

DISTRICT OF LANTZVILLE

CORPORATE CLIMATE
CHANGE PLAN

2008



DEVELOPED FOR THE INVENTORY YEAR 2006

CORPORATE CLIMATE ACTION PLAN 2008

AN ENERGY AND EMISSIONS MANAGEMENT PLAN
DEVELOPED FOR THE INVENTORY YEAR 2006

Prepared for:

District of Lantzville
7192 Lantzville Road, P.O. Box 100
Lantzville, BC V0R 2H0

Prepared by:

Hyla Environmental Services Ltd.
169 Aspenwood Drive
Port Moody, BC
Canada V3H 5A5
(604) 469-2910
rhaycock@hyla.ca



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Acronyms

CO₂ – Carbon Dioxide

CO₂e – Carbon Dioxide Equivalent

DOL – District of Lantzville

FCM – Federation of Canadian Municipalities

GHG – Greenhouse Gas

GMF – Green Municipal Funds

HES – Hyla Environmental Services Ltd.

PCP – Partners for Climate Protection

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EXECUTIVE SUMMARY

In 2007, the District of Lantzville made a voluntary commitment to participate in the Partners for Climate Protection (PCP) Program. The PCP begins with an inventory of energy and emissions and a management plan to reduce existing and future emissions. The program is designed to continuously report and monitor energy and emissions as reduction measures are implemented. Further, the program is also designed to ensure that new buildings and engineering assets consider energy consumption and resulting emissions at the planning stage for new assets, or at the time of purchase for other energy consuming assets.

Energy consumption and emissions are both projected to increase by 5 percent. Energy costs are projected to increase by 39 percent. The forecast is based on current growth trends and does not consider a high-growth scenario that may be associated with increased potable water service throughout the community.

Forecasted Parameter	Base Year (2006)	Forecast Year (2016)	Percent Increase
Energy Consumption	1,585 GJ	1,661 GJ	5%
Energy Costs	\$32,438	\$45,248	39%
Emissions	42 tonnes	44 tonnes	5%

The District of Lantzville can reduce its 2006 base year emissions quantity of 42 tonnes CO₂e by 7.2 tonnes, or 17 percent, by 2016. Interviews with District staff confirm that the reduction quantity is achievable and should be explored further within reasonable program resources and with a commitment from Council and management to undertake the programs proposed in the Technical Compendium of Reduction Measures.

Sector	2006 Base Year Emissions (tonnes CO ₂ e)	2016 GHG Projection (tonnes CO ₂ e)	Potential Reduction of GHG Emissions (2016)	GHG Emissions After Measures (2016)	Percent Reduction of Projected Emissions (2016)
Buildings	16.4	17.5	5	12.5	-30%
Water and Wastewater	4.9	5.1	1	4.1	-20%
Vehicle Fleet	16.0	16.6	1	15.6	-6%
Corporate Solid Waste	4.7	4.8	0.2	4.6	-4%
Totals	42	44	7	37	-17%

Recommendations

An emission reduction target of 7.2 tonnes CO₂e, an amount that will reduce emissions by 17 percent below 2006 levels by 2016, is recommended for adoption as the District's corporate operations objective.

A Introduction & Context

The District of Lantzville recognizes that climate change is occurring and wishes to strengthen its overall sustainability program by developing a corporate climate change plan. Based on the inventory of greenhouse gases completed and recommendations made within this Corporate Energy and Emissions Management Plan, the capacity of Lantzville to meet progressive GHG emission reduction targets by 2016 is established.

This report is an example of the value of a corporate energy and emissions plan for smaller municipalities that are growing rapidly. Lantzville is a prime example of a municipality that has the potential to establish carbon neutral growth strategies as an integral part of its operations management. This plan can contribute to a strategy on sustainability that can place the District in a leadership role for local implementation of sustainability initiatives within the community.

A1 Regional Climate Change Initiative

Although this report is specific to Lantzville's corporate operations, it is part of a larger project that involves each member municipality within the Regional District of Nanaimo. When all the components are completed, Lantzville will have played a major role alongside the Regional District of Nanaimo and all other member municipalities in achieving more effective energy and emissions management.

A2 Plan Development Process

Hyla Environmental Services Ltd. (HES) was hired to develop this document. Five corporate climate change plans are to be developed, one for Lantzville, one for the RDN, and one for each of the other three RDN municipalities. Lantzville's Chief Administrative Officer was interviewed and provided several critical components of plan development as follows:

- the detail required to complete the energy and emissions analysis and confirm the base year emissions quantity
- assistance with the forecast of energy consumption, costs for consumption, and emissions
- confirmation of the final reduction initiatives to be used to calculate the overall program goal (i.e., the reduction quantity)

A3 Overall Program Goal: The Reduction Quantity

The overall program goal of this plan is to identify the potential for emission reductions, or the reduction quantity. This quantity has been developed through the planning process by combining the reductions that are possible in each sector into an overall reduction quantity for the District's operations. Since emissions are the result of the combustion of fuel and use of electrical energy, the plan incorporates various types of measures, or reduction initiatives, that reduce energy and emissions through:

- conservation through reduced use;
- technological change;
- switching to less carbon-intensive fuel; and,
- offsetting conventional energy with renewable energy.

A4 Climate Change Plan Structure

This plan presents the results of the planning process in three sections. Section 1 provides the introduction, context, and methodology. Section 2 presents the results of the energy and emissions inventory and the forecasts of energy consumption, costs for consumption, and emissions. Section 3 presents a summary of the reduction initiatives that District staff wish to implement, as well as estimates of the potential reductions for each reduction initiative.

A5 Global Climate Change and Greenhouse Gas Emissions

The global trend toward stricter greenhouse gas emission reduction targets is placing pressure on local governments to take measurable steps toward offsetting the negative effects of climate change. At the beginning of post-Kyoto climate change talks in Bali, Indonesia to determine the global climate change regime after 2012, delegates have called for not only stricter GHG reduction targets but also stricter enforcement measures. The tougher stance on emission reductions echoes the G8 summit in Germany in June 2007, where leaders of the G8 nations introduced more aggressive targets for greenhouse gas emission reductions, agreeing to halve current levels by 2050

The meeting of world leaders followed the release by the United Nations of its toughest critique on climate change in the *Intergovernmental Panel on Climate Change (IPCC) 4th Assessment Report - Climate Change 2007*. Written by over 2,500 top scientists, the report concludes that there is “unequivocal” evidence that climate change is real and happening faster than expected. Notably, it calls on nations to increase their efforts in the areas of climate change adaptation, mitigation and technology.

At the federal level, the Canadian government has committed to taking ‘real action’ in its most recent climate change plan, setting GHG emission reductions at 20 percent by 2012 while imposing mandatory reduction targets on industry. To support efforts to reduce air pollution and greenhouse gas emissions, the Canada EcoTrust for Clean Air and Climate Change was introduced in February 2007 to co-fund with the provinces technology development, energy efficiency, and related projects.

British Columbia will receive \$199.2 million of the \$1.5 billion in initial funding from the EcoTrust fund to put towards its provincial GHG reduction initiatives, which are some of the toughest in North America. Notably, BC is the first Canadian province to adopt California’s tough motor vehicle emissions reduction targets—30 percent by 2016. Together with 30 US states and an Indian tribe, the province has become a founding member of the North American Climate Registry, a greenhouse gas emissions reporting system.

The province of British Columbia continues to take a national leadership role on climate change with the introduction of the British Columbia Climate Action Charter. Municipal signatories to the charter have agreed to achieve carbon neutral operations by 2012, measure and report GHG emissions and develop energy efficient building, transit, and energy projects.

The stepped up actions on emission reductions at the global and regional levels have direct implications for local governments whose emission reduction initiatives are a key part of the global climate change solution. The Government of Canada can play an important role by providing strong leadership to ensure that any federal plan speaks to actions that can be implemented at the local level. These actions will be further supported by direct funding for the development of GHG reduction projects, conservation efforts and educational programs.

Since the signing of the United Nations Framework Convention on Climate Change in 1992, countries have worked toward meeting the GHG emission reduction targets set at the first Earth Summit in Rio de Janeiro, Brazil. Under the Kyoto Protocol—the agreement that sets out the targets and options available to countries to achieve them—Canada’s target is to reduce its GHG emissions to six percent below 1990 levels in the period 2008 to 2012.

A6 Partners for Climate Protection Program

The District of Lantzville became a member of the FCM/ICLEI Partners for Climate Protection in May 2007. The PCP is an umbrella initiative that fosters municipal participation in greenhouse gas emission reduction and overall sustainability initiatives. Its goal is to assist municipalities with their greenhouse gas management initiatives by providing tools and logistics support.

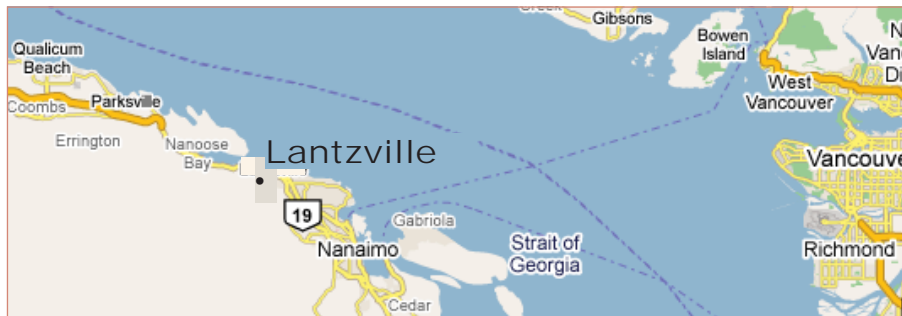
Local governments that become members of the Partners for Climate Protection make a voluntary commitment to complete five milestones (see <http://www.sustainablecommunities.fcm.ca>). Once this plan is endorsed by Council and approved by the PCP Secretariat, the District will be recognized for completing the corporate stream of Milestones One, Two, and Three.

A7 Regional and Local Context

The District of Lantzville is located on the east side of Vancouver Island off the southwest coast of British Columbia. It is a newer municipality and was formally a portion of an electoral area within the Regional District of Nanaimo.

The District of Lantzville is one of BC's newest local governments and was formed in 2003 (Figure A7). Of all cities, district municipalities, towns, and villages in British Columbia, Lantzville ranks 87th in population out of a total of 157 municipalities (regional districts, electoral areas, and Indian reservations excluded; www.bcstats.gov.bc). According to Statistics Canada, the population of Lantzville in 2006 was 3,661, and increase of 0.2 percent from 2001.

Figure A7 Map of Lantzville



A8 Energy and Emissions Inventory and Forecast

In order to implement an effective strategy to reduce greenhouse gas emissions, it is necessary to develop an inventory of the emissions. In its absence, the local government lacks a starting point from which progress can be measured. Further, they will not be able to forecast future emissions and predict the benefits of proposed reduction measures.

The emissions inventory for the District's operations provides an analysis for all its activities and operations. This report pertains to the corporate emissions and related reduction initiatives only. The base year emissions quantity is for 2006 and the project period is from 2008 to 2016.

A review of emissions by sector allows an analysis of the activity or operation responsible for various emissions. Corporate emissions by sector include those resulting from buildings, fleet vehicles and other motorized equipment, potable water, storm and sanitary sewers, and solid waste generated at District facilities. The District does not own any traffic or street lights.

A review of emissions by source allows for an analysis of the origin of various emissions. The origin of the emission is attributed to the type of fuel burned while carrying out the activity or operation. Major sources of greenhouse gas emissions include electricity, natural gas, diesel fuel, and gasoline. Greenhouse gases are emitted as these fuels are burned. Methane from the decomposition of waste in landfills is also a major source of greenhouse gas emissions, but is a direct emission, as opposed to the emissions from burning fossil fuels.

Milestone One: Complete GHG and energy use inventories and forecasts for both municipal operations and the community as a whole.

Milestone Two: Set Reduction Targets. Suggested PCP targets are a 20 percent reduction in GHG emissions from municipal operations, and a minimum six percent reduction for the community, both within 10 years of making the commitment.

Milestone Three: Develop a Management Plan. Develop a plan that sets out how emissions and energy use in municipal operations and the community will be reduced.

Milestone Four: Implement the Plan. Create a strong collaboration between the municipal government and community partners to carry through on commitments, and maximize benefits from greenhouse gas reductions.

Milestone Five: Monitor and Report Progress. Maintain support by monitoring, verifying, and reporting greenhouse gas reductions.

From the energy consumed by the District's operations, the mass of greenhouse gas emissions is calculated. This information forms the data from which the overall program goal is derived, and upon which evaluation of progress can be measured in the future.

District staff from all sectors of its operations assisted with the collection of energy consumption data.

BC Hydro and Terasen Inc. provided consumption data and costs for consumption of electricity and natural gas respectively, for the inventory year of 2006. Vehicle fleet data was compiled from internal District records while solid waste generated from operations was derived from the volume of bins at District facilities and the frequency of pick-up of the bins.

Data was imported into the Energy and Emissions module of Hyla Environmental Services Ltd.'s Energy & Emissions. The emissions calculator within this software conforms to the methods described in the International Panel on Climate Change Greenhouse Gas Inventory Reference Manual (IPCC 2006), the principles provided in the International Standards Organization (ISO) Draft International Standard for Greenhouse Gases (ISO 2005), and the general guidance within the FCM's guidance document for the preparation of PCP inventories (FCM 2006). Emissions coefficients are found in the IPCC document while emissions coefficients for electricity are provided by BC Hydro.

Energy and emissions are calculated at the account level (i.e., an asset that consumes energy, such as a building or pumping facility, represents an account in the software). The exception is the vehicle fleet since only the total amount of gasoline and diesel fuel was available. A detailed summary of the energy and emissions inventory is presented in Appendix A.

A9 Reduction Initiatives and the Reduction Quantity

The reduction initiatives selected are presented in the District's *Technical Compendium of Potential Reduction Initiatives* and summarized in Section 3.

The reduction quantity was calculated once staff selected reduction initiatives that could be achieved by the District. The calculation of reductions is based on the energy types that are affected by the measure. The total reductions that could be achieved by the District is the sum of the individual estimates of each reduction measure, including growth for each sector.

The overall reduction quantity is equal to the difference between the sum of the base year inventory plus the reductions, and the forecast year inventory. The overall reduction quantity is expressed as a mass or as a simple percentage of the base year quantity. To achieve a reduction in emissions on the emissions inventory calculated in 2012, the total reductions achieved during the project period must be greater than the growth in emissions. When expressed as a percentage, the literal translation is, 'the emissions inventory in 2016 will be X % lower than the 2006 base year quantity.'

B Energy and Emissions Inventory

B1 Inventory of Buildings & Engineering Assets

Table B1 provides an overview of the type and number of energy accounts associated with buildings and engineering assets owned and operated by the District of Lantzville.

Table B1 - List of Buildings and Engineering Assets and Energy Accounts

Sector	Subcategory	Number of Assets	Energy Type	Number of Accounts
Buildings	Administration	1	Electricity	1
	Fire Services	1	Electricity	1
	Leased Building - Costin Hall	1	Electricity Natural Gas	1 1
	Leased Building - Heritage Church	1	Electricity Natural Gas	1 1
Water and Wastewater	Potable Reservoir Pump	1	Electricity	1
	Potable Deep Well Pump	5	Electricity	3
	Sanitary Vacuum Sewer Lift	1	Electricity	1
Vehicle Fleet	Heavy Fire Truck	4	Diesel Fuel	1
	Public Works Light/Medium Duty Truck	3	Gasoline	1
	Fire Department Vehicle	2	Gasoline	

*The Lighting Sector is absent from the inventory since the District does not own any traffic signals, streetlights, etc.

B2 Overview of Energy and Emissions for Buildings & Engineering Assets

An overview of total energy consumed, costs, and emissions by sector is presented in Table B2. For the 2006 inventory year, the District's total energy consumed was 1,586 GJ, total costs were ~\$32,000 and total greenhouse gas emissions were 42 tonnes CO₂e.

The majority of energy consumed is in the buildings sector (782 GJ). Water and wastewater consumed 581 GJ, and the vehicle fleet consumed 222 GJ of energy.

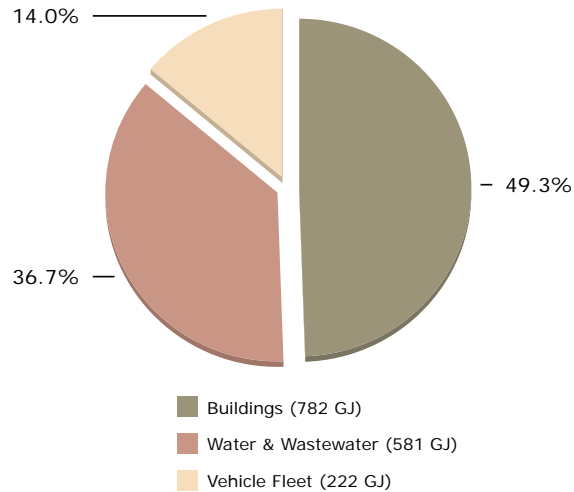
Table B2 - Energy, Costs, and Emissions by Sector (2006)

Sector	Total Energy (GJ)	Total Cost	Total Emissions (CO ₂ e tonnes)	Percent Energy	Percent Costs	Percent Emissions
Buildings	782	\$14,174	16	49%	44%	39%
Water & Wastewater	581	\$11,537	5	37%	36%	12%
Vehicle Fleet	222	\$6,727	16	14%	21%	38%
Solid Waste			5	0%	0%	11%
Total	1,586	\$32,438	42	100%	100%	100%

B2.1 Energy Consumption

As Figure B2.1 illustrates, the majority of energy consumed in 2006 is in the buildings sector at 782 GJ (49 percent). Water and wastewater consumed 581 GJ (37 percent), and the vehicle fleet consumed 222 GJ (14 percent); (Table B2 and Figure B2.1). Since corporate solid waste is a direct GHG emission (methane) to the atmosphere, no energy is consumed.

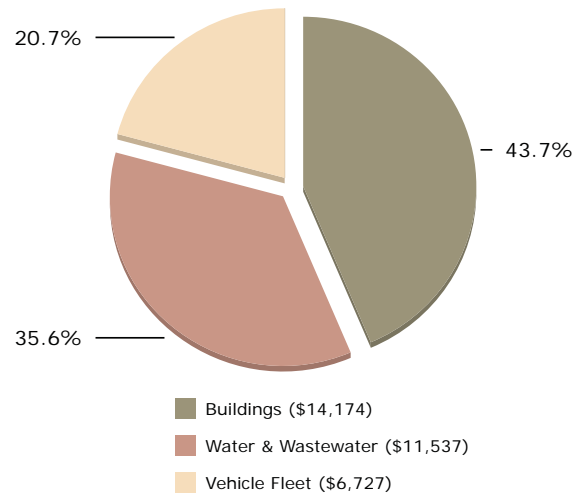
Figure B2.1 – 2006 Energy Consumption (GJ)



B2.2 Energy Costs

The largest portion of the District’s total energy costs were incurred by energy for buildings at ~\$14,000 (44 percent), although a portion of those costs are paid by leasees of two leased buildings. Water and wastewater pumps cost ~\$12,000 (~36 percent), and vehicle fleet costs were ~\$7,000 (~21 percent; Table B2 and Figure B2.2).

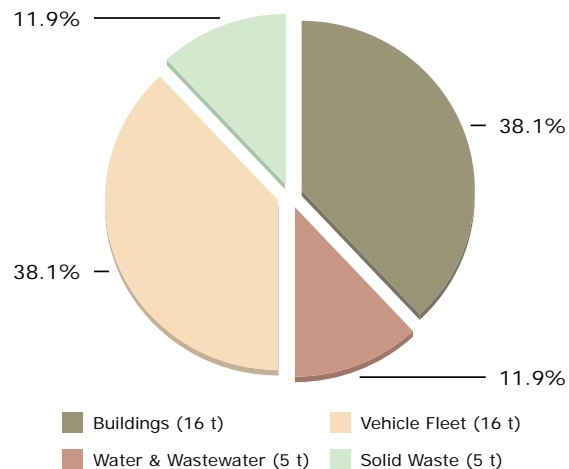
Figure B2.2 – 2006 Energy Costs



B2.3 GHG Emissions

The District’s buildings and vehicle fleet produced the majority of emissions at 16 tonnes CO₂e (~38 percent) each. Solid waste and water and wastewater sectors followed at approximately 5 tonnes (~12 percent) each.

Figure B2.3 – 2006 Emissions (tonnes CO₂e)



B2.4 Sources of Energy and Costs

The District consumes four types of energy: electricity, natural gas, gasoline, and, diesel fuel. In terms of energy type, electricity accounts for 72 percent of the total energy consumed (Table B2.4). Natural gas accounts for 14 percent while gasoline (11 percent) and diesel fuel (3 percent) make up the remainder (Figure B2.4a and Figure B2.4b).

Table B2.4 – Sources of Energy & Costs (2006)

Energy Type	Units	Total Use	Total Energy (GJ)	Total Cost	Percent Total Energy by Source	Percent Total Costs by Source
Electricity	kWh	315,374	1,135	\$22,406	72%	69%
Natural Gas	GJ	228	228	\$3,305	14%	10%
Gasoline	litres	5,199	180	\$5,564	11%	17%
Diesel Fuel	litres	1,086	42	\$1,163	3%	4%
Total			1,586	\$32,438	100%	100%

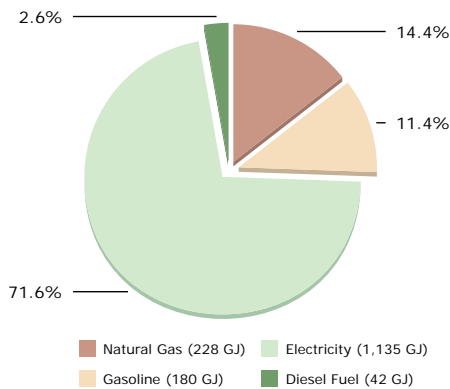


Figure B2.4a – 2006 Sources of Energy (GJ)

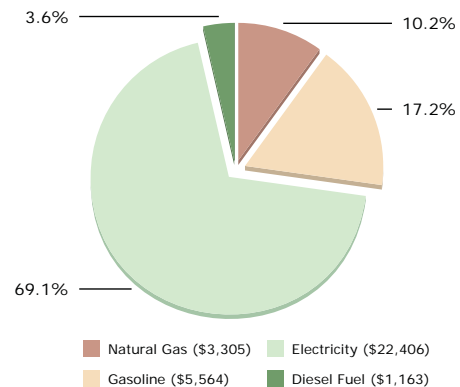


Figure B2.4b – 2006 Sources of Energy Costs

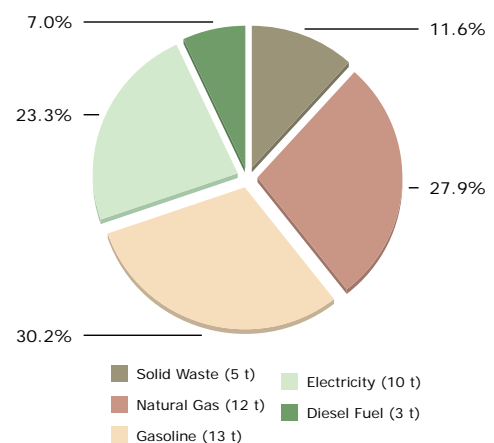
B2.5 Sources of Corporate Emissions

The greatest source of emissions was from the consumption of gasoline (31 percent of total emissions), followed by natural gas (28 percent), electricity (23 percent), corporate solid waste (11 percent) and diesel fuel (7 percent). Table B2.5 and Figure B2.5 illustrate the contribution of each energy source.

Table B2.5 – Sources of Emissions (2006)

Energy Type	Units	Total Use	Total Emissions (CO ₂ e tonnes)	Percent by Source
Electricity	kWh	315,374	10	23%
Natural Gas	GJ	228	12	28%
Gasoline	litres	5,199	13	31%
Diesel Fuel	litres	1,086	3	7%
Solid Waste			5	11%
Total			42	100%

Figure B2.5 – Sources of Emissions (tonnes CO₂e)



B3 Ranking Energy Consumption, Costs, and CO₂e

Ranking buildings and engineering assets (accounts) by energy consumption, costs, and CO₂e can assist local government in prioritizing the implementation of reduction measures. Assuming reduction measures can be practically applied to the buildings and/or engineering assets in question, decisions can be made based on overall consumption; costs for consumption; or, CO₂e. Tables B3a, B3b, and B3c provide a ranking of consumption, costs for consumption, and CO₂e, respectively.

Table B3a - Energy Consumption Ranking (2006)

1	Firehall - 7580 Superior Rd	239 GJ	\$4,623	2.0 t
2	Costin Hall - 7232 Lantzville Rd	236 GJ	\$3,757	8.3 t
3	Well #9 - Harby Rd Pump	210 GJ	\$4,114	1.8 t
4	Wells 5, 6 & 12 - Harby Rd	153 GJ	\$3,016	1.3 t
5	Decommissioned Well - Philips Road	129 GJ	\$2,563	1.1 t
6	District Office - 7192 Lantzville Rd	121 GJ	\$2,432	1.0 t
7	Gasoline Trucks - Public Works	113 GJ	\$3,478	8.1 t
8	District Office To Be Deleted - Phillips Rd	94 GJ	\$1,896	0.8 t
9	Heritage Church - 7244 Lantzville Rd	92 GJ	\$1,465	4.2 t
10	Well # 4 - 7380 Harby Rd	83 GJ	\$1,664	0.7 t

Table B3b - Costs for Consumption Ranking (2006)

1	Firehall - 7580 Superior Rd	239 GJ	\$4,623	2.0 t
2	Well #9 - Harby Rd Pump	210 GJ	\$4,114	1.8 t
3	Costin Hall - 7232 Lantzville Rd	236 GJ	\$3,757	8.3 t
4	Gasoline Trucks - Public Works	113 GJ	\$3,478	8.1 t
5	Wells 5, 6 & 12 - Harby Rd	153 GJ	\$3,016	1.3 t
6	Decommissioned Well - Philips Road	129 GJ	\$2,563	1.1 t
7	District Office - 7192 Lantzville Rd	121 GJ	\$2,432	1.0 t
8	Gasoline Fire Dept. Vehicles	68 GJ	\$2,086	4.9 t
9	District Office To Be Deleted - Phillips Rd	94 GJ	\$1,896	0.8 t
10	Well # 4 - 7380 Harby Rd	83 GJ	\$1,664	0.7 t

Table B3c - Greenhouse Gas Emissions Ranking (CO₂e; 2006)

1	Costin Hall - 7232 Lantzville Rd	236 GJ	\$3,757	8.3 t
2	Gasoline Trucks - Public Works	113 GJ	\$3,478	8.1 t
3	Gasoline Fire Dept. Vehicles	68 GJ	\$2,086	4.9 t
4	Heritage Church - 7244 Lantzville Rd	92 GJ	\$1,465	4.2 t
5	District Office - 7192 Lantzville Rd			4.1 t
6	Diesel Fuel Heavy Fire Trucks	42 GJ	\$1,163	3.0 t
7	Firehall - 7580 Superior Rd	239 GJ	\$4,623	2.0 t
8	Well #9 - Harby Rd Pump	210 GJ	\$4,114	1.8 t
9	Wells 5, 6 & 12 - Harby Rd	153 GJ	\$3,016	1.3 t
10	Decommissioned Well - Phillips Road	129 GJ	\$2,563	1.1 t
11	District Office - 7192 Lantzville Rd	121 GJ	\$2,432	1.0 t
12	District Office To Be Deleted - Phillips Rd	94 GJ	\$1,896	0.8 t

B3.1 Energy Consumption Rank

The firehall and Costin Hall consume the most energy in the District. Two accounts for various potable water wells rank third and fourth (Table B3a). Please refer to Section 3 for a summary of the reduction measures that could be applied to all accounts.

B3.2 Costs for Energy Consumption Rank

The firehall is the most expensive asset to operate in the District due to the high cost of electrical heating. Well #9 ranks second while Costin Hall ranks third due to the cost for natural gas for space heating. Gasoline-fueled medium duty trucks rank fourth (Table B3b).

B3.3 Greenhouse Gas Emissions Rank

Costin Hall produce the most greenhouse gas emissions followed by gasoline-fueled medium duty trucks. The gasoline-fueled Fire Department trucks rank third and Woodgrove Heritage Church ranks fourth. Note that the District Office account, which is ranked fifth, represents an estimate of the emissions from corporate solid waste from this facility and not the emissions from energy consumption (these accounts only appear in Table B3c since the emissions are estimates of corporate solid waste disposed at the regional landfill).

B3.4 Overall Ranking

Table B3.4 lists the relative ranking of accounts by consumption, costs, and CO₂e. The scores do not reflect performance (e.g., good vs. poor), but rather the account's respective value relative to others for the sole purpose of prioritization. The lower the scored rank, the higher the energy consumption, costs for consumption, and CO₂e. The scored rank does not necessarily suggest the practicality and/or achievability of applying reduction measures, it simply serves the purpose of drawing attention to accounts and their relative ranking across the three rating categories (i.e., consumption, costs, CO₂e). The Total Rank Score is the sum of all the scored ranks. The lower the Total Rank Score, the higher the overall priority of the account.

Table B3.4 – Relative Ranking of Accounts by Consumption, Costs, and CO₂e

Account	Rank			Total Rank Score
	Consumption	Costs	CO ₂ e	
Costin Hall	2	3	2	7
Firehall	1	1	7	9
Gasoline Trucks - Public Works	6	4	1	11
Well #9	3	2	8	13
Gasoline Fire Department Vehicles	8	7	3	18
Wells #5, 6, & 12	4	5	9	18
Woodgrove Church	7	9	4	20
District Office	5	6	10	21
Diesel Fuel Heavy Fire Trucks	10	10	6	25
District Office Corporate Waste	11	11	5	27
Well # 4	8	8	11	27

The overall ranking of the accounts is summarized as follows:

- Costin Hall ranked second in consumption, third in costs, and second in CO₂e emissions and therefore, this building is the number one priority. Because it is leased to a community group, the details of any reduction measures must be incorporated into any lease agreement.
- The firehall has the second lowest rank score as this account ranked first in consumption and costs. This building is the number two priority if it is practical to implement reduction measures.
- Gasoline trucks ranked third overall as this account (i.e., four vehicles) ranked sixth in consumption, fourth in costs, and first in CO₂e. Any initiatives for gasoline trucks would apply to all gasoline vehicles in the District.
- Well #9 ranked fourth overall and scored third highest in consumption and second in costs. Water conservation measures at the community level may be the only reduction measure to significantly affect this account, although, significant water conservation measures are already underway throughout the District.
- Gasoline Fire Department Vehicles ranked fifth overall and scored third in CO₂e. Most of the measures applied to the Public Works Gasoline Trucks would also apply to the Gasoline Fire Department Vehicles.

B4 Forecasts

There are two growth forecast scenarios for the District of Lantzville between 2006 and 2016:

1. normal growth to meet the growing needs of the community as observed from the current trend; and
2. significant growth in energy consumption to meet a rapidly growing community—forecast as a high-growth scenario.

Scenario 2 has not been explored since a high-growth scenario would only occur if the District was able to provide significantly more potable water to service undeveloped areas. The scope of this report does not include forecasting the energy consumption associated with a high-growth scenario.

For the buildings and water and wastewater sectors, forecasts are based on current trends in energy consumption accounts. For the vehicle fleet sector, forecasts are based on increased fuel use, not additional vehicles.

Table B4a - Forecast of Energy Consumption by Sector (2006 - 2016)

Sector	Energy Type/ Unit	Consumption	Energy (GJ)		Forecast Percent	Forecasted Energy (GJ)	Forecasted Total Energy (GJ)
			2006	Total Energy (GJ)			
			2006			2016	
Buildings	Elect (kWh)	153,961	554	782	1.03	571	817
	Natural Gas (GJ)	228	228		1.08	246	
Water & Wastewater	Elect (kWh)	161,413	581	581	1.05	610	610
Vehicle Fleet	Diesel (L)	1,086	42	222	1.03	43	234
	Gas (L)	5,199	180		1.06	191	
Total			1,585			1,661	

Table B4b - Forecast of Costs by Sector (2006 - 2016)

Sector	Energy Type/ Unit	Consumption	Costs		Forecasted Unit Costs	Forecasted Costs	Forecasted Total Costs
			2006	Total Costs			
			2006			2016	
Buildings	Elect (kWh)	153,961	\$10,869	\$14,174	1.03	\$12,686	\$15,395
	Natural Gas (GJ)	228	\$3,305		1.08	\$2,709	
Water & Wastewater	Elect (kWh)	171819	\$11,537	\$11,537	1.05	\$13,559	\$13,559
Vehicle Fleet	Diesel (L)	1086	\$5,564	\$6,727	1.03	\$13,777	\$16,294
	Gas (L)	5199	\$1,163		1.06	\$2,517	
Total			\$32,438			\$45,248	

Table B4c - Forecast of Costs by Sector (2006 - 2016)

Sector	Energy Type	Emissions CO ₂ e (t)	Total CO ₂ e (t)	Forecast Percent	Forecasted Emissions CO ₂ e (t)
		2006		2016	
Buildings	Elect (kWh)	4.7	16.4	103%	4.8
	Natural Gas (GJ)	11.7		108%	12.6
Water & Wastewater	Elect (kWh)	4.9	4.9	105%	5.1
Vehicle Fleet	Diesel (L)	13	16.0	103%	16.6
	Gas (L)	3		106%	
Solid Waste	N/A	4.7	4.7	102%	4.8
Total		42		44	

B5 Summaries

Summaries are provided for the energy and emissions inventory; the scored ranking of consumption, costs, and greenhouse gas emissions; and the forecasts in sections B5.1, B5.2, and B5.3, respectively.

B5.1 Energy and Emissions Inventory Summary

Greenhouse gas emissions, energy, and costs for consumption by energy type were calculated for the District's base year (2006) and forecast year (2016). In the base year, the emissions quantity was 42 tonnes CO₂e, the total amount of energy consumed was 1,585 GJ and the total costs for consumption were \$32,438.

B5.2 Summary of Ranking

Table B3.3 lists the relative ranking of accounts by consumption, costs, and CO₂e. The scores do not reflect performance (e.g., good vs. poor), but rather the account's respective value relative to others for the sole purpose of prioritization. The lower the scored rank, the higher the energy consumption, costs for consumption, and CO₂e. The scored rank does not necessarily suggest the practicality and/or achievability of applying reduction measures; it simply serves the purpose of drawing attention to accounts and their relative ranking across the three rating categories (i.e., consumption, costs, CO₂e). The Total Rank Score is the sum of all the scored ranks. The lower the Total Rank Score, the higher the overall priority of the account.

B5.3 Summary of Forecasts

In the forecast year, the forecast of emissions is 44 tonnes CO₂e, the forecast of energy consumed is 1,661 GJ, and the forecast of costs for consumption is \$45,248.

From 2006 to 2016, overall energy consumption is forecast to increase by 5 percent, while overall costs for energy are forecast to increase by 39 percent mainly due to the forecasted increase in the unit cost for automotive fuel. Over the same period, overall emissions are forecast to increase by 5 percent. The forecasts for energy consumption, costs, and emissions are summarized in Table B5.3.

Table B5.3 - Summary of Forecasts

Forecasted Parameter	Base Year (2006)	Forecast Year (2016)	Percent Increase
Energy Consumption	1,585 GJ	1,661 GJ	5%
Energy Costs	\$32,438	\$45,248	39%
Emissions	42 tonnes	44 tonnes	5%

It should be noted that the 5 percent increase in electricity consumption in the water and wastewater sector includes the decommissioning of a pump station, addition of the Ware Road Reservoir, and the deletion of the accounts associated with the former District Hall.

B6 Forecasts and Their Contribution to Reduction Targets

The forecast of energy consumption, costs and emissions is essentially the projected growth in these parameters from the base year through to the forecast period. Forecasts are considered a work in progress as new information can change the forecast and therefore the reduction targets. Since all the parameters used to calculate the reduction targets are subject to change, targets are essentially 'moving' as new information is gathered.

The reduction target is equal to the percent difference between the base year inventory and the forecast year inventory. Since reduction targets are absolute, to achieve an actual reduction, the total reductions achieved during the project period must be greater than the growth in emissions.

C Corporate Reduction Initiatives

C1 Reduction Initiatives

To calculate the overall reduction quantity for this project, reduction initiatives have been selected that reduce energy consumption and the production of emissions from the existing infrastructure (base year energy and emissions) and infrastructure that will be added in the future (growth in energy and emissions).

For each sector, reduction measures have been calculated based on information gathered through pre-screening audits, staff knowledge of the infrastructure and/or comparable data from audits HES has conducted in other communities. Detailed audits of District infrastructure were beyond the scope of this project.

Based on HES' knowledge of similar buildings, a preliminary end-use breakdown of energy loads for buildings was calculated in EEMRS™. Tables C2.1 to C5.1 summarize estimates of the typical reductions for the given reduction initiatives selected by sector (buildings, water and wastewater, vehicle fleet, waste, etc.).

Although reduction amounts are considered estimates, careful consideration has been given to the effect each measure will have on energy consumption.

A Technical Compendium of Potential Reduction Initiatives has been provided to staff that lists all the reduction initiatives that have been applied to each account in the energy inventory. Staff must refer to the technical compendium to review the specific reduction initiatives that have been applied to individual accounts. This is a confidential document that was produced for District staff.

Administrative Considerations

For corporate operations, the District should begin monitoring and reporting energy consumption and emissions and coordinating corporate energy and emissions efficiency. The frequency of reporting should be annual in order to review any changes that are occurring over time. The District should review the implications of any buildings and engineering assets as part of any decision making process undertaken for procurement, if any.

Since the District may grow significantly in the future, this report will require review in three to five years. Further, although the project period is stated as 2008-2016, the measures proposed in the Technical Compendium of Potential Reduction Measures require review in two to three years since technology is changing rapidly.

Timeline for Measures Proposed

The suggested reduction target herein is based on initiatives proposed for implementation between 2008 and 2016.

Technology

Technology plays an important role in the actual reductions achieved during the project period. The rate of introduction of new technologies that increase energy efficiency and the availability of alternative energy sources and new technologies for energy production are key to achieving significant reductions in the future.

Measures do not include technologies that are not commercially viable today or that are not currently cost effective.

C2 Buildings Sector

It is estimated that ~168 GJ of energy can be saved by implementing simple measures in the four buildings owned by the District. These retrofits will result in energy savings of approximately \$2,869, calculated at current day costs for energy consumption. The majority of the costs savings would apply to the Costin Hall and Heritage Church. Since the District is responsible for the emissions from buildings leased to others, any greenhouse gas emission reductions are credited to the District. The estimated energy reductions would result in a reduction of ~5 tonnes CO₂e.

Reduction initiatives include the redesign of existing T8 lighting in the Administration Building and the retrofit of existing T12 lighting at Costin Hall, the Heritage Church, and the Fire Hall.

Although detailed audits of District infrastructure were beyond the scope of this project, upon review of the buildings and engineering assets, no detailed audits are recommended. With the exception of the lighting in the Fire Hall, buildings are as efficient as possible (Note: Some long-term efficiencies in costs for space heating in the administration building and the fire hall could be gained by switching electricity with natural gas, but greenhouse gas emissions will increase slightly).

The cost of connecting natural gas to the two buildings owned by the District that do not currently consume natural gas may outweigh the savings incurred by displacing electricity used for space heating with natural gas. An exception may occur if the District wishes to explore a gas-assisted, roof top air conditioning unit for the administration building. Within any exploration of this option, a mechanical engineer may want to conduct a full building audit to provide a comparison of options for the District. The audit may conclude that only a small, electrical powered AC unit is required.

Table C2.1 provides a summary of proposed measures, summarized by measure category.

Table C2.1 – Summary of Proposed Reduction Initiatives for the Buildings Sector (2008-2016)

BUILDINGS	Reductions			
	Consumption	Costs	CO ₂ e (t)	
BUNDLED RETROFIT				
Combined Energy	98 GJ		3.7 t	
Electricity	12,697 kWh	\$912	0.3 t	
Natural Gas	15 GJ	\$228	0.8 t	
EFFICIENT TECHNOLOGY				
Electricity	2,320 kWh	\$163	0.1 t	
Total	Electricity	15,017 kWh	\$1,075	0 t
	Natural Gas	15 GJ	\$228	1 t
	Combined Energy	98 GJ		4 t
		168 GJ	\$2,869	5 t

Future Buildings

A LEED™ Silver design standard, which includes at least a 25 percent renewable energy component, should reduce growth in energy in new buildings by 25 to 30 percent. Regardless, staff are encouraged to require a LEED™ Gold standard on all new buildings and ensure the design meets the highest standard practically achievable in the energy and atmosphere category.

C3 Lighting Sector (streetlights, traffic signals, outdoor sportsfield lighting, etc.)

In total, there are approximately 300 overhead lights in the District however these lights are owned by BC Hydro and therefore have not been included in the District of Lantzville’s corporate inventory. Energy reduction measures for the lighting sector are BC Hydro initiatives and have no outcome on the District of Lantzville’s corporate emissions.

C4 Water and Wastewater Sector

It is estimated that ~196 GJ of energy can be saved in the water and wastewater sector, which will result in ~\$3,888 in cost savings, and ~1 tonne CO₂e.

Although we have applied water conservation measures to this sector, these reductions are difficult to quantify in the absence of monitoring. Further, the District is already applying very aggressive conservation measures, so the effectiveness of our additional measures may be overestimated.

There may be savings by applying a temperature setback for the Ware Road Reservoir, but this building is new and it is difficult to predict the amount of use of the building when space heating is required in order to determine the effectiveness of potential energy conservation retrofits.

Table C4 – Summary of Proposed Reduction Initiatives for the Water and Wastewater Sector (2008-2016)

WATER & WASTEWATER		Reductions		
		Consumption	Costs	CO ₂ e (t)
EFFECTIVE MANAGEMENT/AUDITS				
	Electricity	18,589 kWh	\$1,317	0.4 t
ENABLES MEASURES THROUGH ADMINISTRATIVE/POLICY CHANGE				
	Electricity	35,800 kWh	\$2,571	0.8 t
Total	Electricity	54,389 kWh	\$3,888	1 t
		196 GJ	\$3,888	1 t

C5 Vehicle Fleet Sector

With the exception of idle free policies, driver education, tire audits, and nitrogen tire inflation, there are no significant reductions presently available in the vehicle fleet. Light duty trucks are used by public works staff and are right-sized for the large variety of tasks assigned. It is possible that E85 vehicles and E85 fuel (85 percent ethanol) will be available during the project period, although other technologies may emerge that would render E85 technology obsolete (e.g., electric hybrid-diesel fuel medium duty trucks, efficient propane technology, etc.).

Approximately 20 GJ of energy could be saved in the vehicle fleet sector, which would result in an approximate cost savings of \$550, calculated at 2006 costs for gasoline and diesel fuel. The estimated energy reductions would result in an emissions reduction of ~1 tonne CO₂e.

Table C5 – Summary of Proposed Reduction Initiatives for the Vehicle Fleet Sector (2007-2012)

VEHICLE FLEET	Reductions			
	Consumption	Costs	CO ₂ e (t)	
EFFICIENT TECHNOLOGY				
Gasoline	130 L	\$139	0.3 t	
EFFECTIVE MANAGEMENT/AUDITS				
Gasoline	0 L	\$0	0.0 t	
ENABLES MEASURES THROUGH ADMINISTRATIVE/POLICY CHANGE				
Diesel	22 L	\$23	0.1 t	
Gasoline	364 L	\$389	0.9 t	
Total				
	Gasoline	22 L	\$23	0 t
	Diesel Fuel	494 L	\$529	1 t
		20 GJ	\$552	1 t

C6 Reduction Initiatives for the Corporate Solid Waste Sector

There are two significant reduction measures that District staff can implement to reduce corporate solid waste in the District's buildings as follows:

1. Expand recycling and composting facilities for staff and the public in District-owned buildings; and
2. Convert to a paperless system (as much as possible and practical).

By reducing the amount of solid waste produced and landfilled, the District could reduce its corporate emissions in this sector by approximately 0.2 tonnes CO₂e.

C7 Summary of Corporate Emission Reductions

In general, the District's buildings are energy efficient relative to the age and occupancy of buildings. The administration hall uses electricity for space heating, which is not unusual for a building of this size. Adding air conditioning to this building will significantly enhance user comfort, especially in Council chambers on the second floor, although it would increase energy consumption and greenhouse gas emissions. User comfort would overshadow the latter issue and the District could compensate for slight increases in emissions by aggressively pursuing reductions in other areas.

All buildings with T12 lighting would benefit from retrofits to T8 lighting. Interlocks on the bay doors at the Fire Hall are possible and should be explored after an evaluation of energy consumption during periods of the year when space heating is required.

With the exception of community water conservation measures, there are no significant energy efficiency retrofits for the potable water pump stations and reservoir. District staff should monitor the electricity use at the new Ware Road Reservoir and ensure temperature setbacks are in place for the two roof mount space heaters.

Gasoline-fueled vehicles operated by District staff may benefit from activity-based conservation measures (fuel conservation education), although the fuel efficiency of individual vehicles is not tracked and therefore a basis for recommending such education has not been established.

Measures for diesel-fueled heavy fire trucks are limited to use of the vehicles during non-emergency operations. The use of biodiesel in fire trucks may not be possible given issues around the required consistent reliability of emergency equipment.

By implementing the initiatives listed in the *Technical Compendium of Reduction Initiatives*, the District could reduce emissions by 17 percent. Table C7 provides a summary of the potential reductions in each corporate sector.

Table C7 – Summary of Estimated Impact of Reduction Measures on Corporate Sectors

Sector	2006 Base Year Emissions (tonnes CO ₂ e)	2016 GHG Projection (tonnes CO ₂ e)	Potential Reduction of GHG Emissions (2016)	GHG Emissions After Measures (2016)	Percent Reduction of Projected Emissions (2016)
Buildings	16.4	17.5	5	12.5	-30%
Water and Wastewater	4.9	5.1	1	4.1	-20%
Vehicle Fleet	16.0	16.6	1	15.6	-6%
Corporate Solid Waste	4.7	4.8	0.2	4.6	-4%
Totals	42	44	7	37	-17%

It is important to remember that the 17 percent reduction calculated above represents the potential reductions achievable over the project period (2008-2016) relative to the projected emissions in 2016, which includes the growth of emissions predicted during the project period.

C8 Corporate Sector Target Statement

The following corporate target statement is suggested:

An emission reduction target of 7.2 tonnes CO₂e, an amount that will reduce emissions by 17 percent below 2006 levels by 2016, is recommended for adoption as the District’s corporate operations objective.

REFERENCES

FCM (2006), *Developing Greenhouse Gas Emissions and Energy Consumption Inventories: A Standards and Guidance Document for Canadian Municipalities*. Federation of Canadian Municipalities: Ottawa. 59pp.

ISO (2006), *Draft International Standard ISO/TC 207 WG5 N162. Greenhouse gases - Part 1: Specification with guidance at the organization level for quantification and reporting of greenhouse gas emissions and removals*. 28pp.

IPCC (2006), *IPCC Guidelines for National Greenhouse Gas Inventories*, Prepared by the National Greenhouse Gas Inventories Programme, Eggleston H.S., Buendia L., Miwa K., Ngara T. and Tanabe K. (eds). Published: IGES, Japan.

Glossary of Terms (IPCC 2006)

Carbon dioxide (CO₂): A naturally occurring gas; also a byproduct of burning fossil fuels and biomass, as well as land use changes and other industrial processes. It is the principal anthropogenic greenhouse gas that affects the earth's radiative balance. It is the reference gas against which other greenhouse gases are measured and therefore has a Global Warming Potential of 1.

Climate change: A statistically significant variation in either the mean state of the climate or in its variability, persisting for an extended period (typically decades or longer). Climate change may be due to natural internal processes or external forcings, or to persistent anthropogenic changes in the composition of the atmosphere or in land use.

Note that the Framework Convention on Climate Change (UNFCCC), in its Article 1, defines "climate change" as "a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods." The UNFCCC thus makes a distinction between "climate change" attributable to human activities altering the atmospheric composition and "climate variability" attributable to natural causes.

Emissions factor: The estimated average emission rate of a given greenhouse gas for a given source.

Equivalent CO₂ (CO₂e): The concentration of CO₂ that would cause the same amount of radiative forcing as a given mixture of CO₂ and other greenhouse gases.

GJ (GigaJoules): A Canadian unit of heating value equivalent to 943,213.3 Btu. The standard gas unit in Canada is the gigajoule pursuant to GISB under Order 587-A (1997). A gigajoule (GJ) is a metric term used for measuring energy use. For example, 1 GJ is equal to 277.8 kWh of electricity, 26.9 m³ of natural gas, 25.9 litres of heating oil. Similar to the energy released when burning a million wooden matches, a gigajoule of gas will cook over

2500 hamburgers, and a gigajoule of electricity will keep a 60-watt bulb continuously lit for six months.

Greenhouse gas: Gaseous constituents of the atmosphere, both natural and anthropogenic, that absorb and emit radiation at specific wavelengths within the spectrum of infrared radiation emitted by the Earth's surface, the atmosphere, and clouds. This property of greenhouse gases causes the greenhouse effect. Water vapour (H₂O), carbon dioxide (CO₂), nitrous oxide (N₂O), methane (CH₄) and ozone (O₃) are the primary greenhouse gases in the Earth's atmosphere. Moreover, there are a number of entirely human-made greenhouse gases in the atmosphere, such as the halocarbons and other chlorine- and bromine-containing substances, dealt with under the Montreal Protocol. Besides CO₂, N₂O, and CH₄, the Kyoto Protocol deals with the greenhouse gases sulphur hexafluoride (SF₆), hydrofluorocarbons (HFCs), and perfluorocarbons (PFCs).

Kyoto Protocol to the United Nations Framework Convention on Climate Change (UNFCCC): The Kyoto Protocol was adopted at the Third Session of the Conference of the Parties (COP) to the UNFCCC in 1997 in Kyoto, Japan. It contains legally binding commitments in addition to those included in the UNFCCC. Countries included in Annex B of the Protocol (most Organisation for Economic Co-operation and Development countries and countries with economies in transition) agreed to reduce their anthropogenic greenhouse gas emissions (CO₂, CH₄, N₂O, HFCs, PFCs, and SF₆) by at least 5% below 1990 levels in the commitment period 2008 to 2012. The Kyoto Protocol entered into force on February 16, 2005.

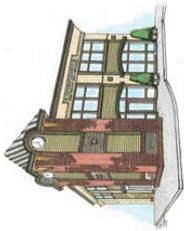
Methane (CH₄): An odorless, colorless, flammable gas, CH₄ is the major constituent of natural gas that is used as a fuel and an important source of hydrogen and a wide variety of organic compounds.

Nitrous Oxide (N₂O): A powerful greenhouse gas with a global warming potential most recently evaluated at 310.

Major sources of nitrous oxide include soil cultivation practices, especially the use of commercial and organic fertilizers, fossil fuel combustion, nitric acid production, and biomass burning.

United Nations Framework Convention on Climate Change (UNFCCC): The Convention was adopted on May 9, 1992, in New York and signed at the 1992 Earth Summit in Rio de Janeiro by more than 150 countries and the European Community. Its ultimate objective is the “stabilisation of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system.” Under the Convention, parties included in Annex I aim to return greenhouse gas emissions not controlled by the Montreal Protocol to 1990 levels by the year 2000. The convention entered into force in March 1994. See: Kyoto Protocol.

Appendix A - Detailed Summary of Emissions Inventory



Lantzville

Corporate Energy & Greenhouse Gas Emissions Inventory: 2006

Account & Address	Account Consumption & Costs by Energy Type				Account Subtotal			
	Type	Consumption	Energy	Costs	CO ₂ e	Energy	Costs	CO ₂ e
2006								
BUILDINGS								
Administration Offices								
DISTRICT OFFICE 7192 LANTZVILLE Rd	Electricity	33,726 kWh	121 GJ	\$2,432	1.0 t	121 GJ	\$2,432	1.0 t
DISTRICT OFFICE TO BE DELETED PHILLIPS Rd	Electricity	26,195 kWh	94 GJ	\$1,896	0.8 t	94 GJ	\$1,896	0.8 t
		Include in forecast as deletion						
Administration Offices Subtotal		59,921 kWh	216 GJ	\$4,328	1.8 t	216 GJ	\$4,328	1.8 t
Fire Services								
FIREHALL 7580 SUPERIOR Rd	Electricity	66,289 kWh	239 GJ	\$4,623	2.0 t	239 GJ	\$4,623	2.0 t
Fire Services Subtotal		66,289 kWh	239 GJ	\$4,623	2.0 t	239 GJ	\$4,623	2.0 t
Leased Bldgs								
COSTIN HALL 7232 LANTZVILLE Rd	Electricity	24,607 kWh	89 GJ	\$1,701	0.8 t	236 GJ	\$3,757	8.3 t
	Natural Gas	147 GJ	147 GJ	\$2,057	7.5 t			
HERITAGE CHURCH 7244 LANTZVILLE Rd	Electricity	3,144 kWh	11 GJ	\$217	0.1 t	92 GJ	\$1,465	4.2 t
	Natural Gas	81 GJ	81 GJ	\$1,248	4.1 t			
Leased Bldgs Subtotal		27,751 kWh	100 GJ	\$1,917	0.8 t	328 GJ	\$5,222	12.5 t
	Natural Gas	228 GJ	228 GJ	\$3,305	11.7 t			

2006 Energy & Greenhouse Gas Emissions Inventory

11/07/2008



Energy & Emissions Monitoring and Reporting System™ v.2.1

Lantzville

Corporate Energy & Greenhouse Gas Emissions Inventory: 2006

Account & Address	Account Consumption & Costs by Energy Type						Account Subtotal		
	Type	Consumption	Energy	Costs	CO ₂ e	Energy	Costs	CO ₂ e	
Buildings Subtotal		Consumption	Energy	Costs	CO₂e	782 GJ	\$14,174	16.4 t	
Electricity		153,961 kWh	554 GJ	\$10,869	4.7 t				
Natural Gas		228 GJ	228 GJ	\$3,305	11.7 t				
WATER & WASTEWATER									
Potable Water Reservoir									
WARE ROAD RESERVOIR 7370 WARE RD	Electricity	895 kWh	3 GJ	\$70	0.0 t	3 GJ	\$70	0.0 t	
This account opened in 2007. Include in forecast of emissions.									
Potable Water Reservoir Subtotal	Electricity	895 kWh	3 GJ	\$70	0.0 t	3 GJ	\$70	0.0 t	
Potable Water Well									
WELL #9 HARRY RD PUMP	Electricity	58,326 kWh	210 GJ	\$4,114	1.8 t	210 GJ	\$4,114	1.8 t	
WELLS 5, 6 & 12 HARRY RD	Electricity	42,435 kWh	153 GJ	\$3,016	1.3 t	153 GJ	\$3,016	1.3 t	
DECOMMISSIONED WELL PHILIPS ROAD	Electricity	35,800 kWh	129 GJ	\$2,563	1.1 t	129 GJ	\$2,563	1.1 t	
WELL # 4 7380 HARRY RD	Electricity	23,168 kWh	83 GJ	\$1,664	0.7 t	83 GJ	\$1,664	0.7 t	
Potable Water Well Subtotal	Electricity	159,729 kWh	575 GJ	\$11,358	4.9 t	575 GJ	\$11,358	4.9 t	
Vacuum Sewer Lift									
PEBBLE BEACH LIFT STATION PEBBLE BEACH	Electricity	790 kWh	3 GJ	\$109	0.0 t	3 GJ	\$109	0.0 t	
Vacuum Sewer Lift Subtotal	Electricity	790 kWh	3 GJ	\$109	0.0 t	3 GJ	\$109	0.0 t	
Water & Wastewater Subtotal		Consumption	Energy	Costs	CO₂e	581 GJ	\$11,537	4.9 t	
Electricity		161,413 kWh	581 GJ	\$11,537	4.9 t				
VEHICLE FLEET									
Diesel Fuel Vehicles									

2006 Energy & Greenhouse Gas Emissions Inventory 11/07/2008

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Hyla Environmental Services Ltd., 169 Aspenwood Drive, Port Moody, BC V3H 5A5 rhaycock@hesitd.ca or sspilker@hesitd.ca Mi: 604.469.2910 F: 604.469.5753

Lantzville

Corporate Energy & Greenhouse Gas Emissions Inventory: 2006

Account & Address	Account Consumption & Costs by Energy Type						Account Subtotal	
	Type	Consumption	Energy	Costs	CO ₂ e	Energy	Costs	CO ₂ e
DIESEL FUEL HEAVY FIRE TRUCKS -	Diesel Fuel	1,086 litres	42 GJ	\$1,163	3.0 t	42 GJ	\$1,163	3.0 t
Diesel Fuel Vehicles Subtotal	Diesel Fuel	1,086 litres	42 GJ	\$1,163	3.0 t	42 GJ	\$1,163	3.0 t
Gasoline Vehicles								
GASOLINE TRUCKS - PUBLIC WORKS - Six Trucks	Gasoline	3,250 litres	113 GJ	\$3,478	8.1 t	113 GJ	\$3,478	8.1 t
GASOLINE FIRE DEPT. VEHICLES -	Gasoline	1,949 litres	68 GJ	\$2,086	4.9 t	68 GJ	\$2,086	4.9 t
Gasoline Vehicles Subtotal	Gasoline	5,199 litres	180 GJ	\$5,564	13.0 t	180 GJ	\$5,564	13.0 t
Vehicle Fleet Subtotal	Consumption	Energy	Costs	CO ₂ e		222 GJ	\$6,727	16.0 t
	Gasoline	5,199 litres	180 GJ	\$5,564	13.0 t			
	Diesel Fuel	1,086 litres	42 GJ	\$1,163	3.0 t			
SOLID WASTE								
Administration Offices								
DISTRICT OFFICE 7192 LANTZVILLE RD	Solid Waste		52 cu. yds	7.80	4.1 t			4.1 t
Administration Offices Subtotal	Solid Waste		52 cu. yds	7.80	4.1 t			4.1 t
Fire Services								
FIREHALL 7580 SUPERIOR RD	Solid Waste		7 cu. yds	0.98	0.5 t			0.5 t
Fire Services Subtotal	Solid Waste		7 cu. yds	0.98	0.5 t			0.5 t
Solid Waste Subtotal		Volume	Mass	CO ₂ e				4.7 t
	Solid Waste	59 cu. yds	8.78 t	4.7 t				

Lantzville

Corporate Energy & Greenhouse Gas Emissions Inventory: 2006

Account & Address	Account Consumption & Costs by Energy Type						Account Subtotal		
	Type	Consumption	Energy	Volume	Mass	CO ₂ e	Energy	Costs	CO ₂ e
Total							1,586 GJ	\$32,438	41.9 t
Electricity	315,374 kWh	1,135 GJ			\$22,406	9.6 t			
Natural Gas	228 GJ	228 GJ			\$3,305	11.7 t			
Gasoline	5,199 litres	180 GJ			\$5,564	13.0 t			
Diesel Fuel	1,086 litres	42 GJ			\$1,163	3.0 t			
		Volume			Mass	CO ₂ e			
Solid Waste		59 cu. yds			8.78 t	4.7 t			