top tier of consumption ratings for its class.
- Enact an anti-idling policy for District vehicles.
- Develop an equipment purchasing policy that requires all new equipment to be EnergyStar rated. All new lawn and garden equipment should be electric where appropriate.

3.6 Staff Awareness

Raising staff awareness and concern about energy efficiency and GHG emissions is an important component of any carbon neutral plan. All staff can have an impact on energy consumption through such things as turning off computers and driving in an efficient manner. Operations and maintenance staff have a more direct impact through the operation of District facilities. However, the benefit of building support amongst staff goes beyond the direct savings. It will improve the effectiveness of training programs and the likelihood of new technologies and operating strategies being accepted. And it will ensure that policies and procedures are followed and enforced.

Some of the key factors in successful staff engagement include:

- Build a broad conservation ethic, rather than focusing just on energy efficiency or GHG emissions.
- Emphasize all benefits (healthy buildings, air quality, cost savings, etc.) related to energy efficiency, not just the climate change imperative.
- Provide ongoing awareness raising activities. This will keep the issue fresh in people's minds as well as convincing them it's not just a passing fad.
- Encourage staff by following through on suggestions and providing implementation funding where needed.

Energy efficiency and GHG emissions awareness programs can be piggy-backed on existing outreach programs within the district. There are also a number of non-profit and educational institutes who can assist in developing and delivering such services.

Recommendations:

- Develop a comprehensive staff engagement strategy for:
  - Energy and water conservation
  - Driver training
  - Composting and recycling

4. Reduction Targets

The commitment to carbon neutrality made under the Climate Action Charter is a two part process, requiring a reduction in GHG emissions followed by the purchase of offsets for any remaining emissions. Although offset purchases will meet the requirements of the Charter, maximizing emissions reductions is the real intent. Emissions reductions also result in energy cost savings for the District, whereas offsets are an increased cost that will grow over time.

Setting a reduction target will provide a goal and a timeline for reducing consumption. Targets can be pragmatic or visionary. Pragmatic targets are developed based on a detailed assessment of opportunities and available technologies. Visionary targets set a goal for reductions based on the perceived need, and actions are then driven by the target. In practise most targets are a combination of both.

There are many opportunities for reducing energy consumption and emissions within Sechelt's corporate operations, as outlined in Section 3. Although precise savings estimates have not been calculated, the following are estimates of the savings potential by sector, through retrofits or technology choices:

Savings Estimates by Sector

Sector	GHG Reduction	Notes
Buildings	15 - 25%	Based on opportunity assessment of largest buildings.
Streetlights	0 – 50%	Savings are likely to be minimal until technology changes and price reductions occur.
Wastewater	5 – 15%	Requires more investigation.
New facilities	30 – 50%	Dependant on level of performance targeted for new buildings.
Fleet & Equipment	10 – 40%	Higher savings dependant on vehicle replacement.
New Vehicles	30 – 80%	Combination of fuel efficiency and right-sizing.

Solid Waste	70 – 90%	70% reduction expected from implementation of landfill gas collection at Sechelt landfill.

In the short term (3 – 5 years), the lower end of these savings ranges is more likely to be achieved, while the higher end is more applicable to the longer term (10 – 15 years).

Applying the lower end savings to the current inventory results in an energy reduction of 10% and GHG reductions of 14%.

Applying the higher end of the savings estimates to the 2020 forecasted inventory would result in an energy reduction of 29% and GHG reductions of 39%. However, some of these savings would be offset by growth, resulting in a net energy reduction of 14% and GHG reduction of 26% by 2020, relative to 2009 levels.

There is potential to exceed these estimates through staff behaviour change, new technologies, or additional opportunities that may be discovered. Therefore a target that slightly exceeds the 2020 reduction estimates would be a good combination of pragmatic and visionary target setting.

While the forecast has been incorporated into the target ranges, it should be noted that any major new facilities could result in significantly increased emissions. This emphasizes the importance of incorporating energy efficiency into new buildings and fleet purchases.

Recommendations:

- Set a short term reduction target of 10% energy reduction and 15% GHG reduction by 2015, relative to 2009 levels.
- Set a long term reduction target of 15% energy reduction and 30% GHG reduction by 2020, relative to 2009 levels.

5. Recommended Actions

The following are the key recommended actions. The recommended timeframe for implementation is relatively short, in order to maximize reductions and savings prior to 2012, the carbon neutral commitment year. Responsibility for implementing each action has also been identified.

Action		Timeframe	Responsibility
1.1	Set a target for energy reductions of 10% by 2015 and 15% by 2020, and GHG reductions of 15% by 2015 and 30% by 2020.	2010	Council
1.2	Set an annual budget for energy efficiency and GHG reduction activities.	2010	Council
1.3	Establish ongoing monitoring and reporting of energy consumption and GHG emissions.	2010	EM

Buildings & Infrastructure			
2.1	Undertake a comprehensive energy efficiency retrofit of all buildings.	2011	EM
2.2	Perform a detailed study of the RCMP building.	2011	EM
2.3	Further investigate energy savings opportunities at the wastewater treatment plants.	2011	EM
2.4	Conduct an audit of existing streetlights.	2011	EM
Fleet & Equipment			
3.1	Implement a driver training program.	2011	EM
3.2	Establish a regular maintenance program and checklist focused on energy efficiency.	2010	KT
3.3	Establish a regular monitoring program to record fuel consumption, kilometres, and maintenance costs by vehicle. Provide feedback to users on performance.	2010	KT
3.4	Request information on emissions and reduction efforts as part of contract negotiations for solid waste and recycling services.	2011	KT
Solid Waste			
4.1	Formalize recycling programs and expand to other facilities and outdoor areas.	2010	EM
4.2	Implement organics recycling with on-site composting at the District hall and RCMP buildings.	2010	EM
4.3	Implement a comprehensive recycling program at the Public Works yard, including recycling of oil, batteries, anti-freeze, metals, etc.	2010	KT
Renewables			
5.1	Install a solar water heating system on the district hall / library.	2011	EM
Policies			
6.1	Develop a green buildings policy for new and existing buildings.	2011	EM
6.2	Update the 2006 vehicle purchasing policy.	2011	EM
6.3	Enact an anti-idling policy.	2011	EM
6.4	Develop an equipment purchasing policy.	2011	EM
Staff Awareness			
7.1	Develop a staff education and awareness plan for energy efficiency, solid waste/recycling/compost, and driver training.	2011	EM

6. Implementation

6.1 Budgets & Financing

6.1.1 Budget

To achieve the targeted reductions, a financial investment will be required. This applies to capital projects as well as planning and studies. No detailed cost estimates have been performed, but the following are rough estimates for some of the main actions that can be used to guide budgeting decisions. These will need to be further refined prior to proceeding with action implementation. There will also be staff time required to implement the actions, but this has not been quantified.

Action	Budget	Timeframe	Notes
Building retrofits	$150,000 - 200,000	1 – 2 years	Allowance for contingency and other buildings/projects.
RCMP study	$10,000 - 15,000	1 year	Implementation budget would depend on study results.
WWTP investigation	$10,000 - 15,000	1 year	Implementation budget would depend on study results.
District Hall solar water heating	$10,000	1 – 2 years	
Policy development	$5,000 – 10,000	1 year	Consultant fees.
Staff engagement activities	$7,500/year	ongoing	Dependant on how much is done in-house vs. contracted. Piggyback on existing programs where possible.
Miscellaneous projects/pilots	$20,000 - $50,000	2 - 3 years	
Total	**$220,000 – 325,000**	**2 - 3 years**	

6.1.2 Financing

An important consideration in funding energy efficiency projects is to understand that capital investments will be paid back through lower energy costs. If funds are borrowed with a financing term equal to the project payback, there will be no net cost to the District or to taxpayers. Grant funding may be available for some of the actions from a variety of sources. It should be noted that it is more difficult to obtain funds for energy efficiency projects than it was in the past. There are fewer programs available and more communities vying for funding. Possible funding sources are listed below:

Potential Funding Sources/Programs

Action	
Building retrofits	BC Hydro Power Smart – Product Incentive Program EcoEnergy - Retrofits Gas Tax Funds

RCMP study WWTP investigation	Local Government Planning Grants BC Hydro Power Smart – Power Smart Partners BC Hydro Power Smart – Industrial Program Gas Tax Funds
District Hall solar water heat	Solar BC EcoEnergy - Renewable Heat
Driver training	Local Government Planning Grants
Policy development Staff engagement	Local Government Planning Grants

6.2 Offsets

The commitment to carbon neutrality requires a reduction in energy consumption as well as the purchase of carbon offsets for any remaining emissions. Carbon offsets are investments made in other GHG reducing projects. These projects are generally more cost effective than projects a municipality could undertake, so the cost per tonne of CO2 is relatively low (typically $15 – $30/tonne). But carbon offsets must be purchased every year, with potentially rising costs, whereas money invested in energy reductions will pay back over time through reduced operating costs. Therefore it is preferable to maximize cost effective reductions over the purchase of offsets.

Offsets are generated from a number of different types of projects. These can include energy efficiency, renewable energy generation, landfill gas capture, forestation, etc. Offsets have been somewhat maligned through reports of companies selling dubious offset projects. However, offsets are an innovative financial mechanism that can greatly reduce GHG emissions and without offsets it will be very difficult for most organizations to make deep reductions. With increasing regulatory requirements for GHG reductions, the oversight and regulation of offsets will increase.

For an offset to be considered valid, it must be additional. This means that it would not have gone ahead anyway without the sale of offsets. Other important factors in assessing the quality of offsets are third party verification, uniqueness (the offset is only counted once), permanence, and leakage (where the project results in an increase in emissions elsewhere). There are a number of standards available for assessing offset projects, of which the Gold Standard is probably the highest, supported by organizations such as the World Wildlife Fund and the David Suzuki Foundation.

From the District's perspective, there are a number of ways it can invest in offsets to meet its carbon neutral commitment:

1. **Purchase offsets from the Pacific Carbon Trust (PCT).** The PCT was set up by the provincial government to invest in GHG offset projects in British Columbia. Originally set up to provide offsets to government and crown corporations, PCT is now selling to local governments and companies. Offset projects are regulated by the BC Emission Offsets Regulation and can be considered to be high quality. The current purchase price is $25/tonne.

2. **Purchase offsets from another vendor.** There are at least 14 offset vendors in Canada and over 140 internationally. The quality of offsets available ranges considerably. The David Suzuki Foundation and Pembina Institute have released a report that grades the Canadian offset vendors and six international vendors. Vendors are ranked and grouped into strong, average, and weak performers. This list is an invaluable resource if offsets are to be purchased from a vendor other than PCT. The cost of offsets at the top ranked Canadian vendors ranges from $20 to $47.50/tonne.

3. **Develop or invest directly in an offset project.** This is a difficult way to obtain offsets, as viable offset projects are not likely to be located within Sechelt. Projects are usually quite large to achieve economies of scale, and require large capital investments. Projects such as renewable energy require significant expertise and can take years to develop. The most likely local projects for the District to invest in would be landfill gas recovery or forestation.

   Methane capture from landfills can be a valid and cost effective offset project. The SCRD operates two landfills, in Sechelt and Pender Harbour. The Sechelt landfill will require landfill gas collection by 2016, at which time offsets would no longer be valid. However, if the collection system was put in place before then, the reductions achieved would likely be sufficient to offset Sechelt's emissions for many years, as well as selling some to other vendors. The Pender landfill does not currently have any requirement for landfill gas collection. Therefore it could be considered as a long term offset project. However, gas collection at small landfills can be expensive. Either of these projects would be quite involved an require close collaboration with the SCRD.

   Planting trees to sequester carbon is considered a valid offset (although not by the Gold Standard). This would be a relatively low cost means of generating offsets. It requires a significant amount of land, with offset estimates ranging from 2 to 12 tonnes/year per hectare. Therefore the District would need from 28 to 170 hectares of available land for tree planting. The draft Urban Forest Management Plan calls for increased tree planting in streets, parking lots, and utility right-of-ways, and future work could examine the potential number of trees to be planted. With forestation, care needs to be taken to ensure additionality. Trees planted in the District's community forest would not be eligible for offsets, as there is a requirement to replant trees in the community forest.

4. **Carbon Reserve Fund.** A carbon reserve fund is a fund set up by the local government to which money is contributed for the purpose of investing in local projects that reduce GHGs. This concept was first developed by the District of Saanich prior to the Climate Action Charter. These are not true offsets, as there is no guarantee (and little likelihood) that the money can achieve the same level of GHG reductions as large-scale offset projects. However, it does keep the money within the community, or within the District's facilities if so designated. Funds would probably be set aside at the same rate as the PCT ($25/tonne). There may be some question whether the Province will accept this scheme as being in compliance with the Climate Action Charter commitment, but indications are that they will, at least initially. A resolution has been proposed by the District of North Vancouver for the 2010

UBCM Convention to ask the Province to allow local governments to create carbon reserve funds as a means of meeting their carbon neutral obligations.

The District will need to consider these options in the near future. If the intention is to invest in an offset project, it would take a number of years to develop. Initial planning should start immediately. For the other options, a decision can be made closer to the carbon neutral reporting date (end of 2012). The Province is likely to provide additional guidance to municipalities before then on offsetting their emissions.

Whether investing directly in offset projects or through a carbon reserve fund, the District is likely to have more success in developing projects if it partners with the SCRD and other municipal governments. It is recommended that the District explore opportunities with the SCRD prior to making a decision on the means of offsetting their emissions.

7. Conclusions

The District of Sechelt has made a commitment to carbon neutrality in their corporate operations by signing the Climate Action Charter. To meet that commitment, the District will need to reduce energy consumption and GHG emissions, as well as offsetting any remaining emissions.

There are a variety of opportunities available for reducing energy consumption in the District's operations, including building retrofits, driver training and vehicle maintenance, purchasing policies, and staff engagement. By implementing these opportunities, the district can target emissions reductions of 30% by 2020. To do so, it will be necessary to budget for implementation activities, with a recommended budget of $220,000 - $325,000 over the next 2 – 3 years.

There are a variety of means of offsetting the District's remaining emissions, including the purchase of offsets, investing in an offset project, or the establishment of a carbon reserve fund. It is recommended the District explore opportunities with the SCRD prior to deciding which method to pursue.

Appendix

A - Opportunity Assessment for Buildings
B - E3 Fleet Assessment