Developing a Green Fleet Program for the Township of Esquimalt

598 Policy Report
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EXECUTIVE SUMMARY

After voluntarily signing the British Columbia (BC) Climate Action Charter in October 2008, the Township of Esquimalt faces the challenging task of becoming carbon neutral in its operations by 2012. Working toward carbon neutrality, the Township of Esquimalt will inventory its fleet GHG emissions and review the management of its fleet. The goal is to identify GHG emission reduction opportunities in fleet operations. This report will recommend a green fleet program which will assist Esquimalt in achieving its carbon neutrality commitment.

The objective of a green fleet program is to reduce GHG emissions through the purchasing and operational practices of the fleet. To be successful, the program must consider both the municipality's financial constraints and operational need to continue delivering services. The research undertaken in this report was to answer the following questions:

1. How can the Township of Esquimalt reduce its fleet's GHG emissions?
2. How will the goal of reducing GHG emissions be balanced with the municipality's need to complete its service delivery tasks?
3. What are the most cost-effective ways for Esquimalt to reduce its fleet's GHG emissions?
4. What actions are local governments in other jurisdictions doing to reduce their fleet's GHG emissions?
5. Which of these green fleet initiatives could be successfully adopted by the Township of Esquimalt?

To address these questions, this report's research approach was three-pronged and included: completing a review of green fleet programs in other jurisdictions; conducting telephone interviews with four BC local governments; and facilitating a focus group with Township of Esquimalt employees.

<u>Key Research Findings</u>

The review of comparable green fleet programs resulted in the development of a framework. The framework includes achieving the objective of reductions in GHG emissions by implementing initiatives from two streams, fleet purchasing and operations. The purchasing component of the framework includes fleet and vehicle right-sizing, alternative technologies and fuels, alternative forms of transportation, aftermarket technologies and conducting a life cycle cost analysis. The operations component of the framework includes trip and route planning, idling reduction strategies, driver fuel-efficiency training, fleet maintenance, and fleet monitoring and benchmarking.

The interview findings provided greater insight on four BC local governments' benefits and challenges in implementing their green fleet program. Benefits and challenges were experienced in the implementation of both the purchasing and operations components of a green fleet program. The common green fleet initiatives that were identified as being beneficial included green purchasing, life cycle costing, the use of aftermarket technologies, idling reduction and education campaigns, fleet monitoring and participation in the E3 fleet program. The key

challenges of implementing a green fleet program were in the areas of right-sizing, the adoption of alternative fuels and vehicles due to the lack of employee buy-in and budget constraints.

The focus group findings discussed how the Township of Esquimalt currently operates and manages its municipal fleet. It highlighted several green fleet initiatives which employees believe could be successfully implemented including green purchasing, right-sizing of vehicles and monitoring. At the same time, employees believed that challenges of implementing a green fleet program framework could be experienced with fleet and vehicle right-sizing, alternative fuels, and idling reduction.

The report found that the common challenges to implementing a green fleet program included: the cost of implementing green fleet initiatives; the lack of knowledge on green fleet programs and its benefits among key stakeholders; and employees' resistance to change. A green fleet program, and its implementation plan, would need to address these challenges to be successful.

Recommendations

It is recommended that the Township of Esquimalt implement a green fleet program in three phases over five years with a completion date of 2013.

Phase I (2009-2010) establishes the groundwork of Esquimalt's green fleet program which includes the implementation of initiatives to obtain organizational buy-in towards implementing a green fleet program. This entails organizing a Green Fleet Review Committee, measuring fleet GHG emissions, setting a short-term GHG emission target, implementing a green fleet purchasing policy, creating a purchasing worksheet, monitoring the municipal fleet, and becoming a member of the Fraser Basin Council's E3 Fleet Program.

Phase II (2010-2012) achieves significant reductions in GHG emissions from fleet operations. This entails adopting the use of alternative fuels and vehicles, having an E3 Fleet review conducted on the municipal fleet, and implementing an idling reduction strategy.

Phase III (2013) evaluates the green fleet program's cost-effectiveness and ability to meet the short-term target. This evaluation then leads to the establishment of longer-term targets and actions.

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After voluntarily signing the British Columbia (BC) Climate Action Charter in October 2008, the Township of Esquimalt faces the challenging task of becoming carbon neutral in its operations by 2012. Achieving carbon neutrality requires the reduction of greenhouse gas (GHG) emissions and the purchase of carbon offsets for the remaining GHG emitted. Working toward carbon neutrality, the Township of Esquimalt will inventory its fleet GHG emissions and review the management of its fleet. The goal is to identify GHG emission reduction opportunities in fleet operations.

There are several reasons why the municipal fleet will be the first area of Esquimalt's operations to be examined for a reduction in GHG emissions. First, fleet emissions are a contributor to Esquimalt's corporate GHG emissions, and therefore are a factor in achieving carbon neutrality. Second, new vehicles are purchased by the municipality every year as older vehicles reach the end of their operating life. The purchase of new vehicles presents an opportune time for greening the fleet, by beginning with the initial purchasing decision. Third, Esquimalt Council asked that the purchase of new vehicles be aligned with the municipality's carbon neutrality goal. As a result, Esquimalt employees are now tasked with evaluating the GHG emission impact of vehicle and equipment purchases. Fourth, the development of a green fleet strategy furthers the recommendations made by Holland Barrs Planning Group (2007) for an Esquimalt Sustainable Development Strategy.

This report undertakes to recommend a green fleet program which will support the municipality's goal of carbon neutral operations by 2012. A strategic approach, which recognizes the operational and financial barriers to implementation, will be taken in developing a green fleet program for Esquimalt. This report will address the following research questions:

1. How can the Township of Esquimalt reduce its fleet's GHG emissions?
2. How will the goal of reducing GHG emissions be balanced with the municipality's need to complete its service delivery tasks?
3. What are the most cost-effective ways for Esquimalt to reduce its fleet's GHG emissions?
4. What actions are local governments in other jurisdictions doing to reduce their fleet's GHG emissions?
5. Which of these green fleet initiatives could be successfully adopted by the Township of Esquimalt?

To address these questions: green fleet programs in other jurisdictions will be reviewed; telephone interviews with four BC local governments will be conducted; and a focus group with Township of Esquimalt employees will be held.

This report is organized into 9 sections, including this introduction, to present the Township of Esquimalt with a green fleet program framework. Section 2 provides background on climate change, government GHG legislation, and on the Township of Esquimalt and its fleet. Section 3 details the research methodology for this report. Section 4 reviews green fleet programs in other jurisdictions and presents a framework. Section 5 presents the research findings from telephone interviews with four BC local governments and the focus group with Township of Esquimalt employees. Section 6 analyzes the findings in the report to provide a broader discussion on the

benefits and challenges of implementing a green fleet program. Section 7 discusses the evaluation criteria for developing and evaluating a successful green fleet program. Section 8 outlines a recommended green fleet program for the Township of Esquimalt, and includes an implementation plan. Finally, Section 9 concludes this report.

SECTION 2: RELEVANT BACKGROUND

This section provides the relevant background on why the Township of Esquimalt wishes to implement a green fleet program. First, climate change and climate change mitigation is discussed. Second, the BC Climate Action Charter and its impact on local government operations are presented. Third, the operation of the Township of Esquimalt's municipal fleet is described.

2.1 Climate Change

Researchers have found that GHG emissions contribute to the warming of the earth's surface, which is commonly referred to as global warming or climate change (Ramanathan & Feng, 2009). There are a number of gases that are classified as GHGs. The most important ones include carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_20); however, these gases are commonly measured together as tonnes in carbon dioxide equivalent [tCO_2e] (Ministry of Community Services, 2008). Pielke and Roger (2004) stated that climate change is due to human activity increasing GHG emission levels in the atmosphere; more specifically, as a result of the burning of fossil fuel and deforestation.

Climate change is a global issue, and if not mitigated will negatively impact the environment and result in poor economic and social conditions for humans (Karl & Trenberth, 2003). These effects are already evident in BC where many communities having experienced the economic and environmental devastation linked to the Mountain Pine Beetle epidemic and increased storms and floods (Ministry of Community Services, 2008). The Province of British Columbia (2008) indicates that GHG emission levels will continue to rise unless action is taken to reduce the amount of GHG entering the atmosphere.

The issue of climate change is not a new phenomenon. For over three decades scientists have been stating that the GHG emission levels from human activity are increasing and contributing to the warming of the earth's surface. In 1979, the United Nations' World Meteorological Organization hosted the first World Climate Conference in Geneva. At that time, the World Meteorological Organization called for government action to prevent human-made changes to the environment and that action is required to mitigate the problem of climate change (Armitage, 2005).

The next significant event occurred in 1997 with the adoption of the Kyoto Protocol during the United Nations Framework Convention on Climate Change (UNFCCC). The UNFCCC focused on climate change mitigation through global GHG emissions reduction. The Protocol established binding GHG emission reduction targets for the European Union and signatory countries over the five-year period of 2008-2012 (United Nations Framework Convention on Climate Change, n.d.). North America's commitments to the Kyoto Protocol targets have been poor. In 2001, the United States backed out of the agreement. In 2007, Canada announced that it would not meet its Kyoto reduction targets and instead set a lower target of achieving 20% reduction by 2020 (Haag, 2007).

North American's awareness of climate change heightened as a result of the 2006 Academy Award winning documentary, "An Inconvenient Truth" by former United States Vice President Al Gore (Meyer, 2006). The importance of taking immediate action to mitigate climate change is

supported by the Stern Report (2007). The report, which presents the economic argument for climate change mitigation, states that when it comes to climate action, "the benefits of strong and early action far outweigh the economic costs of not acting," (Stern, 2007, p. vi). This finding has spurred increased government spending, at all levels of government, on mitigation to minimize the future social and economic costs of climate change.

The importance of government leading climate action initiatives through legislation, policies and action is growing around the world. In North America, many government jurisdictions are being recognized for their climate action initiatives. These include the State of California (Mazmanian, Jurewitz, & Nelson, 2008) and the City of Portland, Oregon (Grewe, Anderson, & Butman, 2002). The Province of British Columbia is also taking action to mitigate climate change by setting GHG emission reduction targets. The following section will detail the Province of British Columbia's climate action plan.

2.2 British Columbia Climate Action Charter

Recognizing the important role of governments to lead and take action against climate change, the Province of British Columbia has set aggressive targets for province-wide reductions in GHG emissions. The BC Premier first announced the government's vision for climate action leadership during the 2007 Speech from the Throne (Legislative Assembly of British Columbia, 2007). The targets included: becoming carbon neutral in its operations by 2010; and in comparison to 2007 levels, to reduce GHG emissions by 33% by 2020, and then by at least 80% by 2050 (Province of British Columbia, 2008).

A relatively new climate action model is carbon neutrality. The objective of carbon neutrality is to achieve net zero GHG emissions. Carbon neutrality is a three step process including: conducting an inventory of GHG emissions (baseline); reducing these GHG emissions as much as possible; and offsetting the remaining GHG emissions to achieve net zero emissions. The offsetting of GHG emissions entails the purchasing of carbon offsets; whereby an investment is being made in carbon sequestering projects which reduce GHG emissions (Province of British Columbia, 2008). For organizations that burn fossil fuels in the production of its goods and / or delivery of its services, achieving carbon neutrality means increased operational costs in the purchase of carbon offsets. Figure 1 outlines the process of achieving carbon neutral operations. Overall, carbon neutrality is the balancing of GHG emission levels emitted with an equal investment in GHG offsets.

Figure 1: The Carbon Neutral Process

These provincial targets have been entrenched in legislation under the *Greenhouse Gas Reduction Targets Act,* and a Climate Action Plan was developed. The plan outlines strategies and actions that will take BC 73% of the way towards achieving its goal of 33% GHG emissions reductions by 2020. The plan outlines the need to act in a number of sectors including transportation, buildings, waste, agriculture, industry, energy and forestry. This plan also highlights the importance of working with all levels of government, including local governments, in order to achieve these targets (Province of British Columbia, 2008). One tool that was introduced for working with local governments is the BC Climate Action Charter.

The BC Climate Action Charter is a voluntary and non-binding agreement between the Province of British Columbia, the Union of British Columbia Municipalities and signatory local governments (Province of British Columbia & Union of British Columbia Municipalities, 2007). The Charter establishes the role that local governments can play in the Province's Climate Action Plan and in their own communities against climate change. A copy of the Charter is included with this report as Appendix A.

By voluntarily signing the Charter, a local government agrees to three non-binding commitments:

(1) to become carbon neutral in its operations by 2012;
(2) to measure and report on the community's GHG emissions; and
(3) to create a complete, compact, and energy-efficient community (Province of British Columbia & Union of British Columbia Municipalities, 2007).

As stated in the introduction, the scope of this report is focused solely on Esquimalt's commitment to the first goal, to achieve carbon neutral operations by 2012.

2.3 Township of Esquimalt

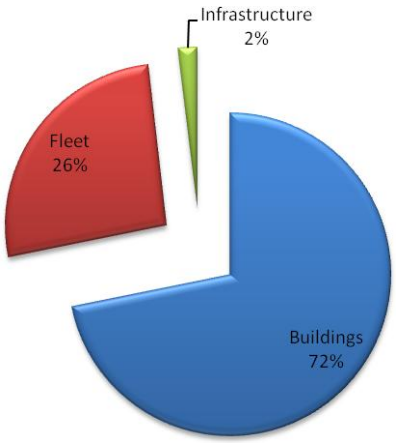
The Township of Esquimalt is located on the southern tip of Vancouver Island in British Columbia, Canada. With a population of 17,000 residents, Esquimalt is the westerly neighbour of the City of Victoria, the provincial capital, and a member of the Capital Regional District (Township of Esquimalt, 2008). The Township of Esquimalt has over 200 full-time, part-time and auxiliary municipal employees. The organization is structured into six departments according to the services it provides: Corporate Services; Financial Services; Development Services; Engineering and Public Works; Parks and Recreation; and Fire Rescue Services.

In the provision of its services to the community, the municipality uses energy and emits GHG, thereby contributing to global warming. To understand the significance of the fleet's operations to Esquimalt's overall corporate GHG emissions, an inventory of Esquimalt's 2008 corporate GHG emissions was completed. The quantity of energy used in 2008 was obtained through 2008 invoices from BC Hydro, Terasen Gas and several fuel suppliers. These quantities were then multiplied by the GHG factors published in the *Draft Guidance: Carbon Neutral Local Government* (Province of British Columbia & Union of British Columbia Municipalities, 2009) to calculate the corporate inventory.

The inventory indicates that 1,076 tonnes of carbon dioxide equivalent (tCO_2e) were emitted in 2008. The sources of GHG emissions included: 773 tCO_2e from buildings (72%), 283 tCO_2e from the

fleet (26%), and 20 tCO_2e from infrastructure (2%). Figure 2 illustrates the percentage breakdown of Esquimalt's 2008 corporate GHG emissions by area.

Figure 2: Corporate GHG Emissions by Area



The municipal fleet is the second largest contributor to Esquimalt's corporate GHG emissions. In 2008, Esquimalt had 70 vehicles and pieces of equipment in its fleet. These units are used by the Engineering, Public Works, Parks and Recreation, and Fire Rescue departments in the provision of services such as waste collection, road, park and sewer maintenance, and fire services.

The fleet is organized into four categories based on the characteristics of the unit. Categorization is important as different types of fleet units produce higher or lower levels of GHG emissions compared to others. **Equipment** is used only to perform a specific task; therefore, it is not used as a mode of transportation. **Equipment-Vehicles** are used for transportation with the purpose of completing an intended task. Equipment-Vehicles typically are complex and include both a chassis and a piece of specialized equipment. **Tools** are hand-operated motorized devices. **Vehicles** are used in the transportation of equipment and personnel to job sites. Esquimalt's municipal fleet has 23 pieces of equipment, 16 equipment-vehicles, 11 tools, and 20 vehicles. Of these 70 units the fuel types used include 21 diesel, 39 gasoline, 2 propane, 1 electric, 7 using no fuel, and 1 unit using both diesel and propane. Figure 3 provides a table outlining the type of fuel used by fleet classification. A detailed inventory of Esquimalt's fleet can be found in Appendix B.

Figure 3: Municipal Fleet by Classification and Fuel Type(s)

Classification	Diesel	Gasoline	Propane	Electric	No Fuel	Total
Equipment	11	4	2	1	5	**23**
Equipment-Vehicles	10	4	1	0	2	**16***
Tools	0	11	0	0	0	**11**
Vehicles	0	20	0	0	0	**20**
Total Fleet	**21**	**39**	**3**	**1**	**7**	**70**

* One Equipment-Vehicle unit uses both diesel and propane.

An inventory of Esquimalt's fleet's fuel consumption in 2008 identifies: the quantity of fuel used (litres); the cost of the fuel; the level of GHG emissions (tCO_2e); and the potential cost of purchasing carbon offsets. The fuel types used included biodiesel (discontinued July 2008), diesel, electric, gasoline, and propane. The litres of fuel and cost of fuel is based on the 2008 inventory and accounting information. The level of GHG emissions were calculated using the GHG factors published in the *Draft Guidance: Carbon Neutral Local Government* (Province of British Columbia & Union of British Columbia Municipalities, 2009) and the Green Fleets BC (n.d.c) biodiesel emissions reduction calculator. The cost of purchasing carbon offsets is based on the Pacific Carbon Trust's[1] (2009) revenue projection of $25 per tonne of carbon dioxide equivalent (tCO_2e) offset. The carbon offsetting cost is included in the table to signal the future cost to the municipality of purchasing offsets to achieve carbon neutrality. Figure 4 illustrates the municipal fleet inventory based on all four of these components.

Figure 4: 2008 Fleet Fuel Use, Cost, GHG Emissions and Carbon Offsetting Costs

Fuel Type	# of Fleet Units	Litres of Fuel		Cost of Fuel			GHG Emissions (tCO2e)			Carbon Offsetting Cost	
		Total	Per Unit	Total	Per Unit	Per Litre	GHG Factor/ Litre	Total	Per Unit	Total	Per Unit
Biodiesel (B5)	21	31,985	1,523	$36,875	$1,756	$1.15	0.002620	84	4	$2,095	$100
Diesel	21	22,307	1,062	$24,770	$1,180	$1.11	0.002760	62	3	$1,539	$73
Diesel (total)	21	54,292	2,585	$61,645	$2,935	$1.14	-	145	7	$3,634	$173
Electric	1	-	-	N/A	-	-	0.000022	-	-	N/A	-
Gasoline	39	49,471	1,268	$55,398	$1,420	$1.12	0.002410	119	3	$2,981	$76
Propane	3	12,214	4,071	$11,632	$3,877	$0.95	0.001540	19	6	$470	$157
Total	**63***	**115,977**	**1,841**	**$128,675**	**$2,042**	**$1.11**	**-**	**283**	**4**	**$7,085**	**$112**

* One Equipment-Vehicle unit uses both diesel and propane.

According to the GHG inventory, in 2008 the operation of Esquimalt's fleet cost $128,675 in fuel and produced 283 tonnes of GHG emissions. If the Township of Esquimalt continues to operate its fleet on a business as usual basis, it can expect to be paying $7,085 or more for carbon offsets by 2012. Carbon offsetting will cost an average of $112 per fleet unit.

To lower the cost of purchasing carbon offsets in the future, the Township of Esquimalt will have to implement measures for reducing GHG emissions. The most effective option to reduce the fleet's GHG emissions to zero is to dispose of all GHG emitting units. This option is unrealistic as Esquimalt requires its vehicles and equipment for the delivery of its municipal services. For this reason, this report will develop a strategy for the reduction of GHG emissions based on the operational constraint of continuing to deliver municipal services. The developed strategy will also recognize the municipality's financial limitations; being that, the municipality cannot afford to

[1] Pacific Carbon Trust was incorporated as a provincial Crown corporation in March 2008. Its mandate is to "*deliver quality BC-based greenhouse gas offsets to help clients meet their carbon reduction goals and to support growth of this industry in BC*" (Pacific Carbon Trust, 2009, p.5).

immediately adopt all GHG emission reduction measures (i.e. purchase and replacement of all fleet units with lower GHG vehicles).

2.4 Summary

The background section described the relevant background that lead up to the Township of Esquimalt's interest in reducing GHG emissions of its fleet. The reasons for this include current information and knowledge on the reasons for, and effects of, climate change. The Province of BC's Climate Action Plan resulted in the drafting of the BC Climate Action Charter for local governments. As a signatory to the Charter, the Township of Esquimalt has committed to reducing the level of GHG emissions resulting from its operations. One area of Esquimalt's operations to be examined for GHG emissions reductions, and is the focus of this report, is its fleet. The next section outlines the research methodology of this report.

SECTION 3: RESEARCH METHODOLOGY

This section outlines the research methodology undertaken in this report. Both primary and secondary research was conducted to understand what green fleet programs have been implemented by local governments in other jurisdictions. The research findings will be valuable in the development of a green fleet program for Esquimalt. The methodology was three-pronged including: completing a literature review of green fleet programs in other jurisdictions; conducting telephone interviews with four BC local governments; and facilitating a focus group with Township of Esquimalt employees.

3.1 Literature Review

The literature review uncovered the green fleet programs that have been implemented in other jurisdictions. The research sources included: federal, provincial, and local government websites; green fleet program websites; and website focused on sharing leading climate action practices. The findings are presented in Section 4 on *Green Fleet Programs in Other Jurisdictions* and form the basis of a green fleet program framework.

3.2 Telephone Interviews

To obtain information on local governments' experience in implementing its green fleet programs, phone interviews were conducted with four local governments located on Vancouver Island. Three municipalities were interviewed, the City of Courtenay, the District of Saanich, and the City of Victoria. These municipalities were selected due to their location on Vancouver Island and their membership in the E3 Fleet Program[2]. The fourth participant was the Capital Regional District (CRD), the regional district of which Esquimalt is a member. The reason for selecting the CRD was due to its leadership role in forming a Climate Action Working Group to assist its' member municipalities with fulfilling their carbon neutral commitments.

A letter of invitation to participate in the research was emailed to the participants and is included as Appendix C. The interviewees were responsible for managing the fleet and / or implementing climate action initiatives for their local government. Interviews were conducted over the phone; however, participants had the opportunity to share information by email. Given time constraints, the City of Victoria participant responded to the interview questions by email. The three phone interviews ranged from 20 to 50 minutes in length. The telephone interview questions are included as Appendix C.

The purpose of the interviews was to obtain information on the local government's green fleet program, including the success and challenges experienced during implementation. These findings will provide supporting evidence towards the recommendations made at the end of this report.

[2] The E3 Fleet is a membership based program for fleet managers and its aim is to assist organizations' with increasing its fuel efficiency while reducing emissions and costs.

3.3 Focus Group

A focus group with key players in the management of Esquimalt's fleet was also conducted. The goal of conducting the focus group was to obtain information on how the Township of Esquimalt currently manages its fleet; to have employees identify opportunities to “green” the fleet; and to discuss the potential challenges to implementation. The focus group format was chosen to allow Esquimalt employees to openly share their knowledge, expertise, and ideas on how Esquimalt can develop and implement a 'greener' fleet.

The letter of invitation to participate in the research was emailed to participants and is included as Appendix D. The participants represented the following Esquimalt departments: Public Works, Engineering, Parks, Fire, Finance and Corporate Services. Appendix E is a listing of the departments and positions that participated in the focus group. Prior to the focus group meeting, an agenda and a table summarizing green fleet program initiatives was emailed to all participants, and is included as Appendix F.

The focus group took place in a meeting room at the Municipal Hall and was an hour and a half in length. There were eight focus group participants, with one participant who was unable to attend submitting their response by email. The findings from the focus group will help form the development of a green fleet program by providing information on Esquimalt's current fleet operations and understanding employees’ receptivity to green fleet initiatives.

3.4 Summary

This section outlined the three-pronged research methodology of this report. To identify the leading green fleet program initiatives, the following research was conducted: a literature review of green fleet programs in other jurisdictions; interviews with four BC local governments; and a focus group with Township of Esquimalt employees. The next section will review green fleet programs in other jurisdictions and present a green fleet program framework.

SECTION 4: REVIEW OF GREEN FLEET PROGRAMS IN OTHER JURISDICTIONS

This section reviews local governments' green fleet programs and their initiatives which have been implemented in other jurisdictions. The purpose of conducting the review of comparable green fleet programs was to assist in answering the fourth research question of this report: *what actions are local governments in other jurisdictions taking to reduce their fleet's GHG emissions*? The green fleet program initiatives are organized and described in three sub-sections: program objective, fleet purchasing, and fleet operations. This section then concludes with the description of a green fleet program framework.

4.1 Objective of a Green Fleet Program

According to the BC Climate Action Kit (2009a), a resource website on climate action for local governments, implementing a green fleet program is an effective strategy for reducing a municipality's GHG emissions. Traditional fleet vehicles and equipment burn fuel during their operation, resulting in the production of GHG emissions. The BC Climate Action Toolkit (2009a) states that municipal fleets account for the largest or second largest share of local governments' GHG emissions. Being a major contributor to corporate GHG emissions, many local governments have developed policies and programs which focus on increasing the fuel efficiency of its fleet (BC Climate Action Toolkit, 2009a).

Local government's green fleet programs are geared towards reducing the fuel-consumption of their fleet and some have even set targets for reducing GHG emissions. Often, the target is to reduce emissions to a fraction of its historical baseline figure. For example, the City of Dawson Creek's (2006) goal is to reduce fleet emissions by 20% below 2006 levels by 2016. The Township of Langley's (2007) goal is to reduce fleet emissions the same level as all corporate emissions, by 10% below 2000 levels by 2010. The City of Toronto's (2008) goal is to meet or surpass Council's emissions targets from the 1990 levels of 6% by 2012; 30% by 2020; and 80% by 2050.

The possibility of achieving zero or very low emissions is not feasible for most local governments which require a fleet to deliver services to its community. The desire to balance GHG emissions reductions with the need to continue the municipality's service delivery tasks, leads to the next two subsections on fleet purchasing and operations.

4.2 Purchasing

The following section will outline the initiatives that comprise the vehicle and equipment purchase decision-making. The following sections will describe green "purchasing" initiatives which include: a purchasing policy, fleet and vehicle right-sizing, the purchase of vehicles that use alternative technologies, the purchase of alternative fuels, the adoption of alternative transportation, and the purchase of aftermarket technologies. Figure 5 depicts the purchasing components uncovered in the review of green fleet programs and discussed in the following section.

Figure 5: Purchasing Component of a Green Fleet Program Framework

4.2.1 Green Purchasing Policy

A green fleet purchase decision-making process is best managed by having a policy in place that embodies the organization's mandate of operating a fuel-efficient fleet (BC Climate Action Toolkit, 2009d). The purpose of a green fleet purchasing policy is to ensure the most fuel-efficient vehicles, which offer the greatest reduction in GHG emissions, are the type of vehicles being purchased.

The City of San Jose (2007) in the United States has a Green Fleet Policy which documents the purchasing and management of its municipal vehicles and equipment. The purchasing components of San Jose's Purchasing Policy include: optimizing fleet size; reducing vehicle size; and increasing use of alternative fuel vehicles and equipment. The *E3 Fleet Rating Guidelines* state that the goal of green fleet purchasing is to "purchase the most energy efficient vehicle / equipment for the job." (Fraser Basin Council, 2006, p.21)

The following six purchasing components discuss in detail how a policy can identify the most fuel-efficient purchasing options.

4.2.2 Fleet & Vehicle Right-Sizing

Fleet and vehicle right-sizing is the process of examining the use of the fleet and determining the right number and size of vehicles needed to complete a municipality's service delivery tasks (BC Climate Action Toolkit, 2009b). Fleet right-sizing involves a thorough examination of fleet operations and use of its vehicles based on number of trips and capacity used in order to identify underused vehicles. Underused vehicles can be shared with another department in order to optimize its use, or be removed from the fleet completely through sale or disposal. The benefits of having an optimal sized fleet is the opportunity to reduce vehicle count, which in turn reduce operating costs and GHG emissions from the excessive number of vehicles that were previously in operation (Fraser Basin Council, 2006).

The BC Climate Action Toolkit (2009b) indicates the following benefits of fleet right-sizing: greater efficiency in operating practices by reducing the number of underutilized vehicles; reduced level of GHG emissions and pollutants; reduced fuel consumption, lower operating and insurance costs; and reducing the level of capital investment in the fleet. There are two fleet initiatives that can

further support a fleet right-sizing initiative, adopting alternative means of transportation and through trip and route planning. Both of these initiatives are discussed later on in this section.

The BC Climate Action Toolkit (2009b) recommends that local governments have a purchasing strategy in place for ensuring the purchase of right-sized vehicles. The City of Vancouver (2004) incorporated vehicle right-sizing in its green fleet program by purchasing the most appropriately sized vehicle for the required tasks. The City of Dawson Creek's (2006) green vehicle policy evaluates a number of parameters to ensure the right-sized vehicles for the required tasks are purchased including: engine size, vehicle weight, average carrying capacity, average passenger capacity and average terrain. Through fleet right-sizing, the City of Victoria (n.d.) was able to reduce the overall size of its fleet from 422 vehicles in 1998 to 340 vehicles by 2006. It accomplished this by eliminating underutilized vehicles, greater sharing of vehicles between departments and through short-term lease or rental vehicles for seasonal programs.

4.2.3 Alternative Technologies

The purchase of vehicles and equipment that are powered by alternative technologies, such as battery-electric and hybrid vehicles, are being incorporated into many green fleet purchasing policies. These technologies offer fuel cost savings and produce lower levels of GHG emissions compared to conventional combustion engines. Though there is much research and investment being put into the development of hydrogen fuel cell vehicles, this technology will not be available on the market anytime in the near future and therefore is not discussed (Hydrogen Highway, n.d.).

Battery-Electric. Battery-electric vehicles, often referred to simply as 'electric', use the power stored in a battery to propel a car (Natural Resources Canada, 2008a). The advantage of electric vehicles is that they do not produce any tailpipe emissions and are therefore seen to have great potential in reducing GHG emissions and smog related pollutants. The GHG reduction potential of electric vehicles in BC is high as 90% of BC's electricity supply comes from renewable energy sources which do not produce any GHG (Government of British Columbia, n.d.).

Natural Resources Canada (2008a) outlines some challenges to the commercial adoption of electric cars including: the availability of recharging infrastructure, the time required for recharging, and the need for better battery technology. The current purchasing options for electric vehicles are limited; however, there is the opportunity for vehicle conversions. The Vancouver Electric Vehicle Association is a resource on the options available for buying an electric vehicle or converting a vehicle to electric (Vancouver Electric Vehicle Association, n.d.). Looking towards future developments, the City of Vancouver (2004) has been testing electric cars since 2003. In April 2009, the City of Vancouver and BC Hydro began a one year testing of the first production-ready, highway-capable electric car, the Mitsubishi i MiEV (Simpson, 2009).

Hybrid Electric. Hybrid electric vehicles combine a battery powered electric motor with a conventional combustion engine (Natural Resources Canada, 2008a). Unlike plug-in battery-electric vehicles, a hybrid's engine battery recharges from the energy produced through coasting, breaking and idling (Natural Resources Canada, 2008b).

Hybrid-electric cars produce fewer GHG emissions and related pollutants compared to conventional combustion vehicles. Natural Resources Canada (2008b) reports that hybrid electric vehicles are 30% lower in GHG emissions compared to conventional combustion vehicles that use

gasoline. Hybrid electric cars have been more commercially successful than electric cars as they offer the same convenience as conventional vehicles in terms of refuelling and driving range (Natural Resources Canada, 2008a).

The City of Vancouver owns a hybrid electric vehicle, the Toyota Prius Hybrid with a plug-in conversion module (City of Vancouver, n.d.). A plug-in Hybrid Electric Vehicle (PHEV) works in the same manner as a Hybrid Electric Vehicle but has the benefits of an electric car by using existing electricity outlets to recharge the battery, lessening the dependence on fuel (Samaras & Meisterling, 2008).

Today there are a handful of hybrid electric cars on the market, with manufacturers planning on the introduction of more vehicles using this technology (Natural Resources Canada, 2008a). As hybrid electric vehicles become more commercialized, the purchasing cost of a hybrid electric may decrease.

4.2.4 Alternative Fuels

Many green fleet programs incorporate using alternative fuels to traditional petroleum gas or diesel (BC Climate Action Toolkit, 2009e). These alternatives, such as biodiesel, ethanol, natural gas, propane and hydrogen fuel cells, typically emit lower carbon and GHG emissions than diesel or gasoline. Progress in the development and commercial availability of alternative fuels is being made as a result of the increasing cost of petroleum gasoline and increased awareness on the negative effects of GHG emissions and other pollutants (Conner, 2007).

The use of low carbon fuels provides an opportunity for fleets to reduce their GHG emissions and the possibility to save on fuel costs (BC Climate Action Toolkit, 2009e; Green Fleets BC, n.d.a). There are an increasing number of fleets that are using alternative fuels (BC Climate Action Toolkit, 2009e); however, adoption is limited to the vehicle makes and warranties which allow the use of alternative fuels.

Key factors in adopting alternative fuel include cost, the requirement for vehicle conversion, availability of refuelling infrastructure, the fuel's GHG emissions, and the availability and accessibility of high quality fuel (Green Fleets BC, n.d.a). Descriptions of the most prominently used alternative fuels are outlined in Appendix G. The most common type used in local governments' green fleet program is biodiesel. Conversion of fleet vehicles to biodiesel is listed as a suggested action in the BC Climate Action Charter's addendum (Province of British Columbia & Union of British Columbia Municipalities, 2007). The City of Toronto (2008) and City of Vancouver (2007) have both adopted the use of biodiesel to fuel its fleet.

4.2.5 Alternative Transportation

Alternative transportation refers to the options available to an organization other than owning and maintaining a vehicle or piece of equipment in its fleet. These options include renting, car sharing, public transit, taxi services and bicycles. For example, the BC Climate Action Toolkit (2009f) states that local governments will experience the following benefits of adopting bicycles for their transportation needs: reduced fuel and fleet maintenance costs, lower GHG emissions, and improvements in employees' health and satisfaction.

The City of Langford is in discussions with the Victoria Car Share Co-op to transfer the ownership of two of its vehicles to the Car Share Co-op and to expand the availability of this car share service to Langford. This alternative transportation option is being viewed as a strategy to begin supporting longer term sustainability initiatives in the community (Hill, 2009).

4.2.6 Aftermarket Technologies

Aftermarket technologies can be installed after the initial purchase to reduce a vehicle's fuel consumption and GHG emissions. A fleet supervisor may wish to consider adopting some of the following aftermarket technologies to increase vehicle fuel-performance: advanced tires, aerodynamic devices, auxiliary power units, engine control modules, engine coolant heaters, refrigeration systems, and tire pressure systems (Green Fleets BC, n.d.b). For example, the value of a tire pressure system is highlighted in the *E3 Fleet Rating System Guidelines* which reports that under inflated tires can increase fuel consumption by 10% or more (Fraser Basin Council, 2006).

The City of Vancouver (2007) uses auxiliary cab heaters to heat the inside of work vehicles without having to idle the vehicle's engine. The City of Toronto incorporates LED lights, batteries, inverters, space heaters and other equipment to reduce the need of engine idling while operating lights and equipment (Toronto Fleet Services, 2008).

4.2.7 Life Cycle Costing

Traditionally, local government purchase decision-making is based on selecting the lowest cost option. A green purchasing policy shifts the decision-making criteria from up-front cost to the total cost of owning and maintaining a vehicle over its operating life. This purchasing evaluation is achieved through the use of life cycle costing analysis.

In addition to the initial acquisition cost, life cycle costing calculates the cost of operations and maintenance over the asset's entire operating life (BC Climate Action Toolkit, 2009c). This is a significant component to a green purchasing policy as options requiring greater fuel consumption, and thereby producing more GHG emissions, will have a higher life cycle cost than lower energy options. As of 2012, signatory local governments to the BC Climate Action Plan will need to purchase carbon offsets for each tonne of GHG it emits to achieve carbon neutrality. This introduces the need to place a monetary value on each purchasing options' GHG emissions. The cost of a carbon offset will then be added to the life cycle cost equation of purchasing one option over another. One example of a life cycle costing tool is the Excel spreadsheet created and used by Metro Vancouver which calculates all the related costs of ownership and operation of a vehicle.

The application of life cycle costing is not limited to new purchases. Life cycle costing can be used to evaluate the true cost of continuing to own and operate older vehicles and equipment when compared to replacing them with a new vehicle. Conducting a life cycle cost analysis of the fleet is an effective strategy for local governments' as replacement schedules may be based on an outdated and narrow cost analysis or "rule of thumb" (E3 Fleet, n.d.a). Life cycle cost analysis resulted in the Township of Langley replacing older high emission vehicles earlier than originally scheduled with new vehicles. By doing so, the Township of Langley was able to save 5% in fuel and repair costs which more than offset the additional capital investment it made in new vehicles (BC Climate Action Toolkit, 2009c).

Life cycle costing is often mistaken with life cycle analysis. Life cycle analysis estimates the total environmental impacts and costs of a project or asset over its entire life, from the sourcing of its components and production right through to its disposal (BC Climate Action Toolkit, 2009c). Life cycle analysis is a useful tool for determining projects with the lowest GHG emissions but is a much more extensive process which calculates GHG emissions that are beyond the scope of the BC Climate Action Charter.

4.3 Operations

The following section will outline the initiatives that comprise the "operations" in a green fleet program. As opposed to examining the type of vehicles and equipment in a fleet, this section reviews how fuel-efficient the fleet is being used and managed. The green "operation" initiatives discussed in this section include: trip and route planning, idling reduction strategies, driver fuel-efficiency education, fleet maintenance, and fleet monitoring and benchmarking. Figure 6 depicts the operations components uncovered in the review of green fleet programs and discussed in the following section.

Figure 6: Operations Component of a Green Fleet Program Framework

4.3.1 Trip and Route Planning

The number of trips and routes travelled by the fleet can be examined for GHG emission reduction opportunities (BC Climate Action Toolkit, 2009g). Trip planning should be the first area examined by fleet supervisors to determine whether passenger and equipment capacity is being optimized in every vehicle trip.

Route planning identifies the best routes to minimize the overall distance and time traveled. To achieve this, an improved logistics system must be implemented which defines the territory, schedules deliveries, avoids redundancy, and plans routes that use less congested roads (BC Climate Action Toolkit, 2009g). A tool, such as a Global Positioning System (GPS), can be used to track and plan routes. The City of Hamilton uses trip and route planning as a way to minimize the number and length of its fleet's trips (BC Climate Action Toolkit, 2009g).

4.3.2 Idling Reduction

A corporate idling reduction strategy is an immediate and cost-effective way to decrease a fleet's fuel consumption and GHG emissions. Vehicle idling results in the burning of fuel and release of GHG emissions with no gains in the distance travelled. An effective idling reduction strategy includes a policy with measures to reduce fuel wastage from idling, and an awareness and training program for employees on anti-idling practices (BC Climate Action Toolkit, 2009h).

The effectiveness of an idling reduction strategy is based on the following findings:

- Idling for longer than 60 seconds wastes fuel and money; 60 seconds is greater than the break-even point for the incremental cost of wear and tear on the starter and battery (Natural Resources Canada, 2009e)
- Idling reduction reduces GHG emissions and related pollutants (Idle Free BC, n.d.a)
- Idling reduction improves fuel performance; saving 10-20% on annual fuel costs (BC Climate Action Toolkit, 2009h; Idle Free BC, n.d.a)
- Idling reduction reduces vehicle wear and maintenance costs (Idle Free BC, n.d.a)
- Idling reduction improves the public image of an organization (BC Climate Action Toolkit, 2009h)

An idling awareness program educates staff on the environmental and financial benefits that can result from idling reduction. At the same time, a corporate idling reduction policy can be introduced and communicated to staff. An awareness campaign can include workshops, regular meetings, workplace posters, idling tips resources, personnel pay stub inserts and/or group emails (BC Climate Action Toolkit, 2009h). In an organization, it may be effective to implement an incentive program for staff in conjunction with the idling reduction strategy. An incentive program would reward individual employees or departments for reducing their vehicle and equipment idling time.

Through idling reduction measures, the City of Richmond has saved $117,000 in fuel costs and reduced 220 tonnes of GHG emissions since 2004 (BC Climate Action Toolkit, 2009h). The City of Dawson Creek (2006) implemented idling reduction measures by writing it into its green vehicle policy and by including anti-idling education as part of all mandatory staff driver training. The introduction of an anti-idling bylaw is suggested action in the BC Climate Action Charter's addendum (Province of British Columbia & Union of British Columbia Municipalities, 2007).

4.3.3 Driver Education

To communicate and gain buy-in from employees who are responsible for implementing many initiatives within a green fleet program, driver education and awareness on organizational fuel-efficient policies and procedures should be conducted (BC Climate Action Toolkit, 2009i). Training can be streamed in to the regular staff training schedule or be an independent session. The training can be in-class or in-vehicle depending on the needs of the organization (BC Climate Action Toolkit, 2009i). The driver education initiative would inform employees on the driving practices and techniques that can be taken to achieve the organization's targets on fuel efficient fleet operations (BC Climate Action Toolkit, 2009i).

4.3.4 Maintenance

A green fleet program is not just limited to the type of vehicles and fuels purchased and its operation; it also includes the maintenance of these capital assets. The leading green fleet program practice is to have a preventative maintenance program in place to lower fuel consumption and reduce GHG emissions. The BC Climate Action Toolkit (2009j) states that the benefits of a preventative maintenance program include improved fuel performance, driver and mechanic satisfaction due to improved fleet performance, reduction in GHG emissions, extended life, and a higher resale value. A fleet preventative maintenance program may result in fuel savings of 10% (Fraser Basin Council, 2006).

4.3.5 Monitoring & Benchmarking

Fleet monitoring and benchmarking programs are an important component of evaluating realized fuel and GHG reductions from a green fleet program. Fleet monitoring improves fleet performance through the collection of data to measure performance and / or to make purchasing decisions. Performance indicators that can be monitored include vehicle fuel efficiency, preventative maintenance and repair costs, and vehicle idling time (BC Climate Action Toolkit, 2009k). The *E3 Fleet Review Guidelines* outlines several ways to measure idling time: estimation based on first-hand observation; use of tracking technology such as a GPS; and / or tracking engine hours and distance traveled to calculate average vehicle speed (Fraser Basin Council, 2006). Fleet performance measurement areas may include: by vehicle, by employee or by department; as an internal baseline for performance measurements over time; and as a baseline for comparison to other fleets' performance.

The benefits of a monitoring and benchmarking program is to measure what green fleet initiatives are effective and identify new opportunities for improved fuel efficiency and greater GHG reductions (BC Climate Action Toolkit, 2009k). The frequency by which fleet monitoring is conducted is up to the organization's discretion; however, the City of Hamilton tracks fuel consumption for each vehicle on a weekly and monthly basis to resolve problems quickly (BC Climate Action Toolkit, 2009k).

The leading resource for fleet monitoring and benchmarking is the Fraser Basin Council's[3] E3 Fleet Program. Standing for Energy Environment Excellence, the E3 Fleet program was first launched in November 2006 and is one of several fleet initiatives[4] by the Fraser Basin Council (E3 Fleet, n.d.b). There are currently seventy-one E3 Fleet Members in Canada; fifty-one of these members are from BC with thirty-six being BC local governments. E3 members in the Capital Regional District include Colwood, Langford, Saanich and Victoria (E3 Fleet, n.d.c). Participation in the E3 Fleet

[3] The Fraser Basin Council is a sustainability leader in British Columbia with a mandate to improve social, economic and environmental sustainability in the Fraser Basin. The Council was formed in 1997 with the partnership of community groups, businesses and four levels of government, including First Nations. The Council has created and manages a number of sustainability programs which provide information and tools for communities. Fleet initiatives is an example of one of their program areas and includes Green Fleets BC and the E3 Fleet Program which are discussed in the resources section of this literature review (Fraser Basin Council, n.d.).

[4] The Fraser Basin Council fleet initiatives include Green Fleets BC, Bio Fleet, Idle Free BC, the Hybrid Experience and E3 Fleet, the national fleet review and rating program.

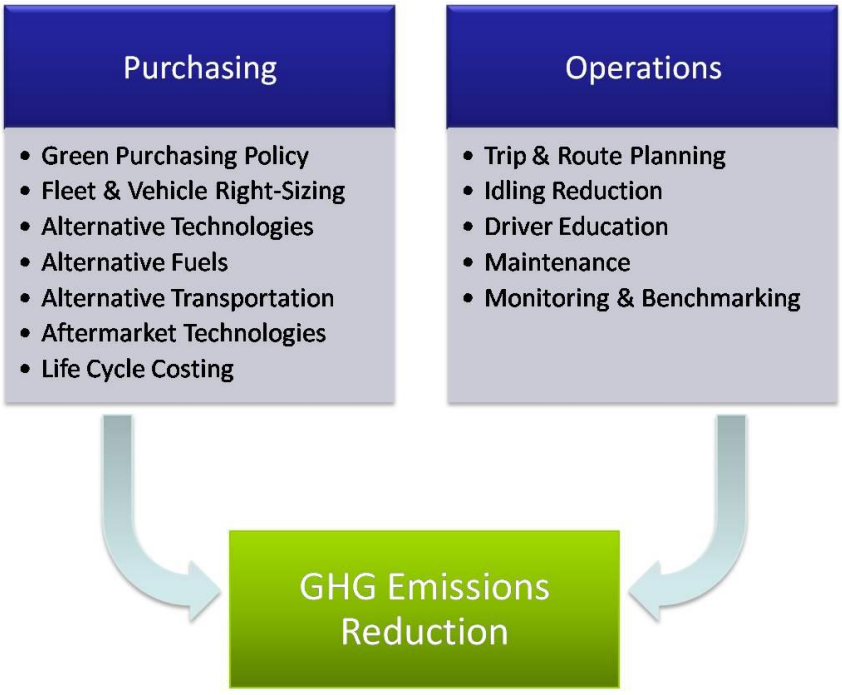
Program is listed as one suggested action in the BC Climate Action Charter's addendum (Province of British Columbia & Union of British Columbia Municipalities, 2007).

The E3 Fleet Program provides three distinct services: education, fleet review and fleet rating. The rating program awards points based on a fleets 'green' performance by assessing a fleet's action plan; driver training and awareness; idling reduction; vehicle purchasing [policy]; fuel data management [fleet benchmarking & monitoring]; operations and maintenance; trip & route planning; utilization management [fleet & vehicle right-sizing]; fuel efficiency; and GHG performance (E3 Fleet, n.d.d). These points are then used to rank a fleet rating level of Bronze, Silver, Gold, or Platinum. A fleet rating recognizes an organization for achieving green performance in its fleet (Fraser Basin Council, 2006).

4.4 Framework

The above described fleet purchasing practices and operational components form a framework for a green fleet program. These two streams of a green fleet program, and its components, all share the same key objective - the reduction of fleet GHG emissions. The Green Fleet Framework, presented in Figure 7, demonstrates that there is no singular measure to "green" a fleet. The framework highlights that it is through both the initial purchase decision-making and fleet operations that a green fleet program is implemented. To achieve the key objective of reducing GHG emissions, initiatives must be implemented from both streams.

Figure 7: Green Fleet Program Framework



4.5 Summary

This section reviewed green fleet programs in other jurisdictions and presented a framework. The green fleet program framework includes three components, fleet purchasing, fleet operations and achieving the program's objective of reducing GHG emissions. This section highlighted that the greatest reduction in GHG emissions can be achieved by implementing a number of green fleet initiatives. There is no one action that in itself reflects the establishment of a green fleet. For this reason, to significantly reduce GHG emissions a program must include initiatives from both the purchasing and operations streams of a green fleet program. The next section of this report will detail the findings gathered from telephone interviews with four Vancouver Island local governments and findings from a focus group with Township of Esquimalt employees.

SECTION 5: INTERVIEW AND FOCUS GROUP FINDINGS

This section presents the findings from the interviews with BC local governments and focus group with Township of Esquimalt employees. The purpose of conducting the interviews and focus group was to assist in answering the fourth and fifth research question of this report: *what actions are local governments in other jurisdictions taking to reduce their fleet's GHG emissions;* and *which of these green fleet initiatives could be successfully adopted by the Township of Esquimalt*. First, the local governments' green fleet programs are outlined. Second, the findings from the interviews with four BC local governments are presented. Third, the focus group findings with Esquimalt employees are reported.

5.1 Local Governments' Green Fleet Program

This section will outline the green fleet programs of the four interviewed local governments. Three of the four local governments have publicly documented green fleet strategies that are available on their website. The CRD and Courtenay's green fleet programs are outlined in each organization's Corporate Climate Action Plan (SENES Consultants Limited, 2006; City of Courtenay, 2009). Victoria (n.d) has a stand alone "Fleet Operations - Climate Protection Program" document. At the time of the interview, Saanich had not prepared and publicly distributed a green fleet action plan; instead, they are implementing environmental initiatives as part of an internal fleet administration manual. Esquimalt currently has no green fleet plan. Figure 8 presents an overview of the local governments green fleet programs in relation to the Esquimalt. The overview outlines information on the size of each local government's fleet, the percentage of each fleet's contribution to the local governments' corporate emissions, the date that the green fleet program was first introduced and the GHG emission targets which the local governments have set.

Figure 8: Background of Local Government's Green Fleet Program

Green Fleet Program	Esquimalt	CRD[5]	Courtenay[6]	Saanich[7]	Victoria[8]
# of Vehicles	78	400	145	250+	340
Fleet as % of all GHG emissions	26%	50%	40%	54%	60%
Green Fleet Program Introduced	No	March 2008	Feb. 2009	2006	1997
GHG Emissions Reduction Target	No target established	10% in fuel related emissions from 2004 levels by 2012	33% in overall corporate emissions from 2007 levels by 2020	50% in fuel related emissions from 2007 levels by 2020	No target established

[5] (SENES Consultants Limited, 2006)
[6] (City of Courtenay, 2009)
[7] (District of Saanich, 2009)
[8] (City of Victoria, n.d.)

5.2 Local Governments, Vancouver Island, BC, Canada

This section details the strategies that the four interviewed local governments' reported to be beneficial or challenging in implementing a green fleet program. The telephone interview questions are included as Appendix C. The questions were open-ended; therefore, comments on each initiative were not discussed by all interviewees. The interviewed local governments were the Capital Regional District, City of Courtenay, District of Saanich, and City of Victoria.

5.2.1 Purchasing

This section will outline the interview findings on the purchasing components of the green fleet program framework including: green purchasing, fleet and vehicle right-sizing, alternative vehicles, fuels, and transportation, aftermarket technologies, and life cycle costing.

Green Purchasing. Courtenay, Saanich and Victoria have implemented purchasing requirements for greener vehicles.

Courtenay has implemented a new purchasing process as a result of Council adopting a Green Fleet Policy and Procedure. The purchasing policy stipulates that "The City shall make every effort to purchase and use the lowest emission vehicle or equipment item possible, while taking into account the vehicle's life-cycle costs and the ability to support City operations and services" (City of Courtenay, 2009). Courtenay's (2009) purchasing policy also establishes a Green Fleet Team composed of managers whose role is to "monitor, review and implement the Green Fleet Policy."

Saanich looks for the "best in class" vehicle models in its purchasing. Victoria's green purchasing practice is to include a minimum fuel efficiency standard in its procurement specification in tenders.

Benefits. Saanich found that "best in class"[9] vehicles have both the lowest cost and greatest fuel-efficiency and is therefore a beneficial green purchasing approach.

Challenges. Courtenay experienced difficulty with the requirements of the new policy being met in the purchasing of new vehicles. The interviewee reported that this difficulty was a result of the overlap in time of when employees began researching the purchasing of new vehicles and when the policy was introduced. This could have been the result of a lack of communication with employees on the development and implementation of the new policy. To resolve the issue, the Green Fleet Team worked directly with the employees doing the purchasing to identify more suitable vehicles that did meet the requirements of the new policy.

Fleet & Vehicle Right-Sizing. Saanich and Victoria have completed significant work in this area of right-sizing. Courtenay is beginning to look at right-sizing its fleet, and the CRD did not report on any vehicle right-sizing initiatives taking place.

Benefits. Saanich began adopting fleet and vehicle right-sizing as a result of its E3 Fleet Review. It found that fleet and vehicle right-sizing was an effective strategy for reducing

[9] "Best in class" refers to Natural Resources Canada's (2009d) ecoENERGY Vehicle Award for the most fuel-efficient vehicles in a model year.

emissions. Right-sizing was examined each time an opportunity for purchasing a new vehicle arose. This approach allowed the municipality to introduce hybrids to the fleet in the most cost effective manner. Life cycle cost analysis indicated that hybrid vehicles would be most cost-effective if used in the highest mileage areas. A hybrid vehicle would be purchased when a vehicle in a low usage area was up for replacement, the hybrid would then be swapped with a vehicle from a high usage area.

Victoria has been reducing the overall size of its fleet for nearly 10 years. Through fleet right-sizing, Victoria was able to reduce the size of its municipal fleet from 422 vehicles in 1998 to 340 in 2006 (City of Victoria, n.d.).

Challenges. At first Saanich found it difficult to convince employees to replace the traditional two tonne 'crew' trucks with smaller Dodge sprinter vans. They found they had to reassess and redevelop the proposal to employees and have only recently been able to purchase the right-sized vans. The challenge appeared to be a lack of employee buy-in to the idea of purchasing smaller-sized vehicle.

Alternative Vehicles. Local governments are slowly adopting alternative vehicles. The Saanich and the CRD have adopted hybrid vehicles in its municipal fleet. Courtenay has stated that it will adopt electric vehicles when the cost to do so is lower.

Benefits. Saanich reported realizing fuel-efficiency gains when hybrid vehicles were assigned to high mileage areas.

Challenges. The CRD Corporate Climate Action Plan states that it is difficult to build a business case for adopting higher-cost hybrid vehicles as most of the CRD vehicles travel low mileages; therefore, the higher upfront cost of a hybrid vehicle would not be recouped over the vehicles operating life (SENES, 2006). Saanich found it difficult to adopt hybrid vehicles in low mileage areas as there would be very small fuel efficiency gains for a hybrid vehicle operating mainly on city roads.

Alternative Fuels. Victoria, Saanich and Courtenay are using alternative fuels to conventional gasoline and diesel. Victoria is the only local government which reported using compressed natural gas in its fleet. Both Victoria and Saanich use a B5 blend of biodiesel. Courtenay had been using a B5 blend of biodiesel until the fall of 2008 when it began using a B20 blend.

Benefits. Victoria found alternative fuels to be an effective part of their strategy to reduce overall emissions given that alternative fuels had lower GHG emissions relative to conventional fuels.

Challenges. Victoria experienced resistance from staff when compressed natural gas and biodiesel were introduced. The employees' resistance had to do with employee dissatisfaction with the performance of vehicles. The poor performance was due to the increasing operational downtime of vehicles and equipment after the introduction of an alternative fuel.

When it first began testing a higher blend of biodiesel, Saanich experienced difficulties in two areas. First, the municipality had challenges acquiring a B20 blend of biodiesel. Second, this

higher blend damaged the vehicles' engines. Saanich did not believe there is any cost savings from using a B5 blend versus diesel and that the benefits of biodiesel are similar to ultra low sulphur diesel. As a result, the municipality is waiting for biodiesel to be proven effective before re-evaluating the use of this fuel.

Courtenay experienced difficulty when it first adopted the use of B20 biodiesel. The blend led to mechanical issues in the fleet. This was corrected by the mechanics after they discovered what needed to be done for the vehicles to perform well with a B20 blend of fuel.

Alternative Transportation. The four local governments did not discuss any plans to develop or implement alternative transportation options as part of a green fleet program.

Aftermarket Technologies. Courtenay and Victoria were the only local governments to have implemented aftermarket technologies. Courtenay has introduced auxiliary vehicle cab heaters to reduce vehicle idling in colder weather. Courtenay also plans to purchase aftermarket automatic engine shut-off devices if the level of fleet idling did not decrease. Victoria (n.d.) installed solar power panels on service vehicles to power emergency lighting and thereby reduce the need for vehicle idling.

Benefits. Courtenay reported that the purchase of auxiliary cab heaters were effective at reducing emissions by reducing the need to run vehicle engines to warm up the vehicles' cabs.

Challenges. The interviewees did not report any challenges on the implementation of aftermarket technologies.

Life Cycle Costing. Life cycle costing, which calculates the total cost of ownership of an asset over its operating life and reports it as a net present value, is only used by Saanich and Courtenay. Saanich began life cycle costing as a result of its E3 Fleet Review. The review found that 53 fleet vehicles were beyond their life cycle. This meant that these vehicles were more expensive to continue operating compared to purchasing a new vehicle. Courtenay has implemented life cycle costing in its fleet purchasing process by using Metro Vancouver's comparison tool to conduct life cycle cost analysis.

Benefits. Saanich found life cycle costing to be an effective tool at building confidence among Council and management to move on the replacement of old vehicles and to commit a budget in order to do so. Life cycle costing also allowed Saanich to determine that the payback of purchasing a hybrid was cost-effective. Life cycle costing determined that the higher up-front cost of a hybrid vehicle would be recovered through operational cost savings over its operating life. Courtenay stated that life cycle cost analysis assisted in making a business case for the purchase of vehicles with lower GHG emissions but had a higher up-front cost.

Challenges. Life cycle costing can present budgeting concerns when the cheaper vehicle from a life cycle cost point of view is more expensive in the short term than the alternatives. Saanich noted that the public may have a negative perception regarding a municipal fleet having brand new vehicles. The public may disagree on the spending of tax dollars for new vehicles as they do not understand the benefits of the vehicles' operational performance.

5.2.2 Operations

This section will outline the interview findings on the operations component of the green fleet program framework including: trip and route planning, idling reduction and driver education, maintenance, fleet monitoring and participation in the E3 Fleet Program.

Trip & Route Planning. The four local governments did not discuss any plans to implement trip or route planning as part of a green fleet program.

Idling Reduction & Driver Education. Victoria, Saanich and Courtenay have all developed and implemented driver education with a focus on idling reduction. Victoria implemented an anti-idling policy which prohibits employees from idling city owned or operated vehicles for an excessive period of time. An excessive period of time would be the idling of a vehicle when doing so is not required for its operation. Victoria provided driver education to its employees who operate fleet vehicles; whereas, Courtenay provided driver education sessions to all its employees.

Saanich has implemented an anti-idling initiative and plans on doing more work on it. The Saanich interviewee believed that 60-65% of the success of implementing a green fleet initiative is attributed to getting buy-in from other employees. In terms of Saanich's introduction of an anti-idling initiative, pamphlets on the anti-idling policy were distributed to residents and anti-idling training was conducted with staff.

Courtenay decided to take a soft approach to its idling reduction initiative by encouraging idling reduction behaviour through education instead of a policy. They also activated the engine automatic shut-off devices on the vehicles that already had them installed.

Benefits. Courtenay found it was effective to provide fuel-efficiency driver education in order to roll-out an idling reduction strategy. The driver education included in-vehicle training for municipal fleet drivers, and classroom instruction for municipal hall employees. The interviewee felt the initiative was effective as they were able to have 100% attendance by all municipal drivers.

Challenges. Saanich initially experienced resistance among staff towards adopting idling reduction practices at work. However, the interviewee believed that when the employees learned that the driving practices being taught could save them money on their gas bill at home, they began changing their driving habits at home and this newly learned behaviour continued at work.

Courtenay plans on purchasing and installing more engine shut-off devices for the fleet if vehicle idling were to continue.

Maintenance. The four local governments did not discuss any plans to develop or refine maintenance practices as part of a green fleet program.

Monitoring & E3 Participation. Except for the CRD, the other three local governments have implemented fleet monitoring. This monitoring is directly linked with the local government's participation in the E3 Fleet Program. Saanich reported that it was the first fleet on Vancouver Island to have an E3 Review completed. Victoria outlined that it is participating in the E3 Fleet Programs national fleet benchmarking program. Courtenay is waiting for the arrival of a cardlock

system (which tracks fuel dispensing) so that they can begin to gather data to have an E3 Fleet Review completed in 2010.

Benefits. Saanich indicated the most effective component of its green fleet program was having an E3 Fleet Review completed and the resulting recommendations. The interviewee believed that having recommendations come from an outside source were seen as more credible and proved useful in convincing Council and employees to act on implementing those recommendations.

Challenges. The CRD is experiencing difficulty with monitoring the operations of its decentralized fleet. The difficulty with decentralization is that the CRD uses eight different fuel cards for eight different suppliers of fuel. Moving forward on its green fleet program, the CRD recently hired a fleet manager whose role is to review the current fleet management practices and make recommendations on how to make fleet management in the CRD more effective.

Courtenay and Saanich both stated that a significant amount of staff time is needed to collect and compile the required data for an E3 Fleet Review to be completed.

Figure 9 compiles the above finding from the four BC local governments on their green fleet program. The table is split to present both the benefits and challenges that were identified for each green fleet program initiative.

Figure 9: Summary of Findings, Interviewed BC Local Governments

Green Fleet Program	Benefits	Challenges
PURCHASING:		
"Green" Purchasing	• Purchasing "Best in Class" (Saanich) • Establishing a Green Fleet Team (Courtenay)	• Employees following the requirements of the purchasing policy (Courtenay)
Fleet & Vehicle Right-Sizing	• Reported to be an effective strategy at reducing emissions (Saanich & Victoria) • Effective strategy for introducing hybrids to the fleet in the most cost effective manner (Saanich)	• Difficulty in convincing staff to downsize from the traditional two tonne truck (Saanich)
Alternative Vehicles	• Fuel-efficiency gains with hybrid vehicles in high mileage areas (Saanich)	• Business case of purchasing hybrid vehicles (CRD, Courtenay & Saanich)
Alternative Fuels	• Biodiesel 5% (Saanich & Victoria) and 20% (Courtenay) • Compressed natural gas (Victoria)	• Resistance from employees if there was any change in vehicle performance after introducing alternative fuel (Saanich & Victoria) • Experienced difficulties when first introducing a higher blend of biodiesel, 20% (Courtenay & Saanich) • Discontinued use of 20%

Green Fleet Program	Benefits	Challenges
		biodiesel (Saanich)
Alternative Transportation	• Not discussed by participants	• Not discussed by participants
Aftermarket Technologies	• Auxiliary vehicle cab heaters in order to reduce idling (Courtenay) • Solar power panels on service vehicles to power emergency lighting (Victoria)	• None reported by participants
Life Cycle Costing	• Rationalizes the purchase of higher-priced 'greener' vehicles due to the gained efficiencies over its operating life (Courtenay & Saanich) • Provides a business case for the replacement of vehicles that are beyond their operating life (Saanich) • E3 Fleet Review (Saanich) and Metro Vancouver's comparison tool (Courtenay) can be used to conduct a life cycle cost analysis.	• Establishing a budget to purchase new vehicles earlier than planned (Saanich)
OPERATIONS:		
Trip & Route Planning	• Not discussed by participants	• Not discussed by participants
Idling Reduction/ Driver education	• Provided driver education to staff (Courtenay, Saanich & Victoria) • Implemented an idling awareness campaign in the community (Saanich)	• Initial resistance from staff (Saanich) • Future need to purchase automatic engine shut-off devices for vehicles (Courtenay)
Maintenance	• Not discussed by participants	• Not discussed by participants
Monitoring/ Participation in E3	• The introduction of monitoring was a result of local governments' participation in the E3 program (Courtenay, Saanich & Victoria) • Receiving recommendations after having an E3 Fleet review completed (Saanich & Victoria)	• The need to have proper infrastructure in place to begin monitoring – a cardlock system which tracks the dispensing of fuel (Courtenay) • Decentralized operation of fleet (CRD) • The time and staff resources required to gather the data to have an E3 Fleet review done (Courtenay & Saanich)

5.2.3 Summary

The interview findings provide greater insight on the four local governments' successes and challenges in implementing their green fleet program. Benefits and challenges were experienced in the implementation of both the purchasing and operations components of a green fleet program framework. The common green fleet initiatives that were identified as being beneficial included green purchasing, life cycle costing, the use of aftermarket technologies, idling reduction and education campaigns, fleet monitoring and participation in the E3 fleet program. The key challenges of implementing a green fleet program were in the areas of right-sizing, the adoption of alternative fuels and vehicles due to the lack of employee buy-in and budget constraints. The next section reports on Esquimalt's fleet management practices and employees' feedback on introducing a green fleet program.

5.3 Township of Esquimalt, BC, Canada

This section will outline the findings from the focus group conducted with Township of Esquimalt employees. Prior to the focus group meeting, an agenda and a table summarizing green fleet program initiatives was emailed to all participants, and is included as Appendix F. The findings include information on how Esquimalt's municipal fleet is currently managed, and employees' perceived opportunities and challenges in implementing a green fleet program.

5.3.1 Purchasing

This section outlines the focus group findings on the "purchasing" component of the green fleet program framework including Esquimalt's current purchasing practice and response to the ideas of fleet and vehicle right-sizing, alternative vehicles, fuels, and transportation, aftermarket technologies, and adoption of life cycle costing in its fleet purchasing practice.

Purchasing. Esquimalt's purchase of new vehicles was based on a historical vehicle replacement schedule based on an average life expectancy of 10 to 15 years. In the last few years, the practice has changed to an "as-needed" basis which is determined by staff and the fleet mechanic. The discussion of when to replace a vehicle typically happens after a vehicle is ten to twelve years old, resulting in several vehicles remaining in the fleet for long periods of time.

When the purchase of a new vehicle is decided, a tender with specifications for the replacement vehicle is developed. The drafting of the tender includes consulting with the end users to ensure the vehicle will meet their needs. Once this has occurred, the tender is opened for bids. Currently the purchasing specifications for tenders do not include fuel-efficiency or any "green" criteria. If all specifications in the tender are met, the decision is to purchase the lowest priced bid. This is in accordance with the Township of Esquimalt's Purchasing and Disposal Bylaw No. 2669, included as Appendix H. A flow-chart depicting Esquimalt's fleet purchasing process is illustrated in Figure 10.

Figure 10: Esquimalt's Current Fleet Purchasing Process

Opportunities. Employees would like a documented 'green' purchasing policy to be developed which outlines additional guidelines to Esquimalt's Purchasing and Disposal Bylaw. The employees suggested that a scored and weighted scale for rating various 'green' features be developed to assist with purchase decision-making.

Challenges. Employees thought it may be difficult for staff to understand how to begin purchasing in accordance with a 'green' purchasing policy. The employees felt it would be beneficial to have a panel of three or four people who review new fleet purchasing decisions to ensure it meets the criteria of the new policy.

Fleet & Vehicle Right-Sizing. The employee consensus was that the use of the vehicles was already being optimized. The Public Work vehicles that were reported to get the most mileage are the garbage truck and the street sweeper due to its daily use; however, there is no documentation to support these findings.

When vehicles are not moving equipment, they are transporting employees to meetings. Often the Fire Chief and Deputy Fire Chief attend meetings in downtown Victoria and are required to take a vehicle which carries equipment in case they are called in for an emergency. Other times vehicles are used to attend a meeting at another municipal building. A staff member noted that they often walk from the Municipal Hall to the Public Works Yard if time permits, other times a vehicle is taken for efficiency.

Opportunities. The municipality has purchased only a few compact-sized trucks in the last few years. Employees believe that there is more that can be done in regards to 'right-sizing'. One possibility is the purchase of smaller pick-up trucks.

Challenges. Employees highlighted that the mindset in Public Works is that vehicles are large 'boy toys'. Another perception among employees is that larger vehicles offer greater flexibility to accommodate a variety of uses. The fire department's reliance on having an equipped vehicle in cases of emergency is also a barrier to right-sizing. Employees believe it will take a lot of convincing before the purchase of more suitable sized vehicles can be done.

Alternative Vehicles. Esquimalt does not have any alternative vehicles in its fleet and has no specific plans to purchase any.

Opportunities. In 2008 Esquimalt Council passed a zero emissions low speed electric powered vehicles bylaw to allow the travel of these vehicles in the municipality. As a result, the municipality can purchase and operate low speed electric vehicles.

Challenges. When the low speed electric powered vehicles bylaw was being introduced, a staff report went to Council which recommended that Council not approve the bylaw due to safety concerns. The recommendation was based on concerns that these light-weight vehicles,

which do not pass the safety standards of conventional road vehicles, are a risk to employees' safety. This report indicates that there was already a resistance among staff towards the adoption of these alternative vehicles in the fleet. In addition, not all CRD municipalities have adopted a similar bylaw; therefore, a low speed electric vehicle could not leave the municipal boundaries to make deliveries.

Alternative Fuels. The Public Works Buyer-Storekeeper reported that the municipality spends about the same amount of money on gasoline as it does for diesel in a year. Accounting records indicate that diesel accounted for 48% of total fuel costs in 2008; whereas, gasoline accounted for 43%. The fuel-efficiency of diesel versus gasoline engines is significant as diesel engines accounted for 33% of the fleet whereas gasoline engines made up 62%. The Public Works department expressed a preference towards the purchase of gasoline vehicles. This preference may be a result of employees viewing gasoline as a cleaner fuel than diesel. As per Figure 4 in Section 2 of this report, the GHG factor per litre of gasoline is 0.002410 compared to diesel with a GHG factor of 0.002760 per litre. Based on the GHG factors, gasoline is a lower GHG fuel as 414 litres of gasoline result in the production of one tonne of GHG; whereas, one tonne of GHG is emitted for every 362 litres of diesel. Employees reported that larger vehicles tended to be available only in diesel. The Public Works department felt that the highest users in fuel are the big diesel vehicles. This assumption is supported by the inventory of the fleet fuel consumption in 2008, presented earlier in Section 2, which finds a diesel engine uses an average of 2,582 litres whereas gasoline engines used an average of 1,268 litres.

Challenges. Several employees shared their concerns on the procurement and environmental benefit of using biodiesel. At the end of 2007 and into the middle of 2008, Esquimalt had been using a B5 blend of biodiesel. The purchasing of 5% biodiesel fuel stopped in July of 2008 due to the purchasing cost of biodiesel being higher than regular diesel and the difficulty in getting a reliable supply. Currently the municipality purchases ultra low sulphur diesel and employees believes it to be just as effective, if not more than, biodiesel in terms of cost, pollutants, and in being better for the vehicle's engine.

Employees expressed concerns about the true environmental benefits of biodiesel. They believe that the energy used and GHG emitted in the production of biofuel increases the downstream GHG emissions of biodiesel.

Alternative Transportation. Esquimalt has not implemented any alternative transportation initiatives.

Challenges. Employees reported that vehicles are usually required to carry equipment with each trip, in case the equipment is needed. An employee, who commutes to work by bicycle, expressed the difficulty with biking in business clothes to a meeting.

Aftermarket Technologies. Esquimalt has never considered the purchase of aftermarket technologies.

Opportunities. The use of aftermarket technologies was seen as an opportunity for obtaining auxiliary cab heaters to reduce the idling of vehicles in cold weather. Several respondents noted that employees idle vehicles on cold mornings to warm up the vehicle and defrost windows.

Life Cycle Costing. Esquimalt employees reported that the current purchasing decision-making process does not include life cycle costing analysis.

Opportunities. Employees expressed that they like the concept of life cycle costing but that they would like more information on the process and time involved in its calculation.

Challenges. Employees are concerned that it will be hard to approximate maintenance costs for life cycle costing calculation, particularly for newer technologies which are not familiar and which maintenance costs are not available. Employees noted that reported fuel economy changes depending on the information source (manufacturers' reports compared to consumer guide indexes). Employees believed that if different measurements for fuel economy are being used, the validity of the life cycle costing analysis would be compromised. For the purpose of life cycle costing, employees recommended that a standard resource be established for estimating a vehicle's fuel economy. Participants stated a preference for figures made available through Transport Canada's website.

5.3.2 Operations

This section will outline the focus group findings on the "operations" component of the green fleet program framework including the adoption of trip and route planning, idling reduction and driver education, maintenance, and monitoring of the fleet.

Trip & Route Planning. Esquimalt has not implemented any trip or route planning initiatives in the operations and management of the municipal fleet.

Challenges. The group discussed an issue with the culture of the outdoor staff (parks and public works) and current trip practices. During the day employees are deployed to different work sites throughout the municipality. For mandatory breaks, employees then travel to a central location to meet with other co-workers. Under the Union's collective agreement, employees are entitled to a mandatory 15 minute break in the morning and afternoon and a one hour lunch break. Employees believed it would be very difficult to change this practice and sense of entitlement.

Idling Reduction & Driver Education. Esquimalt has not taken any action to reduce vehicle idling. Currently, driver education is only offered when a new vehicle is purchased.

Opportunities. Employees felt it would be more effective to implement an idling reduction policy in conjunction with driver education than solely adopting a policy.

Challenges. Employees noted that the vehicle operators are not concerned about saving the municipality money. Therefore, an idling reduction and education program would need to have a focus other than saving money on fuel.

Maintenance. Employees felt that one area where Esquimalt does really well is the management of its fleet's regular maintenance. There is a preventative maintenance schedule currently in place which is based on mileage, hours used or on a timeline.

Challenges. One of the difficulties of regular maintenance is getting staff to bring vehicles in on time.

Monitoring. For years, Esquimalt has been using a cardlock system for dispensing fuel. In the Spring of 2009, the cardlock system was programmed to request the vehicle's odometer reading before refuelling. The purpose of beginning to track both fuel use and the odometer reading for vehicles is to determine the fuel-efficiency of the vehicles.

Opportunities. Esquimalt has already begun monitoring fuel consumption and distance traveled by fleet vehicles which will assist with determining the fuel-efficiency of vehicles.

Challenges. Several employees raised the concern that there was no way for the cardlock system to know whether the correct odometer reading was being punched in by staff. If the incorrect odometer reading is being entered this would compromise the fuel-efficiency calculations.

Figure 11 compiles the above finding from the Township of Esquimalt focus group. The table is split to present both the perceived opportunities and challenges that employees shared on each green fleet program initiative.

Figure 11: Summary of Findings, Focus Group

Green Fleet Program	Opportunities	Challenges
PURCHASING:		
"Green" Purchasing	• Development of a 'green' purchasing policy with green purchasing specifications	• Needing a panel of employees to review purchasing decisions to ensure it meets the requirements of the policy
Right-Sizing	• More effort towards purchasing right-sized vehicles	• Staff perception that vehicles and equipment are large 'boy toys' • Belief that larger vehicles offer more flexibility
Alternative Vehicles	• Esquimalt has passed a bylaw to allow the use of low speed electric powered vehicles on municipal roads	• Employee safety concerns in using these low speed electric vehicles which do not pass the safety standards of conventional road vehicles
Alternative Fuels	• Have used a B5 blend of biodiesel in the past	• Discontinued the use of biodiesel due to cost and supply difficulty • Belief that ultra low-sulphur diesel is just as environmentally effective, if not more, than biodiesel
Alternative Transportation	• None reported by participants	• The use of bicycles is seen as impractical due to the need of vehicle use often to travel with equipment or to attend business meetings

Green Fleet Program	Opportunities	Challenges
Aftermarket Technologies	• Purchase of auxiliary cab heaters to reduce idling of vehicles in cold weather	• None reported by participants
Life Cycle Costing	• Participants liked the concept of conducting life cycle analysis for purchasing decision making	• Difficulty in estimating maintenance costs • Importance of using one source for fuel-consumption figures
OPERATIONS:		
Trip & Route Planning	• None reported by participants	• Employees use vehicles to travel from work sites to a central location to take breaks
Idling Reduction/ Driver education	• Participants believe it would be most effective to introduce an idling reduction strategy in conjunction with driver education on fuel-efficient driving practices	• Employees would not be interested in idling reduction measures and fuel-efficient driving as they are not interested in saving the municipality money
Maintenance	• Preventative maintenance schedule in place based on mileage, hours used and on timeline	• Getting employees to bring in the vehicles on time to be serviced
Monitoring	• A cardlock system is already in place to track the dispensing of fuel • Cardlock system recently programmed to have drivers input odometer readings before fuel can be dispensed	• Fuel tracking data is not being evaluated • No mechanism in place to verify the correct odometer reading is being entered

5.3.3 Summary

This section discussed how the Township of Esquimalt currently operates and manages its municipal fleet. It highlighted several green fleet initiatives which employees believe could be successfully implemented including green purchasing, vehicle right-sizing and monitoring. At the same time, employees believed that challenges of implementing a green fleet program framework could be experienced with fleet and vehicle right-sizing, alternative fuels, and idling reduction.

5.4 Summary

This section outlined the research findings from the interviews with four BC local governments and the focus groups with Township of Esquimalt employees. The first section outlined the local governments green fleet program. The second section presented the success and challenges that were experienced by the interviewed local governments in implementing their green fleet program. The third section reported information on Esquimalt's current fleet management practices and employees' perceptions on the opportunities and challenges in implementing a green fleet program. The findings from this section will contribute to the following analysis and discussion sections in this report. The next section will provide analysis of the findings on the benefits and challenges of implementing a green fleet program.

SECTION 6: ANALYSIS

This section will analyze the findings made in this report on the benefits and challenges of implementing a green fleet program. The findings stem from the review of comparable green fleet programs in other jurisdictions; the interview findings from four BC local governments; and the focus group findings with Esquimalt employees. In many cases, regardless of the local governments' geographical differences or fleet size, the findings are still applicable to Esquimalt given that the objective of all green fleet programs is to reduce GHG emissions. When any one local government's experience is not applicable to Esquimalt, it is noted in the analysis that follows. First is an analysis of the local governments green fleet programs. Second is an analysis of the green fleet purchase findings. Third is an analysis of the green fleet operations findings. Fourth is an analysis of the common challenges to implementing a green fleet program.

6.1 Local Governments' Green Fleet Program

There are a number of similar initiatives among the local governments' green fleet programs; however, the stage of implementation each local government is at differs. The review of comparable programs found that having a green fleet plan, such as a purchasing policy, was an important implementation component (BC Climate Action Toolkit, 2009d).

The interview findings did not indicate there was a relationship between a local government having a documented green fleet plan and the successful implementation of green fleet initiatives. Without a green fleet action plan, the District of Saanich (2009) reduced its fuel GHG emissions by 18.5% since 2004 by implementing such green fleet initiatives as having an E3 Fleet Review completed and implementing its recommendations. Meanwhile, the CRD with a detailed fleet action plan since 2008 has not yet begun its implementation. For a local government to have a successful green fleet program it most implement initiatives and not just plan on doing so. The following sections will provide insight on what factors hinder or help implementation.

6.2 Purchasing

This section will analyze the findings on the "purchasing" component of the green fleet program framework including green purchasing, alternative vehicles, fuels, and transportation, aftermarket technologies and life cycle costing.

Green Purchasing. The review of comparable programs found that having a purchasing policy, which prioritizes fuel-efficiency, was an important component to a green fleet program (BC Climate Action Toolkit, 2009d). Courtenay believed its Green Fleet Team was an effective tool for implementing its new Green Fleet Policy and Procedure. The Green Fleet Team, who are responsible for overseeing the Green Fleet Policy and Procedure and approving fleet purchases, acted as a resource for educating and assisting employees with fulfilling the requirements of the policy. This team was deemed necessary as employees initially had difficulty in meeting the purchasing requirements of the policy themselves; however, as indicated in the interview findings, this may have been a result of the poor communication surrounding the new policy.

Victoria has set minimum fuel-efficiency standards for vehicle purchasing. Though this practice may be effective at reducing emissions it does not examine the life cycle cost of operating each purchasing option. The downside can be that a vehicle which meets the minimum fuel-efficiency standard is not the most fuel-efficient option available. A similar limitation applies to Saanich's approach of purchasing "best in class" vehicles. Natural Resources Canada only provides "best in class" rating for personal vehicles. The limitations to the policy are: first, the majority of Esquimalt's fleet is made up of commercial vehicles and equipment; second, the purchase of "best in class" vehicles may not necessarily result in the lowest life cycle cost option being purchased.

Fleet & Vehicle Right-Sizing. The review of comparable programs found that fleet and vehicle right-sizing will lower a fleet's GHG emissions (BC Climate Action Toolkit, 2009b). The effectiveness of this strategy is further supported by the interviewed local governments of Courtenay, Saanich and Victoria having all introduced right-sizing initiatives.

The major challenge in fleet and vehicle right-sizing is getting employees to buy-in to changes in the number, type and size of vehicles in the fleet. Employees may find it difficult to accept different vehicles than the ones they have become accustomed to. Saanich experienced resistance from staff in the replacing the traditional two tonne crew trucks with smaller Dodge Sprinter Vans. Saanich was able to overcome this resistance and obtain employee buy-in by communicating the reasons for the change with staff over a period of time.

Employee culture also plays a role. An Esquimalt focus group member commented that vehicles and equipment are seen as large 'boy toys' and smaller vehicles are contrary to that image. Municipalities may also have to take steps to change employees' perceptions regarding the feasibility and requirement to change the size and makeup of the fleet.

Alternative Vehicles. The review of comparable programs suggests that alternative vehicles are an effective initiative to reduce GHG emissions. However, the adoption of alternative vehicles has been slow among the interviewed local governments. The most cited reason for this includes the higher cost of purchasing an alternative vehicle and the inability to recoup that initial cost over its operating life. These evaluations were completed prior to any knowledge on the future requirement of purchasing carbon offsets to achieve carbon neutrality. However, the current projected cost of carbon offsets at $\$25/tCO_2e$ may not be high enough to compensate for the higher cost of an alternative vehicle; however, the cost of carbon offsets may increase in the future. Regardless, an organization that is committed to a green fleet program will also evaluate the non-cost factors such as GHG emissions reduction and leadership in its purchase decision-making.

Alternative Fuels. The review of comparable programs and interview findings indicate that there are lower GHG emitting fuels on the market compared to gasoline and diesel. The use of alternative fuels has been implemented by three of the four local governments. Esquimalt had been using a B5 blend of biodiesel but discontinued this practice due to its higher cost and difficulty in obtaining a reliable supply. The B5 blend of biodiesel is the most common alternative fuel type as both Saanich and Victoria use this blend.

Courtenay has been successful with using a B20 blend year round. The higher the percent of a biodiesel blend, the greater are the GHG emissions reduction. The interviewed local governments,

Saanich, Victoria and Esquimalt, were concerned that a higher blend would negatively impact the performance of vehicles and damage vehicle engines. This misconception of biodiesel is a major barrier to its adoption at this time. Greater awareness and education on the adoption of higher blend biodiesel is needed for local governments to increase their own adoption of this fuel.

Alternative Transportation. The review of comparable programs discussed the benefits of alternative transportation methods for reducing fleet GHG emissions; however, among the interviewed local governments, there were no plans to implement any alternative transportation options. The lack of planning for the adoption of alternative transportation options indicates: that it has not been considered; or it has been reviewed but was dropped due to employee resistance; or it was reviewed but was deemed to be an ineffective option. For example, the option of using bicycles for conducting municipal business was felt to be an ineffective option by an Esquimalt employee who commutes daily to work on bike.

Aftermarket Technologies. The review of comparable programs discusses the adoption of aftermarket technologies as a way to reduce engine idling and thereby fleet GHG emissions. Courtenay and Victoria have adopted aftermarket technologies which help to reduce engine idling and thereby reduce GHG emissions. The implementation challenge is ensuring the technologies are being properly used to minimize engine idling and to recover the upfront cost of purchasing these products. Aftermarket technologies can also be used to support the implementation of an idling reduction strategy. Automatic engine shut-off devices, for when vehicles are left idling, can be purchased and installed on vehicles that do not already have one built-in. Many aftermarket technologies, such as cab heaters and vehicle lighting, are also meant to reduce the need for engine idling.

Life Cycle Costing. The review of comparable programs found that life cycle costing is an important component for implementing a green fleet program. Life cycle costing provides a business case for the purchase of greener vehicles and equipment by showing that the higher purchasing cost, can eventually be paid back through equal to greater cost savings over the operating life of the asset. Life cycle costing has been an important component for both Courtenay's and Saanich's implementation of their green fleet programs.

The major challenge, which was expressed as a concern by Esquimalt employees but was not mentioned by the interviewed local governments, was the difficulty and time involved in conducting life cycle costing. It is possible for a local government to adopt a life cycle costing method that is already being used by another organization instead of having to re-invent the wheel. For instance, Courtenay has adopted the use of Metro Vancouver's life cycle costing tool.

6.3 Operations

This section will analyze the findings on the "operations" component of the green fleet program framework including the adoption of trip and route planning, idling reduction and driver education, maintenance, and monitoring of the fleet and participation in the E3 Fleet Program.

Trip & Route Planning. The review of comparable fleet programs highlight the potential of trip and route planning to reduce fleet GHG emissions. It is therefore surprising that trip and route planning was not prominently discussed by any of the interviewed local governments. The lack of

discussion on trip and route planning by the local government participants raises the question of whether it is an unpopular strategy, and thereby be difficult to implement.

Esquimalt employees believed that the small geographic area of the municipality suggests that efficiencies are not likely to be gained by route planning. Employees did indicate the greatest challenge towards implementing trip planning was that employees use municipal vehicles to travel several times a day from work sites to a central location for breaks. The introduction of trip planning would likely be unpopular with staff and could cause problems with the Union as the Collective Agreement provides employees the right for two 15 minute breaks and an hour lunch break. If employees are no longer permitted to use municipal vehicles to travel to their desired break spot, employees will view trip planning, and the green fleet program, as an attack against this long-standing benefit.

The introduction of trip and route planning would have to be done with sensitivity to ensure employees do not take the change as a personal attack. Overall, this green fleet initiative would be one of the hardest for Esquimalt to implement.

Idling Reduction & Driver Education. The review of comparable programs found that idling reduction strategies and a driver education program to communicate new fleet policies, was an effective measure for reducing a fleet's GHG emissions. Idling reduction and driver education were common components of the local governments' green fleet program. Courtenay's 'soft approach' of education as compared to Victoria's 'hard approach' of implementing an anti-idling policy, demonstrates the varying degrees to which idling reduction measures could be implemented.

Courtenay and Saanich believed the key to attaining employee buy-in on idling reduction measures was through education. The education strategy included fuel-efficient driver education for not only drivers but all municipal employees. The training included information on fuel-efficient driving practices that employees could also use when driving their personal vehicles to save fuel. Esquimalt employees believed that an idling reduction policy should be introduced in conjunction with driver education.

Maintenance. Though the review of comparable programs discussed the benefits of a preventative maintenance program, plans to develop or refine current maintenance practices were not reported by any of the interviewed local governments. This lack of discussion indicates that maintenance practices have either not been considered, or they have and the current maintenance practices were deemed effective. For example, Esquimalt employees felt that their maintenance practice of regularly scheduling preventative maintenance was effective. However, Esquimalt focus group participants also mentioned the challenge of getting employees to bring in vehicles for maintenance in a timely manner.

Monitoring & E3 Participation. The review of comparable programs found that fleet monitoring is an important component of a green fleet program and an effective measure for program evaluation. During the local government interviews, even the CRD, who does not currently monitor its fleet, discussed the importance of monitoring and planned on making improvements in this area. Courtenay, Saanich and Victoria all expressed the important role that having an E3 Fleet Review played in implementing and improving their fleet monitoring practices.

The E3 Fleet Review requires that data be collected before a review can be conducted. A main component of fleet monitoring is fuel consumption data for each vehicle. This data can be easily obtained with a fuel cardlock system. Esquimalt already has a cardlock system in place but the data has not been examined with the purpose of identifying fleet fuel-efficiency. Esquimalt's challenge to monitoring is that the fuel cardlock system cannot tell if an odometer reading was being punched in correctly.

Saanich believed an E3 Fleet Review is also beneficial as recommendations for fleet improvement than comes from an outside organization. Saanich found that getting recommendations from a third party (E3) was an effective strategy of obtaining buy-in from management and Council to move on green fleet initiatives. The E3 Fleet Review may be an effective tool for local governments who are looking to obtain buy-in to implementing a green fleet program.

6.4 Common Challenges to Implementing a Green Fleet Program

This section will discuss the common challenges to implementing a green fleet program. These common challenges were repeatedly identified in the findings and analysis of green fleet programs. The three common challenges towards implementing a green fleet program are the cost of implementation, lack of green fleet knowledge among key stakeholders, and employees' resistance towards change.

6.4.1 Cost

The cost of implementing a green fleet program usually entails the additional cost of greener options compared to conventional options. The interviewed local governments and Esquimalt employees cited the higher financial cost of purchasing alternative vehicles and fuels as a barrier to implementation. Another concern was the indirect cost of employees' time in implementing green fleet initiatives.

The barrier to implementing more costly green fleet initiatives is due to local governments' limited budgets. Saanich was able to overcome the cost barrier of purchasing new vehicles by presenting Council with the life cycle costing recommendation that came out of its E3 Fleet Review. Saanich believed it was effective to receive the recommendation to replace vehicles from a third-party. The recommendation also made it easier to convince Council and employees to commit a budget towards replacing vehicles.

Another approach to overcome the cost challenge is by conducting a life cycle costing analysis of all vehicle and equipment purchasing options. The use of this tool enables the municipality to evaluate purchasing decisions based on the long-term cost of owning and operating the various options. Saanich had a life cycle costing analysis completed of its entire fleet as part of an E3 Fleet Review. Courtenay has adopted Metro Vancouver's comparison tool, an Excel spreadsheet, to evaluate different purchasing options.

In some cases, life cycle costing may indicate that the higher upfront cost of implementing certain green fleet initiatives will be recovered through the operational cost-savings of a more fuel-

efficient option. Overall, the cost barrier to implementing a challenge a green fleet program can be balanced by taking a broader and longer-term view on the future cost-savings.

6.4.2 Lack of Green Fleet Program Knowledge

The concept of a green fleet program, particularly for local governments, is relatively new. This means that the average Council member, employee or citizen does not have enough knowledge to evaluate the GHG reduction potential of green fleet initiatives. For example, Saanich had to educate Council, management, and members of the public on why fleet vehicles should be replaced earlier than originally planned. Members of Council and citizens typically view the purchase of new vehicles and equipment as an unnecessary expenditure if municipal vehicles and equipment are still operating. Saanich was able to change this perception by educating Council on the results of the fleet's life cycle costing analysis and the opportunity for cost-savings in the long-term. This changed the perception towards the purchase of new vehicles to be viewed as both a cost-saving and GHG reducing measure.

To overcome the challenge of Council, employees and citizens' lack of knowledge on green fleet initiative, communicating the purpose and benefits of green fleet initiatives is important for these audiences. The City of Courtenay communicated the merits of its green fleet initiatives in the municipality's Corporate Climate Action Plan. This public document was presented to Council and employees and is made available for public viewing on the municipality's website.

The District of Saanich was able to get its community involved in its green fleet program by engaging residents in its idling reduction strategy and fuel-efficient driver education. The municipality shared knowledge on the benefits of idling reduction and driving behaviour to promote a change not only in its municipal fleet's driving practices but residents' driving practices as well.

6.4.3 Employees' Resistance to Change

The resistance of employees to change is the major challenge facing local governments in implementing a green a fleet program. Employee resistance was experienced by Victoria with the implementation of alternative fuels and by Saanich in the purchase of right-sized vehicles. The Township of Esquimalt shared some insight on why employees would be resistant to implementing a green fleet program. One reason has to do with employees' perception and lack of knowledge. For example, some employees do not perceive that biodiesel fuel offers greater benefits than the conventional ultra low sulphur diesel, when in reality it does. Secondly, employees who operate fleet vehicles and equipment view them as large 'boy toys' and would be unenthusiastic about replacing them with smaller-sized vehicles.

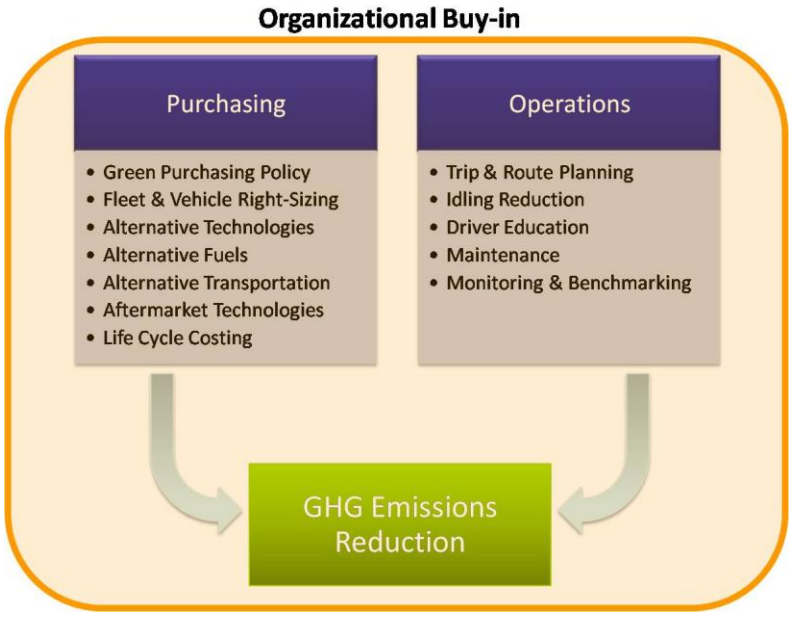
The main objective of a green fleet program is to reduce fleet GHG emissions. Fleet GHG emissions are directly related to the type and amount of fuel consumed. Actions which reduce fuel consumption can be perceived by employees as a cost-saving measure by the municipality. Employees, particularly fleet drivers, may not be motivated to implement green fleet initiatives that are described as a cost-saving measure. Employees are not motivated by the objective of saving the municipality money. One reason for this may be that managing operating costs is not included in local government employees' job evaluation.

Employees' resistance to change can be best overcome by attaining employee buy-in on adopting a green fleet program. Obtaining employees buy-in has to do with changing employees attitudes in order to influence behaviour (McKenzie-Mohr & Smith, 1999). In the case of adopting a green fleet program, employees should be educated on the purpose of the proposed changes to increase employees' willingness to implement green initiatives. The City of Courtenay indicated that having key employees lead the decision-making process by being a member of a Green Fleet Team assisted with furthering employee buy-in.

The Saanich interviewee believed that 60-65% of the success of implementing a green fleet initiative is attributed to getting buy-in from others. Saanich used education to overcome employee resistance to implementing idling reduction initiatives. In order to have employees interested in the driver education, the training addressed how employees could use fuel-efficient driving practices at home to reduce fuel bills. Approaches which appeal to employees own self-interests would be an effective strategy for achieving employee buy-in on adopting a green fleet program.

Overall, the necessary component for a local government to implement a successful green fleet program is to obtain organizational buy-in from Council, management and employees. Figure 12 illustrates that a green fleet program framework takes place within an organizational culture where buy-in exists.

Figure 12: Green Fleet Program Framework with Organizational Buy-in



6.5 Summary

This section provided an analysis of a green fleet program based on the findings from the review of green fleet programs in other jurisdictions and the interview and focus group findings. This

section highlighted the opportunities and challenges that implementing a green fleet program presents to local governments, and particularly to Esquimalt. The common challenges of implementing a green fleet program, and how to overcome them, was also discussed. The common challenges are the cost of implementation, lack of green fleet knowledge among key stakeholders, and employees' resistance towards change. The next section will discuss how to evaluate the findings made in this report to recommend a green fleet program for the Township of Esquimalt.

SECTION 7: DISCUSSION

This section provides a discussion on how to evaluate the implementation of a successful green fleet program. This section presents the need to evaluate a green fleet program based on a balance of the Township of Esquimalt's desire to reduce its fleet GHG emissions within its operational and financial constraints. The findings from the review of comparable programs, interviews and focus group will add to the discussion presented in this section. The evaluation of a green fleet program will be based on the original research questions of this report. This leads to the discussion of: first, setting a GHG emission reduction target; second, assessing the impact of a green fleet program on municipal operations; and third, determining the cost-effectiveness of various green fleet initiatives.

7.1 Evaluation Criteria for a Green Fleet Program

The criteria for evaluating a successful green fleet program will address the first three research questions of this report. The research questions were:

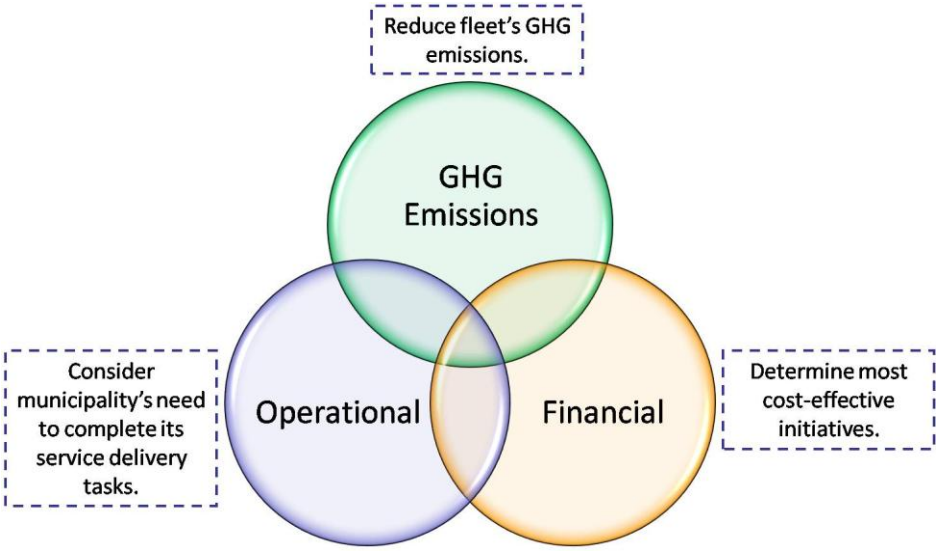
(1) How can the Township of Esquimalt reduce its fleet's GHG emissions?

(2) How will the goal of reducing GHG emissions be balanced with the municipality's need to complete its service delivery tasks?

(3) What are the most cost-effective ways for Esquimalt to reduce its municipality's GHG emissions?

The research questions form the evaluation criteria of the various initiatives presented in the green fleet program framework. The evaluation model, illustrated in Figure 13, includes weighting the Township of Esquimalt's operational and financial constraints with the objective of reducing GHG emissions.

Figure 13: Evaluation Criteria for Esquimalt's Green Fleet Program



GHG Emissions. The first and most prominent evaluation criterion is to implement the green fleet initiatives which reduce the fleet's GHG emissions. The objective of all components of a green fleet framework, presented in section 4, is to lower a fleet's fuel consumption, and thereby reducing GHG emissions. How many initiatives a local government will want to implement will depend on what they set as a goal for reducing GHG emissions. The larger the goal is, the greater the number of green fleet initiatives there are to implement. Section 7.2 discusses the value of setting a GHG emission reduction target.

Operational. The second evaluation criterion is to ensure that the green fleet initiatives which are implemented will not negatively affect the municipality's ability to complete its service delivery tasks. The less a green fleet initiative interferes with the service delivery tasks, the more likely that initiative will be successfully implemented. Section 7.3 analyzes the impact of a green fleet program on municipal operations.

Financial. The third evaluation criterion is to determine which green fleet initiatives are most cost-effective. The importance of this evaluation criterion has to do with the number of green fleet initiatives which reduce GHG emissions; however, taking a fiscally responsible approach would be to determine which initiatives would be most cost-effective to implement. Section 7.4 evaluates the cost-effectiveness of green fleet initiatives.

7.2 Setting a GHG Emission Reduction Target

The first research question of this report was "*How can the Township of Esquimalt reduce its fleet's GHG emissions?"* The report findings provided information on the initiatives local governments in other jurisdictions have implemented to reduce their fleet GHG emissions. This information serves as a guideline on what GHG emission reductions the Township of Esquimalt can expect by implementing similar initiatives. One question that still remains is by how much the Township of Esquimalt wants to reduce its fleet's GHG emissions.

For Esquimalt, the call to action on reducing its GHG emissions came from signing on to the BC Climate Action Charter, by committing to become carbon neutral in its operations by 2012. The Township of Esquimalt may wish to establish a target for reducing its fleet's GHG emissions. Setting a target will accomplish two things. First, it will stimulate action towards implementing a green fleet program by setting a measurable goal (Ministry of Community and Rural Development, 2009). Second, it will set a benchmark from which the municipality can evaluate the performance of its green fleet program compared to its stated objective (Bish & Clemens, 2008).

The review of comparable programs and interview findings show that when undertaking a green fleet program, a target level and date for completion were also established. A common occurrence was that the shorter the timeframe, the smaller the target. For instance, the Township of Langley's (2007) target was a 10% reduction in fuel emissions by 2010 compared to 2000 levels. Whereas, the City of Toronto's (2008) target is to meet or surpass an 80% reduction by 2050 compared to 1990 levels.

The Township of Esquimalt may wish to examine its fleet's GHG emission target in conjunction with its target for overall corporate GHG emissions. As the emissions resulting from all municipal operations are outside of the scope of this report, an interim target will be presented for the

purpose of developing a green fleet program. Figure 14 outlines a number of fleet GHG emission reduction targets at 5% intervals. The table presents the percentage value of GHG emissions reduced based on the 2008 fleet GHG inventory at 283 tonnes of carbon dioxide equivalents (tCO_2e), the total amount of GHG emissions reduced, and amount of remaining GHG emissions. The amount of remaining GHG emissions will need to be offset beginning in 2012 through the purchase of carbon offsets.

Figure 14: Esquimalt GHG Emission Reduction Targets for Fleet Operations, Compared to 2008 Levels

GHG Emission Reduction Targets	GHG Reduced (tCO2e)	Remaining GHG Emissions (tCO2e)
0%	0	283
5%	14	269
10%	28	255
15%	42	241
20%	57	226
25%	71	212
30%	85	198
35%	99	184
40%	113	170
45%	127	156
50%	142	142
55%	156	127
60%	170	113
65%	184	99
70%	198	85
75%	212	71
80%	226	57
85%	241	42
90%	255	28
95%	269	14
100%	283	0

The Township of Esquimalt should adopt a specific GHG emission reduction target. Fried and Slowik (2004) believe that a goal should be specific as opposed to general. Esquimalt simply stating that it will do its best to reduce fleet GHG emissions is not a sufficient target; instead a target goal should be set. This goal must also be measurable and attainable (Fried & Slowik, 2004). To evaluate the performance of its green fleet program, the Township of Esquimalt should regularly measure and report its fleet GHG emissions. Doing so will provide a feedback loop on the effectiveness of the initiatives being implemented and on the progress being made towards meeting the goal. The Township of Esquimalt may wish to consider setting both a short-term and long-term GHG reduction target. By setting a short-term target, and achieving it, Esquimalt may increase the organization's motivation and commitment to meeting a longer-term target.

Prior to setting any GHG emission reduction target, an evaluation of what green fleet initiatives are feasible, with the municipality's operational and financial constraints, will want to also be considered.

7.3 Impact of a Green Fleet Program on Municipal Operations

The Township of Esquimalt has committed to achieve carbon neutrality by 2012 and must look for ways to reduce its fleet's emissions while continuing to deliver its services. As discussed in Section 2, one option to reduce GHG emissions is to discontinue fleet operations. This is not a viable option as the municipality is required to provide services to residents and businesses, such as garbage collection, road repair and the maintenance of parks. The review of comparable programs uncovered how local governments in other jurisdictions reduced their fleets' GHG emissions while continuing to operate. From this review, a green fleet program framework emerged which presented opportunities in fleet purchasing and operational practices for achieving a reduction in GHG emissions.

The interview and focus group discussed the true implications of a green fleet program on the municipality's operation. The common challenges to implementation among the interviewed local governments, beside cost, were lack of green fleet program knowledge among key stakeholders, and employees' resistance to change. Hence, the challenge was not finding suitable options for reducing fleet emissions, such as adopting biodiesel or right-sized vehicles, but communicating to the organization that these initiatives would be effective and negligibly impact operations. Based on the focus group findings, a similar approach of communicating and obtaining employee buy-in will be required to successfully implement a green fleet program for Esquimalt.

To obtain employee buy-in it is recommended that the Township of Esquimalt slowly introduce its green fleet program by first picking the low hanging fruit. The concept of low hanging fruit is to first accomplish the easiest task or the most readily achievable goal (Berndt, 2007). In this case, it applies to the Township of Esquimalt implementing the initiatives that would meet the least employee resistance. For instance, the adoption of biodiesel fuel would have far less of an impact on employees' daily work practices than being given a smaller-sized vehicle or told to ride a bicycle to worksites. The resistance of employees towards the adoption of biodiesel appears to be a lack of knowledge that a reliable supply of biodiesel is available on Vancouver Island. If the successes of Saanich and Courtenay's fleet, in procuring and using biodiesel, were communicated to employees, resistance may be decreased and result in increasing the ease of implementation.

By the Township of Esquimalt implementing the low hanging fruit of a green fleet program, it will likely achieve greater success than beginning with the higher branches. One high branch is the practice of trip and route planning. The focus group findings indicated that employees regularly use fleet vehicles to travel from worksites to a central meeting place for coffee and lunch breaks. If Esquimalt were to implement a policy prohibiting the use of vehicles during breaks, it may find that staff will be less willing to implement other fuel-efficiency measures such as idling reduction.

Overall, Esquimalt can be more successful in implementing a green fleet program if it were to consider employees receptiveness to the proposed green fleet initiatives instead of only the GHG reduction potential of the initiative.

7.4 Cost-effectiveness of Green Fleet Initiatives

Bish and Clemens (2008) state that the balance of benefits and costs is an important decision making criterion for local government decision makers. This balance is a deciding factor for local governments when allocating budgets for the implementation of GHG reduction initiatives. The Federation of Canadian Municipalities (2009) believes that a municipality's fiscal challenge is a major barrier to local governments achieving its full GHG emission reduction potential. Currently, only 8 cents of every tax dollar collected in Canada goes to municipal governments. This leaves local governments dependent on property tax and user fees to cover the costs of their operations. For this reason, the benefit of every dollar spent on reducing GHG emissions is an important evaluation measure for local governments.

The Federation of Canadian Municipalities (2009) report, *Act Locally: The Municipal Role in Fighting Climate Change,* evaluates the cost of emissions reductions, expressed as dollars per tonne of carbon dioxide equivalent ($/t$CO_2$e) reduced. This evaluation method can be used for local governments in evaluating the cost-effectiveness of various green fleet initiatives. As the framework in Section 4 illustrates, all green fleet initiatives contribute towards the same objective - the reduction of GHG emissions. By comparing the cost of implementing each green fleet initiative against the expected reduction of GHG; local governments would have a useful evaluation method. Using this methodology, the most cost-effective option would be the initiative with the lowest cost per tonne of GHG reduced.

The review of comparable programs and interview findings presented information on the implementation and effectiveness of various green fleet initiatives. That information, in conjunction with some preliminary research into Esquimalt's fleet emissions, allows for some cost-effectiveness estimates on several green fleet initiatives. Figure 15 outlines some preliminary estimates of the cost-effectiveness of a green fleet program. The first column details the green fleet initiative to be evaluated. The second and fourth columns states the calculated GHG emission reduction and cost of the initiative based on earlier findings in this report or from the sources provided in the last column on "Notes". The third column displays the GHG reduction of the initiative as a percentage reduction from the fleet's 2008 GHG inventory baseline. The fifth column displays the cost-effectiveness of the initiative by cost per tCO_2e reduced. Finally, the last row displays the sum of all the green fleet initiatives examined in the table.

Figure 15: Cost-effectiveness of Green Fleet Initiatives

Green Fleet Initiative	GHG Reduction (tCO2e)	% Reduction in GHG emissions (compared to 2008 levels)	Cost	Cost/ tCO_2e Reduced	Notes
Alternative Technology - Replacement of one gasoline powered pick-up with a battery-electric option.	3.00	1.06%	$0	$0	The cost of a 2010 Chevrolet Silverado Pickup is very similar in cost to a smaller-sized Might-E-Truck. This initiative would therefore also include the practice of vehicle right-sizing.
Alternative Technology - Replacement of propane powered Ice Resurfacer with a battery-electric option.	18.00	6.36%	$63,000	$3,500	In 2009 Esquimalt evaluated the purchasing decision for a propane versus electric Ice Resurfacer. Based on annual expected usage, a propane unit would produce 19 tCO2e annually; whereas, an electric unit would only emit one tCO2e.
Alternative Technology - Replacement of one gasoline powered car with a hybrid-electric option.	0.90	0.32%	$6,500	$7,222	Natural Resources Canada (2008b) reports that hybrid-electric vehicles result in 30% lower GHG emissions compared to a conventional vehicle. Implementation Cost is difference in purchasing a 2010 Ford Fusion Hybrid versus a 2010 Ford Focus.
Alternative Fuels - Adoption of a B5 blend of biodiesel.	7.49	2.65%	$2,172	$290	Application of a B5 blend results in a 5% reduction in the GHG factor of diesel fuel.
Alternative Fuels - Adoption of a B20 blend of biodiesel.	29.97	10.59%	$2,172	$72	Application of a B20 blend results in a 20% reduction in the GHG factor of diesel fuel.
Alternative Transportation Options - Replacement of one gasoline vehicle with a bicycle.	3.00	1.06%	$1,200	$400	Implementation cost includes a bike and safety gear and accessories. There are secure bike lookup area and showers at the Municipal Hall, Public Works Yard, Parks Nursery and Recreation Centres.

Green Fleet Initiative	GHG Reduction (tCO2e)	% Reduction in GHG emissions (compared to 2008 levels)	Cost	Cost/ tCO_2e Reduced	Notes
Life Cycle Cost Analysis of Fleet - Completing an E3 Review and implementing recommendations for early replacement of vehicles and equipment.	7.00	2.47%	$3,000	$429	Township of Langley was able to save 5% in fuel and repair costs by replacing vehicles earlier than planned (BC Climate Action Toolkit, 2009c). Assumption that half of the cost-savings was related to reduced fuel consumption.
Idling Reduction/Driver Training	23.00	8.13%	$6,000	$261	Idle FreeBC (n.d.a) states that an organization can see fuel savings of 10-20% from idling reduction. Assumption is that there will be a fuel savings of 10%. The implementation cost is for bringing in a consultant to host driver fuel-efficiency workshops.
TOTAL	**92**	**32.64%**	**$84,043**	**$1,522**	

The preliminary evaluation of the cost-effectiveness of several green fleet initiatives indicates that some initiatives are expected to be lower in cost than others per the tonne of GHG emissions reduced. According to the preliminary analysis, one of the most cost-effective options would be the replacement of one fleet pick-up truck with a smaller sized electric-battery zero emission utility vehicle. Though the decision to implement such an initiative from a financial perspective is easy, the findings from the focus group indicate that convincing employees to accept a smaller sized vehicle may be difficult. Similarly, the adoption of a B20 blend of biodiesel is more cost-effective than a B5 blend, but the interview and focus group findings were that employees are reluctant to adopt this initiative.

7.5 Summary

This section discussed how to evaluate a local government's green fleet program. The evaluation was based on the need of balancing the objective of reducing GHG emissions with the operational and financial constraints of the local government. The discussion highlighted the need to set a GHG emission reduction target, and to evaluate green fleet initiatives based on: implications for the municipality's operations; and the cost-effectiveness of each initiative based on the cost per tonne of GHG emission reduced. The application of the above evaluation criteria was beneficial in making recommendations for a green fleet program from the Township of Esquimalt, which is discussed in the next section.

SECTION 8: RECOMMENDATIONS

This section presents recommendations for the development and implementation of a green fleet program for the Township of Esquimalt. The green fleet initiatives recommended in this section result from the findings and evaluation criteria presented earlier in this report. The green fleet program recommended in this section sets out to achieve Esquimalt's objective of reducing fleet GHG emissions within its operational and financial constraints.

The findings indicated there was no single action that establishes a 'green' fleet; instead, there are a number of initiatives that comprise a green fleet program framework. This is due to the positive relationship between a larger number of initiatives being implemented with a greater reduction in GHG emissions, as illustrated in Section 7.4. The implementation of each additional initiative will result in further reduction of the fleet's GHG emissions.

The recommendation is for the Township of Esquimalt to introduce a green fleet program taking a three-phased approach over five years (2009-2013). The three-phased approach will address the implementation challenges, discussed in section 6 of this report, which includes cost, lack of green fleet program knowledge, and employees' resistance to change. The recommendations address these barriers in order to gain organizational buy-in for the implementation of a green fleet program. The three-phases allows for time to allocate a budget for implementation, and time to communicate the changes to Council, management and staff.

The following three sections describe each of the three implementation phases in greater detail. Implementation details will include descriptions of the recommended green fleet initiatives, outline the resources required to implement them, and indicate performance measures for Esquimalt to evaluate the success of its green fleet program.

8.1 Phase I: Green Fleet Program (2009-2010)

The seven recommendations in Phase I establish the groundwork for Esquimalt's green fleet program. This groundwork includes the introduction of initiatives to obtain organizational buy-in for a green fleet program. The purpose is to communicate the benefits of a green fleet program to key stakeholders. In addition, it recommends fleet monitoring in order to later evaluate the performance of a green fleet program.

Phase I recommendations should be implemented before the end of 2010. The recommendations include: establishing a Green Fleet Review Committee, measuring fleet GHG emissions, setting a short-term GHG emission reduction target, introducing a green fleet purchasing policy, creating a purchasing worksheet, monitoring the municipal fleet, and becoming a member of the E3 Fleet Program. The reason to first introduce these seven initiatives is to begin adopting a new approach to purchasing and monitoring the fleet before the operational changes are implemented in the second phase.

Figure 16: Phase I of Esquimalt's Green Fleet Program (2009 - 2010)

Phase I: Initiatives	Description	Resources	Performance Measures	Responsibility
Green Fleet Review Committee	The purpose of the Green Fleet Review Committee is to assist with the implementation of the Green Fleet Program; particularly as a decision-making body for the purchasing of new vehicles under a new fleet purchasing policy. The members of the Green Fleet Review Committee will be employees that are responsible for the management of the municipal fleet this may include, but is not limited to, the Director of Engineering & Public Works, Manager of Public Works, Fleet Supervisor (Public Works), Buyer-Storekeeper (Public Works), Manager of Parks Services, Fire Chief, Deputy Fire Chief, Manager of Sustainability, Director of Financial Services, and the Chief Administrative Officer.	Staff Time	Establishment of a Green Fleet Review Committee	Chief Administrative Officer Sustainability Coordinator
Measure and Report Fleet GHG Emissions	Conduct an inventory of the fleet's GHG emissions. Establishing baseline data on the fleet's GHG emissions is imperative for later measuring the results of the green fleet program. Choose a calculation for converting litres of fuel to GHG emissions and implement.	Staff Time	Establish a baseline for fleet GHG emissions. Annual reporting of fleet GHG emissions. Compare annual fleet GHG emissions to baseline and GHG reduction target.	Sustainability Coordinator

Phase I: Initiatives	Description	Resources	Performance Measures	Responsibility
Set a GHG Emission Reduction Target	Establish a short-term fleet GHG emission reduction target with a deadline of 2012.	Staff Time	Adoption of target by Council Compare annual fleet GHG emissions to target.	Council Green Fleet Review Committee Sustainability Coordinator
Purchasing Policy	A sustainable-green fleet purchasing policy and procedure which provides clear direction to municipal employees on the purchasing of new vehicles and equipment (Appendix K). The policy and procedure would be added as an addendum to Esquimalt's Purchasing and Disposal Bylaw No. 2669 (Appendix H).	Staff Time Higher initial cost of purchasing 'greener' vehicles compared to conventional options.	Adoption of policy Compare fuel-efficiency, GHG emissions and costs of new vehicles to replacement vehicles.	Council Green Fleet Review Committee Sustainability Coordinator
Purchasing Worksheet	Create a tool to be used in the purchasing decision making process so that opportunities for adopting the greenest alternatives to conventional vehicles and equipment are always considered.	Staff Time	Completion of purchasing worksheet for every fleet unit purchased.	Green Fleet Review Committee Sustainability Coordinator
Fleet Monitoring	Continue monitoring the fuel use and mileage of all municipal vehicles. Begin tracking the maintenance cost and any service downtime of all municipal vehicles.	Staff Time	Measure and report fuel-efficiency, GHG emissions and costs for each fleet unit.	Fleet Supervisor Manager of Public Works Public Works Buyer-Storekeeper Sustainability Coordinator
E3 Fleet Membership	The benefits of E3 membership includes access to emissions and cost calculators	Cost of $600 for membership on an	Number of correspondence and resources received in a year.	Fleet Supervisor

Phase I: Initiatives	Description	Resources	Performance Measures	Responsibility
	of alternative fuels; an E3 Fleet Rating Handbook; subscription to the E3 Fleet Newsletter; and discounts on E3 workshops.	annual basis.	Number of E3 workshops attended by employees.	

The second recommendation in this phase is to measure and report fleet GHG emissions. Fleet GHG emissions for 2008 was measured and included in the background section of this report. This GHG inventory can be the baseline from which the Township of Esquimalt set its GHG reduction target(s). The challenge in implementing the purchasing policy is applying the policy to a diverse range of purchasing options. To assist with this difficulty, a purchasing worksheet was created and is included as Appendix K. The recommendation of fleet monitoring may be the most challenging action of this first phase, by demanding ongoing staff time to track fleet data. Regardless of this challenge, it is a vital component of implementing and measuring a successful green fleet program.

8.2 Phase II: Green Fleet Program (2010-2012)

The five recommendations in Phase II entails green initiatives that will take a longer time to develop and implement than those in Phase I. Phase II recommendations are intended to be implemented over three years and by the end of 2012. The recommendations being made during Phase II include: adopting the use of alternative fuels and vehicles, having an E3 Fleet review conducted on the municipal fleet, and implementing an idling reduction strategy which includes driver education. The implementation of these initiatives will achieve significant reductions in the fleet's GHG emissions.

Figure 17: Phase II of Esquimalt's Green Fleet Program (2010 – 2012)

Phase II: Initiatives	Description	Resources	Performance Measures	Responsibility
Alternative Fuels and Vehicles	Purchase alternative fuels and vehicles when it becomes cost-effective to do so. For example, purchase a hybrid vehicle when life cycle costing indicates that the additional cost of doing so is equal to or less than the projected cost	Staff time to monitor and evaluate cost-effectiveness. Incremental costs of purchasing alternative fuels or vehicles compared to conventional options.	Annual reporting of type and quantity of alternative fuel purchased and resulting GHG emissions. Number of alternative vehicles purchased in a year.	Green Fleet Review Committee Public Works Buyer-Storekeeper Sustainability Coordinator

Phase II: Initiatives	Description	Resources	Performance Measures	Responsibility
	savings and/or reduction of GHG emissions. Continue to monitor developments in the production and supply of alternative fuels and vehicles. Resources available to do this include the E3 Fleet Program and the BC Climate Action Toolkit, Green Fleets BC, Bio Fleet, the Hybrid Experience, and Natural Resources Canada websites.	Costs of installing alternative fuelling station, if applicable.	Compare fuel-efficiency, GHG emissions and costs of new alternative vehicles to replacement vehicles.	
E3 Fleet Review	The E3 Fleet review provides a comprehensive report on the performance of the fleet and makes recommendations on how to further implement greening action in the fleet.	Staff time to collect and compile the data needed for the review. Cost of $3000 to have the municipal fleet reviewed.	Completion of an E3 fleet review. Track number of review recommendations that are implemented. Compare fuel consumption, GHG emissions and costs of operating the fleet before and after review.	Fleet Supervisor Manager of Public Works Public Works Buyer-Storekeeper Sustainability Coordinator
Idling Reduction & Driver Education	Develop and implement an idling reduction awareness campaign, within the organization and the community. Educate vehicle drivers, equipment operators and all employees on Esquimalt's sustainable-green fleet	Staff time to implement an idling reduction campaign. Cost of hiring a driving education consultant. Staff time to receive driver education on idling reduction	The percentage of staff who have attended a driver education session. Compare the fuel-efficiency, GHG emissions and cost of fleet before and after training.	Fleet Supervisor Manager of Public Works Public Works Buyer-Storekeeper Sustainability Coordinator

Phase II: Initiatives	Description	Resources	Performance Measures	Responsibility
	program. Provide fuel-efficient and idling reduction driver education in a workshop environment to all employees. Become a recognized member of Idle Free BC by reporting the targets, implementation and outcome of Esquimalt's idling reduction campaign. Resources for information on idling reduction strategies and driver education are available through the BC Climate Action Toolkit, E3 Fleet, Green Fleets BC, IdleFree BC and Natural Resources Canada websites.	techniques. Cost of producing and distributing idling reduction information in the organization and to the community.		

Phase II recommendations will be more difficult to implement than Phase I. One area of difficulty will be obtaining buy-in for the re-adoption of alternative fuels, as biodiesel was already piloted in 2008 and discontinued due to supplier issues. To find a reliable biodiesel supplier, the Township of Esquimalt should research suppliers in southern Vancouver Island by seeking references from its neighbouring municipalities.

Another difficulty is obtaining buy-in for the introduction of idling reduction initiatives. Based on the research findings, idling reduction initiatives in a fleet are best complimented by a community-wide idling reduction strategy. It is recommended that Esquimalt implement a community-wide anti-idling campaign alongside its organization-wide one. The importance of also providing fuel-efficiency training was highlighted in the interview findings of this report. It is recommended that the Township of Esquimalt offer driver education workshops as a component of its organization-wide idling reduction campaign to promote fuel-efficient driving practices.

8.3 Phase III: Green Fleet Program (2013)

The recommendation in Phase III is for the Township of Esquimalt to complete an evaluation of its green fleet program in 2013. The evaluation will review whether the Township of Esquimalt has met its short-term GHG emission reduction target (established in Phase I). The review will also provide a comparison between the estimated and actual cost-effectiveness of the implemented green fleet initiatives. The Green Fleet Review Committee will play a critical role in this evaluation by sharing their feedback on what initiatives worked for the organization or still require improvement. The Green Fleet Review Committees' qualitative evaluation of the program will help assess the level of organizational buy-in to the green fleet program. By evaluating the performance of the green fleet program from 2009-2012, the Township of Esquimalt can then work on establishing a longer-term GHG emissions target and develop a plan for meeting its target.

8.4 Summary

This section outlined thirteen recommendations, to be implemented in three-phases, on how the Township of Esquimalt can implement a green fleet program. The recommendations included details on the resources required for implementation, the employees responsible for implementing the initiatives, and performance measures to evaluate the success of each initiative and the green fleet program overall. The thirteen recommendations achieve Esquimalt's objective of reducing its fleet's GHG emissions with minimal impact on operations and in the most cost-effective manner possible.

SECTION 9: CONCLUSION

This report's purpose was to develop a green fleet program for the Township of Esquimalt so it might reduce its fleet's GHG emissions to meet its commitment under the BC Climate Action Charter. A review of comparable green fleet programs in other jurisdictions identified a number of leading green fleet practices and contributed to the development of a green fleet program framework. The benefits and challenges in implementing a green fleet program were highlighted in the interviews conducted with four BC local governments and a focus group with Esquimalt employees. The analysis and discussion of the research findings allowed for the evaluation of different program options and the making of a recommendation for a green fleet program.

The recommendation is for the Township of Esquimalt to adopt a green fleet program which includes thirteen actions to be implemented in three phases with a completion date of 2013. Several of the Phase I recommendations have already begun implementation as part of this report: an inventory of Esquimalt's 2008 fleet GHG emissions (Figure 4); the establishment of a replacement and purchasing policy for all vehicles and equipment (Appendix J); and the creation of a vehicle and equipment purchasing worksheet (Appendix K).

By implementing the recommendations in this report, the Township of Esquimalt will be able to reduce its fleet's GHG emissions with minimal impact on its fleet operations and in the most cost-effective manner possible. The Township of Esquimalt's Green Fleet Program will lower GHG emissions and therefore be a key component in fulfilling Esquimalt's BC Climate Action Charter commitment of achieving carbon neutrality by 2012.

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APPENDIX A: British Columbia Climate Action Charter

THE BRITISH COLUMBIA CLIMATE ACTION CHARTER
BETWEEN
THE PROVINCE OF BRITISH COLUMBIA (THE PROVINCE)
AND
THE UNION OF BRITISH COLUMBIA MUNICIPALITIES (UBCM)
AND
SIGNATORY LOCAL GOVERNMENTS
(THE PARTIES)

(1) The Parties share the common understanding that:
(a) Scientific consensus has developed that increasing emissions of human caused greenhouse gases (GHG), including carbon dioxide, methane and other GHG emissions, that are released into the atmosphere are affecting the Earth's climate;
(b) the evidence of global warming is unequivocal and the effects of climate change are evident across British Columbia;
(c) reducing GHG emissions will generate environmental and health benefits for individuals, families, and communities;
(d) climate change and reducing GHG emissions are issues of importance to British Columbians;
(e) governments urgently need to implement effective measures to reduce GHG emissions and anticipate and prepare for climate change impacts;
(f) protecting the environment can be done in ways that promote economic prosperity; and
(g) it is important to take action and to work together to share best practices, to reduce GHG emissions and address the impacts of climate change.

(2) The Parties acknowledge that each has an important role in addressing climate change and that:
(a) The Province has taken action on climate change, including commitments made in the 2007 Speech from the Throne, the BC Energy Plan, and the Western Climate Initiative on climate change;
(b) Local Governments have taken action on climate change, including planning livable, sustainable communities, encouraging green developments and transit oriented developments, and implementing innovative infrastructure technologies including landfill gas recapture and production of clean energy; and
(c) these actions create the foundation for the Parties to be leaders in affecting climate change.

(3) This Charter acknowledges that:
(a) The interrelationship between each Order of Government's respective jurisdictions and accountabilities with respect to communities, and activities related to and within communities, creates both a need and an opportunity to work collaboratively on climate change initiatives;

(b) both Orders of Government have recognized a need for action, both see that the circumstances represent a Climate for Change in British Columbia, and both are responding; and
(c) the actions of each of the Parties towards climate change will be more successful if undertaken jointly with other Parties.

(4) The Parties share the common goals of:
(a) Fostering co-operative inter-governmental relations;
(b) aiming to reduce GHG emissions, including both their own and those created by others;
(c) removing legislative, regulatory, policy, or other barriers to taking action on climate change;
(d) implementing programs, policies, or legislative actions, within their respective jurisdictions, that facilitate reduced GHG emissions, where appropriate;
(e) encouraging communities that are complete and compact and socially responsive; and
(f) encouraging infrastructure and a built environment that supports the economic and social needs of the community while minimizing its environmental impact.

(5) In order to contribute to reducing GHG emissions:
(a) Signatory Local Governments agree to develop strategies and take actions to achieve the following goals:
(i) being carbon neutral in respect of their operations by 2012, recognizing that solid waste facilities regulated under *the Environmental Management Act* are not included in operations for the purposes of this Charter.
(ii) measuring and reporting on their community's GHG emissions profile; and
(iii) creating complete, compact, more energy efficient rural and urban communities (e.g. foster a built environment that supports a reduction in car dependency and energy use, establish policies and processes that support fast tracking of green development projects, adopt zoning practices that encourage land use patterns that increase density and reduce sprawl.)
(b) The Province and the UBCM will support local governments in pursuing these goals, including developing options and actions for local governments to be carbon neutral in respect of their operations by 2012.

(6) The Parties agree that this commitment to working together towards reducing GHG emissions will be implemented through establishing a Joint Provincial-UBCM Green Communities Committee and Green Communities Working Groups that support that Committee, with the following purposes:
(a) To develop a range of actions that can affect climate change, including initiatives such as: assessment, taxation, zoning or other regulatory reforms or incentives to encourage land use patterns that promote increased density, smaller lot sizes, encourage mixed uses and reduced GHG emissions; development of GHG reduction targets and strategies, alternative transportation opportunities, policies and processes that support fast-tracking of green development projects, community gardens and urban forestry; and integrated transportation and land use planning;
(b) to build local government capacity to plan and implement climate change initiatives;

(c) to support local government in taking actions on becoming carbon neutral in respect of their operations by 2012, including developing a common approach to determine carbon neutrality for the purposes of this Charter, identifying carbon neutral strategies and actions appropriate for the range of communities in British Columbia and becoming reporting entities under the Climate Registry; and,
(d) to share information and explore additional opportunities to support climate change activities, through enhanced collaboration amongst the Parties, and through encouraging and promoting climate change initiatives of individuals and businesses within communities.

(7) Once a common approach to carbon neutrality is developed under section (6)(c), Signatory Local Governments will implement their commitment in 5 (a) (i).

(8) To recognize and support the GHG emission reduction initiatives and the climate change goals outlined in this Charter, Signatory Local Governments are invited by the other Parties to include a statement of their initiatives and commitments as an appendix to this Charter.

(9) This Charter is not intended to be legally binding or impose legal obligations on any Party and will have no legal effect.

SIGNED on behalf of the **PROVINCE OF BRITISH COLUMBIA** by:

The Honourable Barry Penner
Ministry of Environment

Date

The Honourable Kevin Krueger
Ministry of Community Development

Date

SIGNED on behalf of the **UNION OF BRITISH COLUMBIA MUNICIPALITIES** by:

Chair Robert Hobson and
President of the Union of British

Date

Columbia Municipalities

SIGNED on behalf of the **SIGNATORY LOCAL GOVERNMENT:**

_____
(NAME OF LOCAL GOVERNMENT)

by:

Mayor/Chair Date

Appendix
GHG reduction initiatives or commitments of Signatory Local Government

Note: Local Governments that choose to become Signatories may also choose to provide a statement of their individual commitments in a customized addendum to the main body of the Charter. Below is a sample version of the proposed addendum

SAMPLE

Addendum to
The British Columbia Climate Change Action Charter

For

[Name of Local Government]

is committed to

1. Implementing existing plans

Local Governments could list here plans they have developed and are in the process of implementing; for example:

- Community energy plan
- Greenhouse gas emissions inventory
- Official Community Plan – Smart Growth
- Community Action on Energy Efficiency Initiative (CAEE)
- Partners for Climate Protection, Federation of Canadian Municipalities
- District Energy System
- Eco-Industrial Project
- Transit Oriented Development Plan
- Landfill Gas Utilization

2. Continue to pursue activities

Local Governments could list here recent projects they have implemented; for example:

- Bio-diesel fleet vehicle conversion
- E3 Fleet Program
- Greenhouse Gas Reduction Strategy
- Carbon Neutral Municipal Operations
- Organics Recovery
- Recycling and waste management plan
- Greenhouse gas local action plan
- Energy Efficient Municipal Operations
- Employee car-pooling

- Air quality planning\

3. Preparing new plans, bylaws, policies, etc.

Local Governments could list here plans, bylaws, policies they are committed to develop; for example:

- Plan for being carbon neutral in respect of their operations by 2012
- Anti-idling bylaw
- Green Buildings BC for Local Governments
- Smart Growth Development Checklist
- Green Building Program – Built Green and LEED standards
- Micro-generation projects (hydro, wind power, etc)
- Sustainable Community Servicing Plan
- Green Roof Policy
- Greywater recycling policy and standards
- Pedestrian and transit friendly community design
- Local Purchasing Policy
- Streamlined Green Building Application Process

APPENDIX B: Esquimalt Fleet Listing

Unit #	Year	Description	Department	E3 Category	Fuel Type(s)
EQUIPMENT					
160	1998	Aerway 6' Aerator	Parks & Recreation	E1	NF
162	1999	Honda EA7 Generator	Emergency Preparedness	E1	G
163	1999	Honda EA7 Generator	Emergency Preparedness	E1	G
187	2004	Caroni 93" Rotary Mower	Parks & Recreation	E1	NF
109	1989	Fox Salt Spreader	Public Works	E2	NF
110	1989	Roots Plow Blade	Public Works	E2	NF
153	1985	Hyster E40XL Forklift	Public Works	E2	Elec.
171	2001	Toro Groundmaster Mower	Parks & Recreation	E2	D
175	2002	Toro Workman 2110	Parks & Recreation	E2	G
181	2004	Tycrop Top-Dresser	Parks & Recreation	E2	NF
188	2004	Kubota Tractor,Loader,Mower	Parks & Recreation	E2	D
193	2008	Vermeer SC252 Stump Grinder	Parks & Recreation	E2	G
202	2004	Craftco Cracksealer	Public Works	E2	D
205	2009	Bobcat Skidsteer Loader	Public Works	E2	D
206	2008	Ingersol Compressor	Public Works	E2	D
121	1991	Cat Asphalt Roller	Public Works	E3	D
126	1991	Zamboni Ice Resurfacer	Parks & Recreation	E3	P
189	2004	Zamboni Ice Resurfacer	Parks & Recreation	E3	P
192	2005	Bandit Model95 Chipper	Parks & Recreation	E3	D
199	2006	Kubota B7800 Tractor	Parks & Recreation	E3	D
201	2007	Kato Light Generator	Public Works	E3	D
207	2008	Case 580M Backhoe	Public Works	E3	D
208	2008	Case 580M Backhoe	Public Works	E3	D
		TOTAL EQUIPMENT	**23**	**Diesel**	**11**
				Gasoline	**4**
				Propane	**2**
				Electric	**1**
				No fuel	**5**
EQUIPMENT-VEHICLES					
F2	1997	Ford Ladder Truck	Fire Services	T3	D
F3	1988	MAC Pumper Truck	Fire Services	T2	D
F6	2007	Smeal Pumper Truck	Fire Services	T3	D
166	2001	Roots Plow Blade	Public Works	E2	NF
167	2001	Swenson Salt Spreader	Public Works	E2	NF
104	2005	Crane Truck	Public Works	T1	D
136	1994	Chev 3500 Aerial truck	Public Works	T1	G
164	2001	GMC HD3500 Dump Truck	Parks & Recreation	T1	G
204	2008	Ford F450 Chipper Box	Parks & Recreation	T1	G
142	1996	IHC Dump Truck	Public Works	T2	D
165	2001	IHC Dump Truck	Public Works	T2	D

Unit #	Year	Description	Department	E3 Category	Fuel Type(s)
182	1992	Mack/Thermolay Hotbox	Public Works	T2	D & P
203	2008	Ford F550 Dump	Public Works	T2	G
210	2009	Nissan/Elgin Sweeper	Public Works	T2	D
146	1997	IHC Garbage Packer	Public Works	T3	D
169	2002	IHC Garbage Packer	Public Works	T3	D
		TOTAL EQUIPMENT-VEHICLES	**16**	**Diesel**	**10**
				Gasoline	**4**
				Propane	**1**
				Electric	**0**
				No fuel	**2**
TOOLS					
145	1996	Monarch Mixer	Public Works	E1	G
147	1996	Power-Ease Pressure washer	Public Works	E1	G
150	1996	Ryan Sod Cutter	Parks & Recreation	E1	G
157	2007	Bomag BT6014 Tamper	Public Works	E1	G
159	2007	Exmark THP19KAE483 Mower	Parks & Recreation	E1	G
174	2002	Exmark Mower-48"	Parks & Recreation	E1	G
178	2003	Bomag BT50 Tamper	Public Works	E1	G
180	2004	Target T80/14 Saw	Public Works	E1	G
190	2004	Target Diamond Saw	Public Works	E1	G
194	2005	Graco Linelazer	Public Works	E1	G
198	2006	Bomag BPR 30/38Plate Tamper	Public Works	E1	G
		TOTAL TOOLS	**11**	**Diesel**	**0**
				Gasoline	**11**
				Propane	**0**
				Electric	**0**
				No fuel	**0**
VEHICLES					
F4	1996	Chev Tahoe SUV	Fire Services	S	G
F5	2001	Chev Pickup	Fire Services	P	G
139	1995	Chev Corsica	Administration	C	G
196	2006	Chev Cobalt	Development Services	C	G
133	1993	Chev 2500 Pickup	Parks & Recreation	P	G
155	1998	Ford F250 Pickup	Public Works	P	G
156	1998	Chev2500 Pickup	Parks & Recreation	P	G
170	2002	Chev HD2500 Pickup	Parks & Recreation	P	G
177	2003	Chev 2500 Pickup	Parks & Recreation	P	G
183	2004	Chev HD 2500 Club Cab Pickup	Public Works	P	G
184	2004	Chev HD 2500 Pickup	Public Works	P	G
185	2004	Chev HD 2500 Pickup	Public Works	P	G
186	2004	Chev HD 2500 Pickup	Public Works	P	G
195	2006	Dodge 2500 Crew Cab	Parks & Recreation	P	G
200	2006	Ford Ranger Pickup	Public Works	P	G
212	2009	Ford F250 4X4 Pickup	Public Works	P	G
125	1992	Dodge 1-Ton Flatdeck	Parks & Recreation	T1	G

Unit #	Year	Description	Department	E3 Category	Fuel Type(s)
191	2005	Chev 3500 Utility Truck	Public Works	T1	G
179	2004	Chev Astro Van	Public Works	V	G
211	2009	Ford E350 Van	Public Works	V	G
		TOTAL VEHICLES	**20**	**Diesel**	**0**
				Gasoline	**20**
				Propane	**0**
				Electric	**0**
				No fuel	**0**

NOTES:

Classification

Equipment: Used to perform a specific task and are not used for transportation.

Equipment-Vehicles: Used for transportation with the purpose of completing an intended task; vehicle make is complex as they include both a chassis and specialized equipment.

Tools: Hand-operated motorized devices.

Vehicles: Used in the transportation of equipment and personnel to job sites.

E3 Category

C:	Car
E1:	Equipment – Small
E2:	Equipment – Medium
E3:	Equipment – Large
P:	Pickup
T1:	Truck, 10,000-17,000 lbs. GVW
T2:	Truck, 17,001-35,000 lbs. GVW
T3:	Truck, 35,001-60,000 lbs. GVW
V:	Van

Fuel Types

D: Diesel
Elec: Electric
G: Gas
NF: No Fuel
P: Propane

APPENDIX C: Invitation and Phone Interview Questions (BC Local Governments)

Invitation to British Columbia Local Government Employee

I work for the Township of Esquimalt and am also a graduate student at the University of Victoria. I am contacting you in the hopes that you will participate in a research project I am undertaking for the Township of Esquimalt. The purpose of the project is to develop a 'green' fleet management strategy for the Municipality. The research will specifically look at ways to reduce the greenhouse gases that are emitted by municipal vehicles in the provision of municipal services. The research results will support the Township of Esquimalt's efforts to meet its commitment to be carbon neutral by 2012 under the BC Climate Action Charter.

I am undertaking this project for the Township as part of a capstone report that is required for completing my Masters of Public Administration degree at the University of Victoria. My academic supervisor with the school is Dr. Lynne Siemens, and she can be contacted at 250-721-8069 or siemensl@uvic.ca.

In addition to examining the Township of Esquimalt's current fleet management practices, the project will review the green fleet strategies that have been developed and implemented by other local governments in British Columbia. I will be conducting phone interviews with several local governments and your valuable insight would be an asset to my research. This interview will take approximately 30 to 45 minutes. I also welcome any written material that you would like to share with me.

The questions will be oriented around your municipality's 'green' fleet management practices and the success and challenges that have been presented in its development and implementation. There is no known risk to you by participating in this research. Information collected from your interview will be used to inform the development of a 'green' fleet strategy for the Township of Esquimalt. The name of your organization will be used in the final report and in any drafts or presentations, but your name will not be; however, due to the nature of your work the information you provide may make you identifiable to members within your organization.

Participation in the interview is voluntary and everyone who participates would have reviewed the enclosed *Letter of Information for Implied Consent*. If you are able to participate in this telephone interview please express your interest to me by phone or email. I will then be in contact with you to set a date and time for the phone interview. Please review the attached participation consent form, your consent and agreement to the terms and conditions of this research are implied by your active participation in the interview and research process, which may include follow-up discussion by phone or email.

If you had any questions concerning this research, you can contact Laurie Hurst, A/ Chief Administrative Officer for the Township of Esquimalt by email at lhurst@esquimalt.ca or by calling 250-414-7141. If you are not the most appropriate individual to speak with, could you please forward this information to someone who could assist me with this research?

Thank you in advance for your participation, please feel free to contact me should you have any further questions.

Sincerely,

Marlene Lagoa
Manager of Communications and Sustainability
Township of Esquimalt
1229 Esquimalt Rd. Esquimalt, BC V9A 3P1
Tel: 250-414-7122
Fax: 250-414-7111
Email: marlene.lagoa@esquimalt.ca

Questions:

Date/Time:
Local Government:
Participant Name/Title:

1. What is your municipality's green fleet strategy? [Policy, Procedure, Action Plan, etc.]

2. What are the components of your municipality's green fleet strategy?

3. What has proven to be the most effective components of your municipality's green fleet strategy in terms of results [emission reduction and cost-savings]?

4. What difficulties were presented in the implementation of your municipality's green fleet strategy?

5. Is there any other information on fleet 'greening' that you recommend I look into?

6. Is there any other information that has not already been discussed that you would like to share with me?

APPENDIX D: Invitation and Focus Group Questions (Esquimalt Employees)

Invitation to Township of Esquimalt Employee

I work for the Township of Esquimalt and am also a graduate student at the University of Victoria. I am contacting you in the hopes that you will participate in a research project I am undertaking for the Township of Esquimalt. The purpose of the project is to develop a 'green' fleet strategy for the Municipality. The research will specifically look at ways to reduce the greenhouse gases that are emitted by municipal vehicles in the provision of municipal services. The research results will support the Township of Esquimalt's efforts to meet its commitment to be carbon neutral by 2012 under the BC Climate Action Charter.

I am undertaking this project for the Township as part of a capstone report that is required for completing my Masters in Public Administration degree at the University of Victoria. My academic supervisor with the school is Dr. Lynne Siemens, and she can be contacted at 250-721-8069 or siemensl@uvic.ca.

In addition to examining the Township of Esquimalt's current fleet management practices, the project will review the green fleet strategies that have been developed and implemented by other local governments in British Columbia. I will be conducting a focus group with some of Esquimalt's employees and your valuable insight on this matter would be an asset to my research and the development of a strategy. This focus group will take approximately 1.5 hours. I also welcome any written material that you would like to share with me.

The focus group is scheduled for Wednesday, May 27, 2009 from 2:30 – 4:00 pm in Council Chambers, Municipal Hall. A meeting request will be sent to your inbox. An agenda for this meeting will be distributed next week.

The questions will be oriented around Esquimalt's current fleet management practices and how green practices, such as purchasing and fuel-efficiency measures, can be implemented. There is no known risk to you by participating in this research. Information collected by Esquimalt employees during the focus group will be used to inform the development of a 'green' fleet strategy for the Township. A focus group format means that the feedback you provide is openly shared and identifies you to other focus group participants. Your name will not be used in the final report but due to the nature of your work the information you provide may make you identifiable to other members in your organization.

Participation in the focus group is voluntary and everyone who participates will have signed and returned the attached consent form to participate. The signed consent form can be returned to me by inter-office mail to the Municipal Hall, attention Marlene Lagoa, or by fax to 250-414-7111. Following the focus group, I may further the research with a follow-up discussion with you by telephone or email. Your consent will be implied if you actively participate by responding to my questions at that time.

I have attached the following documents:

- Consent Form (please print and sign)

- Project Proposal (for background information)

If you had any questions concerning this research, you can contact Laurie Hurst, A/Chief Administrative Officer by email at lhurst@esquimalt.ca or by calling 250-414-7141.

Thank you in advance for your participation, please feel free to contact me should you have any further questions.

Sincerely,

Marlene Lagoa
Manager of Communications and Sustainability
Township of Esquimalt
1229 Esquimalt Rd. Esquimalt, BC V9A 3P1
Tel: 250-414-7122
Fax: 250-414-7111
Email: marlene.lagoa@esquimalt.ca

Questions:

Date/Time:
Local Government: Township of Esquimalt
Participant Name(s)/Title(s):

1. How is the fleet currently managed (purchasing, monitoring, maintenance and disposal)?

2. What opportunities are there for greening Esquimalt's fleet?

3. What are the challenges towards greening Esquimalt's fleet?

4. What are the next steps from here? What is needed to get buy-in for this initiative

APPENDIX E: List of Focus Group Participants

Position	Department
Chief Administrative Officer/Director of Finance	Corporate Services/Financial Services
Director of Engineering and Public Works	Engineering and Public Works
Manager of Public Works	Public Works
Fleet Supervisor	Public Works
Buyer – Storekeeper	Public Works
Manager of Parks Services	Parks Services
Fire Chief	Fire Rescue
Deputy Fire Chief & Training Officer	Fire Rescue

List of staff interviewed who did not attend the Focus Group

Position	Department
Recreation Maintenance Supervisor	Recreation Services

APPENDIX F: Agenda for Focus Group and Summary of Green Fleet Initiatives

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AGENDA

DATE: Wednesday, May 27, 2009 from 2:30 pm – 4:00 pm

LOCATION: Council Chambers, Municipal Hall

FROM: Marlene Lagoa, Manager of Communications and Sustainability

SUBJECT: DEVELOPING A GREEN FLEET ACTION PLAN

1. INTRODUCTION:
   - Background of project – school & work related

2. PRESENTATION:
   - Purpose of the Project – Sustainability Initiative
   - Council Strategic Priority
   - Legislation: BC Climate Action Charter and becoming Carbon Neutral by 2012
   - Purchasing of new vehicles – ensure fuel efficiency is considered
   - Outcome of new initiative: Reduce Greenhouse Gas (GHG) emissions and related pollutants and reduce cost of operating the municipal fleet

3. GREEN FLEET INITIATIVES:
   - Refer to hand-out that lists green fleet initiatives being adopted by local governments
   - This list can be a platform for the proceeding group discussion

4. GROUP DISCUSSION:

   1. How is the municipal fleet currently managed? [purchasing, scheduling, monitoring, maintenance, and disposal]

   2. What opportunities are there for greening Esquimalt's fleet?

   3. What are the challenges towards greening Esquimalt's fleet?

   4. What are the next steps from here? What is needed to get buy-in for this initiative?

5. FLEET PURCHASING:
   - As a result of research and feedback, will be drafting a purchasing framework
   - NOx emission standards changing for diesel trucks in 2010?

DATE: Wednesday, May 27, 2009, 2:30 – 4:00 pm, Council Chambers

FROM: Marlene Lagoa, Manager of Communications and Sustainability

SUBJECT: Green Fleet Meeting – Summary of Green Fleet Initiatives

The below table is a listing of green fleet practices being examined and/or implemented by various local governments. This listing is for reference and information sharing only and reflects the research I have completed to date. I have kept the information brief but can elaborate further and answer any questions during the meeting. You are invited to share any comments you may have during the meeting. I have included a "Notes" column to assist you with organizing your ideas.

Initiatives	Examples	Notes
Purchasing Decision Framework • Process and requirements for the purchasing of vehicles, equipment and components of new fleet assets or in the replacement of old ones. • Elements would include: - Fleet & vehicle Right-Sizing (see below) - Fuel-efficiency - Life cycle costing (see below)	Dawson Creek, BC Courtenay, BC San Jose, California, USA	
Fleet & vehicle Right-Sizing • Fleet right-sizing refers to the number of vehicles in a fleet - How often are vehicles being used? - What are the vehicles being used for? - How can the use of vehicles be optimized? • Vehicle right-sizing refers to having an appropriate-sized vehicle-to-task - What task(s) does the vehicle need to complete? - What is the most fuel-efficient, environmentally and financially sound vehicle?	Langley, BC Victoria, BC Vancouver, BC Toronto, ON	
Alternative Transportation • Alternatives to a municipal vehicle - Tele or Video Conferencing - Walking - Cycling - Public Transit - Taxis - Car Sharing	Province of BC Toronto, ON	
Alternative Fuels & Vehicles	Various local	

Initiatives	Examples	Notes
• Fuels: alternatives to conventional petroleum gasoline or diesel - Biodiesel - Ethanol - Hydrogen - Natural Gas • Vehicles: alternatives to conventional combustion engine - Electric - Hybrid (Plug-in Hybrid)	governments have implemented various elements	
Aftermarket Technologies - advanced tires - aerodynamic devices - auxiliary power units - engine control modules - engine coolant heaters - tire pressure systems	Courtenay & Vancouver, BC are using auxiliary cab heaters to heat the inside of a work vehicle without running the engine	
Life Cycle Costing • Life cycle costing calculates the cost of operating and maintaining an asset over its entire operating life. Purchasing decisions are conventionally made only on the initial cost and the simple payback of an asset. • Elements can include: - initial acquisition cost - estimated fuel usage & cost - estimated GHG emissions - maintenance & replacement component costs - residual value & disposal cost • When can life cycle costing be used? - Purchasing a new vehicle - Deciding when to replace a vehicle	Courtenay, BC Dawson Creek, BC Metro Vancouver, BC Langley, BC replaced older vehicles before the end of their operating life and saved 5% in fuel and repair costs	
Monitoring & Benchmarking • Monitoring of such items as fuel consumption, mileage, maintenance, idling… • Monitor based on vehicle, employee, department • Benchmark using an internal baseline over time or to comparable fleets • E3 Fleet Program provides fleet review and rating	Vancouver, BC Williams Lake, BC Hamilton, ON	

Initiatives	Examples	Notes
Trip & Route Planning • Trip Planning: maximizing the efficiency of every vehicle trip • Route planning: taking the most direct or efficient routes	Langley, BC Hamilton, BC	
Maintenance • The regular scheduling of vehicle inspection and maintenance • Having a preventative maintenance program optimizes fuel-efficiency, reduces GHG emissions and vehicle down time	Toronto, ON	
Driver education • Communicate corporate fuel-efficiency policy • Educate on fuel-efficiency driving practices in-vehicle or during staff training/meetings • Component of an idling reduction strategy (see below)	Courtenay, BC Langley, BC Toronto, ON	
Idling Reduction • Idling reduction decreases fuel costs and GHG emissions • Implementation includes policies, driver education and technologies that automatically shut-off the engine of idling vehicles	Various local governments and various approaches	
Shop • Establishing a 'dry' shop	Victoria, BC Toronto, ON	

APPENDIX G: Alternative Fuels Comparaison

Comparison	Biodiesel	Ethanol	Hydrogen	Natural Gas	Propane
Description	A clean burning, non-toxic, biodegradable alternative fuel produced from renewable sources such as vegetable oils, waste cooking oil, animal fats or tall oil (a by-product from pulp and paper processing) (Green Fleets BC, n.d.c; Natural Resources Canada, 2008c).	A renewable fuel made from corn, sugar, grain or straw. In Canada, ethanol is mainly produced from corn and wheat (Green Fleets BC, n.d.d).	Electricity that is generated by hydrogen or hydrogen-containing fuels which electrochemically combine hydrogen with oxygen from the air. The hydrogen can be sourced from a number of compounds, including natural gas, water, sugar and various petroleum products (Natural Resources Canada, 2009b).	Natural gas is an odourless, colourless, clean-burning fuel gas that is made of 90% methane (Green Fleets BC, n.d.f; Natural Resources Canada, 2008d). For transportation use, natural gas is compressed and stored in cylinders and is referred to as compressed natural gas or CNG (Green Fleets BC, n.d.f).	Propane, also known as liquefied petroleum gas (LPG), is a clean-burning, gaseous fuel that is pressurized and stored as a liquid when used in vehicles (Green Fleets BC, n.d.g; Natural Resources Canada, 2008e) Propane is a co-product of natural gas production (Natural Resources Canada, 2008e).
GHG Emissions	Generates less harmful emissions than diesel (Green Fleets BC, n.d.c; Natural Resources Canada, 2008c).	Natural Resources Canada (2009a) claims that an ethanol-gasoline blend of fuel has environmental advantages when compared with gasoline. However,	From a life-cycle perspective, and depending on the source, hydrogen produces zero to very low emissions (Natural Resources Canada, 2009b). Hydrogen produces	Natural Gas Vehicles create 20% to 25% fewer GHG emission with its smog related pollutants being substantially lower than diesel engine vehicles (Green Fleets BC, n.d.f).	Propane burns more cleanly than gasoline and has lower GHG emissions by up to 20% on a life cycle basis. On average it can produce up to 90% fewer carbon monoxide emissions

Comparison	Biodiesel	Ethanol	Hydrogen	Natural Gas	Propane
		what extent of environmental advantage is not made clear. Ethanol is considered to reduce GHG emissions because the grain or other biomass used to make the ethanol absorbs carbon dioxide as it grows (Green Fleets BC, n.d.d). As the GHG reduction is in the pre-consumption phase of ethanol's life-cycle, its carbon sequestering activity can not be factored into direct emission reductions to a local government's measuring and reporting of its GHG emissions in the operations of its municipal fleet.	zero emissions with water being the only by-product that is produced (Green Fleets BC, n.d.e).		and 50% fewer toxics than gasoline (Green Fleets BC, n.d.g).
Application	Can be blended at any level of concentration, from 5 to 95%, with	Can be blended with gasoline with the most popular concentration being	Hydrogen can be used as an alternative fuel in conventional vehicles with	Light to medium duty Natural Gas Vehicles (NGV) can operate in two ways, solely on	Vehicles can run solely on propane or on either propane or gasoline.

Comparison	Biodiesel	Ethanol	Hydrogen	Natural Gas	Propane
	conventional diesel and used in almost any diesel engine with no modifications to the engine. It is often referred to as a B-blend with a B5 blend consisting of 5% biodiesel and % 95% conventional diesel. In very cold weather a high blended fuel can not be used as it can gel, research and testing are being done to improve its cold weather performance (Natural Resources Canada, 2008c). However, due to the typical winter weather on the lower mainland and Vancouver Island, this is not a significant concern (Green Fleets BC, n.d.c).	E-10, 10% ethanol and 90% gasoline. The reason for this is that most conventional cars built after 1980 can run with an E-10 blend without any modifications of the engine or fuel system. A higher concentration blend can be used in Flexible Fuel Vehicles (FFV's) which are built to run on an ethanol blend that contains up to 85% ethanol(Green Fleets BC, n.d.d).	combustion engines or in the innovative and ongoing development of fuel cell vehicles. A conventional vehicle's engine can be converted to run on gaseous hydrogen (Green Fleets BC, n.d.e).	natural gas, or on natural gas or gasoline and are known as 'bi-fuel' vehicles. While medium to heavy duty diesel NGV operate solely on natural gas (Green Fleets BC, n.d.f). NGVs can be purchased straight from the manufacturer or conventional gasoline engines in vans, trucks or sport utility vehicles, can be converted to natural gas (Natural Resources Canada, 2009c).	Conventional gasoline vehicles can be easily converted to use propane (Green Fleets BC, n.d.g).
Availability	Biodiesel can be	E-10 is commercially	The hydrogen vehicle	Canada is one of the	Propane has had the

Comparison	Biodiesel	Ethanol	Hydrogen	Natural Gas	Propane
	delivered or purchased as a blended product and stored in any conventional tank. All diesel engine manufacturers allow a blend of up to 5% without voiding their warranty program and some manufactures are allowing the use of even higher blends (Green Fleets BC, n.d.c).	available at service stations across Canada and at Husky stations in British Columbia. An 85% ethanol-blended gasoline (E-85) is not yet commercially available (Green Fleets BC, n.d.d).	market is still years away from commercialization (Green Fleets BC, n.d.e). There is a lot of hope for fuel cell technology due to the mass availability of fuels that can be converted to hydrogen and the significant environmental, energy efficiency and economic benefit it may offer (Natural Resources Canada, 2009b).	largest producers of natural gas in the world and is typically used in homes for heating (Natural Resources Canada, 2008d). "Currently, natural gas at the CNG retail network in BC is 30-40% cheaper than gasoline" (Green Fleets BC, n.d.f). Due to its cost savings compared to gasoline, natural gas is used as a transportation fuel mainly by high-use vehicles, such as taxis, buses and fleet cars (Natural Resources Canada, 2008d).	largest market share of any alternative fuel in British Columbia due to being more economical compared to gasoline. Also, there are a number of retail refuelling stations across Canada and there is little difference in its performance compared to gasoline (Green Fleets BC, n.d.g).
Challenges	May have negative environmental consequences if its production is diverting the use of food crops for fuel production. Local governments will	The E-10 blend has little to no impact on a vehicle's fuel economy or horsepower, instead it increases fuel consumption by an average of 2% when	Hydrogen and fuel cell technology has not yet been commercialized due to economic and environmental challenges which include:	Few auto manufacturers are making new light duty gasoline equivalent Natural Gas Vehicles for the North American market. This market	Propane fuelled vehicles are rarely being manufactured new; therefore, existing gasoline vehicles will need to be converted. These conversion costs can

Comparison	Biodiesel	Ethanol	Hydrogen	Natural Gas	Propane
	need to work with suppliers to ensure the availability of biodiesel fuel to be supplied, and particularly that it is from non-food grade crops and waste (BC Climate Action Toolkit, 2009l).	compared to pure gasoline (Green Fleets BC, n.d.d). Research is being done on producing ethanol from non-food sources is close to commercialization (Natural Resources Canada, 2009a).	- creation of hydrogen fuelling infrastructure - the high capital costs of the technology - issues regarding hydrogen storage - sourcing environmentally friendly hydrogen supply (Green Fleets BC, n.d.e; Natural Resources Canada, 2009b).	is currently being serviced through conversions of existing gasoline vehicles. These conversion costs can often be offset by the resulting cost savings during the operating life of the vehicles. Fleets would need to have fuelling infrastructure in place to fuel their vehicles on site (Green Fleets BC, n.d.f).	often be offset by the resulting cost savings during the operating life of the vehicles (Green Fleets BC, n.d.g)
Popularity	Biodiesel has been widely accepted for use by many fleets (Green Fleets BC, n.d.c). It is one of the most popular alternative fuels being used by other local governments who have	By 2010 all gasoline sold in Canada will be mandated to be an E5 blend. This is a result of the Federal Government introducing a Renewable Fuel Standard for Canada and the British	British Columbia is leading demonstration fuel cell technology projects. There are five Ford Focus fuel cell vehicles in five prominent Vancouver fleets. The Hydrogen Highway[tm10] is a	Natural Resources Canada (2009c) reports that there are about 20,000 Natural Gas Vehicles in Canada. A prime market for natural gas has been high fuel usage fleets such as TransLink in Metro	Due to the high cost of vehicle conversion, it is mostly used in high usage vehicles such as taxis and delivery vans. The BC Ministry of Transportation operates about 250 propane fuelled

[10] Hydrogen Highway is a showcase for hydrogen and fuel cell technology development. It is a network of fuel cell technology projects in British Columbia and a metaphor for the route of hydrogen in the future. The purpose of the demonstration project is to advance the commercialization of hydrogen and fuel cell technologies (Hydrogen Highway, n.d.).

Comparison	Biodiesel	Ethanol	Hydrogen	Natural Gas	Propane
	implemented a green fleet strategy.	Columbia Government announced they will be mandating the same (Green Fleets BC, n.d.d).	major initiative of various levels of Government and industry to develop hydrogen fuelling infrastructure in British Columbia (Green Fleets BC, n.d.e).	Vancouver (Green Fleets BC, n.d.f).	vehicles in its fleet (Green Fleets BC, n.d.g).

APPENDIX H: Bylaw No. 2669 (Purchasing and Disposal)

CORPORATION OF THE TOWNSHIP OF ESQUIMALT

BYLAW NO. 2669

A Bylaw to delegate authority for Purchasing and Disposal

WHEREAS pursuant to the *Community Charter* the Municipality has the capacity, rights, powers and privileges of a natural person of full capacity including the power to enter into agreements;

AND WHEREAS the Council may, by bylaw, delegate its powers, duties and functions to its Officers and Employees;

AND WHEREAS it is desirable to delegate to certain Officers and Employees of the Municipality the authority to enter into agreements and contracts on behalf of the Municipality and to execute such agreements and contracts so as to bind the Municipality thereto;

NOW THEREFORE, the Council of the Township of Esquimalt in open meeting assembled enacts as follows:

1. This bylaw may be cited for all purposes as *the "COUNCIL DELEGATION PURCHASING AND DISPOSAL BYLAW, 2007, NO. 2669"*.

2. Council hereby delegates to the Mayor and Municipal Department Heads all of the powers, duties and functions of Council under section 154(1) of the *Community Charter* to make agreements respecting the Township's activities, works or services, SUBJECT TO the limitations on the delegated authority as set out in the Township's Purchasing and Disposal Policy attached as Schedule "A" to this bylaw.

READ a first time by the Municipal Council on the 27th day of August, 2007.

READ a second time by the municipal Council on the 27th day of August, 2007.

READ a third time by the municipal council on the 27th day of August, 2007.

ADOPTED by the Municipal Council on the 04th day of September, 2007.

CHRIS CLEMENT MAYOR	DONNA DUPAS MUNICIPAL CLERK

SCHEDULE "A"

PURCHASING AND DISPOSAL POLICY

1. OBJECTIVES

The objective of this policy is to establish general practices to be followed to purchase goods and services and dispose of surplus goods and materials. These practices will enable cost-effective, timely and efficient purchasing while maintaining equal opportunity for qualified suppliers.

Purchasing goods and services is an activity that is of considerable interest to elected officials, the business community and the public. These groups must be assured that the Township's purchasing decisions are made for the benefit of the Township and are without favour or bias.

Suppliers of goods and services must be able to compete for municipal business and must be aware that the municipality does not accept responsibility for paying for any service or work until it has been properly authorized.

Employees responsible for purchasing must strive for the best value. Lowest price may not be the best value. Additional factors such as quality, residual value, training, maintenance, delivery and shipping terms, warranties, payment terms, performance and environmental impact must be considered.

This policy applies to all departments and commissions of the Township that use corporate funds for the acquisition of goods or services.

2. PRINCIPLES

Purchasing activities are to be carried out in a manner that:

- Enhances competitive bidding, so that required goods or services are obtained in a timely manner, in the desired quantity, of the desired quality, and in the most cost-effective manner possible.
- Gives qualified suppliers' equal opportunity.
- Encourages the development of local sources of supply where there is no increase in cost to the Township.
- Insures that decisions are based on demonstrable technical and operational considerations.
- Insures that decisions are based on the total cost of ownership.

In order to increase the Township's awareness and use of environmentally sound products and services, municipal staff is encouraged to review requirements to ensure that, wherever possible and economical, specifications provide for use of goods and services that are more environmentally acceptable.

3. AUTHORITY, RESPONSIBILITY & LIMITS

The Chief Administrative Officer has overall responsibility to ensure compliance with this policy.

Department Heads are responsible for ensuring that this policy is followed within their areas of control. In this regard, Department Heads shall ensure that:

- Expenditures comply with the Township's Financial Plan.
- Sufficient analysis and discussion has taken place.
- The risk of fraud, embezzlement and error is minimized.

Department Heads may delegate purchasing authority to employees in their department, subject to the limits set out below. The Finance Department must be advised in writing of all delegations of purchasing authority.

Purchasing approval limits are:

Council	over $250,000
Chief Administrative Officer	up to $250,000
Department Head	up to $100,000
Manager	up to $25,000
Delegated Staff	up to $5,000

Notwithstanding these approval limits, the Chief Administrative Officer may direct staff to submit any contract or agreement to Council for approval.

All purchases of goods or services, reimbursements of expenses and refunds shall involve at least two individuals in the ordering, receiving and/or approval process. Evidence of this shall be in the form of two different signatures or initials on the transaction documents as a whole.

4. PURCHASING METHODS & LIMITS

(1) Direct Acquisition

Goods or services up to a cost of $5,000 may be purchased directly from a supplier. Telephone or written quotations are recommended but not required.

(2) Telephone Quotations

Telephone quotations from at least three suppliers are required for the purchase of goods or services with a cost from $5,001 to $25,000. Written quotations are recommended but not required.

(3) Written Quotations

Written quotations from at least three suppliers are required for the purchase of goods or services with a cost from $25,001 to $100,000. Tenders or requests for proposals may also be used.

(4) Tenders or Requests for Proposals

Formal tenders or requests for proposals (RFP) must be used for purchases of goods or services costing in excess of $100,000.

In compliance with the Agreement on Internal Trade all procurements of goods or services over $100,000 and of construction projects over $250,000 shall be advertised nationally using the Province of British Columbia's BC Bid service (http://www.bcbid.gov.bc.ca/open.dll/welcome).

(5) Quotations, Tenders and Requests for Proposals

A quotation is a formal request for bids (verbal or in writing) to supply goods or services. Quotations are not opened in public. Total bid prices shall be made available for public review on request.

A tender is a formal request for sealed bids to supply goods or services in response to an advertised invitation. Tenders are opened in public at a set time and place.

A request for proposals is a formal request for sealed proposals to supply goods or services that may or may not be fully defined or specified. Proposals are opened in public at a set time and place.

5. PURCHASE OPTIONS

(1) Petty Cash

Petty cash may be used for purchases under $25 where the Township does not have an account with the supplier or where the purchase is less than the supplier's minimum amount for sales on account.

(2) Purchasing Card

A purchasing card may be used for purchases under $1,000 per transaction where the Township does not have an account with the supplier or where the purchase is less than the supplier's minimum amount for sales on account. This limitation does not apply to expenses associated with an approved convention or seminar, e.g. registration fees, airfares, accommodation, etc.

(3) Purchase Order

Purchase orders must be issued for all purchases of goods or services, other than for purchases by petty cash, purchasing card, or where the invoice is received at the same time as the order is placed and the goods or services are received.

(4) Open Purchase Order

Where greater efficiency will result via purchasing goods or services from one supplier for all or part of a calendar year an "Open Purchase Order" may be issued. Quotation and tendering limits apply to the estimated overall value of the open purchase order. Open purchase orders must be reissued for each calendar year.

6. SPECIFICATIONS & EVALUATION CRITERIA

User departments are responsible for preparing specifications that can be easily interpreted by qualified suppliers. In addition, unless it can be demonstrated that there are valid technical, operational or financial reasons for not doing so, specifications must be prepared that can be fulfilled by more than one product or manufacturer.

Where price is not the only consideration, departments must describe in advance the criteria and method of evaluation that will be used to determine the relative merits of quotations, tenders or proposals.

7. LOWEST COST PURCHASE

Where a recommended purchase is not the least cost, a report justifying the selection shall be submitted for the approval of the appropriate Department Head or the Chief Administrative Officer, depending on the level of purchasing authority described earlier in this policy.

8. SOLE SOURCE PURCHASES

Sole source purchases generally occur when there is only one available supplier of a product or service that meets the Township's needs or during an emergency. The terms and conditions for the purchase are completed through negotiation.

Exemptions to the competitive quotation/bidding process may be approved by the Chief Administrative Officer in the following circumstances:

1. The compatibility of an item with existing equipment, facilities or services is a paramount consideration.
2. The good or service is required to cope with an emergency.
3. An item is purchased for testing and trial use.
4. An item is currently rented with a rental contract that has a purchase option and the purchase option is beneficial to the Township.
5. An item is offered for sale by tender, auction or negotiation and purchasing the item is clearly in the best interest of the Township.

9. PREFERENCE TO LOCAL SUPPLIERS

The Township supports local businesses by encouraging local purchasing where all things are equal.

After considering the total cost of ownership, geographical priorities will be considered in the following order:

- Within the Township of Esquimalt
- Within the Capital Regional District
- Within the Province of British Columbia
- Within Canada
- Outside Canada

10. CAPITAL REGION JOINT PURCHASING GROUP

The Township will participate in the joint procurement of commonly used goods and services where it is in the Township's best interest to do so.

11. EMERGENCY PURCHASES

Emergency purchases may be required to restore or maintain acceptable levels of community services or to prevent further damage, serious delays or injury.

In an emergency the preparation, documentation and analysis set out in the usual purchasing procedures may not be possible. Oral authorization to bypass normal purchasing procedures, including sole-source purchasing, is acceptable.

All normal purchasing documentation and reporting, complete with signed authorizations, as required, is to be completed as soon as possible after the emergency.

12. PURCHASE ORDERS AT YEAR-END

In order to facilitate year-end cut-off procedures, purchase orders issued late in each fiscal year shall be examined to ensure that the purchase relates to the current year. This does not apply to regular receipts on open purchase orders or to the reissue of open purchase orders for the following calendar year.

Purchase orders for goods or services that have not been received in full during the fiscal year shall be a commitment in the following fiscal year to the extent not completed.

13. PETTY CASH FUNDS

All petty cash funds will operate on an imprest basis, i.e. reimbursement will be made for authorized disbursements to restore the total fund to its original amount. All requests to establish petty cash funds, or to change the imprest amount, shall be made by the Department Head to the Director of Financial Services.

All petty cash disbursements must be supported by a fully completed Petty Cash Voucher with an attached store receipt. Petty cash funds may not be used for personal loans, IOUs, payment of wages (including contracted services) or payment of business travel expenses.

All petty cash reimbursements will be by cheque payable to the fund custodian. Petty cash reimbursement cheques may be cashed by Township cashiers.

Petty cash funds must be kept segregated from other funds in a cash box acquired for this purpose and stored in a secure location. Petty cash funds are subject to audit by Finance staff and the Township's external auditors.

14. PURCHASING CARDS

Purchasing cards reduce operating costs associated with low value, non-repetitive purchases of goods or services. If this method of purchasing is available, each Department Head shall submit requests for purchasing cards to the Director of Financial Services.

Credit limits and designated areas of acceptable use for each card will be related to departmental needs and determined individually after consultation between the Department Head and the Director of Financial Services.

The holder of a purchasing card is responsible for documenting all charges on the card as directed by the Finance Department. In the event of loss or destruction of a purchasing card the cardholder must notify the Finance Department immediately. Upon termination of employment a purchasing card must be returned to the Finance Department.

A purchasing card shall not be used by anyone other than the person whose name appears on the card. A purchasing card shall not be used for personal purposes. Cash advances are not permitted on a purchasing card.

15. CHEQUE REQUISITION FORM

The cheque requisition form is generally used in circumstances where there is no invoice. Examples of this situation include:

- Fee refunds to a member of the public
- Registration fees for a conference or seminar
- Statutory fees, e.g. Land Title Office

16. TRAVEL FORMS

The Monthly Business Travel Expense Report shall be used to claim all expenses for travel and allowances on municipal business other than for attendance at conferences and seminars. Allowable expenses include personal vehicle use, parking, business meals, bus fares, taxi fares, etc.

The Expense Account – Attendance at Convention, Seminar, Etc. form shall be used to claim all expenses for registration, travel, accommodation and meals associated with attendance at an approved convention or seminar that have not been paid directly or paid using a purchasing card.

17. DISPOSAL OF SURPLUS ASSETS

Surplus assets shall be disposed using the following priority:

1. As a trade-in for a new piece of equipment.

2. Offering it to other civic departments.
3. Advertising it for sale on the Township's web site.
4. Donating it, without competition, to any non-profit organization, subject to the approval of the Chief Administrative Officer.

Surplus equipment with a market value less than the costs of disposition may be disposed of by the least-cost method available, taking into account any environmental implications of the disposal.

The Finance Department shall be provided with a written description of all assets transferred between departments, or disposed of by donation, trade-in, sale or discard.

18. APPEALS

The appeal process allows those who feel the purchasing process was flawed to discuss the matter and seek redress.

An aggrieved proponent must advise the Chief Administrative Officer in writing within five business days of the event causing the issue, stating the nature and basis of their appeal.

The Chief Administrative Officer, within five days, shall convene a meeting of the proponent and the appropriate municipal staff to attempt to resolve the proponent's concerns. Within five business days of this meeting, the Chief Administrative Officer will advise the proponent in writing of the administrative decision on their appeal.

If the proponent's concerns are not satisfied then, within a further five days, the proponent may request that the Municipal Council hear their appeal.

Council must hear the issue at the next regularly scheduled meeting. Both municipal staff and the proponent may make presentations on the matter. The Corporate Administrator shall provide the proponent with Council's decision, in writing, within five days. The decision of Council shall be considered final.

19. PROHIBITIONS

The following activities are prohibited:

1. The division of purchases or contracts to bypass the approval and purchasing limits in this policy.
2. Purchases by the Township from any member of Council, an employee or member of their immediate families or from any other source that would result in a conflict of interest.
3. Purchases by the Township of any goods or services for personal use by or on behalf of any member of Council, employee or member of their immediate families.
4. Acceptance of personal gifts or gratuities from any current or potential suppliers of goods or services.

In addition, new capital expenditures shall not be made prior to adoption of the current year's Financial Plan unless authorized in writing by the Chief Administrative Officer who may refer the item to Council for approval.

20. UNAUTHORIZED PURCHASES

Unauthorized purchases are the personal financial responsibility of the individual making the commitment and the Township reserves the right to recover all costs from the employee and consider appropriate disciplinary action.

21. FREEDOM OF INFORMATION

Freedom of Information ("FOI") and Protection of Privacy legislation applies to all purchasing records. Any such records may be the subject of an FOI request and may be released to a third party by the Township's FOI Co-ordinator.

APPENDIX I: Esquimalt Equipment & Vehicle Purchasing Summary Report

Township of ESQUIMALT

EQUIPMENT & VEHICLE PURCHASING
SUMMARY REPORT

DATE:

DESCRIPTION OF ITEMS BEING PURCHASED:

VEHICLE/EQUIPMENT/TOOLS TOOLS SUPPLIER	COST $	COMPONENTS SUPPLIER	COST $	TRADE IN VALUE	GST CREDIT	TOTAL COST
RECOMMENDATIONS:					PST	
					FINAL COST	

XXXXXXXXXXXXX
Manager

XXXXXXXXXXXXX
Director

XXXXXXXXXXXXX
CAO

APPENDIX J: Esquimalt Green Fleet Purchasing Policy (Draft)

The purpose of this policy is to ensure that all vehicle and equipment purchasing meets both environmentally responsible and economically viable requirements.

OBJECTIVES:

- to achieve the Township of Esquimalt's commitment under the British Columbia Climate Action Charter to become carbon neutral in its operations by 2012
- to demonstrate Esquimalt's commitment to environmental, economic and social stewardship;
- to reduce the operating costs of municipal vehicles and equipment including capital assets, fuel, maintenance, and insurance;
- to yield long-term savings to Esquimalt taxpayers through reduced life-cycle costs for municipal vehicles and equipment;
- to minimize the impact of the municipal fleet on climate change by reducing GHG emissions;
- to support other like-minded municipalities and agencies by encouraging the application of green fleet practices in both the private and public sector;
- to increase awareness of green fleet purchasing and operations;
- to implement a green municipal fleet program while continuing to deliver municipal services; and
- to model green leadership to the community.

IMPLEMENTATION:

1. **Replacement**

   Vehicles and equipment in the municipal fleet will be replaced only when:

   i. They reach the end of their operating life, or

   ii. When a life cycle cost analysis indicates that the economic and environmental cost of continuing to operate the vehicle or equipment is greater than its replacement.

2. **Purchasing**

   The purchase of all vehicles and equipment must comply with the criteria of being a "green" purchasing decision which includes:

   i. A new vehicle or equipment is only purchased when no other alternative exists;

   ii. The purchase is that of the right-sized vehicle or equipment which can complete its service delivery task; and

iii. The most fuel-efficient vehicle or equipment with the greatest potential for GHG emission reduction is purchased (based on technology, fuel types, and any additional equipment or features that reduces the need to burn fuel).

3. Green Specifications

"Green" specifications must be included in all fleet purchasing tenders. The green specifications are:

i. Fuel consumption (city driving);

ii. Alternative technology (hybrid, electric, hydrogen fuel cell, etc.);

iii. Use of alternative fuel types without voiding manufacturer's warranty;

iv. Emission level of GHGs and all other pollutants; and

v. Description of any other "green" features that result in greater fuel-efficiency and reduction in GHG emissions during the intended operation of the vehicle or equipment.

4. Life Cycle Costing

A life cycle cost analysis must be completed before the purchase of any new vehicle or equipment and must be conducted for a minimum of three options.

Life cycle costing will calculate the net present value of owning and operating a vehicle or equipment over its entire operating life using the following variables:

- Expected operating life (in years)
- Initial purchasing cost
- Fuel costs
- Maintenance costs
- Insurance costs
- GHG emissions and the cost of purchasing carbon offsets
- Residual value and / or disposal costl

Resulting from the life cycle cost analysis, the purchasing option with the lowest net present value, while also offering the greatest reduction in GHG emission, will be the one purchased.

5. Green Fleet Review Committee

The purchase of all vehicles and equipment must be reviewed and approved by a minimum of 3 members of the Green Fleet Review Committee.

The purpose of the Green Fleet Review Committee is to monitor, review and implement the Township of Esquimalt's Green Fleet Program and Green Fleet Purchasing Policy.

The Green Fleet Review Committee has the authority to make a recommendation to Council for the purchase of a "green" vehicle or equipment whose incremental cost is more than the cost of a comparable model but emits fewer GHG emissions.

The members of the Green Fleet Review Committee will include, but is not limited to, the Director of Engineering & Public Works, Manager of Public Works, Fleet Supervisor (Public Works), Buyer-Storekeeper (Public Works), Manager of Parks Services, Fire Chief, Deputy Fire Chief, Manager of Sustainability, Director of Financial Services, and the Chief Administrative Officer.

6. Green Fleet Purchasing Policy Worksheet

The attached Green Fleet Purchasing Policy Worksheet must be completed and submitted to the Green Fleet Review Committee before the purchase of any vehicle or equipment.

7. Exemptions

An exemption to the requirements of this policy may be granted by the Chief Administrative Officer, and on a case by case basis, under the following circumstances:

i. The purchase of a vehicle or equipment that meets the requirements of the Green Fleet Purchasing Policy would significantly disrupt operations or reduce service levels.

ii. That a life cycle cost analysis indicated that the incremental cost of purchasing a vehicle or equipment that meets the requirements of the Green Fleet Purchasing Policy cannot be recovered over the operating life of the vehicle or equipment through a reduction in fuel, maintenance, and other costs that could be incurred during the operating life of such vehicle or equipment.

In the case that an exemption is granted, the vehicle or equipment that is purchased shall meet the highest fuel efficiency and lowest GHG emission rating available for the type of vehicle or equipment specified, provided the cost of doing so is within a reasonable range to the cost of a comparable option with a higher GHG emission rating.

APPENDIX K: Esquimalt Green Fleet Purchasing Worksheet (Draft)

******This worksheet must be completed and submitted to the Green Fleet Review Committee before the purchase of any vehicle or equipment******

The following four tables are tools to guide decision-makers in implementing the Township of Esquimalt's Green Fleet Purchasing Policy. The arrangement of the tables and its criteria were developed based on the leading green fleet practices as it relates to the process of replacing and purchasing a new vehicle or equipment.

The decision making process of purchasing a new vehicle or equipment includes:

- Demonstrating the need for a vehicle or equipment to be replaced (Table 1: Replacement of Vehicle or Equipment);
- Reviewing whether an opportunity to replace the vehicle or equipment with an alternative other than purchasing a new vehicle or equipment exists, and if not, justifying why an alternative opportunity does not exist (Table 2: Alternative to Purchasing a Vehicle or Equipment);
- Examining the purchasing options based on its "green" merit (Table 3: Purchasing a "Green" Vehicle or Equipment);
- Evaluating the purchasing options based on the net present value of purchasing, operating, maintaining and disposing the vehicle or equipment over its entire operating life (Table 4: Life Cycle Cost Analysis); and
- Purchasing the most cost-effective "green" vehicle or equipment.

For clarification on the green fleet purchasing policy criteria or for assistance in completing this worksheet please refer to the Green Fleet Purchasing Policy; Green Fleet Program Action Plan; and or contact a member of the Green Fleet Review Committee.

BACKGROUND:

Department:

Description of the vehicle or equipment:

a) What is its function?

b) How frequently is it used (please provide any historical information that is available)?

Table 1: Replacement of Vehicle or Equipment

Decision-Making Criteria	Results		
	Yes	No	Notes
Has the vehicle or equipment reached the end of its operating life?			
Does a life cycle cost analysis indicate that the economic and environmental cost of continuing to operate the vehicle or equipment is greater than its replacement?			

If any answer to the decision making criteria of whether a municipal vehicle or equipment needs to be replaced was "Yes" then continue to Table 2 to review alternatives to purchasing a new vehicle or equipment.

Table 2: Alternatives to Purchasing a Vehicle or Equipment

Decision-Making Criteria	Results		
	Yes	No	Notes
Can the vehicle or equipment be replaced or shared with another vehicle or equipment in the municipal fleet?			
Is it cost-effective to replace the vehicle or equipment with an alternative to purchasing? (rent, car share, walk, bike, bus, taxi, teleconference, etc)			

If the answers to the decision making criteria of whether an alternative to purchasing a vehicle or equipment exists were all "No" then continue to Table 3 to evaluate the "green" criteria among the purchasing options.

Table 3: Purchasing a "Green" Vehicle or Equipment

Decision-Making Criteria	Options		
	1	2	3…
Is the vehicle or equipment the smallest sized as is possible to complete its service delivery tasks? • Engine size • Vehicle weight • Average carrying capacity • Average passenger capacity			

Decision-Making Criteria	Options		
	1	2	3…
• Average terrain			
Is the vehicle "best in class"?			
Does the vehicle or equipment use alternative technology? (hybrid, electric, hydrogen fuel cell, etc.)			
Can the vehicle or equipment use an alternative fuel without voiding the manufacturer's warranty? If so, what type of alternative fuel and how high of a blend? (biodiesel, compressed natural gas, etc.)			
What is the vehicle or equipments fuel consumption? (based on its intended use – i.e. city driving)			
What are the vehicle or equipment's emissions? (GHG, GHG equivalents, other pollutants)			
What additional "green" features does the vehicle or equipment include, which improves fuel-efficiency and reduces emissions? (LED lights, engine idling shut-off, etc)			

After answering the above questions on "green" purchasing of vehicle and equipment it should be clear which purchasing options have the smallest environmental impact. The answers from Table 3 will also assist in calculating life cycle costs in Table 4. A life cycle cost analysis should be completed for a minimum of 3 [three] purchasing options.

Table 4: Life Cycle Cost Analysis

Life Cycle Cost Criteria	Options		
	1	2	3...
Operating Life (in Years)			
Initial Purchasing Cost			
Fuel Costs			
Maintenance Costs			
Insurance Costs			
Carbon offsets Costs (based on GHG emissions)			
Residual Value			
Disposal Cost			
Net Present Value			

Notes: [provide explanation of any assumptions made in estimating costs above]

The vehicle or equipment purchasing option with the lowest net present value, while also offering the greatest reduction in GHG emission, will be the one purchased.

RECOMMENDATION:
