

TOWN OF QUALICUM BEACH

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

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Acronyms

CO₂ – Carbon Dioxide

CO₂e – Carbon Dioxide equivalent

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 May 2007, the Town of Qualicum Beach 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. The program is also designed to ensure that new buildings and engineering assets consider energy consumption and resulting emissions at the planning stage and at the time of purchase.

Forecasts of energy consumption, costs, and associated emissions were developed. Energy consumption and greenhouse gas emissions are projected to increase by five percent and four percent, respectively. Energy costs are projected to increase by 119 percent. The increase in costs is mainly due to the rapid acceleration of costs per unit price for gasoline and diesel fuel and is a conservative estimate based on \$2.50/litre and \$2.25/litre respectively.

Forecasted Parameter	Base Year (2006)	Forecast Year (2016)	Percent Increase
Energy Consumption	16,230	17,002	5%
Energy Costs	\$295,528	\$648,523	119%
Emissions	608 CO ₂ e tonnes	634 CO ₂ e tonnes	4%

The Town of Qualicum Beach can reduce its 2006 base year emissions quantity of 608 tonnes CO₂e by 103 tonnes, or 13 percent, by 2016. Interviews with Town 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	141	147	8	139	2%
Lighting	8	8	3	5	33%
Water and Wastewater	39	41	4	37	5%
Vehicle Fleet	373	390	84	306	18%
Corporate Solid Waste	47	48	4	44	6%
Totals	608	634	103	51	13%

Recommendations

1. Implement the reduction initiatives in the Technical Compendium of Potential Reduction Initiatives, which describes reduction initiatives for buildings and engineering assets that will result in reductions in energy consumption, energy costs, and greenhouse gas emissions;
2. Adopt a recognized, high performance building standard for new buildings (LEED™, GreenBuilt);
3. Replace older, less fuel efficient vehicles with newer, fuel efficient vehicles and ensure that vehicle procurement decisions are weighted in favour of fuel efficiency and not price point;
4. Regular and accurate fuel consumption and fuel efficiency reporting should be established;

5. Continue to replace motors with variable frequency drives to take advantage of additional savings in electrical consumption;
6. Increase the number of recycling receptacles at Town facilities and ensure staff are able to recycle the same wastes that are recycled through the existing curbside recycling program that is currently delivered in the community;
7. Report the Town's progress to the Partners for Climate Protection Secretariat in coordination with the Regional District of Nanaimo and request recognition for the corporate stream of PCP Milestones One, Two, and Three;
8. Establish annual monitoring and reporting of energy consumption, costs, and emissions; and,
9. Develop a community energy and emissions sustainability plan in coordination with the Regional District of Nanaimo's region wide community energy and emissions planning initiative.

Target Statement

An emission reduction target of 103 tonnes CO₂e, an amount that will reduce emissions by 13 percent below 2006 levels by 2016, is recommended for adoption as the Town's corporate operations objective.

A Introduction & Context

The Town of Qualicum Beach wishes to strengthen its overall sustainability program by developing a climate change plan. This plan can contribute to a strategy on sustainability that can place the Town in a leadership role for local implementation of sustainability initiatives within the community. Based on the inventory of greenhouse gases completed and recommendations made within this Plan, the capacity of Qualicum Beach to meet progressive GHG emission reduction targets by 2016 is established.

A1 Regional Climate Change Initiative

Although this report is specific to Qualicum Beach'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, Qualicum Beach 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 being developed, one for Qualicum Beach, one for the RDN, and one for each of the other three RDN municipalities. Qualicum Beach staff were 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)

Further, additional work was completed by staff to identify buildings owned by the Town, but leased to community businesses and/or organizations. Staff received electricity consumption for all significant leased buildings.

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 has been developed through the planning process by combining the reductions that are possible in each sector into an overall reduction quantity for the Town'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 Town staff wish to implement as well as estimates of the potential reductions for each reduction initiative. A separate document, the Technical Compendium of Reduction Measures, lists each building and engineering asset and the measures that were assigned to each.

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 in December 2007 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 around the globe, 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

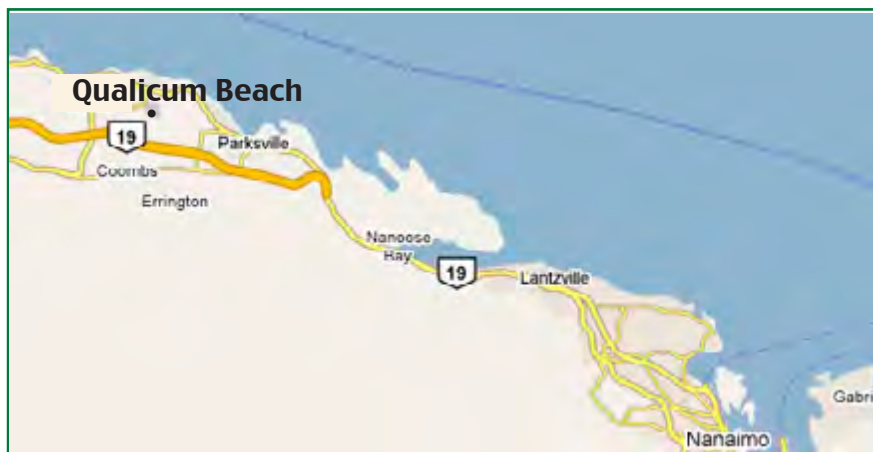
The Town of Qualicum Beach became a member of the FCM/ICLEI Partners for Climate Protection in May 2007. The PCP is an umbrella initiative that fosters municipal participation in greenhouse gas emission reductions and overall sustainability initiatives. Its goal is to assist municipalities with their greenhouse gas management initiatives by providing tools and logistical 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 endorsed by Council and approved by the PCP Secretariat, the Town will be recognized for completing Milestones One, Two, and Three of the corporate stream of the PCP.

A7 Regional and Local Context

The Town of Qualicum Beach is located on the east side of Vancouver Island off the southwest coast of British Columbia (Figure A7). It was incorporated in 1942 and has a total land area of 12.5 square kilometers with a population of 8,502 (Statistics Canada, 2006) and the highest average age (60.9) in Canada.

Figure A7 Map of Qualicum Beach



A8 Energy and Emissions Inventory and Forecast

The emissions inventory for the Town'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.

The Town owns approximately 21 energy consuming buildings that are leased to community businesses and organizations. These leased buildings are not included in the emissions inventory in accordance with the operational control model within the corporate emissions reporting protocols established by the World Resources Institute¹. Overhead streetlights owned by BC Hydro, but leased to the Town are also not included in the inventory. Regardless, Appendix B provides a listing of all leased buildings and the overhead streetlights leased to the Town by BC Hydro. Town staff obtained actual electrical consumption data from the majority of leased buildings, and where possible, HES estimated the natural gas consumption of these buildings based on actual data from similar buildings within the Nanaimo Regional District.

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, street lighting, potable water, storm and sanitary sewers, and solid waste generated at Town facilities.

A review of emissions by source allows 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.

From the energy consumed by the Town'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.

1

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.

Town 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 Town records while solid waste generated from operations was derived from the volume of bins at Town 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 Monitoring and Reporting System™. 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)², the principles provided in the International Standards Organization (ISO) Draft International Standard for Greenhouse Gases (ISO 2005)³, and the general guidance within the FCM's guidance document for the preparation of PCP inventories (FCM 2006)⁴. 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 Town'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 Town. 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 Town 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 emissions inventory calculated in 2016, 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.'

² 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.

³ ISO (2006), 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.

⁴ FCM (2008), Developing Greenhouse Gas Emissions and Energy Consumption Inventories: A Standards and Guidance Document for Canadian Municipalities. Federation of Canadian Municipalities: Ottawa. 35pp.

B Energy and Emissions Inventory

B1 Inventory of Buildings & Engineering Assets

Table B1a provides an overview of the type and number of energy accounts associated with buildings and engineering assets owned and operated by the Town of Qualicum Beach, while table B1b provides provides a listing of buildings owned by the Town, but leased to others.

Table B1a. List of Buildings and Engineering Assets and Energy Accounts

Sector	Subcategory	Assets	Energy	Accounts
Buildings	Administration Offices (1), Airport (1), Civic Centre (1), Community Hall (1), Fire Services (1), Heritage Site (1), Curling Sheets (1), Park Fieldhouse (1), Park Washrooms (2), Public Works Buildings and Yards (1), Rental House (2)	13	Electricity Natural Gas	15 6
Lighting	Flashing Amber Signals (3), Ornamental Lighting (no information), Rail Crossing (1), Reader Boards/Kiosks (3), Highway Sign (2), Traffic Signals (2)	11	Electricity	14
Water and Wastewater	Chlorination Plan (1), Irrigation Controls (1), Liquid Waste Pump Station (1), Potable Water Pump Station (4), Potable Water Well (7)	14	Electricity	14
Vehicle Fleet	Vehicles Gas (31), Vehicles Diesel Fuel (11), Tractor/Grader/Backhoe/Mower Diesel Fuel (15), Fire Department Gas (6), Fire Department Diesel Fuel (4)	67	Gasoline Diesel Fuel	1 1

Table B1b. List of Buildings and Engineering Assets and Energy Accounts

Sector	Subcategory	Assets	Energy	Accounts
Buildings	Administration Offices (1), Chamber of Commerce (2), Church (1), Community Hall (1), Family Services (1), Golf Clubhouse (1), Heritage (3), Library (1), Medical (2), Parking (1), Recreation (3), Seniors Centre (1), Other (4)	21	Electricity Natural Gas	22 8
Lighting	Overhead Streetlighting		Electricity	

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 Town's total energy consumed was 16,231 GJ, total costs were ~\$296,000 and total greenhouse gas emissions were 608 tonnes CO₂e. The majority of energy consumed is in the buildings sector (~5,496 GJ). The vehicle fleet consumed ~5,180 GJ, water and wastewater consumed ~4,640 GJ, and lighting consumed ~914 GJ of energy.

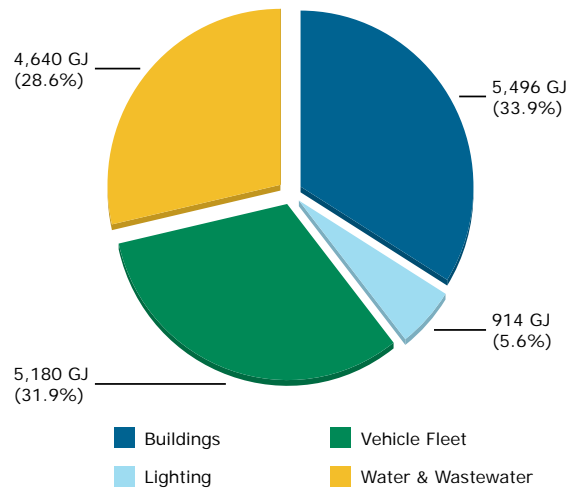
Table B2 - Energy, Costs, and Emissions by Sector (2006)

Sector	Total Energy (GJ)	Total Cost	Total Emissions (CO ₂ e tonnes)	Percent Energy	Percent Costs	Percent Emissions
Buildings	5,496	\$76,539	141.0	34%	26%	23%
Lighting	914	\$16,260	7.7	6%	6%	1%
Water & Wastewater	4,640	\$68,975	39.3	29%	23%	6%
Vehicle Fleet	5,180	\$133,754	372.8	32%	45%	61%
Solid Waste			46.7	0%	0%	8%
Total	16,231	\$295,528	607.6	100%	100%	100%

B2.1 Energy Consumption

The majority of energy consumed in 2006 is in the buildings sector at 5,496 GJ (34 percent) (Figure B2.1). The vehicle fleet follows at 5,180 GJ (32 percent). Water and wastewater consumed 4,640 GJ (29 percent) and lighting consumed 914 GJ (six percent).

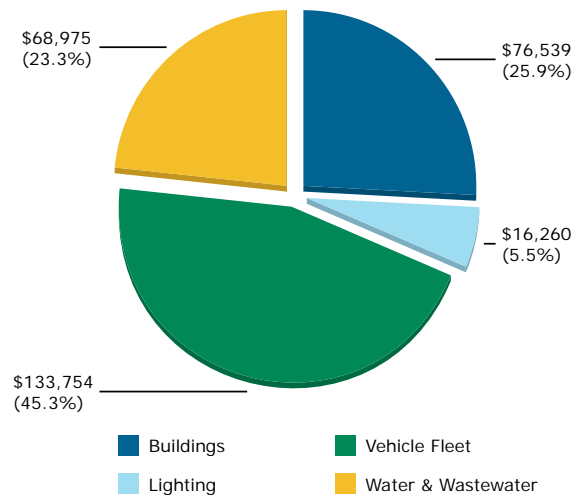
Figure B2.1 – 2006 Energy Consumption (GJ)



B2.2 Energy Costs

The majority of the Town’s total energy costs are for gasoline and diesel fuel for the vehicle fleet at ~\$134,000 (~45 percent). Electricity and natural gas consumption in buildings costs ~\$77,000 (~26 percent), electricity in the water and wastewater sector costs \$69,000 (23 percent) and electricity for outdoor lighting costs ~\$16,000 (six percent) (Table B2 and Figure B2.2).

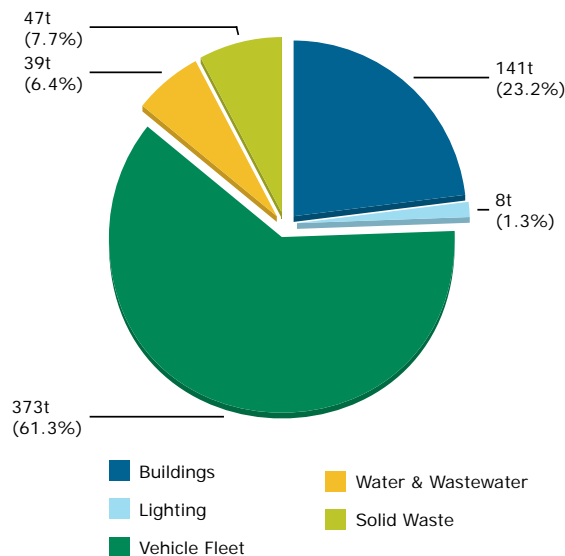
Figure B2.2 – 2006 Energy Costs



B2.3 GHG Emissions

The Town’s vehicle fleet produced the majority of emissions at 373 tonnes CO₂e (~61 percent). Buildings are responsible for 141 tonnes (~23 percent), solid waste follows at 47 tonnes (eight percent), water and wastewater produced 39 tonnes (~six percent), lighting was 8 tonnes (~one percent) (Table B2 and Figure B2.3).

Figure B2.3 – 2006 Emissions (tonnes CO₂e)



B2.4 Energy Consumption and Costs by Energy Type

The Town consumes four types of energy: electricity; natural gas, gasoline, and diesel fuel. In terms of energy type, electricity accounts for 54 percent of the total energy consumed (Table B2.4). Gasoline (17 percent), diesel fuel (15 percent), and natural gas (14 percent), make up the remainder. Figure B2.4a illustrates energy by energy type and Figure B2.4b illustrates costs for energy by energy type.

Costs for energy are dominated by electricity. Even though all the Town’s major buildings consume natural gas for space heating, the Town does not operate any buildings that require large volumes of natural gas (e.g., natural gas for process pool water in an indoor pool).

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	2,454,854	8,837	\$141,853	54%	48%
Natural Gas	GJ	2,213	2,213	\$19,921	14%	7%
Gasoline	litres	79,614	2,759	\$74,359	17%	25%
Diesel Fuel	litres	62,587	2,421	\$59,395	15%	20%
Total			16,231	\$295,528	100%	100%

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

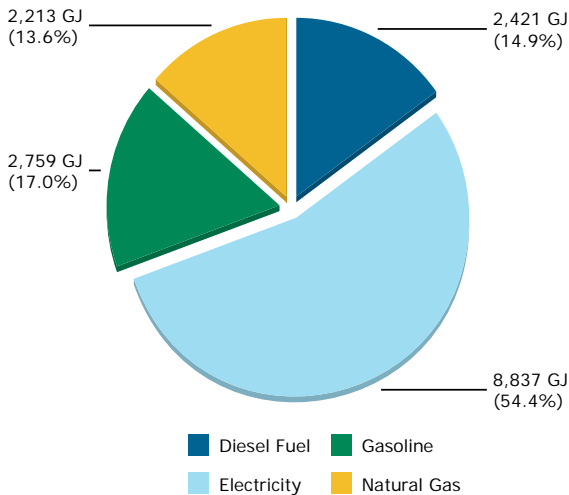
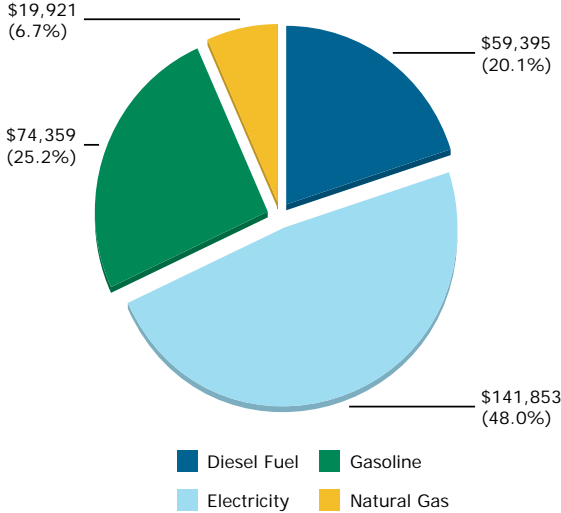


Figure B2.4b – 2006 Sources of Energy Costs



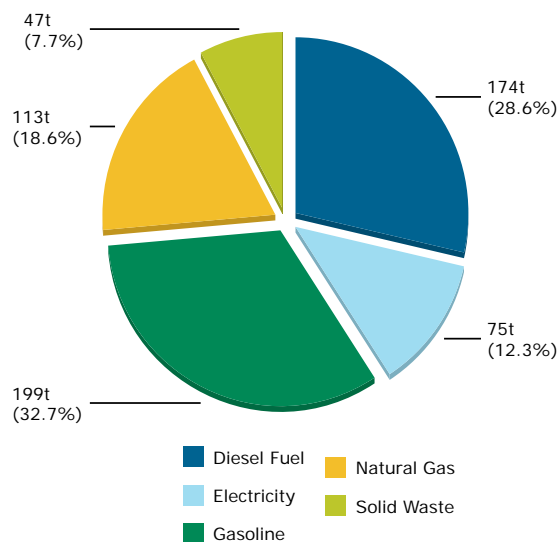
B2.5 Emissions by Energy Type

The greatest source of emissions was from the consumption of gasoline (33 percent) and diesel fuel (29 percent). Overall, emissions from the vehicle fleet account for 62 percent of total emissions. Natural gas accounts for the third largest emission source at 19 percent while electricity follows at 12 percent (Table B2.5 and Figure B2.5). Corporate solid waste is the smallest source of corporate emissions at eight percent (Note: The emissions from corporate solid waste are direct emissions to the atmosphere at the landfill where the corporate waste is deposited, whereas other components listed in Table B2.5 are energy sources.).

Table B2.5 – Sources of Emissions (2006)

Energy Type	Units	Total Use	Total Emissions (CO ₂ e tonnes)	Percent by Source
Electricity	kWh	2,454,854	74.9	12%
Natural Gas	GJ	2,213	113.2	19%
Gasoline	litres	79,614	198.8	33%
Diesel Fuel	litres	62,587	174.0	29%
Solid Waste			46.7	8%
Total			607.6	100%

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



B2.6 Buildings Sector Summary

The Town owns and operates 13 buildings, which includes four minor buildings (e.g., one park fieldhouse, two park washrooms, and two rental houses). One of the eight major buildings includes the local airport. The Town does not own any indoor pools. Instead, the Regional District of Nanaimo owns and operates the local indoor pool (Ravensong Aquatic Centre), which is located on property owned by the Town.

The total energy consumed in all buildings was 5,496 GJ, which is shared by two energy types: electricity (3,283 GJ) and natural gas (2,213 GJ). Total costs for all buildings was \$76,539, and the total emissions was 141 tonnes CO₂e (Table 2.6). Figure 2.6a illustrates the composition of building type by cost for energy consumption.

Figure 2.6a Costs for Energy for Buildings (2006)

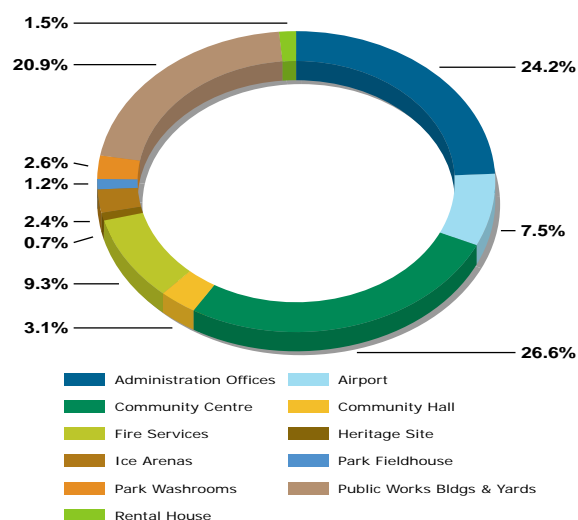


Table 2.6a - Summary of Buildings Sector Emissions (2006)

Sector	Energy Type & Units	Total Use	Total Energy (GJ)	Total Costs	Total CO ₂ e (t)
Buildings	Electricity kWh	911,918	3,283	\$56,618	27.8
	Natural Gas GJ	2,213	2,213	\$19,921	113.2
Totals			5,496	\$76,539	141

B2.7 Lighting Sector Summary

In total, there are approximately 910 overhead lights in the Town however overhead streetlights that are attached to power poles are owned and maintained by BC Hydro and therefore have not been included in the Town’s corporate inventory. Ornamental streetlights are owned by the town and are included in the corporate inventory as reduction measures can be implemented by the Town. These ornamental lights range from 95W and 350W (Table B2.7a).

Table B2.7a – Overhead and Ornamental Street Lights

Streetlight Account	95W HPS	100W HPS	130W HPS	150W HPS	190W HPS	200W MH	350W HPS
Ornamental	11		93		244		8

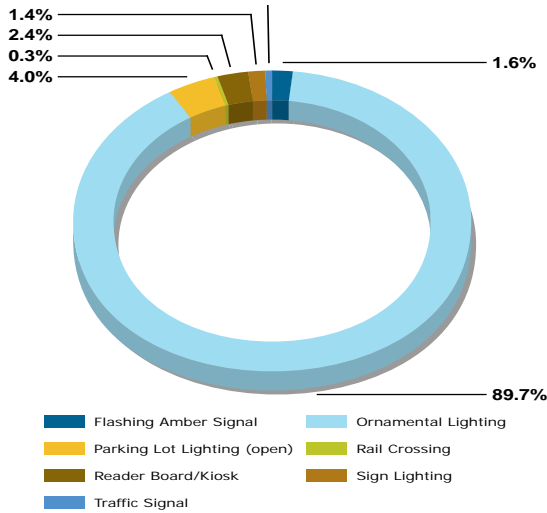
Key: W=Watts; MH=Metal Halide; HPS=High Pressure Sodium

The Town’s lighting consumed 914 GJ of electricity (253,934 kWh), resulting in the production of eight tonnes of CO₂e at a cost of \$16,260 (Table 2.7b). Ornamental streetlights incurred the majority of costs (90%) (Figure 2.7a). The Town has retrofitted its traffic signals (three) from incandescent to LED technology.

Table 2.7b - Summary of Lighting Sector Emissions (2006)

Sector	Energy Type & Units	Total Use	Total Energy (GJ)	Total Costs	Total CO ₂ e (t)
Lighting	Electricity kWh	253,934	914	\$16,260	7.7
Totals			914	\$16,260	8

Figure 2.7a. Costs for Energy for Lighting (2006)



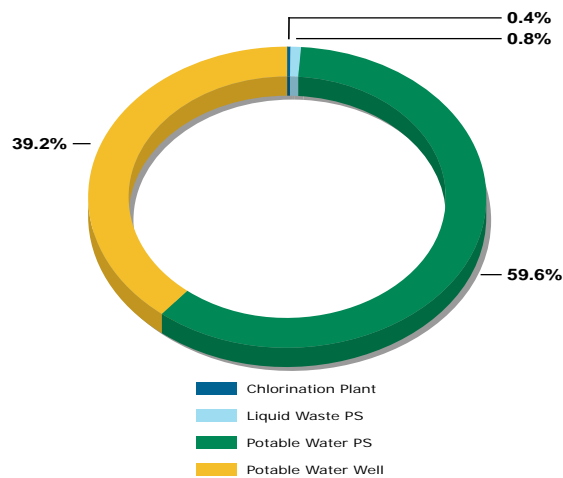
B2.8 Water & Wastewater Sector Summary

Energy consumed in the water and wastewater sector is for motors that drive potable water pumps and deep water well pumps. Overall, 1,289,002 kWh of electricity was consumed, which resulted in the release of 39 tonnes of emissions at a cost of ~\$68,975 (Table 2.8).

Table 2.8 - Summary of Water and Wastewater Sector Emissions (2006)

Sector	Energy Type & Units		Total Use	Total Energy (GJ)	Total Costs	Total CO ₂ e (t)
Water & Wastewater	Electricity	kWh	1,289,002	4,640	\$68,975	39.3
Totals				4,640	\$68,975	39

Figure 2.8a - Costs for Energy for Water and Wastewater (2006)



B2.9 Vehicle Fleet Sector Summary

The vehicle fleet includes all motorized vehicles operated by the Town including off-road vehicles. The Town's vehicles produced 373 tonnes of CO₂e and fuel costs were \$133,754 (Table 2.9).

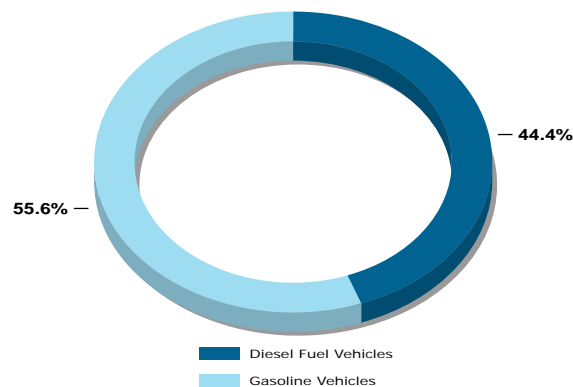
Table 2.9 - Summary of Vehicle Fleet Sector Emissions (2006)

Sector	Energy Type & Units		Total Use	Total Energy (GJ)	Total Costs	Total CO ₂ e (t)
Vehicle Fleet	Gasoline	litres	79,614	2,759	\$74,359	198.8
	Diesel Fuel	litres	62,587	2,421	\$59,395	174.0
Totals				5,180	\$133,754	373

Gasoline-powered cars, vans, jeeps, and light trucks consumed the majority of fuel in the vehicle fleet followed by gasoline and diesel fuel powered medium to heavy trucks and vans. Approximately 20,000 litres of propane is used by on and off-road vehicles; approximately 15,000 litres is consumed by four propane vehicles and the remainder is

consumed by forklifts that operate at the works yard. The Town operates one hybrid vehicle; a Toyota Camray, which was purchased in the summer of 2007.

Figure 2.9b - Costs for Energy for Vehicles (2006)



B2.10 Corporate Solid Waste Sector Summary

Solid waste generated in municipal facilities accounts for eight percent of total corporate emissions. In 2006, the Town's waste from its corporate operations resulted in 47 tonnes of CO₂e. Amendments are possible if better data for the inventory year is developed.

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 either 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)

Gasoline Vehicles - -	2,759 GJ	\$74,359	198.8 t
Diesel Fuel Vehicles - -	2,421 GJ	\$59,395	174.0 t
River Wells #5,6,7 - Island Hwy Pump	2,309 GJ	\$27,530	19.6 t
Qualicum Beach Civic Centre - 747 Jones Rd	1,513 GJ	\$20,352	31.6 t
Main Yard - 233 E Fern Rd	1,371 GJ	\$16,009	54.3 t
City Hall - 660 Primrose St 201	1,311 GJ	\$18,489	27.4 t
Ornamental Street Ltg - Ornamental Street Ltg	840 GJ	\$14,457	7.1 t
Berwick Wells Four Wells - Rupert Rd P1717rw	661 GJ	\$10,287	5.6 t
Harlech Road Fire Hall - 124 Harlech Rd	483 GJ	\$7,112	13.7 t
River Well #1a - Waters Rd	457 GJ	\$8,097	3.9 t
500 College Rd Pump - 500 College Rd Pump	438 GJ	\$8,523	3.7 t

Table B3b - Costs for Consumption Ranking (2006)

Gasoline Vehicles - -	2,759 GJ	\$74,359	198.8 t
Diesel Fuel Vehicles - -	2,421 GJ	\$59,395	174.0 t
River Wells #5,6,7 - Island Hwy Pump	2,309 GJ	\$27,530	19.6 t
Qualicum Beach Civic Centre - 747 Jones Rd	1,513 GJ	\$20,352	31.6 t
City Hall - 660 Primrose St 201	1,311 GJ	\$18,489	27.4 t
Main Yard - 233 E Fern Rd	1,371 GJ	\$16,009	54.3 t
Ornamental Street Ltg - Ornamental Street Ltg	840 GJ	\$14,457	7.1 t
Berwick Wells Four Wells - Rupert Rd PI717rw	661 GJ	\$10,287	5.6 t
500 College Rd Pump - 500 College Rd Pump	438 GJ	\$8,523	3.7 t
River Well #1a - Waters Rd	457 GJ	\$8,097	3.9 t
Harlech Road Fire Hall - 124 Harlech Rd	483 GJ	\$7,112	13.7 t

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

Gasoline Vehicles - -	2,759 GJ	\$74,359	198.8 t
Diesel Fuel Vehicles - -	2,421 GJ	\$59,395	174.0 t
Main Yard - 233 E Fern Rd	1,371 GJ	\$16,009	54.3 t
Qualicum Beach Civic Centre - 747 Jones Rd	1,513 GJ	\$20,352	31.6 t
City Hall - 660 Primrose St 201	1,311 GJ	\$18,489	27.4 t
Main Yard - 233 E Fern Rd			24.8 t
River Wells #5,6,7 - Island Hwy Pump	2,309 GJ	\$27,530	19.6 t
Harlech Road Fire Hall - 124 Harlech Rd	483 GJ	\$7,112	13.7 t
Leased Curling Rink - 644 Memorial Ave			12.4 t
Community Hall - 644 Memorial Ave	192 GJ	\$2,373	7.8 t
Ornamental Street Ltg - Ornamental Street Ltg	840 GJ	\$14,457	7.1 t

B3.1 Energy Consumption Rank

The total energy consumed for gasoline and diesel fuel for fleet vehicles ranks number one and number two of all the energy types consumed in the Town. Electricity for river wells # 5, #6, & #7 rank number three, while the Civic Centre, the Works Yard, and Town Hall rank numbers four, five, and six, respectively (Table B3a).

Fleet vehicles are a significant energy consumer in the Town relative to buildings and other engineering assets, although that does not necessarily infer that there are significant savings in this sector. From the inventory list of vehicles owned by the Town, there are many off-road vehicles in the inventory. Staff should note that the Federation of Canadian

Municipalities' Partners for Climate Protection guidance document allows staff to exclude off-road vehicles from the inventory. There are few options to reduce fuel consumption in these types of vehicles, beyond maintaining fuel efficiency through regular maintenance and reducing the amount of time vehicles idle.

Although not yet thoroughly tested by all engine manufacturers, biofuels, such as biodiesel for diesel fuel-powered off-road vehicles, may provide significant opportunities for GHG reductions in the future (Note: Biodiesel cannot necessarily be used in any diesel fuel-powered engine.). Given an opportunity in the future to count the reductions for a measure that was not available to local government in the past, we recommend that off-road vehicles remain in the emissions inventory.

Individually, the river well pumps would not place in the top five ranking for energy consumers, but collectively the three motors driving these pumps are significant and staff have already taken the initiative to replace the motors with variable frequency drives resulting in a significant savings (see Section C4).

The Civic Centre, Main Yard, and Town Hall have minor lighting retrofits to complete (e.g., there are T12 tubes and ballasts to be replaced with T8 fixtures), otherwise, these buildings are as energy efficient as they can be at this time.

B3.2 Costs for Energy Consumption Rank

In general, energy costs are always on the rise. Natural gas, gasoline, diesel fuel, propane, and fuel oil are all commodities that share an increasing trend in cost per unit. Although not a commodity in a conventional sense, electricity is also purchased and sold in very specific distribution and end use markets. The cost per unit of electricity is also on the rise and will rise sharply once the BC Provincial government's targets for electricity in their Energy Plan¹ are implemented.

In terms of costs, gasoline vehicles are the most expensive to operate followed by diesel fuel vehicles. The cost for electricity for the motors at river wells #5, #6, & #7 rank third followed by the Civic Centre and Town Hall (Table B3b).

It is important to implement reduction measures for the vehicle fleet as the price per litre of gasoline and diesel fuel is projected to rise to \$2.50/litre by 2010 (Nesbitt-Burns, Oil and Gas Weekly).

B3.3 Greenhouse Gas Emissions Rank

Gasoline and diesel fuel-powered vehicles produce the most greenhouse gas emissions followed by the Main Yard, Civic Centre, and Town Hall (Table B3c). The second entry for the Main Yard is present in the ranking since this account represents the emissions from solid waste generated (Note: The emissions are an estimate for waste disposed at the regional landfill).

B3.4 Overall 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 value relative to others for the sole purpose of prioritization. The lower the scored rank, the higher the energy consumption, cost for consumption, and CO₂e. The scored rank does not necessarily suggest the practicality and/or ability to apply 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 the three individual scores. The lower the Total Rank Score, the higher the overall priority of the account.

¹Province of British Columbia. "The BC Energy Plan: A Vision for Clean Energy Leadership." <http://www.energyplan.gov.bc.ca/>, accessed October 11, 2007.

Table B3.3 – Relative Ranking of Accounts by Consumption, Costs, and CO₂e

Overall Rank	Account	Rank			Total Rank Score
		Consumption	Costs	CO ₂ e	
1	Gasoline Vehicles	1	1	1	3
2	Diesel Fuel Vehicles	2	2	2	6
3	Civic Centre	4	4	4	12
4	River Wells #5,#6,#7	3	3	7	13
5	Main Yard	5	6	3	14
6	City Hall	6	5	5	16
7	Ornamental Street Ltg	7	7	11	23
8	Berwick Wells Four Wells	8	8	12	28
9	Harlech Road Fire Hall	9	11	8	28

The overall ranking of the accounts is summarized as follows:

- Gasoline and diesel fuel vehicles are ranked number one and two overall and should be the priority for reductions in consumption, costs for consumption, and CO₂e;
- The Civic Centre has the third lowest rank score as this account ranked fourth in consumption, costs, and CO₂e. The Civic Centre is the highest priority for implementation of reduction measures in building stock;
- River Wells #5, #6, & #7 are a priority in the water and wastewater sector and ranked 3, 3, & 7 in consumption, costs for consumption, and CO₂e, respectively (Note: The motors that drive these pumps may already be as energy efficient as possible.);
- The Main Yard and Town Hall rank fifth and sixth overall and remain a high priority for building stock.

B4 Forecasts

A forecast for corporate operations in Qualicum Beach is provided and is based upon normal growth to meet the needs of the community. For the buildings, lighting, and water and wastewater sectors, forecasts are based on current trends in energy consumption accounts and whether or not buildings and/or engineering assets are to be added to the current inventory. For the vehicle fleet sector, forecasts are based on increased fuel use but does not include the addition of any vehicles.

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

Sector	Energy Type/ Unit	Consumption	Energy (GJ)	Total Energy (GJ)	Forecast Percent	Forecasted Total Energy (GJ)	
						2006	2016
Buildings	Elect (kWh)	911,918	3,283	5,496	104%	3,414	5,716
	Natural Gas (GJ)	2,213	2,213		104%	2,302	
Lighting	Elect (kWh)	253,934	914	914	109%	996	996
Water & Wastewater	Elect (kWh)	1,289,002	4,640	4,640	105%	4,872	4,872
Vehicle Fleet	Diesel (L)	62,587	2,421	5,180	103%	2,494	5,418
	Gas (L)	79,614	2,759			2,925	
Total			16,231 GJ			17,002 GJ	

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

Sector	Energy Type/ Unit	Consumption	Costs	Total Cost	Forecasted Unit Costs	Forecasted Total Costs	
						2006	2016
Buildings	Elect (kWh)	911,918	\$56,618	\$76,539	104%	\$0.08	\$101,188
	Natural Gas (GJ)	2,213	\$19,921		104%	\$11.00	
Lighting	Elect (kWh)	253,934	\$16,260	\$16,260	109%	\$0.30	\$83,036
Water & Wastewater	Elect (kWh)	68,975	\$68,975	\$68,975	105%	\$0.08	\$108,276
Vehicle Fleet	Diesel (L)	62,587	\$59,395	\$133,754	103%	\$2.25	\$356,022
	Gas (L)	79,614	\$74,359			\$2.50	
Total			\$295,528			\$648,523	

Table B4c - Forecast of Emissions 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)	28	141	104%	149	
	Natural Gas (GJ)	113		104%		
Lighting	Elect (kWh)	8	8	109%	17	
Water & Wastewater	Elect (kWh)	39	39	105%	45	
Vehicle Fleet	Diesel (L)	174	373	103%	390	
	Gas (L)	199		103%		
Solid Waste	N/A	47	47	102%	42	
Total			608 tonnes CO₂e		634 tonnes CO₂e	

B4.1 Forecasts and Their Contribution to Reduction Targets

The forecast of energy consumption, costs and emissions is 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.

B5 Summaries

Summaries are provided for the energy and emissions inventory, the scored ranking of consumption, costs, and greenhouse gas emissions, and the forecast 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 of energy types were calculated for the town’s base year (2006) and forecast year (2016). In the base year, the emissions quantity was 608 tonnes CO₂e, the total amount of energy consumed was 16,231 GJ and the total costs for consumption was \$295,528.

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 rank relative to others for the sole purpose of prioritization. The lower the score of the rank, the higher the energy consumption, cost for consumption, and CO₂e. The ranks assigned do not necessarily suggest the applicability of reduction measures, rather the intent of these tables is to draw 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 (2016), the forecast of emissions is 634 tonnes CO₂e, the forecast of energy consumed is 17,002 GJ, and the forecast of costs for consumption is \$648,523.

From 2006 to 2016, overall energy consumption is forecast to increase by five percent, while overall costs for energy are forecast to increase by 119 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 four 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	16,230	17,002	5%
Energy Costs	\$295,528	\$648,523	119%
Emissions	608 CO ₂ e tonnes	634 CO ₂ e tonnes	4%

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 we have conducted in other communities. Detailed audits of Town infrastructure were beyond the scope of this project.

Based on our knowledge of similar buildings, a preliminary end-use breakdown of energy loads for buildings was calculated. Tables C2.1 to C5.1 summarize estimates of the typical reductions for the given reduction initiatives selected by sector (e.g., buildings, lighting, 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 Town staff and is not intended for further distribution.

Administrative Considerations

For corporate operations, the Town 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 town should review the implications of any buildings and engineering assets as part of any decision-making process undertaken for procurement, if any.

Although the project period is stated as 2008-2016, the measures proposed in the *Technical Compendium of Potential Reduction Measures* require annual review 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, such as LED overhead streetlights.

C2 Buildings Sector

It is estimated that ~433 GJ of energy can be saved by implementing simple measures in the buildings owned by the Town. These measures will result in energy savings of ~\$7,000, calculated at current day costs for energy consumption. The estimated energy reductions would result in a reduction of 8 tonnes CO₂e.

Reduction initiatives include redesign of existing T8 lighting in the Town Hall and retrofit of existing T12 lighting at the Civic Centre, Community Hall, Fire Hall, and Public Works Yard.

Overall, buildings are efficient with the exception of a small number of T12 fixtures remaining in buildings that have otherwise had most lights retrofitted (Civic Centre, Fire Hall, Main Yard) and T12 lighting remaining in buildings that are not used frequently enough to justify the expense of new fixtures (e.g., train station, community hall). Table C2 provides a summary of proposed measures, summarized by measure category.

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

BUILDINGS	Reductions			
	Consumption	Costs	CO ₂ e (t)	
BUNDLED RETROFIT				
Natural Gas	61 GJ	\$546	3.1 t	
Electricity	62,058 kWh	\$4,207	1.9 t	
EFFICIENT TECHNOLOGY				
Natural Gas	30 GJ	\$271	1.5 t	
Electricity	33,110 kWh	\$1,937	1.0 t	
Subtotals	Electricity	95,167 kWh	\$6,144	3 t
	Natural Gas	91 GJ	\$817	5 t
Total this Sector:		433 GJ	\$6,961	8 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 20 to 30 percent. 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.)

Although not yet available as a cost-effective measure, approximately 335 GJ of energy can be saved by undertaking streetlighting retrofits (e.g., LED technology). Energy savings would result in approximately \$6,000, calculated at current day costs for energy consumption. The estimated energy reductions would result in a savings of ~three tonnes CO₂e. Table C3 provides a summary of proposed measures (note: does not include overhead lights owned by BC Hydro).

Table C3 – Summary of Proposed Reduction Initiatives for the Lighting Sector (2008-2016)

LIGHTING	Reductions			
	Consumption	Costs	CO ₂ e (t)	
EFFICIENT TECHNOLOGY				
Electricity	93,161 kWh	\$6,242	2.8 t	
Subtotals	Electricity	93,161 kWh	\$6,242	3 t
Total this Sector:		335 GJ	\$6,242	3 t

C4 Water and Wastewater Sector

Reduction measures have been implemented in the river well motors. Staff calculate approximately \$1,750 in additional savings from the installation of variable speed drives in two additional pumping stations.

Additionally, it is estimated that ~100,000 GJ of energy can be saved in the water and wastewater sector, which result in ~\$6,700 in cost savings, and ~three tonnes CO₂e. Although we have applied several water conservation measures to this sector, these reductions are difficult to quantify in the absence of monitoring. These types of measures include sprinkling restrictions, including public education and bylaw enforcement, water conservation devices (showerheads, etc.), and other programs designed to conserve potable water.

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

WATER & WASTEWATER		Reductions		
		Consumption	Costs	CO ₂ e (t)
EFFICIENT TECHNOLOGY				
	Electricity	27,558 kWh	\$1,750	0.8 t
ENABLES MEASURES THROUGH ADMINISTRATIVE/POLICY CHANGE				
	Electricity	95,733 kWh	\$6,259	2.9 t
VOLUNTARY INITIATIVE, CHALLENGE, OR THROUGH EDUCATION				
	Electricity	8,343 kWh	\$439	0.3 t
Subtotals	Electricity	131,635 kWh	\$8,449	4 t
Total this Sector:		474 GJ	\$8,449	4 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 in the gasoline vehicle fleet presently available. The most practical solution to reductions in the vehicle fleet sector is to begin to replace older vehicles with newer, more fuel efficient vehicles.

Overall, approximately 54 tonnes CO₂e could be saved in the vehicle fleet sector based on measures involving technology, education, policy change and effective management, which would result in an approximate cost savings of \$20,000, calculated at 2005 costs for gasoline and diesel fuel (Table C5 Summary of Proposed Measures, Summarized for Both Gasoline and Diesel Fuel Vehicles). An additional 30 tonnes CO₂e can be saved by switching to B20 blend of diesel fuel, increasing the overall vehicle fleet reductions to 84 tonnes as there is no expected cost or consumption reductions associated with this measure.

Table C5 – Summary of Proposed Reduction Initiatives for the Vehicle Fleet Sector (2008-2016)

VEHICLE FLEET		Reductions		
		Consumption	Costs	CO ₂ e (t)
EFFICIENT TECHNOLOGY				
	Diesel	1,565 L	\$1,485	4.4 t
	Gasoline	1,990 L	\$1,859	5.0 t
FUEL SWITCH TO B20 BIODIESEL				
	Diesel	0 L	\$0	30.0 t
EFFECTIVE MANAGEMENT/AUDITS				
	Diesel	0 L	\$0	0.0 t
	Gasoline	796 L	\$744	2.0 t
ENABLES MEASURES THROUGH ADMINISTRATIVE/POLICY CHANGE				
	Diesel	7,510 L	\$7,127	20.9 t
	Gasoline	5,573 L	\$5,205	13.9 t
VOLUNTARY INITIATIVE, CHALLENGE, OR THROUGH EDUCATION				
	Diesel	1,252 L	\$1,188	3.5 t
	Gasoline	1,592 L	\$1,487	4.0 t
Subtotals	Diesel Fuel	10,327 L	\$9,800	29 t
	Gasoline	9,952 L	\$9,295	25 t
Total this Sector:		784 GJ	\$19,095	84 t

C6 Reduction Initiatives for the Corporate Solid Waste Sector

There are two significant reduction measures that Town staff can implement to reduce corporate solid waste in the Town's buildings as follows: expand recycling and composting facilities for staff and the public in Town-owned buildings; and convert to a paperless system (to the extent possible and practical).

By reducing the amount of solid waste produced and sent to the landfill, the Town could reduce its corporate emissions in this sector by approximately 4 tonnes CO₂e.

C7 Summary of Corporate Emission Reductions

In general, the Town's buildings are energy efficient relative to the age and occupancy of buildings. Staff are currently working towards retrofitting all T12 lighting, incandescent pot lights, and high wattage outdoor HID lighting.

Retrofits are possible for ornamental streetlights, although the technology currently available for overhead streetlights may not meet illumination standards and/or is currently not cost effective.

With the exception of community water conservation measures, there are no significant energy efficiency retrofits for the potable water pump stations and reservoir beyond replacing all fixtures with variable speed drives.

Gasoline-fueled vehicles operated by Town 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 a program has not been established. Staff should begin to track odometer readings of vehicles to be able to track fuel efficiency of individual vehicles.

Biodiesel is recommended as a pilot project, although the fleet manager must continue to monitor biofuels pilot projects in other communities and keep current with the results of biodiesel use across a wide range of vehicle types.

By implementing the initiatives listed in the *Technical Compendium of Reduction Initiatives*, the Town could reduce emissions by 13 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	141	147	8	139	2%
Lighting	8	8	3	5	33%
Water and Wastewater	39	41	4	37	5%
Vehicle Fleet	373	390	84	306	18%
Corporate Solid Waste	47	48	4	44	6%
Totals	608	634	103	51	13%

It is important to remember that the 13 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 recommended:

An emission reduction target of 103 tonnes CO₂e, an amount that will reduce emissions by 13 percent below 2006 levels by 2016, is recommended for adoption as the Town’s corporate operations objective.

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 Gigajoule is the standard unit of natural gas heating measurement in Canada. 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).

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.

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, the major constituent of natural gas, that is used as a fuel and is 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." It contains commitments for all parties. 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 - Summary of Emissions Inventory



Qualicum Beach 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								
CITY HALL 660 PRIMROSE ST 201	Electricity	258,000 kWh	929 GJ	\$15,048	7.9 t	1,311 GJ	\$18,489	27.4 t
	Natural Gas	382 GJ	382 GJ	\$3,441	19.6 t			
Administration Offices Subtotal		258,000 kWh	929 GJ	\$15,048	7.9 t	1,311 GJ	\$18,489	27.4 t
	Natural Gas	382 GJ	382 GJ	\$3,441	19.6 t			
Airport								
QUALICUM BEACH AIRPORT 1000 RAVENSBOROUGH LANE	Electricity	71,700 kWh	258 GJ	\$5,013	2.2 t	258 GJ	\$5,013	2.2 t
AIRPORT LIGHTING 1000 RAVENSBOROUGH LANE LTG	Electricity	8,885 kWh	32 GJ	\$671	0.3 t	32 GJ	\$671	0.3 t
AIRPORT GATE 1000 RAVENSBOROUGH LANE GATE				\$78			\$78	0.0 t
Airport Subtotal		80,585 kWh	290 GJ	\$5,762	2.5 t	290 GJ	\$5,762	2.5 t
Community Centre								
QUALICUM BEACH CIVIC CENTRE 747 JONES RD	Electricity	297,600 kWh	1,071 GJ	\$16,381	9.1 t	1,513 GJ	\$20,352	31.6 t
	Natural Gas	441 GJ	441 GJ	\$3,972	22.6 t			
Community Centre Subtotal		297,600 kWh	1,071 GJ	\$16,381	9.1 t	1,513 GJ	\$20,352	31.6 t
	Natural Gas	441 GJ	441 GJ	\$3,972	22.6 t			
Community Hall								
COMMUNITY HALL 644 MEMORIAL AVE	Electricity	13,220 kWh	48 GJ	\$1,074	0.4 t	192 GJ	\$2,373	7.8 t
	Natural Gas	144 GJ	144 GJ	\$1,299	7.4 t			

2006 Energy & Greenhouse Gas Emissions Inventory

7/15/2008



Qualicum Beach

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
Community Hall Subtotal	Electricity Natural Gas	13,220 kWh 144 GJ	48 GJ 144 GJ	\$1,074 \$1,299	0.4 t 7.4 t	192 GJ	\$2,373	7.8 t
Fire Services								
HARLECH ROAD FIRE HALL 124 HARLECH RD	Electricity Natural Gas	71,755 kWh 225 GJ	258 GJ 225 GJ	\$5,091 \$2,021	2.2 t 11.5 t	483 GJ	\$7,112	13.7 t
Fire Services Subtotal	Electricity Natural Gas	71,755 kWh 225 GJ	258 GJ 225 GJ	\$5,091 \$2,021	2.2 t 11.5 t	483 GJ	\$7,112	13.7 t
Heritage Site								
TRAIN STATION 174 RAILWAY ST B	Electricity Natural Gas	4,901 kWh 20 GJ	18 GJ 20 GJ	\$390 \$180	0.1 t 1.0 t	37 GJ	\$569	1.2 t
Heritage Site Subtotal	Electricity Natural Gas	4,901 kWh 20 GJ	18 GJ 20 GJ	\$390 \$180	0.1 t 1.0 t	37 GJ	\$569	1.2 t
Ice Arenas								
LEASED CURLING RINK 644 MEMORIAL AVE	Electricity	25,576 kWh	92 GJ	\$1,823	0.8 t	92 GJ	\$1,823	0.8 t
Ice Arenas Subtotal	Electricity	25,576 kWh	92 GJ	\$1,823	0.8 t	92 GJ	\$1,823	0.8 t
Park Fieldhouse								
FIELDHOUSE 300 W FIRST AVE	Electricity	12,691 kWh	46 GJ	\$926	0.4 t	46 GJ	\$926	0.4 t
Park Fieldhouse Subtotal	Electricity	12,691 kWh	46 GJ	\$926	0.4 t	46 GJ	\$926	0.4 t
Park Washrooms								
BEACH WASHROOMS 2811 W ISLAND HWY	Electricity	19,249 kWh	69 GJ	\$1,383	0.6 t	69 GJ	\$1,383	0.6 t
LEE HOUSE WASHROOMS 124 W 2ND AVE WASH	Electricity	7,524 kWh	27 GJ	\$574	0.2 t	27 GJ	\$574	0.2 t
Park Washrooms Subtotal	Electricity	26,773 kWh	96 GJ	\$1,957	0.8 t	96 GJ	\$1,957	0.8 t
Public Works Bldgs & Yards								

Qualicum Beach

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	
MAIN YARD 233 E FERN RD	Electricity	102,761 kWh	370 GJ	\$7,000	3.1 t	1,371 GJ	\$16,009	54.3 t	
	Natural Gas	1,001 GJ	1,001 GJ	\$9,009	51.2 t				
Public Works Bldgs & Yards Subtotal		102,761 kWh	370 GJ	\$7,000	3.1 t	1,371 GJ	\$16,009	54.3 t	
	Natural Gas	1,001 GJ	1,001 GJ	\$9,009	51.2 t				
Rental House									
RENTAL HOUSE - BROWN PROPERTY: CABIN AND STABLES 292 E CRESCENT RD	Electricity	14,736 kWh	53 GJ	\$955	0.4 t	53 GJ	\$955	0.4 t	
RENTAL HOUSE 3175 W ISLAND HWY	Electricity	3,320 kWh	12 GJ	\$214	0.1 t	12 GJ	\$214	0.1 t	
	This account was previously identified as irrigation.								
Rental House Subtotal		18,056 kWh	65 GJ	\$1,168	0.6 t	65 GJ	\$1,168	0.6 t	
Buildings Subtotal									
	Electricity	911,918 kWh	3,283 GJ	\$56,618	27.8 t	5,496 GJ	\$76,539	141.0 t	
	Natural Gas	2,213 GJ	2,213 GJ	\$19,921	113.2 t				
LIGHTING									
Flashing Amber Signal									
FLASHER VILLAGE WAY	Electricity	1,776 kWh	6 GJ	\$110	0.1 t	6 GJ	\$110	0.1 t	
FLASHER ROUTE 4/6TH AVE	Electricity	1,332 kWh	5 GJ	\$82	0.0 t	5 GJ	\$82	0.0 t	
FLASHER + PEDESTRIAN BENNETT RD/HWY 19A	Electricity	1,080 kWh	4 GJ	\$67	0.0 t	4 GJ	\$67	0.0 t	
Flashing Amber Signal Subtotal		4,188 kWh	15 GJ	\$259	0.1 t	15 GJ	\$259	0.1 t	
Ornamental Lighting									
ORNAMENTAL STREET LTG ORNAMENTAL STREET LTG	Electricity	233,355 kWh	840 GJ	\$14,457	7.1 t	840 GJ	\$14,457	7.1 t	
687 CHARTWELL BLVD LTS 687 CHARTWELL BLVD LTS	Electricity	1,042 kWh	4 GJ	\$125	0.0 t	4 GJ	\$125	0.0 t	
Ornamental Lighting Subtotal		234,397 kWh	844 GJ	\$14,582	7.1 t	844 GJ	\$14,582	7.1 t	

Qualicum Beach

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	
Parking Lot Lighting (open)									
130 E 2ND AVE LITE 130 E 2ND AVE	Electricity	8,571 kWh	31 GJ	\$647	0.3 t	31 GJ	\$647	0.3 t	
Parking Lot Lighting (open) Subtotal							31 GJ	\$647	0.3 t
Rail Crossing									
LABURNUM RD 1 ANDREEF RD - RR XING LABURNUM RD 1 ANDREEF RD - RR	Electricity	516 kWh	2 GJ	\$54	0.0 t	2 GJ	\$54	0.0 t	
Rail Crossing Subtotal							2 GJ	\$54	0.0 t
Reader Board/Kiosk									
READER BOARD MEMORIAL/RUPERT RD	Electricity	1,669 kWh	6 GJ	\$168	0.1 t	6 GJ	\$168	0.1 t	
CHAMBER KIOSK 124 W 2ND AVE KIOS	Electricity	1,270 kWh	5 GJ	\$141	0.0 t	5 GJ	\$141	0.0 t	
WATERFRONT PARK KIOSK WEST OF 3035 W ISLAND HWY							\$78	\$78	0.0 t
Reader Board/Kiosk Subtotal							11 GJ	\$387	0.1 t
Sign Lighting									
ISLAND HWY SIGN ISLAND HWY SIGN	Electricity	1,296 kWh	5 GJ	\$143	0.0 t	5 GJ	\$143	0.0 t	
ISLAND HWY SIGN ISLAND HWY/SIGN	Electricity	299 kWh	1 GJ	\$82	0.0 t	1 GJ	\$82	0.0 t	
Sign Lighting Subtotal							6 GJ	\$225	0.0 t
Traffic Signal									
ROUTE 4/FERN RD ROUTE 4/FERN RD	Electricity	1,728 kWh	6 GJ	\$107	0.1 t	6 GJ	\$107	0.1 t	
Traffic Signal Subtotal							6 GJ	\$107	0.1 t
Lighting Subtotal							914 GJ	\$16,260	7.7 t
							914 GJ	\$16,260	7.7 t
WATER & WASTEWATER									

Qualicum Beach

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
Chlorination Plant								
BERWICK ROAD CHLORINATION BERWICK RD 2A	Electricity	2,973 kWh	11 GJ	\$259	0.1 t	11 GJ	\$259	0.1 t
Chlorination Plant Subtotal	Electricity	2,973 kWh	11 GJ	\$259	0.1 t	11 GJ	\$259	0.1 t
Liquid Waste PS								
SEACROFT SEWER LIFT SEACROFT RD	Electricity	7,455 kWh	27 GJ	\$567	0.2 t	27 GJ	\$567	0.2 t
Liquid Waste PS Subtotal	Electricity	7,455 kWh	27 GJ	\$567	0.2 t	27 GJ	\$567	0.2 t
Potable Water PS								
RIVER WELLS #5,6,7 ISLAND HWY PUMP	Electricity	641,400 kWh	2,309 GJ	\$27,530	19.6 t	2,309 GJ	\$27,530	19.6 t
500 COLLEGE RD PUMP 500 COLLEGE RD PUMP	Electricity	121,800 kWh	438 GJ	\$8,523	3.7 t	438 GJ	\$8,523	3.7 t
BEACH CEMETARY PUMP HILLIERS RD	Electricity	70,980 kWh	256 GJ	\$4,998	2.2 t	256 GJ	\$4,998	2.2 t
GARRETT ROAD BOOSTER PUMP 782 GARRETT RD	Electricity	157 kWh	1 GJ	\$50	0.0 t	1 GJ	\$50	0.0 t
Potable Water PS Subtotal	Electricity	834,337 kWh	3,004 GJ	\$41,101	25.4 t	3,004 GJ	\$41,101	25.4 t
Potable Water Well								
BERWICK WELLS FOUR WELLS RUPERT RD P.L717RW	Electricity	183,720 kWh	661 GJ	\$10,287	5.6 t	661 GJ	\$10,287	5.6 t
RIVER WELL #1A WATERS RD	Electricity	127,080 kWh	457 GJ	\$8,097	3.9 t	457 GJ	\$8,097	3.9 t
RIVER WELL #3 KINCADE RD PUMP	Electricity	99,780 kWh	359 GJ	\$6,100	3.0 t	359 GJ	\$6,100	3.0 t
HEMSWORTH PUMP BOOSTER HEMSWORTH RD	Electricity	29,176 kWh	105 GJ	\$2,086	0.9 t	105 GJ	\$2,086	0.9 t
RIVER WELL #4 LABURNUM RD	Electricity	2,160 kWh	8 GJ	\$212	0.1 t	8 GJ	\$212	0.1 t
EAGLECREST SPRINKLER EAGLECREST DR	Electricity	1,272 kWh	5 GJ	\$141	0.0 t	5 GJ	\$141	0.0 t
VILLAGE RESERVOIR HEATER 712 VILLAGE WAY	Electricity	1,049 kWh	4 GJ	\$126	0.0 t	4 GJ	\$126	0.0 t
Potable Water Well Subtotal	Electricity	444,237 kWh	1,599 GJ	\$27,048	13.5 t	1,599 GJ	\$27,048	13.5 t

Qualicum Beach 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
Water & Wastewater Subtotal								
Electricity		1,289,002 kWh	4,640 GJ	\$68,975	39.3 t	4,640 GJ	\$68,975	39.3 t
VEHICLE FLEET								
Diesel Fuel Vehicles								
DIESEL FUEL VEHICLES -		62,587 litres	2,421 GJ	\$59,395	174.0 t	2,421 GJ	\$59,395	174.0 t
Diesel Fuel Vehicles Subtotal								
Diesel Fuel		62,587 litres	2,421 GJ	\$59,395	174.0 t	2,421 GJ	\$59,395	174.0 t
Gasoline Vehicles								
GASOLINE VEHICLES -		79,614 litres	2,759 GJ	\$74,359	198.8 t	2,759 GJ	\$74,359	198.8 t
Gasoline Vehicles Subtotal								
Gasoline		79,614 litres	2,759 GJ	\$74,359	198.8 t	2,759 GJ	\$74,359	198.8 t
Vehicle Fleet Subtotal								
Gasoline	Consumption	79,614 litres	2,759 GJ	\$74,359	198.8 t	2,759 GJ	\$74,359	198.8 t
Gasoline	Energy	79,614 litres	2,759 GJ	\$74,359	198.8 t	2,759 GJ	\$74,359	198.8 t
Diesel Fuel	Energy	62,587 litres	2,421 GJ	\$59,395	174.0 t	2,421 GJ	\$59,395	174.0 t
SOLID WASTE								
Administration Offices								
CITY HALL 660 PRIMROSE ST 201	Solid Waste		78 cu. yds	11.70	6.2 t	78 cu. yds	11.70	6.2 t
Administration Offices Subtotal								
	Solid Waste		78 cu. yds	11.70	6.2 t	78 cu. yds	11.70	6.2 t
Airport								
QUALICUM BEACH AIRPORT 1000 RAVENSGOURNE LANE	Solid Waste		26 cu. yds	3.90	2.1 t	26 cu. yds	3.90	2.1 t
Airport Subtotal								
	Solid Waste		26 cu. yds	3.90	2.1 t	26 cu. yds	3.90	2.1 t
Community Centre								

Qualicum Beach

Corporate Energy & Greenhouse Gas Emissions Inventory: 2006

Account & Address	Account Consumption & Costs by Energy Type							Account Subtotal	
	Type	Volume	Mass	CO ₂ e	Energy	Costs	CO ₂ e		
COMMUNITY HALL 644 MEMORIAL AVE	Solid Waste	5 cu. yds	0.78	0.4 t			0.4 t		0.4 t
Community Centre Subtotal	Solid Waste	5 cu. yds	0.78	0.4 t			0.4 t		0.4 t
Fire Services									
HARLECH ROAD FIRE HALL 124 HARLECH RD	Solid Waste	5 cu. yds	0.78	0.4 t			0.4 t		0.4 t
Fire Services Subtotal	Solid Waste	5 cu. yds	0.78	0.4 t			0.4 t		0.4 t
Heritage Site									
TRAIN STATION 174 RAILWAY ST B	Solid Waste	5 cu. yds	0.78	0.4 t			0.4 t		0.4 t
Heritage Site Subtotal	Solid Waste	5 cu. yds	0.78	0.4 t			0.4 t		0.4 t
Ice Arenas									
LEASED CURLING RINK 644 MEMORIAL AVE	Solid Waste	156 cu. yds	23.40	12.4 t			12.4 t		12.4 t
Ice Arenas Subtotal	Solid Waste	156 cu. yds	23.40	12.4 t			12.4 t		12.4 t
Public Works Bldgs & Yards									
MAIN YARD 233 E FERN RD	Solid Waste	312 cu. yds	46.80	24.8 t			24.8 t		24.8 t
Public Works Bldgs & Yards Subtotal	Solid Waste	312 cu. yds	46.80	24.8 t			24.8 t		24.8 t
Solid Waste Subtotal	Solid Waste	588 cu. yds	88.14 t	46.7 t			46.7 t		46.7 t
Total	Type	Consumption	Costs	CO ₂ e	Energy	16,231 GJ	CO ₂ e	607.6 t	
	Electricity	2,454,854 kWh	\$141,853	74.9 t	8,837 GJ		74.9 t		
	Natural Gas	2,213 GJ	\$19,921	113.2 t	2,213 GJ		113.2 t		
	Gasoline	79,614 litres	\$74,359	198.8 t	2,759 GJ		198.8 t		
	Diesel Fuel	62,587 litres	\$59,395	174.0 t	2,421 GJ		174.0 t		
	Solid Waste	Volume	Mass	CO ₂ e	Volume	Mass	CO ₂ e		
		588 cu. yds	88.14 t	46.7 t	588 cu. yds	88.14 t	46.7 t		

Appendix B - Summary of Emissions from Leased Buildings/Streetlights



Qualicum Beach 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									
Leased Bldgs									
REGIONAL LIBRARY AND RENTAL UNITS 660 PRIMROSE ST 101	Electricity	61,257 kWh	221 GJ	\$4,309	1.9 t	984 GJ	\$4,309	40.9 t	
	Natural Gas	763 GJ	763 GJ		39.0 t				
QUALICUM BEACH MEMORIAL GOLF COURSE CLUB HOUSE 115 W CRESCENT	Electricity	135,978 kWh	490 GJ	\$9,516	4.1 t	490 GJ	\$9,516	4.1 t	
	Natural Gas	0 GJ	0 GJ		0.0 t				
CHAMBER OF COMMERCE KIOSK "LEIGH" HOUSE 124 W 2ND AVE	Electricity	8,286 kWh	30 GJ	\$556	0.3 t	127 GJ	\$556	5.2 t	
	Natural Gas	97 GJ	97 GJ		5.0 t				
VALHALLA HOSPICE 210 W CRESCENT RD	Electricity	9,166 kWh	33 GJ	\$691	0.3 t	97 GJ	\$691	3.6 t	
	Natural Gas	64 GJ	64 GJ		3.3 t				
SENIOR CENTRE 703 MEMORIAL	Electricity	0 kWh	0 GJ		0.0 t	97 GJ		5.0 t	
	Natural Gas	97 GJ	97 GJ		5.0 t				
PHYSIOTHERAPY CLINIC 140 W 1ST AVE 1	Electricity	24,056 kWh	87 GJ	\$1,722	0.7 t	87 GJ	\$1,722	0.7 t	
	Natural Gas	0 GJ	0 GJ		0.0 t				
QUALICUM BEACH BAPTIST CHURCH 600 BEACH RD	Electricity	23,946 kWh	86 GJ	\$1,719	0.7 t	86 GJ	\$1,719	0.7 t	
OLD SCHOOL HOUSE(TOSH) AND PARKING 122 FERN ROAD W	Electricity	0 kWh	0 GJ		0.0 t	73 GJ		3.7 t	
	Natural Gas	73 GJ	73 GJ		3.7 t				
CHAMBER OF COMMERCE- TOURISM 2711 W ISLAND HWY	Electricity	16,456 kWh	59 GJ	\$1,197	0.5 t	59 GJ	\$1,197	0.5 t	
FAMILY RESOURCE ASSOCIATION 181 W SUNNINGDALE RD	Electricity	12,879 kWh	46 GJ	\$949	0.4 t	46 GJ	\$949	0.4 t	
FAMILY RESOURCE ASSOCIATION 181 W SUNNINGDALE RD	Electricity	10,110 kWh	36 GJ	\$756	0.3 t	36 GJ	\$756	0.3 t	

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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	
SCOUT HALL 298 FIRST AVE WEST	Electricity	0 kWh	0 GJ		0.0 t	0 GJ		0.0 t	
	Natural Gas	0 GJ	0 GJ		0.0 t				
HOYLAKE ROAD 266 HOYLAKE ROAD W	Electricity	0 kWh	0 GJ		0.0 t	0 GJ		0.0 t	
LAWN BOWLING GREEN 665 JONES STREET	Electricity	0 kWh	0 GJ		0.0 t	0 GJ		0.0 t	
UNDERGROUND PARKING 660 PRIMROSE ST	Electricity	0 kWh	0 GJ		0.0 t	0 GJ		0.0 t	
BERWICK WELLS/TOWER PUMPHOUSES 200	Electricity	0 kWh	0 GJ		0.0 t	0 GJ		0.0 t	
"BROWN" PROPERTY 570 ST ANDREWS	Electricity	0 kWh	0 GJ		0.0 t	0 GJ		0.0 t	
GENERAL MONEY PARK, TRAIN STATION 600 BEACH RD	Electricity	0 kWh	0 GJ		0.0 t	0 GJ		0.0 t	
QUALICUM BEACH HISTORICAL AND MUSEUM 587 BEACH	Electricity	0 kWh	0 GJ		0.0 t	0 GJ		0.0 t	
BEACHFRONT 2711 W ISLAND HWY	Electricity	0 kWh	0 GJ		0.0 t	0 GJ		0.0 t	
BEACHFRONT HUT 2831 W ISLAND HWY	Electricity	0 kWh	0 GJ		0.0 t	0 GJ		0.0 t	
WELCOME SIGN 845 VILLAGE WAY	Electricity	0 kWh	0 GJ		0.0 t	0 GJ		0.0 t	
Leased Bldgs Subtotal		302,134 kWh	1,088 GJ	\$21,414	9.2 t	2,182 GJ	\$21,414	65.2 t	
	Natural Gas	1,094 GJ	1,094 GJ		56.0 t				
Buildings Subtotal		Consumption	Energy	Costs	CO₂e	2,182 GJ	\$21,414	65.2 t	
	Electricity	302,134 kWh	1,088 GJ	\$21,414	9.2 t				
	Natural Gas	1,094 GJ	1,094 GJ		56.0 t				
LIGHTING									
Overhead Lighting									
OVERHEAD STREET LTG OVERHEAD STREET LTG	Electricity	241,997 kWh	871 GJ	\$73,382	7.4 t	871 GJ	\$73,382	7.4 t	
Overhead Lighting Subtotal	Electricity	241,997 kWh	871 GJ	\$73,382	7.4 t	871 GJ	\$73,382	7.4 t	

Qualicum Beach

Corporate Energy & Greenhouse Gas Emissions Inventory: 2006

Account & Address	Account Consumption & Costs by Energy Type						Account Subtotal		
	Type	Consumption	Energy	Costs	CO ₂ e	CO ₂ e	Energy	Costs	CO ₂ e
Lighting Subtotal	Electricity	Consumption 241,997 kWh	Energy 871 GJ	Costs \$73,382	CO ₂ e 7.4 t		871 GJ	\$73,382	7.4 t
Total	Type	Consumption	Energy	Costs	CO ₂ e		3,053 GJ	\$94,796	72.6 t
	Electricity	544,131 kWh	1,959 GJ	\$94,796	16.6 t				
	Natural Gas	1,094 GJ	1,094 GJ		56.0 t				