



City of Fernie GHG Emission Reduction Plan

Milestones 2 and 3

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Introduction

Developing climate action plans and GHG emission reduction strategies is a valuable and important process not only for emission reduction, but as a process to increase the resiliency and sustainability of a community. It can be an important process of prioritization, of identifying opportunities for improved health of a community and its residents. The Province of British Columbia has acknowledged the importance of developing targets and strategies for GHG emission reduction. The Province recently legislated under Bill 27 that all Official Community Plans for communities in British Columbia must incorporate targets and strategies for GHG emission reduction. This is an important and progressive piece of legislation. Through the process of developing the GHG emission reduction plan for Fernie, the City is poised to meet this legislation, and begin the implementation phase.

The Partners for Climate Protection framework outlines the process for developing a greenhouse gas emission reduction plan for community and corporate emissions. Milestone 1 (Inventory) was completed in December 2008 and adopted by Council. Revisions were made in January 2009 based on updated community data that was retrieved locally, to enhance the data collected by the Province of British Columbia.

Milestone 2 of the Partners for Climate Protection framework includes developing forecasts and targets for both community and municipal emissions. Forecasting future emissions proved to be a challenge in Fernie, BC, where the permanent resident population has been in decline over the past decade, but where residential development has continued to increase with demand from out-of-province second homeowners. This report will describe the methodology used to determine future emissions, which will be updated and adjusted as more stats become available.

Milestone 3 of the Partners for Climate Protection framework is Developing the Local Action Plan. For Fernie, this specifically refers to the development of the Greenhouse Gas Emission Reduction Plan. Based on the targets for reduction, a series of recommendations have been developed for municipal and community emissions. Each recommendation is supported with relevant case studies, potential funding opportunities and where applicable, suggested policy and bylaw amendments.

The City of Fernie has committed to being carbon neutral in corporate operations by 2012, as part of the Climate Action Charter developed by the Province of British Columbia in the fall of 2007. Although this commitment was made after this project began, the target has been taken into account, and the recommendations with most potential for greatest emission reduction at the corporate level have been identified as high priority. After consultation with staff, it was agreed that with confirmation on funding availability, achieving significant reductions within the next 3 years would allow the City to contribute significantly to their carbon neutral goals.

The following report has been developed with not only greenhouse gas emission reductions in mind, but with greater intentions of fostering a sustainable and healthy community. This Plan is to serve as a strategy for greenhouse gas emission reduction, but should ultimately inspire changes and adaptations to existing policies and plans that enhance the sustainability of the community.

Forecast and Targets

A forecast and target has been developed for each the municipality and community. Partners for Climate Protection recommends that local governments set a target of a 20% reduction in GHG emissions from the baseline, within 10 years of signing on to the PCP. For the community, the recommendation is 6% reduction of GHG emissions.

In determining an appropriate reduction target for emissions, forecasts were developed to identify sources and increases in future emissions, and how much additional GHG emission would have to be reduced in the future to achieve the reduction targets. The following section outlines the forecasts for emissions for the City and community of Fernie.

City of Fernie: GHG Emission Forecast and Targets

Generally, forecasts for municipal operations for most sectors will mirror the population projections for a community. For Fernie, this is challenging, as the permanent resident population has been in decline over recent years. The interesting challenge though, is that the number of housing starts has continued to increase, and over recent years, and the number of second homeowners has exploded (the current number of second homeowners is approximately 1000). The housing starts from 1996-2006 increased by 27%. It is anticipated that this growth will continue for the next decade, based on the current development plans. For a community of just over 4200, the influence of development can be quite significant.

To determine the forecast for emissions, several factors were taken into consideration. These include:

- Potential increase of municipal services required by increased development;
- Potential development of, or ownership over additional buildings in the next; decade by the City of Fernie;
- Increase in number of staff employed by the City of Fernie.

City of Fernie Greenhouse Gas Emissions Reduction Plan

The forecast by sector is outlined below in Table 1. This forecast can be reviewed in the future to determine actual increases in development and growth, but is more accurate than assuming no or reduced increase in greenhouse gas emissions. The forecasts are based on best available data, consultation with the CAO and Directors at the City of Fernie, and are best estimates.

Table 1: Summary of Forecasted Changes in GHG Emissions for the City of Fernie

Sector	Forecasted Changes	Resulting Increase (%)
Buildings	<ul style="list-style-type: none"> Recent purchase of school (~40 t/yr) No other plans for building development or ownership; forecast incidental 5% increase of emissions from buildings by 2020 Plans to centralize public safety operations (i.e. reduce number of buildings for fire, search and rescue, etc.) 	7%
Streetlights	<ul style="list-style-type: none"> Expansion of streetlighting to new developments (anticipated 27% increase over the next decade) 2 tonne increase per year 	negligible
Water & Sewage	<ul style="list-style-type: none"> Almost \$20 million of capital expenditure dedicated to sewage and water operations upgrades Projected 50% increase in energy use with major upgrades Recent increase in energy costs due to the installation of new turbines 	4%
Vehicle Fleet	<ul style="list-style-type: none"> Vehicle fleet increased 1% from 1995 to 2006 Increase of operations estimated at 2% per year to 2020 	5%
Waste	<ul style="list-style-type: none"> Forecasted increase to be in-line with operational increases, as 5% by 2020 	1%
Total Increase from Baseline (%)		17%

The forecasted increases for each sector are summarized in Table 2 below, and are compared to the baseline scenario. The Business as Usual forecast indicates the emissions expected from municipal operations in 2020.

Table 2: Summary of Baseline vs BAU Emissions

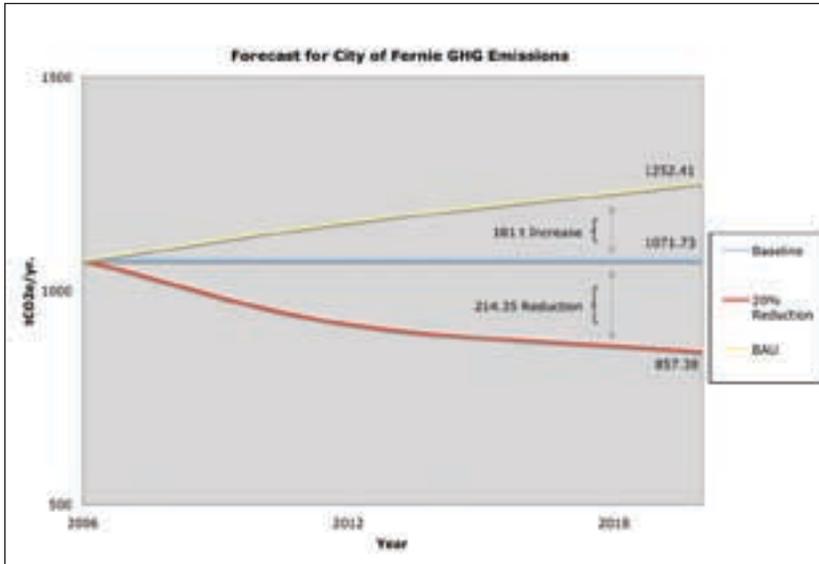
Sector	Baseline Emissions 2006 (t CO ₂ e)	BAU Emissions 2020 (t CO ₂ e)	BAU: Total increase of 181 tonnes, or 17% over the baseline year of 2006 by 2020.
Buildings	670.58	744.11	
Streetlights	9.23	11.72	
Water/Sewage	87.64	131.46	
Vehicle Fleet	267.89	321.45	
Waste	36.39	43.67	
Total	1071.73 t CO₂e	1252.41 t CO₂e	

When developing reduction targets for the City of Fernie, it must be kept in mind that there is forecasted to be a 17% increase in emissions by 2020 and that there is already an established interim target of carbon neutral by 2012.

Using the PCP recommended reduction target of 20% below baseline levels, the total reductions required to meet this target is summarized below, and shown graphically in Figure 1:

- A 20% reduction from baseline emissions would require the reduction of 214.35 tonnes of GHG emissions, which would result in an annual total of 857.38 t GHG emissions.
- According to the BAU forecast, by 2020 the City of Fernie can expect an increase in their emissions by 17%, or 181 tonnes.
- To capture the forecasted emissions, the City of Fernie must reduce a total of 395.35 tonnes of GHG emissions by 2020 to reach the desired 857.38 t CO₂e.

Figure 1: Forecast for Emissions by 2020 for the City of Fernie



Community of Fernie: GHG Emission Forecast and Targets

Forecasts for community emissions, as with corporate emissions, generally mirror population trends and census data to determine the historic and projected population growth for the community. In the case of Fernie, the census data demonstrates a reduction in the population over the past decade. Population projections based on this historic trend demonstrate a downward trend in population growth, which on initial speculation would indicate a potential for limited or no increase in emissions. Fernie is unique, however in that there are significant influences of tourism and second-homeowners on the growth of the community. Although permanent resident populations are declining, the development of estate family homes, multi-unit condos and other residential units have increased drastically over recent years. Although these homes are likely to be marketed to out-of-town homeowners, there will be year-round energy use by these homes, but not as significant as a home that is inhabited permanently.

Based on the projected increased in residential homes, but decrease in population, one can speculate on the projected greenhouse gas emissions for the future. Table 3 identifies the projected changes in greenhouse gas emissions for a business as usual scenario, that is, if there were to be no GHG reduction initiatives implemented in the community. As with the Corporate forecast, the challenge of a declining population means the forecast developed is based on best available information. It provides a future trend, and again, is more accurate than assuming a declining population results in reduction of GHG emissions.

Table 3: Projected Changes in Community GHG Emissions to 2020

Sector	Forecasted Changes	Resulting Increase from baseline (%)
Residential Buildings	<ul style="list-style-type: none"> Build-out of approximately 2000 residential units by 2020; marketed for second-homeowners, so most will be lived in for only parts of the year; estimated 15% increase in emissions from residential homes. Expected increase in size of houses with renovations/upgrades to existing small homes Increase in 'green building' and more stringent building codes, requiring reduced energy and water consumption Little to no increase in population 	5%
Commercial Buildings	<ul style="list-style-type: none"> Slight expansion in commercial buildings, of approximately 10% by 2020 	2%
Industrial Buildings	<ul style="list-style-type: none"> Slight increase in industrial buildings of approximately 10% by 2020 	negligible

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Transportation	<ul style="list-style-type: none"> • Small increase in local vehicle use, but majority associated with tourists and vacation properties • Estimated in line with residential, at 15% increase 	4%
Waste	<ul style="list-style-type: none"> • Increase in waste by approximately 10% as collected from new developments 	1%
Total Increase from Baseline (%)		12%

Partners for Climate Protection recommends a 6% reduction in GHG emissions for the community. The forecasted changes are summarized in Table 4, with the baseline compared with the business as usual scenario identified above.

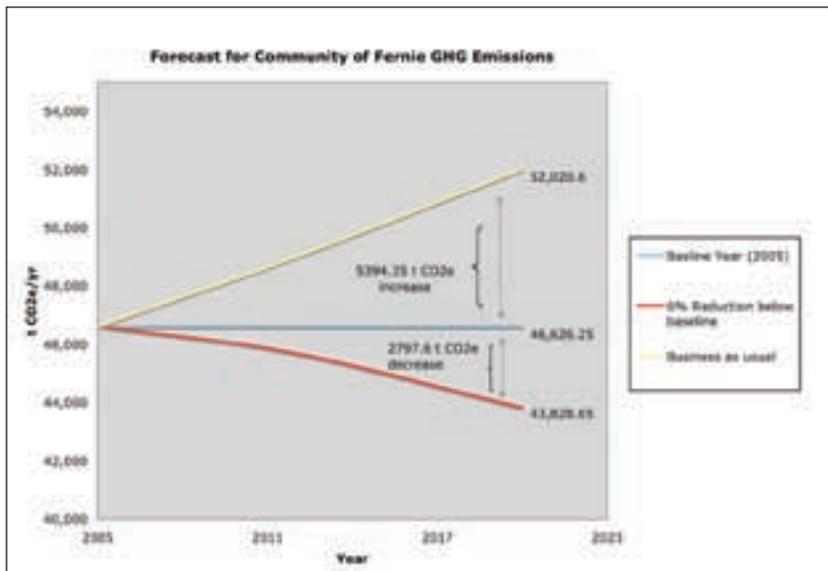
Table 4: Summary of Baseline vs BAU Emissions for the community

Sector	Baseline Emissions (t CO ₂ e)	BAU Emissions 2020 (t CO ₂ e)	BAU:
Residential Buildings	14,644	16,840.60	Total increase of 5394.35 tonnes, or 11.5% over the baseline year of 2005 by 2020
Commercial Buildings	9879	10,867	
Industrial Buildings	26	28.6	
Vehicles and Transportation	19,433	21,376.3	
Waste	2644.25	2908.7	
TOTAL	46,626.25 t CO₂e	52020.6 t CO₂e	

Using the PCP recommended reduction target of 6% below baseline levels for community emissions, the total reductions required to meet this target is summarized below, and demonstrated graphically in Figure 2:

- A 6% reduction from baseline emissions would require the reduction of 2797.6 tonnes of GHG emissions, which would result in an annual total of 43,828.65 t GHG emissions.
- According to the BAU forecast, by 2020 the community can expect an increase in their emissions by 11.5%, or 5394.35 tonnes.
- To capture the forecasted emissions, the community must reduce a total of 8191.95 tonnes of GHG emissions by 2020 to reach the desired 43,828.65 t of emissions.

Figure 2: Forecast for Emissions by 2020 for Fernie community emissions



Summary of Forecasts and Targets

In the unique situation of declining permanent population, and increasing development, forecasting is achieved with best available data, and with consultation with City staff and directors. As with the inventory, growth can be monitored over time, and the data adjusted if unexpected growth or development occurs in the near future.

The following bullets summarize the forecasts and targets for the City of Fernie and Community emissions.

City of Fernie

- Forecasted increase of 181 t CO₂e over baseline by 2020
- Reduction target of 20% below baseline by 2020
- Total reductions required to meet target: 395.35 t CO₂e

Community of Fernie

- Forecasted increase of 5394.35 t CO₂e over baseline
- Reduction target of 6% below baseline by 2020
- Total reductions required to meet target: 8191.95 t CO₂e

Milestone 3: GHG Emission Reduction Plan

Milestone 3 of the Partners for Climate Protection framework is the development of a greenhouse gas emission reduction plan. This plan has been developed through several consultations with staff, as well as the community. A workshop was held on January 29th 2009, which was open to all residents. About 50 people attended the three-hour session, and a wide variety of reduction strategies were developed. Appendix A contains the meeting proceedings from this workshop.

The following sections outline the reduction strategies for the City of Fernie and Community emissions. Unique to many greenhouse gas emission reduction strategies, the reduction opportunities in this report have been quantified where possible, based on engineer studies, case studies or successful application in other communities. The reduction strategies have been developed with the intention of meeting the reduction targets set for 2020. Where possible, case studies and suggested policies have been included in the report and appendix so that implementation is successful. It is recommended that the City work with local groups and interested residents to ensure implementation of the recommendations over the next decade. This may be facilitated through the development of an integrated committee, a partnership with local organizations or the development of a staff position or portfolio at the City of Fernie. Communities across Canada have facilitated implementation of reduction strategies through a variety of means, but all successful initiatives must have a champion or leader to ensure plans are followed through, and successes are monitored.

Where possible, the following strategies should complement and be integrated into the planning processes for the community. The development of a sustainable and resilient community requires integration of planning processes, and a commitment to a dynamic approach to decision making. This plan is intended to provide the guidance towards a sustainable community, but is only step in the process. Successful implementation will require a shift from business as usual.

Municipal Energy and Emission Reduction Opportunities

The Municipal target of 20% below baseline emissions by 2020 means a reduction of 395.35 t CO₂e must be achieved. The following sections outline the emission reduction strategies that will help the City of Fernie achieve these reductions, and meet the targets. Although not the focus of this particular report, these reduction strategies can also be used in meeting the carbon neutral target for corporate emissions by 2012.

Reduction strategies are broken into the sectors of buildings, utilities, vehicles and waste.

Municipal Buildings

Total Baseline Emissions = 670 t CO₂e

The City of Fernie has significant opportunity to reduce greenhouse gas emissions through improved efficiency of current facilities. The most significant reductions can be realized at the large facilities, and particularly where there is a reduction of natural gas consumption (the emission factor for natural gas is significantly higher than that of hydroelectricity). The following opportunities and recommendations will satisfy the reduction of a total of 396 tonnes of GHG emissions.

Aquatic Centre: Heat Reclamation and Solar Hot Water

Aquatic facilities are generally the largest energy consumer of all municipal facilities. They are also the facility that offers most potential for

City of Fernie Greenhouse Gas Emissions Reduction Plan

reduction of energy use through the implementation of heat reclamation. Due to the constant load, temperature and usage of a pool, there is a constant flow of heated air expelled from the facility. Heat recovery, or reclamation has historically been overlooked because of the traditional use of natural gas or electricity. The Community Energy Association identifies the use of wasted or excess heat as “one of the most cost-effective renewable energy forms...” Once a system is set up, the capture of waste heat can drastically reduce the need for natural gas.

The Fernie Aquatic Centre is an ideal situation for the implementation of a heat reclamation system. Several engineers have been involved in assessing the opportunities for a retrofit at the aquatic centre, acknowledging that the facility is one of the larger emitters of GHG emissions, but also that success has been shown in other communities in the reduction of GHG emissions through aquatic centre retrofits. The most feasible and significant opportunity has been identified and assessed by a professional engineer from Coral Engineering¹, and the GHG emission reduction potential has been estimated at 176 tonnes CO₂e annually. By employing a dehumidification system, in combination with a solar hot water installation for domestic hot water (i.e. dressing room showers, etc.), the use of natural gas is reduced by up to 70%.

Recommendation:

The City of Fernie should move forward with the aquatic centre retrofit, implementing a heat reclamation (dehumidification) system, and installing solar hot water heaters.

Cost Effectiveness: Costs for a dehumidification system is estimated to be approximately \$600,000. This is a typical cost for a pool, wading pool and hot tub. The assessment completed by Coral Engineering identified the opportunity for applications to two potential funds.

Coral Engineering has identified the ecoEnergy, Provincial SolarBC and Federal infrastructure grants as those applicable to the project to offset costs. The cost savings from reduced energy use is estimated to be over \$75,000/yr, resulting in a 2.63 year payback with funding support, 7.74 years without.

GHG Emission Reduction Potential: Installing a dehumidification system and solar hot water drastically reduces the need for natural gas. In terms of greenhouse gas emission reduction, where the use of fossil fuels can be reduced the greater the opportunity for emission reduction. Preliminary estimates suggest that there will be a net savings of 5077 GJ per year, resulting in a reduction of approximately 176 tonnes of CO₂e.

Ease of Implementation: Implementation of a dehumidification system requires professional contractors and engineers. Coral Engineering has designed a custom system for the Fernie Aquatic Centre. Similar systems have been installed in other locations, including the Hope and District Recreation Centre, the Brennan Park Recreation Centre in Squamish and an installation in Hyde Creek. Should the City apply for grants and funding opportunities, this will add additional work and effort to the process. Further, if the proposal designed by Coral Engineering is not approved, the implementation of this recommendation will become more significant, as further proposals and assessments will have to be developed and performed.

City Hall Retrofit

Fernie City Hall is located in the centre of town, and is where all City administration is located, as well as Council Chambers. Over the past year, there have been several audits completed at the building, and these have resulted in opportunities for energy savings and emission reductions.

As with any office space, there are opportunities to save energy through simple behavioral changes. Although simple, actions such as turning off lights in rooms, turning off computers and office equipment at night, and participating in recycling and waste reduction initiatives add up and over time and result in significant energy and emission reduction. Major retrofits, although requiring initial investment will result in reduced operating costs, and improved comfort of the building through draft reductions and temperature control.

The City of Fernie has an opportunity to take a leadership role in the community by demonstrating the potential energy savings and greenhouse gas emission reduction opportunities through building retrofits. The Corporation of Delta, BC, has installed solar hot water on their municipal hall. As a method of education and awareness for the community, a monitor was installed inside the building, which displays the temperature of water being heated by the solar panels. The Corporation has noted that the installation has created interest and excitement in the community around solar hot water.

The following recommendations have been developed both from the results of the audits completed at City hall, and also from successful case studies of building retrofits.

Recommendations:

- *Retrofit existing T12 light ballasts in City Hall with T8 models.*

Office GHG Reduction Tips

Livesmart BC for Offices and BC Hydro Green Your Business

- Turn off monitors and computers when not in use
- Purchase LCD monitors when replacing; use 80-90% less energy
- Buy sustainable and/or recyclable supplies
- Conduct a waste assessment
- Avoid disposable dishes and water bottles

¹Wildsight does not necessarily endorse the use of Coral Engineering for the retrofit of the Aquatic Centre. The City of Fernie is responsible for the final decisions and hiring of contractors or consultants. The report quotes the results of Coral Engineering, as this is the most recent and best available information at time of report production.

- *Window and roof retrofit: Replace all existing windows with high efficient windows (i.e. at least double glazes). Replace roof and improve insulation.*
- *Implement a comprehensive waste and recycling program.*
- *Consider solar hot water heater for domestic water and demonstration project.*

Cost Effectiveness: All retrofits require an initial investment, however the pay off of reduced energy costs can result in a payback between 2 and 5 years, based on similar applications in municipal offices, with varying degrees of funding. Window, roof and insulation upgrade is currently budgeted for in the City of Fernie budget, and again with the potential energy savings, the payback is between 2 and 5 years for windows along, according to the Canadian Mortgage and Housing Corporation. Combining a window retrofit with roof and insulation retrofit with result in energy reductions of up to 35%. The application of solar hot water for municipal domestic water should be considered if grant applications are successful. The costs of implementing the system can be up to \$40,000 (application at an aquatic rec centre), however grants are available to fund up to half of installation costs.

GHG Emission Reduction Potential: A lighting audit completed this year for City Hall suggests that a reduction 11.66 t CO₂e, or 58,000 kWh is possible with the replacement of existing T12 lights with T8's. T8's are approximately 25-35% more efficient than T12's. Because the reduction is in electricity use, the associated GHG emissions are limited, but still contributes to the overall reduction. Window, roof and insulation upgrades results in immediate savings on building heating costs². Switching to high-performance windows should yield 9-18% reduction in space heating costs. Roof replacement and insulation should result in an additional 7-12% reduction in heating energy. For application in City Hall, and the relatively old, single pane window models, it is assumed that the potential reduction is approximately 5% reduction for windows; 10% reduction with roof and insulation; and lighting up to 30% electricity demand reduction. Potential reduction of a solar hot water system for residential homes is estimated by SolarBC to be approximately 2 tonnes CO₂e annually. Total for all initiatives: approximately 12 tonnes GHG emission reduction annually.

Ease of Implementation: Retrofits and upgrades to City Hall must be completed by specialized contractors. Audits have already been completed for the lighting and window replacement, and as of winter 2009, an RFP is being developed for the roof of City Hall. Grants should be applied for through SolarBC for the implementation of the solar hot water heater. It is recommended that a partnership be discussed with BC Hydro to contribute to the cost of a lighting retrofit, which will result in significant energy savings at City Hall.

Fernie Memorial Arena Audit and Retrofit

The Fernie Memorial Arena has been in operation since the early 1960's and has been the home for the famed Fernie Ghostriders, among other successful programs such as figure skating, hockey and adult scrimmage. Arenas in general reject significant amounts of heat from the refrigeration equipment, which can be captured and used for space and water heating. In most arenas, including the City of Fernie's, the heat is released into the atmosphere from the building. One option is to pump the heat into ground loops, which store the heat in pipes in the ground. This is a very costly option, and so an alternative application may be to pipe the heat that is not used by the arena to the Community Centre, which is in close proximity to the arena.

Coral Engineering has conducted a preliminary audit, the results of which will be presented to the City of Fernie in summer of 2009. Although the results are not ready, there have been other applications of heat capture in arenas, which are summarized below. The costs of the other applications are much higher, as they included the installation of ground loops. Table 5 summarizes the implementation of similar systems in arenas or large office buildings. Results of the engineering assessment will be presented to the City of Fernie for review and consideration.

Table 5: Summary of Heat Reclamation Examples

Building Details: location, size, etc.	Cost of Installation	Cost saving after installation	Payback period	GHG Reduction
Curling Rink, Oliver BC (1059 sq meters) Retrofit was complete in 1994	\$90,000	About \$18,634 in annual total saving (energy and maintenance): \$10,359 vs \$28,993 conventional	Less than 3 years in energy savings alone (50% energy use reduction) and less than 2 years including operating costs	27.1 tonnes annually
Office building in Winnipeg, Manitoba (38,000 sq ft.)	\$205,000 for ground- source pump compared to \$136,000 for electric	\$17,000 annually in savings: \$9000 to heat and cool with heat pump; \$26,000 with electric	Just over 2 years	unknown

¹http://oeenrcan.gc.ca/publications/infosource/pub/renovate/Consumers_Guide_EE_Windows_Section08.cfm

The City of Dawson Creek has installed solar hot water heaters on municipal buildings including:

- City Hall
- Fire Hall
- RCMP Building
- Public Works Yard

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<p>Ice rink (circa 1952) and community hall (total 3447 sq. meters) in Miami, Manitoba</p> <p>This retrofit was done in 1998/1999</p>	<p>\$212,500 for ground-source; \$179,500 for conventional</p>	<p>\$13,500 annually in energy costs alone: \$22,000 annually for conventional; \$8500 for ground-source...</p> <p>With less maintenance, total system is less than half of conventional</p>	<p>In energy savings alone, payback is less than 3 years.</p> <p>Including total maintenance costs (\$54,025 vs \$23,130), payback drops to less than 2 years</p>	<p>47.6 tonnes of CO₂ annually reduced in energy reduction</p>
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The Fernie Memorial Arena produces the second most greenhouse gas emissions among municipal buildings, after the aquatic centre. The opportunities for greenhouse gas emission reduction are significant, and of course result in the co-benefits of increased energy efficiency and reduced operating costs.

Recommendation:

Opportunities for energy-saving retrofits at the Fernie Memorial Arena should be further assessed. Continue working with Coral Engineering in determining the feasibility of the report results (expected Summer 2009). Consider implementing energy-saving retrofits based on recommendations from Coral Engineering³.

Cost Effectiveness: Reducing consumption of natural gas allows for significant savings, both cost and energy. Capital costs for the installation of a heat capture system at the arena will be determined in the initial feasibility study by Coral Engineering, but is expected to be between similar to the costs of the aquatic center retrofit (less than \$600,000). Payback from similar installations in other communities range from 2-4 years. In terms of reducing the operating costs of the building, a payback for any retrofit of less than 5, or even 10 years is economical. If the excess heat can also be used in the Community Centre (to be determined), there would be an added benefit of reducing energy costs in that building as well.

GHG Emission Reduction Potential: Initial estimates suggest a potential reduction of GHG emissions by at least 50 tonnes CO₂e, or 966 GJ. A recent light retrofit will also contribute to the reduction of energy use.

Ease of Implementation: The initial audit has been completed, and the results are currently being compiled. Again, this initiative would require the skills of experienced contractors. Additional training may be required by staff to ensure the system is maintained and monitored properly. The retrofit could be completed during the ice-free period in the summer, and would result in immediate savings with little to no interruption to current programming.

Municipal Building Audits and Retrofits: General Recommendations

All municipal buildings should be audited for potential energy reduction opportunities. There are likely significant opportunities for the installation of solar hot water, or for replaced and upgraded boilers at existing municipal buildings. Replacement and improvement of garage doors, insulation and windows should be considered for the Public Works buildings.

As a general recommendation, an audit should be completed on all buildings leading up to the carbon neutral commitments in 2012. Capital budget should be allocated for the implementation of energy saving retrofits to achieve further GHG emission reductions leading up to 2020.

Although not included in the 2006 inventory, the City of Fernie recently acquired Max Turyk Elementary School, which increase the total energy consumed by municipal buildings, but does offers significant opportunity for energy reduction as a demonstration building. The GHG reduction potential of this initiative will not be included in the overall reduction strategy of this report, but should be considered in the future for the City as a potential community awareness project. The City of Fernie is encouraged to implement demonstrations of alternative energy, sustainable design or waste reduction as a means of education and leadership in the community.

Potential demonstration projects could include:

- Rain-water collection cistern for use in the building (toilets) or landscaping
- Solar hot water heaters
- Photovoltaic solar panels for space/water heating
- Green roof installation (demonstration project)
- Bicycle Fleet for Municipal Staff

The Town of Norman Wells replaced **inefficient boilers and hot water heaters** in their Fire Hall, Community Hall, Maintenance Shop, Arena and Staff residence, resulting in approximately **166 tonnes CO₂e** reduction per year. The total payback for the project was only 5 years.

³Wildsight does not necessarily endorse the use of Coral Engineering for the retrofit of the Fernie Memorial Arena. The City of Fernie should review and determine the best approach for achieve energy efficiency for this building based on best available information.

Similar initiatives could be implemented at a number of municipal buildings, and it is recommended that the City of Fernie consider the positive impact of leadership in creating low-energy and sustainable communities.

Policy Recommendations for Municipal Buildings

Policies can be implemented by the local government to guide their own energy efficiency and waste reduction. For the building sector, there are opportunities to develop policies or guiding principles that ensure the City is making decisions with consideration of environmental impact and sustainability. Table 6 identifies the potential policies or guiding principles that could be implemented to reduce greenhouse gas emissions from municipal buildings.

Table 6: Summary of Recommended Policies for Municipal Buildings

Policy Recommendation	References and Case Studies
Implement a Green Purchasing Policy for municipal operations	<p>Municipality of Jasper: Green Procurement Policy</p> <ul style="list-style-type: none"> ensures high environmental standard for all services offered and received See Policy in Appendix B
Green Building Standards for future new buildings	<p>Although no major Municipal buildings are planned for the City of Fernie, implementing a Green Building policy is advisable for potential future developments.</p> <p>The Town of Banff has implemented a Green Building Policy that requires all new buildings to meet a minimum of LEED Silver certification.</p> <ul style="list-style-type: none"> See Policy in Appendix B
Develop an Energy Conservation or Efficiency Policy for Municipal buildings	<p>Guides the implementation of retrofits, audits and renewable energy to Municipal buildings.</p> <ul style="list-style-type: none"> A Policy has been developed by Saanich entitled: Energy Conservation Policy for the Municipality of Saanich See Appendix B

Impact of Municipal Building Reductions

Table 7 summarizes the total GHG emission reduction potential through the implementation of the recommendations for municipal building reductions that have been identified for immediate implementation. These have been considered by staff, and have potential budget allocation, or possible grant opportunities.

Table 7: Summary of GHG Emission Reduction Initiatives for Municipal Buildings (Quantified and Immediate)

Recommendation	Potential GHG Reduction	% of Target (total target = 395.35)
Aquatic Centre Retrofit	176 t CO ₂ e	44%
City Hall Retrofit	12 t CO ₂ e	3%
Fernie Arena Retrofit	50 t CO ₂ e	13%
Total	238 t CO₂e	60%

As detailed in the previous sections, the City of Fernie can implement a number of policies and initiatives that are not easy to quantify immediately, but that can contribute to a reduction of GHG emissions, and foster sustainable operations. Table 8 outlines the initiatives that are recommended for implementation up to and beyond 2020. The exact impact of GHG emission reduction by implementation of these recommendations should be assessed in the future, once feasibility studies or assessments have been completed. Emphasis of several of these recommendations is on demonstrating leadership and successful implementation of energy-saving projects.

Table 8: Summary of Recommended GHG Emission Reduction Initiatives for Future Implementation

Recommendation	Opportunities	Implementation
Building Audits for all municipal operations	<ul style="list-style-type: none"> Identify specific retrofits for all buildings Improve energy efficiency and reduce operating costs Significant opportunity for GHG reduction 	<p>Requires contracting an energy auditor.</p> <p>At time of assessment, GHG reduction potential can be estimated</p>

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Solar Hot Water for additional buildings	<ul style="list-style-type: none"> • Demonstrate leadership in alternative energy use • Reduce energy costs associated with hot water 	<p>Potential partnership with SolarBC and ecoEnergy</p> <p>Opportunity may exist for buildings with appropriate exposure</p>
Demonstration building for sustainable retrofits	<ul style="list-style-type: none"> • Rainwater collection cistern for landscaping or non-potable water-use • Green roof installation • Solar hot water or PV panels 	<p>May require significant capital investment with long payback</p> <p>Excellent opportunity for community education and awareness</p>
Policy Implementation for Energy Standards	<ul style="list-style-type: none"> • Design a policy for existing and future municipal buildings which guides actions for improved energy efficiency and GHG reduction 	<p>Requires the will of City administration and Council to develop Policy, and ensure implementation</p>

Utilities (Water and Streetlights)

Total Baseline Emissions = 97 t CO₂e

The utility services provided by the City of Fernie cover all of the water and sewage treatment and pumps, lift stations and the streetlights throughout the community. For the overhead and ornamental light categories, BC Hydro owns and maintains majority of these, but the electricity-use is paid for by the City. The City maintains the streetlights throughout the neighborhoods, as well as traffic lights and signals. The contribution of emissions from streetlights is very limited, due to the sole use of electricity for the lights. Water and sewage operations tend to use limited energy for the pump and lift stations, however the sewage treatment plant consumes a considerable amount of energy, and produces about 70% of the total GHG emission from the water and sewage operations. Reductions in these sectors are difficult, as it requires the participation and cooperation of the community to reduce overall water consumption to reduce the energy requirements at the operations.

The City of Fernie is currently planning for a major expansion of the water services for the community, and the City has identified a secondary water source, which will be fed into the existing piping infrastructure. Expansion to the sewage operations has also begun, increasing the capacity of the sewage lagoon and treatment plant to accommodate future development and growth in the community. The sewage treatment plant consumes the most energy, and so increased emissions in the water and sewage operation sectors are expected to increase quite significantly (by potentially up to 50%).

The following sections identify the opportunities for energy reduction associated with streetlights and water and sewage operations.

Streetlight Replacement Program

Municipalities across the country are implementing streetlight replacement programs to slowly phase out mercury vapour lamps. In many communities, fixtures and ballasts are being replaced to produce more directed, efficient lighting, reducing the wattage of light required to produce the same effect as the mercury vapour lamps.

Recommendation:

Replace all mercury vapour lamps as required with high-pressure sodium lamps.

Cost Effectiveness: With potential energy savings of 35%, there is significant potential for costs savings if the lamps are replaced as older ones burnout. It may be inefficient to undertake an entire replacement process at once, however the incremental replacement is feasible, and strongly recommended.

GHG Emission Reduction Potential: Because streetlights are powered entirely by electricity, and in British Columbia, our electricity emissions factor is so low, the potential for greenhouse gas emission reduction is quite minimal. Because of the cost and energy savings, and the quantifiable reduction in emissions (although minimal), the project has decent potential to contribute to overall reductions. The estimated GHG emission reduction is approximately 3.2 tonnes of GHG emissions annually once all fixtures are replaced.

Ease of Implementation: Because there are many other communities that have implemented a streetlight conversion project, and because streetlights must be replaced anyways, the implementation of a streetlight replacement initiative would be quite simple. Staff would have to source appropriate supplier of high-pressure sodium bulbs, and ideally look at the installation of flat-lens fixtures that reduce the amount of wasted light.

Water leak and detection Initiative

The Water Use and Loss in Water Distribution Systems guidance document was developed by the National Guide to Sustainable Municipal Infrastructure in 2003, and stated: "Water loss carries a significant price tag, both economic and environmental...Proper accounting of water used and lost will help reduce the costs associated with potable water and lead to a more sustainable product."⁴

⁴Water Use and Loss in Water Distribution Systems: A Best Practice by the National Guide to Sustainable Municipal Infrastructure (2003).

The City of Fernie has initiated a water loss reduction program, which monitors and detects leaks in the system, and assesses the need for repairs. This initiative has not yet been quantified for savings since the initiation of the project, and it is advised that monitoring be on-going into the future so that savings can be calculated.

Recommendation:

Continue with the monitoring and identification of leak locations, and repair as required. Implement a monitoring system to track leakage reduction and quantify energy savings as a result.

Cost Effectiveness: The City of Fernie has implemented a leak detection program already, however the costs of accessing and repairing leaks continue to be a major barrier. It is cost effective to be delivering and treating water efficiently, and will result in savings in the long-term. The co-benefits to the water distribution system includes: reduction of water treatment and pumping costs; reduction of wastewater treatment costs; and reduction of damage to infrastructure.

GHG Emission Reduction Potential: The potential for energy savings results from the efficient delivery and treatment of water. The savings are dependent on the success of the leak detection and repair initiative. It is estimated that a potential 10% reduction in emissions could be achieved for the improvement of the water distribution system. This should be further studied and monitored to understand determine more precise water loss quantities.

Ease of Implementation: The City of Fernie has already initiated the task of identifying and repairing leaks in the main water systems: this is an on-going process, and will require further monitoring. The costs associated with major improvements and repairs are likely to be a barrier to immediate attention to leaks. Funding may be available (See Appendix F for funding opportunities) to help with the costs associated with water main repairs.

Water Conservation

The City of Fernie has committed to achieving a 20% water consumption reduction by 2012, and to meeting 50% of water demands to 2020 through conservation. This is a significant goal that will require not only involvement of the municipality, but an aggressive campaign directed at reducing domestic water consumption.

Reduced water consumption contributes to reduced energy needs for the distribution, pumping and treatment of water, and results in overall greenhouse gas emission reduction associated with the water operations. There are many programs that can be implemented that facilitate water consumption reduction, which are identified in the Utilities policy section below.

Recommendation:

Implement a community-wide water conservation initiative to address conservation targets, and to reduce emissions from water and sewage operations.

Develop a low-flow water fixture and appliance exchange program for residents and municipal buildings.

Cost Effectiveness: Water conservation reduces the use of energy of the water and sewage operations, lowering overall operating costs. The implementation of water conservation programs may require investment of the municipal government to establish education and awareness programs for the community. Many programs already exist, and would require very limited investment. For major projects, such as a water metering initiative, a subsidy or similar incentive for participation in the initiative may require greater investment by the municipality.

GHG Emission Reduction Potential: Reducing the energy use for water and sewage operations will directly reduce the greenhouse gas emissions. The main source of emissions for water and sewage operations are the water supply at Fairy Creek and the sewage treatment facility. Reducing water consumption will mean less energy used to pump and treat water in the system. The resulting emission reductions from this initiative is estimated to be 25%, considering the future goal of achieving 50% of future needs by conservation. This will reduce the forecasted emissions, as well as baseline. Monitoring should be implemented to update and refine this target as quantified data becomes available.

Ease of Implementation: While there are programs and resources readily available for the implementation of water conservation initiatives, the participation of the community in voluntary initiatives may be a challenge. It is recommended that continuous education and awareness be provided through the website and at City Hall. Grants and incentives should be identified as available through local utility providers and Provincial programs.

Policy Recommendations for Utilities

There are many policies that have been implemented around water conservation and demand reduction. The following section outlines

The Halifax Regional Water Commission implemented a program in 2001, which has since saved **31.8 million litres** of water per day, or 11.6 billion per year. The water loss reduction strategy has resulted in an approximate annual reduction in costs of \$200,000 and emissions of **3,250 tonnes** of GHG emissions.

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potential case studies and examples that could be implemented in Fernie to reduce water consumption by the community, resulting in reduced energy consumption by water and sewage operations. Case studies and opportunities for reduced runoff and stormwater treatment are also included.

Town of Gibsons, BC

Implementing a water metering program, as well as water efficient fixtures and hot water tank replacements.

<http://www.gibsonswater.ca>

Province of BC

“Water Smart Home Assessment” as part of the Water Smart program to facilitate water conservation at the residential scale.

http://www.livingwatersmart.ca/get_involved/home-assessment.html

City of Chilliwack, BC

Has a water system that is 100% metered. Water rates are determined by their bylaw: The Chilliwack Waterworks Regulation Bylaw 2004, No. 2995. Information about water use and water conservation in Chilliwack:

<http://www.chilliwack.ca/main/page/cfm?id=1240>

District of Lantzville, BC

Subdivision and Development Bylaw No. 55, 2005, which incorporates low impact development standards for roads and storm water management, as well as alternatives for impervious surfaces, etc.,

http://www.lantzville.ca/upload/dcd263_BylawNo55.pdf

Province of BC, Ministry of Environment

Stormwater management resource document; includes case studies, best practices and strategies for alternative stormwater management techniques.

<http://www.env.gov.bc.ca/epd/epdpa/mpp/stormwater/stormwater.html>

District of Metchosin, BC

Adaptation of the Rain Water Bylaw to encourage onsite management of rainwater, establishing a performance target of 90% rainfall being addressed on site.

<http://www.district.metchosin.bc.ca/467/467.pdf>

Appendix C contains a guide for developing a water conservation program for small communities. The guide has been developed by the US Environmental Protection Agency, and provides a template for the development of initiatives and programs for water conservation. The City of Fernie may choose to use examples from the text box above, combined with the framework for water conservation plans to help reach the targets of 20% reduction by 2012. Table 8 summarizes the reduction opportunities associated with the municipal utilities recommendations.

Table 8: Summary of Utility GHG Reduction Strategies

Recommendation	Potential GHG Reduction	% of Target (total target = 395.35)
Streetlight Replacement	3.2 t CO ₂ e	1%
Water Conservation	22 t CO ₂ e	5.5%
Leak Detection	10 t CO ₂ e	2.5%
Total	35.2 t CO₂e	9%

Vehicle Fleet

Total Baseline Emissions: 267.89 t CO₂e

The City of Fernie recently became involved with the Fraser Basin Council’s E3 Fleets program, completing the first step of the vehicle fleet inventory. Currently, E3 Fleets is reviewing the data provided by the City of Fernie, and it is expected that the results and recommendations that come from that report will be incorporated into this strategy. The following recommendations include both anticipated opportunities from E3 Fleets, as well as additional initiatives that could be implemented immediately for fuel efficiency, cost savings and reduction of greenhouse gas emission reduction.

Municipal Idle Reduction and Right-Sizing Initiative

The City of Fernie has recently initiated a process of putting up Idle Free signs as a means of encouraging the community to reduce unnecessary idling. In many communities, the local government has established an Idle Free Policy for the vehicle fleet, seeing reductions of



up to 10-15% fuel use reduction. A survey was completed for the City of Fernie staff, which confirmed all drivers of vehicles do some amount of idling during the day, with a minimum of 5 minutes, maximum of 10-20 minutes. Simple awareness and education can help reduce idling. Further action may have to be taken to address issues of cold winter engines, with a possibility of looking into block heaters or interior cab heaters to prevent excessive idling in the mornings during the winter months.

Right-sizing for efficient vehicle use refers to the process of identifying the use of a particular vehicle, and determining whether the vehicle suits the needs of the job for which it is used. For example, if the purpose of a vehicle is to transport people between offices, it may not be necessary to drive a pick-up truck. A more appropriate vehicle may be a small or medium-sized vehicle. The potential for more efficient use of vehicles will result in reduced fuel use, costs and emissions.

Recommendations:

The City of Fernie should implement a municipal idle-free policy, coupled with education and awareness of City staff on the fuel and maintenance cost savings.

Block heaters or similar technologies should be explored to reduce winter idling in the mornings. Further research should be completed to identify the most efficient and effective means of engine and cab warming.

Develop a policy to ensure vehicle replacement considers 'right-sizing' of vehicles. Make internal operational decisions on the vehicles assigned for each job or purpose.

Cost Effectiveness: Idling for 10 minutes consumes over 1 cup of wasted fuel, and over ½ litre for a 5-litre engine. Over the lifetime of a vehicle, this adds up to a considerable amount of fuel, and is financially inefficient. Idling for more than 60 minutes causes more wear on an engine than turning it off and restarting⁴. Turning off the engine costs nothing, and results in immediate fuel savings. In addition, right-sizing vehicles ensure efficient use of fuel, and if vehicles need to be replaced, the idea of appropriate vehicles for the job should be included in the decision matrix of the purchasing policy.

GHG Emission Reduction Potential: Successful idle free campaigns at the municipal level have demonstrated a potential for 10% reduction of GHG emissions associated with idling. In addition, right sizing vehicles for the intended job will result in more efficient use of fuel. For the City of Fernie, the emission reduction potential is approximately 40 tonnes of GHG emissions.

Ease of Implementation: There are multiple resources and tools available to implement an idle free initiative for municipal vehicles. The challenge and barrier is often implementation of the policy by staff. Involving staff in the development of the policy and monitoring program can help overcome this barrier. Awareness and education can be very effective in helping staff participate in an idle free program.

E3 Fleet Review and Recommendation Implementation

E3 Fleets has been extremely successful in guiding reduced fuel use by municipal fleets. The City of Fernie is currently involved in a fleet review, the results of which are expected in the summer of 2009. Initiatives that are often recommended include:

- Revised purchasing policy
- Alternative fuel purchasing
- Staff training and awareness
- Route efficiency through GPS tracking.

It is anticipated that an additional 10% of reductions could be possible through E3 Fleet recommendations, and in particular the development of a purchasing policy for fuel efficient vehicles.

Recommendation:

Upon receipt of E3 Fleet recommendations, the City of Fernie should implement incrementally the recommendations to achieve optimal fuel efficiency and cost savings for the vehicle fleet. The City should continue to monitor and measure fuel use for tracking purposes.

Cost Effectiveness: The City of Fernie has already signed up and is a member of E3 Fleets. The Community Action on Energy and Emissions Fund and Wildsight funded the fees for this program.

GHG Emission Reduction Potential: Additional reductions are estimated to be approximately 27 tonnes of CO₂e through the implementation of E3 recommendations, and also through the integration of an efficient vehicle purchasing policy.

Ease of Implementation: E3 Fleets is a very comprehensive program that guides the process of facilitating fuel consumption and emissions reduction through their program. Implementation of the recommendations by the City is highly recommended, although will require staff training and driver awareness.

⁴Natural Resources Canada. <http://oee.nrcan.gc.ca/transportation/idling/wastes.cfm?attr=8>

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Policies for Municipal Fleets

Although not quantifiable, reductions are possible with the implementation of policy and guidelines for municipal fleets. Appendix D contains examples of Idle Free policies from BC Local governments, as well as purchasing policies for green vehicle fleets.

The City of Fernie has taken the first step in encouraging community idle-free zones, and should consider writing guidelines or policies to ensure staff are participating in the initiative, and contributing the goal of GHG emission reduction through reduced idling. Table 9 summarizes four examples of policies or guidelines that have been developed in community for idling.

Table 9: Summary of Idle Free Bylaws in BC⁵

Municipality	Bylaw or Guidelines	Anti-Idling Terms	Restrictions
Vancouver District	Street and Traffic Bylaw No. 7125 (2004). Adopted November 15, 2004	No person shall permit a motor vehicle engine to be left in operation more than 3 minutes in a 60 minute period while the vehicle is stationary	Does not apply to: <ul style="list-style-type: none"> • The engine of an emergency vehicle, • Where the motor vehicle is in traffic, • Undergoing repairs at a motor vehicle service garage, • Undergoing emergency repairs along a roadside, • Is an armoured vehicle, • Is participating in a parade authorized by the District, or • Used to power equipment ancillary to the motor vehicle.
North Vancouver	City Street and Traffic Bylaw No 6234, 1991. Adopted April 13, 1992.	No person shall permit a motor vehicle engine to idle on a street for more than 3 minutes in a 60 minute period.	This section does not apply to: <ul style="list-style-type: none"> • A mobile workshop while such a vehicle is being used as a mobile workshop. • Police, fire or ambulance vehicles while engaged in operational activities, including training activities, except where idling is substantially for the convenience of the operator of the vehicle. • Vehicles assisting in an emergency activity. • Vehicles for which idling is required as part of a repair or regular pre-check maintenance process. • Armoured vehicles in which a person remains inside the vehicle while guarding the contents of the vehicle or while the vehicle is being loaded or unloaded. • Vehicles required to remain motionless because of an emergency, traffic, or mechanical difficulties over which the driver has no control. • Vehicles engaged in a parade or race or any other event authorized by the City of North Vancouver. • Vehicles required to use heating or refrigeration systems powered by the motor or engine for the preservation of perishable cargo. • Vehicles when the ambient temperature inside the vehicle is: <ul style="list-style-type: none"> o More than 27°C; or o Less than 5°C
Kamloops	Noise Control Bylaw 24-42 No. 24-42. Adopted 2007.	No person shall cause or permit a commercial motor vehicle to idle in a residential area for more than 3 consecutive minutes.	Does not apply to: <ul style="list-style-type: none"> • Buses, fire apparatus, police, or emergency medical service vehicles while engaged in operational activities, including training and patient transfer activities. • Commercial motor vehicles participating in an emergency activity • Commercial motor vehicles that remain motionless because of an emergency, traffic conditions (including congestion and signals), weather conditions, or mechanical difficulties over which the driver has no control, • Commercial motor vehicles where idling is required as part of the repair process or to prepare the vehicle for service • Armoured vehicles where a person remains inside the vehicle while guarding the contents of the vehicle or while the vehicle is being loaded or unloaded • Commercial motor vehicles engaged in a parade or race or any other such event authorized by Council, or • Mobile workshops

⁵Adapted from: Inventory of Air Quality Bylaws in British Columbia for: Anti-Idling, Open-Burning, and Wood-Burning-Appliances. BC Ministry of Environment. April 2007.

Gibsons	Anti-Idling Bylaw No. 1010, 2005. Adopted October 4, 2005.	No person shall cause or permit a vehicle to idle for more than 3 consecutive minutes.	<p>Does not apply to:</p> <ul style="list-style-type: none"> • Vehicles idling while passengers are embarking or disembarking; • Vehicles idling because of traffic, an emergency, or mechanical difficulties; • Armoured vehicles involved in the secure delivery and pick up of goods; • Emergency vehicles, as that term is defined in the Motor Vehicle Act; • Vehicles engaged in a parade or a race; • Vehicles engaged in a mechanical test or maintenance procedure for which idling is required; • Vehicles that must remain idling so as to power a heating or a refrigeration system for the preservation of perishable cargo; and, • Vehicles that must remain idling so as to power any tools or equipment necessary for or incidental to the provision of services by a municipality or a public utility.
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Appendix D contains an example vehicle fleet purchasing policy as developed by the City of Dawson Creek. The Policy contains language around right-sizing vehicles in replacement purchases, as well as idling and maintenance scheduling. The Policy may serve as a sample for the City of Fernie in the development of a local vehicle fleet policy. Table 10 below summarizes the total emission reduction for vehicle fleet initiatives.

Table 10: Summary of Vehicle Fleet Reduction Opportunities

Recommendation	Potential GHG Reduction	% of Target (total target = 395.35)
Idle Reduction	40 CO ₂ e	10%
Right-sizing vehicles		
E3 Fleet Policy Implementation	27 t CO ₂ e	7%
Total	67 t CO₂e	17%

Municipal Waste

Total Baseline Emissions: 36.39 t CO₂e

The quantity of waste from Municipal operations is quite minimal, however there are always opportunities to improve waste diversion and to reduce the amount of recyclables going into the waste. The very simple initiatives of recycling and composting can make a significant difference in the office space, reducing waste production to a very minimal amount.

The following recommendations will help with the City of Fernie to reduce waste, however it will be up to the staff and administration to change behaviors and reduce the amount of waste created at the office. There are also policy changes that can be made, such as the banning of plastic water bottles, which the City of Vancouver recently implemented.

Recommendations:

Implement a comprehensive recycling program at all municipal buildings.

Consider composting facility for municipal buildings, such as a vermicomposting system.

Encourage behavioral change to reduce waste coming into buildings (i.e. waste-free lunches, no plastic water bottles, etc.).

Comprehensive recycling and composting systems in all Municipal buildings

The City of Fernie does have several designated recycling bags or bins throughout buildings. The system is not comprehensive, and does not facilitate the recycling of all materials. There is opportunity to improve the 'user-friendliness' of the recycling program to ensure that all employees have access to recycling facilities. Furthermore, setting up designated recycling areas throughout buildings will foster behavioral change patterns, which will result in increased participation in a recycling initiative. A multi-bin system (i.e. paper, cans, glass) is recommended, with additional paper recycling bins placed at key locations (i.e. photocopiers, printers, etc.).

Cost Effectiveness: The price for recycling bins is very minimal (approx. \$150-200 for simple multi-product separating bins). The cost of implementing a program is also minimal, as the process is already set in place. This initiative would simply enhance and improve the current recycling program. Composting in office buildings have been implemented using vermicomposting, the implementation of which is approximately \$60/bin.

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GHG Emission Reduction Potential: Approximately 30-40% of the waste stream is paper or paper products that have a potential to reduce the total amount of waste going to the landfill. Additional recyclables include cans, bottles, glasses, e-waste and printer cartridges. It is estimated that approximately one-third of the City's waste could be diverted through an enhanced recycling program. Providing opportunity for alternative waste disposal of old electronics, batteries, cartridges, lightbulbs, etc. will allow for significant reduction of waste ending up in the landfill. This reduction results in approximately 12 t of CO₂e. Reducing organic waste will reduce GHG emission by an additional 10 CO₂e.

Ease of Implementation: The initial barrier of implementation will be dedicating a small amount of money to the purchase of appropriate recycling bins. General awareness and education will be required to ensure participation by staff.

Table 11 summarizes the total emissions resulting from municipal waste. This should be further measured and monitored to determine actual reductions. Additional GHG reduction initiatives could be implemented in the form of recycled paper purchase or other procurement opportunities, which were identified in the Buildings sector.

Table 11: Summary of GHG Reduction Potential for Waste

Recommendation	Potential GHG Reduction	% of Target (total target = 395.35)
Office waste reduction	12 t CO ₂ e	3%
Organic waste	10 t CO ₂ e	2.5%
Total	22 t CO₂e	5.5%

Summary of Municipal Reduction Strategies

Table 12 summarizes the quantifiable and behavioral strategies that have been recommended for greenhouse gas emission reduction for the City of Fernie. As identified in the introduction, the strategies have been developed through consultation with staff, review of successful case studies, best practices and examples from other communities throughout British Columbia.

The successful implementation of these strategies is dependent on the commitment of the municipality to champion the initiatives. It is recommended that a staff-person be identified, or a committee established to ensure the continuous monitoring and reporting of implementation.

Table 12: Summary of Municipal Reduction Strategies

Sector	Recommendation	Reduction Comments
Buildings	The City of Fernie should move forward with the aquatic centre retrofit, implementing a heat reclamation (dehumidification) system, and installing solar hot water heaters.	Potential reduction of 176 t CO ₂ e
	The City of Fernie should retrofit existing T12 light ballasts in City Hall with T8 models. Window and roof retrofit: Replace all existing windows with high efficient windows (i.e. at least double glazes). Replace roof and improve insulation. Implement a comprehensive waste and recycling program. Consider solar hot water heater for domestic water and demonstration project.	Reduction potential of at least 12 t CO ₂ e, and significant savings on lighting and heating costs.
	Opportunities for energy-saving retrofits at the Fernie Memorial Arena should be further assessed. Continue working with Coral Engineering in determining the feasibility of the report results (expected Summer 2009). Consider implementing energy-saving retrofits.	Assessment currently underway; expected reduction of at least 50 t CO ₂ e
	Demonstration building or retrofit, bringing awareness to potential initiatives such as: <ul style="list-style-type: none"> • Rain-water collection cistern for use in the building (toilets) or landscaping • Solar hot water heaters • Photovoltaic solar panels for space/water heating • Green roof installation (demonstration project) • Bicycle Fleet for Municipal Staff 	Awareness and education; could result in additional reductions up to 10% from buildings with water conservation and alternative energy
	Implement a Green Purchasing Policy for municipal operations	Policy based; reductions recognized in Vehicle Fleet sections

Buildings (continued)	Green Building Standards for future new buildings	Policy based; new buildings would reduce forecasted emissions by up to 30%
	Develop an Energy Conservation or Efficiency Policy for Municipal buildings	Policy based; tool to enforce energy efficient buildings
Utilities: Streetlights and Water & Sewage Operations	Replace all mercury vapour lamps as required with high-pressure sodium lamps.	Reduction potential of 3.2 t CO ₂ e
	Implement a community-wide water conservation initiative to address conservation targets, and to reduce emissions from water and sewage operations. Develop a low-flow water fixture and appliance exchange program for residents and municipal buildings.	Requires community participation; Estimated reduction of 22 t CO ₂ e
	Continue with the monitoring and identification of leak locations, and repair as required. Implement a monitoring system to track leakage reduction and quantify energy savings as a result.	Requires further monitoring and assessment. Estimated potential reduction of 10 t CO ₂ e
	Policy Options including: • Water metering • Water Smart Home Assessment for all residents • Stormwater management policies, through Subdivision Servicing Bylaw amendments	Policy options could lead to significant savings, particularly if water meters are implemented.
Vehicle Fleet	The City of Fernie should implement a municipal idle-free policy, coupled with education and awareness of City staff on the fuel and maintenance cost savings. Block heaters or similar technologies should be explored to reduce winter idling in the mornings. Further research should be completed to identify the most efficient and effective means of engine and cab warming. Develop a policy to ensure vehicle replacement considers 'right-sizing' of vehicles. Make internal operational decisions on the vehicles assigned for each job or purpose.	Idle Free Vehicle Fleets and Right-Sizing vehicle use are effective when implemented successfully. Staff awareness and education necessary. Potential reductions of at least 40 t CO ₂ e
	Upon receipt of E3 Fleet recommendations, the City of Fernie should implement incrementally the recommendations to achieve optimal fuel efficiency and cost savings for the vehicle fleet. The City should continue to monitor and measure fuel use for tracking purposes.	Reduction potentials will depend on E3 Results, and implementation of recommendations. Projected reductions of 27 t CO ₂ e annually.
Municipal Waste	Implement a comprehensive recycling program at all municipal buildings. Consider composting facility for municipal buildings, such as a vermicomposting system. Encourage behavioral change to reduce waste coming into buildings (i.e. waste-free lunches, no plastic water bottles, etc.).	Total potential of 22 t CO ₂ e for enhanced recycling and organic compost implementation. Would require a drastic reduction in paper use; and increase in recycling.
Emission Reduction Potential	Quantified:	362.2 t CO₂e
	Estimated (Behavioral/Policy Based):	~ 100 tonnes (10% additional to building, waste and vehicles)

Community Energy and Emission Reduction Opportunities

The community of Fernie has a target of reducing emissions by 6% below baseline by 2020. Reaching this target requires a reduction of emissions of 8191.95 t CO₂e, based on the forecasted and baseline emissions. It should be noted that if developments do not proceed as planned within the next ten years, the forecasted emissions might be reduced. Achieving reductions in community emissions is particularly challenging, as it requires behavioral change on the individual level. For those that are aware of the importance of GHG reduction, or of sustainable communities, this may be an easy task. For most however, a great deal of education and awareness is necessary before change occurs. Although the following strategies result in the reduction of emissions at the community level, many will require the resources and initiative of the City of Fernie to facilitate the reductions strategies.

The following section outlines the reduction opportunities for buildings, waste and transportation. Where possible, the strategies have been

quantified. Strategies with a focus on education and awareness are difficult to quantify, but it is expected that emission reduction will result through successful implementation. For many initiatives, once momentum is gained and the community is aware and involved, significant change is possible. The quantifiable and behavioral/education based strategies are summarized in Table 13.

Residential Buildings

Total Baseline Emissions: 14,644 t CO₂e

Residential buildings produce the second largest quantity of emissions in the community profile, after transportation. The majority of emissions result from the use of natural gas. As identified in the emissions forecast, the population of Fernie has been in decline recently, but development continues to rise, with the interest of second homeowners investing in Fernie. The most significant contributor to the emissions forecast out to 2020 is the dramatic increase in residential buildings. The strategies below deal with both new and existing residential homes.

New Home Construction Standards

The forecasted emissions for the residential sector are significant because of the planned units currently set for build-out in Fernie. Over 2000 units have been planned for five different developments. There is an immediate opportunity to reduce the emissions as a result of new developments through the development of energy efficient construction. There are several programs that exist to rate new home construction, including LEED, Built Green and enerGuide.

Communities throughout BC have implemented guidelines or policies that require all new developments to meet minimum standards to ensure that only energy efficient and water smart homes are being constructed. Recent amendments to the Local Government Act has extended the ability of local governments to establish Development Permit Areas that facilitate the reduction of greenhouse gas emissions and encourage energy and water conservation. The amended Local Government Act can be found at: http://www.leg.bc.ca/38th4th/3rd_read/gov27-3.htm.

Recommendation:

Develop development guidelines or policy that encourages or requires all new residential homes to meet minimum energy efficient standards. Consider setting a standard of EnerGuide 77 or 80 (Built Green Gold or Platinum, respectively) for new buildings.

Develop sustainability or energy efficiency guidelines for new developments.

Amend existing bylaws, policies or building codes to allow for sustainable and low impact development strategies.

Cost Effectiveness: Builders wanting to meet Built Green standards must be recognized as a 'Built Green' certified builder, which requires a short course delivered through the Canadian Home Builders' Association-BC. For the homeowner, a home built to EnerGuide 80 standards will consume approximately 30% less energy than a house built to minimum building standards. The operational costs of the home are therefore drastically reduced.

GHG Emission Reduction Potential: The energy savings for EnerGuide 80 homes are approximately 30% over and above the standard building construction. The GHG reduction potential associated with this reduction has been estimated to be approximately 15%. If implemented for all new residential homes, the forecasted emissions could be reduced by approximately 700 tonnes CO₂e. It should be noted that this estimation should be monitored and reevaluated as homes are developed. The opportunities may be greater as new technologies are implemented.

Ease of Implementation: The current Subdivision Servicing Bylaw, Development Permit Areas and Building Codes may require review to ensure there are not barriers within these policies and bylaws that would prevent a developer from implementing green building design. While developing a policy to support energy efficient construction may not be difficult, enforcing it and requiring all developers to become recognized by Built Green or EnerGuide for New Homes may be a barrier to implementation. With appropriate communication between developers and the municipality, the easier implementation will be. Appendix E provides an example of a Sustainability Checklist used by the City of Port Coquitlam on which proposed developments are 'marked' for their sustainability and energy efficient design standards. Appendix E also includes a bylaw developed by the City of Vancouver that guides energy efficient construction for new homes.

Residential Home Retrofits (for existing homes)

Residential buildings are the second largest emitters of GHG emissions in the community inventory contributing 14,644 t CO₂e, which equates to 32% of the total community emissions. As a result of these figures there is ample opportunity for GHG emission reduction in this sector. Fernie has a significant number of older, inefficient homes that may become more energy efficient with simple retrofits. Retrofit projects may seem daunting and costly to homeowners, however, government agencies and not-for-profit organizations provide resources and funding for such projects. In order to simplify the learning process, a local home retrofit workshop could be hosted providing homeowners with resources required to begin a retrofit project such as; types of retrofits, costs, funding opportunities, payback timelines and material/technology suppliers.

There are two potential applications of a residential home retrofit program:

1. Encourage homeowners to take simple steps to improve the efficiency of their homes through purchasing of low-energy appliances, changing showerheads, lightbulbs, etc. This would be a low-cost opportunity for homeowners to make small, but important changes in their homes.
2. Promote the ecoEnergy audit and retrofit program. This requires initial costs by the homeowner to perform and audit, but also provides significant opportunity for grants and incentives to fund retrofits.

Recommendation:

Provide local residents with the tools and resources necessary to facilitate residential retrofit programs such as: website of audit links, funding sources, etc.

Consider providing incentives for energy audits (i.e. financial incentives or provision of energy efficient fixtures), and promotion of ecoEnergy audits and retrofits.

Cost Effectiveness: Option 1 has relatively low costs associated with implementation, and the results would be reduced energy bills. Option 2 requires greater upfront investments by the homeowners, but there are significant grants available through www.livesmartbc.ca and local utility providers, that offset the costs of the energy audit and the retrofits. Funding for home and business retrofits are readily available from a variety of government, businesses and not for profit organizations making generally expensive retrofits affordable. Organizations offering monetary incentives for retrofits include: ecoEnergy; BC Hydro; Fortis BC and Solar BC.

GHG Emission Reduction Potential: The amount of GHG emission savings from home retrofits is difficult to quantify as projects can vary from small scale such as weather stripping to large scale such as solar hot water systems. Smaller projects such as bulb replacement from incandescent to CFL are affordable and easily accomplished. For every household that changes their most frequently used bulbs to CFL the expected saving is 0.227 t CO₂e per year. If only 300 homes in Fernie changed their most frequently used bulbs to CFLs than the community could expect a reduction of approximately 68 t CO₂e. Assuming that a successful program could involve 300 people in 'Option 1' (i.e. minor changes to the home, reduced energy use), the reductions could be approximately 600 tonnes of GHG emissions. If 100 people were to participate in 'Option 2', the full ecoEnergy Audit, an additional 600 tonnes of GHG emissions could be further reduced. Successful implementation and increased interest by the community has the potential to exceed the estimated reductions.

Ease of Implementation: This program would not be difficult to implement in Fernie, as the resources exist and there are resources available at the Provincial level. It would be recommended that additional resources and support be provided through the City of Fernie website, or similar venue.

Application in Fernie

A participatory and educational workshop could feature a visit to a local home that has undergone energy-saving retrofits, allowing participants to see firsthand retrofit options. The City of Fernie, or partner organization could create a website to provide homeowners with updates on retrofit incentives and funding opportunities available both locally and Provincially. To celebrate successes, local projects could be featured on the City website and a forum could exist so that homeowners can share information on their projects or offer services.

Case Study

Vancouver, BC

City Green Solutions, based in Vancouver, BC, offers a series of workshops for those interested in sustainable living. The workshops provide information on sustainable planning and design, energy efficiency and heating for home and business as well as guest expert sustainability presentations and information on retrofit incentives and available funding. In addition to the workshops, City Green Solutions also has a comprehensive website that offers information on incentives available for retrofits to existing homes, new homes and multi-unit residential buildings. The website also features retrofit success stories <http://www.citygreen.ca/>.

Participate in Team Power Smart

BC Hydro has set a goal for energy consumption, and is challenging BC residents to contribute to making BC electricity self sufficient by 2016. That is to say that the BC government has ordered BC Hydro to rely solely on province made electricity by the year 2016, rather than importing it from other sources such as the US. BC Hydro currently imports electricity to meet the needs of the Province. In order to reach the target

The following section of the **District of Squamish's OCP** addresses energy and land management:

- Objective 1. Foster the conservation and efficient use of energy and other resources in buildings, vehicles, and infrastructure.
- Objective 5. Foster the planning, design, and development of neighbourhoods that support walking, cycling, and transit and other energy-efficient transportation modes.

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of self-sufficiency, BC Hydro has initiated several incentive programs to encourage the individual to contribute to lowering BC's electricity demand. Included in these incentive programs is the **Team Power Smart** program. This is both an individual and a community-based program. As an individual one can participate and enjoy exclusive offers, rebates and incentives. As an additional benefit, homeowners will reduce their electricity bill and in the end be proactive in saving money. By joining, homeowners commit to reducing their electricity consumption by 10%. BC Hydro has compiled several energy saving documents to help one meet this personal goal; these documents are readily available online. In addition, one can monitor their electricity savings online and set goals for further energy conservation.

Fernie, especially during the winter months, hosts many international residents, most of whom rent from landlords. To accommodate for such situations, one does not have to hold a BC Hydro account in order to participate in the program. The only downfall is that one who does not hold an account will not be able to track their savings online, however, their participation will contribute to the community challenge. Energy savings in a community is tallied with all other participants from that community, and the community results are compared with others. Currently in Fernie, there are approximately 49 participants. By increasing Fernie's status in the community challenge, The City will be taking a positive step towards decreasing residential greenhouse gas emissions. In addition, Fernie will be aiding BC Hydro and the government of BC to achieve their 2016 target of being self-sufficient in electricity production. This will also aid in avoiding future energy shortage problems in the province and will help lower the cost of electricity to the average consumer.

Recommendation:

Increase participation in the Team Power Smart program in Fernie. Encourage at least 100 homeowners to join and reduce their energy consumption by 10%.

Cost Effectiveness: In order for an individual to participate in this program, there are very little costs involved. Joining the initiative is free, and as part of the program, the consumer saves energy, as well as saving money on their electricity bills. The participants may also take advantage of monetary incentives offered through the program, further increasing the efficiency of their homes.

GHG Emission Reduction Potential: This program was implemented by BC Hydro to encourage BC residents to reduce their energy consumption by 10% in order for the province to meet its set target of energy self-sufficiency by 2016. By initiating this program, BC Hydro is stating that combined individual participation can have a serious impact on electricity consumption in the province. Because the reductions of energy use are limited to electricity consumption, the greenhouse gas emission potential is relatively low, however it supports behavioral change, which will likely result in other actions being taken by the individuals involved in the program.

Ease of Implementation: Currently, there are approximately 49 program participants in Fernie. Increasing participation in this program can be very easily accomplished as the program is already in existence. The BC Hydro website is user friendly and gives adequate directions for signing up for the program and highlights the program incentives among many other features. BC Hydro is currently marketing the program through a series of TV and newspaper advertisements. Obviously, this type of marketing is not overly effective for the City of Fernie. Consequently, the City could look into other options to market the program in order to increase participation. The City of Fernie could set a community participation target and advertise this target in local media.

Application in Fernie

As this program has already been implemented and there are participants in Fernie, encouraging other local participation should be an easy task. A well-read medium such as the Fernie Fix or Free Press would be an appropriate choice for advertising. Promoting the program as a community challenge through local advertising would be cost effective.

Case Study and Contact Information

The BC Hydro Team Power Smart website (www.bchydro.com/powersmart) highlights program success stories at the residential, commercial, industrial and public service levels. One example of success is described below:

A Powell River, BC family took a chance on the sun and is now reaping in the benefits. Jeremy Mercer and his wife invested \$35,000 into a solar collection system, and soon saw that their dependence on BC Hydro was dropping exponentially. They have surpassed the proposed target of reduced BC Hydro electricity dependence of 10% with a decrease of 75%. During peak sunny times they even produce electricity for the grid. Although, initially the system was costly, The Mercer's are now saving money by reducing the amount of energy they buy from BC Hydro.

BC Hydro has now implemented a program that allows low income households to apply for free energy saving kits which includes simple and easy to install energy saving tools such as low flow showerheads and weather stripping (http://www.bchydro.com/powersmart/residential/energy_saving_kits.html).

Team Power Smart also highlights community involvement. When one registers to participate they are automatically added to the community challenge. The more participants, the higher ranked a community is. As of date, Vancouver has the greatest number of participants followed by Surrey, Burnaby, Saanich and Richmond. Although the population of Fernie is small in comparison to these bigger centers, Fernie can still strive to rise on the community ranking.

Community Awareness and Incentives for Residential GHG Reduction

There are a number of approaches that the City of Fernie, or partner organizations can take to increase the knowledge and awareness of residents GHG emissions within the community. The following points are education-based recommendations that although are not quantifiable, will assist in facilitating change in the community, and ensure access to the information and resources necessary for individuals to take action in their own homes.

- *Establish a resource centre, located at a municipal building or other centrally located space, where materials, grant applications and other 'green home' resources are available.*

The City of Ottawa has established a resource centre in their City Hall, which is managed by a local non-profit organization. The centre provides resources, including an EnviroBoutique where energy and water efficient products and fixtures are available for purchase. <http://www.envirocentre.ca/>

- *Offer incentives to builders who build to higher energy efficient standards.*

The City of Calgary offers rebates on building permits of 10%, 20% or 30% respectively for homes built to bronze, silver and gold standards under the Built Green program.

- *Dedicate a webpage or link to tracking participation in the various programs offered to the community. Provide on-line resources and links to facilitate individual action, and to provide a centralized location for all residential-related reduction opportunities.*
- *Promote SolarBC incentive and rebate program for **solar hot water heaters**.*

SolarBC (<http://www.solarbc.ca/install/households>) currently provides up to \$3000 in financial incentives for the installation of solar hot water heaters on residential homes. Homes must undergo an energy audit to be eligible for incentives, but the savings from reduction of natural gas use for hot water heating is substantial. Tax credits are also available from the Federal government.

Commercial Buildings

Total Baseline Emissions: 9879 t CO₂e

Commercial buildings contribute a small percentage of overall emissions for the community of Fernie, however there are still significant savings opportunities for businesses in the community. The following section identifies some of the opportunities that exist for commercial GHG emission reduction.

Encourage participation in Green Awards at local lodging facilities

There are a few Green Award Programs available to the accommodation and lodging industries that promote greening business and saving money. Currently, a few hotels and lodges in the Fernie area participate in these programs. It would be beneficial to encourage others to participate, and contribute to reducing greenhouse gas emissions in the commercial sector.

Terra Choice Environmental Marketing and Audubon International work together on the Audubon Green Leaf Program, which is based on the principle of *what is good for the environment, can be good for business*. This program allows the hospitality industry to save money and work towards their environmental commitments. In addition, the program assists travelers in choosing environmentally sound lodging options. There are two levels of commitment in the program. The first level introduces participants to eco-efficiency and environmental issues associated with the hospitality industry. The second level is based on a rating system. Participants are rated based on their eco-efficiency through an audit, then provided with a report that provides them guidance to achieve the next level of rating. There are five easy steps required to participate in the program they begin with the Audubon Green Leaf Eco Rating Survey, followed by the payment of an annual participation fee, analysis of the survey by TerraChoice Environmental, receipt of a Green Leaf Rating and verification of your information/random checks. Currently in Fernie, The Park Place Lodge participates in this program.

The Hotel Association of Canada (HAC) is an organization that promotes and protects its members. As part of their ongoing programs and services, the association offers the Green Key Eco Rating program to their members. The program is a graduated rating scheme encouraging participants to improve their environmental and fiscal performance. The program is voluntary to members of the Hotel Association of Canada, however, participation is strongly encouraged as there are many benefits including professional respect and monetary savings. In addition, the program is open to any lodging property even if it is not a member of the HAC.

Participants in the Green Key Program undergo a Green Key Audit through which they are given a rating from 1-5 based on their environmental performance. In addition, hoteliers are provided with guidance to reducing their operation costs and their environmental impacts. Alongside positive feedback from guests, participants benefit from marketing (and can now advertise their Green Key Rating with CAA), team building and positive public relations. The program is user friendly and easy to access as it is completed entirely online. The audit consists of multiple choice questions covering sustainable operation including: energy conservation, water conservation, solid waste management, hazardous

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waste management, indoor air quality, community outreach, building infrastructure, land use and environmental management. The HAC hopes to have a team of auditors prepared to conduct on site audits in the next year.

Recommendation:

At least 60% of lodgings in Fernie participate in an energy or environmental rating program.

Cost Effectiveness: The only costs associated with this program are the participation fee required by the lodging facilities (Averaging around \$350 per annum). The City could provide further incentive to participate in this program by offering to pay a portion of the participation fee. In addition, the potential savings on energy bills following upgrades and changes recommended by The Canadian Hotel Association, should be emphasized to local lodging facilities. The City could expect some costs in promotion of the program. Suggested promotional tools include holding a conference open to managers of lodging facilities to promote participation in the program. As an alternative, a local organization or Chamber may wish to organize and promote the opportunity for energy savings and GHG reduction at local hotels and lodgings in Fernie.

GHG Emission Reduction Potential: This program offers small greenhouse gas reduction potential to the overall reduction goal, as the commercial sector of the matrix is not one of the main contributors to the overall greenhouse gas emissions. There is opportunity for reductions at the individual hotel level, which will nonetheless contribute to the larger community goal.

Ease of Implementation: This program is easy to implement in Fernie as the program is already in existence and there are local participants in such programs. Resources such as websites are already in place. The main barrier is a local champion or leader to spearhead a campaign to encourage further involvement in the programs.

Application in Fernie

Currently in Fernie, there are a few lodging facilities who participate in the above highlighted programs. It would be quite easy to encourage other local lodging facilities to participate in such programs. Not only will the community enjoy the benefits with reduced greenhouse gas emissions, but the lodging facilities can reap in the benefits as they will they be saving money on energy bills. Upon successful implementation, they may also use their rating as a marketing tool through advertisement promotion. In addition, The Hotel Association of Canada advertises participating facilities.

Case Study and Contact Information

Many lodging facilities participate in environmental rating programs; in fact, program awards have been won by local facilities. The case studies below highlight some success stories from the Green Key program initiated by the Hotel Association of Canada (http://www.hotelassociation.ca/site/programs/green_key.htm).

Island Lake Lodge, located in Fernie, is the most recent recipient of the Hotel Association of Canada's Hall of Fame Award of Excellence in the Energy and Environment category. The award is granted to a lodging property that integrates environmental management into their daily program while maintaining quality services for their guests. Island Lake Lodge was awarded the title due to its commitment to preserving the environment and reducing its energy consumption in its daily activities. The main point of consideration for this award was the installation of two micro hydro stations, which produces 100% of the lodge's electrical needs. Island Lake Lodge currently holds a rating of 4 out of 5 green keys which gives them a percentile rating of 60-79.9. This rating indicates that the lodge demonstrates national leadership and commitment to protecting the environment through their mature practices and policies, which have shown results.

Within Fernie, there are two other lodging facilities that participate in the Hotel Association of Canada's Green Key Eco Rating Program. Travelodge Three Sisters has a rating of 2 Green Keys, which indicates a score of 20-39.9%. Briefly, this indicates that the hotel has made a firm commitment and has taken considerable strides to minimize its ecological footprint and to improve its impact through policies and programs.

Best Western Fernie Mountain Lodge has a rating of 3 Green Keys, which puts the hotel in the 40-59.9 percentiles. This suggests that they have implemented strong environmental management programs, training and engineering programs that benefit the environment and community.

Siwash Lake Ranch located near 70 Mile House, BC is a leader in the industry and has been granted a perfect rating of 5 Green Keys. This indicates that the ranch demonstrates the highest social and environmental standards in all aspects of their business and operations. In addition, the facility implements the highest quality of technologies, programs and policies that coincide with international environmental standards for sustainable lodging operations. Siwash Lake Ranch satisfies these criteria by operating off the grid using solar energy to meet the ranch's electrical needs. The ranch aims to minimize its footprint through environmental policies and procedures. The staff and owners share their knowledge of environmental stewardship with interested clients. In addition, the ranch has worked with Ducks Unlimited Canada to enhance wetlands surrounding Siwash Lake.

Business GHG emission reduction program

The small business and commercial industry in Fernie is relatively small, however significant energy and emissions savings and reduction can be achieved with simple retrofits and adjustments to the office or store environment. Currently, BC Hydro offers a program to the business and commercial sector, providing incentives for the purchase of energy efficient products including lighting, LED exit signs, controls and sensors and HVAC systems. BC Hydro is currently providing a complementary energy audit walk-through program to businesses located in the Lower Mainland and Victoria, however there may be opportunity to arrange a coordinated energy assessment for businesses in Fernie. Whether

delivered by BC Hydro or a local energy auditor, business will find that by replacing lighting, windows, or heating and cooling systems, the cost savings are significant.

Recommendation:

Engage commercial, retail and small businesses in an energy audit and assessment of energy reduction opportunities.

Provide the tools and resources necessary for the commercial sector to access incentives and rebates for energy retrofits.

Cost Effectiveness: BC Hydro has a very comprehensive listing of potential retrofit ideas for the business and commercial sector. The resources are available free on the website, with the incentives for energy efficient fixtures and products available at: <http://www.bchydro.com/ecatalog/>. In order to gain the most benefit from initiative, business should have an energy audit, which could be arranged through BC Hydro. Further discussion should take place with BC Hydro to arrange the complementary walk-through. This initiative could be very cost effective if this service were provided free of charge.

GHG Emission Reduction Potential: The easiest things to change in an office or commercial setting are lights, exit signs and use of electronic equipment. Retrofits of this nature will reduce the energy use of the building or office space, but will not significantly reduce GHG emissions, because of the low emission factor for electricity in British Columbia. As a community, however, the business sector has the potential to contribute to overall emission reduction, and will realize the benefits of operating cost reductions as a result of the retrofits.

Ease of Implementation: The Power Smart program for commercial businesses is already set up by BC Hydro. Local promotion of the program would be quite simple, as the information and marketing materials are available from BC Hydro. If BC Hydro is unable to provide the complementary building walk-through, this may be a barrier to the implementation of the program, as an energy auditor would need to be sourced and paid for by the businesses.

Transportation

Total Emissions: 19,433 t CO₂e

As a rural community in British Columbia, citizens of Fernie are reliant on vehicles to travel between communities. Typically, because of the rural nature and the often poor road conditions in the winter, people own larger trucks or vehicles which tend to consume more fuel per kilometer traveled. Within the community of Fernie, however, there is great opportunity to reduce vehicle emissions through the facilitation of non-vehicle transportation. Furthermore, the driving habits of unnecessary idling can have significant impacts on the fuel consumption of vehicles, as well as the air quality in the community. This section identifies several opportunities for emission reduction in the transportation sector. Of course, much of the change must be facilitated through education and awareness.

Idle Free Fernie Campaign

The transportation sector is the largest contributor of GHG emissions to the community inventory. With 19,433 t CO₂e, the transportation sector accounts for 42% of the total 46,278 t CO₂e at the community level. As a result, there is ample opportunity for GHG reduction in this sector.

As part of the City of Fernie Greenhouse Gas Reduction Initiative, statistics were collected on idling hot spots in the City. The number of vehicles idling, the length of idling time, the type of vehicle, the sex of the driver and what the driver was doing while idling were parameters of information that were collected. This data was then used to determine which locations were idling hot spots in town, included in these locations are the two railway crossings to the Ridgmont subdivision. Both of these railway crossings experience frequent idling as people travel to and from Ridgmont. The emissions produced at these crossings during daylight hours were calculated to contribute 8 tonnes annually to the total transportation emissions. At maximum frequency, the train passes through Fernie twenty-six times in 24 hours, making for frequent idling time at crossings both day and night.

Other common idling locations include drive-thrus and school zones. Currently, as part of the idle free campaign, signs are being installed around Fernie, encouraging people to turn off their engines. In order for this campaign to be successful, the program should be promoted so that the general public is aware of the implications of the signs. A public workshop should be held to inform citizens of the environmental and financial downfalls of idling, and to explain the expectations and intentions of the Idle Free signs posted throughout the community. The Idle Free program could also be advertised in various local papers and magazines as a form of press release. In addition, information sheets could be sent home with students at the local schools to educate the idling parents.

Recommendation:

Continue to promote Fernie as an Idle Free community.

Work with local residents and organizations to deliver information through workshops, local media, schools and businesses.

Monitor (through surveys, observation, data collection), the successes and behavioral change as a result of Idle Free signage and awareness initiatives.

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Cost Effectiveness: There are very little costs involved in the implementation of this program. Sign generation, wages and public awareness are the only aspects of the project that involve costs and funds are available to cover these costs. To date, funding for an idle free program in Fernie has been provided by ecoEnergy for Personal Vehicles, Idle Free BC, Wildsight, City of Fernie and Kicking Horse Coffee. This funding has supported the development of pamphlets, wages to monitor idling activity throughout the City and the production of idle free signs. Further funding may be required in order to conduct community education sessions. Further funding should be investigated through Natural Resources Canada.

GHG Emission Reduction Potential: If each Canadian who drives a vehicle, avoided idling just three minutes for every day in the calendar year, then we would reduce our carbon dioxide emissions by 1.4 million tonnes per annum. In addition, we would be saving 630 million litres of fuel per year. Consequently, this program offers good opportunity for reducing our greenhouse gas emissions and may take a couple of years to notice results. Potential emission reduction upon successful implementation in Fernie is 1000 tonnes GHG emissions based on reduced fuel consumption by approximately 5%. It is anticipated that as the program is more widely accepted and recognized, potential reductions could be greater.

Ease of Implementation: This program has been proven to be successful in a wide range of communities across Canada and success stories are highlighted below. There are a variety of websites available that offers information on implementing community-based Idle Free campaigns. For example, Natural Resources Canada (<http://oee.nrcan.gc.ca/transportation/idling/material/tool-kit-introduction.cfm>), provides the general public with campaign resources, which offers information on all steps of a campaign as well as useful tools such as signs, letters and dialogues on intervention among many other features. Due to previous anti idling campaigns hosted by the local high school, some members of the community are aware of the program.

Application in Fernie

This program has already been partially implemented in Fernie. Idling data has been collected; idling hot spots have been identified and anti idling signs have been made. As part of Environment Week 2009 celebrations in Fernie, Idle Free Signs were posted at various locations throughout Fernie on Clean Air Day. Further measures could be taken including hosting a public information session and considering a no idling bylaw.

Case Studies and Contact Information

Idle Free campaigns have been successful in many communities across Canada, from small towns such as Fernie, to bigger cities, the program has been implemented to help reduce GHG emissions across the country. Some of these success stories are highlighted below.

Clean Air Hamilton (<http://www.cleanair.hamilton.ca/>) is a group dedicated to improving air quality in Hamilton, ON. As part of their mission to improve air quality, they have implemented an anti-idling program in the City of Hamilton focusing on the City fleet as well as on the community. This program includes, but is not limited to, the introduction of an idling bylaw, placement of idling awareness signs around the city and the distribution of idling posters and brochures.

In Vancouver, BC, Better Environmentally Sound Transportation (<http://www.best.bc.ca/>), and the provincial government worked together to reduce idling at ferry terminals, schools and workplaces. The program involved several different aspects of implementation including, outreach, education and implementing an idling bylaw. Volunteers distributed anti idling window decals and confronted idling drivers and asked them to sign an anti-idling pledge. At schools, student volunteers informed idling parents about the downfalls of idling. At the workplace, emphasis was put on the potential monetary savings involved with reducing idling in fleet vehicles. As well, the campaign focused on the recognition that companies could receive for their leadership.

The Northern Climate ExChange (<http://www.taiga.net/nce/>) is an organization focusing on circumpolar climate change in the North that introduced an anti idling program in Whitehorse, YT. The program focused on three main benefits to minimizing idling in Whitehorse including, saving money, reducing greenhouse gas emissions and preventing wear and tear on vehicles. The organization created 140 idle free areas in the community including parking lots, drop off zones, schools and delivery areas. Idle free signs were posted in these areas, reminding motorists to turn off their engines while in these zones. Also, parents were reminded to turn off their engines at schools.

Alternative Transportation: Increased bike trail system and biking infrastructure

In an effort to reduce GHG emissions associated with transportation in Fernie, further effort could be put forward to increase and improve bike infrastructure and facilitating alternative transportation options throughout the community. Better infrastructure can increase ridership; communities with extensive bike lanes have experienced an increase in use for commuting purposes by 3 times. The Province of BC has developed a biking initiative entitled Bike BC, which provides funding opportunities to municipal governments wanting to improve their biking infrastructure, including bike lanes, trails and lockers.

Recommendations:

Provide bike facilities (i.e. racks, storage rooms at businesses, etc.) to encourage bike commuters and local bike transportation.

Amend Road Design Standards to include bike lane development on major roads within the City.

Encourage alternative transportation through the continued education and promotion of existing programs such as Commuter Challenge, Walk to

Work Week and Bike BC.

Cost Effectiveness: Infrastructure would have to be created for this program, and as a result, there are costs involved, there are some funding opportunities available for this type of project. Applications for 2009-2010 funding are available through BikeBC's Cycling Infrastructure Partnerships Program. Applications and information are available in Appendix F, or at <http://www.th.gov.bc.ca/BikeBC/CIPP.html>.

GHG Emission Reduction Potential: This program has the capacity to reduce fuel consumption again by an additional 10% as with the Idle Free program. The possibility for even greater reduction exists if the program is successful for more residents in the community. Promotion and education will increase the participation in the initiative, and result in increased GHG emission reduction, improved air quality and general improved health and fitness of the community.

Ease of Implementation: There is potential for barriers associated with behavioral change in terms of encouraging people to get out of their cars and engage in active transportation. Creating additional bike lanes would require planning from several departments at the City of Fernie, and may also require amendments to road design standards for some neighborhoods or core streets. Partnerships should be developed with existing groups, such as the Fernie Mountain Bike Club to tie in existing trails to a core trail and bike-lane network.

Application in Fernie

Improvements to existing trails and an increase in trails within and surrounding the city will promote further biking as a means of transport within the City. In addition, making the downtown core more bike-friendly by increasing the number of bike racks available to cyclists will aid in making biking a more viable transportation option for community members.

Case Study and Contact Information

Kimberley and Cranbrook, BC

The City's of Kimberley and Cranbrook, BC have partnered together along with Canadian Pacific to convert an unused rail line running between the two City's into a useable bike trail. The trail has been developed to provide a means of alternative transportation between the City's as many people make the daily commute between Cranbrook and Kimberley.

Niagara Falls, ON:

The City of Niagara Falls has a series of bicycle routes and paths that offer casual riding opportunities or rigorous workouts. The trails allow for easy commuting throughout the city. <http://www.canadatrails.ca/tct/on/niagarariver.html>

Gas Lawnmower Trade In Program

Although not a 'vehicle', the opportunity to reduce greenhouse gas emissions through the reduction of gas lawnmower use is significant, and relatively easy to implement, and so is included in the community reduction strategy.

The Clean Air Foundation encourages Canadians to reduce their greenhouse gas emissions through a program entitled Mow Down Pollution. This program encourages Canadians to retire their old gas lawn mowers and trimmers, which are greenhouse gas emitting culprits. The program runs at The Home Depot for ten days during the spring. Old lawnmowers and trimmers can be exchanged for an instant rebate on a new push reel, electric, cordless electric, low emission gas mower or trimmer. You do not have to purchase a new piece of equipment if you simply want to have your old gas operated mower or trimmer retired. Since the program began in 2001, 26 800 pieces of gas powered lawn equipment have been retired and permanently recycled. The program runs an annual equipment collection event at Home Depot. However, many of the equipment recycling outfits have agreed to accept mowers and trimmers year round.

The operation of a gas powered lawn mower for **an hour** can emit as many harmful air pollutants as a brand new car that has **driven 550 km**. Annually, in Canada, approximately 80,000 tonnes of emissions are released from gas powered lawn equipment. The most environmentally sound alternative to a gas powered lawnmower or trimmer is the reel push mower. However, this type of equipment is not practical for those living in rural areas with large lawns. In such cases, homeowners can resort to a four stroke engine with a spill proof can; this option emits less greenhouse gases in comparison to the traditional alternative.

It would be beneficial to the Greenhouse Gas Reduction Plan to encourage local residents to participate in the Mow Down Pollution Program. As mentioned above, gas powered lawn mowers are major contributors to greenhouse gas emissions and residents of the City of Fernie utilize these machines to trim their lawns in the summer months. With a reduction in the number of gas powered lawn mowers that are used in the City of Fernie, there will be a reduction in the areas greenhouse gas emissions.

Recommendation:

Implement a lawnmower exchange program, in coordination with local retailers, or through the municipal government to encourage the use of reel, or four-stroke engine mowers.

Provide a 'loan' mower at City Hall, or a resource centre to allow interested homeowners test a reel, or push mower.

Cost Effectiveness: This program has minimal costs involved as it has been implemented successfully in other communities, and there are



City of Fernie Greenhouse Gas Emissions Reduction Plan

opportunities for funding. However, there are costs involved to the consumer should they choose to replace their old piece of lawn equipment. In addition, transportation costs will be involved as the nearest Home Depot is located in Cranbrook, BC. Opportunities for a partnership with a local retailer may be an option.

GHG Emission Reduction Potential: Environment Canada estimates that 10% of Canada's greenhouse gas emissions are generated from off road gasoline powered engines, including lawn mowers and trimmers. Annually, each gas-powered lawn mower creates 48kg of GHG emissions. Consequently, this program provides good opportunity for greenhouse gas emission reduction, despite the fact that it may take a few years to notice a result.

Ease of Implementation: This program has been proven to be successful in a wide range of municipalities, in fact, 166 Home Depot stores participate in this program nationwide. Resources are available through a website (www.cleanairfoundation.org). The website provides information on the program including greenhouse gas emission stats, a link to The Home Depot site and previous year program success. The closest participating Home Depot to Fernie is in Cranbrook. Fernie residents would have a 10 day window of opportunity to drive to Cranbrook with their old piece of lawn equipment to receive a rebate on a new machine and to have their old one recycled. Also, Farbrook Auto Recycling in Cranbrook, is a member of BC Auto Recyclers Association and will recycle old pieces of lawn equipment throughout the year. Again, investigating the opportunity to partner with a local retailer would be ideal.

Application in Fernie

This program is already in place in 166 communities across Canada where Home Depots are located. There is no Home Depot in Fernie, however there is one in Cranbrook. Consequently, The City could promote the program in Fernie suggesting that residents take advantage of the 10 day long program and bring their old gas powered lawn mower or trimmer to Cranbrook. It could also be emphasized that if residents miss out on the program, that Farbrook Auto Recycling, in Cranbrook, will accept and recycle old pieces of lawn equipment throughout the year. The City of Fernie could partner with The Home Depot, or a local retailer, and promote the program in local advertising.

Another interesting concept that could aid in reducing GHG emissions associated with lawn maintenance is a reel mower rental program. The program could be run by the City, which would purchase 2 or 3 reel mowers, to be rented out to members of the community on a need basis. This program is ideal for the smaller lawns in Fernie. Not only would this program contribute to GHG emission reductions but it would also promote active living and a sense of community.

Case Study and Contact Information

The Clean Air Foundation website (www.cleanairfoundation.org) highlights the program success from previous years. In addition, the website lists the net emission reductions from year to year.

Since the program began in 2001, the number of recycled gas powered lawn mowers and trimmers has been increasing exponentially. The 2007 campaign experienced a record number of retired inefficient machines with a value of 5,700 recycled pieces of equipment. Currently, the 2008 results are not available.

Community Waste

Total Emissions: 2644.25 t CO₂e

Waste collection is a service provided by the Regional District of East Kootenay. Behavioural changes, and education and awareness could be implemented by the City of Fernie, however changes to the waste pick-up services, or implementation of a new service (such as curbside glass recycling, or organic waste) would need to be coordinated with the RDEK. The following recommendations would significantly reduce waste within the community, and were discussed extensively with the community at the Workshop in January 2009. There is a great interest in alternative waste services, and waste reduction within the community.

Organic Waste Collection

The waste sector of Fernie's GHG emissions contributes to 2296 t CO₂e of the total 46 278 t CO₂e. Although this contribution is small (4.96%) to overall GHG emissions at the community level, there is ample opportunity to reduce this value and consequently contribute to the overall GHG emission reduction goal at the community level. In Canada, nearly 50% of our household waste is organic and compostable. Currently in Fernie, very little home composting occurs primarily due to the abundance of wildlife in the area. However, composting at the community level, offers a safe and effective way to reduce the amount of solid waste that is transported to Lethbridge, AB. As well, such a program would reduce the number of trips, and, as a result, GHG emissions associated with waste transportation to Lethbridge. Reduction benefits beyond solid waste management are possible including GHG reduction potential as decomposition of waste would shift from anaerobic (primarily methane byproduct) in a landfill to aerobic (primarily carbon dioxide byproduct) in a properly churned composting system. Methane has a global warming potential 21 times greater than carbon dioxide. As a result, carbon dioxide is a more favourable byproduct when a byproduct is inevitable. Generally, the quantity of GHG emitted from aerobic decomposition is less than that of anaerobic decomposition.



Exact emission reduction by organic waste diversion is difficult to quantify, however the State of California suggests that for every tonne of organic food waste diverted from landfill to a composter, there is a reduction of one tonne of GHG emission. Or, every tonne of dry food waste sent to a landfill can create 0.25 tonnes of methane in its first 4 months of decomposition quantifying into a CO₂ reduction of 6 tonnes if properly composted (USCC, 2008). The Regional District of East Kootenay's Waste Service states that the community of Fernie produces approximately 5486 t of waste annually. As a result of these figures, there is obvious potential for GHG reductions in Fernie's waste sector.

In addition to reducing GHG emissions by diverting waste into compost other benefits include; less reliance on national peat reserves, and consequently, less extraction of peat, which has many negative impacts including effects on reservoir water quality. In addition, utilizing compost may result in improved soil health, reduced soil loss, increased water storage and infiltration and a reduction in inputs of contaminants.

Recommendations:

Conduct a feasibility study for the implementation of a curbside composting program.

Encourage the composting of yard waste. Consider banning organic yard waste from the landfill (i.e. household waste pile at the Transfer Station).

Education and awareness around safe backyard composting opportunities, and vermicomposting programs.

Cost Effectiveness: In order to implement and run a curbside composting program there would be significant costs involved. A feasibility study should be conducted, but some of the costs include: the purchasing of composting carts or bins (but could then be leased or sold to participants at a price that could help divert the cost of the cart); City or municipal resources such as vehicles and staff, and other pieces of equipment, such as building supplies and tools would be required to build and maintain the compost pile. Many of these resources are currently available due to the similarities between solid waste management and composting. Grants are available to help fund this program through a variety of organizations that support greenhouse gas reduction which would help pay for costly facilities. In terms of providing backyard or vermin-composting options, municipalities could provide the materials, or at least resources at little to no cost for residents in the community to implement voluntarily.

GHG Emissions Reduction Potential: An organic waste collection program would assist in solid waste management issues. Waste diversion has large GHG reduction potential as decomposition would shift from anaerobic to aerobic. Reduction results will be realized in a few years time from implementation. Estimated reduction is 450 t CO₂e.

Ease of Implementation: This type of program has proven to be successful in a variety of municipalities across Canada. As a result, there are plenty of resources available for all types of systems and programs. The public is aware of such programs and there has been community interest in an organic waste collection program at community consultations.

Application in Fernie

Compost piles are attractants for scavenging animals such as bears. With a dense population of bears in the Fernie area, residents are skeptical to collect compost in their yards. Consequently, home composting is sparse in this area. Organic waste management can be a success in the Fernie area despite the presence of wildlife, if it is properly managed and maintained. In addition, there are several methods available for storing the compost, some of the methods, which are described below, contain the organic material in a container which eliminates odour.

There are options for Fernie to consider when it comes to the schedule and logistics of the program as well as storing the compost. When considering pick up, other communities within Canada have utilized different methods. Large composting carts (similar to recycling carts) could be purchased and rented out to participants. These carts are filled by the participants in their backyards and there is a pick up of the contents by a large truck that empties the contents immediately into the truck. Another option includes having participants purchase smaller bins with more frequent curbside collection. Thirdly, the responsibility could be placed entirely on the participant by having them drop off their organic waste themselves during set drop off times.

In Canada, communities tend to choose from two processing systems; either a compost pile/windrow system or an in vessel system. The first option has proven to be successful in many communities including areas that are constantly dealing with wildlife issues such as Whitehorse, YT. Generally, the pile is located in an isolated area such as at a landfill where attractants already exist, and often, the pile is surrounded by a barbed wire or electric fence in attempts to keep animals out of the area. The pile is also churned often to encourage aerobic decomposition and to minimize odours. In-vessel storage implies that the decomposing organic matter is stored inside a vessel which indicates that the process is clean and odour free. This process is highly effective, but is the more costly of the two systems.

City of Fernie Greenhouse Gas Emissions Reduction Plan

Case Study and Contact Information

The Community Compost Program has been proven successful in places all over Canada including St-Henri, PQ and Victoria, BC. Success stories are highlighted below:

The City of Whitehorse originally began their curbside composting program as a pilot project in 2000 with 250 volunteer households. In 2001, another community was added to the program and by 2002 the program existed to all curbside collection areas. Surveys suggested that participation in the program was low due to inconvenience of bagging composting. Consequently, by the spring of 2009 every household along curbside pickup routes will have wheel carts for compost and garbage pickup. Wheel carts have proven to be most convenient for participants as well as for city waste collection staff. Residents will receive a cart for garbage and a compost pail and cart. Pickup occurs bi-weekly for each type of waste. There are no costs for program participants due to funding provided by the Federation of Canadian Municipalities (\$75 000) and a legacy grant provided by Canada Winter Games (\$40 000). The curbside compost is collected bi-weekly and brought to the landfill where it is introduced into a windrow system. The program accepts all types of organic waste including food waste, cooked and raw meat, soiled paper and yard waste. After a year's time in the windrow system, the compost is done and ready for sale.

Municipal waste in **Banff** is transported to the Calgary landfill. Of the thousands of tonnes of waste transported, until recently, nearly 50% of it was food waste. Banff is situated within Banff National Park, as a result, backyard composting in the municipality is not permitted due to the abundance of wildlife in the area. In order to address waste disposal costs, the Municipality of Banff developed a bio-solids composting facility, commissioned in 2003 for a cost of \$3 981 416. Compost was first produced at the facility March 23rd, 2003. The facility offers many benefits to the municipality, for example, with the composting program, less waste will be transported to Calgary, saving money and reducing GHG emissions associated with waste transportation. In addition, with the diversion of organic waste, the municipality is cutting back on their greenhouse gas emissions as less methane is being produced by the anaerobic decomposition of waste. In 2007, based on provincial government protocols, Banff was eligible to claim 17,490 tonnes of greenhouse gas offset credits. In 2008, Town Council voted to sell their offset credits gaining \$500,000 in revenue to go towards other environmental initiatives.

Coop la maison verte (<http://www.cooplamaisonverte.com/>) and Eco-Quartier have worked together to create a community composting program with the intention of reducing soil contamination, greenhouse gas emissions and diverting organic waste from landfills. Community members can participate in the program for the low cost of \$5 a week, and can enjoy a discounted rate if they sign up for 3 months of service. This service fee includes the provision of a recycled compost container, cornstarch bag liners, required reading material and weekly pickup. Pickup is a simple process for participants; all that is required is that they place their buckets in front of their houses. The bucket's contents are then dumped into a large truck, the bucket is cleaned and the liner bag is replaced. Once the truck is full, the organic material is dumped at the composting site to an outdoor pile. Organic waste is piled and mixed on a platform and is turned once a month to aerate the waste with a mechanical shovel. This method of composting produces high yields and is cost effective in comparison to windrow composting. However, a leachate treatment system is required as the pile is exposed to precipitation (<http://www.enviroaccess.ca/techno-27-en.html>). Consequently, piles should be placed near a waste water treatment facility.

As part of **The District of Nanaimo's Solid Waste Management** program, the Zero Waste initiative will attempt to divert 75% of the District's waste out of the Regional Landfill by 2010. Organic waste diversion into a resource and consequently conserving valuable landfill space are the two main mandates proposed to achieve waste diversion targets. In 2004 a waste composition study determined that 34% of RDN's waste is organic and compostable. As a result, an Organic Diversion strategy was developed focusing on commercial and residential food waste diversion. In 2007, a one year residential food waste pilot project was conducted to provide valuable information for the creation of a curbside food waste collection program. In total 2 000 homes were selected to participate in the pilot project based on recommendations from a consulting firm so to incorporate urban, suburban and rural residents. Participants were provided with a kitchen catcher and a large curbside cart to be collected on a weekly basis with other waste and recycling. The waste was transported in a split-packer truck with a food waste compartment to International Composting Corporation's processing facility. At the processing facility waste is introduced to an in vessel system which produces compost, fertilizer and soil amendments that all meet international standards. The pilot project proved to be successful and a RDN wide curbside compost collection program is expected to be available to residents by 2010. The Federation of Canadian Municipalities provided \$90 000 in funding for the pilot project. An equal amount of funds were supplied by the RDN.

General Waste Reduction Awareness and Policies

There was a great deal of interest from the participants in the Community workshop regarding waste diversion and reduction in Fernie. The following strategies have been implemented in other communities, and would significantly contribute to the reduction of local waste production.

- Encourage the reduction of the use of plastic bags at all retail stores in Fernie. Consider enforcing a voluntary ban.

The community of **Leaf Rapids, Manitoba** was the first community in Canada to develop a bylaw banning the use of disposable plastic bags. The bylaw came into effect in 2007. See Appendix E for the Leaf Rapids bylaw.

- Implement a FreeCycle or Reuse shed at the Fernie transfer station.
- Promote and advertise waste reduction events, such as Waste Reduction Week, or Zero Waste days (see: Recycling Council of BC <http://www.rcbc.bc.ca/>)

Summary of Community Reduction Strategies

Table 13 summarizes the reduction strategy recommendations for community emissions. Where possible, the potential emission reduction were quantified, however it should be noted that the actual reduction potential is highly dependent on the success of education and awareness programs.

One of the general recommendations noted in the table is the development of a resource centre, coordinated either through the City of Fernie or a community organization, to provide a centralized location for access to energy and emission reduction information. This, along with the identification of champions for this project within the City will ensure the success of the reduction strategy. It is important for the implementation stage that residents are aware of where to access resources, how to implement the strategies, and what support exists to help them take action.

Table 13: Summary of Emission Reduction Strategies for the Community of Fernie

Sector	Recommendation	Reduction Comments
Residential Buildings	Develop development guidelines or policy that encourages or requires all new residential homes to meet minimum energy efficient standards. Consider setting a standard of EnerGuide 77 or 80 (Built Green Gold or Platinum, respectively) for new buildings. Develop sustainability or energy efficiency guidelines for new developments. Amend existing bylaws, policies or building codes to allow for sustainable and low impact development strategies.	Approximately 700 t CO ₂ e reduction. Further assessment should be done based on actual building starts in the future.
	Provide local residents with the tools and resources necessary to facilitate residential retrofit programs such as: website of audit links, funding sources, etc. Consider providing incentives for energy audits (i.e. financial incentives or provision of energy efficient fixtures), and promotion of ecoEnergy audits and retrofits	Approximately 1200 t CO ₂ e based on successful implementation of simple, and comprehensive (i.e. audits) actions.
	Increase participation in the Team Power Smart program in Fernie. Encourage at least 100 homeowners to join and reduce their energy consumption by 10%.	Likely majority of energy reduction will be electricity; potential for 200 t CO ₂ e reduction. Should be monitored and tracked with Power Smart
	Establish a resource centre, located at a municipal building or other centrally located space, where materials, grant applications and other 'green home' resources are available. Offer incentives to builders who build to higher energy efficient standards. Dedicate a webpage or link to tracking participation in the various programs offered to the community. Provide on-line resources and links to facilitate individual action, and to provide a centralized location for all residential-related reduction opportunities. Promote SolarBC incentive and rebate program for solar hot water heaters	Education and Awareness based initiatives; It is assumed that actions taken based on successful implementation of these recommendations will result in emission reductions.
	At least 60% of lodgings in Fernie participate in an energy or environmental rating program.	Potential 30% energy savings from retrofits associated with these programs; approx. 1000 t CO ₂ e reduction across the sector.
	Engage commercial, retail and small businesses in an energy audit and assessment of energy reduction opportunities. Provide the tools and resources necessary for the commercial sector to access incentives and rebates for energy retrofits.	Primarily education and awareness based; small GHG reduction potential.

City of Fernie Greenhouse Gas Emissions Reduction Plan

Transportation	<p>Continue to promote Fernie as an Idle Free community.</p> <p>Work with local residents and organizations to deliver information through workshops, local media, schools and businesses.</p> <p>Monitor (through surveys, observation, data collection), the successes and behavioral change as a result of Idle Free signage and awareness initiatives.</p>	<p>Potential for 5% improved fuel efficiency. 500-1000 t CO₂e reduction in emissions possible.</p> <p>Requires monitoring, as reductions will not be captured by future Provincial inventories.</p>
	<p>Provide bike facilities (i.e. racks, storage rooms at businesses, etc.) to encourage bike commuters and local bike transportation.</p> <p>Amend Road Design Standards to include bike lane development on major roads within the City.</p> <p>Encourage alternative transportation through the continued education and promotion of existing programs such as Commuter Challenge, Walk to Work Week and Bike BC.</p>	<p>Additional 10% fuel use reduction possible. Increased interest and participation in the initiatives may result in greater reductions.</p>
	<p>Implement a lawnmower exchange program, in coordination with local retailers, or through the municipal government to encourage the use of reel, or four-stroke engine mowers.</p> <p>Provide a 'loan' mower at City Hall, or a resource centre to allow interested homeowners test a reel, or push mower.</p>	<p>Small reduction potential overall. Very worthwhile for fuel savings and emission reduction for health.</p>
	<p>Conduct a feasibility study for the implementation of a curbside composting program.</p> <p>Encourage the composting of yard waste. Consider banning organic yard waste from the landfill (i.e. household waste pile at the Transfer Station).</p> <p>Education and awareness around safe backyard composting opportunities, and vermicomposting programs.</p>	<p>At least 450 t CO₂e reduction based on 1/3 of resident participation.</p> <p>Potential for greater reductions with enhanced education regarding waste diversion.</p>
Waste	<p>Encourage the reduction of plastic bag use at all retail stores in Fernie. Consider enforcing a voluntary ban.</p> <p>Implement a FreeCycle or Reuse shed at the Fernie transfer station.</p> <p>Promote and advertise waste reduction events, such as Waste Reduction Week, or Zero Waste days.</p>	<p>Awareness based actions; reducing plastic bags will significantly reduce landfill waste over time.</p>
Emission Reduction Potential	Quantified:	5050 t CO₂e
	<p style="text-align: center;">Estimated (Behavioral/Policy Based):</p> <p>**For community emissions, it is very difficult to predict participation in initiatives, or tendency for behavioral change. Initiatives should be monitored over time to determine accurate reduction potentials.</p>	<p>Potentially up to twice quantified amount upon successful implementation and participation in initiatives.</p>



Conclusions

The City of Fernie has committed to demonstrating leadership and environmental stewardship through a number of initiatives. The GHG Emission Reduction Plan is one example of this leadership. The next steps of this process will focus on implementation of the recommendations, and monitoring to measure and assess the success of the programs.

City of Fernie Council will work with staff and the community to successfully implement programs that achieve a sustainable community. The benefits are many, and it is hoped that through the process of developing a GHG emission reduction plan, the City will foster a community that is energy efficient, sustainable and resilient.

Appendix A

**Community Engagement Proceedings
from the GHG Emission Reduction
workshop that took place in Fernie, BC
on January 29th, 2009.**



Meeting Proceedings from:

Greenhouse Gas Emissions Reduction Plan Community Input Session

January 24th, 2009
Fernie, BC





Greenhouse Gas Emissions Reduction Plan Community Input Session

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The logo features a stylized tree with its branches forming a circular shape, set against a background of a textured, brownish paper. The text "Greenhouse Gas Emissions Reduction Plan Community Input Session" is written in a dark brown, sans-serif font across the top of the page.

Greenhouse Gas Emissions Reduction Plan Community Input Session

Special Thanks and Acknowledgements

The Community Input Session was a great success and significantly due to the incredible participation by the community of Fernie. I'd like to thank all of those who attended the session; your input is valuable and demonstrates commitment to helping shape our community one for a sustainable future.

A special thanks to the volunteers from that night, including: Ashley Graham, Katherine Orr, and Tracey Chala. These were the leaders during our breakout sessions, and were a great help in the preparations before the event.

The food was delicious; fresh bread and chili was made by the Corner Pocket, located at Fernie Alpine Resort. Desserts, coffee and tea were provided by Mugshots, downtown Fernie.

Thank you to the College of the Rockies, Fernie Campus for providing the space for this event.

And finally, a big thanks to the funders that have contributed to this project over the past year, as well as directly to the Community Input session. These funders include: Federation of Canadian Municipalities (Green Municipal Funds), Community Action on Energy and Emissions, and the City of Fernie.



Greenhouse Gas Emissions Reduction Plan Community Input Session

Community Input Session: Background

The City of Fernie Greenhouse Gas Emissions Plan has been in the works for the past year. As a two-year project, this plan was initiated after the City of Fernie signed Partners for Climate Protection (PCP), followed shortly after by the Climate Action Charter. As a signatory to PCP, the City of Fernie has engaged in a process of developing a greenhouse gas emissions plan in partnership with Megan Walsh, Program Manager of Wildsight's Climate Solutions for the Kootenay program. The PCP program guides municipal governments through five milestones, the first three (indicated in bold below) of which are encompassed by the project with Wildsight. The five milestones are:

1. Develop a baseline inventory of emissions

2. Set reduction targets

3. Develop a GHG reduction action plan

4. Implement the reduction plan

5. Monitor and measure progress

The baseline inventory of emission for the community and municipal government for 2006 was completed in fall of 2008 and presented to city council for approval. Research has been on-going of potential reduction initiatives for the reduction of community and corporate emissions, however input from staff and the community are integral in the development of a successful emissions reduction plan.

The community input session took place on January 29th, 2009, and was attended by about 50 community members from varying backgrounds. There was representation from Mayor and Council, from non-profit, from the business sector, from temporary and very long-term residents, local consultants and other interested citizens.

All of the comments and input provided throughout the community input sessions have been compiled in this report. All comments have been read and incorporated into the database of potential initiatives. The next step is to quantify as best as possible the potential emission reduction, the ease of implementation and the cost of each initiative. An action plan will be developed, and suggested implementation timelines will be provided to the City of Fernie. The following sections outline the information that was presented during the community input session, and summarizes the comments and input collected through the breakout sessions.

Overview of Information Presented: Part 1 (~60 min)

The first section of the community engagement covered the process of developing a greenhouse gas emission reduction plan, the commitments that have been made by the local government, and an overview of climate science.

The purpose of this engagement process was to:

- Gather input into the development of reduction strategies and recommendations
- Gather local 'citizen science'
- Develop initiatives that meet the needs of residents
- Inform communities of challenges and opportunities with the respect to climate change

The following key points describe the commitments and frameworks that are guiding the development of the GHG emission reduction plan:

- This initiative is part of Wildsight's Climate Solutions for the Kootenay program, and is a two-year project that is following the Five-Milestone process identified above.
- The process is supported through Federal, Provincial and Local funding including: Community Action on Energy and Emissions; Natural Resources Canada; Columbia Basin Trust; Wildsight; and the City of Fernie.
- There are several commitments that the City of Fernie has made that require climate action. These include: Joining Partners for Climate Protection (May 2007); Signing the Climate Action Charter (Fall 2007)
- Provincial legislation has been passed to require that municipal governments incorporate greenhouse gas emission reduction targets, goals and strategies into their Official Community Plan.

Beyond the commitments that have been made by the Provincial and Municipal governments, it is widely acknowledged that changes in our climate to some degree is inevitable; it is more cost effective to be proactive. Taking action to reduce local greenhouse gas emissions means better air quality and reduced health issues associated with emissions. Finally, taking action to reduce energy consumption and increasing efficiency means money is saved by residents and the City.

Greenhouse Gas Emissions Reduction Plan Community Input Session

Climate Change 101

Climate change is defined by the Intergovernmental Panel on Climate Change (2007) as:

A change in the state of the climate that can be identified by changes in the mean or variability of its properties, and that persists for an extended period (decades, centuries).

This can be stated simply as:

- Changes that are unusual
- Changes that are not within the expected variability
- Last longer than weeks or months
- Caused by natural or human activities

Scientists are observing a change in climate that is significantly different than historical records demonstrate. Figure 1 (Global Temperature Time Series) demonstrates the dramatic trend of temperature increase. Global models from later 1800's to early 2000's demonstrate a similar story, that there is dramatic increase in temperatures and that the trends suggest a continuing warming. The characteristics of change as observed by scientists include:

- At a rate greater than ever observed in history before
- Consequences more dramatic and potentially catastrophic than historically
- At a rate that may be too fast for species to adapt (including humans)
- "Unequivocal" warming - dramatic changes in sea level/temp, glacier retreat, global temps

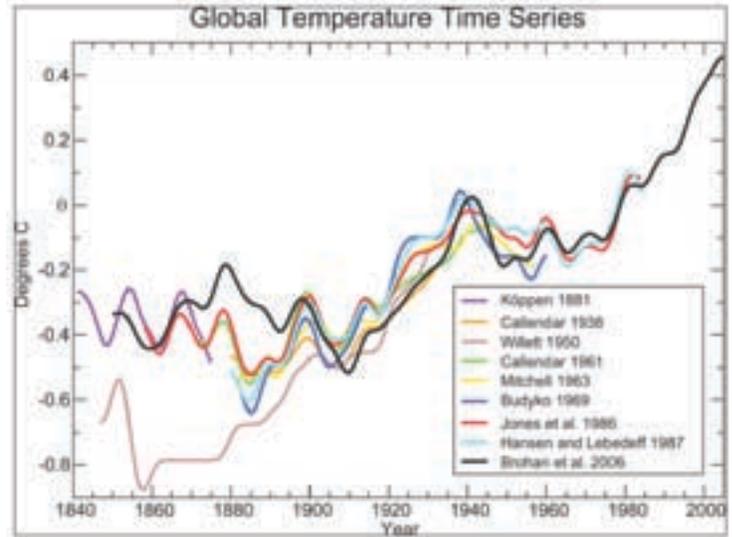


Figure 1

Globally, there are visible impacts of climate change that are playing out today. When considered, impacts of climate change can be recognized locally, in Fernie. The next section of the engagement identifies those changes.

Community Input Opportunity #1

In breakout groups of about 12 participants, facilitators guided a brainstorming session to determine what observations residents have made that might be attributed to a changing climate. This was an extremely informative exercise, as there was input from residents that were born and raised in Fernie, as well as those that had recently moved to Fernie. Participants contributed observations that they had made from their own hometowns, as well as from Fernie and area.

Participants were asked two questions:

1. What is different today than what you remember in years or decades past?
2. What have you observed in the backcountry, your garden, the air, the water, etc. that you think has changed (for better or worse)?

The following table outlines the observations that were made by the participants:

The City landfill has improved waste management.
There is now less idling of vehicles.
There has been an increase in mosquitoes.
There has been an increase in algae/scum alongside the river, possibly as a result of increased use of fertilizers.
There have been changes in ice flow in the Canadian Arctic.
There have been drier, longer autumns and later, cooler, wetter springs.
There has been a loss in the glacier behind the Three Sisters Mountain.
There are now fire bans and/or restrictions in Fernie (July onward).
There has been an increase in the water temperature (i.e. in the Elk River).
We have noticed an increase in species outside their range.



Greenhouse Gas Emissions Reduction Plan Community Input Session

Changes in the populations of animals (No more porcupines, decreased #s of frogs, salamanders, increased #s of badgers & gophers).

There have been changes in the snow pack (snow fall has generally decreased), and there has been an increase in snowmaking.

The South Country is generally drier and warmer in the summers.

There has been an increased amount of scarred fish as a result increased boating and recreational activity on the river.

There has been an increase of severe/catastrophic weather patterns out of the norm: i.e. more hurricanes in Eastern Canada, Tornadoes in the prairies.

There has been an increase of invasive species (i.e. Pine Beetle infestations in Fernie area).

Mountain Caribou have become critically endangered.

There is now water rationing in Fernie in the summers.

The selenium content of the Elk River has increased.

Tree rings are not as wide; therefore trees are not growing as quickly.

The winters in Fernie have been generally colder, and there are more extreme high temperatures in the summers.

There are now squirrels in Fernie when previously there weren't.

There are more deer in town then previously.

Industries such as Mining have been expanded.

Car companies have been releasing larger, more inefficient vehicles.

There are fewer bees around.

Urban development has been taking over green space (in Fernie and elsewhere in Canada).

Our wetlands are disappearing, and therefore water runoff is causing flooding because there is a lack of natural drainage.

BC Forests are losing biodiversity and becoming monoculture.

Fernie's city water is more turbid.

There are significantly more people in British Columbia.

There is a decrease in land being used for agriculture.

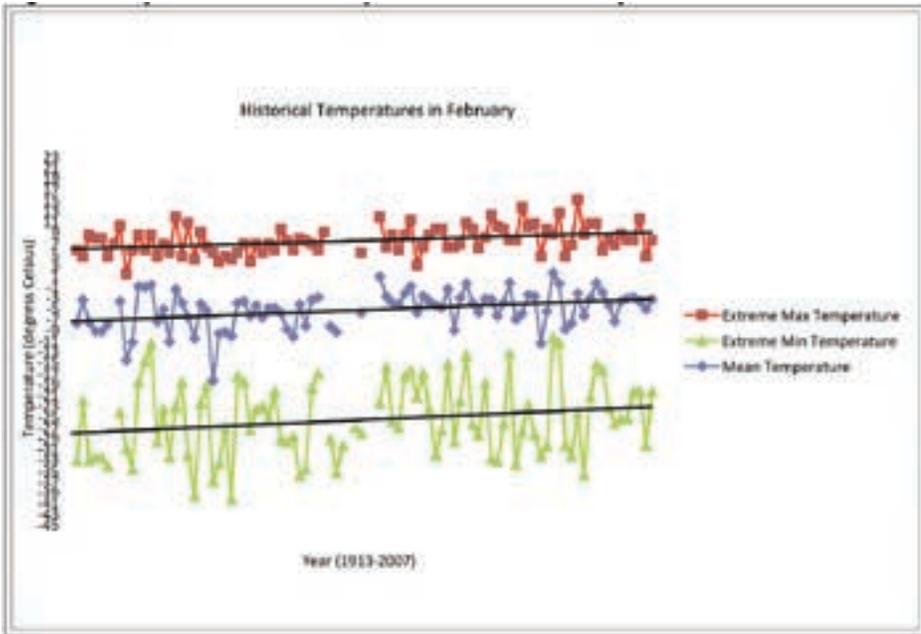
Historical Climate Trends in Fernie

It was clear from the observations that were made by the participants that there is a recognition that change is occurring in our community, and that the trends are variable and mostly unpredictable.

These observations were validated with some historical climate data that has been compiled from records dating back to the early 1900's. The following figures are a sample of the data, indicating trends towards warmer, or less cold temperatures and a change in precipitation. The impacts of these changes may play out in reduced streamflow and water availability in late summer months, a change in the snowline, shift in seasons and a change in the composition of species and ecosystems.

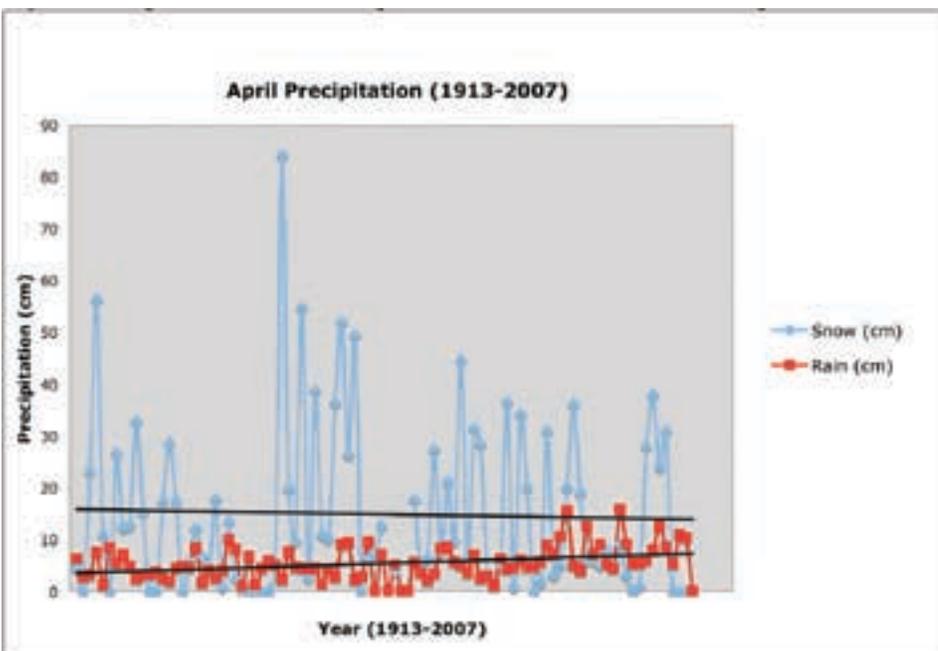
Greenhouse Gas Emissions Reduction Plan Community Input Session

Figure: Example of Historical Temperature Trends: February 1913-2007 in Fernie, BC.



As can be seen from the Figure above, the coldest years have become less cold over time, however there is still considerable variation. This has implications for pests such as the pine beetle, which have historically been controlled by extreme cold temperatures during the winter. We have seen an increase in their populations as a result of several variables, one of which is the lack of extreme cold. The figure below demonstrates the trend for precipitation in Fernie during the month of April.

Figure: Example of Historical Precipitation Trends for Fernie, BC for April 1913-2007



Greenhouse Gas Emissions Reduction Plan Community Input Session

The general trend for precipitation is an increase during the winter, and decrease during the summer. Of course, as temperatures increase in the winter, this precipitation may fall more often as rain than snow, resulting in a reduced snow pack. A reduced snow pack means that less water is held in the alpine as storage for the spring and summer months. The snowpack feeds tributaries and rivers throughout the summer, and for many communities (such as Fernie) is a significant source for domestic water supply.

The trends and data for precipitation, snowpack and temperature should be carefully monitored in the future. There may be a need to implement water conservation measures, or community monitoring to ensure we are aware of our water supply.

For more information on trends for a range of sectors across British Columbia, Pacific Climate Impacts Consortium has been working with the Royal BC Museum to publically present and showcase models and projections for future climate.

This can be accessed at: <http://pacificclimate.org/resources/climateimpacts/rbcmuseum/>

Overview of Information Presented: Part 2

Part Two of the community engagement was focussed on the inventory for the community, and most importantly, on gathering input from the community on potential reduction strategies.

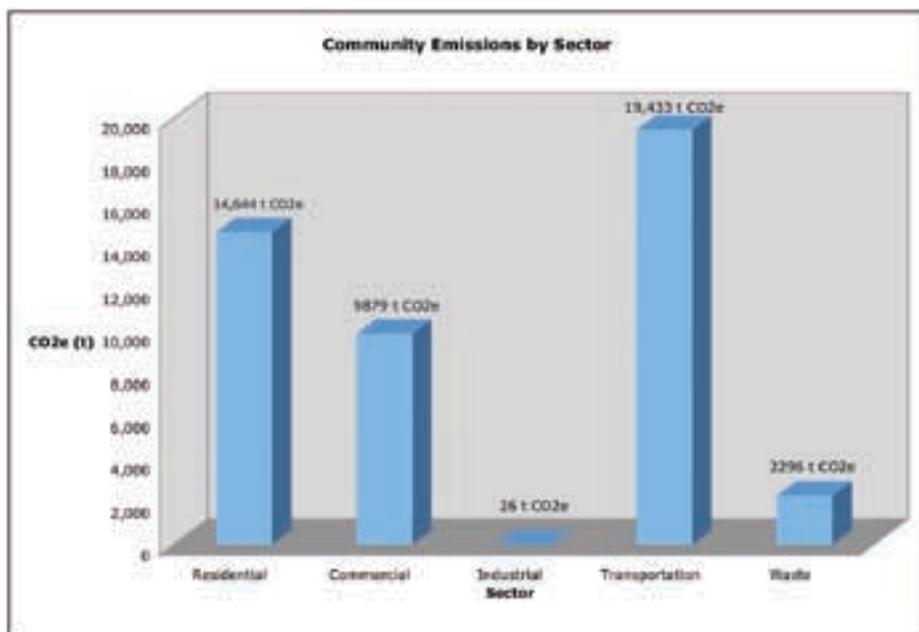
Inventories are developed to provide a baseline off which emission reductions can be measured. For the community of Fernie, the following five sectors were included in the inventory:

- Residential Buildings
- Commercial Buildings
- Industrial Buildings
- Waste
- Transportation

The inventory for Fernie, and for every community throughout the Province is being completed by the Ministry of Environment. The Community Energy and Emissions Inventory is an initiative that the Province has taken on which provides communities with inventories that have been completed using the same protocol so that inventories can be compared equally between communities. The initiative also helps local governments satisfy requirements by Bill 27, Local Government Act, of incorporating greenhouse gas emission reduction targets and strategies into their official community plan.

The following table summarizes the inventory results for the community of Fernie emissions.

Figure: Summary of Community Emissions for Fernie, BC. 2005.



The header image features a textured, light brown background with a faint, circular graphic on the left side that resembles a stylized leaf or a globe. The text is positioned in the upper left quadrant of this image.

Greenhouse Gas Emissions Reduction Plan Community Input Session

Community Input Opportunity #2

The last hour of the workshop was dedicated to brainstorming as many ideas as possible that would either encourage individual actions for reduced emissions, facilitate community-wide change, or influence policies and bylaws. The opportunity for input was left wide open to the creativity of the participants.

The following question was asked of the participants:

What are some initiatives that the City of Fernie/the community could undertake to reduce Greenhouse Gases in the following 4 sectors: Residential buildings, Transportation, Waste and Commercial Buildings?

In small groups, the following ideas were generated. There was some overlap between groups, which was not included here, but overall the session was a great success, with some very realistic and feasible ideas being generated. The following lists are a summary of the ideas that were generated by the workshop participants.

Business/Commercial

1. Create a system of local carbon credits that would support local initiatives.
2. Make the downtown core “Pedestrian Only”.
3. Create educational programs to showcase and teach local businesses how to implement changes and/or modify their policies.
4. Encourage businesses to have “Chemical Free” work environments (free of pesticides, non-biodegradable cleaners, no scents, etc).
5. Create a composting infrastructure for businesses.
6. Create a by-law to limit the building footprint of a business.
7. Create a ban on plastic bags in the town (or potentially a by-law).
8. Create an educational program (or potentially a by-law) to encourage reducing heating temperatures in the winter, turning off lights during non-working hours, etc.
9. Transform the roofs of city buildings to “Green Roofs”.
10. L.E.E.D. certification for commercial buildings (start with a basic level as a minimum).
11. Create a by-law that outlaws idling at drive-thru's.
12. Have “Fernie” Power that invests in renewable energy such as wind, solar, and harnessing power from incineration of wood waste.
13. Have a Green Hospitality Award that provides staff incentives, focusing on waste, water, emissions, etc.
14. Have an Incentive Program with awards and grants.
15. Have community partnerships to build on the Incentive Program.
16. Have an environmental half time show at the local hockey game in order to reach out to those who normally would not hear about these issues.
17. Put information on the Community Channel on Shaw Cable.
18. Have City Council create a public “plug” on Shaw Cable.
19. Create an Energy Waste Audit where the consultant fees are offset by grants.

Waste

1. Curb side glass recycling
2. Worm composting (even as a for-profit endeavour).
3. Financial incentives to reduce grey water (i.e. retrofitting homes with efficient shower heads, front loading washing machines).
4. Measure water inflow and outflow.
5. Solid waste gasification.
6. Construction by-law to enforce low flush toilets.
7. Encourage stores to bring in products with less packaging.
8. Ban on plastic shopping bags, “to go” containers, Styrofoam cups.



Greenhouse Gas Emissions Reduction Plan Community Input Session

9. Organize waste field trips for schools and businesses/employees to understand what happens with our waste, and the full cycle.
10. Stop the export of solid waste to Lethbridge.
11. Make it harder to dump your rubbish, as a result forcing you to create less waste.
12. Implement a “Pay-per-bag” system for household garbage collection.
13. Implement commercial composting for restaurants, supermarkets, etc.
14. Retiring old leasehold vehicles.
15. “Air care” to be BC wide.
16. Encourage a “Waste for Art” initiative.
17. Implement a Free-cycle system.

Transportation

1. Increase public transportation (in particular to the Ski Hill). Use smaller buses that will fill up quicker, but have more of them so they are not driving empty buses up and down the hill at inopportune times.
2. Ban parking on 2nd Ave except for the elderly and disabled people, and have the side streets be for parking. This would encourage people to walk or bicycle to areas within walking distance instead of driving the few blocks to the store.
3. Hire high school students to bike your groceries home for you for a fee.
4. Alternatively, have a bike trailer-making workshop (or a number of them), so that locals can use their bicycles for more things.
5. Put more effort into promoting the car share program in Fernie, or even give funding to this program.
6. Introduce a “yellow” bike program, or a “dial-a-bike” program.
7. Have a “Free Bus” that is sponsored by the City or paid for by advertisers that runs to Tourist Attractions in Peak Season (i.e. the “Fred” bus in Halifax, NS).
8. Have the city work out a deal with Greyhound or other buses between Calgary and Fernie, because as it is right now it is so inconvenient and expensive that many simply drive to Calgary when they would like to take the bus if it were more feasible.
9. Public promotion of the Ride Board (or perhaps setting one up on a larger network, such as Craigslist).
10. Incentives for good transportation practices i.e. Insurance breaks for car poolers, or penalties if you drive by yourself (not sure if Fernie is big enough for this, similar to High Occupancy Vehicle Lanes in larger cities).
11. Yearly safety checks on vehicles would reduce the average age of cars on the roads in Fernie, keeping those with the worst emission records off the road.
12. Car warmers with thermostats or timers so as to reduce wasteful heating.
13. Government rebates to take cars that are over 12 years old off the road and sell them for parts (i.e. Car Heaven). If this already exists in Fernie, then increased promotion of this program.
14. Create a pamphlet on the most energy efficient method for heating your car in certain winter temperatures. I.e. in – 40 degrees, is it better to turn your car on for 10 minutes and warm it up, or to run your block heater for X # of hours. Have these statistics be relevant to something people can relate to (\$\$ perhaps).
15. The city could convert their fleet to all hybrids, bio diesel, or simply smaller cars.
16. City could subsidize replacing old wood stoves for newer, more efficient ones (might already do this one).
17. Incentives to buy hybrid vehicles (i.e. the 1 Ton Challenge).
18. Walk-to-work week for all of the local in town businesses, with Wildsight giving out prizes to the winner.
19. Increased bike parking.
20. Further consideration over the fact that how the city is planned directly effects how transportation is used. I.e. Sprawling subdivisions like the Alpine development and other condo projects do not encourage walking, and lack of sidewalks in the Airport likewise does not encourage walking to town.
21. Consider, as well, subsequent to #20, that infrastructure changes are long-lasting and a good use of city money.



Greenhouse Gas Emissions Reduction Plan Community Input Session

22. Make it easier for people to put solar panels/windmills on their homes/property (they might have come to the conclusion that there are no restrictions on this but I'm not sure).
23. City funded sidewalk plows (or a coalition of in town businesses who split the cost), which would encourage walking, as it wouldn't be as dangerous, especially for the elderly.
24. Hire people to go around to local businesses to get people excited about being green.
25. Doing something about regional/inter-town public transit.

Residential

1. Have by-laws and educational pamphlets that enforce proper sorting of recycling and proper disposal.
2. Switch back to blue bins instead of blue bags, as this will create less waste.
3. Advertise for an eco-garden compost drop off.
4. Have the city use advertising space to inform the public about emissions and solutions.
5. Have a free store at the dump.
6. Implement a tax credit for home renovations that increase efficiency.
7. Educate the public about energy audits or the home, and have credits available to residents who complete audits.
8. Advertise the woodstove exchange (new, more efficient stoves for old, polluting stoves).
9. Have Solar BC provide incentives for solar improvements (if they already do, then further advertisement of this).
10. Making use of scrap wood for district heating cogeneration.
11. "Turn Down The Heat" programs – programmable thermostats.
12. Workshops on insulation and draught prevention.
13. Have the City retrofit a building in Fernie to use as an example for residents.
14. Have a local energy cap and trade system, which could be brought into schools.
15. Educate on the economic return on efficiency.
16. Loans for low-income families to invest in efficiency programs.
17. Have cardboard boxes available at the grocery stores instead of plastic bags.

Outcomes and Next Steps

The Fernie community workshop was a great success in sharing information, gathering citizen science, and generating excitement and ideas around GHG emission reduction in Fernie. Most importantly, the workshop offered the opportunity for members of our community to sit down together for a few hours, and discuss a sustainable vision for the community.

The next steps of the initiative are as follows:

- Summarize Community and Staff Reduction Action Recommendations
- Develop emissions forecasts for community and Municipal emissions
- Develop emission reduction targets for the community and municipality
- Research case studies, best practices for GHG emission reduction strategies
- Compile and finalize Milestone 2 and 3 reports
- Endorsement of reports by Council
- Recognition of Milestone completion by Federation of Canadian Municipalities

We look forward to hosting an Open House once the project has wrapped up. This will highlight some of the reduction initiatives that have been recommended for the City of Fernie, as well as the plans moving forward with implementation.

The benefits of developing a greenhouse gas emission inventory and reduction plan go far beyond meeting targets and saving energy. Ultimately, the project can promote community wide sustainability, increase resiliency and improve quality of life for all visitors and residents of Fernie. It is an ongoing process of awareness and education, but one that ultimately benefits our local community, and our planet.

Appendix B

Policy options and examples for City of Fernie infrastructure GHG reduction. Facilitates the reduction of energy through retrofits and planning for future developments.

Included in this Appendix:

- **Green Procurement Policy for the Municipality of Jasper**
- **Green Building Policy from the Town of Banff for all new municipal buildings**
- **Energy Conservation Policy for the Municipality of Saanich**

POLICY: Environmental Stewardship

Municipal Council and employees of the Municipality of Jasper will demonstrate leadership in environmental stewardship by implementing environmental alternatives and practices and by purchasing environmentally responsible goods whenever practical.

BACKGROUND:

The Municipality of Jasper demonstrates a commitment to environmental stewardship and values environmental integrity. This policy aims to ensure that all Municipal Services, both offered and received are obtained in an effective, expedient and environmentally friendly manner and at the best overall value. This will be achieved by purchasing goods and services that have less impact on human health and the environment, compared to competing products and services that serve the same purpose.

**MUNICIPALITY OF JASPER
POLICY MANUAL**

**CONTROL CODE: D-BB
CATEGORY: ENVIRONMENTAL STEWARDSHIP
GREEN PROCUREMENT**

GUIDELINES

Green Purchasing

The Municipality of Jasper shall choose products that display environmental labelling. Environmental labelling or "eco-labelling" indicates that a product meets standards of environmental soundness and that are supported by extensive research into the product's impact on the environment. Municipal staff shall consider products certified under the [Environmental Choice® Program](#) (ECP) for all purchases. When purchasing products in the following categories: office equipment; appliances; heating, ventilating and cooling equipment; consumer electronics; lighting; signage and commercial and industrial equipment [ENERGYSTAR®](#) products shall be considered. When sourcing and purchasing products, all departments shall consider environmental products listed on the ECP website.

Contracting

The Municipality of Jasper is responsible for the contracting of goods and services on behalf of individual departments. All departments should be responsible for applying green procurement policy for all contracted services.

Green Meetings

Departments within the Municipality of Jasper can reduce environmental impacts in their operations by planning meetings that are environmentally responsible.

All departments will adopt a pollution prevention approach when planning meetings; this will be applied at every stage of the organization process. In lieu of travel a teleconference will be held whenever practical. If conferences, workshops, or meetings are deemed more appropriate, considerations to the location of the meeting, the types of services contracted, and even the commuting mode to and from the meeting will be considered. When practical; administrators, managers, directors and members of council should use laptop computers in lieu of printing meeting materials. All council meeting agenda's and minutes shall be sent electronically to reduce paper consumption. The Municipality of Jasper shall host meetings, conferences and events that minimize impact on the environment by reducing waste, conserving resources and saving energy.

Fleet Vehicles

The Municipality of Jasper shall improve the Municipality of Jasper fleet by purchasing vehicles that reduce fuel consumption and reduce emissions contributing to poor air quality and climate change. When practical we shall:

- Consider EnerGuide fuel efficient vehicles as endorsed by Natural Resources Canada.
- purchase smaller, more energy efficient vehicles that have less environmental impact throughout their life cycle;
- purchase hybrid vehicles that reduce fuel consumption by 15% to 35% versus comparable conventional models, and reduce emissions of key air pollutants by over 50%;
- Optimize vehicle travel, operation, and maintenance;
- Substituting other travel modes, or reducing the need to travel;
- Use low-sulphur gasoline;

APPROVED: June 13, 2006

Res. #127/06

Page 1 of 2

This policy will promote solutions that are affordable, renewable and sustainable. Through reduced fuel consumption and reduction of greenhouse gas emissions The Municipality of Jasper will demonstrate leadership and a commitment to environmental stewardship.

Energy Supply (Power)

The Municipality of Jasper shall reduce its fossil fuel dependence by diversifying the energy supply and supporting environmentally sustainable energy technologies. Upon renewal of our energy supply contract, the Municipality of Jasper shall commit to purchasing the AUMA standard percentage of energy from green sources. Green energy sources shall be chosen from the most environmentally friendly technologies available at the time of contract renewal.

PROCEDURES:

Purchasing guidelines shall take into account key values for the purchase of all goods and services, with respect to environmental impact and in accordance with the Environmental Choice Certification Program. For all purchases where an ECP choice does not exist, the purchaser shall, when pricing out costs, request from the supplier an environmentally friendly alternative for the desired item. Environmental alternatives shall be compared with other product alternatives. When the item meets all regular purchasing criteria and the cost is deemed to be approximately equal (within a 10% margin), the ECP product shall be purchased. The Municipality of Jasper will ensure that a comprehensive examination of goods and services is made before purchase. The Municipality of Jasper will develop a reference list of commonly purchased products, available to all employees. Additions to this list will be added on an on-going basis and according to overall product satisfaction by the department.

For all purchases, the following pollution prevention criteria will be considered valid justification for purchasing an environmental alternative over another product:

- Products are reusable, recycled and/or that are recyclable;
- product is made from highest available recycled material or post-consumer content;
- product is durable and has a long life expectancy;
- product is energy efficient, rechargeable, uses renewable fuels or reduces water use;
- product is less toxic or non-toxic, and is biodegradable;
- products produced locally (reduce shipping and packaging requirements);
- packaging: minimal or no packaging preferred, purchase bulk when available, acquire packaging that is refillable, recyclable, reusable or returnable;
- the product has been approved under the [Environmental Choice® Program](#) and/or has [ENERGYSTAR®](#) certification.

For all purchases, departments will include on all purchasing documentation the Municipality of Jasper Environmental Stewardship Policy Statement:

"The Municipality of Jasper is committed to environmental stewardship and supports environmentally sustainable initiatives. The Municipality of Jasper will always consider environmentally superior products in its purchasing decisions."



MUNICIPAL SUSTAINABLE BUILDING

Policy C106

1.0 POLICY

The Town of Banff will incorporate a standard for all new municipal buildings to meet or exceed the Silver Level certification of the Leadership in Energy Environmental and Design (LEED™) Green Building Rating System.

2.0 PURPOSE

The overall purpose of the Town of Banff Municipal Sustainable Building Policy is to demonstrate commitment to environmental, social and economic improvements and to provide leadership and guidance in the application and development of sustainable building practices.

Adoption of this policy will also serve to:

- 2.1 Align the design, construction and operation of municipal buildings with commitments made in the Town of Banff Environmental Stewardship Strategy, Purchasing Policy, and Local Action Plan for addressing energy management & greenhouse gas emissions.
- 2.2 Yield long-term cost savings to residents and through reduced life-cycle costs for municipal buildings including reducing operating costs to the Town through improved energy and water efficiency.
- 2.3 Enhance the indoor and outdoor environment and promote a healthy and productive workplace for all Town employees and visitors.
- 2.4 Reduce amount of construction and renovation waste being sent to landfill by encouraging materials reuse and recycling, an important aspect of reaching regional landfill reduction targets as set by the Bow Valley Waste Commission

3.0 SCOPE

This policy applies to all:

- 3.1 Newly constructed municipal buildings with a footprint greater than 500 square metres (5,400 square feet) should be designed, built and certified, at minimum, in accordance with the Canada Green Building Council's (CaGBC) LEED™ 'Silver' standard.
- 3.2 New municipal buildings smaller than 500 square metres, renovations and other projects where a LEED™ standard may not apply shall be designed and built to reflect similar Triple Bottom Line principles.

4.0 RESPONSIBILITIES

- 4.1 The planning and development department is responsible for:
 - a) Revising Town processes and policies as necessary to reflect the Municipal Sustainable Building Policy.
 - b) Encouraging learning from our demonstration projects, awareness of green building practices, trends and approaches of both within the Town and the wider community.
 - c) Recognizing various achievements with green building initiatives in Banff, and consider the development of incentives to encourage the private sector to adopt green building practices.

C106 Municipal Sustainable Building Policy

- 4.2 The engineering department is responsible for:
- a) Incorporating green building practices into municipal facilities that are developed, owned or managed by the Town by retaining designers and builders familiar with CaGBC's LEED™.
 - b) Considering life-cycle costing analysis prior to tendering for all construction and retrofit projects larger than 500 square meters.
 - c) Continuing to undertake operational retrofits of existing facilities to improve energy and water efficiency.
 - d) Ensuring that new municipal buildings comply with the Municipal Sustainable Building Policy.
- 4.3 The operations department is responsible for:
- a) Updating knowledge of technology incorporated and maintaining Town 'green' buildings.
 - b) Working with all departments involved to produce an annual review to track the performance of Town projects falling within the Municipal Sustainable Policy.
- 4.4 The corporate services department is responsible for:
- a) Ensuring that project budgets contain the investment funding required to support the delivery of a LEED™ Silver Certified building projects.
 - b) Tracking and reporting cost savings achieved through higher standard building.

5.0 ATTACHMENTS

- 5.1 Appendix 1: Definitions

6.0 RELATED DOCUMENTS

- 6.1 Policy C099 – Purchasing
- 6.2 Policy C093 – Environmental Stewardship
- 6.3 Local Action Plan for addressing energy management and greenhouse gas emissions

This policy shall be in effect on the date it is approved by resolution of Council.

John Stutz
Mayor

Robert Earl
Town Manager

APPROVAL HISTORY

Approved: 2007.09.10 COU07-171

APPENDIX 1: DEFINITIONS

- 1.0 **Building** means any structure used for support or shelter of any use or occupancy, as defined by the Building Code.
- 2.0 **Canada Green Building Council (CaGBC)** was founded in 2002, and is the license holder for LEED™ in Canada. The CaGBC is the developer of LEED™ Canada, and administrator of the LEED™ Canada Green Building Rating System for New Construction and Major Renovations (LEED™ Canada NC).
- 3.0 **LEED™ Green Building Rating System** stands for Leadership in Energy and Environmental Design™ (LEED™). It is a voluntary, consensus-based system for developing high-performance, sustainable buildings. It is a recognizable 'brand' that is also used to recognize industry leaders, and raise consumer awareness.
- 4.0 **LEED Green Building Rating System Certification** involves different levels - from certified to silver, gold and platinum. They are awarded based on the total number of credits earned in the categories of: sustainable sites, water efficiency, energy and atmosphere, materials and resources, and indoor environmental quality. The CaGBC grants this certification after a thorough review of the project characteristics.
- 5.0 **Life-cycle costing analysis** is an evaluation tool that assesses the net present value of the design, construction, and operational costs of a building. It can also include qualitative measures such as the health and productivity of occupants, cost of environmental impacts and costs of social impacts.
- 6.0 **Renovation** means any change, addition or modification to an existing building or structure.
- 7.0 **Sustainable building** means integrating building materials and methods that promote environmental, economic and social benefit through the design, construction and operation of the built environment. Green building design encompasses the following areas: strategic site location, appropriate management of land, efficient use of energy and water resources, management of materials and waste, protection of environmental quality, and protection of occupant health/wellness and indoor air quality. Other terms used to describe green buildings include sustainable buildings and high-performance buildings.
- 8.0 **Triple Bottom Line** means the economics of the project (both short- and long-term) are taken into consideration with social and environmental costs and benefits. Environmental objectives discussed could include strategies such as strategic site location, appropriate management of land, efficient use of energy and water resources, protection of environmental quality, and management of materials and waste. Social objectives relate to the protection of occupant health and wellness, and maintaining high indoor air quality.

COUNCIL POLICY

SUBJECT: ENERGY CONSERVATION POLICY FOR THE MUNICIPALITY OF SAANICH	
DATE: NOVEMBER 4, 1985	REFERENCE: 85/CW

The Energy Conservation Policy of the Municipality of Saanich is:

to increase the energy efficiency of new and existing structures, equipment, and transportation systems in the Municipality, through activities and programs which encourage conservation of energy resources, while maintaining the Municipality as an attractive place to live and do business.

Towards this end, the Municipality will work towards these goals:

1. REFITTING EXISTING BUILDINGS

All buildings, and particularly residential buildings, in the Municipality shall be made as energy efficient as is economically possible. This will be determined on the basis of the costs of the conservation measures versus current and predicted energy prices. These refitting programs shall initially be implemented through voluntary actions. However, they may be assisted by incentive grants from senior governments or advice from the Municipality or from the Conservation Energy Society of British Columbia. A guiding principle of these programs will be that residential property owners who implement energy conservation measures pay no more for their combined fuel and weatherproofing costs than they previously paid for heating fuel alone.

2. LAND USE POLICIES

The Municipality will encourage building designs and configurations that reduce energy requirements and take advantage of solar energy. In addition, the Municipality will encourage land use policies that increase access to public transit, reduce the need for travel and generally are in accord with the Community Plan.

3. RENEWABLE ENERGY

The Municipality shall encourage the application of various renewable energy technologies and alternate energy systems to reduce consumption of nonrenewable energy resources in the residential and commercial sectors. The Municipality shall facilitate the use of such systems by removing administrative barriers and encouraging solar-oriented residential development. In addition, the Municipality shall increase public awareness of various energy saving alternative technologies, such as composting and recycling, that will reduce the overall energy consumption by the Municipality and its citizens.

4. **TRANSPORTATION SYSTEMS**

The Municipality shall support reduced consumption of nonrenewable fuels by taking measures to increase the efficiency of the various transportation and traffic regulation systems operating within the Municipality. These measures will encourage individuals to choose the most fuel-efficient methods of travel appropriate to their needs, promote the energy efficient movements of goods, and provide examples for the use of fuel-efficient vehicles.

5. **MUNICIPAL PROGRAMS**

The Municipality shall endeavor to reduce energy consumption in its own buildings and equipment by implementing the most energy efficient conservation measures and changing operational procedures.

6. **ROLE OF THE MUNICIPALITY**

The role of the Municipality is to support this Energy Conservation Policy and its implementation. The Municipality shall therefore set an example by introducing energy conservation measures directly within its own areas of responsibility. It shall also encourage similar efforts from the private sector through education and incentive programs. For example, fact sheets or brochures on energy conservation could be handed out by the Planning or Development Departments as guides to builders or other applicants when refitting or new buildings are being considered.

The Municipality's efforts shall include an ongoing campaign to promote energy conservation by informing all sectors of available programs and conservation techniques, developing financial incentives, seeking out support for the Municipality's conservation program from regional, Provincial and Federal governments, and regulating conservation actions where appropriate.

7. **CONSERVATION COMMITTEE**

To assure the proper review and evaluation of the Municipality's energy conservation program, a Conservation Committee may be appointed by the Mayor and confirmed by Council.

This Committee will advocate conservation actions, monitor the progress of implementation, and propose appropriate changes to the policy as they see fit. The Committee will make periodic reports to Council on its activities, and will issue an in-depth analysis of policy implementation activities and effects not later than three years from the time the policy is formally adopted.

Appendix C

Basic Guidelines for Water Conservation Plans for Small Populations – Developed by the US Environmental Protection Agency

This document provides comprehensive guidance for the development of strategies and assessment for water conservation initiatives. This may be useful as a template for the City of Fernie as planning moves forward for the implementation of water conservation efforts.

It is recommended that a key staff person is dedicated to the design and implementation of the water conservation strategies.



U.S. Environmental Protection Agency
Water Conservation Plan Guidelines

PART 3
BASIC GUIDELINES FOR
PREPARING WATER CONSERVATION PLANS

Worksheet 3-2: Water Demand Forecast [a]

Line	Item	Current Year	5-Year Forecast	10-Year Forecast
A TOTAL ANNUAL WATER DEMAND				
1	Current total annual water demand (from Worksheet 3-1) [a]			
2	Current population served [b]			
3	Total water demand per capita (line 1 divided by line 2) [b]			
4	Projected population [b]			
5	Projected total annual water demand (line 3 multiplied by line 4)			
6	Adjustments to forecast (+ or -) [c]			
7	Adjusted total annual water demand (line 5 plus line 6)			
8	Current annual demand (line 1) and adjusted annual water demand forecast (line 7 for forecast years)			
9	Current and projected annual supply capacity (from Worksheet 3-1) [d]			
10	Difference between total annual water demand and total annual supply capacity (+ or -) (subtract line 8 from line 9)			
B AVERAGE-DAY AND MAXIMUM-DAY DEMAND				
11	Current and forecast average-day demand (line 8 divided by 365)			
12	Current maximum-day demand (from Worksheet 3-1)			
13	Maximum-day to average-day demand ratio (line 12 divided by line 11)			
14	Projected maximum-day demand (line 13 multiplied by line 11 for all forecast years)			
15	Adjustment to maximum-day demand forecast [c]			
16	Current (line 12) and adjusted maximum-day demand forecast (add lines 14 and 15)			
17	Daily supply capacity (line 9 divided by 365)			
18	Ratio of maximum-day demand to daily supply capacity (line 16 divided by line 17)			

- [a] Separate forecasts should be prepared for large-volume users, as well as for nonaccount water (water not billed to customers) if nonaccount water is a significant amount (such as more than 10 percent of total production).
- [b] Managers can use connections instead of population and per-connection water use instead of per-capita water use.
- [c] Please explain adjustments to your forecast (lines 6 and 15), including effects of installed conservation measures and rate changes.
- [d] Supply capacity should take into account available supplies (permits), treatment capacity, or distribution system capacity and reflect the practical total supply capacity of the system, including purchased water.

4. IDENTIFY AND EVALUATE CONSERVATION MEASURES

Conservation Measures

Water systems have a wide selection of specific conservation measures at their disposal. These measures include both supply-side and demand-side management techniques for saving water, and range from relatively simple educational tools to advanced water-efficient technologies. Use of any particular measure depends on whether it meets cost-effectiveness and other planning criteria and whether its use complies with applicable laws and regulations, including state and local plumbing codes.

The conservation measures identified in Table 2-3 of the Overview are organized into three levels: Level 1, Level 2, and Level 3. Each level includes four categories of measures. Specific water conservation measures are identified within each category. The number of specific measures included in each level expands from the Basic to the Intermediate and from the Intermediate to the Advanced Guidelines. In other words, the measures are cumulative. *Appendix A provides additional information and several worksheets on the conservation measures.*

All water systems, regardless of their size or the conditions under which they operate, should consider the very fundamental and widely accepted practices identified under Level 1. The measures in Levels 2 and 3 generally are considered appropriate for systems with significant conservation needs and interests. Managers are encouraged to explore the full range of potential conservation measures for their systems. Many systems will find it beneficial to expand their conservation programs beyond the minimum set of measures.

Review of Measures

The minimum list of measures recommended for consideration appears in Worksheet 3-4. Systems should use the checklist to review and summarize the measures that are currently implemented, planned, or not planned at this time. Managers also can identify additional measures and practices as they develop their conservation plans

Measures should be selected on the basis of how well they can help the system achieve water savings, program costs, and other factors that are important to the water system. The planning document should discuss the criteria used in selecting the conservation measures and provide a summary of the results in terms of the measures planned for actual implementation.

Identify the conservation measures that have been implemented, are planned, or are not planned. Provide an explanation for why recommended measures are not planned for the water system. For each measure chosen, estimate total implementation costs (dollars) and anticipated water savings (volume) and assess the cost effectiveness of the measure.

The first step in the selection process is to identify criteria for evaluating the conservation measures. The cost-effectiveness of the measures is one criterion, but other factors should be considered as well. Managers are free to consider as many selection criteria as they believe are appropriate, but the relevance of the criteria should be explained in the conservation plan. The criteria that can be used in selecting conservation measures for implementation may include:

- Program costs
- Cost-effectiveness
- Ease of implementation
- Budgetary considerations
- Staff resources and capability
- Environmental impacts
- Ratepayer impacts
- Environmental and social justice
- Water rights and permits
- Legal issues or constraints
- Regulatory approvals
- Public acceptance
- Timeliness of savings
- Consistency with other programs

For each selection criterion, managers should identify whether, how, and why the factor affects the feasibility of implementing one or more conservation measures. Some factors might be more important than others. Planners also may want to bear in mind that techniques can be used to mitigate adverse effects and improve acceptance of measures. A cost-effective conservation measure should not be dismissed without careful consideration of how barriers to implementation might be overcome.

Budget

Developing a budget for each conservation measure is an invaluable part of the planning process. A simplified *cost-effectiveness* analysis can also be used to compare alternative conservation measures in terms of dollars per gallon of water saved. For example, one measure might produce savings at the rate of \$.25/1,000 gallons while another produces savings at a cost of \$.50/1,000 gallons.

Worksheet 3-3 should be completed for *each* planned conservation measure. In some cases, managers may want to combine measures based on the conservation program they envision. *All interrelated measures that are expected to result in an identifiable amount of water savings should be combined and treated as one measure in order to avoid counting the planned water savings more than once in the analysis.*

Worksheet 3-3 begins with an open-ended description of the measure. The anticipated life span for the measure should be indicated. Managers also should indicate whether the measure is targeted toward reduction in average-day demand, maximum-day demand, or both. A method for summing the total budget needed for implementing the measure is provided. All costs associated with implementation should be included. Managers should ascertain reasonable cost estimates by potential vendors whenever possible. Several different types of costs as indicated on the worksheet should be analyzed. When estimating costs, a realistic



Appendix C Basic Guidelines for Water Conservation Plans for Small Populations

implementation schedule should be considered. Any special circumstances affecting the schedule or cost of implementing the proposed measures should be discussed in the plan.

Worksheet 3-3 also includes a method for estimating annual water savings and total life-span savings that can be achieved by the measures. For each measure, the method used to calculate anticipated water savings should be provided. This might include, for example, a formula for converting daily per capita savings to annual savings. In some cases (such as a leakage control program), it might not be feasible to estimate savings for each unit, in which case total annual savings for the entire measure are sufficient. Cost per gallon of water saved can be used to compare conservation measures and to compare conservation to supply-side options.

If a system chooses not to implement any of the minimum measures, a complete explanation should be provided in the plan. If perceived costs and benefits are among the reasons for rejecting a measure a supporting analysis should be provided. This analysis can be based on a comparison of implementation costs to the system's average annual cost of production (or revenue requirements). Planners can consult the Intermediate Guidelines for more information about benefit-cost and cost-effectiveness analysis.

Conservation measures that affect the demand side of the water system have the effect of reducing water sales and utility revenues usually are a function of the quantity of water sold and the rate charge (per unit of water sold). Because revenue sufficiency plays an important role in ensuring the capacity of the water system, managers should consider conservation effects on revenues. The conservation plan should briefly address how planned conservation measures will affect water utility revenues (based on reduction in sales) and discuss strategies for addressing these revenue effects.

Summary

The plan should summarize and describe in general terms the range of conservation measures planned for implementation and the anticipated benefits, including effects on planned capital facility projects (if applicable). Measures planned for implementation can include Level 2 and Level 3 measures. The plan should discuss whether conservation can help the system avoid, downsize, or defer capital expenditures. The Intermediate Guidelines also provide some guidance on this issue.

The process of selecting measures can be summarized in Worksheet 3-4. For each recommended measure, managers should indicate whether the measure was selected for implementation. Managers also should identify the primary reason or reasons for selecting or rejecting the measure. Special conditions or actions that are required before a selected measure can be implemented (such as an approval from regulators) should be noted. In some cases, managers may conclude that a measure (or measures) cannot be implemented because of a constraint that exists in the short term. Conservation measures that might be planned for future implementation, once constraints are resolved, should be discussed in the plan.

Worksheet 3-3: Budget and Savings for Each Conservation Measure

Describe planned conservation measure:

Typical water savings from the measure: _____ per _____

Number of planned installations: _____

Anticipated life span for the measure: _____ years

The measure is designed to reduce: Average-day demand
 Maximum-day demand
 Both average-day and maximum-day demand

Line	Item	Amount	Amount
A	BUDGET FOR EACH MEASURE [a]	Per unit [b]	Total cost of the measure
1	Materials	\$	\$
2	Labor		
3	Rebates or other payments		
4	Marketing and advertising		
5	Administration		
6	Consulting or contracting		
7	Other		
8	Total program cost for the life of the measure (add lines 1 through 7) [c]		\$
B	TOTAL SAVINGS		
9	Number of units to be installed [d]		
10	Anticipated annual water savings per unit in gallons [e]		
11	Total annual savings for the measure in gallons (multiply line 9 by line 10)		
12	Expected life span for the measure in years		
13	Total life span savings for the measure in gallons (multiply line 11 by line 12)		
14	Cost per gallon of water saved (divide line 8 by line 13)		\$ /gallon

[a] A separate analysis should be performed for each conservation measure, but measures can be combined if they jointly produce water savings.

[b] Examples of a unit are a toilet, a retrofit kit, and an audit. A unit estimate may not be appropriate for each measure, in which case total program water savings and costs for the measure can be used.

[c] Include all recurring operation and maintenance costs over the life of the measure.

[d] Units can be individual product units (such as toilets) or groups of products (such as household retrofits), as long as the analysis is consistent. Leave blank if unit values do not apply.

[e] For example, water savings per retrofit. See Appendix B for benchmarks and sample calculations. Leave blank if unit values do not apply.

Appendix C Basic Guidelines for Water Conservation Plans for Small Populations

Worksheet 3-4: Selection of Conservation Measures

Line	Measure	Already implemented <input type="checkbox"/>	Plan to implement <input type="checkbox"/>	Primary criteria for selecting or rejecting the conservation measure for implementation [a]
Universal metering [B]				
1	Source-water metering			
2	Service-connection metering			
3	Meter public-use water			
Water accounting and loss control [A]				
4	Account for water			
5	Repair known leaks			
Costing and pricing [B]				
6	Cost-of-service accounting			
7	User charges			
8	Metered rates			
Information and education [B]				
9	Understandable water bill			
10	Information available			
Other Measures [b]				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20...				

[a] This space may also be used to note special issues related to this measure, including legal or obstacles to its use that preclude further consideration.

[b] See Appendix A for additional information on water conservation measures.

[A] = measure affects average-day demand

[P] = measure affects maximum-day (peak) demand

[B] = measure affects average and peak demand

5. Present Implementation Strategy

In this final step in the conservation planning process, the water system specifies its strategy and timetable for implementation. It can be emphasized, however, that conservation planning will require an *ongoing* effort on the part of water utility managers. Ongoing planning and implementation will go hand in hand.

Present a strategy and timetable for implementing and assessing conservation measures and other elements of the conservation plan.

In the implementation strategy, managers should make note of any specific factors or contingencies that might affect or prevent the implementation of specific measures. For example, if a measure cannot be implemented prior to obtaining a special permit or other authority, this fact should be noted along with an explanation of the strategy for obtaining the necessary authority. Some measures might require implementation actions that take place over several years (in order to sustain conservation savings). The plan should provide sufficient detail to understand the utility's strategy with regard to implementing such measures.

Worksheet 3-5 is a simple template for summarizing the water system's implementation and evaluation strategy for the conservation plan. A plan for public involvement should discuss how and when the water system intends to involve members of the community in the development and implementation of the conservation plan. Systems may want to plan regular communications (meetings and mailings) with community groups to keep them informed of the system's progress in meeting goals.

A plan for monitoring and evaluation should address data collection, modeling, and other issues that will be important in tracking the effects of water conservation on demand over time. The system may want to collect new kinds of data for monitoring purposes as well as for future forecasting needs. Many systems might find, for example, that more detailed data on demand by customer class are needed, including more detail on contributions to average-day and maximum-day demands. More detailed data might also be needed to assess trends in nonaccount water.

A plan for updates and revisions will help keep the system's conservation plan current over time and account for the system's actual experience with conservation. Updating forecasts of water demand and supply capacity as new data become available is especially important. In some cases, the system might want to revise or expand its planning goals. Many systems update plans every five years. However, changing conditions or other concerns might justify more frequent updates. The schedule of updates and revisions might be affected by state or local requirements for conservation planning by the water system.

The conservation planning document also should include a record of the plan's adoption by the water system's governing body (such as a Board of Directors or City Council), as appropriate.

Worksheet 3-5: Implementation Strategy

A. PUBLIC INVOLVEMENT

Describe plan for public involvement:

B. MONITORING AND EVALUATION

Describe plan for monitoring and evaluation:

Describe plan to collect water demand data:

C. PLAN UPDATES

Describe plan for updates and revisions:

D. ADOPTION OF THE PLAN

Date plan completed: _____

Date plan approved: _____

Approved by [governing body]: _____

Signature: _____

the success of conservation programs. Members of the community who might be interested in water conservation include:

- ❑ Residential water consumers
- ❑ Commercial water consumers
- ❑ Industrial water consumers
- ❑ Wholesale customers
- ❑ Environmental groups
- ❑ Civil rights groups
- ❑ Indian tribes
- ❑ Labor groups
- ❑ Business and commerce groups
- ❑ Recreational water users
- ❑ Agricultural users
- ❑ Educational institutions
- ❑ Government agencies

In addition to helping the water system specify planning goals, community participants also may have an ongoing role in a system's conservation program. Ongoing involvement helps maintain and build support for achieving conservation goals and "getting the word out" about the conservation effort. Participants can act as a focus group for exploring specific conservation measures (discussed in Section 4), and also can provide valuable linkages to key groups—consumers, businesses, and institutions—involved in implementing certain conservation measures. Participants also can offer input on the level of satisfaction with the system's programs. Finally, community groups can assist the water system in monitoring results and adjusting program implementation.

For many water systems, involving the community in water system planning will be a new experience. Community involvement does not have to consume excessive time or resources. Even a few "town hall" meetings or "brainstorming" sessions can be helpful. Most system managers will find that involving members of the community in developing goals, implementing programs, and evaluating results is a very worthwhile investment. Fortunately, guidance on this approach is available.¹

¹ See *Public Involvement Strategies: A Manager's Handbook* (Denver, CO: American Water Works Association Research Foundation, 1996).

1. Specify Conservation Planning Goals

Planning Goals

Planning goals can be developed from different perspectives. These Guidelines emphasize a water supplier perspective. Lowering water demand can help water suppliers avoid, downsize or postpone the construction and operation of supply-side facilities.

Customers and society at large also benefit from conservation. Conservation benefits society by preserving environmental resources. Conservation can benefit customers by lowering energy and long-term water costs. Water conservation reduces demands on wastewater systems; in fact, the need to reduce wastewater treatment costs can be a strong rationale for water conservation. The Guidelines and the worksheets can be used to simultaneously address the potential effects of conservation on water and wastewater operations.

Specify conservation planning goals in terms of expected benefits for the water system and its customers. Involve affected members of the community in the development of conservation planning goals and throughout the implementation process.

Water systems should state their goals in specific terms. Measurable goals are useful for evaluation purposes. For example, many water systems identify a specific water-use reduction goal (as a percentage of current water usage). Water conservation planning goals may include:

- Eliminating, downsizing, or postponing the need for capital projects.
- Improving the utilization and extending the life of existing facilities.
- Lowering variable operating costs.
- Avoiding new source development costs.
- Improving drought or emergency preparedness.
- Educating customers about the value of water.
- Improving reliability and margins of safe and dependable yields.
- Protecting and preserving environmental resources.

Managers should revisit the goals section before finalizing the conservation plan and periodically thereafter, because goals and the means to achieve them will evolve. As the water system accomplishes certain conservation goals, new objectives may emerge.

Community Involvement

The process of developing goals should involve community representation. Modern resource planning emphasizes an open process that gives all affected groups an opportunity to express their interests and concerns. Involving the community in goal development and implementation also serves an important public education function, and can greatly enhance

the success of conservation programs. Members of the community who might be interested in water conservation include:

- ❑ Residential water consumers
- ❑ Commercial water consumers
- ❑ Industrial water consumers
- ❑ Wholesale customers
- ❑ Environmental groups
- ❑ Civil rights groups
- ❑ Indian tribes
- ❑ Labor groups
- ❑ Business and commerce groups
- ❑ Recreational water users
- ❑ Agricultural users
- ❑ Educational institutions
- ❑ Government agencies

In addition to helping the water system specify planning goals, community participants also may have an ongoing role in a system's conservation program. Ongoing involvement helps maintain and build support for achieving conservation goals and "getting the word out" about the conservation effort. Participants can act as a focus group for exploring specific conservation measures (discussed in Section 4), and also can provide valuable linkages to key groups—consumers, businesses, and institutions—involved in implementing certain conservation measures. Participants also can offer input on the level of satisfaction with the system's programs. Finally, community groups can assist the water system in monitoring results and adjusting program implementation.

For many water systems, involving the community in water system planning will be a new experience. Community involvement does not have to consume excessive time or resources. Even a few "town hall" meetings or "brainstorming" sessions can be helpful. Most system managers will find that involving members of the community in developing goals, implementing programs, and evaluating results is a very worthwhile investment. Fortunately, guidance on this approach is available.¹

¹ See *Public Involvement Strategies: A Manager's Handbook* (Denver, CO: American Water Works Association Research Foundation, 1996).

2. DEVELOP A WATER SYSTEM PROFILE

Developing a system profile by taking inventory of existing resources and conditions helps systems assess their present circumstances and design strategies to meet emerging needs. Most systems should maintain the information necessary for building a profile. Much information may already have been compiled for a facility plan or for other purposes.

Systems can use Worksheet 3-1 to compile and present a system profile. The profile may be expanded to include additional information, for example, data on trends for some characteristics (such as supply and demand measures) that help describe the system. The first part of the worksheet lists system characteristics.

The second part of the worksheet provides an overview of conditions that might affect the conservation planning effort. This checklist can be used to review conditions affecting the supply or demand for water, focusing on conditions that most affect your system. The conditions outlined in the worksheet suggest the need for water conservation planning. While all water systems can benefit from efficiency improvements, water conservation is especially beneficial for systems experiencing water shortages or rapid increases in demand.

For some conditions, states might provide benchmark measures that water systems can use for comparison purposes. For example, a state might have specific criteria for defining critical use or stressed areas, for classifying per-capita water use, or for identifying the age of systems. Systems should try to compare significant conditions using generally accepted measures.

The last part of the worksheet is provided so that water systems can describe their current water conservation activities and programs.

Summarize the service and operating characteristics of the water system. Provide an overview of conditions and a description of climate, water availability, or other factors that might affect water conservation planning.

Worksheet 3-1: Water System Profile

SUMMARIZE SYSTEM CHARACTERISTICS

A	SERVICE CHARACTERISTICS	Number		
1	Estimated service population			
2	Estimated service area (square miles)			
B	ANNUAL WATER SUPPLY	Annual volume	Percent metered	
3	Total annual water supply			%
C	SERVICE CONNECTIONS	Connections	Percent metered	
4	Residential, single-family			%
5	Other			%
6	Total connections			%
C	WATER DEMAND	Annual volume	Percent of total	Per connection
7	Metered residential sales			
8	Metered nonresidential sales			
9	Other metered sales			
10	Unmetered sales			
11	Nonaccount water [a]			
12	Total system demand (total use)			
D	AVERAGE & PEAK DEMAND	Volume	Total supply capacity	Percent of total capacity
13	Average-day demand			%
14	Maximum-day demand			%
F	PRICING	Rate structure [b]	Metering schedule [c]	Billing schedule [c]
15	Residential rate			
16	Nonresidential rate			
17	Other rate			
G	PLANNING	Prepared a plan <input type="checkbox"/>	Date	Filed with state <input type="checkbox"/>
18	Capital, facility, or supply plan			
19	Drought or emergency plan			
20	Water conservation plan			

(Worksheet continues)

3. PREPARE A DEMAND FORECAST

Forecasting water use (or demand) can range from simple projections based on anticipated population growth to complex models. Forecasts can be made for the water system as a whole; however, forecasts are more accurate when they are prepared for separate classifications of water use.

Prepare forecasts for five-year and ten-year time points. Additional time points can be used as well. The longer the planning horizon, the greater will be the uncertainty of the forecast. Forecasts should be revisited and updated on a regular basis.

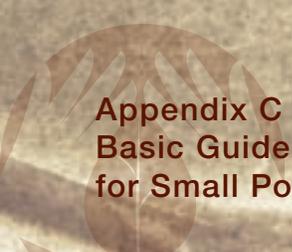
Prepare a forecast of anticipated water demand for selected time periods. To the extent practical, the planner should take into account variations in demand based on type of water usage, as well as perform a “what if” (sensitivity) analysis.

The demand forecast should recognize the effects of conservation measures already implemented. However, for the purposes of this conservation plan, anticipated demand effects from measures contemplated in the plan should not be included.

This section of the plan is optional if the population served by the water system is not growing at a rate of more than 2 percent per year (or another population-growth benchmark specified by the state). Additionally, it is not necessary for systems to prepare a separate forecast for the purposes of this plan if a forecast has already been prepared for the system within the suggested time frame. Managers should include the results of such forecasts in this plan.

Worksheet 3-2 provides a simple water demand forecasting methodology based on population. This method is reasonable for water systems that have little variation within their service populations (such as systems that serve only single-family residential customers in comparable housing) and stable water-use characteristics. The method calculates per capita water use and multiplies the result by projected population levels. Projected water use is compared to system capacity to calculate the anticipated surplus or shortage. Any adjustments to the forecasts for known and measurable factors that might affect demand should be explained. Worksheet 3-2 also provides a method for estimating average-day and maximum-day demand.

An alternative to calculating water use on a per-capita basis is to calculate water use on a per-connection (or per-household) basis. (Managers often use the median number of persons per household to make conversions.) For forecasting purposes, per-connection water use is multiplied by the number of current and projected connections (such as residential households). It may be easier to project households based on land-use planning data and construction estimates.



Appendix C Basic Guidelines for Water Conservation Plans for Small Populations

Care should be taken in using the per-capita or per-connection approach to forecasting, particularly if the service population is varied. Separate forecasts should be prepared for large-volume water users (such as a large industrial plant). When one large-volume user begins, changes, or terminates service from a relatively small utility, the effects can be felt throughout the utility's operations. Plant managers can be consulted about projected water needs for the industrial sector.

The per-capita and per-connection methods of forecasting have limitations. They assume that water use is essentially a function of population or changes in the number of connections and that usage patterns will not change with time. For example, customers are not expected to install water-saving fixtures or respond to future changes in rates. For this reason, managers should include a brief assessment of factors that could affect the level or pattern of demand in their service territory.

Appendix D

Vehicle Fleet Policy sample for municipalities. The City of Dawson Creek has established a guide that directs the purchasing of appropriate-sized vehicles, encourages an idle-free municipal fleet and outlines appropriate maintenance and monitoring to ensure optimum efficiency.

GREEN VEHICLE POLICY

Background

In 2004, Dawson Creek completed a baseline study on its municipal energy consumption. One of the study's recommendations was the creation of a green vehicle policy that would guide vehicle purchasing decisions and operating practice in order to help reduce energy consumption. An overview of the different components and options for a green vehicle policy was prepared and presented to Dawson Creek in February, 2006. The policy that follows reflects the goals and direction that Dawson Creek chose from these options. For background information on each section, please see the *Dawson Creek Green Vehicle Policy Working Paper*.

Rationale

- Gasoline and diesel fuels used for transportation produce greenhouse gas (GHG) emissions that contribute to climate change, and local air emissions (Criteria Air Contaminants – CACs) that degrade local air quality. This policy will help to reduce vehicle emissions.
- New vehicles will be an ongoing expense in Dawson Creek. This policy will ensure that life cycle costs are considered for new vehicle purchases and that vehicle efficiencies are maximized.
- Many of the policy options described here can be adapted and expanded to the community level. This policy provides a starting point to engage on other transportation issues throughout the municipality.

Goals and Objectives

The goals and objectives of this policy are:

- To reduce emissions from the municipal vehicle fleet to levels that are 20% below 2004 levels by 2016 by:
 - Reducing idling
 - Reducing single occupancy trips
 - Purchasing more efficient vehicles and fuels
 - Right-sizing vehicles
- To consider the life cycle costs of municipal vehicle operations when purchasing vehicles.
- To maximize vehicle efficiency.
- To provide a framework for lessening the environmental impact of vehicle operations that can be expanded to the larger community.

Guidelines

1. Purchasing

1.1. *Right-sizing*

Vehicles should be purchased according to the average or usual anticipated use of the vehicle. Occasional vehicle needs that exceed the capacity of the vehicle purchased should be met through vehicle sharing or renting. The following use requirements should be considered when purchasing a vehicle:

- engine size
- vehicle weight

Green Vehicle Policy

- average carrying capacity
- average passenger capacity
- average terrain

These use requirements should accompany and form part of any recommendation made to the Chief Administrative Officer and Chief Financial Officer under the Purchase of Capital Equipment Policy.

1.2. Life cycle cost

Life cycle costs should be considered for all vehicle purchases. Life cycle costs should include: capital costs, maintenance costs, fuel costs, and resale costs.

2. Fuel Choice

2.1. Fuel choice

The lowest GHG emission fuel possible should be purchased for all vehicles in the fleet. Consideration of fuels should include:

- purchasing low emission fuel for the whole fleet (i.e. low-sulphur gasoline or biodiesel)
- purchasing vehicles that run on alternative fuel sources

3. Operating

3.1. Idling

Idling should be reduced among all municipal vehicles where possible. The following guidelines should be followed by all municipal vehicle operators:

- Reduce warm-up idling (no more than 30 seconds as long as windows are clear)
- It takes more gas to idle for more than 10 seconds than it does to restart your vehicle. If stopped for more than 10 seconds, vehicles should be turned off, except in the following circumstances:
 - In traffic
 - In the course of performing a specific duty that requires that the vehicle be left running
 - If the temperature is below -10C
 - If doing so would compromise human safety or the mechanical integrity of the vehicle

3.2. Vehicle sharing

Single occupancy vehicle trips should be minimized. Vehicles should be shared between departments to ensure maximum efficiency for vehicle use.

3.3. Driver education

Driving procedures to increase the efficiency of vehicle operations, including anti-idling, should be included in driver training programs that municipal staff are required to take.

4. Maintenance and monitoring

4.1. Maintenance

Maintenance on municipal vehicles should continue to ensure that preventative maintenance continues to maximize the efficiency of all vehicle operations.

4.2. Monitoring

All vehicles should be monitored to track fuel consumption, fuel costs, mileage, and maintenance costs.



**Appendix D
Vehicle Fleet Policy Sample**

Green Vehicle Policy

5. Evaluation

5.1. Monitoring objectives

The objectives in this policy should be measured at regular intervals to ensure that the policy is effectively moving Dawson Creek towards its goals.

5.2. Policy evaluation

This policy should undergo regular evaluation to ensure that it is enabling Dawson Creek to move towards its goals.

APPROVED BY COUNCIL:

DATE: May 29, 2006

Appendix E

Policies and Bylaws to support sustainable community development.

Included in this Appendix is:

- **The City of Vancouver Green Building Bylaw**
- **The City of Port Coquitlam Triple Bottom Line Sustainability Checklist**
- **Leaf Rapids Plastic Bag Ban Bylaw**

BY-LAW NO. 9691

**A By-law to amend Building By-law No. 9419 regarding
green building strategy for one family homes,
one family homes with secondary suites, and two family homes**

THE COUNCIL OF THE CITY OF VANCOUVER, in public meeting, enacts as follows:

1. This By-law amends the indicated provisions of the Building By-law.
2. In Table 9.25.2.1 of Part 9 of Division B and the notes to that table, Council:
 - (a) from the first column, strikes out “(insulation to 600 mm below grade)”;
 - (b) from the first sub-column of the second column, strikes out “Less than 4500 Celsius Degree Days⁽¹⁾”;
 - (c) from the first sub-column of the second column, strikes out the “3.5” that is in the same row as “Frame Walls”, and substitutes “3.85”;
 - (d) from the first sub-column of the second column, strikes out the “2.1” that is in the same row as “Foundation Walls”, and substitutes “3.85”;
 - (e) from the first sub-column of the second column, strikes out the “1.8” that is in the same row as “Unheated Concrete Slabs on Ground at or above grade”, and substitutes “2.1”;
 - (f) from the first column, strikes out “Unheated Concrete Slabs on Ground at or above grade”, and substitutes “Concrete Slabs on Ground at, above, or below grade (insulation under all slab area and around edge of slab)”;
 - (g) from the first column, strikes out “Radiant Heating Slabs on Ground (insulation under all slab area and around edge of slab⁽⁴⁾)”;
 - (h) from the first sub-column of the second column, strikes out the “2.1” that is in the same row as “Radiant Heating Slabs on Ground (insulation under all slab area and around edge of slab⁽⁴⁾)”;
 - (i) strikes out the second sub-column of the second column entitled “4500 and Greater Celsius Degree Days⁽¹⁾”, and the contents of the second sub-column of the second column;
 - (j) strikes out Notes 1) and 2); and
 - (k) re-numbers Notes 3), 4), and 5) as Notes 1), 2), and 3).

3. After Part 11 of Division B, Council adds:

**“Part 12
Environmental Protection**

Section 12.1. General

12.1.1. Application

12.1.1.1. Scope

1) The scope of this Part shall be as described in Subsection 1.3.3. of Division A except that this Part shall apply only to one-family dwellings, two-family dwellings, and one-family dwellings with secondary suites.

12.1.2. Definitions

12.1.2.1. Defined Terms

1) Words that appear in italics are defined in Article 1.4.1.2. of Division A.

12.1.3. Conflicts

1) In case of a conflict between any provision of this Part 12 and any other provision of this By-law, the Part 12 provision shall prevail.

Section 12.2. Building Envelope Performance and Energy Efficiency

12.2.1. Building Envelope Performance

12.2.1.1. Windows

1) Windows shall have a maximum thermal conductance (U value) of 2.00 W/(K·m²).

12.2.2. Energy Efficiency

12.2.2.1. Light Fixtures

1) At least 40% of hard wired, electrically powered light fixtures shall be hard wired so as not to accept incandescent or halogen light bulbs.

12.2.2.2. Energy Usage Display Meter

1) Electrical installations shall have an energy usage display meter in the dwelling unit capable of calculating and displaying electrical consumption on at least a monthly basis.

12.2.2.3. Hot Water Tanks

1) Electrically powered hot water tanks shall have insulation that provides a minimum RSI value of 1.76.

12.2.2.4. Hot Water Tank Piping

1) The first 3 m of non-recirculating hot water piping leading from both electrically powered and gas powered hot water tanks, and the last 1 m of piping prior to connecting to the hot water tank, shall have insulation that provides a minimum RSI value of 0.35.

2) Despite Sentence 12.2.2.4.(1), the entire hot water piping system, if it is of constant recirculation design, shall have insulation that provides a minimum RSI value of 0.35.

12.2.2.5. Gas-Fuelled Fireplaces

1) Gas-fuelled fireplaces shall use electronic ignitions.

2) Gas-fuelled fireplaces shall be direct vented so that all products for and of combustion circulate to and from the dwelling unit without the use of a chimney.

12.2.2.6. Toilets

1) Toilets shall be of dual flush design, with a maximum single flush consumption of 6 litres.

12.2.2.7. Heat recovery ventilators

1) Each dwelling unit, in the case of a one-family dwelling or two-family dwelling, and each one-family dwelling with secondary suite shall have one heat recovery ventilator.

2) Each heat recovery ventilator shall

a) be designed and tested to meet the CSA International Standard CAN/CSA-F326 M91 ("Residential Mechanical Ventilation Systems"),

b) be installed by persons trained by the Heating, Refrigeration and Air Conditioning Institute of Canada or equivalent,

c) supply outdoor air directly to the principal living area, each bedroom, and any floor without a bedroom,

d) be operated by centrally located manual controls or by automatic controls,

- e) not exhaust supplemental exhausts in the kitchens and bathrooms which shall be controlled by a manual switch in the room being served,
 - f) if a solid-fuel-fired appliance is present, be installed to operate without depressurizing the house in any operating mode,
 - g) be located in an accessible location within the dwelling unit, having a minimum headroom clearance of 2 m,
 - h) have an air intake equipped with a damper or bird screen, and be a minimum of 450mm above finished grade,
 - i) have an air exhaust equipped with a damper or bird screen, and be a minimum of 100mm above finished grade,
 - j) have supply-air ducts carrying un-tempered air through heated spaces insulated to at least RSI 0.5 (R-2.9), and
 - k) have exhaust ducts in unheated spaces insulated to RSI 0.5 (R-2.8).
- 3) Door under-cuts or transfer grilles shall be installed in doors to rooms where both supply and return air ducts are not located.

12.2.2.8. Energuide Rating System Audit

1) Before issuance of an occupancy permit, the Chief Building Official shall be provided with an Energuide Rating System Audit, as defined by the EnerGuide™ Rating Service of Natural Resources Canada.

12.2.2.9. Vertical Service Shaft

1) A vertical service shaft shall extend from the service room, which contains the service water heater, to the attic space, consisting of at least two 50 mm PVC pipes, capped at both ends, and having at least a 20° angle.

12.2.2.10. Cable Raceway

1) Each dwelling unit shall have a cable raceway leading from the electricity circuit panel to an enclosed outlet box in the garage or carport.

2) A raceway not smaller than size 21 shall be provided to accommodate future conductors of a separate branch circuit intended to supply a future receptacle for use with the electric vehicle charging system.

3) An outlet box for the receptacle referred to in Sentence (2) and approved for the purpose shall be provided in a parking space or a parking stall of a storage garage or carport intended for use with the electric vehicle charging system.

4) The raceway described in Sentence (2) shall be installed between the dwelling unit panel board and the outlet box referred to in Sentence (3).

12.3 Objective and Functional Statements

12.3.1. Objective and Functional Statements

1) For the purposes of compliance with this By-law as required in Clause 1.2.1.1.(1)(b) of Division A, the objectives and functional statements attributed to the acceptable solutions in this Part shall be the objectives and functional statements listed in Table 12.3.1.1. (See A-1.1.2.1.(1) in Appendix A.)

Table 12.3.1.1.
Objectives and Functional Statements Attributed to the Acceptable Solutions in Part 12
Forming Part of Sentence 12.3.1.1.(1)

Acceptable Solutions	Objectives and Functional Statements
12.2.1.1. Windows	
(1)	[F51,F52,F53F54,F55,F61,F63,FEP01-OEP1]
12.2.2.1. Light Fixtures	
(1)	[FEP1-OEP1]
12.2.2.2. Energy Usage Display Meter	
(1)	[FEP1-OEP1]
12.2.2.3. Hot Water Tanks	
(1)	[FEP1-OEP1]
12.2.2.4. Hot Water Tanks	
(1)	[FEP1-OEP1]
(2)	[FEP1-OEP1]
12.2.2.5. Gas-Fuelled Fireplaces	
(1)	[F40,F41,F43,F44,FEP1-OEP1,OEP3]
(2)	[F40,F41,F43,F44,F54,F55,FEP1-OEP1,OEP3]
12.2.2.6. Toilets	
(1)	[F72,FEP1-OEP4]
12.2.2.7. Heat Recovery Ventilators	
(1)	[F40,F44,F50,F51,F52,F53,F54,F63,OEP1]
12.2.2.8. EnerGuide Rating System Audit	
(1)	[OEP1,OEP5]

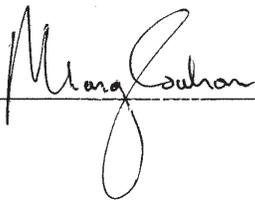
4. A decision by a court that any part of this By-law is illegal, void, or unenforceable severs that part from this By-law, and is not to affect the balance of this By-law.

5. This By-law is to come into force and take effect on the date of its enactment.

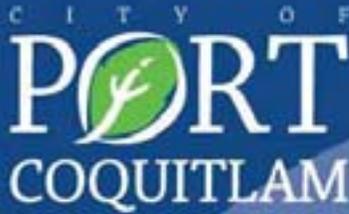
ENACTED by Council this 8th day of July, 2008



Mayor



City Clerk



SUSTAINABILITY CHECKLIST FOR REZONING & DEVELOPMENT PERMIT APPLICATIONS

OUR VISION

Port Coquitlam will aspire to be a complete community, unique because of its small town atmosphere, its strong sense of pride and where:

- Citizens have a collective sense of belonging, and contribute to the quality of life in the community.
- The community celebrates a vibrant culture and heritage.
- The environment is nurtured for present and future generations.
- A dynamic economy contributes to prosperity and the opportunity to work close to home.
- Planned development strengthens the character of the community, helping to create safe and affordable neighbourhoods.

– Port Coquitlam Official Community Plan (OCP), 2005

USING TRIPLE BOTTOM LINE ASSESSMENT TO ACHIEVE SUSTAINABILITY GOALS

The City of Port Coquitlam is committed to fiscally, socially and environmentally responsible land use development. Sustainable development integrates the three systems that support us – the economy, the environment and our society. Each of these systems must be functioning and healthy for us to survive and enjoy a high quality of life. To be sustainable, we must understand how these systems interact, and make sure our activities do not compromise the ability of any of the systems to function currently and in the future.

New development is essential to achieve a complete community in which to live, work and play. The location, composition, density, and design of new development projects can have an immense, cumulative impact on our community's ability to: sustain a healthy economy and reasonable cost of living; to provide effective and accessible public services; to secure adequate choice and opportunity for present and future generations of residents; to protect our environment; and to ensure we all continue to enjoy a high quality of life.

***Sustainability:** To improve the social, environmental and economic well being of the community through good planning and land use management (OCP, 2005)*

Developers and their consultants are important partners in maintaining and improving our community's high quality of life. By providing sustainability criteria at the earliest development stage, the City enables developers and their consultants to create the most sustainable project possible. The Sustainability Checklist provides a comprehensive assessment of a development project's contribution to sustainability by balanced scoring of environmental, economic and social criteria. The balanced scoring of 1/3 environmental, 1/3 economic and 1/3 social is called triple bottom line assessment.

Please note, in total, the checklist describes an *ideal* – it is highly unlikely that any one project will earn maximum points in all sections, and no pass/fail standard has been set. Different types of development will result in a range of scores, and some sections may not be applicable to all development, which will be noted in the assessment. The checklist assessment will indicate how well a proposed application performs relative to the sustainability and complete community goals contained in our OCP and Corporate Strategic Plan, and help identify any areas where improvement is desirable and possible. It will inform decisions in the development approval process as to how well a proposed development achieves community sustainability.

INSTRUCTIONS

All Rezoning and Development Permit applicants are required to complete the Sustainability Checklist, as follows:

1. **Self-Scoring** – Applicants are to review and complete the checklist, as an initial assessment. The criteria are weighted differently so the maximum score for each criterion reflects its importance to sustainability goals. To calculate the score, multiply the points for a given answer by the criteria's weight and enter it into the designated TBL column. The first page divides the weighting score into 50% for the economic and social columns. The second page directs the scores to be placed in the unshaded column.
2. **Supplementary Information** – Statistical data indicated by an asterisk (*) is to be provided (e.g. the number of permanent employees, floor area ratio, property tax base increase) as well as a completed copy of the LEED Canada-NC 1.0 Project Checklist or best practice checklist for each application. Consultation with City staff may be of assistance in estimating this data. If needed, provide any additional description of how the proposed development incorporates the sustainability criteria.
3. **Submit Application** – Submit the completed checklist, data and supplementary information as part of the rezoning or development permit application.
4. **Final Assessment** – City staff will review the checklist and discuss with the applicant. Following the consultation with the applicant, a final checklist will be completed by staff for review by the Community and Economic Development Committee and Council, as part of the application process.

OTHER RESOURCE MATERIALS

- Official Community Plan – www.portcoquitlam.ca
- 2002 Strategic Plan – www.portcoquitlam.ca
- Zoning Bylaw – available at City Hall
- Downtown Plan – available at City Hall
- Canada Green Building Council website – www.cagbc.org
- SmartGrowthBC website – www.smartgrowth.bc.ca

FOR MORE INFORMATION, CONTACT:

Planning Division
2nd Floor, City Hall, 2580 Shaughnessy Street
Port Coquitlam, BC V3C 2A8
Tel 604.927.5410
Fax 604.927.5331
Email planning@portcoquitlam.ca
www.portcoquitlam.ca



Appendix E
Policies and Bylaws to Support
Sustainable Community Development



SUSTAINABILITY CHECKLIST

REZONING AND DEVELOPMENT PERMIT APPLICATIONS

	<i>Points</i>	<i>Wt</i>	<i>Total</i>	<i>Soc</i>	<i>Env</i>	<i>Eco</i>
1. Land Use						
<ul style="list-style-type: none"> Mix of uses provided or uses consistent with OCP Adds to the diversity of uses within an existing neighbourhood, such as employment, housing, retail, civic, educational, cultural, recreational 	None – 0 Poor – 1 Good – 2 to 3 Excellent – 4 to 5	1	/5	(50%)		(50%)
2. Housing						
<ul style="list-style-type: none"> Offers or adds a mix of housing types, sizes and tenure, including special needs¹ Provides units with a wide-range of pricing options that will be sold or leased 	None – 0 Poor – 1 Good – 2 to 3 Excellent – 4 to 5	2	/10	(50%)		(50%)
<ul style="list-style-type: none"> Provides subsidized or rental housing² 	No – 0 Yes – 5	1	/5	(50%)		(50%)
3. Community character and design						
<i>a) Design</i>						
<ul style="list-style-type: none"> Building design follows required architectural style and demonstrates innovation Building orientation towards open space, views and/or daylight Treatment of façade breaks down massing and articulates depth, verticality & street edge Scale and massing of buildings relate to neighbourhood structures Provides crime prevention through environmental design Incorporates enhanced durability/longevity of construction materials. 	None – 0 Poor – 1 Good – 2 to 3 Excellent – 4 to 5	2	/10	(50%)		(50%)
<i>b) Public Space</i>						
<ul style="list-style-type: none"> Creates or enhances community spaces, such as plazas, squares, parks & streets Strong connections to adjacent natural features, parks and open space Builds or improves pedestrian amenities, such as sidewalks, transit shelters, bike racks and connections to civic, cultural, school and retail/service uses 	None – 0 Poor – 1 Good – 2 to 3 Excellent – 4 to 5	2	/10	(50%)		(50%)
<i>c) Density & Infill</i>						
<ul style="list-style-type: none"> Maximizes FAR or dwelling unit/acre density¹ Results in infill/redevelopment and enhanced community fabric² 	None – 0 Poor – 1 Good – 2 to 3 Excellent – 4 to 5	1	/5	(50%)		(50%)
<i>d) Transportation</i>						
<ul style="list-style-type: none"> Accessible by multiple modes of transport, emphasizing public transit including future planned Parking does not visually dominate the street view & allows easy, safe pedestrian building access Interconnected road system with direct street connections, short block lengths, no cul-de-sacs Provides traffic speed & demand management 	None – 0 Poor – 1 Good – 2 to 3 Excellent – 4 to 5	1	/5	(50%)		(50%)

	Points	Wt	Total	Soc	Env	Eco
4. Environmental Protection & Enhancement						
a) <i>Lands</i> <ul style="list-style-type: none"> Does not intrude on ALR or designated open lands Protects riparian areas and other designated environmentally sensitive areas Provides for native species habitat restoration/improvement Redevelops environmentally contaminated site 	None – 0 Poor – 1 Good – 2 to 3 Excellent – 4 to 5	2	/10			
b) <i>Servicing</i> <ul style="list-style-type: none"> Does not require extension of existing municipal infrastructure (e.g. roads, water and sewer) Located in existing commercial and transportation nodes 	None – 0 Poor – 1 Good – 2 to 3 Excellent – 4 to 5	1	/5			
c) <i>Construction/Design</i> <ul style="list-style-type: none"> Provides LEED certification (certified, silver, gold, platinum) or accepted green building best practices (e.g. Built Green BC, Green Globes)³ 	None – 0 Certified – 2 Silver – 3 Gold – 4 Platinum – 5	4	/20			
5. Social Equity						
<ul style="list-style-type: none"> Contains elements of community pride and local character, such as public art Provides affordable space for needed community services Conducts public consultation, including documenting concerns & providing project visuals 	None – 0 Poor – 1 Good – 2 to 3 Excellent – 4 to 5	2	/10			
6. Economic Development						
a) <i>Employment</i> <ul style="list-style-type: none"> Provides permanent employment opportunities¹ Increases community opportunities for training, education, entertainment or recreation 	None – 0 Poor – 1 Good – 2 to 3 Excellent – 4 to 5	1	/5			
b) <i>Diversification and Enhancement</i> <ul style="list-style-type: none"> Net increase to property tax base¹ Promotes diversification of the local economy via business type and size Improves opportunities for new and existing businesses, including eco-industrial and value-added Developer demonstrates experience with similar projects 	None – 0 Poor – 1 Good – 2 to 3 Excellent – 4 to 5	1	/5			
Social/Environmental/Economic				/35 (%)	/35 (%)	/35 (%)
Application Total				/105 (%)		
TRIPLE BOTTOM LINE SUMMARY						

¹ Per the instructions, please provide statistical data for these indicators, such as floor area ratio, estimated number of employees, number of housing types, sizes and tenures.

² Subsidized Housing encompasses all types of housing for which some type of subsidy or rental assistance is provided, including public, non-profit and co-operative housing, as well as rent supplements for people living in private market housing. It also includes emergency housing and short-term shelters. Enhanced community fabric includes multiculturalism, mobility accessibility, integration with neighbourhoods and crime prevention through environmental design.

³ Please provide a copy of the green building checklist chosen. For example: LEED Canada-NC 1.0 Project Checklist can be obtained at: <http://www.cagbc.org/uploads/LEED%20Canada-NC%20Project%20Checklist.xls>
Green Globes at: http://www.greenglobes.com/design/Green_Globes_Design_Summary.pdf

Appendix E Policies and Bylaws to Support Sustainable Community Development



LEED Canada-NC 1.0 Project Checklist

Project Name

City, Province

Yes ? No

Sustainable Sites 14 Points

Y	Prereq 1	Erosion & Sedimentation Control	Required
	Credit 1	Site Selection	1
	Credit 2	Development Density	1
	Credit 3	Redevelopment of Contaminated Site	1
	Credit 4.1	Alternative Transportation , Public Transportation Access	1
	Credit 4.2	Alternative Transportation , Bicycle Storage & Changing Rooms	1
	Credit 4.3	Alternative Transportation , Alternative Fuel Vehicles	1
	Credit 4.4	Alternative Transportation , Parking Capacity	1
	Credit 5.1	Reduced Site Disturbance , Protect or Restore Open Space	1
	Credit 5.2	Reduced Site Disturbance , Development Footprint	1
	Credit 6.1	Stormwater Management , Rate and Quantity	1
	Credit 6.2	Stormwater Management , Treatment	1
	Credit 7.1	Heat Island Effect , Non-Roof	1
	Credit 7.2	Heat Island Effect , Roof	1
	Credit 8	Light Pollution Reduction	1

Yes ? No

Water Efficiency 5 Points

	Credit 1.1	Water Efficient Landscaping , Reduce by 50%	1
	Credit 1.2	Water Efficient Landscaping , No Potable Use or No Irrigation	1
	Credit 2	Innovative Wastewater Technologies	1
	Credit 3.1	Water Use Reduction , 20% Reduction	1
	Credit 3.2	Water Use Reduction , 30% Reduction	1

Yes ? No

Energy & Atmosphere 17 Points

Y	Prereq 1	Fundamental Building Systems Commissioning	Required
Y	Prereq 2	Minimum Energy Performance	Required
Y	Prereq 3	CFC Reduction in HVAC&R Equipment	Required
	Credit 1	Optimize Energy Performance	1 to 10
	Credit 2.1	Renewable Energy , 5%	1
	Credit 2.2	Renewable Energy , 10%	1
	Credit 2.3	Renewable Energy , 20%	1
	Credit 3	Best Practice Commissioning	1
	Credit 4	Ozone Protection	1
	Credit 5	Measurement & Verification	1
	Credit 6	Green Power	1

Yes ? No

Materials & Resources 14 Points

Y	Prereq 1	Storage & Collection of Recyclables	Required
	Credit 1.1	Building Reuse: Maintain 75% of Existing Walls, Floors, and Roof	1
	Credit 1.2	Building Reuse: Maintain 95% of Existing Walls, Floors, and Roof	1
	Credit 1.3	Building Reuse: Maintain 50% of Interior Non-Structural Elements	1
	Credit 2.1	Construction Waste Management: Divert 50% from Landfill	1
	Credit 2.2	Construction Waste Management: Divert 75% from Landfill	1
	Credit 3.1	Resource Reuse: 5%	1
	Credit 3.2	Resource Reuse: 10%	1
	Credit 4.1	Recycled Content: 7.5% (post-consumer + ½ post-industrial)	1
	Credit 4.2	Recycled Content: 15% (post-consumer + ½ post-industrial)	1
	Credit 5.1	Regional Materials: 10% Extracted and Manufactured Regionally	1
	Credit 5.2	Regional Materials: 20% Extracted and Manufactured Regionally	1
	Credit 6	Rapidly Renewable Materials	1
	Credit 7	Certified Wood	1
	Credit 8	Durable Building	1

Yes ? No

Indoor Environmental Quality 15 Points

Y	Prereq 1	Minimum IAQ Performance	Required
Y	Prereq 2	Environmental Tobacco Smoke (ETS) Control	Required
	Credit 1	Carbon Dioxide (CO₂) Monitoring	1
	Credit 2	Ventilation Effectiveness	1
	Credit 3.1	Construction IAQ Management Plan: During Construction	1
	Credit 3.2	Construction IAQ Management Plan: Testing Before Occupancy	1
	Credit 4.1	Low-Emitting Materials: Adhesives & Sealants	1
	Credit 4.2	Low-Emitting Materials: Paints and Coating	1
	Credit 4.3	Low-Emitting Materials: Carpet	1
	Credit 4.4	Low-Emitting Materials: Composite Wood and Laminate Adhesives	1
	Credit 5	Indoor Chemical & Pollutant Source Control	1
	Credit 6.1	Controllability of Systems: Perimeter Spaces	1
	Credit 6.2	Controllability of Systems: Non-Perimeter Spaces	1
	Credit 7.1	Thermal Comfort: Compliance	1
	Credit 7.2	Thermal Comfort: Monitoring	1
	Credit 8.1	Daylight & Views: Daylight 75% of Spaces	1
	Credit 8.2	Daylight & Views: Views 90% of Spaces	1

Yes ? No

Innovation & Design Process 5 Points

	Credit 1.1	Innovation in Design	1
	Credit 1.2	Innovation in Design	1
	Credit 1.3	Innovation in Design	1
	Credit 1.4	Innovation in Design	1
	Credit 2	LEED® Accredited Professional	1

Yes ? No



Appendix E Policies and Bylaws to Support Sustainable Community Development

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Project Totals (pre-certification estimates)	70 Points
Certified 26-32 points Silver 33-38 points Gold 39-51 points Platinum 52-70 points				

Plastic Bag Ban By-law

TOWN OF LEAF RAPIDS

By-Law No. 462

Being a By-Law of the Town of Leaf Rapids for the establishment of Single Use Plastic Shopping Bags.

WHEREAS Single Use Plastic Shopping Bags are a very visible component of litter throughout the Town of Leaf Rapids, lake side, trails, roadside and the nuisance grounds;

AND WHEREAS Single Use Plastic Shopping Bags have a negative impact on our wildlife habitat and are not environmentally friendly;

AND WHEREAS the Town of Leaf Rapids incurs a significant cost to clean up the Single Use Plastic Shopping Bags each year;

AND WHEREAS local businesses can reduce merchandise cost by not having to purchase Single Use Plastic Shopping Bags;

AND WHEREAS the Town of Leaf Rapids has provided education to shoppers and school children about the environmental advantages and reduced cost of using reusable shopping bags;

AND WHEREAS by using a multi-use shopping bag, residents are reminded of the positive impact of recycling;

NOW THEREFORE upon passing this By-Law, the Council of the Town of Leaf Rapids, enacts as follows:

1. THAT the Town of Leaf Rapids will be Single Use Plastic Shopping Bag free effective April 2, 2007.
2. THAT retailers in the Town of Leaf Rapids will not be permitted to give away or sell plastic shopping bags that are intended for single use.
3. THAT a person who contravenes this By-Law of the Town of Leaf Rapids is guilty of an offence and is liable on summary conviction of a fine of not more than \$1000.00.
4. THAT where a contravention continues for more than one day, the person is guilty of a separate offence for each day it continues.
5. THAT on passing of this By-Law, By-Law No. 457 is hereby rescinded.
6. DONE AND PASSED as a By-Law of the Town of Leaf Rapids at the Townsite of Leaf Rapids, in the Province of Manitoba, this 22nd day of March, 2007, A.D.

EXEMPTIONS TO THE BY-LAW

Small plastic bags that are used to store non-packaged goods such as: a) Dairy products b) Fruit, vegetables or nuts c) Confectionery d) Cooked foods, hot or cold e) Ice f) Smaller bags for fresh meat, fish, candy and poultry g) Bags that cost more than \$1.50

Appendix F

**Funding opportunities for implementation of
greenhouse gas emission reduction strategies.**

Funding Opportunities for GHG Emission Reduction

Waste

GMF Funds: Studies

Grants and loans are also available to help finance capital projects with up to \$400 000 in grants or 4 million dollars in loans. Eligible projects must divert at least 50% of waste from landfills once completed. In addition, prior to submitting a proposal a waste review containing data that is no more than 5 years old and a solid waste management plan that is no more than 7 years old must be submitted. Guidelines are available at: <http://www.sustainablecommunities.fcm.ca/files/GMF/Sector-documents/Waste/Waste-app-guid-e.pdf>.

Gas Tax Agreement

Funding from the Gas Tax Agreement can be allocate to development of solid waste management or diversion services through the Strategic Priorities, and Innovations Fund.

<http://www.civicnet.bc.ca/siteengine/ActivePage.asp?PageID=294>

Other Waste-related sites:

Biobag Canada

www.biobag.ca

EcoSafe Biodegradable

www.ecosafeplastics.com

Transportation

Shell Environmental Fund

http://www.shell.ca/home/content/ca-en/society_environment/environment/protect/support/environment_fund/dir_sef.html

BikeBC

Currently accepting applications for 2009/2010 funding for improvements to or development of bike lanes, trails and infrastructure.

<http://www.th.gov.bc.ca/BikeBC/CIPP.html>

Natural Resources Canada – Idle Free Zone

Tools and resources for implementing and expanding Idle Free initiatives at the community and municipal level.

<http://oee.nrcan.gc.ca/communities-government/idling.cfm>

BC Recreation and Parks Association's Active Communities Initiative Grant Program

Designed to assist communities with the development and implementation of an Active Community Plan, or the development and maintenance of walkways, trails and/or bikeways.

<http://www.activecommunities.bc.ca/wp/grants/active-communities-grants/>

BC Healthy Communities

Seed grants are available to identify opportunities to link health and active living in communities. Eligible for NGOs or local governments.

<http://www.bchealthycommunities.ca/Content/News/Index.asp#WhatisSG>

Transport Canada's Moving on Sustainable Transportation

Working with organizations across Canada to make sustainable transportation a reality.

<http://www.tc.gc.ca/programs/environment/most/menu.htm>

Buildings (All)

LiveSmart BC

Comprehensive listing of a variety of grants available for building retrofits and improvements.

http://www.livesmartbc.ca/homes/h_rebates.html



Appendix F Funding Opportunities

Office of Energy Efficiency ECOENERGY

<http://oee.nrcan.gc.ca/residential/personal/retrofit-homes/retrofit-qualify-grant.cfm>

ecoENERGY Green Communities Canada

http://egh.gca.ca/index.php?en_grant

BC Hydro

A wide variety of incentives and grants available to home and business owners.

<http://www.bchydro.com/>

Solar BC

Up to \$3000 in financial rebates and incentives available to convert hot water heaters to solar.

<http://www.solarbc.ca/>





wildsight