



## General Purposes Committee

Anderson Room, City Hall  
6911 No. 3 Road

Monday, July 4, 2011  
4:00 p.m.

Pg. #      ITEM

### MINUTES

- GP-5**      *Motion to adopt the minutes of the meeting of the General Purposes Committee held on Monday, June 20, 2011.*



### COMMUNITY SERVICES DEPARTMENT

- GP-11**      1. **REACHING CARBON NEUTRALITY – PROPOSED RICHMOND STRATEGY**  
(File Ref. No. 01-0370-01/2011-Vol01) (REDMS No. 3230864)

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See Page **GP-11** of the General Purposes agenda for full hardcopy report

*Designated Speaker: Margot Daykin*

### STAFF RECOMMENDATION

- (1) *That the Carbon Responsible Strategy, as outlined in Attachment 5 of the staff report entitled “Reaching Carbon Neutrality – Proposed Richmond Strategy”, dated June 1, 2011 be adopted; and*
- (2) *That the City work with the Province and UBCM to establish carbon compensation credits for Richmond-based initiatives.*



**GP-31            2.    REACHING CARBON NEUTRALITY: ENERGY AND EMISSIONS INVENTORY AND RECOMMENDED EARLY ACTION**

(File Ref. No. 01-0370-01/2011-Vol01) (REDMS No. 3086030)

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See Page **GP-31** of the General Purposes agenda for full hardcopy report

*Designated Speaker: Margot Daykin*

**STAFF RECOMMENDATION**

*That greenhouse gas emission reduction action in corporate facilities and civic fleet use through the 2012 budget process and the other targeted action as presented in the report titled “Reaching Carbon Neutrality: Energy and Emissions Inventory and Recommended Early Action”, dated June 1, 2011, be endorsed.*



**PLANNING AND DEVELOPMENT DEPARTMENT**

**GP-129            3.    REPORT FROM CITY REPRESENTATIVES ON VANCOUVER INTERNATIONAL AIRPORT AERONAUTICAL NOISE MANAGEMENT COMMITTEE (YVR ANMC) AND STATUS UPDATE OF RICHMOND AIRPORT NOISE CITIZENS ADVISORY TASK FORCE REPORT RECOMMENDATIONS**

(File Ref. No. 01-0153-04-01) (REDMS No. 2996497)

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See Page **GP-129** of the General Purposes agenda for full hardcopy report

*Designated Speaker: Victor Wei*

**STAFF RECOMMENDATION**

- (1) That a letter be sent to the Vancouver Airport Authority to:
  - (a) acknowledge the positive efforts made by the Authority towards addressing the Richmond Airport Noise Citizens Advisory Task Force recommendations; and*
  - (b) request that the Authority provide a status report on its progress towards any outstanding Task Force recommendations as part of its next annual presentation to Council; and**
- (2) That the term of the Richmond Airport Noise Citizens Advisory Task Force be extended to March 2012 in order to provide feedback on the initiatives of the Control Zone Procedures Working Group of the YVR ANMC.*



ADJOURNMENT









## General Purposes Committee

Date: Monday, June 20, 2011

Place: Anderson Room  
Richmond City Hall

Present: Mayor Malcolm D. Brodie, Chair  
Councillor Linda Barnes  
Councillor Derek Dang  
Councillor Evelina Halsey-Brandt  
Councillor Greg Halsey-Brandt  
Councillor Sue Halsey-Brandt  
Councillor Ken Johnston  
Councillor Bill McNulty  
Councillor Harold Steves

Call to Order: The Chair called the meeting to order at 4:10 p.m.

### AGENDA ADDITION

It was moved and seconded

*That the matter of E-Comm role during the riots in Vancouver be added to the agenda as Item No. 6.*

**CARRIED**

### MINUTES

It was moved and seconded

*That the minutes of the meeting of the General Purposes Committee held on Monday, June 6, 2011, be adopted as circulated.*

**CARRIED**

# **General Purposes Committee**

**Monday, June 20, 2011**

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## **CORPORATE SERVICES DEPARTMENT**

**1. APPOINTMENT OF CHIEF ELECTION OFFICER AND DEPUTY CHIEF ELECTION OFFICER FOR THE 2011 GENERAL LOCAL AND SCHOOL ELECTION**

(File Ref. No. 12-8125-60-01/Vol 01) (REDMS No.3218577)

*That David Weber be appointed as Chief Election Officer, and that Gail Johnson be appointed Deputy Chief Election Officer, for the 2011 General Local and School Election.*

**CARRIED**

**2. 2011 CIVIC ELECTION UPDATE AND BYLAW AMENDMENT**

(File Ref. No. 12-8160-20-8778/Vol 01) (REDMS No.3212349, 3228541, 2450679, 3225069)

It was moved and seconded

*That Civic Election Administration and Procedure Bylaw No. 7244, Amendment Bylaw No. 8778, be introduced and given first, second and third readings.*

The question on the motion was not called, as a brief discussion took place about the 'Vote Anywhere' Initiative and the hours of operation for proposed voting places including Lansdowne Mall and Aberdeen Centre. The Director, City Clerk's, Office, David Weber, noted that both Lansdowne Mall and Aberdeen Centre have indicated a willingness to leave their doors open from 8:00 a.m., to 8:00 p.m., for voters, and that the polling stations in the malls would be accessible to the public even if the rest of the shops were closed.

In answer to a question about internet voting, Mr. Weber advised that the Province would be likely giving consideration to internet voting for the 2014 election, as there was not adequate time to make the necessary legislative amendments and other preparations for the 2011 election.

The question on the motion was then called, and it was **CARRIED**.

**3. DETERMINING ELECTION RESULTS WHERE A TIE VOTE EXISTS AFTER A JUDICIAL RECOUNT**

(File Ref. No. 12-8125-60-01/Vol 01) (REDMS No.3214869, 3218594)

A discussion took place among Committee members and Mr. Weber about:

- the responsibility of the Board of Education to pass their own bylaw on the matter of determining election results when a tie vote exists;
- that runoff elections must be conducted in the manner that is equivalent to the original election with the same voting opportunities;
- that a runoff election would be between all the candidates who were not successful in the original election;

## **General Purposes Committee**

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- concerns related to the costs of approximately \$250,000 associated with having a runoff election on the same scale as the original election;
- concerns that the determination by lot method is not a democratic process; and
- the possibility of establishing legislation that allows runoff elections to take place just between the candidates that were tied.

It was moved and seconded

*That Civic Election Administration and Procedure Bylaw No. 7244, Amendment Bylaw No. 8770, be introduced and given first, second and third readings.*

**CARRIED**

OPPOSED: Cllrs. E. Halsey-Brandt  
S. Halsey-Brandt

It was moved and seconded

*That a letter be written to the Minister of Community, Sport and Cultural Development and the local MLAs in support of the following legislative amendments:*

- (1) *that in the event of a tie vote following a judicial recount in a municipal election, that a runoff election on a reduced scale be permitted; and*
- (2) *that a runoff election be between only the candidates who received the same number of votes.*

**CARRIED**

It was moved and seconded

*That a resolution on the matter be forwarded to the UBCM consistent with the wording of the letter to be written to the Minister of Community, Sport and Cultural Development and the local MLAs.*

**CARRIED**

#### **4. THE OATH OF OFFICE – RESPONSE TO COUNCIL REFERRAL**

(File Ref. No. 12-8060-20-8779/Vol 01) (REDMS No.3225409, 3225402)

A discussion ensued about the various options presented in the staff report for wording of the Oath of Office. Committee members expressed their opinions on their preferences, and as a result:

It was moved and seconded

- (1) *That the staff report titled “The Oath of Office – Response to Council Referral,” dated May 30, 2011 from the Director, City Clerk’s Office, be received for information;*

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- (2) *That Civic Election Administration and Procedure Bylaw No. 7244, Amendment Bylaw No. 8779, be introduced and given first, second and third readings, with the Oath of Office worded as presented in Option 2 with additional wording from Option 1 of the staff report, to read as follows:*

*I, .....[name of person elected or appointed]....., do [swear]/[solemnly affirm] that:*

- *I will perform the duties of the office of [Mayor]/[Councillor] faithfully and with integrity and will not allow any private interest to influence my conduct in public matters;*
  - *I will abide by the statutes, bylaws and policies that govern the City and will promote openness, accountability, and responsible leadership; and*
  - *I will dedicate myself at all times to acting in the best interests of the residents of the City of Richmond.*
- (3) *That the option to take the Oath of Allegiance in conjunction with the Oath of Office continue to be provided to incoming Council members.*

**CARRIED**

## **BUSINESS AND FINANCIAL SERVICES DEPARTMENT**

### **5. CITY CENTRE AREA TRANSITIONAL TAX EXEMPTION BYLAW NO. 8776**

(File Ref. No. 12-8060-20-8776) (REDMS No. 3228251)

Andrew Nazareth, General Manager, Business and Financial Services, joined by Ivy Wong, Manager, Revenue, briefly reviewed his report and the criteria and conditions that must be met in order to qualify for the tax exemption. Mr. Nazareth noted that the tax exemptions were only available over the next five years, and were not for the purpose of attracting new tenants, rather the focus was on retaining existing business and jobs in the City Centre Area.

A discussion ensued about:

- How the City would recover some of the costs associated with the tax exemption, including the possibility of having to distribute the tax burden to others within the same property classifications, or shifting it to other property classifications;
- the anticipated new growth from City Centre Area properties, particularly properties around the Oval and in the Firbridge area;
- the advertising requirements in connection with the City Centre Area Transitional Tax Exemption Bylaw No. 8776;

## **General Purposes Committee**

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- concerns about how to communicate with property owners who reside outside of the country, as well as all the tenants that will be affected, including the feasibility of hand delivering notices to business licence holders; and
- and the drop in the mill rate since 2005.

Staff were also directed to provide a map of the area eligible for the City Centre Area Transitional Tax Exemption prior to next Regular Council Meeting, scheduled to take place on Monday, June 27, 2011.

It was moved and seconded

- (1) *That the City Centre Area Transitional Tax Exemption Bylaw No. 8776 be introduced and given first, second and third readings and that staff provide public notice in accordance with Sections 94 and 227 of the Community Charter; and*
- (2) *That staff advise Council in due course about the method used to provide the notice to the owners and as many tenants as possible.*

**CARRIED**

### **6. E-COMM DURING THE RIOTS**

Councillor Bill McNulty, provided an oral report on the role of E-Comm during the riots in Vancouver on June 15, 2011. He noted that E-Comm's staff responded in a calm and professional manner while dealing with approximately four times the normal volume of 911 calls. Councillor McNulty also noted that E-Comm's radio system performed without any issues, and easily coped with the enormous increase in radio traffic.

It was moved and seconded

*That the oral report regarding E-comm's role during the Vancouver riots be received for information.*

**CARRIED**

## **ADJOURNMENT**

It was moved and seconded

*That the meeting adjourn (5:04 p.m.).*

**CARRIED**

## **General Purposes Committee**

**Monday, June 20, 2011**

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Certified a true and correct copy of the Minutes of the meeting of the General Purposes Committee of the Council of the City of Richmond held on Monday, Monday, June 20, 2011.

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Mayor Malcolm D. Brodie  
Chair

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Shanan Dhaliwal  
Executive Assistant  
City Clerk's Office



# City of Richmond

## Report to Committee

**To:** General Purposes Committee

**Date:** June 1, 2011

**From:** Cecilia Achiam, MCIP, BCSLA  
Interim Director, Sustainability and District Energy  
Senior Program Manager, CPMG, CAO's Office

**File:** 01-0370-01/2011-  
Vol01

**Re:** Reaching Carbon Neutrality – Proposed Richmond Strategy

### Staff Recommendation

1. That Council adopt the strategy, as outlined in Attachment 5 of the attached report titled "Reaching Carbon Neutrality - Proposed Richmond Strategy", dated June 1, 2011.
2. That the City work with the Province and UBCM to establish carbon compensation credits for Richmond-based initiatives.

Cecilia Achiam, MCIP, BCSLA  
Interim Director, Sustainability and District Energy  
Senior Program Manager, CPMG, CAO's Office  
(604-276-4122)

Att. 5

FOR ORIGINATING DEPARTMENT USE ONLY			
<b>ROUTED TO:</b>		<b>CONCURRENCE</b>	<b>CONCURRENCE OF GENERAL MANAGER</b>
Parks		Y <input checked="" type="checkbox"/> N <input type="checkbox"/>	
Project Development		Y <input checked="" type="checkbox"/> N <input type="checkbox"/>	
Community Safety		Y <input checked="" type="checkbox"/> N <input type="checkbox"/>	
<b>REVIEWED BY TAG</b>	YES <input checked="" type="checkbox"/>	NO <input type="checkbox"/>	<b>REVIEWED BY CAO</b>
			YES <input checked="" type="checkbox"/> NO <input type="checkbox"/>

## Staff Report

### Origin

The City of Richmond has committed to becoming carbon neutral in its civic operations by 2012. The purpose of this report is to present to Council a proposed approach for meeting this commitment in a manner that itself is sustainable. The proposed approach supports the following Council Term Goal:

*Council Term Goal #7: "Sustainability and the Environment – Demonstrate leadership in and significant advancement of the City's agenda for sustainability through the development and implementation of a comprehensive strategy that among other objectives includes incorporating sustainability into our City policies and bylaws".*

### Background

Climate change is identified as one of the most pressing social, economic and environmental issues facing society<sup>1</sup>. Responding effectively to climate change means taking action directed at:

1. Climate Protection (i.e., avoid greater changes); and
2. Climate Change Adaptation (i.e., increase ability to adapt to unavoidable changes).

Climate protection involves reducing emissions of greenhouse gases which are causing the atmosphere to retain greater levels of solar radiation. It also means protecting ecosystems which store and/or absorb greenhouse gases.

In 2008, the City of Richmond signed the BC Climate Action Charter, a voluntary agreement among the Province, Union of British Columbia Municipalities (UBCM) and local governments. This Charter signified the City's intention to work with the Province and UBCM to accelerate action for protecting the climate by reducing greenhouse gas emissions. The Charter commits local government to 3 goals:

- becoming carbon neutral in civic operations by 2012;
- measuring and reporting on their community greenhouse gas emissions profile; and
- creating complete and compact communities, more energy efficient communities.

The City's commitment to carbon neutrality is currently one of eight targets developed to-date and incorporated into the City's Sustainability Framework (**Attachment 1**). These targets include climate protection targets for the corporation and the community. The corporate target is to be carbon neutral by 2012. The community target is to achieve a 33% greenhouse gas emission reduction from 2007 levels by 2020 and an 80% greenhouse gas emission reduction by 2050.

### About Carbon Neutrality

In broad terms, carbon neutrality involves two main actions: reducing internal greenhouse gas emissions and making investments to "offset" unavoidable emissions. An "offset" is compensatory measure made by an individual or company for their greenhouse gas emissions. To be considered an "offset", the compensatory measure must be made outside of an organization's core service areas.

To achieve carbon neutrality, an organization must measure its levels of greenhouse gas emissions (commonly referred to as carbon footprint), reduce its emissions to the largest extent possible, invest in offsets to balance remaining unavoidable emissions and report activities (i.e., Measure, Reduce, Offset,

<sup>1</sup> "Climate change is the defining challenge of our generation. Scientists warn we have less than 10 years to halt the global rise in greenhouse gas emissions if we are to avoid catastrophic consequences.... It is a practical and moral imperative." Ban Ki-moon, United Nations Secretary-General, 2009.



and Report). These activities must be conducted each year and as such, carbon neutrality must be managed as an annual program. A glossary of climate change terminology is provided in **Attachment 2**.

### **The Need for A Sustainable Approach to Carbon Neutrality**

Carbon neutrality has built momentum in accelerating climate protection action and is viewed as a potential catalyst to advance a low-carbon economy. By embedding the cost of greenhouse gas emissions, carbon neutrality helps business case decisions become closer in considering actual costs. However, carbon neutrality is a relatively new concept and the science and best management practices are continuing to be developed. While various protocols have been developed, no universally accepted practice has been established. As such, various standards exist for measuring greenhouse gas emissions and establishing offsets. Other challenges also exist that if inadequately managed, can risk corporate credibility, result in high cost/limited gain outputs and/or otherwise impair the advancement of sustainability. These challenges are discussed in **Attachment 3**.

To ensure that carbon neutrality is advanced in a way that is itself inherently sustainable (e.g., can be supported over the long-term, uses fiscal resources wisely, doesn't come at the expense of other important sustainability objectives, etc.), it is important that these challenges be well-managed and that the carbon neutrality agenda is guided by broader sustainability principles.

### **City of Richmond's Climate Action**

Before the introduction of the Climate Action Charter, the City of Richmond had adopted a comprehensive approach to climate change, inclusive of both greenhouse gas emissions reduction and climate change adaptation at both the corporate and community level. The City had also already implemented a wide range of action initiatives. At the corporate level, highlight initiatives include the city's High Performance Building Policy, corporate Green Fleet Policy, corporate recycling program, corporate energy-retrofit program and city carpool program. Community-based initiatives include the City's land-use policies in support of complete and compact communities, green development policies, alternative transportation initiatives, community recycling program and outreach initiatives such as the Climate Change Showdown. Most recently, Richmond Council adopted a Strategic Climate Change Program as part of its Sustainability Framework which established targets and set strategic direction.

Council endorsed the recommendation to sign the Climate Charter as a means to continue its corporate leadership. However, the commitment was based on the fulfillment of specific conditions, namely that the Province would work with municipalities to develop a carbon neutral approach that was well-resourced and adequately flexible to address multiple local government interests. A copy of the Mayor's letter to the Premier and response letter from the Province is provided in **Attachment 4**.

### **Emerging Provincial Climate Neutral Framework**

Since the launch of the BC Climate Action Charter, the Province has introduced a new program that enables those local governments who have signed the Charter to be reimbursed for their carbon tax expenditures. The Province has also been working with a joint committee with representatives from UBCM and local governments to develop a framework for establishing a carbon neutral protocol. The

City, along with other local governments, has been working to influence the Provincial framework development to meet local governments' interests<sup>2</sup>.

Specifically, the City of Richmond has been advocating for a framework that:

- advances carbon neutrality as part of a broader sustainability agenda (e.g., directs an appropriate level of investment to carbon neutrality in proportion to investment needs in other areas, uses public funds appropriately, etc.);
- enables carbon offsets to be invested locally;
- is fiscally sustainable for local governments, empowering municipalities to reduce their own greenhouse gas emissions and costs over time;
- supports local government policy action (in addition to capital investment) that can result in emission reduction gains in the community; and
- recognizes and supports strengthening carbon resiliency (e.g., the ability of urban forests and natural ecosystems to retain carbon).

In May 2011, the Province released a proposed framework for guiding implementation of carbon neutrality<sup>3</sup>. The proposed framework outlines the four main steps for achieving carbon neutrality – Measure, Reduce, Balance and/or Offset, and Report. Three options are proposed to balance/offset annual emissions:

- Option 1 - Invest in Provincially-approved greenhouse gas emission reduction projects within local communities;
- Option 2 - Invest in alternate community emission reduction projects as identified by local governments;
- Option 3 - Purchase offsets through a third-party (e.g., Pacific Carbon Trust, etc.).

The opportunity to reinvest compensation action locally has been provided in the framework with the introduction of Options 1 and 2. However, as currently designed, these options generally do not provide viable compensation action initiatives<sup>4</sup>. As such, the proposed framework is predominately orientated towards the one option of purchasing third-party offsets. Third-party offsets are generally invested outside of local communities and often support greenhouse gas emission reduction in the private sector. There are additional challenges including a lack financial support and other tools for supporting local governments to reduce corporate greenhouse gas emissions<sup>5</sup>, and has not incorporated considerations pertaining to either policy investments or strengthening carbon resiliency.

<sup>2</sup> A number of measures have been taken to influence Provincial framework development, including UBCM resolutions, correspondence to the Province through Metro Vancouver Regional Engineering Advisory Committee (REAC) and joint workshops and discussions with Provincial staff.

<sup>3</sup> The Guidebook can be found at [http://toolkit.bc.ca/sites/default/files/BecomingCarbonNeutral\\_Guidebook\\_05.11.pdf](http://toolkit.bc.ca/sites/default/files/BecomingCarbonNeutral_Guidebook_05.11.pdf)

<sup>4</sup> Option 1 projects, which consist largely of fleet conversions and energy retrofits in non-City facilities, will be difficult to implement as they are unlikely to be considered an appropriate use of local government funds. Option 2 allows local governments to identify their own community-based projects but such projects are unlikely to be cost-effective given the burden of verification being sought.

<sup>5</sup> It has been suggested that local governments could use reimbursed carbon tax funds to purchase offsets. However, this would mean that these monies would no longer be available to support internal reduction actions and reduce the need to purchase offsets over time. As such, local governments would need to keep spending money to pay for corporate emissions.

## **Richmond's Proposed Carbon Responsible Approach**

Recognizing that the Charter is voluntary, that it is a joint effort with UBCM and that the timelines being taken by the Province to develop a framework were leaving municipalities with very little time for implementation, the City of Richmond has been proactive in developing a made-in-Richmond strategy.

The City's proposed Carbon Responsible Strategy is presented in **Attachment 5**. The City's strategy is based on the vision to address key challenges and achieve carbon neutrality in a cost-effective and sustainable manner.

The City has already completed the first 3 steps to prepare for carbon neutrality, namely:

- Explicitly embed carbon neutrality as one component within the City's Sustainability Framework;
- Establish a Carbon Neutral Provisional Fund; and
- Initiate embedding the cost of greenhouse gas emissions into the City's Land and Capital process by requiring that any relevant information pertaining to greenhouse gas emissions (growth and reductions) be included into project submission information.

A separate report is being brought forward to fulfill the 4<sup>th</sup> step which is to establish a baseline for measuring emissions and propose early strategic action to reduce the City's carbon footprint.

## **Analysis**

### **Reaching Agreement on Meeting Carbon Neutrality, in a Sustainable Manner**

While a strong concept in theory, it is challenging to implement carbon neutrality effectively. The City's proactive efforts have meant that the City of Richmond is well-informed about carbon neutrality and is in a strong position for advancing a strategy that meets City interests and Provincial objectives.

A key feature of the City's strategy is that it is seeking to advance carbon neutrality, not as an end-goal in itself, but as one strategy for reaching the much broader goal of community sustainability. By formally embedding carbon neutrality as one component within a broader sustainability agenda, the City of Richmond is able to advance carbon neutrality within a complete and balanced approach to sustainability. This means that the City is better able to direct appropriate level of resources given suite of sustainability objectives. (It is noted that corporate emissions account for about 1% of community-wide emissions).

Additional features of the City's approach include:

- a focus on retaining investment within the local community;
- a focus on reducing corporate emissions and reducing costs associated with offsets;
- a focus on cost-effective strategic action (e.g., reducing emissions that "count" first<sup>6</sup>, leveraging all tools available to municipalities including policy instruments, fiscal incentives, land-use planning, procurement, capital investment; a focus on big value action that minimizes administrative costs, etc.);
- an emphasis on both greenhouse gas emission reduction (i.e., creating less harm) and increasing carbon resiliency (i.e., creating value).

<sup>6</sup> As per protocol, carbon neutrality applies to a specific scope of emissions. While it is important to reduce emissions from all activities, a focus first on those emissions that have an associated carbon costs yields the dual benefit of increased climate protection and reduced corporate operational costs.

It is recommended that Richmond Council adopt the proposed Richmond approach to carbon neutrality and that the City continue to work with the Province and UBCM to reach agreement on implementation. Staff will provide an update on progress in Fall 2011.

### *Financial Implications*

The commitment to carbon neutrality seeks to reduce long-term costs associated with climate change by accelerating greenhouse gas emission reduction. The Provincial Framework means that the City would need to expend its carbon tax reimbursement on the investments outside of the Richmond community through the purchase of third-party offsets. This exchange would need to be continued as long as the City remained committed to carbon neutrality.

Richmond's proposed strategy is aimed at retaining the carbon tax reimbursement within the Richmond community. The strategy also seeks to reduce corporate greenhouse emissions first, thereby, reducing offset costs which are expected to increase over time. The strategy also leverages all available municipal tools and leverages existing program and initiatives in order to develop low-cost reduction and compensation action initiatives that serve multiple community benefits.

### **Financial Impact**

There is no additional cost to the City from this report. Costs associated with specific accelerated emission reduction action, compensation action development or other activities involved in implementing the proposed approach will be brought forward to Council for prior approval.

### **Conclusion**

Demonstrating corporate leadership in doing its part to protect the climate and avoid dangerous levels of climate change, the City of Richmond committed to achieving carbon neutrality in its corporate operations by 2012. This report recommends that Council adopt a proposed made-in-Richmond approach to meet this commitment in an innovative manner that accelerates climate protection, meets multiple local government objectives and advances the broader sustainability agenda.

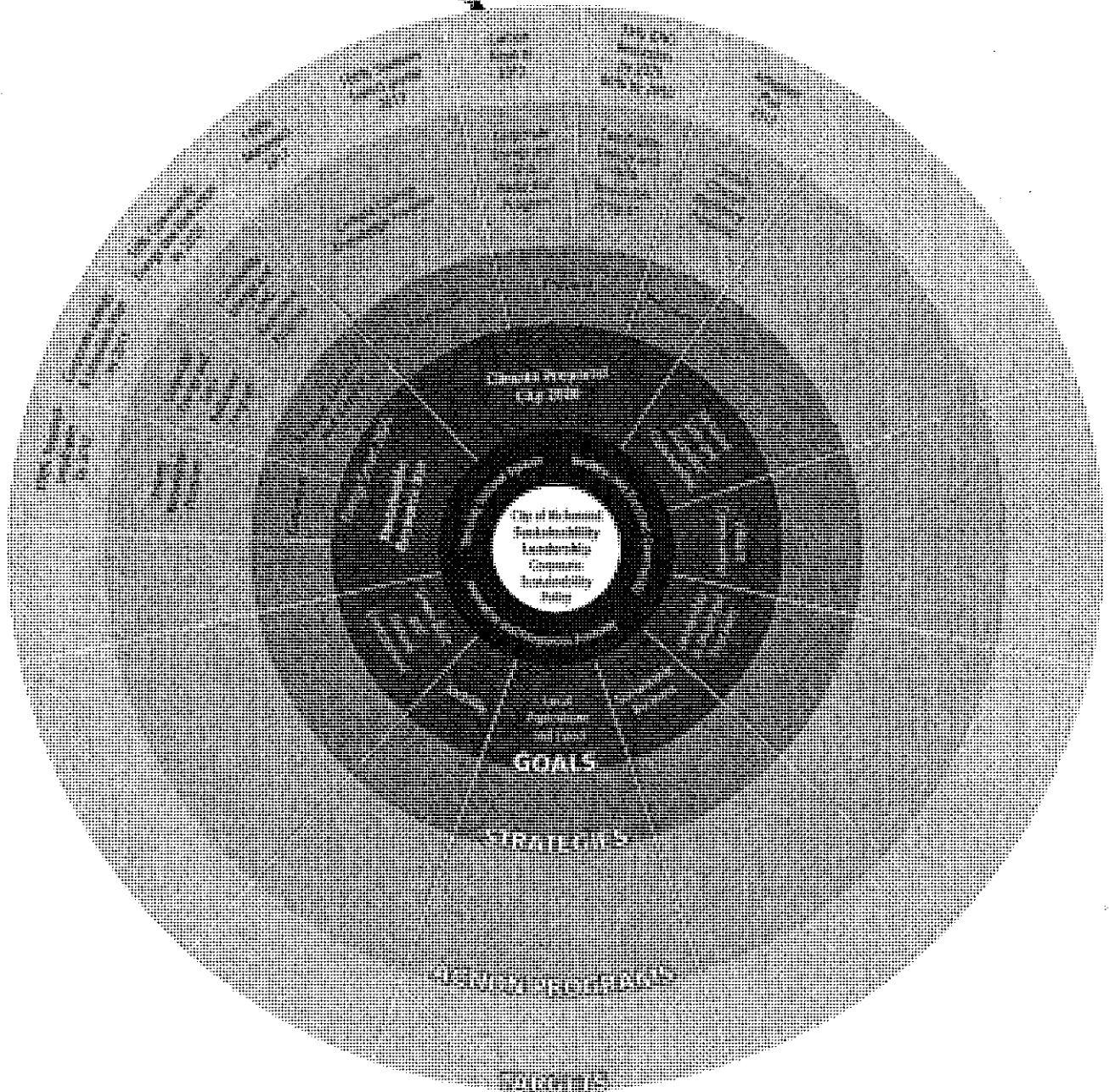


Margot Daykin, M.R.M.  
Sustainability Manager, Community Services  
(604-276-4130)

MD:md

## City's Sustainability Framework and Carbon Neutral Commitment

*City's carbon neutral  
commitment for  
corporate emissions*



## Glossary of Climate Change Terminology

### Glossary

#### The Science

##### Carbon

Carbon (C) is the building block of life. It is the basic element in all living things, including 50% of the dry weight in the human body. In the form of carbon dioxide, carbon is a powerful greenhouse gas. However, the term "carbon" used in discussing climate change does not just refer to carbon dioxide. It includes the other powerful greenhouse gases, such as methane and nitrous oxide.

##### Carbon Dioxide (CO<sub>2</sub>)

A colourless, odourless gas, formed during breathing, combustion, and decaying of organic materials (e.g., plants, animals). Carbon dioxide is a major greenhouse gas, mainly emitted by the combustion of fossil fuels.

##### Carbon Footprint

Carbon footprint refers to the total amount of greenhouse gases produced by human activities. This is usually expressed in equivalent tons of carbon dioxide (CO<sub>2</sub>), which is the major greenhouse gas. For example, when we burn fossil fuels to run our vehicles or heat our homes, we are releasing carbon dioxide. Almost all our products (food, clothing, materials, etc.) are brought to us through transportation which emit CO<sub>2</sub>. Our carbon footprint is the sum of the CO<sub>2</sub> emissions caused by our activities, usually calculated over a year.

##### Climate

The climate of an area is its local weather conditions — such as temperature, precipitation (rainfall, snow, etc.), humidity, sunshine, cloudiness, wind, and air pressure. It is the weather averaged over a long period of time.

##### Climate Change

Changes in the climate of the earth as a whole, caused by human activities that release greenhouse gases.

##### Fossil Fuels

Fossil fuels, also known as mineral fuels, are natural resources such as coal, oil and natural gas. They are called "fossil" fuels because they are formed from the remains of ancient plant and animal life.

##### Greenhouse Gases (GHGs)

Surrounding the earth like a giant greenhouse, they maintain the earth's climate. The six primary greenhouse gases are: carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), nitrous oxide (N<sub>2</sub>O), sulphur hexafluoride (SF<sub>6</sub>), hydrofluorocarbons (HFCs) and perfluorocarbons (PFCs).

##### Reservoir/ Sinks

A component of the climate system, other than the atmosphere, which has the capacity to store, accumulate, or release carbon or a greenhouse gas. "Oceans, soils, and forests are examples of reservoirs of carbon.

#### Management Terminology

##### Adaptation

Adaptation is the adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities. The definition recognizes that humans can adjust to past ("actual") climate change and its impacts, or prepare for projected future ("expected") climate change and its impacts.

##### Carbon Neutrality

Carbon neutrality is a commitment to reduce greenhouse gas emissions (GHG) as much as possible and then to "offset" remaining emissions through emission reduction credits. Credits can be earned through various activities, including projects which displace fossil fuels (e.g., installation of solar or geothermal based energy systems, capture emissions (e.g., GHG releases from landfills) and projects that absorb GHGs from the atmosphere carbon sequestration projects (through reforestation). An organization is carbon neutral if it has calculated its total emissions, taken measures to minimize those emissions, and used offsets to net residual emissions to zero.

**Carbon Sequestration**

The process of increasing the carbon stored in a reservoir other than the atmosphere, in order to reduce carbon dioxide emitted by human activities. Carbon dioxide can be removed from the atmosphere through such actions as planting forests (trees absorb CO<sub>2</sub>). This removal is temporary, though, because CO<sub>2</sub> returns to the atmosphere when plants die or are burned.

**GHG Emission Inventory**

A database that lists, by source, the amount of greenhouse gases discharged into the atmosphere over a given time period, such as a year.

**Offsets**

Offsets are project-based emission reductions or removals that are used to meet voluntary or regulatory emission reduction obligations.

**Targets**

A target is a desired level of performance to be attained by a certain timeframe. Targets are a commitment to improvement.

**Legislative and Policy Terminology****Carbon Tax**

A surcharge on the carbon content of oil, coal, and gas that discourages the use of fossil fuels and aims to reduce carbon dioxide emissions. B.C. has introduced a carbon tax that will be revenue neutral, meaning all revenue generated by the tax will be returned to individuals and businesses through reductions in other taxes.

**Climate Action Charter**

This Charter establishes a joint local-provincial commitment to climate change and greenhouse gas reduction. The Charter is voluntary and if signed, commits local governments to:

1. be carbon neutral in respect of operations by 2012,
2. measure and report on community's GHG emissions profile; and
3. create complete, compact, more energy efficient rural and urban communities.

**Climate Action Revenue Incentive Program (CARIP)**

Climate Action Revenue Incentive program is conditional grant that enables local governments to recoup 100% of their annual carbon tax expenditure. To be eligible, local governments must have signed the Climate Action Charter and commit to becoming carbon-neutral by 2012.

**Greenhouse Gas Reduction Targets Act (GCRTA)**

Brought into force on January 1, 2008, the Provincial GCRTA requires the public sector become carbon neutral by 2010 and to make a public report available annually that details action taken towards carbon neutrality. The provincial government (including individual ministries and agencies), schools, colleges, universities, health authorities and Crown corporations are all included in this commitment.

**Local Government (Green Communities) Statutes Amendment Act (Bill 27)**

Introduced in April, 2008, Bill 27 requires local governments to include greenhouse gas emission targets, policies and actions in their Official Community Plans and Regional Growth Strategies. The legislation also enables local governments to use development permits to promote energy and water conservation, reduce greenhouse gases and encourage alternative transportation options for off-street parking. Developers who are building small housing units (29 square metres or less) are exempted from paying Development Cost Charges (DCC). Local governments also have the ability to waive or reduce DCC charges for green development including small lot subdivisions and affordable rental housing.

## Key Challenges Associated with Carbon Neutrality

Carbon neutrality is a relatively new concept and the science and best management practices are continuing to evolve. Currently, there remains a number of key challenges that need to be well-managed to avoid potential pitfalls.


Key management challenges include:

1. Avoiding the **“Paying to Pollute”** agenda *(where a dominant focus on offsets means that organizations achieve carbon neutrality with little reduction, and even potential growth, in their own levels of greenhouse gas emissions).*
2. Avoiding the **“Continuous Payment”** agenda *(where a dominant focus on balancing emissions without adequate source reduction means organization must keep paying for emissions every year. With costs projected to increase overtime, this approach is not considered to be fiscally wise)*
3. Avoiding **“Myopia”** *(where disproportionate level of focus is placed on achieving carbon neutrality, resulting in sub-optimal performance in advancing climate change adaptation and other equally important objectives of sustainability).*
3. Avoiding getting lost in **“Minutia ”** *(where disproportionate level of focus is placed on a relatively small amount of greenhouse gas emissions. resulting in failure to achieve bigger gains in more strategic areas. A key consideration for local governments is ensuring that the right balance of action is being advanced towards reducing corporate emissions which represent about 1% of a community's emissions and supporting community-wide emissions which at 99%, represent the vast majority of emissions).*
4. Avoiding **“Questionable Offsets”** *(which tarnish corporate reputations)*
5. Avoiding **“Administrative Inefficiencies** *(where disproportionate amount of limited funds are being directed towards greenhouse gas emission accounting and transaction costs, rather than on-the-ground action)*
5. Creating **“Carbon Resiliency - Doing Good not just Less Bad”** *(in practice, approaches to carbon neutrality have predominately been focussed on only one side of the carbon equation - reducing the amount of emissions being emitted into the atmosphere. Much less focus has been placed on the other yet equally important side of the equation which are actions focussed on retaining carbon within the Earth's crust and/or withdrawing carbon from the atmosphere. This type of action is called carbon sequestration. Due to the difficulty in measuring sequestering value, initiatives that serve to actually improve conditions are generally left out of the carbon neutral agenda.)*



[illegible]

0340-03-01

The logo for Richmond, Virginia, is a circular seal. It features a central illustration of a ship on the water, with the year "1775" above it. The word "RICHMOND" is written in large, bold, serif capital letters across the middle. Below it, the tagline "Island City by Nature" is written in a smaller, italicized serif font. The outer ring of the seal contains the words "OFFICE OF THE" at the top and "CITY OF RICHMOND" at the bottom.

The City of Richmond thanks the Province for adopting a leadership role in climate change management and looks forward to working with the Province and other local communities in developing and pursuing collective action for advancing climate change solutions for BC.

Yours truly,



Malcolm D. Brodie  
Mayor

pc: Hon. Ida Chong, Minister of Community Services and Minister Responsible for Seniors' and Women's Issues  
Hon. Barry Penner, Minister of Environment and Minister responsible for Water Stewardship and Sustainable Communities  
Hon. Olga Ilich, Richmond MLA, Minister of Labour and Citizens' Services  
Hon. Linda Reid, Richmond MLA, Ministry of State of Childcare  
John Yap, Richmond MLA  
Graham Whitmarsh, Head Climate Action Secretariat  
Gary MacIsaac, Executive Director, Union of B.C. Municipalities

**Attachment 1: City of Richmond Climate Change Program - Synopsis****1. Overarching Plan – Climate Change Response Agenda**

In fall 2007, Richmond City Council adopted an overarching framework for guiding corporate action on climate change ([http://www.richmond.ca/cityhall/council/agendas/council/2007/091707\\_minutes.htm](http://www.richmond.ca/cityhall/council/agendas/council/2007/091707_minutes.htm)).

This Agenda (see attached) is based on pursuing initiatives concurrently under 3 pillars of action:

- **Empower** - *increase corporate and community capacity for addressing climate change;*
- **Prevent** - *reduce greenhouse gas (GHG) emissions; and*
- **Prepare** - *implement strategies for adapting to unavoidable changes.*

**2. City Action – Key Initiatives 2007/2008**

The City of Richmond has undertaken a variety of initiatives in effort to advance sustainability-based community development and corporate activity. Many of these initiatives support the City's Climate Change response objectives by reducing emissions and strengthening capacity to respond to change. A summary of core City initiatives which support climate change action is provided in attached table. Key initiatives being conducted through 2007/2008 work period are outlined below.

*i. Empower*

The City is currently working in partnership with BC Sustainable Energy Association (BC SEA) to raise awareness of climate change and its solutions in Richmond schools. BC SEA are conducting a series of workshops through their **Climate Change Showdown** program in a variety of Richmond schools throughout the 2007/2008 school term.

The Corporate Sustainability Initiative has been organizing a **Sustainability Speaker Series** for Richmond staff. Among a suite of other issues and topics, this series has included presentations and films on climate change. The City's Engineering Department incorporated climate change considerations in its annual departmental workshop for 2007. Work included presentations from guest speakers and small group brainstorming sessions on potential strategies for addressing climate change impacts on the department.

*ii. Prevent*

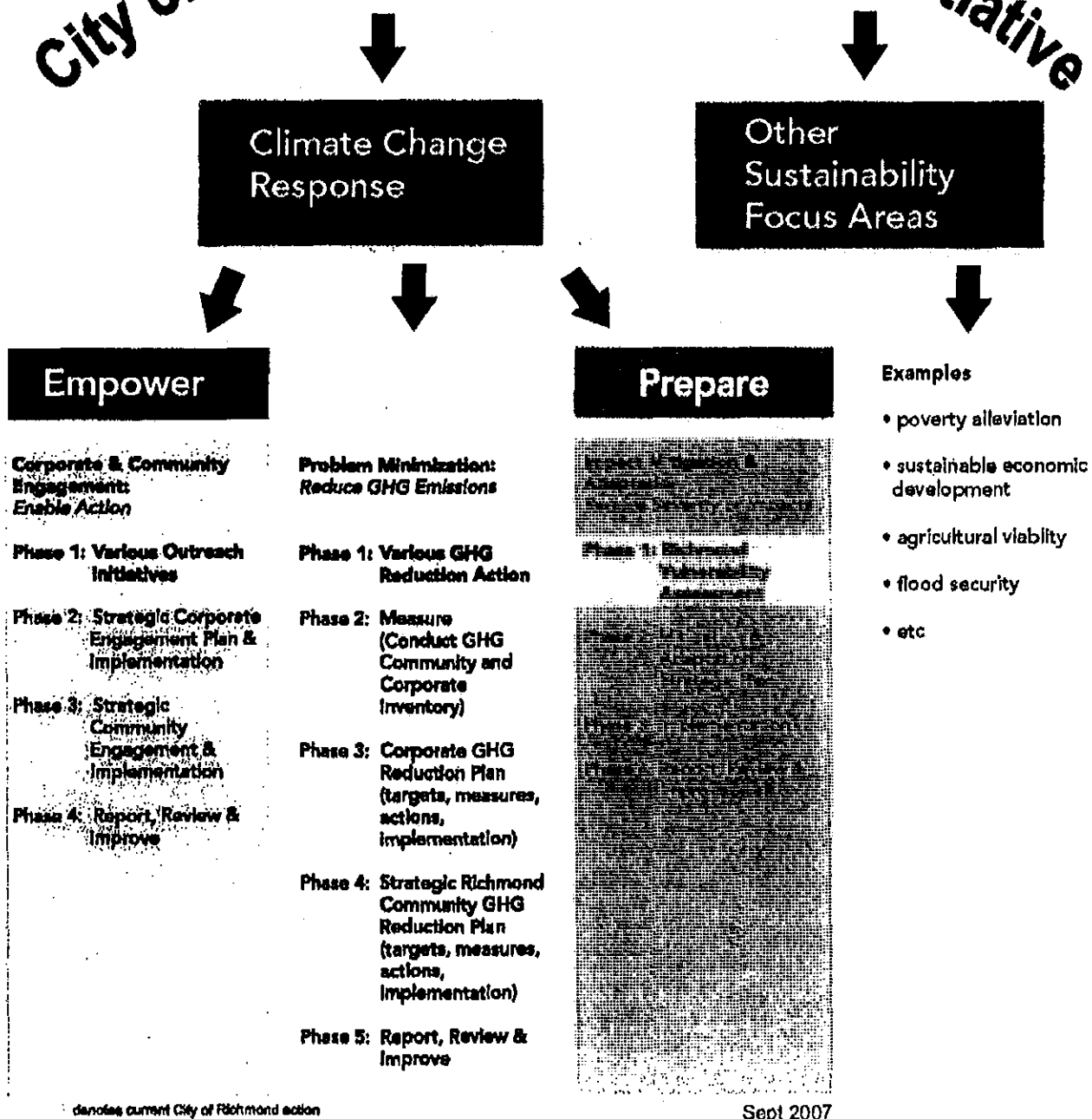
Richmond completed **corporate greenhouse gas (ghg) emission inventory** for the years 1995 and 1999 and has undertaken a number of initiatives which reduce ghg. The City is currently conducting an updated inventory study of corporate emissions which will incorporate the past years data and include emissions inventory for 2003 and 2006. Once the City has an up-to-date inventory, work can proceed with setting targets and strategic reduction planning. The inventory work is anticipated to be completed by Spring 2008.

*iii. Prepare*

In the fall of 2007, the City initiated action in preparing the municipality to better adapt to unavoidable climate change impacts with the launch of the **City of Richmond - Impacts & Early Adaptation Study**. The purpose of the Study is to consolidate existing knowledge on potential changes, identify potential local impacts and identify early adaptation strategies. The Impacts & Early Adaptation Study is a joint effort among the City of Richmond, Environment Canada and University of British Columbia. A key aspect of the Study is to identify adaptive approaches that also reduce greenhouse gas emissions and ultimately, support long-term sustainable community development. An interdepartmental staff team was assembled in the fall of 2007 to provide oversight and strategic advice in guiding the Impacts & Early Adaptation Study.

City of Richmond – Climate Change Response Agenda

# City of Richmond: Sustainability Initiative



**Table 1: City of Richmond Climate Change Action Initiatives**

Action Area		Initiatives	Status
Empower	<b>Supporting Global Action</b> <i>International Government Liaison</i> Support international efforts for reducing GHG emissions globally	Council support for Kyoto Protocol	Complete
		Council endorsement of the Toronto Declaration and Communiqué	Complete
	<b>Supporting Corporate Action</b> <i>Corporate Engagement</i> Raise awareness of climate change impacts, opportunities and solutions throughout the corporation	Sustainability Speaker Series	Ongoing
	<b>Supporting Local Community Action</b> <i>Community Engagement</i> Raise awareness and support community action for reducing energy consumption and GHG emissions	Climate Change Showdown	Ongoing
		Anti-idling School Campaign	Ongoing
		Recycling and Water Conservation Education	Ongoing
		Alternative Transportation Activities (e.g., Island City by Bike, etc.)	Ongoing
		1-Tonne Community Challenge (complete)	Complete
Prevent	<b>Monitor and Measure GHG Emissions</b>	GHG Emission Inventory	Ongoing
	<b>Support Community GHG Emission Reduction</b> <i>Community Servicing</i> Reduce the amount of GHG emissions produced from the consumption and production of potable water. Reduce the amount of GHG emissions produced from landfills.	Water Metering Program	Ongoing
		Use of Trenchless Technology for Installation and Replacement of Infrastructure (water, storm, sanitary, traffic signals & lighting)1	Ongoing
		Curbside Recycling Program	Ongoing
	<b>Sustainable Community Planning</b> Reduce energy consumption and GHG emissions through community planning, transportation-demand management and natural resource protection.	Urban development policies for encouraging compact and complete communities  (OCP policies for reducing urban sprawl, supporting light rail transit, encouraging alternative forms of transportation, bike and greenway planning, etc.)	Ongoing
		Dedication of Richmond Nature Park/Tera Nova Natural Area	Complete
		Tree Protection Bylaw	Ongoing
		ESA Development Permit	Ongoing
		Urban Forest Management Strategy	Complete
		Community Energy Management Program	In Development
	<b>Reduce Corporate GHG Emissions</b> <i>Procurement</i> Reduce energy consumption and GHG emissions from City supplies	Environmental Purchasing Policy/Guidebook	In Use
	<b>Building &amp; Lighting Energy</b> Reduce energy consumption and GHG emissions from City buildings and facilities	High Performance Building Policy	In Use
		Corporate Energy Management Program	Ongoing
		Use of LED Street Lighting	Ongoing
	<b>Green Fleet</b> Reduce City vehicle fleet's GHG emissions	Green Fleet Policy	In Use
		Resolution to Purchase Hybrids/Smart Cars	In Use
		Works Yard Idle-Free Campaign	Complete
		City Car-Pool program	Ongoing
		Use of 5 % Biodiesel	Ongoing



Councillors  
Margot Daykin

Copied & distributed  
to all.

Date: Sept 11, 2008

Initials: CM

SEP 03 2008

Ref: 127830

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His Worship Mayor Malcolm D. Brodie  
City of Richmond  
6911 No. 3 Road  
Richmond, BC V6Y 2C1

Dear Mayor Brodie:

Thank you for your letter of May 26, 2008, addressed to Honourable Gordon Campbell, Premier, regarding your views on the British Columbia Climate Action Charter (Charter). As the Minister of Community Development, responsible for local government issues, I am pleased to respond on behalf of Premier Campbell. I apologize for the delay in responding.

On behalf of the Ministry of Community Development (Ministry), I would like to commend the City of Richmond (City) for developing its Climate Change Response Agenda, specifically with respect to community empowerment, greenhouse gas (GHG) emission reduction, and adaptation planning.

As you may be aware, the Province of British Columbia is working to support local government implementation of the Charter through a number of initiatives, including, but not limited to, the Green Communities Committee working groups, Ministry grant programs, the Sustainability Facilitator Program, the Community Energy and Emissions Inventory (CEEI), the Green Communities Incentive System, and the Green Communities Toolkit. Specifically, the CEEI is a measurement tool being led by the Ministry of Environment. This provincially sponsored initiative will provide local governments with energy and emissions data inventory baselines, ongoing monitoring, and periodic reports to help inform community decision-making. This work is intended to inform planning processes and to guide and monitor local government commitments to GHG targets. If you would like more information on this, or the other mentioned initiatives, please contact Ms. Karen Rothe, Manager of Regional Growth Strategies, by telephone at: 250 356-7064, or by email at: [Karen.Rothe@gov.bc.ca](mailto:Karen.Rothe@gov.bc.ca).

BC  
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City of Richmond  
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SEP 10 2008

MAYOR'S OFFICE

Ministry of Community  
Development

Office of the Minister

Mailing Address:  
PO Box 9056 Stn Prov Govt  
Victoria BC V8W 9E2  
Phone: 250 387-2283  
250 387-4312

GP - 26

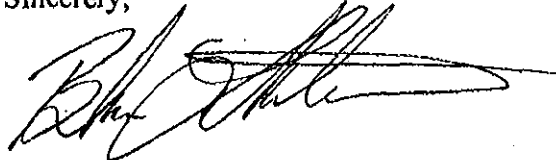
Location:  
Room 133  
Parliament Buildings  
Victoria  
[www.gov.bc.ca/cserv](http://www.gov.bc.ca/cserv)

His Worship Mayor Malcolm D. Brodie  
Page 2

Please accept my congratulations on the steps the City is taking to move toward meeting the spirit and intent of the Charter. The Ministry looks forward to working with the City and other communities in developing innovative solutions to the challenges presented by climate change.

Thank you, again, for taking the time to inform me of your concerns regarding this matter. Your comments are appreciated.

Sincerely,

A handwritten signature in black ink, appearing to read 'Blair Lekstrom', with a long horizontal flourish extending to the right.

Blair Lekstrom  
Minister

pc: Honourable Gordon Campbell  
Premier

Honourable Barry Penner  
Minister of Environment

Honourable Olga Ilich, MLA  
Richmond Centre

Honourable Linda Reid, MLA  
Richmond East

Mr. John Yap, MLA  
Richmond-Steveston

Mr. Graham Whitmarsh  
Head  
Climate Action Secretariat

Mr. Gary MacIsaac  
Executive Director  
Union of British Columbia Municipalities

Ms. Karen Rothe  
Manager of Regional Growth Strategies  
Intergovernmental Relations and Planning Division

## **Proposed Richmond Carbon Responsible Strategy**

### **Guiding Principles**

- *Focus on Sustainability* (advance carbon neutrality as one component strategy within the broader sustainability agenda);
- *Invest Locally* (retain greenhouse gas emission expenditures within the local community);
- *Reduce First, Offset Second* (prioritize greenhouse gas emission reduction, not offsetting to demonstrate strong corporate leadership and reduce long-term corporate costs);
- *Focus on Action, not Accounting* (focus on big value action that yields significant community benefit and minimizes low-value costs associated with greenhouse gas administration); and
- *Be Carbon-Balanced* (direct action towards both greenhouse gas emission reduction and carbon sequestration).

### **Prepare for Carbon Neutrality – Develop a Carbon Responsible Program**

1. Position Carbon Neutrality within the City's Sustainability Framework. (*Complete*)
2. Establish a Carbon Neutral Provisional Fund to support accelerated corporate greenhouse gas emission reduction and other carbon neutral action, including the purchase of offsets if required. (*Complete*)
3. Incorporate considerations of greenhouse gas emissions (growth and reductions) into project submission information as part of the City's Land and Capital process. (*Complete*)
4. Establish a baseline of emissions and identify strategic focus areas to reduce the City's carbon liability to largest extent possible over the next 2 years.
5. Work with the Province to recognize local compensation action initiatives.
6. By end of 2012, establish a Carbon Responsible Program for Council consideration.

### **Be Carbon Neutral – Implement Carbon Responsible Program**

If adopted, the Carbon Responsible Program will manage the following four main steps on an annual basis:

#### **1. Embed**

- review City's Carbon Responsible Program in accordance with City's broader sustainability goals and objectives

#### **2. Measure**

- establish and manage the measurement of the City's greenhouse gas emissions to meet all City commitments (e.g., BC Climate Action Charter, Mexico Pact, etc.)



### 3. **Avoid and Reduce, Strategically**

- develop and realize a corporate greenhouse gas emission reduction target
- collaboratively advance action to avoid future greenhouse gas emissions and reduce the City's existing emissions through a variety of means such as:
  - ~ *corporate capacity building* initiatives (e.g., general climate change and carbon management awareness, low-carbon driving training, etc.)
  - ~ *corporate policy development* (e.g., "no net carbon increase" for new projects, energy standards incorporated into the City's High Performance Building Policy, etc.)
  - ~ *strategic planning* (e.g., trip reduction plans for departments)
  - ~ *strategic project action* (e.g., fleet conversion, IT systems to reduce mobility demand, etc.).
- develop supportive tools and embed the cost of greenhouse gas emissions within relevant City decision-making processes (e.g., carbon calculator embedded within the Land and Capital Model)
- prepare Corporate Energy and Carbon Neutral Action Plan to identify strategic opportunities for integrated corporate energy and emissions reduction initiatives, identify strategic credit generating initiatives and secure carbon rights.
- manage the City's Carbon Neutral Provisional Fund and develop principles, financing mechanisms (e.g., setting up an endowment to provide partial support, etc.) and other tools to support the advancement of strategic greenhouse gas emission reduction action

### 4. **Balance** - invest in local carbon compensation action (sequestering and greenhouse gas emission reduction)

- advance compensation action that directs investments within Richmond
- capture carbon compensation credit from post-2007 and future City investments (e.g., organic recycling program, ecological areas acquisition, etc.) and advance strategic future local carbon compensation action that leverages City programs and supports other City objectives

### 5. **Report and Improve**

- coordinate and manage reporting
- identify opportunities for improvement





# City of Richmond

## Report to Committee

**To:** General Purposes Committee

**Date:** June 1, 2011

**From:** Cecilia Achiam, MCIP, BCSLA  
Interim Director, Sustainability and District Energy  
Senior Program Manager, CPMG, CAO's Office

**File:** 01-0370-01/2011-  
Vol01

**Re:** **Reaching Carbon Neutrality : Energy and Emissions Inventory and  
Recommended Early Action**

### Staff Recommendation

That greenhouse gas emission reduction action in corporate facilities and civic fleet use through the 2012 budget process and the other targeted action as presented in the report titled "Reaching Carbon Neutrality: Energy and Emissions Inventory and Recommended Early Action", dated June 1, 2011, be endorsed.

Cecilia Achiam, MCIP, BCSLA  
Interim Director, Sustainability and District Energy  
Senior Program Manager, CPMG, CAO's Office  
(604-276-4122)

Att. 1

FOR ORIGINATING DEPARTMENT USE ONLY			
<b>ROUTED TO:</b>	<b>CONCURRENCE</b>	<b>CONCURRENCE OF GENERAL MANAGER</b>	
Public Works	Y <input checked="" type="checkbox"/> N <input type="checkbox"/>		
Fire Rescue	Y <input checked="" type="checkbox"/> N <input type="checkbox"/>		
Project Development	Y <input checked="" type="checkbox"/> N <input type="checkbox"/>		
Facilities Services	Y <input checked="" type="checkbox"/> N <input type="checkbox"/>		
Parks	Y <input checked="" type="checkbox"/> N <input type="checkbox"/>		
Finance	Y <input checked="" type="checkbox"/> N <input type="checkbox"/>		
<b>REVIEWED BY TAG</b>	YES <input checked="" type="checkbox"/> NO <input type="checkbox"/>	<b>REVIEWED BY CAO</b>	YES <input checked="" type="checkbox"/> NO <input type="checkbox"/>

## Staff Report

### Origin

The purpose of this report is to present to Council the City's first Corporate Energy and Emissions Inventory. This report also recommends that the City advance targeted action to reduce the City's greenhouse gas emissions. The Inventory and recommended additional early action are an important step towards meeting Council's 2012 carbon neutral commitment. These efforts support the following Council Term Goal:

*Council Term Goal #7: "Sustainability and the Environment – Demonstrate leadership in and significant advancement of the City's agenda for sustainability through the development and implementation of a comprehensive strategy that among other objectives includes incorporating sustainability into our City policies and bylaws".*

### Background

#### Connection to Sustainability Framework

Reducing corporate greenhouse gas emissions and achieving carbon neutrality in civic operations by 2012 is one of Council's sustainability targets in the City's Sustainability Framework. Given the breadth of the sustainability agenda and presence of an infinite number of potential action initiatives, the City's Sustainability Framework facilitates the City in directing resources towards areas of priority. The carbon neutral target is one target within a suite of Council adopted climate change and energy targets that together provide a comprehensive approach to climate change response and the advancement towards more sustainable energy systems.

In general terms, carbon neutrality refers to a net zero greenhouse gas emissions input (commonly referred to as "carbon") into the atmosphere. To achieve carbon neutrality, organizations reduce their greenhouse gas emissions to the largest extent possible and then invest in other action to support carbon sequestering or prevent other greenhouse gas emissions from being emitted that would have occurred if not for the external aid.

#### City's Corporate Energy and Emissions Inventory

This report presents the City's first integrated Corporate Energy and Emissions Inventory (**Attachment 1**). The Inventory provides a profile of corporate energy consumption, energy-related expenditures and greenhouse gas (GHG) emissions from key civic operations.

#### *Purpose and Objectives*

The Corporate Energy and Emissions Inventory (Inventory) supports the City in reducing its corporate greenhouse gas emissions and meeting its carbon neutral commitment by fulfilling the following core objectives:

- it establishes a baseline to measure and report performance;
- it provides a foundation to develop an efficient inventory system; and
- it identifies strategic opportunities for further reducing corporate greenhouse gas emissions.

#### *Inventory Scope*

The City's Inventory was conducted in accordance with protocols established by the Province, FCM (Federation of Canadian Municipalities) and international standards. The Inventory is based on a first

order inventory level which means that it includes the City's major direct greenhouse gas emissions within traditional service areas.

### *Methodology*

As per protocol, the Inventory focuses on the City's traditional service areas within 5 core sectors:

- Buildings
- Fleet
- Outdoor lighting
- Water and wastewater conveyance
- Solid waste.

The first 4 sectors consume energy and generate GHG emissions as a result of that energy consumption. Different sources of energy (e.g., electricity, natural gas, diesel, biodiesel) yield different levels of greenhouse gas emissions from their use. To calculate emissions, the energy used in each area is multiplied by the emission factor attributed to the specific energy source used. GHG emissions are also produced from solid waste as the waste degrades. For solid waste, the amount of solid waste is multiplied by a solid waste emission factor.

### *Main Results*

The City's Corporate Energy and GHG Emissions Inventory identifies the City's efforts to-date, noting that the City of Richmond has:

- "undertaken a wide range of action towards addressing climate change including international policy advocacy, greenhouse gas emission reduction, sustainability community development, early adaptation planning and community outreach"; and
- "adopted a comprehensive climate change response agenda for establishing an overarching strategic approach and ensuring that all initiatives are being pursued as part of an overall plan".

The Inventory provides key information for establishing a baseline for measuring energy, emissions and costs. In 2007, a standard year for establishing greenhouse gas emission baselines, the City of Richmond,

- consumed approximately 270,000 GJ of energy;
- emitted about 10,500 tonnes of greenhouse gas emissions (CO<sub>2</sub>e); and
- expended about \$4,200,000 on energy costs.

Additional Inventory results include:

- Within the sectors assessed, the majority of energy consumption, GHG emissions and energy-related costs (about 70%, 55% and 50%, respectively in 2007) were from civic buildings. Aquatic facilities and ice arenas had the highest energy consumption and GHG emissions of all types of civic facilities<sup>1</sup>.
- City corporate vehicle use was the second major user of energy (17%) and source of GHG emissions (about 17 % and 33%, respectively in 2007). The vast majority of emissions resulted from the use of trucks and vans. Energy consumption and GHG emissions have been relatively constant for City vehicles despite increases in number of assets from 1995-2007.

<sup>1</sup> Three buildings, Watermania, Richmond Ice Centre and Minoru Aquatic Centre, were the largest energy consumers and together accounted for about 30% of corporate GHG emissions in 2007. The City has targeted these buildings in the City's Corporate Energy Retrofit Program and has undertaken major energy efficiency projects during the last 3 years. It is noted that the Richmond Oval is not included in the Inventory as it was constructed post-2007.

38% increase in energy-related costs associated with vehicles during this time period, largely a result of increasing fuel prices.

- The City's outdoor lighting and water and wastewater systems accounted for 15% of the City's total energy consumption but accounted for a small proportion of the City's GHG emissions (3%). Despite asset growth, energy consumption remained relatively constant and significant decreases in GHG emissions<sup>2</sup> occurred in the City's lighting, water and wastewater systems.
- The City's corporate waste generated about 10% of greenhouse emissions in 2007. Emissions were relatively constant over the time period assessed in the Inventory.
- Electricity use has been a significant proportion of the City's energy cost but have contributed a small percentage of the City's GHG emissions (55% and 7%, respectively).

### Analysis

The City provides a diversity of services and programs for the Richmond community, all of which require energy. As the Richmond Community grows, the City's demand for energy increases in response to increasing infrastructure and servicing requirements. The City's energy consumption and GHG emissions have increased over time with expanding services. This growth, however, would have been significantly higher if the City had not invested in its sustainability-based initiatives.

To deliver civic services in a manner that are cost-effective, uses resources responsibly and achieves other sustainability benefits, the City has implemented a number of successful initiatives<sup>3</sup>. Example initiatives include the City's:

- Corporate Recycling Services
- Corporate Energy Retrofit Program
- Corporate Car-Pool Program
- High Performance Building Policy
- Green Fleet Policy.

The City's proactive investments in these and other initiatives have resulted in significant benefits including avoided energy and other resource consumption, avoided GHG emissions and avoided annual operational cost expenditures. These initiatives also mean that the City has a lower carbon footprint and is better prepared to meet its carbon neutral commitment.

The City's Inventory reinforces the need for continued action, especially given that civic services are projected to continue to grow as the Richmond community population increases. The Inventory also showcases the value of strategic-based action. A key consideration is to direct reduction action towards those emissions that are included within the scope of GHG emission inventories. This approach serves to both increase climate protection and avoid additional costs.

The Inventory also identifies which of the sectors included within the scope of the Inventory offer the best potential for achieving cost-effective reductions. Given that the vast majority of corporate energy consumption and GHG emissions generation (85% and 90%, respectively in 2007) occurred within

<sup>2</sup> The decreases in GHG emissions are largely a result of decreases in the GHG emissions factor for electricity that occurred during the time period.

<sup>3</sup> It is noted that this report is focussed on corporate energy and GHG reduction. The City has also advanced a wide range of action to support improved energy use and reduced GHG emissions in the community. Highlight action include the City's land-use policies aimed at creating compact and complete communities and transportation oriented development, the City's bikeway program and other alternative transportation initiatives, and the City's recent district energy initiative.

two areas - civic facility energy use and corporate fleet use - a focused approach which directs investment into these areas present the largest opportunities for achieving cost-effective reductions.

The Inventory also reinforces the need to be strategic in advancing integrated energy and emissions planning and reduction action. A key feature of the City's Inventory is that it includes energy consumption, greenhouse gas emissions and energy expenditure information. The integrated approach means that the City will be able to advance corporate energy sustainability, greenhouse gas emissions reduction and financial sustainability together through a multiple objective-based approach. This is important because, while there are many synergies, reducing consumption, emissions and costs (short and long-term) are not always in alignment<sup>4</sup>. By considering these objectives together, the City will be better able to advance a strategic portfolio of action, one that leverages synergies and enables smart trade-off decision-making.

### *Recommended Action*

The attached Inventory provides an essential step in moving the City towards carbon neutrality. To reduce the City's corporate carbon liability as much as possible for 2012, staff are recommending that Council endorse the following strategic direction and immediate targeted action:

**Strategic Direction** - The City target GHG reduction action in corporate facilities and civic fleet use through the 2012 budget and other corporate decision-making processes.

### **Targeted Action**

- i.. The City identify GHG reduction action initiatives in corporate facilities (proposed and existing) and fleet, and forward opportunities for consideration through the 2012 Land and Capital Process.
- ii. City departments consider trip-reduction planning and other fleet use GHG emissions reduction initiatives in their 2012 operational planning.
- iii. Staff review the City's High Performance Building Policy – City Owned Facilities, Policy 2306 to target reduction of energy and associated GHG emissions and provide recommended amendments for Council's consideration<sup>5</sup>.

### **Financial Impact**

There is no direct financial impact from this report.

The recommended action in this report serves to accelerate greater energy and emissions reduction action by placing more emphasis on these objectives within the City budget process. Specific initiatives, such as an updated High Performance Building Policy, will be brought forward to Council.

<sup>4</sup> For example, actions that reduce corporate electricity consumption are currently supported with strong external incentives. This means that electricity-reduction actions enable the City to achieve immediate operational savings with lower internal cost demands. However, electricity-based improvements yield much smaller greenhouse gas emission and have minimal impact on the City's carbon costs in comparison to action that reduces fossil fuel use. This is because in B.C., electricity is predominately generated through hydroelectricity which has significantly lower carbon content than fossil fuel energy sources.

<sup>5</sup> The Canadian Green Building Council (CaGBC) LEED program, for which the City's "High Performance" building Policy is based, provides various green strategies for achieving an overall performance standard. As such, buildings may meet the overall standard without meeting any specific energy performance objective. The purpose of the proposed review would be to explore merits of establishing specific energy performance targets for new buildings.

## Conclusion

The City has conditionally committed to being carbon neutral in civic operations by 2012. This report presents the City's first integrated energy and emissions inventory. By exploring corporate energy, emissions and costs in an integrated manner, the inventory supports the City to strategically and cost-effectively:

- prepare for meeting its carbon neutral commitment;
- further advance wise corporate energy use; and
- further reduce corporate greenhouse gas emissions.

As an early immediate step, this report recommends that the City seek and advance strategic action initiatives that focus on reducing GHG emissions in civic buildings and fleet use.



Margot Daykin, M.R.M.  
Sustainability Manager, Community Services  
(604-276-4130)  
MD:md



Lea Elliott, M.Sc.  
Environmental Coordinator, Community Services  
(604-247-4661)





# CITY OF **RICHMOND**

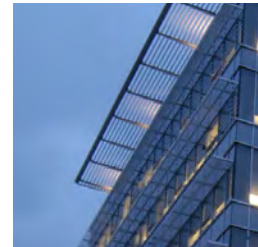


## **CORPORATE GHG EMISSIONS AND ENERGY INVENTORY FOR 1995, 1999, & 2007**





# CORPORATE GHG EMISSIONS AND ENERGY INVENTORY FOR 1995, 1999, & 2007



## Prepared for:

City of Richmond  
6911 No. 3 Road  
Richmond, BC V6Y 2C1



## Prepared by:

Hyla Environmental Services Ltd.  
Port Moody, BC  
(604) 469-2910  
rhaycock@hesltd.ca



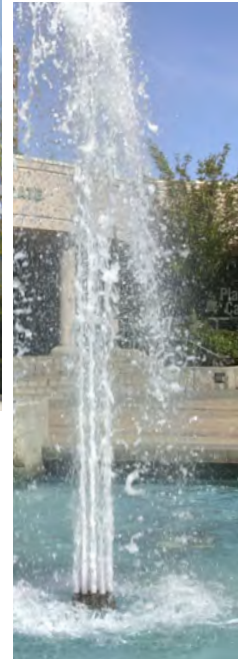
June 2011

### **About Hyla Environmental Services Ltd.**

HES Ltd. specializes in developing corporate and community energy and emissions plans for local government and departments within senior levels of government (regional, provincial, and federal). HES is a leader in this field having completed over 105 corporate energy and GHG emissions inventories and 21 emissions management strategies.

With over 13 years of dedicated experience to greenhouse gas emissions management, HES occupies a leadership position in this discipline and has developed proprietary software– Energy and Emissions Reporting and Monitoring System™ (EEMRS™)– used to support the development of Climate Action Plans. EEMRS™ manages energy consumption and cost data, calculates GHG emissions, develops emissions forecasts, and integrates account-level management to produce accurate, cost effective emissions management strategies. The tables, charts, and figures within this document were produced using EEMRS™.





CITY OF RICHMOND staff are gratefully acknowledged for their efforts in the development of this plan. The Environmental Programs and Sustainability office is acknowledged for coordinating this initiative across all City departments.

Photos provided by Kiyoshi Otsuji from City of Richmond archives.

## ACRONYMS

CO<sub>2</sub> – Carbon Dioxide

CO<sub>2</sub>e– Carbon Dioxide Equivalent

COR – City of Richmond

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

This corporate energy and emissions inventory is the cornerstone document for a greenhouse gas emissions reduction strategy. With an inventory of greenhouse gases completed, the City is well positioned to explore new reduction initiatives, evaluate completed reduction initiatives and develop a credible corporate greenhouse gas (GHG) emissions reduction plan.

In 2007, the City of Richmond civic operations consumed 272,747 GJ of energy, generated 10,454 tonnes CO<sub>2</sub>e at a cost of \$4,158,164 (table E1).

**E1 – 2007 Inventory Summary**

Parameter	2007
Energy Consumption	272,747 GJ
Energy Costs	\$4,158,164
Emissions	10,454 tonnes CO <sub>2</sub> e

From 1995 to 2007, energy consumption and GHG emissions were estimated in 5 sectors: buildings; fleet; outdoor lighting; water and wastewater pumps; and, solid waste. The two major sources of GHG emissions were from City buildings & vehicles, totalling 89 percent of the City's emissions. Emissions from outdoor lighting, wastewater and water infrastructure, and solid waste made up the remaining 11 percent. During this period, GHG emissions increased by 22 percent. Increases in GHG emissions are attributed to the rapid growth the City of Richmond has experienced between 1995 and 2007. The City's growth in emissions have been moderated by decreases in electricity emissions factors over the same time period.

The largest growth in emissions occurred within the City's buildings sector with an increase of 64 percent between 1995 and 2007. GHG emissions from the City's buildings result predominantly from the large amount of natural gas required for process pool water in City pools and space heating in City ice arenas.

The City's vehicle fleet emissions remained relatively stable between 1995 and 2007. GHG emission sources from the City's fleet are predominantly from the operation of gasoline and diesel fuel light, medium and heavy duty trucks, buses and vans.

The City's outdoor lighting, water and wastewater, and solid waste sectors all experienced declines in GHG emissions between 1995 and 2007, due in part to decreases in the electricity emission factor.

Apart from the environmental imperative of mitigating climate change impacts, the trend in rising energy costs necessitates aggressive reduction measures.



## Recommendations

**National Recognition from FCM/ICLEI Partners for Climate Protection.** Once approved by Council, forward this report to the PCP Secretariat for recognition of the corporate stream of Milestone One of the PCP.

**Energy and Emissions Tracking.** Continue to track corporate energy and greenhouse gas emissions on an annual basis. Fire Services should track fuel consumption for individual vehicles to be consistent with the manner in which all other vehicle fuel consumption is tracked in the City. The accounts listed in the unidentified section of the inventory should be identified. Buildings that have been excluded from the inventory (Appendix IV) should be reviewed. The City should consider an audit of solid waste bins at corporate facilities and parks to determine the volume of bins at the time of pick up and possibly amend the mass of solid waste reported herein.

**Prepare for Aggressive, Emerging Protocols.** Emerging protocols are more comprehensive than current protocols and the City should begin to track all emissions sources as described herein.

**Corporate and Community Energy and Emissions Planning.** Develop a corporate and community energy and emissions strategic plan.

**GHG Emissions Reduction.** Focus initial reduction action on GHG emissions from natural gas used for space heating in the City's buildings, and gasoline and diesel fuel consumed by the City's vehicles.

## 1. INTRODUCTION

This report presents a tabulation of anthropogenic greenhouse gas emissions generated by the City of Richmond operations in the years 1995, 1999, and 2007. The City generates emissions through the use of fossil fuels in transportation; the consumption of electricity and natural gas energy in buildings; outdoor lighting; water and wastewater infrastructure; and, the release of methane gas from decomposing waste produced by City operations.

The City of Richmond has demonstrated a commitment to addressing issues of climate change. This commitment includes policies and programs relating to sustainable community development, energy efficiency and conservation as well as GHG emissions reductions. Establishing a current inventory of energy consumption and GHG emissions will support ongoing energy conservation and emissions reduction strategies.

Hyla Environmental Services Ltd. (HES) was hired to develop an energy and emissions inventory, and corresponding report. City staff provided the text and graphics in sections 1.1, 1.2, and 1.3.

### Report Purpose

This report serves to provide the emissions profile, or carbon footprint, for the City of Richmond operations. By providing detailed information on corporate emission sources (i.e. emissions from energy use in buildings, fleet, lighting, pumps, and emissions from solid waste assimilation) the City will be poised to develop further targeted greenhouse gas emission reduction action. Further, the inventory enables the City to meet one of its commitments under the Provincial Climate Change Action Charter<sup>1</sup> and details energy use and cost from corporate emission sources thereby identifying opportunities to reduce energy costs.

### Report Structure

This inventory report presents the emissions inventory in four sections as follows:

- Section 1 provides the introduction, local context, and background information on global climate change and GHGs;
- Section 2 explains what a corporate inventory is and provides a description of the inventory protocol and methodology used in this report;
- Section 3 presents emission inventory results for 1995, 1999 and 2007 and illustrates major trends;
- Section 4 summarizes the major findings and provides recommendations for future inventories; and,
- Appendices provide detailed inventory information for the three inventory years.



“The City of Richmond has undertaken a wide range of action towards addressing climate change, including international policy advocacy, greenhouse gas (GHG) emission reduction, sustainable community development, early adaptation planning and community outreach. In the Fall of 2007, the City of Richmond adopted a comprehensive climate change Response Agenda for establishing an over arching strategic approach and ensuring that all initiatives are being pursued as part of an overall plan.”

- March 25, 2008 Report to Committee

<sup>1</sup> In the Spring of 2008, the City of Richmond signed the Provincial Climate Change Action Charter. This Charter seeks voluntary commitment from municipalities to achieve 3 goals: **a.** Become carbon neutral in respect to their own operations by 2012 **b.** Measure and report their community's greenhouse gas emissions profile **c.** Create a complete, compact, more energy efficient community.

## IPCC

Established by the United Nations Environment Programme (UNEP) and the World Meteorological Organization (WMO), the Intergovernmental Panel on Climate Change (IPCC) provides the world with a clear scientific view on the current state of climate change and its potential environmental and socio-economic consequences.



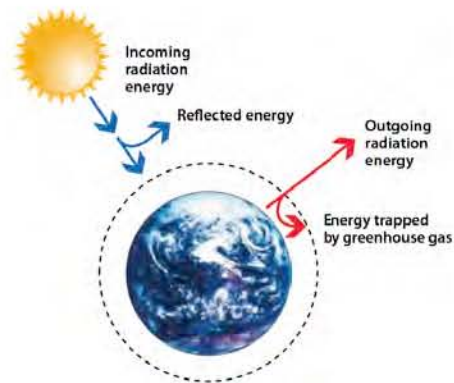
## 1.1 – Understanding Climate Change and Greenhouse Gas Emissions

### What Is Climate Change?

Climate change is a term used to describe the climatic impact of increased warming of the Earth's surface as a result of the accumulation of greenhouse gases.

Greenhouse gases essentially form a blanket over the earth's atmosphere, trapping the sun's energy near the earth's surface (figure 1.1). Without greenhouse gases, the sun's energy would escape and temperatures on earth would be too cold to support life as we know it. Burning fossil fuels and other human activities have significantly increased the concentrations of greenhouse gases in the atmosphere, causing it to retain more energy than it would otherwise retain naturally and raising global temperatures.

**Figure 1.1 – The Greenhouse Effect<sup>2</sup>**



From burning fossil fuels in cars and power plants, to the off-gassing of decomposing solid waste in landfills, humans have dramatically increased the concentration of GHGs above natural levels, effectively augmenting the naturally occurring greenhouse effect. The International Panel on Climate Change (IPCC) predicts that the mean global surface temperature will rise by 0.2°C a decade for the next two decades and will increase approximately 1.1-6.4°C by the end of the century depending on the levels GHG reductions achieved.

### Potential Impacts of Climate Change

An increase of a few degrees may seem inconsequential however such small shifts represent major changes to the earth's energy cycle and as a consequence major changes in the earth's climate.

According to the IPCC, the leading body for climate change assessment, there is unequivocal evidence that our global climate system is warming and the effects are already being experienced<sup>3</sup>.

Climate change impacts, that are already being felt, include:

- rising average air and ocean temperatures;
- rising sea levels and decreased snowpacks;
- increased numbers of heat waves and droughts;
- increased number of extreme precipitation events, leading to increased flood risks;

<sup>2</sup> BC Climate Change Action Plan – The Challenge p. 6

<sup>3</sup> Intergovernmental Panel on Climate Change. Climate Change 2007: Synthesis Report. Summary for Policy makers.

- extinction of up to 30% of plants and animals globally; and,
- decreased global food production.

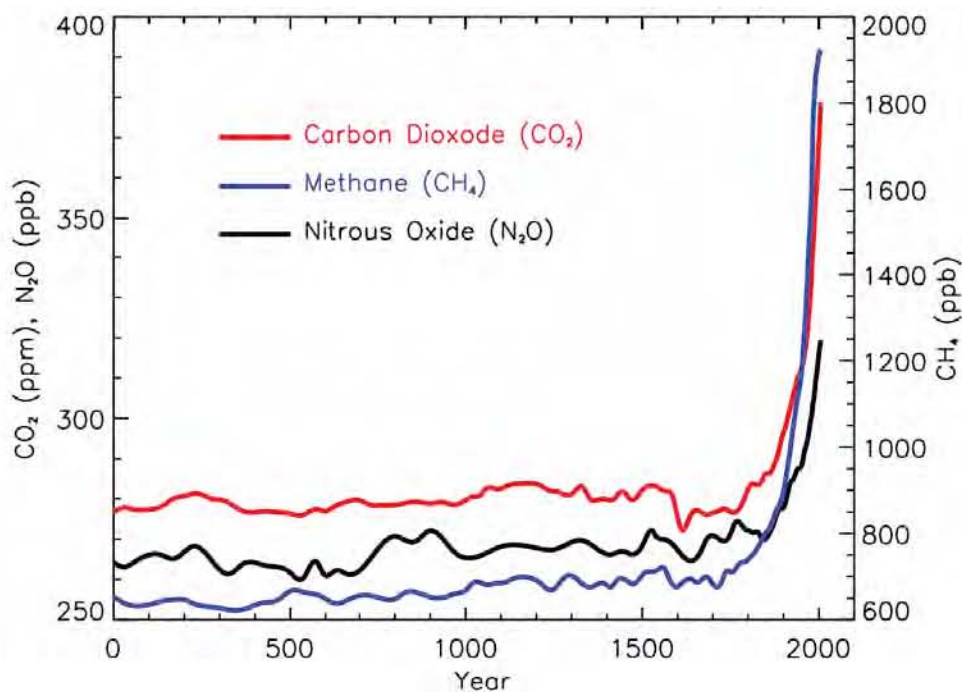
Recent examples of extreme weather such as heat waves and flooding in Europe, increased hurricane intensity in the US, drought and forest fires in the Okanagan, ice storms in Central Canada and drought on the Canadian Prairies provide increasing evidence of changes in the climate. In coastal BC, rising temperatures of river waters, including the Fraser River, have increased the mortality rate of migrating Salmon with serious implications for the coastal fishery. In addition sea levels have risen in Victoria, Vancouver and Prince George over the past 50 years and are expected to rise by 9 to 88 cm over the next century. Rising sea levels pose a serious threat to low lying municipalities such as Richmond.

## 1.2 – Understanding Greenhouse Gas Emissions

### What are Greenhouse Gases?

The primary greenhouse gases in the earth's atmosphere are water vapour ( $H_2O$ ), carbon dioxide ( $CO_2$ ), methane ( $CH_4$ ), nitrous oxide ( $N_2O$ ) and ozone ( $O_3$ ). These greenhouse gases occur naturally and are produced from human activities. There are also a number of entirely human made greenhouse gases, such as halocarbons. Around the year 1750, atmospheric concentrations of long-lived greenhouse gases,  $CO_2$ ,  $CH_4$  and  $N_2O$  began to increase. This coincides with human activities in the industrial era and is in contrast to the relative stability of these gases in the 1750 years analyzed previous to the industrial era (figure 1.2).

Figure 1.2 – Concentrations of Greenhouse Gases from 0 to 2005<sup>4</sup>



Carbon dioxide is released in all combustion reactions. Fossil fuel consumption for transportation, power generation, heating, and industrial activity accounts for the vast majority of anthropogenic  $CO_2$  emissions,  $NH_4$  results from the decomposition of organic material as well as from natural gas.  $N_2O$  is an additive in some fuels and aerosols and is also a by-product of agricultural fertilizer use. Halocarbons such as Hydrofluorocarbons (HFCs), Perfluorocarbons (PFCs), and Sulfur Hexafluoride ( $SF_6$ ) have a wide variety of industrial uses including as refrigerants, insulation material, fire suppressants.

<sup>4</sup> <http://www.ipcc.ch/pdf/assessment-report/ar4/wg1/ar4-wg1-chapter2.pdf>



Not all GHGs are created equal, some gasses have a greater ability to trap heat than other gases. Nitrous oxide, for example, has a warming potential that is 310 times greater than that of CO<sub>2</sub> (see table 1.1). To simplify presenting GHG emissions data all gasses have been converted to CO<sub>2</sub> equivalents (CO<sub>2</sub>e), a standardized measure of a gas's warming potential relative to carbon dioxide. So one tonne of Nitrous oxide emissions is equivalent to 310 tonnes of CO<sub>2</sub>e.

**Table 1.1 – Global Warming Potentials**

GHG	Source	GWP*
CO <sub>2</sub>	Fossil Fuels, Deforestation, Electricity Consumption	1
CH <sub>4</sub>	Natural Gas, Hydro Power, Landfills, Livestock	21
N <sub>2</sub> O	Fossil Fuels, Fertilizers, Aerosols	310
HFCs	Refrigeration, Fire suppression, Industry	12-11,700
PFCs	Refrigeration, Fire suppression, Industry	6,500-9,200
SF <sub>6</sub>	Industry, Insulation	23,900

\*GWP= Global Warming Potential as compared to CO<sub>2</sub>

The impact of a greenhouse gas depends on its concentration, the amount of the sun's energy it absorbs (known as its warming potential) and its lifetime in the atmosphere. CO<sub>2</sub> increases have caused the largest influence on the Earth's warming since the industrial era. This is related to CO<sub>2</sub> being a long-lived gas in the atmosphere and its presence in high concentrations. From 1970 to 2004, the annual global emissions of CO<sub>2</sub> have almost doubled.

### British Columbia Sources of GHG Emissions

In British Columbia, approximately 80% of all GHG emissions are from the use and production of energy. This includes energy to produce fossil fuels, energy used in transportation, energy to heat our homes and businesses, and energy use in industrial activities. The majority of these emissions result from transportation (table 1.2; figure 1.3).

Non-energy sources, including emissions from industrial processes, agricultural processes, waste assimilation and forest loss, make up the remaining 20 percent of BC's GHG emissions.

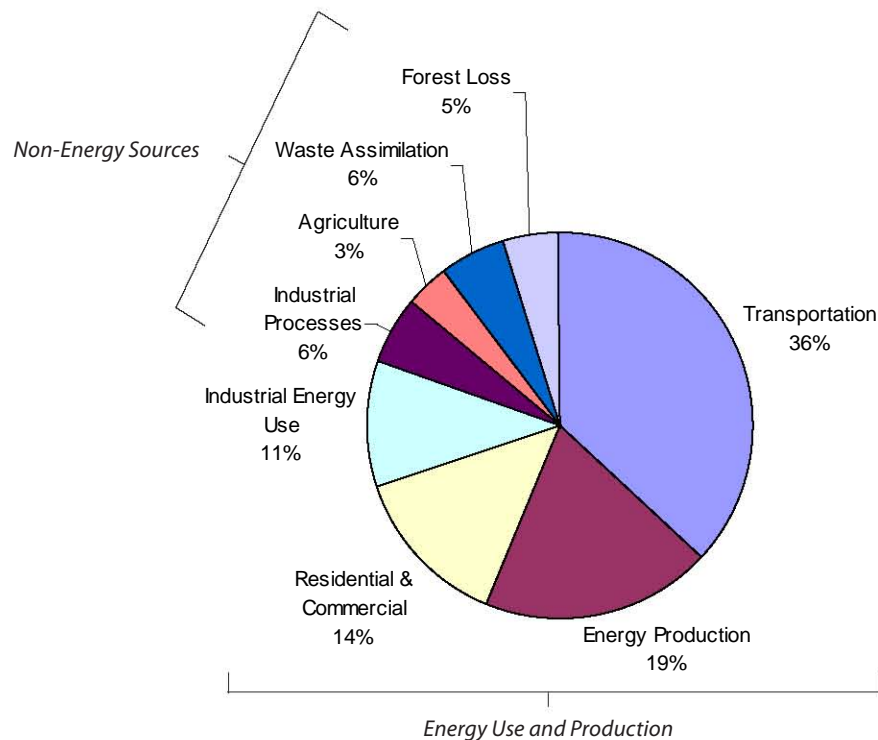
In British Columbia the majority of electrical power generation is from hydroelectric dams. While dams do not directly generate GHGs in their turbines, the large water reservoirs required for power generation do create significant amounts of decaying vegetation as water levels rise and fall, resulting in the release of methane gas. In addition to hydroelectric power generation, a portion of local energy demands are met by natural gas burning power plants such as Burrard Thermal as well as fuel used for the heating and maintenance of facilities. The use of gasoline and diesel fuel in municipal vehicle fleets is another significant source of GHG emissions. Solid waste produced by municipal operations that ends up in landfills produces methane gas and is also a significant source of GHGs.



**Table 1.2 – Sources of GHG Emissions**

Sectors		Description
Energy Use and Production	Transportation	Transportation of people, materials and goods, including fossil fuel transport
	Energy Production	Production of fossil fuels, including extraction and refining
	Residential & Commercial	Production of electricity and heat in thermal power plants, private sector, institutions and homes (stationary)
	Industrial Energy Use	Energy use in manufacturing, construction, agriculture and forestry (stationary)
Other GHG Emissions	Industrial Processes	GHG emissions from industrial process (e.g. lime production, metal production, use of solvents, use of propellants)
	Agriculture Processes	GHG emissions from agriculture processes (e.g. enteric fermentation, manure management, agricultural soils)
	Waste Assimilation	GHG emissions from landfills, wastewater handling and waste incineration
	Forest Loss	GHG emissions from forest loss (re-forestation has been accounted for)

**Figure 1.3 – Sources of GHG Emissions**



### Local Benefits of Reducing GHG Emissions

Although the co-benefits of reducing energy use and greenhouse gases are varied and dependent upon the manner in which energy is consumed, a managed approach to implementation of reduction measures will have positive effects on air pollution, job creation, and energy expenditures.



For local government, reducing operating costs, improving public transit and traffic mobility, enhancing open spaces, improving livability and promoting local economic development are additional co-benefits when implementing greenhouse gas emission action plans. Many of the strategies that reduce greenhouse gas emissions affect other cost and livability factors throughout the community at large. For example, less money spent on electricity and fuel costs translates into more disposable income available to the local economy and potentially lower tax increases.

Reducing greenhouse gas emissions has the additional benefit of reducing particulate matter, nitrous oxides, sulphur oxides and volatile organic compounds—all common air contaminants that contribute to the degradation of air quality.

### **1.3 – City of Richmond Context**

Located north of the Fraser River, the City of Richmond spans an area of 129 square kilometers and is home to approximately 174,000 residents (figure 1.4).

**Figure 1.4 – Local Context for Richmond, British Columbia**



In 2006, Richmond was the fourth fastest growing community in Metro Vancouver with a population growth rate of 6.2% from 2001-2006. The City has also experienced a boom of new construction with the value of new construction permits reaching \$575 million in 2007.

Richmond has over 90 parks that total approximately 1,400 acres in area and an additional 200 acres in a recreational trail system plus a wide variety of recreational amenities, including pools, arenas, community centres, tennis courts, playgrounds, picnic areas, golf courses, lacrosse boxes, running tracks and playing fields. The City also maintains cultural facilities including libraries, a performing arts theatre, art gallery, arts centre, museums, archives and heritage sites. The energy used to operate these facilities make up a large portion of the Corporate Energy and Emissions Inventory.

### **City of Richmond Climate Change Program**

The City of Richmond has undertaken a wide range of action towards addressing climate change, including international policy advocacy, GHG emission reduction, sustainable community development, early adaptation planning and community outreach. In the Fall of 2007, the City of Richmond adopted a comprehensive Climate Change Response Agenda for establishing an over arching strategic approach and ensuring that all initiatives are being pursued as part of an overall plan.

This agenda is based on pursuing initiatives concurrently under 3 pillars of action:

**Empower** - increase corporate and community capacity for addressing climate change

**Prevent** - reduce greenhouse gas (GHG) emissions from municipal operations and the broader Richmond community

**Prepare** - implement strategies for adapting to unavoidable changes.

## City of Richmond Reduction Commitments

### Partners for Climate Protection Program

The Partners for Climate Protection (PCP) is an umbrella initiative that fosters municipal participation in greenhouse gas emission reduction initiatives and overall sustainability. The City of Richmond became a member of the PCP in 2001. 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 PCP make a voluntary commitment to complete five milestones (see inset, and <http://www.sustainablecommunities.fcm.ca>). Although this milestone framework will not change, GHG inventories are becoming more comprehensive in scope.

### Climate Action Charter

The province is taking a national leadership role on climate change with the May 2008 introduction of the Climate Action Charter. The Climate Action Charter is a voluntary commitment by municipalities to measure and report community's greenhouse gas emissions, work to create compact, more energy efficient communities, and to become carbon neutral in corporate operations by 2012.

The City of Richmond is one of 155 BC municipalities to date to have signed the Charter and, as a result, has pledged to monitor community emissions while working towards carbon neutrality in their own operations. The Climate Action Charter recognizes the need to take action on climate change and reduce greenhouse gas emissions. It also recognizes the important role the Provincial Government and Local Governments can play in affecting change.

### Bill 27

The Province of BC's new climate action legislation, Bill 27, requires local governments to incorporate community greenhouse gas emissions (GHG) reduction target and policies and actions to achieve these targets into their Official Community Plans by May 2010. These targets can be achieved through a range of actions including smarter designs for our homes and neighbourhoods and more energy efficient methods of travel.

### 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.



### Inventory Sector Examples:

#### Buildings

- City Hall
- Library
- Park Washroom

#### Outdoor Lighting

- Streetlights
- Traffic Signals
- Playing Field Lights

#### Water and Wastewater

- Potable Water Pumps
- Sanitary Sewer Pumps
- Storm Sewer Pumps

#### Vehicle Fleet

- Passenger Vehicles
- Trucks, Sweepers, Packers

#### Corporate Solid Waste

### Emissions Sources Examples:

Electricity

Natural Gas

Gasoline

Diesel Fuel

Methane from solid waste

## 2. CONDUCTING A CORPORATE GREENHOUSE GAS EMISSIONS INVENTORY

### 2.1 – Inventory Development Process

The Federation of Canadian Municipalities provides a protocol document, which guides the development of inventories for the PCP<sup>1</sup>. By developing common conventions and a standardized approach, protocols make it easier for PCP members to fulfill their commitments to the program.

An effective program to reduce greenhouse gas emissions requires an inventory of GHG emissions, which represents local governments' starting point from which progress can be measured.

The inventory for the City's operations provides an analysis of all its activities and operations in the context of energy consumption and related GHG emissions. Detailed inventory data is provided for 2007 and a summary of inventory data for 1995 and 1999 is included for comparison.

Emissions data is collated by five sectors: buildings, outdoor lighting, water and wastewater, fleet vehicles, and solid waste generated at City facilities (see inset). Emissions are also evaluated by source. 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.

Review by sector and source allows for an analysis of the activity and, energy and non-energy sources of GHG emissions. This information forms the data from which targets can be set and progress can be measured.

### 2.2 – Inventory Protocol

The Partners for Climate Protection is Canada's implementation of ICLEI–Local Governments for Sustainability - Cities for Climate Protection (CCP). Although the FCM released a guidance document for PCP inventories in the spring of 2008<sup>2</sup>, new guidance for local government corporate and community inventories are emerging from ICLEI USA<sup>3</sup>. These emerging protocols are more comprehensive than the existing PCP protocol since the latter has historically focussed on GHG emissions that were policy relevant to local government. For example, corporate inventories have focussed on buildings and engineering assets owned and operated by local governments. Other emissions sources that have not been tracked in the past include presumably insignificant sources such as emissions from sanitary sewer collection pipes, and fugitive emissions from refrigeration systems.

New protocols will also add other GHG emission sources such as emissions from employee travel on business, employee commute, contracted services such as solid waste collection and road building, and upstream and downstream emissions from the purchase of supplies and materials. Although it will not be mandatory to report these emissions, local government will be encouraged to begin to set up internal tracking systems to be able to develop comprehensive, data rich GHG emissions inventories.

1 FCM (2008), Developing Greenhouse Gas Emissions and Energy Consumption Inventories: A Standards and Guidance Document for Canadian Municipalities. Federation of Canadian Municipalities: Ottawa. 59pp

2 ibid

3 Local Government Operations Protocol for the Quantification of Greenhouse Gas Emissions Inventories. Version 1.0. September 2008. California Air Resources Board, California Climate Action Registry, ICLEI - Local Governments for Sustainability, The Climate Registry. 188pp

### 2.3 – Inventory Methodology

BC Hydro and several natural gas distribution companies provided consumption data and costs for the consumption of electricity and natural gas. Vehicle fleet data was compiled from internal City records while solid waste generated from operations was derived from the volume of bins at City facilities and the frequency of pick-up of the bins. City staff from all sectors of its operations assisted with the collection of energy consumption data.

Data was imported into HES' Energy & Emissions Monitoring and Reporting System™ (EEMRS™). The emissions calculator within this software conforms to the methods described in the International Panel on Climate Change Greenhouse Gas Inventory Reference Manual<sup>4</sup> and the principles provided in the International Standards Organization (ISO) Draft International Standard for Greenhouse Gases<sup>5</sup>. Emissions coefficients are listed in table 2.3 below. The emissions factor for electricity was provided by BC Hydro in 2008<sup>6</sup>. At the time, the emissions factor provided was 22 tonnes CO<sub>2</sub>e/GWh (table 2.3).

**Table 2.3 – Emissions Factors and Coefficients**

Fuel Type	Units	Emissions Coefficient			Emission Factor
		CO <sub>2</sub>	CH <sub>4</sub>	N <sub>2</sub> O	CO <sub>2</sub> e
Electricity	tonnes/GWh				22 <sup>†</sup>
Natural Gas	kg/m <sup>3</sup>	1.891	0.000037	0.000035	
Gasoline	kg/L	2.289	0.000068-0.0014*	0.00005-0.00016*	
Diesel Fuel	kg/L	2.663	0.000051-0.00012*	0.000082-0.0011*	
Biodiesel 5		-3.92 % <sup>#</sup>	-3.92 % <sup>#</sup>	-3.92 % <sup>#</sup>	
Propane	kg/L	1.51	0.00064	0.000028	
Global Warming Potential		1	21	310	
† GHG emissions factor for electricity as reported by BC Hydro at the time of preparation of the report. This factor may have been amended since the initial development of this report.					
* assigned according to emissions technology of the vehicle					
# % relative to Diesel Fuel					

Energy and emissions are calculated at the account level (e.g., an asset that consumes energy, such as a building, pumping facility, or individual vehicle represents an account in the software). A detailed summary of the inventory is presented in Appendix I.

4 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.

5 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.

6 (<http://www.bchydro.com/info/reports/reports52594.html>)

### 3. CORPORATE INVENTORY

Section three presents an overview of historical data from 1995 and 1999 followed by a more detailed analysis of the 2007 corporate inventory. Tables comparing consumption, costs and emissions in each of these years are presented in Section three. Tables 3.1, 3.2 and 3.3 illustrate energy consumption, costs and emissions for 1995, 1999 and 2007. See Appendices II and III for detailed inventories for 1995 and 1999.

**Table 3.1 – Energy, Costs, and Emissions by Sector (1995)**

Sector	Total Emissions (CO <sub>2</sub> e tonnes)	Total Energy (GJ)	Total Cost	Percent Emissions	Percent Energy	Percent Costs
Buildings	3,572	110,650	\$1,426,068	42%	57%	50%
Lighting	353	20,849	\$345,417	4%	11%	12%
Water & Wastewater	250	14,771	\$341,036	3%	8%	12%
Vehicle Fleet	3,368	47,055	\$720,131	39%	24%	25%
Solid Waste	988			12%	0%	
<b>Total</b>	<b>8,532</b>	<b>193,326</b>	<b>\$2,832,653</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>

**Table 3.2 – Energy, Costs, and Emissions by Sector (1999)**

Sector	Total Emissions (CO <sub>2</sub> e tonnes)	Total Energy (GJ)	Total Cost	Percent Emissions	Percent Energy	Percent Costs
Buildings	4,319	137,731	\$1,831,237	49%	61%	56%
Lighting	378	26,693	\$431,260	4%	12%	13%
Water & Wastewater	243	17,184	\$399,107	3%	8%	12%
Vehicle Fleet	3,124	44,227	\$602,521	35%	20%	18%
Solid Waste	761			9%	0%	
<b>Total</b>	<b>8,825</b>	<b>225,835</b>	<b>\$3,264,125</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>

**Table 3.3 – Energy, Costs, and Emissions by Sector (2007)**

Sector	Total Emissions (CO <sub>2</sub> e tonnes)	Total Energy (GJ)	Total Cost	Percent Emissions	Percent Energy	Percent Costs
Buildings	5,845	182,729	\$2,175,260	56%	67%	52%
Lighting	168	27,450	\$541,704	2%	10%	13%
Water & Wastewater	91	14,902	\$446,064	1%	5%	11%
Vehicle Fleet	3,417	47,533	\$992,020	33%	17%	24%
Solid Waste	924			9%	0%	
Unidentified	1	132	\$3,117	0%	0%	0%
<b>Total</b>	<b>10,445</b>	<b>272,747</b>	<b>\$4,158,164</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>

### 3.1 – Energy Consumption and GHG Emissions Trends 1995 - 2007

#### GHG Emissions

Using available historical data from 1995, 1999, and 2007, table 3.1 presents GHG emissions trends for the City. In 1995, the City's total greenhouse gas emissions were 8,532 tonnes CO<sub>2</sub>e. By 1999 the City's total greenhouse gas emissions were 8,825 tonnes CO<sub>2</sub>e, an increase of three percent from 1995. By 2007, the City of Richmond's greenhouse gas emissions had grown to 10,445 tonnes CO<sub>2</sub>e, an increase of 18 percent from 1999 and 22 percent from 1995 (figure 3.1; table 3.4). Complete summary inventories are presented in the Appendices for the three inventory years.

Figure 3.1 – Total Emissions Trends (1995 - 2007)

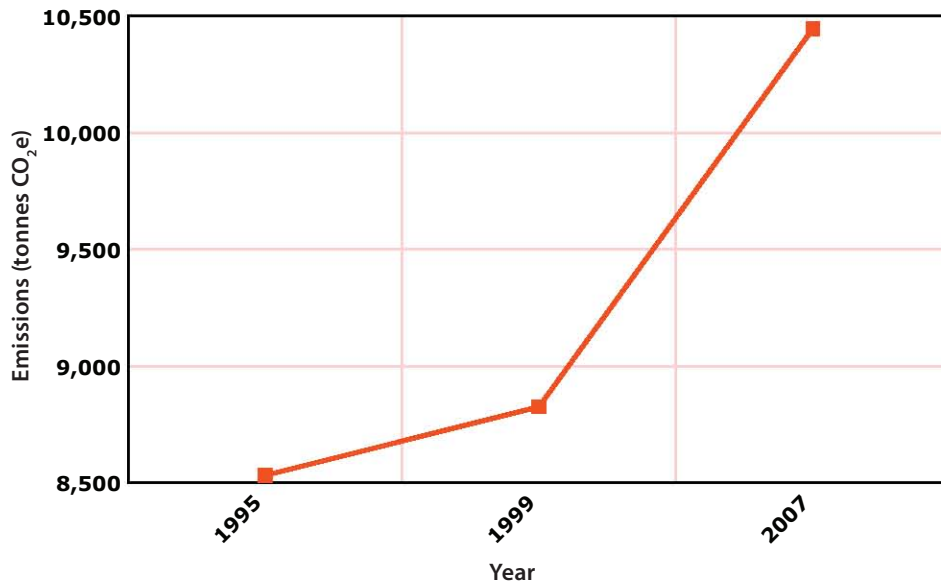
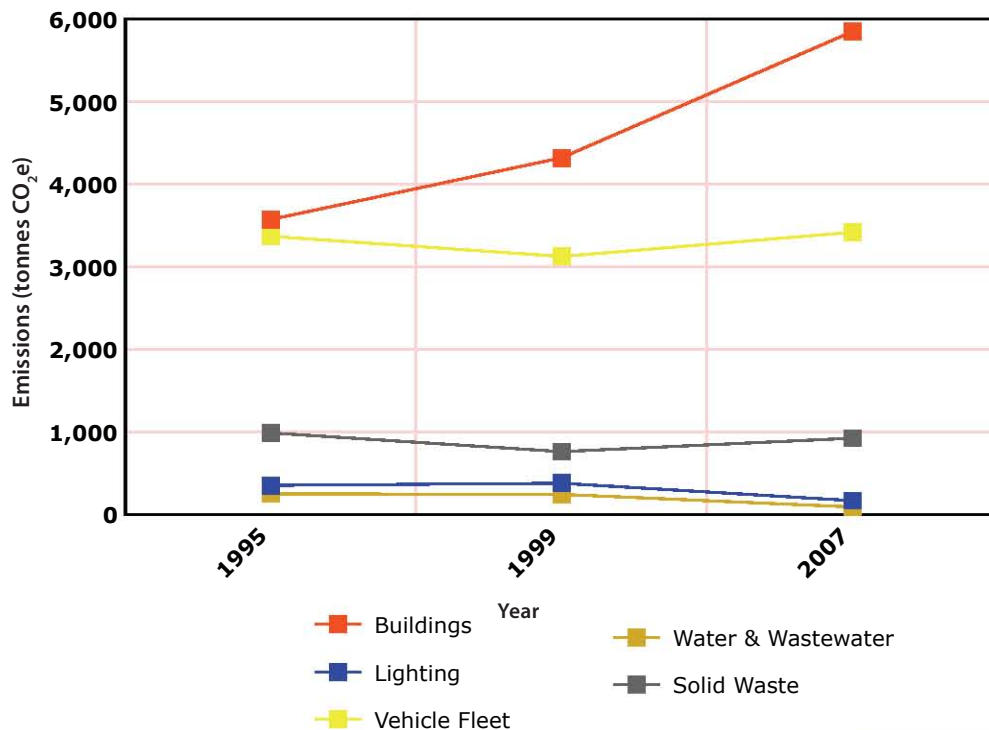


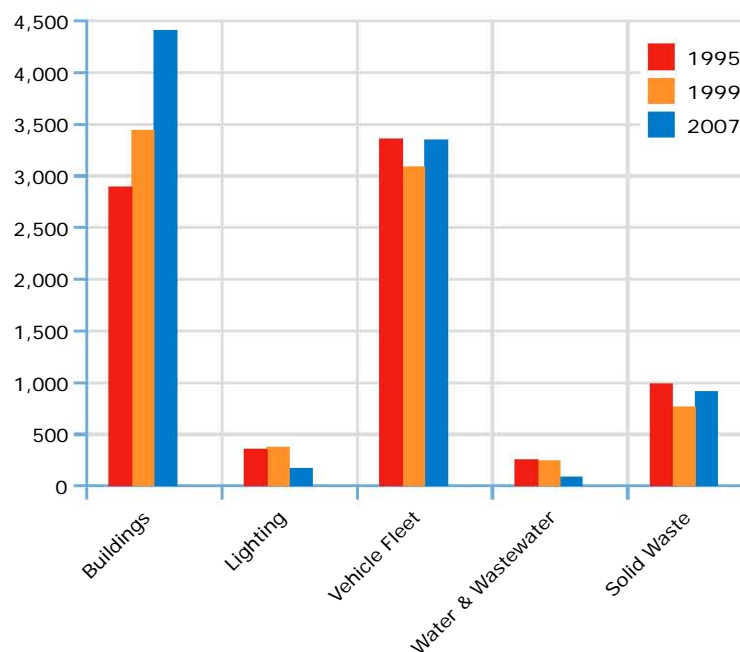
Figure 3.2 – Sector Emissions Trends (1995 - 2007)





Between 1995 and 2007 overall emissions increased significantly in the buildings sector (64 percent). Outdoor lighting emissions and water & wastewater emissions decreased by 52 percent and 64 percent respectively between 1995 and 2007. Solid waste emissions decreased by six percent between 1995 and 2007. See figures 3.2 and 3.3 for two graphical representation of changes in the City's GHG emissions by sector. The two major GHG emission sources are buildings and fleet.

**Figure 3.3 – GHG Emissions (tonnes CO<sub>2</sub>e) by Sector (1995 - 2007)**



**Table 3.4 – Emissions by Sector (1995-2007)**

Sector	Energy Type	Emissions CO <sub>2</sub> e (t)		Emissions CO <sub>2</sub> e (t)		Emissions CO <sub>2</sub> e (t)		Percent Change		
		1995		1999		2007		95-99	99-07	95-07
Buildings	Elect	1,034	3,572	1,044	4,318	475	5,845	21%	35%	64%
	Nat Gas	2,537		3,274		5,370				
Outdoor Lighting	Elect	353	353	378	378	168	168	7%	-56%	-52%
Water & Wastewater	Elect	250	250	243	243	91	91	-3%	-63%	-64%
Vehicle Fleet	Biodiesel B5	-	-	-	-	1,135				
	Diesel	1,112		1,109		251				
	Gas	2,209	3,368	1,869	3,124	2,030	3,416	-7%	9%	1%
	CNG	47		146						
Solid Waste	-	988	988	761	761	924	924	-23%	21%	-6%
Unidentified	Elect	-	-	-	-	1	1	-	-	-
<b>Total</b>		<b>8,532</b>		<b>8,825</b>		<b>10,445</b>		<b>3%</b>	<b>18%</b>	<b>22%</b>

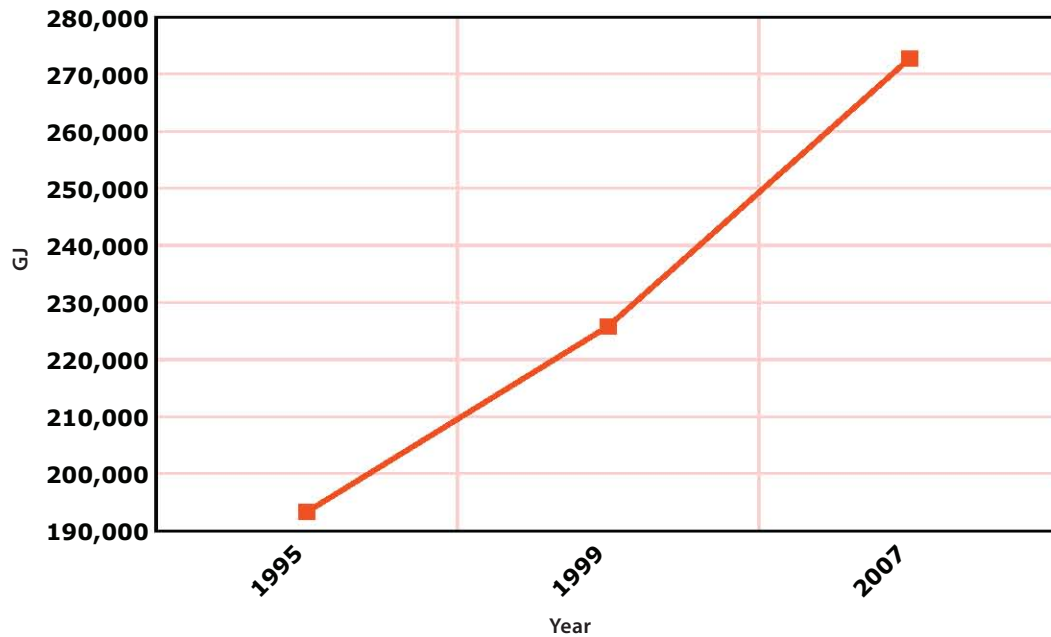


## Energy Consumption and Cost Comparison

### Consumption

The City of Richmond has steadily increased energy consumption in the years between 1995 and 2007 as shown in figure 3.4 and table 3.5. Total energy consumption increased by 41 percent between 1995 and 2007.

Figure 3.4 – Total Energy Consumption Trends (1995-2007)



The largest increase in consumption occurred in the City's buildings sector, rising 65 percent from 1995 to 2007. Energy consumption for outdoor lighting increased by 32 percent between 1995 and 2007. Water & wastewater consumption remained stable with a slight increase of one percent.

Overall vehicle consumption remained stable between 1995 and 2007 with a increase of one percent (table 3.5). See figures 3.5 and 3.6 for a graphical representation in changes in energy consumption between 1995 and 2007.

Figure 3.5 – Sector Energy Consumption Trends (1995-2007)

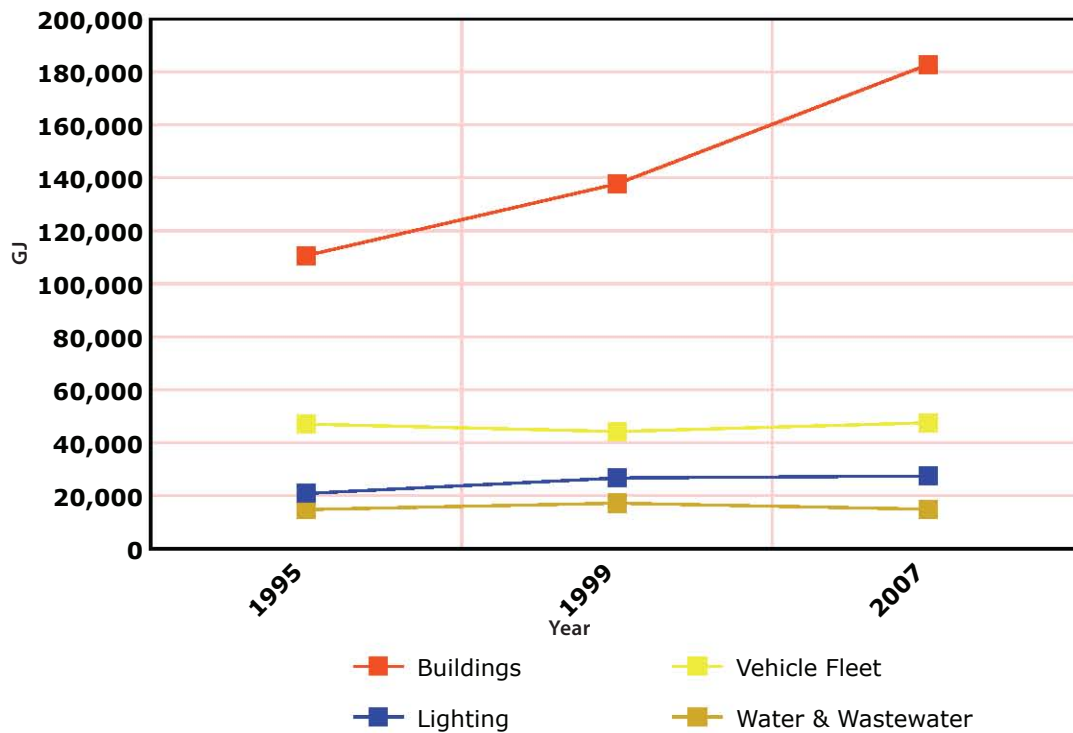
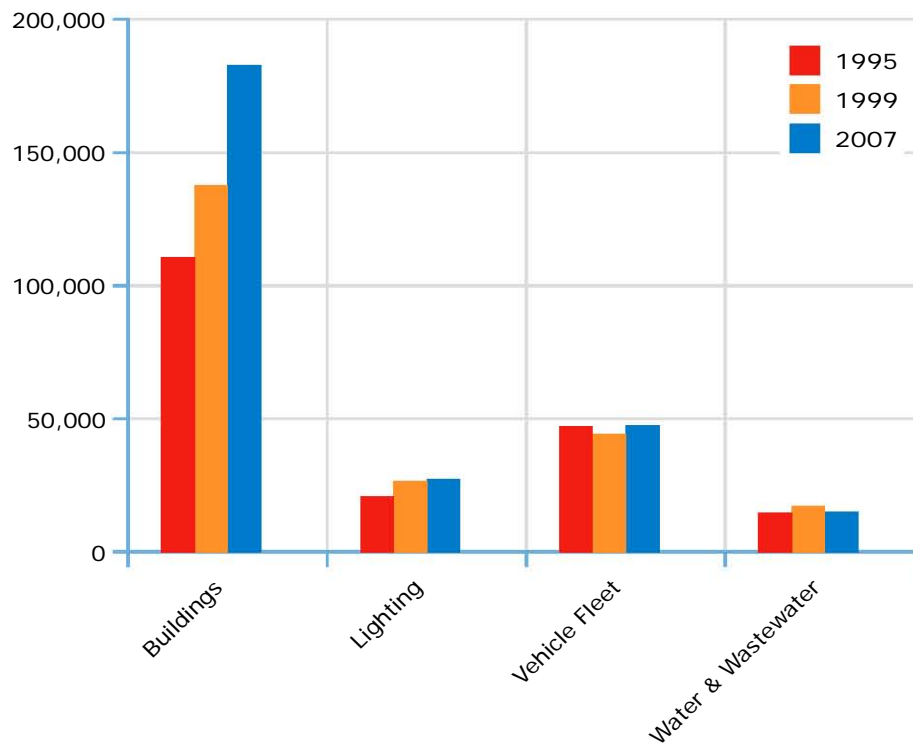


Figure 3.6 – Energy Consumption by Sector (1995-2007)



**Table 3.5 – Energy Consumption by Sector (1995-2007)**

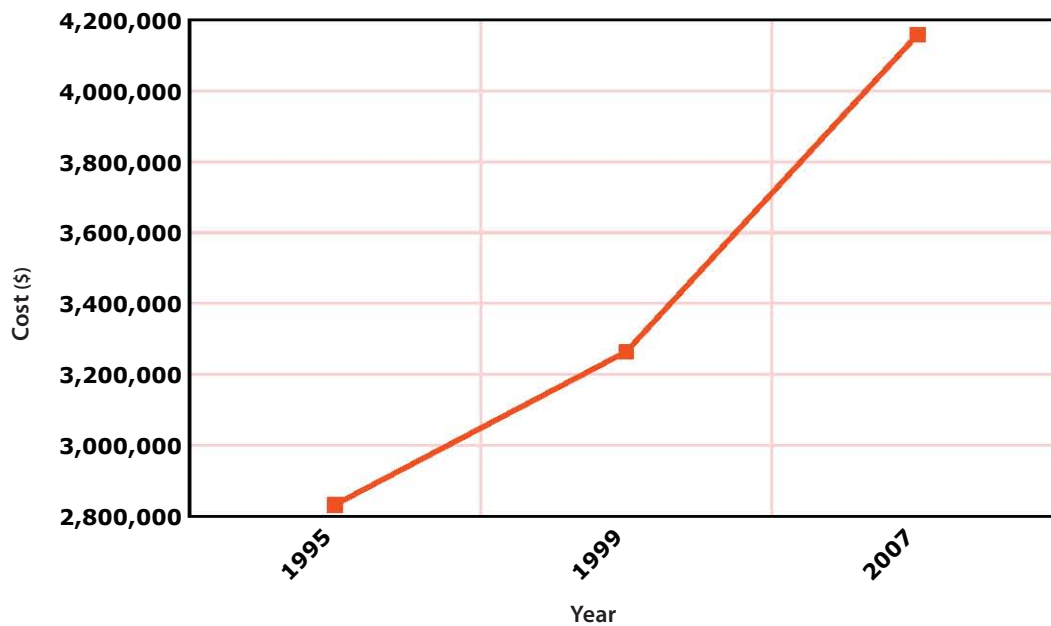
Sector	Energy Type/Unit	Activity			Energy (GJ)			Activity			Energy (GJ)			Percent change		
		1995			1999			2007			95-99			99-07		
Buildings	Electricity (kWh)	16,956,694	61,044	110,650	20,476,629	73,716	137,731	21,594,611	77,741	182,729	24%	33%	65%			
	Natural Gas (GJ)	49,606	49,606		64,015	64,015		104,988	104,988							
Outdoor Lighting	Electricity (kWh)	5,791,419	20,849	20,849	7,414,792	26,693	26,693	7,625,094	27,450	27,450	28%	3%	32%			
Water & Wastewater	Electricity (kWh)	4,103,180	14,771	14,771	4,773,247	17,184	17,184	4,139,551	14,902	14,902	16%	-13%	1%			
Vehicle Fleet*	Biodiesel B5 (L)	-	-	47,055	-	-	44,227	410,085	15,862	47,532	-6%	7%	1%			
	Diesel Fuel (L)	400,134	15,477		399,042	15,435		90,311	3,493							
	Gasoline (L)	884,578	30,659		748,466	25,942		812,962	28,177							
	CNG (GJ)	919	919		77,690	2,693		-	-							
Unidentified	Electricity (kWh)	-	-	-	-	-	-	36,785	132	132						
<b>Total</b>		<b>193,326 GJ</b>			<b>225,835 GJ</b>			<b>272,745 GJ</b>			<b>17%</b>	<b>21%</b>	<b>41%</b>			

\*1995 vehicle fleet is data deficient, 1997 vehicle fleet data utilized

## Cost

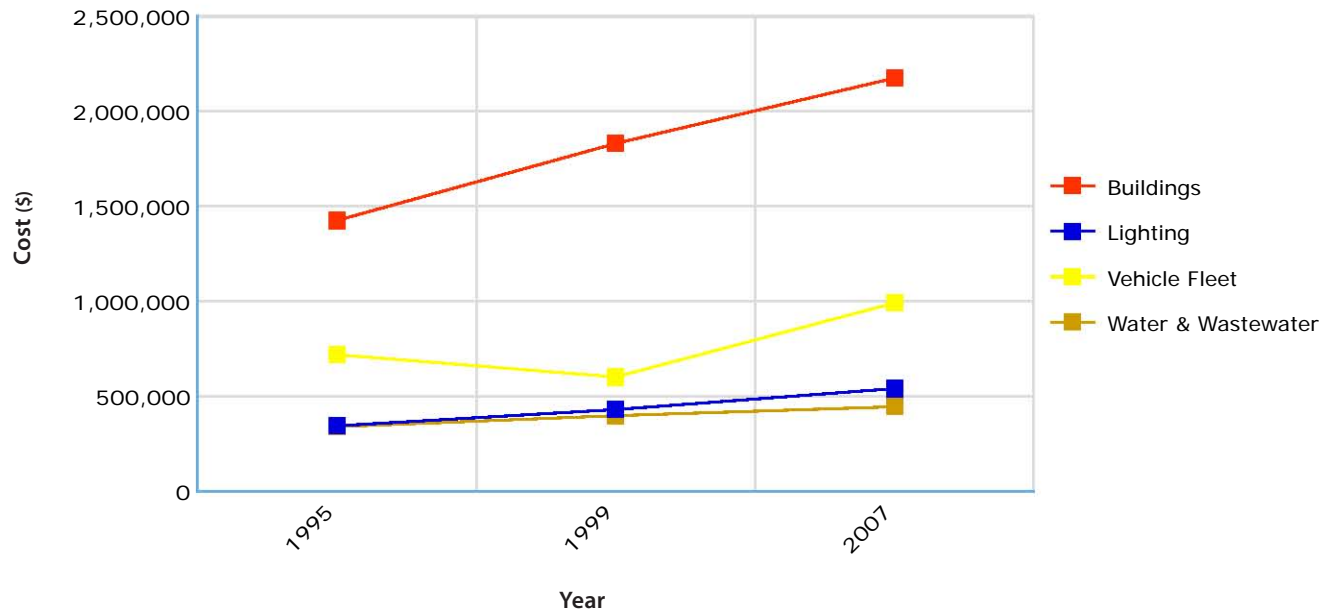
While energy consumption increases over time, so does the costs per unit of energy. In 1995 electricity was \$0.05 per kWh while in 2007 the average price was \$0.07 per kWh. The price for vehicle fuel has also risen in this period from \$0.46/L to \$0.96/L for diesel fuel and \$0.55/L to \$0.88/L for gasoline. Overall energy costs increased by 47 percent between 1995 and 2007 (figure 3.7; table 3.6).

**Figure 3.7 – Total Costs by Sector (1995-2007)**

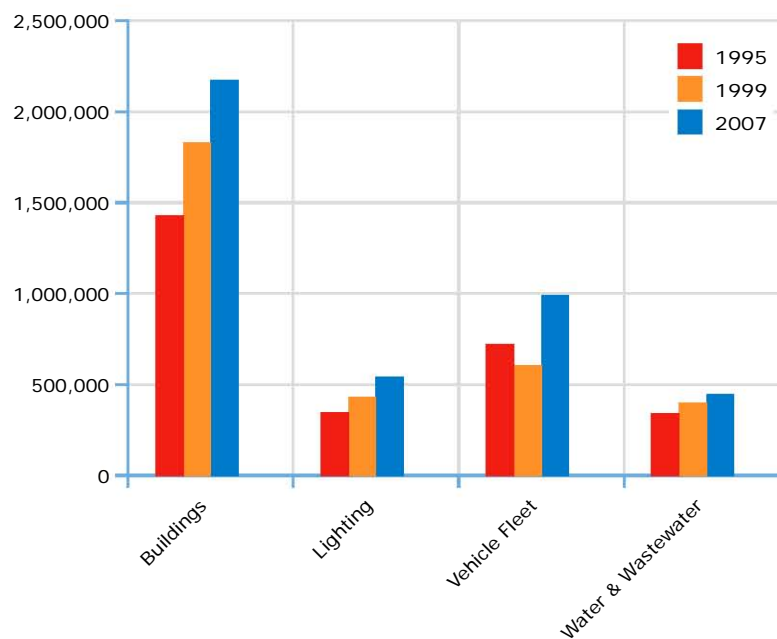


Energy costs for the buildings sector increased by ~53 percent between 1995 and 2007. Energy costs for the outdoor lighting sector increased by ~57 percent between 1995 and 2007. Energy costs for the City's water and waste water assets increased by 31 percent between 1995 and 2007 (table 3.6). See figures 3.8 and 3.9 for a graphical representation of changes in costs by sector.

**Figure 3.8 – Total Costs by Sector (1995-2007)**



**Figure 3.9 – Energy Costs by Sector (1995-2007)**



**Table 3.6 – Energy Costs by Sector (1995-2007)**

Sector	Energy Type	Costs		Costs		Costs		Percent change		
		1995		1999		2007		95-99	99-07	95-07
Buildings	Electricity	\$1,024,386	\$1,426,068	\$1,360,647	\$1,831,237	\$1,266,863	\$2,175,260	28%	19%	53%
	Natural Gas	\$401,682		\$470,590		\$908,397				
Outdoor Lighting	Electricity	\$345,417	\$345,417	\$431,260	\$431,260	\$541,704	\$541,704	25%	26%	57%
Water & Wastewater	Electricity	\$341,036	\$341,036	\$399,107	\$399,107	\$446,064	\$446,064	17%	12%	31%
	Biodiesel B5	-		-		\$270,585				
Vehicle Fleet*	Diesel Fuel	\$182,755	\$720,131	\$169,850	\$602,521	\$83,301	\$992,019	-16%	65%	38%
	Gasoline	\$487,158		\$389,082		\$638,133				
	CNG	\$50,219		\$43,590						
Unidentified	Electricity	-	-	-	-	\$3,117				
<b>Total</b>		<b>\$2,832,653</b>		<b>\$3,264,125</b>		<b>\$4,158,164</b>		<b>15%</b>	<b>27%</b>	<b>47%</b>

\*1995 vehicle fleet is data deficient, 1997 vehicle fleet data utilized

### Inventory Analysis

Between 1999 and 2007 the City of Richmond added 22 buildings, 92 outdoor lighting assets, 31 water & wastewater assets and 294 vehicles to their fleet (table 3.7). This substantial growth in City assets reflects the substantial growth in GHG emissions, energy consumption, and costs for energy between 1999 and 2007.

**Table 3.7 – Corporate Asset Count**

Sector	1999	2007	Absolute Difference
Buildings <sup>1</sup>	66	88	+22
Outdoor Lighting	107	199	+92
Water and Wastewater	165	196	+31
Vehicles	204	498	+294
Solid Waste	n/a <sup>2</sup>	38	-

<sup>1</sup> Does not include leased buildings

<sup>2</sup> Missing Data

Increases in energy consumption are due to the addition and/or expansion of City-owned buildings and engineering assets. The 41 percent growth in energy consumption between 1995 and 2007 reflects the increases in municipal services that have occurred over time.

Increases in greenhouse gas emissions are tied to increases in consumption. However the carbon intensity of electricity decreased from 1995 to 1999 (0.061 kg/kWh to 0.051 kg/kWh), and then again from 1999 to 2007 (0.051 kg/kWh to 0.022 kg/kWh) moderating the growth in GHG emissions to 22% while energy consumption increased at nearly double the observed rate. This explains why the lighting and water & wastewater sectors saw significant decreases in emissions while their overall energy consumption rose (e.g., GHG emissions from both sectors is from electricity consumption).

Energy sources are becoming increasingly expensive because energy demands are increasing faster than new energy supplies become available. Managing energy consumption will provide the City the benefit of both immediately reducing its operating costs and reducing its climate-impacting GHG emissions.

See table 3.8 for a summary of absolute changes in consumption, costs and emissions between inventory years and table 3.9 for a summary of percent change over the inventory years.

**Table 3.8 – Inventory Absolute Change (1995-2007)**

	1995	1999	2007	Absolute Change		
				95-99	99-07	95-07
Energy Consumption	193,326 GJ	225,835 GJ	272,747 GJ	+ 32,509 GJ	+ 46,912 GJ	+ 79,421 GJ
Energy Costs	\$2,832,653	\$3,264,125	\$4,158,164	+ \$431,472	+ \$894,039	+ \$1,325,511
Emissions	8,532 t	8,825 t	10,445 t	+ 293 t	+ 1,620 t	+ 1,913 t

**Table 3.9 – Inventory Summaries (1995-2007)**

	1995	1999	2007	Percent Change		
				95-99	99-07	95-07
Energy Consumption	193,326 GJ	225,835 GJ	272,747 GJ	17%	21%	41%
Energy Costs	\$2,832,653	\$3,264,125	\$4,158,164	15%	27%	47%
Emissions	8,532 t	8,825 t	10,445 t	3%	18%	22%

## 3.2 – 2007 Detailed Analysis

### 2007 Corporate Inventory Summary

An overview of total energy consumed, costs, and GHG emissions by sector is presented in table 3.10 (note: table 3.10 includes the GHG emissions associated with solid waste). In 2007, the City's total energy consumption amounted to 272,747 GJ, total costs were \$4,158,164, and 10,445 tonnes CO<sub>2</sub>e in associated greenhouse gas emissions. Appendix I provides an inventory summary by account for 2007.

City owned buildings accounted for the majority of energy consumption, energy costs, and GHG emissions (56 percent). The City's vehicle fleet accounted for the second greatest amount of GHG emissions (33 percent) followed by solid waste (nine percent). In total, outdoor lighting, water & wastewater infrastructure and unidentified accounts were responsible for approximately three percent of GHG emissions (see figures 3.10, 3.11, 3.12 and table 3.10).

**Table 3.10 – Energy, Costs, and Emissions by Sector (2007)**

Sector	Total Emissions (CO <sub>2</sub> e tonnes)	Total Energy (GJ)	Total Cost	Percent Emissions	Percent Energy	Percent Costs
Buildings	5,845	182,729	\$2,175,260	56%	67%	52%
Lighting	168	27,450	\$541,704	2%	10%	13%
Water & Wastewater	91	14,902	\$446,064	1%	5%	11%
Vehicle Fleet	3,417	47,533	\$992,020	33%	17%	24%
Solid Waste	924			9%	0%	
Unidentified	1	132	\$3,117	0%	0%	0%
<b>Total</b>	<b>10,445</b>	<b>272,747</b>	<b>\$4,158,164</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>

As table 3.10 describes, the majority of 2007 energy consumption occurred in the buildings sector (182,729 GJ). The vehicle fleet consumed 47,533 GJ of energy, outdoor lighting consumed 27,450 GJ of energy, and water and wastewater infrastructure consumed 14,902 GJ.

The majority of the City's total energy costs were incurred by buildings at ~\$2.2 million. Vehicle fleet costs were ~\$1.0 million, outdoor lighting costs were ~\$0.55 million, and water and wastewater costs were ~\$0.5 million (table 3.10). Costs to collect corporate solid waste are relatively insignificant and were not estimated as corporate solid waste is collected along with community waste.

The greatest source of emissions in 2007 was from the combustion of natural gas (56 percent of total emissions), followed by gasoline (21 percent), biodiesel 5 (12 percent), electricity (eight percent) and diesel fuel (three percent). Table 3.11 illustrates the contribution of each major energy source to total emissions.

**Table 3.11 – Sources of Corporate Emissions by Energy Type (2007)**

Energy Type	Units	Total Use	Total Emissions (CO <sub>2</sub> e tonnes)	Percent Emissions
Electricity	kWh	33,396,041	735	8%
Natural Gas	GJ	104,988	5,370	56%
Gasoline	litres	812,962	2,030	21%
Diesel Fuel	litres	90,311	251	3%
Biodiesel 5	litres	410,085	1,135	12%
<b>Total</b>			<b>9,521</b>	<b>100%</b>

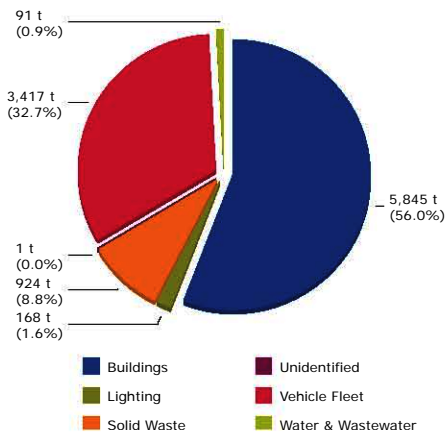
In terms of energy content, electricity accounted for nearly half (44 percent) of the total energy consumed by the City (table 3.1.2), followed by natural gas (38 percent), gasoline (ten percent), biodiesel 5 (six percent), and diesel fuel (one percent), respectively. Figure 3.14 illustrates the use of energy by source and figure 3.15 illustrates costs by energy source.

Electricity accounted for the greatest amount of the City's energy costs (54 percent) followed by natural gas (22 percent) and gasoline (15 percent). Together, biodiesel 5 and diesel fuel accounted for approximately nine percent of the City's energy costs.

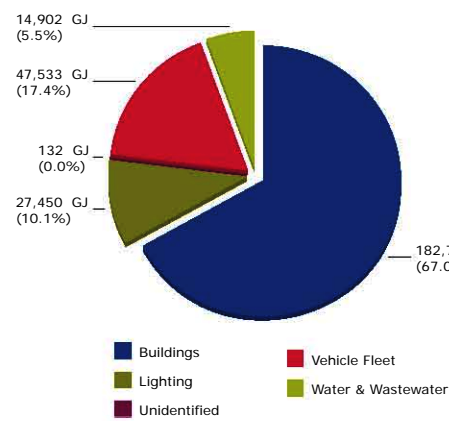
**Table 3.12 – Sources of Corporate Energy & Costs by Energy Type (2007)**

Energy Type	Units	Total Use	Total Energy (GJ)	Total Cost	Percent Total Energy by Source	Percent Total Costs by Source
Electricity	kWh	33,396,041	120,226	\$2,257,748	44%	54%
Natural Gas	GJ	104,988	104,988	\$908,397	38%	22%
Gasoline	litres	812,962	28,177	\$638,133	10%	15%
Diesel Fuel	litres	90,311	3,493	\$83,301	1%	2%
Biodiesel 5	litres	410,085	15,862	\$270,585	6%	7%
<b>Total</b>			<b>272,747</b>	<b>\$4,158,164</b>	<b>100%</b>	<b>100%</b>

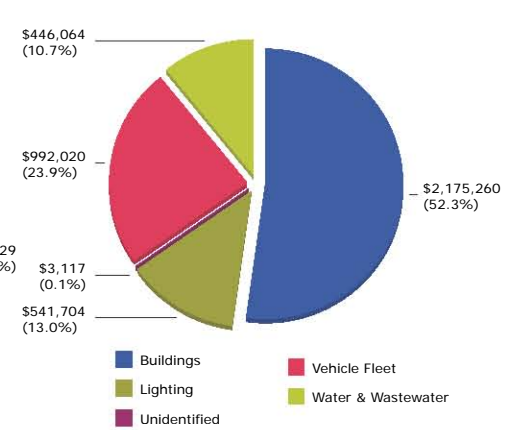
**Figure 3.10 – Emissions (tonnes CO<sub>2</sub>e)**



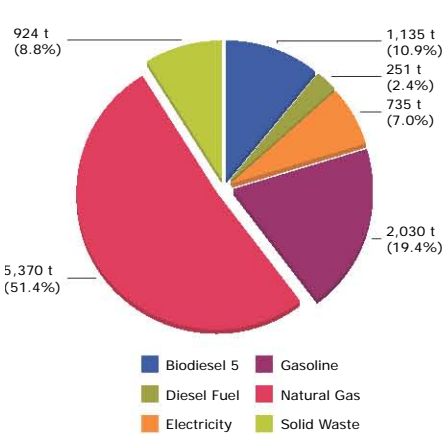
**Figure 3.11 – Energy Consumption**



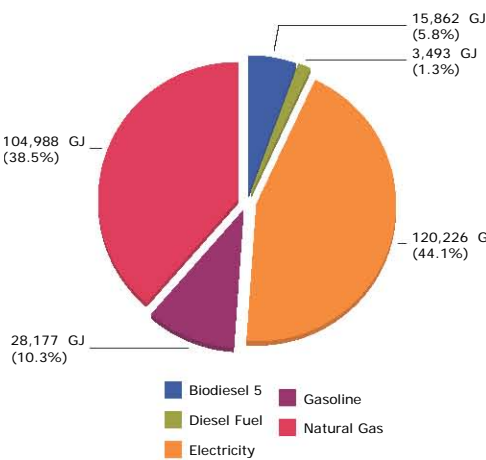
**Figure 3.12 – Energy Costs**



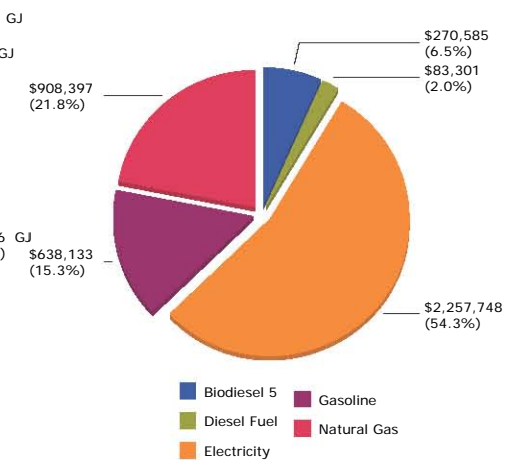
**Figure 3.13 – Sources of Emissions (tonnes CO<sub>2</sub>e)**



**Figure 3.14 – Sources of Energy**



**Figure 3.15 – Sources of Energy Costs**





## Sector Analysis

### Buildings

Figures 3.14 and 3.15 demonstrate that the major energy consumption and costs were from electricity and natural gas, predominantly to light and heat buildings. However, figure 3.13 shows that the majority of the City's GHG emissions arose from natural gas to heat buildings and for gasoline to fuel the City's fleet. Electricity use only accounted for eight percent of the City's GHG emissions.

Electricity and natural gas for the City's building sector was provided by BC Hydro and Terasen Gas respectively. Once consumption and cost data was imported into EEMRS™ individual accounts were identified and assigned to a subsector and staff identified building classes. Leased buildings that the City does not have operational control over (such as RCMP buildings and rental houses) have not been included in the inventory. Buildings that have been excluded from the inventory are listed in Appendix IV.

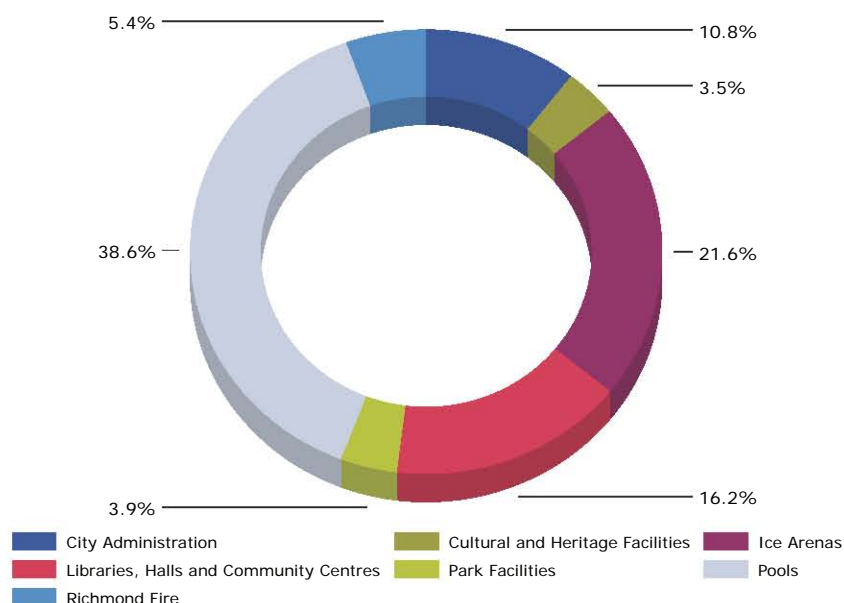
The City has operational control over 88 buildings. Natural gas accounted for the majority of the building sectors emissions (5,370 tonnes CO<sub>2</sub>e) while electricity accounted for the majority of costs (\$1,266,863). Total costs for all buildings were \$2,175,260 and total emissions were 5,845 tonnes CO<sub>2</sub>e (table 3.13).

**Table 3.13 - Summary of Buildings Sector Emissions (2007)**

Energy Type	Units	Total Use	Total Energy (GJ)	Total Cost	Total CO <sub>2</sub> e (t)
Electricity	kWh	21,594,611	77,741	\$1,266,863	475.1
Natural Gas	GJ	104,988	104,988	\$908,397	5,370.1
<b>Total</b>			<b>182,729</b>	<b>\$2,175,260</b>	<b>5,845.2</b>

The City's indoor and outdoor pools were the largest source of emissions (39 percent), followed by ice arenas (22 percent). The City's libraries, halls and community centres were the third largest source of emissions (16 percent) followed by City administration buildings (11 percent; includes public works yards). This proportion of emissions is typical of large municipalities as pools and ice arenas represent energy intensive facilities (figure 3.16).

**Figure 3.16 – GHG Emissions by City Building Classes (2007)**



In 2007, Watermania was the City's top source of GHG emissions. The large emissions from this facility are due to the large amount of natural gas required to heat pool water. The Richmond Ice Center was the building sector's second largest emitter as it consumes a large amount of electricity to power the pumps that run the ice plants, electricity to light the arena and curling sheets, and natural gas to heat the facility. A significant amount of the total emissions from the Richmond Ice Centre is from the use of natural gas. Minoru Aquatic Center, City Hall, and the operations yard are ranked number three, four, and five respectively in terms of their energy consumption (table 3.14). See Appendix I for an inventory summary by account.

**Table 3.14 – Buildings Ranked by Emissions (2007)**

1	<b>Watermania - 14300 Entertainmnt Blv</b>	32,546 GJ	\$314,415 1,204.2 t
2	<b>Richmond Ice Center - 14140 Triangle Rd</b>	30,672 GJ	\$324,773 1,082.8 t
3	<b>Minoru Aquatic Center   Minoru Pool - 7560 Minoru Gate</b>	23,126 GJ	\$204,399 991.1 t
4	<b>Works Yard - 5555 Lynas Ln</b>	11,715 GJ	\$125,093 400.7 t
5	<b>Steveston Branch &amp; Community Centre - 4111 Moncton St</b>	8,027 GJ	\$79,948 321.8 t
6	<b>Main Branch &amp; Cultural Centre - 7700 Minoru Gate</b>	11,390 GJ	\$133,513 284.0 t
7	<b>City Hall - 6911 No. 3 Rd</b>	12,839 GJ	\$182,137 211.4 t
8	<b>Minoru Arena - 7551 Minoru Gate</b>	8,467 GJ	\$107,061 181.9 t
9	<b>Richmond Gateway Theater - 6500 Gilbert Rd</b>	4,965 GJ	\$68,738 161.0 t
10	<b>Fire Hall #1 - Headquarters - 6960 Gilbert Rd</b>	2,882 GJ	\$39,252 107.3 t

## Outdoor Lighting

Electricity data for the City's outdoor lighting sector was provided by BC Hydro. Once consumption and cost data was imported into EERMS™, individual lighting accounts were identified and assigned to a subsector. Ornamental lighting includes all street lighting owned and operated by the City. Recreation lighting includes all outdoor lighting for City parks and recreation facilities. Traffic signals include all lighting used for traffic management aside from signals that only are used for pedestrians. Overhead lighting leased by the City from BC Hydro is not included in this inventory since the City does not have operational control over these assets. Note that the outdoor lighting sector includes lighting that is metered separately from buildings. Lighting that is attached to a meter that includes a building (e.g., parking lot overhead lights) is included in the buildings sector inventory. In these instances, the energy consumption is mainly from loads from within the building, and since audits were beyond the scope of this project, an energy end use breakdown for outdoor lighting was not included.

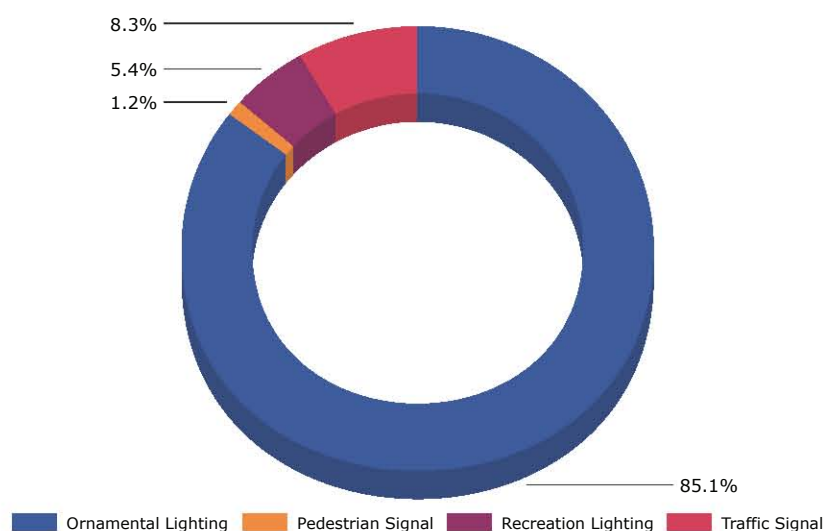
The City's outdoor lighting consumed 27,450 GJ of electricity (7,625,094 kWh), resulting in the production of 168 tonnes of CO<sub>2</sub>e at a cost of \$541,704 (table 3.15). A ranking of the top ten energy consumer in the lighting sector is provided in table 3.15 and a chart illustrating the breakdown of the category is provided in figure 3.17.

**Table 3.15 – Summary of Lighting Sector Emissions (2007)**

Energy Type	Units	Total Use	Total Energy (GJ)	Total Cost	Total CO <sub>2</sub> e (t)
Electricity	kWh	7,625,095	27,450	\$541,704	167.8
<b>Total</b>			<b>27,450</b>	<b>\$541,704</b>	<b>167.8</b>

Ornamental lighting was by far the largest outdoor lighting subsector in terms of GHG emissions, accounting for 85 percent of the sectors emissions. Traffic signals account for eight percent of the sectors emissions, followed by recreation lighting (five percent) and pedestrian signals (one percent; see figure 3.17). See table 3.16 for a ranking of the top ten lighting accounts in terms of GHG emissions. Appendix I provides an inventory summary by account.

**Figure 3.17 – GHG Emissions in the Lighting Subsectors (2007)**



**Table 3.16 – Lighting Ranked by Emissions (2007)**

1	Ornamental Street Ltg -	23,357 GJ	\$454,385	142.7 t
2	All Traffic Signals -	2,223 GJ	\$44,012	13.6 t
3	Hugh Boyd Playing Field Lighting - 9551 Pendleton Rd	798 GJ	\$19,706	4.9 t
4	South Arm Playing Field Lighting - 8880 Williams Rd	299 GJ	\$6,565	1.8 t
5	Pedestrian Signal - Steveston Hwy/Lassam Rd	145 GJ	\$2,810	0.9 t
6	Hugh Boyd Tennis Court Lighting - 9573 Pendleton Rd	117 GJ	\$2,610	0.7 t
7	Imperial Landing Trail Lighting - Westwater/Railway Ave	115 GJ	\$2,543	0.7 t
8	Tennis Court Lighting - 1391 Lancaster Crs	70 GJ	\$1,578	0.4 t
9	Pole Light - English St Bayview Extension	53 GJ	\$1,204	0.3 t
10	Parking Lot Lights (Open) - 12011 7th Ave	47 GJ	\$1,087	0.3 t

## Water & Wastewater

Electricity data for the City's water & wastewater sector was provided by BC Hydro. Once consumption and cost data was imported into EERMS™, individual water & wastewater accounts were identified and assigned to a subsector. Drainage pump stations pump water out of low lying areas susceptible to flooding. Liquid waste pump stations move sanitary waste towards wastewater treatment facilities. Pressure reducing valves (PRV) reduce water pressure in the potable water distribution system. The City's inventory includes one cathodic protection rectifier that helps to reduce corrosion in the distribution system.

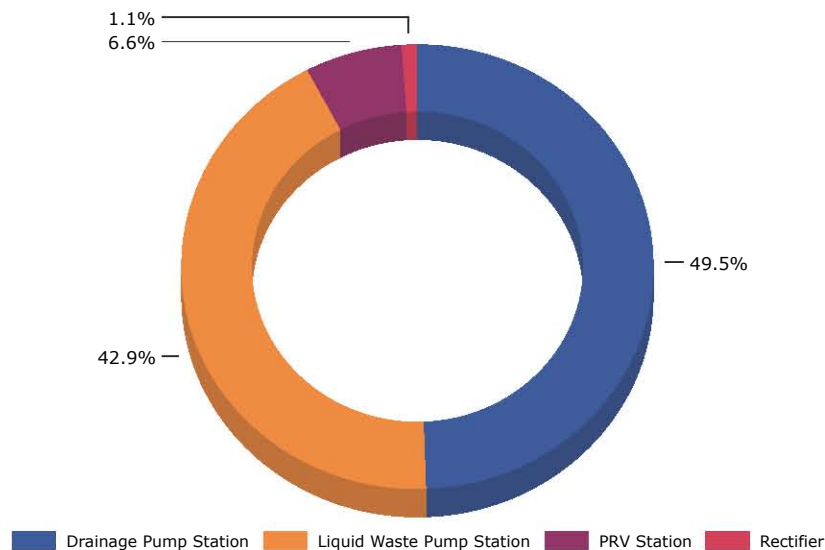
The City does not operate any sewage treatment plants or potable water treatment plants, and therefore, energy consumed in the water and wastewater sector is for motors that drive sanitary sewer, storm sewer and potable water pumps. There are numerous variations of pump and motor configurations at each pump station. The number of assets that make up the subsectors depicted in figure 3.18 is 196. Individual pump stations may contain more than one pump at each site. The majority of these assets are liquid waste pump stations (139) and drainage pump stations (36).

Overall, 4,139,551 kWh of electricity was consumed, which resulted in the release of 91 tonnes of emissions at a cost of \$446,064 (table 3.17).

**Table 3.17 – Summary of Water and Wastewater Sector Emissions (2007)**

Energy Type	Units	Total Use	Total Energy (GJ)	Total Cost	Total CO <sub>2</sub> e (t)
Electricity	kWh	4,139,551	14,902	\$446,064	91.1
<b>Total</b>			<b>14,902</b>	<b>\$446,064</b>	<b>91.1</b>

Drainage pumps were the largest source of emissions (50 percent) in this sector followed by liquid waste pump stations (43 percent). The City's PRV stations accounted for seven percent of emissions while the rectifier accounted for one percent of emissions (figure 3.18). Table 3.18 shows the top 10 water and wastewater accounts ranked by energy consumption. Appendix I provides an inventory summary by account.

**Figure 3.18 – GHG Emissions in the Water and Wastewater Subsectors (2007)****Table 3.18 – Water and Wastewater Ranked by Emissions (2007)**

1	Bath Slough-25 - 12191 River Rd Pump	609 GJ	\$25,777	3.7 t
2	Drainage - 10980 No 6 Rd A	518 GJ	\$14,054	3.2 t
3	Drainage - North Dds 15 No 7/River Rd	466 GJ	\$14,781	2.8 t
4	Horseshoe Slough - 7 - Shell Rd S Ft	440 GJ	\$15,206	2.7 t
5	Woodwards Slough-8 - 9200 Dyke Rd	431 GJ	\$27,390	2.6 t
6	Queens North-1 - 23231 River Rd	429 GJ	\$13,202	2.6 t
7	Shell Road North-24 - 11000 River Rd	386 GJ	\$11,910	2.4 t
8	No 3 Road South-9 - 14040 No 3 Rd A	375 GJ	\$10,168	2.3 t
9	Drainage - No 1 Rd S Ft	353 GJ	\$13,395	2.2 t
10	Sanitary Pump Station-Edgemere - 10371 Aragon Rd	347 GJ	\$7,583	2.1 t

## Vehicle Fleet

Consumption and cost data for individual vehicles was provided by City staff. The City's fleet department manages the fuel for all City departments with the exception of Fire Services. Fire Services manage fuel use and data management for their operations. Individual vehicle accounts were assigned to a vehicle/equipment type and City department (note: Fire Services vehicle data is not broken down by vehicle/equipment type). With the exception of fire department vehicles, all of the City's diesel vehicles are fueled with biodiesel 5. The City's biodiesel 5 is a petrodiesel fuel blend that includes five percent biodiesel derived from rendered animal fats. The GHG emissions factor has been adjusted accordingly (-3.9 percent) for the calculation of all biodiesel fuel consumed.

The vehicle fleet includes all motorized vehicles operated by the City. The City's vehicles produced 3,417 tonnes of CO<sub>2</sub>e and fuel costs were \$992,020. The vehicle fleet uses three fuel types, Gasoline, diesel and biodiesel 5 (table 3.19).

**Table 3.19 – Summary of Vehicle Fleet Sector Emissions (2007)**

Energy Type	Units	Total Use	Total Energy (GJ)	Total Cost	Total CO <sub>2</sub> e (t)
Gasoline	litres	812,962	28,177	\$638,133	2,030.3
Diesel Fuel	litres	90,311	3,493	\$83,301	251.0
Biodiesel 5	litres	410,085	15,862	\$270,585	1,135.4
<b>Total</b>			<b>47,533</b>	<b>\$992,020</b>	<b>3,416.7</b>

Table 3.20 lists vehicle fleet greenhouse gas emissions by vehicle subsector. The City's gasoline light trucks, vans and SUVs were the largest source of vehicle fleet emissions (39 percent) followed by diesel fuel medium to heavy trucks (20 percent). The composition of the vehicle fleet described in table 3.20 is typical of most municipal vehicle fleets since these subsectors represent large numbers of vehicles with high fuel consumption rates. Appendix I lists a summary of emissions by account.

**Table 3.20 – GHG Emissions in the Vehicle Fleet Subsectors (2007)**

Vehicle Fleet Subsectors	GHG Emissions (tonnes CO <sub>2</sub> e)	Percent of Total
Gasoline Light Trucks, Vans, and SUVs	1,320.1	38.6%
Diesel Fuel Medium to Heavy Trucks	670.9	19.6%
Gasoline Medium to Heavy Trucks & Vans	386.6	11.3%
Fire Services	312.7	9.2%
Gasoline Passenger Cars	135.6	4.0%
Diesel Fuel Sweepers & Flushers	103.3	3.0%
Diesel Fuel Tractors, Graders, & Backhoes	84.3	2.5%
Diesel Fuel Off Road Vehicles & Equipment	82.8	2.4%
Diesel Fuel Mowers	58.1	1.7%
Gasoline - misc. equipment	52.9	1.5%
Diesel Fuel Light Trucks, Vans, and SUVs	50.5	1.5%
Diesel Fuel Bus	41.8	1.2%
Gasoline Off Road Vehicles & Equipment	28.3	0.8%
Gasoline-Electric Hybrid Vehicles	21.5	0.6%
Unidentified - Diesel Fuel	17.4	0.5%
Diesel Fuel Passenger Cars	12.8	0.4%
Gasoline Bus	12.6	0.4%
Gasoline Mowers	12.5	0.4%
Gasoline Sweepers and Flushers	4.6	0.1%
Diesel Fuel Generators	4.2	0.1%
Diesel Fuel Misc. Equipment	2.6	0.1%
Unidentified - Gasoline	0.3	~0.0%
Gasoline Vehicles	0.1	~0.0%

## Corporate Solid Waste

Solid waste generated in municipal facilities accounts for nine percent of total corporate emissions. In 2007, the City's waste from its corporate operations resulted in 924 tonnes of CO<sub>2</sub>e.

## 4. MAJOR FINDINGS AND RECOMMENDATIONS

### 4.1 – Major Findings

In 2007, the City of Richmond's operations consumed 272,747 GJ energy, at a cost of \$4,158,164, and generating 10,445 tonnes CO<sub>2</sub>e of greenhouse gas emissions (see the rows in table 4.1 for consumption, costs, and emissions).

**Table 4.1 – Inventory Summaries (1995-2007)**

	1995*	1999	2007	Percent Change		
				95-99	99-07	95-07
Energy Consumption	193,326 GJ	225,835 GJ	272,747 GJ	17%	21%	41%
Energy Costs	\$2,832,653	\$3,264,125	\$4,158,164	15%	27%	47%
Emissions	8,532 t	8,825 t	10,445 t	3%	18%	22%

\*1995 vehicle fleet is data deficient, 1997 vehicle fleet data utilized

The City's asset base has grown in every sector since 1999: building assets have grown by 22 percent, outdoor lighting assets by 92 percent, water & wastewater assets by 31 percent, and vehicle assets by 294 percent (table 3.7). As a result, energy consumption, energy costs, and GHG emissions have also risen. From 1999 to 2007, corporate emissions rose from 8,825 tonnes CO<sub>2</sub>e to 10,445 tonnes CO<sub>2</sub>e, an increase of 18 percent (table 3.4). Over the same time period, energy consumption rose by 21 percent (table 3.5) and energy costs by 27 percent (table 3.6).

The two major sources of GHG emissions were City buildings and vehicles. Together, they made up 89% of the City's emissions. The remaining 12% of Corporate GHG emissions are from lighting, wastewater and water pumps, and solid waste. Three buildings: Watermania, Richmond Ice Centre and Minoru Aquatic Centre are the largest energy consumers and together accounted for 31 percent of all emissions. GHG emission sources from the City's fleet are predominantly from the operation of gasoline and diesel fuel light, medium and heavy duty trucks, vans and buses.

Natural gas accounted for 56 percent of total emissions even though it accounted for only 38 percent of the City's energy consumption. Conversely electricity supplied 44 percent of the City's energy needs, but only eight percent of the City's emissions. This stark contrast in GHG emissions of the two energy types relative to the consumption of each is due to the higher emissions coefficient of natural gas compared to electricity.

#### **4.2 – Considerations for GHG Reduction Action**

**National Recognition from FCM/ICLEI Partners for Climate Protection.** Once approved by Council, forward this report to the PCP Secretariat for recognition of the corporate stream of Milestone One of the PCP.

**Energy and Emissions Tracking.** Continue to track corporate energy and greenhouse gas emissions on an annual basis. Fire Services should track fuel consumption for individual vehicles to be consistent with the manner in which all other vehicle fuel consumption is tracked in the City. The accounts listed in the unidentified section of the inventory should be identified. Buildings that have been excluded from the inventory (Appendix IV) should be reviewed. The City should consider an audit of solid waste bins at corporate facilities and parks to determine the volume of bins at the time of pick up and possibly amend the mass of solid waste reported herein.

**Prepare for Aggressive, Emerging Protocols.** Emerging protocols are more comprehensive than current protocols and the City should begin to track all emissions sources as described herein.

**Corporate and Community Energy and Emissions Planning.** Develop a corporate and community energy and emissions strategic plan.

**GHG Emissions Reduction.** Focus initial reduction action on GHG emissions from City buildings, particularly from natural gas, and fleet.

Apart from the environmental imperative of mitigating climate change impacts, the trend in rising energy costs necessitates aggressive reduction measures.





## GLOSSARY OF TERMS (IPCC 2006)

**Carbon dioxide (CO<sub>2</sub>):** 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.*

**Equivalent CO<sub>2</sub> (CO<sub>2</sub>e):** The concentration of CO<sub>2</sub> that would cause the same amount of radiative forcing as a given mixture of CO<sub>2</sub> 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 m<sup>3</sup> 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 (H<sub>2</sub>O), carbon dioxide (CO<sub>2</sub>), nitrous oxide (N<sub>2</sub>O), methane (CH<sub>4</sub>) and ozone (O<sub>3</sub>) 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 CO<sub>2</sub>, N<sub>2</sub>O, and CH<sub>4</sub>, the Kyoto Protocol deals with the greenhouse gases sulphur hexafluoride (SF<sub>6</sub>), 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 (CO<sub>2</sub>, CH<sub>4</sub>, N<sub>2</sub>O, HFCs, PFCs, and SF<sub>6</sub>) 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 (CH<sub>4</sub>):** An odorless, colorless, flammable gas, CH<sub>4</sub>, 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 (N<sub>2</sub>O):** 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.



## Richmond

### Corporate Energy & Greenhouse Gas Emissions Inventory: 2007

#### Appendix I - 2007 Inventory Summary by Account

Account & Address	Account Consumption & Costs by Energy Type					Account Subtotal		
	Type	Consumption	Energy	Costs	CO <sub>2</sub> e	Energy	Costs	CO <sub>2</sub> e
2007								
BUILDINGS								
Administration Office								
CITY HALL - 6911 No. 3 Rd	Electricity	7,988 kWh	29 GJ	\$684	0.2 t	29 GJ	\$684	0.2 t
CITY HALL - 6911 No. 3 Rd	Electricity	2,746,330 kWh	9,887 GJ	\$149,488	60.4 t	12,839 GJ	\$182,137	171.1 t
	Natural Gas	2,952 GJ	2,952 GJ	\$32,649	110.7 t			
CITY HALL   WEST - 6931 GRANVILLE ST	Electricity	106,325 kWh	383 GJ	\$8,351	2.3 t	559 GJ	\$11,023	8.9 t
	Natural Gas	176 GJ	176 GJ	\$2,671	6.6 t			
CITY HALL   WEST - 6931 GRANVILLE ST	Electricity	21,863 kWh	79 GJ	\$1,754	0.5 t	79 GJ	\$1,754	0.5 t
Administration Office Subtotal	Electricity	2,882,506 kWh	10,377 GJ	\$160,276	63.4 t	13,505 GJ	\$195,597	180.7 t
	Natural Gas	3,128 GJ	3,128 GJ	\$35,320	117.3 t			
Arts   Cultural Centre								
BRITANNIA SHIPYARD - 5180 WESTWATER DR	Electricity	12,080 kWh	43 GJ	\$989	0.3 t	43 GJ	\$989	0.3 t
JAPANESE CANADIAN CULTURAL CENTRE - 4255 MONCTON ST	Electricity	61,589 kWh	222 GJ	\$4,868	1.4 t	453 GJ	\$7,945	10.0 t
	Natural Gas	231 GJ	231 GJ	\$3,077	8.7 t			
LONDON FARM - 6511 DYKE RD	Electricity	47,393 kWh	171 GJ	\$3,758	1.0 t	171 GJ	\$3,758	1.0 t
LONDON FARM - 6511 DYKE RD	Electricity	32,575 kWh	117 GJ	\$2,601	0.7 t	117 GJ	\$2,601	0.7 t
Arts   Cultural Centre Subtotal	Electricity	153,637 kWh	553 GJ	\$12,216	3.4 t	784 GJ	\$15,293	12.1 t
	Natural Gas	231 GJ	231 GJ	\$3,077	8.7 t			
Caretaker House								

2007 Energy & Greenhouse Gas Emissions Inventory

2011-03-24



Energy & Emissions Monitoring and Reporting System™ v.3.1

## Richmond

## Corporate Energy &amp; Greenhouse Gas Emissions Inventory: 2007

Account & Address	Account Consumption & Costs by Energy Type						Account Subtotal	
	Type	Consumption	Energy	Costs	CO <sub>2</sub> e	Energy	Costs	CO <sub>2</sub> e
ALBERTA ROAD - 9280 ALBERTA RD	Electricity	34,605 kWh	125 GJ	\$2,746	0.8 t	146 GJ	\$3,042	1.6 t
	Natural Gas	22 GJ		\$296	0.8 t			
BLUNDELL PARK - 6380 BLUNDELL RD	Electricity	35,533 kWh	128 GJ	\$2,839	0.8 t	128 GJ	\$2,839	0.8 t
BRANSCOMBE HOUSE - 4900 STEVESTON HWY	Electricity	10,551 kWh	38 GJ	\$738	0.2 t	269 GJ	\$3,443	8.9 t
	Natural Gas	231 GJ		\$2,705	8.7 t			
BRIGHOUSE PARK - 7840 GRANVILLE AVE	Electricity	57,910 kWh	208 GJ	\$6,481	1.3 t	586 GJ	\$10,993	15.4 t
	Natural Gas	378 GJ		\$4,512	14.2 t			
DEBECK HOUSE - 8520 ASH ST	Electricity	10,454 kWh	38 GJ	\$731	0.2 t	178 GJ	\$2,447	5.5 t
	Natural Gas	141 GJ		\$1,716	5.3 t			
HUGH BOYD PARK - 9751 PENDLETON RD A	Electricity	3,504 kWh	13 GJ	\$334	0.1 t	79 GJ	\$1,427	2.6 t
	Natural Gas	66 GJ		\$1,092	2.5 t			
MCCLENNAN NORTH PARK - 9120 ALBERTA RD	Electricity	14,002 kWh	50 GJ	\$964	0.3 t	214 GJ	\$2,930	6.4 t
	Natural Gas	164 GJ		\$1,967	6.1 t			
MCHAIR PARK - 9460 NO 4 RD	Electricity	33,822 kWh	122 GJ	\$2,699	0.7 t	265 GJ	\$4,872	6.1 t
	Natural Gas	143 GJ		\$2,173	5.4 t			
RICHMOND NATURE PARK - 11851 WESTMINSTER HWY	Electricity	24,525 kWh	88 GJ	\$1,651	0.5 t	88 GJ	\$1,651	0.5 t
RIVER ROAD - 2680 RIVER RD	Electricity	16,035 kWh	58 GJ	\$1,091	0.4 t	58 GJ	\$1,091	0.4 t
SOUTH ARM POOL - 9040 WILLIAMS RD	Electricity	9,222 kWh	33 GJ	\$648	0.2 t	148 GJ	\$2,070	4.5 t
	Natural Gas	115 GJ		\$1,421	4.3 t			
TERRA NOVA PARK - 2491 WESTMINSTER HWY	Electricity	5,459 kWh	20 GJ	\$394	0.1 t	20 GJ	\$394	0.1 t
WOODWARDS LANDING - 11551 DYKE RD	Electricity	9,639 kWh	35 GJ	\$812	0.2 t	35 GJ	\$812	0.2 t
WORKS YARD - 5400 RIVER RD	Electricity	21,120 kWh	76 GJ	\$1,426	0.5 t	196 GJ	\$2,817	4.9 t
	Natural Gas	120 GJ		\$1,391	4.5 t			
Caretaker House Subtotal	Electricity	286,381 kWh	1,031 GJ	\$23,555	6.3 t	2,410 GJ	\$40,828	58.0 t
	Natural Gas	1,379 GJ		\$17,273	51.7 t			
Community Building								

2007 Energy &amp; Greenhouse Gas Emissions Inventory

2011-03-24

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## Richmond

### Corporate Energy & Greenhouse Gas Emissions Inventory: 2007

Account & Address	Account Consumption & Costs by Energy Type						Account Subtotal	
	Type	Consumption	Energy	Costs	CO <sub>2</sub> e		Energy	Costs CO <sub>2</sub> e
EAST RICHMOND COMMUNITY HALL   KING GEORGE PARK - 12360 CAMBIE RD	Electricity	176,664 kWh	636 GJ	\$16,325	3.9 t		1,208 GJ	\$23,617 25.3 t
	Natural Gas	572 GJ	572 GJ	\$7,292	21.5 t			
SCOUT HALL - 4040 FRANCIS RD	Electricity	15,317 kWh	55 GJ	\$1,258	0.3 t		123 GJ	\$2,371 2.9 t
	Natural Gas	68 GJ	68 GJ	\$1,112	2.6 t			
SEA ISLAND COMMUNITY HALL - 7140 MILLER RD	Electricity	15,551 kWh	56 GJ	\$1,275	0.3 t		233 GJ	\$3,539 7.0 t
	Natural Gas	177 GJ	177 GJ	\$2,264	6.6 t			
SOUTH ARM COMMUNITY HALL - 9020 WILLIAMS RD	Electricity	76,430 kWh	275 GJ	\$6,105	1.7 t		514 GJ	\$9,043 10.6 t
	Natural Gas	239 GJ	239 GJ	\$2,937	9.0 t			
STEVESTON MARTIAL ARTS - 4251 MONCTON STREET	Electricity	230,856 kWh	831 GJ	\$0	5.1 t		1,012 GJ	\$2,098 11.9 t
	Natural Gas	181 GJ	181 GJ	\$2,098	6.8 t			
Community Building Subtotal	Electricity	514,818 kWh	1,853 GJ	\$24,963	11.3 t		3,090 GJ	\$40,667 57.7 t
	Natural Gas	1,237 GJ	1,237 GJ	\$15,704	46.4 t			
<b>Community Centre</b>								
DEBECK CENTRE   HOUSE (FAMILY PLACE) - 8660 ASH ST A	Electricity	8,742 kWh	31 GJ	\$744	0.2 t		124 GJ	\$2,184 3.7 t
	Natural Gas	93 GJ	93 GJ	\$1,440	3.5 t			
LANG (CITY CENTER) COMMUNITY CENTER - 140 - 8297 SABA RD	Electricity	48,923 kWh	176 GJ	\$3,876	1.1 t		176 GJ	\$3,876 1.1 t
SOUTH ARM COMMUNITY CENTRE - 8880 WILLIAMS RD	Electricity	188,695 kWh	679 GJ	\$14,200	4.2 t		679 GJ	\$14,200 4.2 t
SOUTH ARM COMMUNITY CENTRE   BUILDING - 8880 WILLIAMS RD	Electricity	664,132 kWh	2,391 GJ	\$38,593	14.6 t		3,291 GJ	\$50,449 48.4 t
	Natural Gas	900 GJ	900 GJ	\$11,857	33.7 t			
THOMPSON COMMUNITY CENTRE - 5151 GRANVILLE AVE	Electricity	677,523 kWh	2,439 GJ	\$37,811	14.9 t		3,048 GJ	\$45,128 37.7 t
	Natural Gas	609 GJ	609 GJ	\$7,316	22.8 t			
WEST RICHMOND COMMUNITY CENTER - 9180 No 1 Rd	Electricity	233,169 kWh	839 GJ	\$16,977	5.1 t		1,639 GJ	\$26,144 35.1 t
	Natural Gas	799 GJ	799 GJ	\$9,167	30.0 t			
Community Centre Subtotal	Electricity	1,821,184 kWh	6,556 GJ	\$112,202	40.1 t		8,957 GJ	\$141,981 130.1 t
	Natural Gas	2,401 GJ	2,401 GJ	\$29,780	90.0 t			
<b>Education</b>								

## Richmond

## Corporate Energy &amp; Greenhouse Gas Emissions Inventory: 2007

Account & Address	Account Consumption & Costs by Energy Type					Account Subtotal	
	Type	Consumption	Energy	Costs	CO <sub>2</sub> e	Energy	Costs CO <sub>2</sub> e
RICHMOND NATURE PARK - 11851 WESTMINSTER HWY	Electricity	13,951 kWh	50 GJ	\$1,152	0.3 t	197 GJ	\$3,231 5.8 t
	Natural Gas	147 GJ	147 GJ	\$2,079	5.5 t		
RICHMOND NATURE PARK - 11851 WESTMINSTER HWY	Electricity	83,174 kWh	299 GJ	\$6,581	1.8 t	299 GJ	\$6,581 1.8 t
TERRA NOVA BARN   TERRA NOVA RURAL PARK - 2631 WESTMINSTER HWY	Electricity	8,855 kWh	32 GJ	\$623	0.2 t	32 GJ	\$623 0.2 t
Education Subtotal	Electricity	105,980 kWh	382 GJ	\$8,356	2.3 t	528 GJ	\$10,435 7.8 t
	Natural Gas	147 GJ	147 GJ	\$2,079	5.5 t		
<b>Fire Services</b>							
FIRE HALL #1 - HEADQUARTERS - 6960 GILBERT RD	Electricity	247,209 kWh	890 GJ	\$17,068	5.4 t	2,882 GJ	\$39,252 80.1 t
	Natural Gas	1,992 GJ	1,992 GJ	\$22,185	74.7 t		
FIRE HALL #2 - STEVESTON - 11011 No 2 Rd	Electricity	39,744 kWh	143 GJ	\$3,161	0.9 t	971 GJ	\$12,531 31.9 t
	Natural Gas	828 GJ	828 GJ	\$9,370	31.1 t		
FIRE HALL #3 - BRIDGEPORT - 9100 BRIDGEPORT RD	Electricity	31,115 kWh	112 GJ	\$2,489	0.7 t	623 GJ	\$9,041 19.9 t
	Natural Gas	511 GJ	511 GJ	\$6,552	19.2 t		
FIRE HALL #4 - NOT IN USE - 780 LANCASTER CIRS	Electricity	5,040 kWh	18 GJ	\$455	0.1 t	122 GJ	\$1,960 4.0 t
	Natural Gas	104 GJ	104 GJ	\$1,505	3.9 t		
FIRE HALL #4 - SEA ISLAND - 3911 RUSS BAKER WAY	Electricity	178,781 kWh	644 GJ	\$13,382	3.9 t	1,138 GJ	\$17,235 22.5 t
	Natural Gas	494 GJ	494 GJ	\$3,852	18.5 t		
FIRE HALL #5 - HAMILTON - 22451 WESTMINSTER HWY	Electricity	268,495 kWh	967 GJ	\$18,437	5.9 t	1,298 GJ	\$21,026 18.4 t
	Natural Gas	332 GJ	332 GJ	\$2,589	12.4 t		
FIRE HALL #6 - SHELLMONT - 9400 No 4 Rd	Electricity	77,486 kWh	279 GJ	\$6,108	1.7 t	1,137 GJ	\$17,473 33.9 t
	Natural Gas	859 GJ	859 GJ	\$11,366	32.2 t		
FIRE HALL #7 - CRESTWOOD - 5731 No 6 Rd	Electricity	164,152 kWh	591 GJ	\$12,733	3.6 t	1,230 GJ	\$21,397 27.6 t
	Natural Gas	639 GJ	639 GJ	\$8,664	24.0 t		
Fire Services Subtotal	Electricity	1,012,022 kWh	3,643 GJ	\$73,832	22.3 t	9,402 GJ	\$139,916 238.2 t
	Natural Gas	5,759 GJ	5,759 GJ	\$66,084	216.0 t		
<b>Golf Course</b>							

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### Corporate Energy & Greenhouse Gas Emissions Inventory: 2007

Account & Address	Account Consumption & Costs by Energy Type					Account Subtotal	
	Type	Consumption	Energy	Costs	CO <sub>2</sub> e	Energy	Costs CO <sub>2</sub> e
HUGH BOYD PARK - 9771 PENDLETON RD	Electricity	24,292 kWh	87 GJ	\$1,960	0.5 t	87 GJ	\$1,960 0.5 t
<b>Golf Course Subtotal</b>	Electricity	24,292 kWh	87 GJ	\$1,960	0.5 t	<b>87 GJ</b>	<b>\$1,960 0.5 t</b>
<b>Heritage Site</b>							
BRITANNIA SHIPYARD - 12451 TRITES RD	Electricity	156,624 kWh	564 GJ	\$12,140	3.4 t	1,076 GJ	\$17,935 22.7 t
	Natural Gas	513 GJ	513 GJ	\$5,796	19.2 t		
HERITAGE SITE - 2760 RIVER RD	Electricity	2,864 kWh	10 GJ	\$233	0.1 t	10 GJ	\$233 0.1 t
<b>Heritage Site Subtotal</b>	Electricity	159,488 kWh	574 GJ	\$12,372	3.5 t	<b>1,087 GJ</b>	<b>\$18,168 22.7 t</b>
	Natural Gas	513 GJ	513 GJ	\$5,796	19.2 t		
<b>Ice Arena</b>							
MINORU ARENA - 7551 MINORU GATE	Electricity	1,548,974 kWh	5,576 GJ	\$84,703	34.1 t	8,467 GJ	\$107,061 142.5 t
	Natural Gas	2,891 GJ	2,891 GJ	\$22,358	108.4 t		
RICHMOND ICE CENTER - 14140 TRIANGLE RD	Electricity	2,997,761 kWh	10,792 GJ	\$170,445	66.0 t	30,672 GJ	\$324,773 811.4 t
	Natural Gas	19,880 GJ	19,880 GJ	\$154,327	745.5 t		
<b>Ice Arena Subtotal</b>	Electricity	4,546,734 kWh	16,368 GJ	\$255,149	100.0 t	<b>39,139 GJ</b>	<b>\$431,834 953.9 t</b>
	Natural Gas	22,771 GJ	22,771 GJ	\$176,685	853.9 t		
<b>Indoor Pool</b>							
MINORU AQUATIC CENTER   MINORU POOL - 7560 MINORU GATE	Electricity	1,182,539 kWh	4,257 GJ	\$58,590	26.0 t	23,126 GJ	\$204,399 733.6 t
	Natural Gas	18,869 GJ	18,869 GJ	\$145,810	707.6 t		
WATERMANIA - 14300 ENTERTAINMENT BLV	Electricity	2,840,464 kWh	10,226 GJ	\$140,124	62.5 t	32,546 GJ	\$314,415 899.5 t
	Natural Gas	22,321 GJ	22,321 GJ	\$174,290	837.0 t		
<b>Indoor Pool Subtotal</b>	Electricity	4,023,002 kWh	14,483 GJ	\$198,714	88.5 t	<b>55,672 GJ</b>	<b>\$518,814 1,633.1 t</b>
	Natural Gas	41,189 GJ	41,189 GJ	\$320,100	1,544.6 t		
<b>Library</b>							
IRONWOOD LIBRARY - 11688 STEVESTON HWY 8200	Electricity	253,163 kWh	911 GJ	\$17,734	5.6 t	1,069 GJ	\$19,940 11.5 t
	Natural Gas	157 GJ	157 GJ	\$2,206	5.9 t		

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## Corporate Energy &amp; Greenhouse Gas Emissions Inventory: 2007

Account & Address	Account Consumption & Costs by Energy Type				Account Subtotal		
	Type	Consumption	Energy	Costs	CO <sub>2</sub> e	Energy	Costs CO <sub>2</sub> e
MAIN BRANCH & CULTURAL CENTRE - 7700 MINORU GATE	Electricity	1,841,566 kWh	6,630 GJ	\$96,889	40.5 t	11,390 GJ	\$133,513 219.0 t
	Natural Gas	4,760 GJ	4,760 GJ	\$36,624	178.5 t		
STEVESTON BRANCH & COMMUNITY CENTRE - 4111 MONCTON ST	Electricity	547,625 kWh	1,971 GJ	\$32,616	12.0 t	8,027 GJ	\$79,948 239.1 t
	Natural Gas	6,056 GJ	6,056 GJ	\$47,331	227.1 t		
Library Subtotal	Electricity	2,642,355 kWh	9,512 GJ	\$147,240	58.1 t	20,486 GJ	\$233,401 469.6 t
	Natural Gas	10,973 GJ	10,973 GJ	\$86,161	411.5 t		
<b>Museum</b>							
STEVESTON MUSEUM   POST OFFICE - 3811 MONCTON ST	Electricity	20,534 kWh	74 GJ	\$1,661	0.5 t	74 GJ	\$1,661 0.5 t
Museum Subtotal	Electricity	20,534 kWh	74 GJ	\$1,661	0.5 t	74 GJ	\$1,661 0.5 t
<b>Outdoor Pools</b>							
SOUTH ARM (OUTDOOR) - 10100 SOUTH ARM PL	Electricity	129,435 kWh	466 GJ	\$10,164	2.8 t	874 GJ	\$14,976 18.2 t
	Natural Gas	409 GJ	409 GJ	\$4,812	15.3 t		
STEVESTON (OUTDOOR) - 4151 MONCTON ST	Electricity	218,914 kWh	788 GJ	\$16,172	4.8 t	1,382 GJ	\$23,631 27.1 t
	Natural Gas	594 GJ	594 GJ	\$7,459	22.3 t		
Outdoor Pools Subtotal	Electricity	348,349 kWh	1,254 GJ	\$26,335	7.7 t	2,257 GJ	\$38,606 45.3 t
	Natural Gas	1,003 GJ	1,003 GJ	\$12,271	37.6 t		
<b>Park Fieldhouse</b>							
FORSYTHE PARK - 6200 FORSYTHE CRS A	Electricity	2,973 kWh	11 GJ	\$292	0.1 t	11 GJ	\$292 0.1 t
GARRY POINT PARK - 12771 7TH AVE	Electricity	90,377 kWh	325 GJ	\$7,104	2.0 t	408 GJ	\$8,396 5.1 t
	Natural Gas	82 GJ	82 GJ	\$1,292	3.1 t		
HUGH BOYD PARK - 9300 NO 1 RD	Electricity	3,782 kWh	14 GJ	\$356	0.1 t	129 GJ	\$1,922 4.4 t
	Natural Gas	115 GJ	115 GJ	\$1,566	4.3 t		
LAWN BOWLING CLUBHOUSE   SHED - 7328 WESTMINSTER HIGHWAY	Electricity	167,233 kWh	602 GJ	\$13,271	3.7 t	602 GJ	\$13,271 3.7 t
WOODWARD'S LANDING   SCOUT GUIDE CAMP - 11551 DYKE RD	Electricity	40,584 kWh	146 GJ	\$2,702	0.9 t	146 GJ	\$2,702 0.9 t
Park Fieldhouse Subtotal	Electricity	304,949 kWh	1,098 GJ	\$23,725	6.7 t	1,295 GJ	\$26,583 14.1 t
	Natural Gas	198 GJ	198 GJ	\$2,858	7.4 t		
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### Corporate Energy & Greenhouse Gas Emissions Inventory: 2007

Account & Address		Account Consumption & Costs by Energy Type					Account Subtotal			
		Type	Consumption	Energy	Costs	CO <sub>2</sub> e	Energy	Costs	CO <sub>2</sub> e	
Park Washrooms										
DIXON PARK - 9340 GORMOND RD		Electricity	12,693 kWh	46 GJ	\$1,052	0.3 t	46 GJ	\$1,052	0.3 t	
DYKE ROAD WASHROOM - 6140 DYKE RD		Electricity	14,066 kWh	51 GJ	\$1,156	0.3 t	51 GJ	\$1,156	0.3 t	
GARDEN CITY PARK - 9280 ALBERTA RD		Electricity	6,631 kWh	24 GJ	\$538	0.1 t	24 GJ	\$538	0.1 t	
SHELL ROAD WASHROOM - 10951 SHELL RD		Electricity	7,486 kWh	27 GJ	\$648	0.2 t	27 GJ	\$648	0.2 t	
TERRA NOVA RURAL PARK - 2351 RIVER RD		Electricity	18,498 kWh	67 GJ	\$1,501	0.4 t	67 GJ	\$1,501	0.4 t	
Park Washrooms Subtotal		Electricity	59,374 kWh	214 GJ	\$4,895	1.3 t	214 GJ	\$4,895	1.3 t	
Parks & Playing Fields										
COOK NEIGHBOURHOOD PARK - 8600 COOK RD		Electricity	7,678 kWh	28 GJ	\$656	0.2 t	28 GJ	\$656	0.2 t	
LANG PARK - 8211 SABA RD		Electricity	29,251 kWh	105 GJ	\$2,340	0.6 t	105 GJ	\$2,340	0.6 t	
LONDON   STEVESTON ATHLETIC PARK - 6500 WILLIAMS RD		Electricity	97,885 kWh	352 GJ	\$9,323	2.2 t	352 GJ	\$9,323	2.2 t	
MINORU PARK - 7191 GRANVILLE AVE		Electricity	185,331 kWh	667 GJ	\$18,854	4.1 t	1,052 GJ	\$23,455	18.5 t	
		Natural Gas	385 GJ	385 GJ	\$4,600	14.4 t				
MINORU PARK - 6860 GILBERT RD		Electricity	186,746 kWh	672 GJ	\$13,430	4.1 t	672 GJ	\$13,430	4.1 t	
MINORU PARK - 6860 GILBERT RD		Electricity	13,358 kWh	48 GJ	\$1,105	0.3 t	48 GJ	\$1,105	0.3 t	
MINORU PARK - 6860 GILBERT RD		Electricity	0 kWh	0 GJ	\$0	0.0 t	1,726 GJ	\$19,051	64.7 t	
		Natural Gas	1,726 GJ	1,726 GJ	\$19,051	64.7 t				
PALMER   GARDEN CITY NEIGHBOURHOOD PARK - 9280 ALBERTA RD		Electricity	5,581 kWh	20 GJ	\$494	0.1 t	20 GJ	\$494	0.1 t	
		Ornamental Pump								
PALMER   GARDEN CITY NEIGHBOURHOOD PARK - 8301 GARDEN CITY RD		Electricity	34,791 kWh	125 GJ	\$2,774	0.8 t	125 GJ	\$2,774	0.8 t	
PALMER   GARDEN CITY NEIGHBOURHOOD PARK - 8301 GARDEN CITY RD		Electricity	9,657 kWh	35 GJ	\$676	0.2 t	35 GJ	\$676	0.2 t	
SKATEBOARD PARK - 5360 RIVER RD		Electricity	3,867 kWh	14 GJ	\$368	0.1 t	14 GJ	\$368	0.1 t	
STEVESTON COMMUNITY PARK - 4271 MONCTON ST PARK		Electricity	10,060 kWh	36 GJ	\$847	0.2 t	36 GJ	\$847	0.2 t	
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### Corporate Energy & Greenhouse Gas Emissions Inventory: 2007

Account & Address	Account Consumption & Costs by Energy Type					Account Subtotal	
	Type	Consumption	Energy	Costs	CO <sub>2</sub> e	Energy	Costs CO <sub>2</sub> e
Parks & Playing Fields Subtotal	Electricity Natural Gas	584,205 kWh 2,111 GJ	2,103 GJ 2,111 GJ	\$50,867 \$23,652	12.9 t 79.2 t	<b>4,214 GJ</b>	<b>\$74,519 92.0 t</b>
<b>Public Works Bldg &amp; Yard</b>							
RECYCLING DEPOT - 5555 LYNAS LN	Electricity	24,885 kWh	90 GJ	\$2,000	0.5 t	90 GJ	\$2,000 0.5 t
RECYCLING DEPOT - UNION TRAILER - 5000 LYNAS LN	Electricity	14,083 kWh	51 GJ	\$1,156	0.3 t	51 GJ	\$1,156 0.3 t
SIDAWAY ANCILLARY WORKS YARD - 6711 SIDAWAY RD	Electricity	10,837 kWh	39 GJ	\$909	0.2 t	39 GJ	\$909 0.2 t
WORKS YARD - 5555 LYNAS LN	Electricity Natural Gas	1,224,117 kWh 7,308 GJ	4,407 GJ 7,308 GJ	\$68,132 \$56,961	26.9 t 274.0 t	11,715 GJ	\$125,093 301.0 t
Public Works Bldg & Yard Subtotal	Electricity Natural Gas	1,273,922 kWh 7,308 GJ	4,586 GJ 7,308 GJ	\$72,197 \$56,961	28.0 t 274.0 t	<b>11,894 GJ</b>	<b>\$129,158 302.1 t</b>
<b>Seniors Centre</b>							
MINORU SENIORS CENTRE - 7660 MINORU GATE	Electricity Natural Gas	198,589 kWh 1,619 GJ	715 GJ 1,619 GJ	\$16,423 \$18,904	4.4 t 60.7 t	2,334 GJ	\$35,327 65.1 t
Seniors Centre Subtotal	Electricity Natural Gas	198,589 kWh 1,619 GJ	715 GJ 1,619 GJ	\$16,423 \$18,904	4.4 t 60.7 t	<b>2,334 GJ</b>	<b>\$35,327 65.1 t</b>
<b>Spray Park</b>							
STEVESTON PARK   WATER PARK MILLENIUM PROJECT - 4005 MONCTON ST	Electricity	9,839 kWh	35 GJ	\$816	0.2 t	35 GJ	\$816 0.2 t
Spray Park Subtotal	Electricity	9,839 kWh	35 GJ	\$816	0.2 t	<b>35 GJ</b>	<b>\$816 0.2 t</b>
<b>Storage Facility</b>							
CORPORATE STORAGE FACILITY - 4631 SHELL RD 110	Electricity Natural Gas	12,359 kWh 124 GJ	44 GJ 124 GJ	\$1,025 \$2,122	0.3 t 4.6 t	168 GJ	\$3,147 4.9 t
CORPORATE STORAGE FACILITY - 4631 SHELL RD 110	Electricity	36,575 kWh	132 GJ	\$2,916	0.8 t	132 GJ	\$2,916 0.8 t
Storage Facility Subtotal	Electricity Natural Gas	48,934 kWh 124 GJ	176 GJ 124 GJ	\$3,941 \$2,122	1.1 t 4.6 t	<b>300 GJ</b>	<b>\$6,064 5.7 t</b>
<b>Theatre</b>							

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### Corporate Energy & Greenhouse Gas Emissions Inventory: 2007

Account & Address	Account Consumption & Costs by Energy Type						Account Subtotal	
	Type	Consumption	Energy	Costs	CO <sub>2</sub> e		Energy	Costs CO <sub>2</sub> e
RICHMOND GATEWAY THEATER - 6500 GILBERT RD	Electricity Natural Gas	573,517 kWh 2,900 GJ	2,065 GJ 2,900 GJ	\$35,168 \$33,570	12.6 t 108.8 t		4,965 GJ	\$68,738 121.4 t
<b>Theatre Subtotal</b>		573,517 kWh 2,900 GJ	2,065 GJ 2,900 GJ	\$35,168 \$33,570	12.6 t 108.8 t		<b>4,965 GJ</b>	<b>\$68,738 121.4 t</b>
<b>Buildings Subtotal</b>		Consumption 21,594,611 kWh 104,988 GJ	Energy 77,741 GJ 104,988 GJ	Costs \$1,266,863 \$908,397	CO <sub>2</sub> e 475.1 t 3,937.1 t		<b>182,729 GJ</b>	<b>\$2,175,260 4,412.1 t</b>
<b>LIGHTING</b>								
<b>Ornamental Lighting</b>								
ORNAMENTAL STREET LTG -	Electricity	6,487,987 kWh	23,357 GJ	\$454,385	142.7 t		23,357 GJ	\$454,385 142.7 t
PARKING LOT LIGHTS (OPEN) - 12011 7TH AVE	Electricity	13,188 kWh	47 GJ	\$1,087	0.3 t		47 GJ	\$1,087 0.3 t
TREE LIGHTING - WESTMINSTER HWY W/O NO 3 RD	Electricity	761 kWh	3 GJ	\$119	0.0 t		3 GJ	\$119 0.0 t
TREE LIGHTING - BROWNWOOD RD/HAZEL BRIDGE WY	Electricity	805 kWh	3 GJ	\$123	0.0 t		3 GJ	\$123 0.0 t
TREE LIGHTING - 8288 SABA RD SLT	Electricity	910 kWh	3 GJ	\$128	0.0 t		3 GJ	\$128 0.0 t
TREE LIGHTING - 8171 SABA RD SLT	Electricity	549 kWh	2 GJ	\$113	0.0 t		2 GJ	\$113 0.0 t
TREE LIGHTING - 6211 NO 3 RD SLT	Electricity	284 kWh	1 GJ	\$93	0.0 t		1 GJ	\$93 0.0 t
TREE LIGHTING - 6711 NO. 3/RD SLT	Electricity	416 kWh	1 GJ	\$98	0.0 t		1 GJ	\$98 0.0 t
TREE LIGHTING KIOSK   READER BOARD - 8271 WESTMINSTER HWY	Electricity	2 kWh	0 GJ	\$88	0.0 t		0 GJ	\$88 0.0 t
<b>Ornamental Lighting Subtotal</b>	Electricity	6,504,902 kWh	23,418 GJ	\$456,234	143.1 t		<b>23,418 GJ</b>	<b>\$456,234 143.1 t</b>
<b>Overhead Lighting</b>								
POLE LIGHT - 8541 KILMORE RD	Electricity	3,812 kWh	14 GJ	\$355	0.1 t		14 GJ	\$355 0.1 t
POLE LIGHT - ENGLISH ST BAYVIEW EXTENSION	Electricity	14,627 kWh	53 GJ	\$1,204	0.3 t		53 GJ	\$1,204 0.3 t
<b>Overhead Lighting Subtotal</b>	Electricity	18,439 kWh	66 GJ	\$1,559	0.4 t		<b>66 GJ</b>	<b>\$1,559 0.4 t</b>
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## Corporate Energy & Greenhouse Gas Emissions Inventory: 2007

Account & Address	Account Consumption & Costs by Energy Type					Account Subtotal	
	Type	Consumption	Energy	Costs	CO <sub>2</sub> e	Energy	Costs
<b>Pedestrian Signal</b>							
PEDESTRIAN SIGNAL - MONCTON/RAILWAY AVE	Electricity	2,148 kWh	8 GJ	\$149	0.0 t	8 GJ	\$149
PEDESTRIAN SIGNAL - 6251 MINORU BLVD	Electricity	4,462 kWh	16 GJ	\$311	0.1 t	16 GJ	\$311
PEDESTRIAN SIGNAL - CAMBIE RD/SEXSMITH RD	Electricity	2,567 kWh	9 GJ	\$179	0.1 t	9 GJ	\$179
PEDESTRIAN SIGNAL - BUSWELL ST/GRANVILLE AVE	Electricity	4,464 kWh	16 GJ	\$310	0.1 t	16 GJ	\$310
PEDESTRIAN SIGNAL - NO 3 RD/ANDERSON RD	Electricity	4,546 kWh	16 GJ	\$316	0.1 t	16 GJ	\$316
PEDESTRIAN SIGNAL - BLUNDELL RD/CHEVOT PL	Electricity	4,512 kWh	16 GJ	\$314	0.1 t	16 GJ	\$314
PEDESTRIAN SIGNAL - BLUNDELL RD/MONTANA RD	Electricity	4,505 kWh	16 GJ	\$313	0.1 t	16 GJ	\$313
PEDESTRIAN SIGNAL - RIVERDALE/WESTMINSTER HWY	Electricity	4,500 kWh	16 GJ	\$313	0.1 t	16 GJ	\$313
PEDESTRIAN SIGNAL - BLUNDELL RD/CLIFTON RD	Electricity	4,500 kWh	16 GJ	\$313	0.1 t	16 GJ	\$313
PEDESTRIAN SIGNAL - STEVESTON HWY/LASSAM RD	Electricity	40,388 kWh	145 GJ	\$2,810	0.9 t	145 GJ	\$2,810
PEDESTRIAN SIGNAL - MINORU BLV AT RAMP STATION	Electricity	4,497 kWh	16 GJ	\$313	0.1 t	16 GJ	\$313
PEDESTRIAN SIGNAL - PETERSON GRE/NO 1 RD	Electricity	4,500 kWh	16 GJ	\$313	0.1 t	16 GJ	\$313
PEDESTRIAN SIGNAL - BLUNDELL RD/ASH ST	Electricity	4,500 kWh	16 GJ	\$313	0.1 t	16 GJ	\$313
<b>Pedestrian Signal Subtotal</b>	<b>Electricity</b>	<b>90,088 kWh</b>	<b>324 GJ</b>	<b>\$6,267</b>	<b>2.0 t</b>	<b>324 GJ</b>	<b>\$6,267</b>
<b>Recreation Lighting</b>							
DOCK LIGHTING - 6010 DYKE RD	Electricity	2,103 kWh	8 GJ	\$222	0.0 t	8 GJ	\$222
HAMILTON COMMUNITY CENTRE SIGN - 22960 WESTMINSTER HWY	Electricity	2,282 kWh	8 GJ	\$238	0.1 t	8 GJ	\$238
HUGH BOYD PLAYING FIELD LIGHTING - 9551 PENDLETON RD	Electricity	221,586 kWh	798 GJ	\$19,706	4.9 t	798 GJ	\$19,706
HUGH BOYD TENNIS COURT LIGHTING - 9573 PENDLETON RD	Electricity	32,610 kWh	117 GJ	\$2,610	0.7 t	117 GJ	\$2,610
IMPERIAL LANDING TRAIL LIGHTING - WESTWATER/RAILWAY AVE	Electricity	31,835 kWh	115 GJ	\$2,543	0.7 t	115 GJ	\$2,543
SOUTH ARM PLAYING FIELD LIGHTING - 8880 WILLIAMS RD	Electricity	82,955 kWh	299 GJ	\$6,565	1.8 t	299 GJ	\$6,565

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### Corporate Energy & Greenhouse Gas Emissions Inventory: 2007

Account & Address	Account Consumption & Costs by Energy Type					Account Subtotal	
	Type	Consumption	Energy	Costs	CO <sub>2</sub> e	Energy	Costs CO <sub>2</sub> e
TENNIS COURT LIGHTING - 1391 LANCASTER CRS	Electricity	19,420 kWh	70 GJ	\$1,578	0.4 t	70 GJ	\$1,578 0.4 t
TENNIS COURT LIGHTING - LANCASTER CRS/WELLINGTON ST	Electricity	1,404 kWh	5 GJ	\$170	0.0 t	5 GJ	\$170 0.0 t
Recreation Lighting Subtotal	Electricity	394,195 kWh	1,419 GJ	\$33,631	8.7 t	1,419 GJ	\$33,631 8.7 t
<b>Traffic Signal</b>							
ALL TRAFFIC SIGNALS -	Electricity	617,472 kWh	2,223 GJ	\$44,012	13.6 t	2,223 GJ	\$44,012 13.6 t
Traffic Signal Subtotal	Electricity	617,472 kWh	2,223 GJ	\$44,012	13.6 t	2,223 GJ	\$44,012 13.6 t
Lighting Subtotal	Electricity	Consumption 7,625,095 kWh	Energy 27,450 GJ	Costs \$541,704	CO <sub>2</sub> e 167.8 t	27,450 GJ	\$541,704 167.8 t
<b>WATER &amp; WASTEWATER</b>							
<b>Drainage Pump Station</b>							
BATH SLOUGH-25 - 12191 RIVER RD PUMP	Electricity	169,258 kWh	609 GJ	\$25,777	3.7 t	609 GJ	\$25,777 3.7 t
BLUNDELL ROAD WEST-16 ST/10_28_29 - 2500 BLUNDELL RD	Electricity	52,961 kWh	191 GJ	\$5,221	1.2 t	191 GJ	\$5,221 1.2 t
CAMBIE ROAD-21 - 7711 RIVER RD	Electricity	94,240 kWh	339 GJ	\$9,980	2.1 t	339 GJ	\$9,980 2.1 t
DRAINAGE - 7980 MILLER RD	Electricity	4,822 kWh	17 GJ	\$437	0.1 t	17 GJ	\$437 0.1 t
DRAINAGE - No 1 Rd S Ft	Electricity	97,975 kWh	353 GJ	\$13,395	2.2 t	353 GJ	\$13,395 2.2 t
DRAINAGE - 11771 No 4 Rd A	Electricity	9,460 kWh	34 GJ	\$1,171	0.2 t	34 GJ	\$1,171 0.2 t
DRAINAGE - 5 FT MITCHELL RD	Electricity	5,056 kWh	18 GJ	\$915	0.1 t	18 GJ	\$915 0.1 t
DRAINAGE - No 6 Rd/RIVER RD	Electricity	56,976 kWh	205 GJ	\$6,857	1.3 t	205 GJ	\$6,857 1.3 t
DRAINAGE - NORTH DIDS 15 No 7/RIVER RD	Electricity	129,315 kWh	466 GJ	\$14,781	2.8 t	466 GJ	\$14,781 2.8 t
DRAINAGE - No 8 Rd N Ft	Electricity	90,692 kWh	326 GJ	\$11,056	2.0 t	326 GJ	\$11,056 2.0 t
DRAINAGE - 10980 No 6 Rd A	Electricity	143,818 kWh	518 GJ	\$14,054	3.2 t	518 GJ	\$14,054 3.2 t

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## Corporate Energy &amp; Greenhouse Gas Emissions Inventory: 2007

Account & Address	Account Consumption & Costs by Energy Type					Account Subtotal	
	Type	Consumption	Energy	Costs	CO <sub>2</sub> e	Energy	Costs
EWEN ROAD-2 - No 9 Rd Fr/Ewan Rd	Electricity	35,279 kWh	127 GJ	\$4,500	0.8 t	127 GJ	\$4,500
EWEN ROAD-2 DOG KENNELS - 20291 WESTMINSTER HWY A	Electricity	3,558 kWh	13 GJ	\$334	0.1 t	13 GJ	\$334
FRANCIS ROAD WEST-15 - 2500 FRANCIS RD	Electricity	23,529 kWh	85 GJ	\$2,492	0.5 t	85 GJ	\$2,492
FRANCIS ROAD WEST-15 - 2500 FRANCIS RD	Electricity	52,703 kWh	190 GJ	\$2,881	1.2 t	190 GJ	\$2,881
GILBERT AT STEVESTON DRAINAGE - 11020 GILBERT RD A	Electricity	29,204 kWh	105 GJ	\$2,346	0.6 t	105 GJ	\$2,346
GILBERT NORTH-20 - 6551 RIVER RD	Electricity	62,189 kWh	224 GJ	\$15,117	1.4 t	224 GJ	\$15,117
GILBERT SOUTH-10 - 6900 LUCAS RD	Electricity	2 kWh	0 GJ	\$88	0.0 t	0 GJ	\$88
GILBERT SOUTH-10 - 13180 GILBERT RD PUMP	Electricity	4,268 kWh	15 GJ	\$399	0.1 t	15 GJ	\$399
HORSHOE SLOUGH - 7 - SHELL RD S Ff	Electricity	122,221 kWh	440 GJ	\$15,206	2.7 t	440 GJ	\$15,206
MCCALLAN ROAD NORTH-18 - 5011 RIVER RD	Electricity	15,641 kWh	56 GJ	\$1,795	0.3 t	56 GJ	\$1,795
NELSON ROAD-3 - NELSON RD S Ff	Electricity	82,711 kWh	298 GJ	\$9,434	1.8 t	298 GJ	\$9,434
No 1 ROAD NORTH-17 - 4011 RIVER RD	Electricity	24,128 kWh	87 GJ	\$4,149	0.5 t	87 GJ	\$4,149
No 2 Rd NORTH - No 2 Rd BRIDGE No 2/River Rd	Electricity	83,785 kWh	302 GJ	\$6,601	1.8 t	302 GJ	\$6,601
No 2 Rd SOUTH - 13131 No 2 Rd	Electricity	26,596 kWh	96 GJ	\$7,527	0.6 t	96 GJ	\$7,527
No 3 ROAD SOUTH-9 - 14040 No 3 Rd A	Electricity	104,123 kWh	375 GJ	\$10,168	2.3 t	375 GJ	\$10,168
No 4 Rd NORTH-23 - 9991 RIVER RD	Electricity	35,375 kWh	127 GJ	\$6,295	0.8 t	127 GJ	\$6,295
No 7 ROAD SOUTH-4 - 9091 No 7 Rd	Electricity	89,960 kWh	324 GJ	\$16,742	2.0 t	324 GJ	\$16,742
PEACE ARCH PUMP STN - 12811 RICE MILL RD	Electricity	24,104 kWh	87 GJ	\$3,614	0.5 t	87 GJ	\$3,614
QUEENS NORTH-1 - 23231 RIVER RD	Electricity	119,304 kWh	429 GJ	\$13,202	2.6 t	429 GJ	\$13,202
SHELL ROAD NORTH-24 - 11000 RIVER RD	Electricity	107,286 kWh	386 GJ	\$11,910	2.4 t	386 GJ	\$11,910
STEVESTON HWY, WEST-13 StP6 - STEVESTON HWY W END	Electricity	14,480 kWh	52 GJ	\$1,455	0.3 t	52 GJ	\$1,455
TIPPING ROAD SOUTH StP54 - 1020 TIPPING RD	Electricity	122 kWh	0 GJ	\$92	0.0 t	0 GJ	\$92

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	Type	Consumption	Energy	Costs	CO <sub>2</sub> e	Energy	Costs
WILLIAMS ROAD WEST-14 STp5 - 2500 WILLIAMS RD	Electricity	24,138 kWh	87 GJ	\$1,947	0.5 t	87 GJ	\$1,947
WOODWARDS SLOUGH-8 - 9200 DYKE RD	Electricity	119,796 kWh	431 GJ	\$27,390	2.6 t	431 GJ	\$27,390
<b>Drainage Pump Station Subtotal</b>	<b>Electricity</b>	<b>2,059,072 kWh</b>	<b>7,413 GJ</b>	<b>\$269,327</b>	<b>45.3 t</b>	<b>7,413 GJ</b>	<b>\$269,327</b>
<b>Liquid Waste Lift Station</b>							
LWLS - SE CORNER BOEING AVE/CATALINA CRIS	Electricity	83 kWh	0 GJ	\$89	0.0 t	0 GJ	\$89
LWLS - 6420 BUSWELL ST	Electricity	15,511 kWh	56 GJ	\$1,253	0.3 t	56 GJ	\$1,253
<b>Liquid Waste Lift Station Subtotal</b>	<b>Electricity</b>	<b>15,594 kWh</b>	<b>56 GJ</b>	<b>\$1,342</b>	<b>0.3 t</b>	<b>56 GJ</b>	<b>\$1,342</b>
<b>Liquid Waste Pump Station</b>							
PUMP STATION - 5640 OLIVER DR PUMP	Electricity	7,283 kWh	26 GJ	\$629	0.2 t	26 GJ	\$629
SANITARY PUMP STATION-OLIVER S. - S 22000 COCHRAN DR/ N 5060 OLIVER	Electricity	4,007 kWh	14 GJ	\$373	0.1 t	14 GJ	\$373
SANITARY PUMP STATION-ACHESON - 7240 MINORU BLVD	Electricity	7,366 kWh	27 GJ	\$632	0.2 t	27 GJ	\$632
SANITARY PUMP STATION-ACKROYD - 8171 ACKROYD RD A	Electricity	33,361 kWh	120 GJ	\$2,667	0.7 t	120 GJ	\$2,667
SANITARY PUMP STATION-ALBERTA - 9540 ALBERTA RD	Electricity	11,726 kWh	42 GJ	\$977	0.3 t	42 GJ	\$977
SANITARY PUMP STATION-ALDERBRIDGE - OPP 854 LANSDOWNE RD	Electricity	29,556 kWh	106 GJ	\$2,373	0.7 t	106 GJ	\$2,373
SANITARY PUMP STATION-ALDERBRIDGE WEST - 7302 ALDERBRIDGE WAY	Electricity	14,099 kWh	51 GJ	\$1,158	0.3 t	51 GJ	\$1,158
SANITARY PUMP STATION-AMANA - 5388 SMITH DR	Electricity	5,228 kWh	19 GJ	\$468	0.1 t	19 GJ	\$468
SANITARY PUMP STATION-ARCADIA - 8000 BLK ACKROYD RD ARCADIA PUMP	Electricity	40,019 kWh	144 GJ	\$3,188	0.9 t	144 GJ	\$3,188
SANITARY PUMP STATION-ARMOURY - 5000 BLK No 4 Rd	Electricity	220 kWh	1 GJ	\$100	0.0 t	1 GJ	\$100
SANITARY PUMP STATION-ASH - 10011 ASH ST	Electricity	35,399 kWh	127 GJ	\$2,822	0.8 t	127 GJ	\$2,822
SANITARY PUMP STATION-ASPEN - 8282 ASPEN DR	Electricity	8,658 kWh	31 GJ	\$739	0.2 t	31 GJ	\$739
SANITARY PUMP STATION-BARGEN - 11240 DANIELS RD A	Electricity	13,332 kWh	48 GJ	\$1,100	0.3 t	48 GJ	\$1,100
SANITARY PUMP STATION-BARNARD - 6598 BARNARD DR	Electricity	23,575 kWh	85 GJ	\$1,897	0.5 t	85 GJ	\$1,897

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	Type	Consumption	Energy	Costs	CO <sub>2</sub> e	Energy	Costs
SANITARY PUMP STATION-BENNETT EAST - 8555 BENNETT RD PUMP	Electricity	18,924 kWh	68 GJ	\$1,534	0.4 t	68 GJ	\$1,534
SANITARY PUMP STATION-BENNETT WEST - 8151 BENNETT RD A	Electricity	21,203 kWh	76 GJ	\$1,712	0.5 t	76 GJ	\$1,712
SANITARY PUMP STATION-BERRY - 10560 SOUTHGATE RD A	Electricity	6,717 kWh	24 GJ	\$583	0.1 t	24 GJ	\$583
SANITARY PUMP STATION-BLUNDELL - BLUNDELL RD / 8 RD	Electricity	3,910 kWh	14 GJ	\$362	0.1 t	14 GJ	\$362
SANITARY PUMP STATION-BOYD - 9431 PARKSVILLE DR	Electricity	13,127 kWh	47 GJ	\$1,086	0.3 t	47 GJ	\$1,086
SANITARY PUMP STATION-BRIDGE - 4711 JACOBS RD	Electricity	6,471 kWh	23 GJ	\$555	0.1 t	23 GJ	\$555
SANITARY PUMP STATION-BRIDGE - 7355 BRIDGE ST PUMP	Electricity	8,866 kWh	32 GJ	\$754	0.2 t	32 GJ	\$754
SANITARY PUMP STATION-BROADMOOR - 9511 NO. 3 RD	Electricity	25,945 kWh	93 GJ	\$2,084	0.6 t	93 GJ	\$2,084
SANITARY PUMP STATION-BURKVILLE - BOEING AVE/LANCASTER CRs	Electricity	22,481 kWh	81 GJ	\$1,817	0.5 t	81 GJ	\$1,817
SANITARY PUMP STATION-BURROWS - 2011 VAN DYKE PL	Electricity	10,312 kWh	37 GJ	\$867	0.2 t	37 GJ	\$867
SANITARY PUMP STATION-CABOT - 4300 CABOT DR R	Electricity	4,889 kWh	18 GJ	\$442	0.1 t	18 GJ	\$442
SANITARY PUMP STATION-CATHCART - 10220 CATHCART RD A	Electricity	4,641 kWh	17 GJ	\$425	0.1 t	17 GJ	\$425
SANITARY PUMP STATION-CHEVIOT - 7680 CHEVIOT PL A	Electricity	4,919 kWh	18 GJ	\$444	0.1 t	18 GJ	\$444
SANITARY PUMP STATION-CLAYSMITH - 4020 CORDEN RD	Electricity	9,439 kWh	34 GJ	\$798	0.2 t	34 GJ	\$798
SANITARY PUMP STATION-COLBECK - 5400 COLBECK RD A	Electricity	5,410 kWh	19 GJ	\$483	0.1 t	19 GJ	\$483
SANITARY PUMP STATION-CRESTWOOD - 3280 VIKING WAY	Electricity	6,417 kWh	23 GJ	\$562	0.1 t	23 GJ	\$562
SANITARY PUMP STATION-DANIELS - 3791 REES RD	Electricity	12,193 kWh	44 GJ	\$1,011	0.3 t	44 GJ	\$1,011
SANITARY PUMP STATION-DANUBE - 8380 DORVAL RD	Electricity	17,433 kWh	63 GJ	\$1,423	0.4 t	63 GJ	\$1,423
SANITARY PUMP STATION-DOLPHIN - 8660 ASH ST	Electricity	17,765 kWh	64 GJ	\$1,444	0.4 t	64 GJ	\$1,444
SANITARY PUMP STATION-DOMINION - 13580 VULCAN WAY	Electricity	36,609 kWh	132 GJ	\$2,925	0.8 t	132 GJ	\$2,925
SANITARY PUMP STATION-DONALD - 6980 DONALD RD A	Electricity	3,538 kWh	13 GJ	\$337	0.1 t	13 GJ	\$337
SANITARY PUMP STATION-DUNFORD - 11180 FRIGATE CRT	Electricity	5,416 kWh	19 GJ	\$477	0.1 t	19 GJ	\$477

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	Type	Consumption	Energy	Costs	CO <sub>2</sub> e	Energy	Costs
SANITARY PUMP STATION-DUNOON - 760 PETS RD RR	Electricity	7,417 kWh	27 GJ	\$637	0.2 t	27 GJ	\$637
SANITARY PUMP STATION-ECKERSLEY A - 6860 ECKERSLEY RD	Electricity	26,535 kWh	96 GJ	\$2,128	0.6 t	96 GJ	\$2,128
SANITARY PUMP STATION-EDGEMERE - 10371 ARAGON RD	Electricity	96,329 kWh	347 GJ	\$7,583	2.1 t	347 GJ	\$7,583
SANITARY PUMP STATION-ELMBRIDGE - 6751 ELMBRIDGE WAY	Electricity	11,263 kWh	41 GJ	\$939	0.2 t	41 GJ	\$939
SANITARY PUMP STATION-EPPERSON - 7820 WILLOWFIELD DR A	Electricity	5,007 kWh	18 GJ	\$451	0.1 t	18 GJ	\$451
SANITARY PUMP STATION-FERDALE - 9260 FERDALE RD	Electricity	15,170 kWh	55 GJ	\$1,241	0.3 t	55 GJ	\$1,241
SANITARY PUMP STATION-FINLAYSON - 2200 MCLENNAN AVE A	Electricity	7,274 kWh	26 GJ	\$629	0.2 t	26 GJ	\$629
SANITARY PUMP STATION-FORSYTHE - 4120 WESTMINSTER HWY A	Electricity	5,869 kWh	21 GJ	\$519	0.1 t	21 GJ	\$519
SANITARY PUMP STATION-FOSTER - 7391 MCWATH RD	Electricity	6,253 kWh	23 GJ	\$546	0.1 t	23 GJ	\$546
SANITARY PUMP STATION-FOSTER NORTH - 7800 MINORU BLV PUMP	Electricity	10,590 kWh	38 GJ	\$884	0.2 t	38 GJ	\$884
SANITARY PUMP STATION-FRASER - 4479 FRASERSIDE DR	Electricity	3,678 kWh	13 GJ	\$347	0.1 t	13 GJ	\$347
SANITARY PUMP STATION-FRASERPORT NORTH - 7199 NO 8 RD	Electricity	2,160 kWh	8 GJ	\$225	0.0 t	8 GJ	\$225
SANITARY PUMP STATION-FRASERPORT SOUTH - 18199 BLUNDELL RD	Electricity	22,829 kWh	82 GJ	\$1,839	0.5 t	82 GJ	\$1,839
SANITARY PUMP STATION-FRASERWOOD EAST - 22171 FRASERWOOD WAY FRT	Electricity	5,593 kWh	20 GJ	\$493	0.1 t	20 GJ	\$493
SANITARY PUMP STATION-FRASERWOOD WEST - FRASERWOOD WAY WEST	Electricity	2,749 kWh	10 GJ	\$271	0.1 t	10 GJ	\$271
SANITARY PUMP STATION-GABRIOLA - 7940 GABRIOLA GATE A	Electricity	2,302 kWh	8 GJ	\$237	0.1 t	8 GJ	\$237
SANITARY PUMP STATION-GARRATT - 22200 GARRATT DR PUMP	Electricity	3,873 kWh	14 GJ	\$363	0.1 t	14 GJ	\$363
SANITARY PUMP STATION-GARRY - 11851 FENTIMAN PL	Electricity	8,197 kWh	30 GJ	\$701	0.2 t	30 GJ	\$701
SANITARY PUMP STATION-GILLEY EAST - 4991 NO 6 RD	Electricity	15,241 kWh	55 GJ	\$1,252	0.3 t	55 GJ	\$1,252
SANITARY PUMP STATION-GRANDLANDS - 10251 FRESHWATER DR A	Electricity	17,760 kWh	64 GJ	\$1,448	0.4 t	64 GJ	\$1,448
SANITARY PUMP STATION-GRAYBAR - 6801 GRAYBAR RD	Electricity	22,894 kWh	82 GJ	\$1,843	0.5 t	82 GJ	\$1,843
SANITARY PUMP STATION-GVSDD EAST RICHMOND - 23600 GILLEY RD PARK	Electricity	325 kWh	1 GJ	\$104	0.0 t	1 GJ	\$104

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## Corporate Energy &amp; Greenhouse Gas Emissions Inventory: 2007

Account & Address	Account Consumption & Costs by Energy Type					Account Subtotal	
	Type	Consumption	Energy	Costs	CO <sub>2</sub> e	Energy	Costs
SANITARY PUMP STATION-HEATHER - 8135 HEATHER ST	Electricity	5,739 kWh	21 GJ	\$509	0.1 t	21 GJ	\$509
SANITARY PUMP STATION-HEATHER NORTH - 7382 HEATHER ST	Electricity	17,662 kWh	64 GJ	\$1,441	0.4 t	64 GJ	\$1,441
SANITARY PUMP STATION-HIGHFIELD - 10160 SHELLBRIDGE WAY	Electricity	9,568 kWh	34 GJ	\$809	0.2 t	34 GJ	\$809
SANITARY PUMP STATION-HORSESHOE - 12760 HORSESHOE WAY	Electricity	8,754 kWh	32 GJ	\$745	0.2 t	32 GJ	\$745
SANITARY PUMP STATION-IVY - 10340 SPRINGMONT DR A	Electricity	16,250 kWh	58 GJ	\$1,331	0.4 t	58 GJ	\$1,331
SANITARY PUMP STATION-JACOMBS - 3000 JACOMBS RD	Electricity	17,443 kWh	63 GJ	\$1,421	0.4 t	63 GJ	\$1,421
SANITARY PUMP STATION-JONES - 8511 JONES RD PUMP	Electricity	28,401 kWh	102 GJ	\$2,274	0.6 t	102 GJ	\$2,274
SANITARY PUMP STATION-KILBY - 9800 KILBY DR PUMP	Electricity	10,972 kWh	39 GJ	\$916	0.2 t	39 GJ	\$916
SANITARY PUMP STATION-KINGSWOOD - 18499 BLUNDELL RD	Electricity	2,644 kWh	10 GJ	\$263	0.1 t	10 GJ	\$263
SANITARY PUMP STATION-KNIGHTSBRIDGE - No 5 Rd/CAMBIE RD	Electricity	10,552 kWh	38 GJ	\$883	0.2 t	38 GJ	\$883
SANITARY PUMP STATION-LANCING - 5331 BLUNDELL RD	Electricity	22,227 kWh	80 GJ	\$1,797	0.5 t	80 GJ	\$1,797
SANITARY PUMP STATION-LESLIE - 8040 LESLIE RD	Electricity	85,163 kWh	307 GJ	\$6,715	1.9 t	307 GJ	\$6,715
SANITARY PUMP STATION-LIVINGSTONE - 6131 COMSTOCK RD A	Electricity	5,657 kWh	20 GJ	\$502	0.1 t	20 GJ	\$502
SANITARY PUMP STATION-LONDON - 5000 LONDON RD A	Electricity	5,998 kWh	22 GJ	\$526	0.1 t	22 GJ	\$526
SANITARY PUMP STATION-LUCAS - 8500 CULLEN CRES A	Electricity	5,906 kWh	21 GJ	\$519	0.1 t	21 GJ	\$519
SANITARY PUMP STATION-LURGAN - 8180 LURGAN RD A	Electricity	8,082 kWh	29 GJ	\$688	0.2 t	29 GJ	\$688
SANITARY PUMP STATION-LYNAS - 6511 LYNAS LN	Electricity	22,637 kWh	81 GJ	\$1,830	0.5 t	81 GJ	\$1,830
SANITARY PUMP STATION-MANG - 6711 COMSTOCK RD A	Electricity	4,893 kWh	18 GJ	\$442	0.1 t	18 GJ	\$442
SANITARY PUMP STATION-MAINLY - 7891 FROBISHER DR	Electricity	4,523 kWh	16 GJ	\$414	0.1 t	16 GJ	\$414
SANITARY PUMP STATION-MAPLE - 6420 MAPLE RD A	Electricity	7,673 kWh	28 GJ	\$660	0.2 t	28 GJ	\$660
SANITARY PUMP STATION-MCCARTNEY - 18397 MCCARTNEY WAY PUMP	Electricity	1,719 kWh	6 GJ	\$194	0.0 t	6 GJ	\$194
SANITARY PUMP STATION-MCKINNEY - 10460 HOLLYBANK DR	Electricity	7,529 kWh	27 GJ	\$646	0.2 t	27 GJ	\$646

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Account & Address	Account Consumption & Costs by Energy Type					Account Subtotal	
	Type	Consumption	Energy	Costs	CO <sub>2</sub> e	Energy	Costs
SANITARY PUMP STATION-McLENNAN - 10460 BRIDGEPORT RD A	Electricity	13,672 kWh	49 GJ	\$1,130	0.3 t	49 GJ	\$1,130
SANITARY PUMP STATION-MINLER - 8380 MINLER RD A	Electricity	6,205 kWh	22 GJ	\$545	0.1 t	22 GJ	\$545
SANITARY PUMP STATION-MINORU - 5500 CEDARBRIDGE WAY	Electricity	29,531 kWh	106 GJ	\$2,367	0.6 t	106 GJ	\$2,367
SANITARY PUMP STATION-MITCHELL - 13097 MITCHELL RD	Electricity	4,550 kWh	16 GJ	\$416	0.1 t	16 GJ	\$416
SANITARY PUMP STATION-MOFFATT - 7455 MOFFATT RD RR	Electricity	31,028 kWh	112 GJ	\$2,479	0.7 t	112 GJ	\$2,479
SANITARY PUMP STATION-MONTEITH - 11791 KINGFISHER DR A	Electricity	11,313 kWh	41 GJ	\$944	0.2 t	41 GJ	\$944
SANITARY PUMP STATION-MONTROSE - 10400 NO 3 RD	Electricity	46,604 kWh	168 GJ	\$3,706	1.0 t	168 GJ	\$3,706
SANITARY PUMP STATION-NORTON - 22771 NORTON CRT PUMP	Electricity	4,788 kWh	17 GJ	\$434	0.1 t	17 GJ	\$434
SANITARY PUMP STATION-ODLIN - 10500 ODLIN RD PUMP	Electricity	21,942 kWh	79 GJ	\$1,773	0.5 t	79 GJ	\$1,773
SANITARY PUMP STATION-OESER - 10651 HOGARTH DR	Electricity	9,823 kWh	35 GJ	\$825	0.2 t	35 GJ	\$825
SANITARY PUMP STATION-PARSONS - 6760 GOLDSMITH DR A	Electricity	4,432 kWh	16 GJ	\$404	0.1 t	16 GJ	\$404
SANITARY PUMP STATION-PENDLEBURY - 4420 PENDLEBURY RD	Electricity	6,352 kWh	23 GJ	\$557	0.1 t	23 GJ	\$557
SANITARY PUMP STATION-PHOENIX - 4580 MONCTON ST	Electricity	7,243 kWh	26 GJ	\$623	0.2 t	26 GJ	\$623
SANITARY PUMP STATION-PIGOTT EAST - 8991 PIGOTT RD A	Electricity	6,140 kWh	22 GJ	\$540	0.1 t	22 GJ	\$540
SANITARY PUMP STATION-PIGOTT WEST - 9851 PIGOTT RD A	Electricity	3,453 kWh	12 GJ	\$330	0.1 t	12 GJ	\$330
SANITARY PUMP STATION-QUEEN - FRASERWOOD WAY	Electricity	3,527 kWh	13 GJ	\$331	0.1 t	13 GJ	\$331
SANITARY PUMP STATION-QUILCHENA - 3640 MORESBY DR A	Electricity	15,589 kWh	56 GJ	\$1,274	0.3 t	56 GJ	\$1,274
SANITARY PUMP STATION-RANSFORD - RANSFORD RD	Electricity	8,095 kWh	29 GJ	\$693	0.2 t	29 GJ	\$693
SANITARY PUMP STATION-REGENT - NO 1 RD/REGENT ST	Electricity	5,715 kWh	21 GJ	\$511	0.1 t	21 GJ	\$511
SANITARY PUMP STATION-RICHMOND CENTRE - 6451 NO 3 RD	Electricity	41,900 kWh	151 GJ	\$3,328	0.9 t	151 GJ	\$3,328
SANITARY PUMP STATION-RIVERDALE - 4791 WEBSTER RD	Electricity	7,038 kWh	25 GJ	\$606	0.2 t	25 GJ	\$606
SANITARY PUMP STATION-RIVERSIDE EAST - 12140 RIVERSIDE WAY	Electricity	7,610 kWh	27 GJ	\$655	0.2 t	27 GJ	\$655

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	Type	Consumption	Energy	Costs	CO <sub>2</sub> e	Energy	Costs
SANITARY PUMP STATION-ROBINSON - 8360 ROBINSON RD A	Electricity	7,579 kWh	27 GJ	\$650	0.2 t	27 GJ	\$650
SANITARY PUMP STATION-ROWLING - 5500 BLK ROWLING PL	Electricity	3,335 kWh	12 GJ	\$320	0.1 t	12 GJ	\$320
SANITARY PUMP STATION-SAUNDERS - 8540 DEMOREST DR A	Electricity	17,194 kWh	62 GJ	\$1,405	0.4 t	62 GJ	\$1,405
SANITARY PUMP STATION-SAVAGE - 15362 KNOX WAY	Electricity	2,756 kWh	10 GJ	\$276	0.1 t	10 GJ	\$276
SANITARY PUMP STATION-SAXON - 4671 CAMLANN CRT A	Electricity	3,388 kWh	12 GJ	\$325	0.1 t	12 GJ	\$325
SANITARY PUMP STATION-SHARPE - 22239 SHARPE AVE	Electricity	7,682 kWh	28 GJ	\$660	0.2 t	28 GJ	\$660
SANITARY PUMP STATION-SHERIDAN - 6400 WOODWARDS RD RR	Electricity	7,381 kWh	27 GJ	\$637	0.2 t	27 GJ	\$637
SANITARY PUMP STATION-SHERMAN - 11391 WILLIAMS RD	Electricity	22,860 kWh	82 GJ	\$1,843	0.5 t	82 GJ	\$1,843
SANITARY PUMP STATION-SIMPSON - 2320 SIMPSON RD	Electricity	20,940 kWh	75 GJ	\$1,697	0.5 t	75 GJ	\$1,697
SANITARY PUMP STATION-SKYLINE - 8171 CAPSTAN WAY	Electricity	30,182 kWh	109 GJ	\$2,416	0.7 t	109 GJ	\$2,416
SANITARY PUMP STATION-STEVESON - 3500 RICHMOND ST	Electricity	23,597 kWh	85 GJ	\$1,900	0.5 t	85 GJ	\$1,900
SANITARY PUMP STATION-SUNNYMEDE - 8251 SUNNYCROFT RD	Electricity	12,093 kWh	44 GJ	\$1,001	0.3 t	44 GJ	\$1,001
SANITARY PUMP STATION-TEMPLE NORTH - 8560 NO 5 RD	Electricity	1,181 kWh	4 GJ	\$150	0.0 t	4 GJ	\$150
SANITARY PUMP STATION-TEMPLE SOUTH - 10040 NO 5 RD	Electricity	1,884 kWh	7 GJ	\$206	0.0 t	7 GJ	\$206
SANITARY PUMP STATION-TERRA NOVA EAST - 5555 CORNWALL DR	Electricity	13,910 kWh	50 GJ	\$1,143	0.3 t	50 GJ	\$1,143
SANITARY PUMP STATION-TIPPING - 12520 MITCHELL RD A	Electricity	3,881 kWh	14 GJ	\$364	0.1 t	14 GJ	\$364
SANITARY PUMP STATION-TRITES - 12310 TRITES RD	Electricity	10,475 kWh	38 GJ	\$876	0.2 t	38 GJ	\$876
SANITARY PUMP STATION-TUCKER - 6651 GAMBIA DR A	Electricity	3,012 kWh	11 GJ	\$292	0.1 t	11 GJ	\$292
SANITARY PUMP STATION-TURNER NORTH - 22651 MCCLINTON AVE	Electricity	4,128 kWh	15 GJ	\$382	0.1 t	15 GJ	\$382
SANITARY PUMP STATION-TURNER SOUTH - 22711 MCLEAN AVE	Electricity	5,069 kWh	18 GJ	\$456	0.1 t	18 GJ	\$456
SANITARY PUMP STATION-TWIGG - 11935 MITCHELL RD	Electricity	4,416 kWh	16 GJ	\$405	0.1 t	16 GJ	\$405
SANITARY PUMP STATION-TWIGG WEST - 10488 TWIGG PL, PUMP	Electricity	2,300 kWh	8 GJ	\$240	0.1 t	8 GJ	\$240

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Account & Address	Account Consumption & Costs by Energy Type					Account Subtotal	
	Type	Consumption	Energy	Costs	CO <sub>2</sub> e	Energy	Costs CO <sub>2</sub> e
SANITARY PUMP STATION-UTAH NORTH - 6291 BELFLOWER DR A	Electricity	7,668 kWh	28 GJ	\$659	0.2 t	28 GJ	\$659 0.2 t
SANITARY PUMP STATION-UTAH SOUTH - 4731 FOXGLOVE CRES A	Electricity	5,783 kWh	21 GJ	\$512	0.1 t	21 GJ	\$512 0.1 t
SANITARY PUMP STATION-VAN HORNE - 9020 VAN HORNE WAY	Electricity	26,667 kWh	96 GJ	\$2,142	0.6 t	96 GJ	\$2,142 0.6 t
SANITARY PUMP STATION-VICKERS - 12200 VICKERS WAY A	Electricity	5,827 kWh	21 GJ	\$514	0.1 t	21 GJ	\$514 0.1 t
SANITARY PUMP STATION-VICTORIA - 10671 TREPASSEY DR A	Electricity	4,229 kWh	15 GJ	\$391	0.1 t	15 GJ	\$391 0.1 t
SANITARY PUMP STATION-VISCOUNT - 12593 VULCAN WAY	Electricity	3,832 kWh	14 GJ	\$360	0.1 t	14 GJ	\$360 0.1 t
SANITARY PUMP STATION-VULCAN - 12160 VULCAN WAY	Electricity	4,036 kWh	15 GJ	\$376	0.1 t	15 GJ	\$376 0.1 t
SANITARY PUMP STATION-WALFORD - 3211 REGINA AVE	Electricity	11,176 kWh	40 GJ	\$932	0.2 t	40 GJ	\$932 0.2 t
SANITARY PUMP STATION-WALLACE - 10000 KOZIER GTE	Electricity	7,533 kWh	27 GJ	\$646	0.2 t	27 GJ	\$646 0.2 t
SANITARY PUMP STATION-WINDSOR - 22888 WINDSOR CRT	Electricity	4,307 kWh	16 GJ	\$396	0.1 t	16 GJ	\$396 0.1 t
SANITARY PUMP STATION-WOODHEAD - 4371 DALLYN RD	Electricity	30,933 kWh	111 GJ	\$2,482	0.7 t	111 GJ	\$2,482 0.7 t
SANITARY PUMP STATION-WOODHEAD EAST - 12400 WOODHEAD RD PUMP	Electricity	17,475 kWh	63 GJ	\$1,414	0.4 t	63 GJ	\$1,414 0.4 t
SANITARY PUMP STATION-WOODWARDS - MASKALL/WOODWARDS RD	Electricity	8,846 kWh	32 GJ	\$749	0.2 t	32 GJ	\$749 0.2 t
SANITARY PUMP STATION-WOODWARDS EAST - 5511 WOODWARDS RD	Electricity	8,521 kWh	31 GJ	\$723	0.2 t	31 GJ	\$723 0.2 t
SANITARY PUMP STATION-YOUNGMORE - 8840 No. 1 Rd A	Electricity	7,328 kWh	26 GJ	\$633	0.2 t	26 GJ	\$633 0.2 t
Liquid Waste Pump Station Subtotal	Electricity	1,769,707 kWh	6,371 GJ	\$146,499	38.9 t	6,371 GJ	\$146,499 38.9 t
<b>Misc. Facilities</b>							
Dc CHARGER   CATHODIC PROTECTION - 12020 GILBERT RD	Electricity	25,869 kWh	93 GJ	\$2,083	0.6 t	93 GJ	\$2,083 0.6 t
Misc. Facilities Subtotal	Electricity	25,869 kWh	93 GJ	\$2,083	0.6 t	93 GJ	\$2,083 0.6 t
<b>PRV Station</b>							
PRV - 6000 BLK GRAUER RD	Electricity	12,401 kWh	45 GJ	\$1,029	0.3 t	45 GJ	\$1,029 0.3 t
PRV - McDONALD BEACH REC DEV McDONALD R	Electricity	26,834 kWh	97 GJ	\$2,158	0.6 t	97 GJ	\$2,158 0.6 t

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PRV - 6011 RIVER RD	Electricity	59,511 kWh	214 GJ	\$7,339	1.3 t	214 GJ	\$7,339
PRV - 9091 RIVER DR	Electricity	6,075 kWh	22 GJ	\$538	0.1 t	22 GJ	\$538
PRV - 11771 SHELL RD A	Electricity	7,661 kWh	28 GJ	\$660	0.2 t	28 GJ	\$660
PRV - SHELL/IPS STEVESTON	Electricity	74,687 kWh	269 GJ	\$7,991	1.6 t	269 GJ	\$7,991
PRV - 3131 SHELL RD	Electricity	7,083 kWh	25 GJ	\$612	0.2 t	25 GJ	\$612
PRV - BLUNDELL RD/SHELL RD	Electricity	7,312 kWh	26 GJ	\$636	0.2 t	26 GJ	\$636
PRV - SHELL RD/WILLIAMS RD	Electricity	5,134 kWh	18 GJ	\$450	0.1 t	18 GJ	\$450
PRV - 18975 RIVER RD	Electricity	6,106 kWh	22 GJ	\$529	0.1 t	22 GJ	\$529
PRV - ODLIN RD/SHELL RD	Electricity	1,077 kWh	4 GJ	\$144	0.0 t	4 GJ	\$144
PRV - 7701 GRANVILLE AVE	Electricity	404 kWh	1 GJ	\$97	0.0 t	1 GJ	\$97
PRV - 18911 BLUNDELL RD	Electricity	13,334 kWh	48 GJ	\$1,097	0.3 t	48 GJ	\$1,097
PRV - 11040 CAMBIE RD PUMP	Electricity	5,706 kWh	21 GJ	\$507	0.1 t	21 GJ	\$507
PRV - 18951 WESTMINSTER HWY	Electricity	2,840 kWh	10 GJ	\$268	0.1 t	10 GJ	\$268
STEVESTON PRV - 10680 STEVESTON HWY	Electricity	21,032 kWh	76 GJ	\$1,702	0.5 t	76 GJ	\$1,702
PRV Station Subtotal	Electricity	257,197 kWh	926 GJ	\$25,757	5.7 t	926 GJ	\$25,757
<b>Unidentified</b>							
PARKS DEPT ATTN PUMP STATIONS - 15011 STEVESTON HWY	Electricity	8,690 kWh	31 GJ	\$735	0.2 t	31 GJ	\$735
W DOWAD LTD - 9200 GRANVILLE ST B304	Electricity	1,293 kWh	5 GJ	\$136	0.0 t	5 GJ	\$136
W DOWAD LTD - 9200 GRANVILLE ST B205	Electricity	2,127 kWh	8 GJ	\$185	0.0 t	8 GJ	\$185
Unidentified Subtotal	Electricity	12,111 kWh	44 GJ	\$1,056	0.3 t	44 GJ	\$1,056
Water & Wastewater Subtotal	Electricity	Consumption 4,139,551 kWh	Energy 14,902 GJ	Costs \$446,064	CO <sub>2</sub> e 91.1 t	14,902 GJ	\$446,064
<b>2007 Energy &amp; Greenhouse Gas Emissions Inventory</b>							

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Account & Address	Account Consumption & Costs by Energy Type					Account Subtotal	
	Type	Consumption	Energy	Costs	CO <sub>2</sub> e	Energy	Costs
<b>VEHICLE FLEET</b>							
<b>Diesel Fuel Bus</b>							
1996 FORD CLUB WAGON BUS - 894	BioDiesel 5	2,106 litres	81 GJ	\$1,245	5.5 t	81 GJ	\$1,245
1996 FORD PASSENGER BUS - 891	BioDiesel 5	2,004 litres	78 GJ	\$1,201	5.2 t	78 GJ	\$1,201
1999 FORD E450 MINI BUS - 1016	BioDiesel 5	3,755 litres	145 GJ	\$2,640	9.8 t	145 GJ	\$2,640
2003 FORD 21 PASSENGER BUS - 1219	BioDiesel 5	3,926 litres	152 GJ	\$2,760	10.2 t	152 GJ	\$2,760
2003 FORD PARA-TRANSIT BUS - 1206	BioDiesel 5	3,197 litres	124 GJ	\$1,971	8.3 t	124 GJ	\$1,971
2007 GLAVAL BUS - 1383	BioDiesel 5	102 litres	4 GJ	\$72	0.3 t	4 GJ	\$72
<b>Diesel Fuel Bus Subtotal</b>	<b>BioDiesel 5</b>	<b>15,090 litres</b>	<b>584 GJ</b>	<b>\$9,889</b>	<b>39.2 t</b>	<b>584 GJ</b>	<b>\$9,889</b>
<b>Diesel Fuel Generator</b>							
1999 UBILT GENERATOR - 1015	BioDiesel 5	300 litres	12 GJ	\$232	0.8 t	12 GJ	\$232
2000 ARGO MOBILE GENERATOR - 1020	BioDiesel 5	1,222 litres	47 GJ	\$839	3.2 t	47 GJ	\$839
<b>Diesel Fuel Generator Subtotal</b>	<b>BioDiesel 5</b>	<b>1,522 litres</b>	<b>59 GJ</b>	<b>\$1,071</b>	<b>4.0 t</b>	<b>59 GJ</b>	<b>\$1,071</b>
<b>Diesel Fuel Heavy Truck - Class 8</b>							
1992 EH WACHS TANK - 729	Gasoline	1,825 litres	63 GJ	\$1,438	4.6 t	63 GJ	\$1,438
1997 FREIGHTLINER VACTOR TRAILER - 915	BioDiesel 5	11,247 litres	435 GJ	\$6,461	29.2 t	435 GJ	\$6,461
1998 INTERNATIONAL STREET FLUSHER - 956	BioDiesel 5	3,484 litres	135 GJ	\$2,449	9.0 t	135 GJ	\$2,449
<b>Diesel Fuel Heavy Truck - Class 8 Subtotal</b>	<b>Gasoline</b>	<b>1,825 litres</b>	<b>63 GJ</b>	<b>\$1,438</b>	<b>4.6 t</b>	<b>633 GJ</b>	<b>\$10,348</b>
	<b>BioDiesel 5</b>	<b>14,730 litres</b>	<b>570 GJ</b>	<b>\$8,910</b>	<b>38.3 t</b>		
<b>Diesel Fuel Light Trucks, Vans, and SUVs</b>							
1994 FORD 2VHDR TRUCK - 819	BioDiesel 5	2,731 litres	106 GJ	\$1,920	7.1 t	106 GJ	\$1,920
1994 FORD TRUCK - 806	BioDiesel 5	1,858 litres	72 GJ	\$1,123	4.8 t	72 GJ	\$1,123

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	Type	Consumption	Energy	Costs	CO <sub>2</sub> e	Energy Costs CO <sub>2</sub> e
1994 FORD TRUCK - 807	BioDiesel 5	1,006 litres	39 GJ	\$629	2.6 t	39 GJ \$629 2.6 t
2001 GMC SAVANNA VAN - 1144	BioDiesel 5	836 litres	32 GJ	\$597	2.2 t	32 GJ \$597 2.2 t
2002 FORD F-150 PICK UP TRUCK - 5013	BioDiesel 5	7,626 litres	295 GJ	\$6,081	19.8 t	295 GJ \$6,081 19.8 t
2003 FORD F-150 S/C - 1281	BioDiesel 5	2,712 litres	105 GJ	\$2,128	7.0 t	105 GJ \$2,128 7.0 t
2006 GMC SIERRA 3500 - 1316	BioDiesel 5	1,477 litres	57 GJ	\$1,038	3.8 t	57 GJ \$1,038 3.8 t
Diesel Fuel Light Trucks, Vans, and SUVs Subtotal	BioDiesel 5	18,246 litres	706 GJ	\$13,516	47.4 t	706 GJ \$13,516 47.4 t
<b>Diesel Fuel Loaders, Excavators, Graders, &amp; Backhoes</b>						
1994 FORD TRACTOR - 839	BioDiesel 5	2,236 litres	86 GJ	\$1,679	5.8 t	86 GJ \$1,679 5.8 t
1994 INTERNATIONAL TRACTOR - 833	BioDiesel 5	2,516 litres	97 GJ	\$1,769	6.5 t	97 GJ \$1,769 6.5 t
1994 KUBOTA TRACTOR - 837	BioDiesel 5	1,580 litres	61 GJ	\$1,064	4.1 t	61 GJ \$1,064 4.1 t
1995 JOHN DEERE TRACTOR - 873	BioDiesel 5	1,203 litres	47 GJ	\$299	3.1 t	47 GJ \$299 3.1 t
1996 CATERPILAR BACKHOE - 913	BioDiesel 5	3,699 litres	143 GJ	\$2,172	9.6 t	143 GJ \$2,172 9.6 t
1997 CATERPILAR BACKHOE - 961	BioDiesel 5	1,625 litres	63 GJ	\$760	4.2 t	63 GJ \$760 4.2 t
1999 NEW HOLLAND TRACTOR - 1025	BioDiesel 5	2,580 litres	100 GJ	\$1,400	6.7 t	100 GJ \$1,400 6.7 t
2001 CAT BACKHOE - 1169	BioDiesel 5	2,788 litres	108 GJ	\$1,114	7.2 t	108 GJ \$1,114 7.2 t
2003 NEW HOLLAND TRACTOR - 1196	BioDiesel 5	4,132 litres	160 GJ	\$2,461	10.7 t	160 GJ \$2,461 10.7 t
2003 NEW HOLLAND TRACTOR - 1218	BioDiesel 5	4,633 litres	179 GJ	\$2,897	12.0 t	179 GJ \$2,897 12.0 t
FORD TRACTOR - 762	BioDiesel 5	3,463 litres	134 GJ	\$2,131	9.0 t	134 GJ \$2,131 9.0 t
Diesel Fuel Loaders, Excavators, Graders, & Backhoes Subtotal	BioDiesel 5	30,456 litres	1,178 GJ	\$17,747	79.1 t	1,178 GJ \$17,747 79.1 t
<b>Diesel Fuel Medium to Heavy Trucks</b>						
1994 HINO FLATDECK PAINT STRIPPER - 794	BioDiesel 5	2,943 litres	114 GJ	\$2,073	7.6 t	114 GJ \$2,073 7.6 t

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Account & Address	Account Consumption & Costs by Energy Type					Account Subtotal		
	Type	Consumption	Energy	Costs	CO <sub>2</sub> e	Energy	Costs	CO <sub>2</sub> e
1995 FREIGHTLINER DUMP - 858	BioDiesel 5	6,234 litres	241 GJ	\$4,382	16.2 t	241 GJ	\$4,382	16.2 t
1995 FREIGHTLINER DUMP - 859	BioDiesel 5	5,590 litres	216 GJ	\$3,930	14.5 t	216 GJ	\$3,930	14.5 t
1996 FREIGHTLINER DUMP - 875	BioDiesel 5	5,191 litres	201 GJ	\$3,649	13.5 t	201 GJ	\$3,649	13.5 t
1996 FREIGHTLINER DUMP - 876	BioDiesel 5	7,625 litres	295 GJ	\$5,361	19.8 t	295 GJ	\$5,361	19.8 t
1996 FREIGHTLINER DUMP - 877	BioDiesel 5	6,924 litres	268 GJ	\$4,867	18.0 t	268 GJ	\$4,867	18.0 t
2000 F550 STD. CAB FLAT DECK - 1162	BioDiesel 5	1,735 litres	67 GJ	\$972	4.5 t	67 GJ	\$972	4.5 t
2000 GRUMMAN WORKHORSE VAN - 1083	BioDiesel 5	2,466 litres	95 GJ	\$1,323	6.4 t	95 GJ	\$1,323	6.4 t
2000 STERLING TANDEM DUMP - 1074	Gasoline	1,865 litres	65 GJ	\$1,525	4.7 t	418 GJ	\$7,945	28.4 t
	BioDiesel 5	9,132 litres	353 GJ	\$6,420	23.7 t			
2001 E350 1 Ton VERSALIFT VAN - 1095	BioDiesel 5	3,295 litres	127 GJ	\$2,081	8.6 t	127 GJ	\$2,081	8.6 t
2001 E350 1 Ton VERSALIFT VAN - 1096	BioDiesel 5	3,822 litres	148 GJ	\$2,205	9.9 t	148 GJ	\$2,205	9.9 t
2001 F450 STD CAB FLAT DECK - 1167	BioDiesel 5	34,879 litres	1,349 GJ	\$26,620	90.6 t	1,349 GJ	\$26,620	90.6 t
2001 F550 REG CAB DUMP CRANE - 1111	BioDiesel 5	4,453 litres	172 GJ	\$2,413	11.6 t	172 GJ	\$2,413	11.6 t
2001 FORD F450 CREW CAB - 1093	BioDiesel 5	2,591 litres	100 GJ	\$1,664	6.7 t	100 GJ	\$1,664	6.7 t
2001 FORD F450 CREW CAB - 1094	BioDiesel 5	4,894 litres	189 GJ	\$3,441	12.7 t	189 GJ	\$3,441	12.7 t
2001 FORD F450 CREW CAB - 1121	BioDiesel 5	3,553 litres	137 GJ	\$2,498	9.2 t	137 GJ	\$2,498	9.2 t
2001 FORD F450 CREW CAB - 1122	BioDiesel 5	4,022 litres	156 GJ	\$2,828	10.4 t	156 GJ	\$2,828	10.4 t
2001 FORD F450 CREW CAB 2WD - 1102	BioDiesel 5	5,556 litres	215 GJ	\$3,906	14.4 t	215 GJ	\$3,906	14.4 t
2001 FORD STD CAB DUMP - 1166	BioDiesel 5	4,027 litres	156 GJ	\$2,831	10.5 t	156 GJ	\$2,831	10.5 t
2001 FORD STEP VAN RV CUTAWAY - 1142	BioDiesel 5	1,502 litres	58 GJ	\$1,056	3.9 t	58 GJ	\$1,056	3.9 t
2001 GRUMMAN WORKHORSE VAN - 1120	Gasoline	78 litres	3 GJ	\$63	0.2 t	47 GJ	\$876	3.2 t
	BioDiesel 5	1,156 litres	45 GJ	\$813	3.0 t			
2002 F550 REG CAB DUMP CRANE - 1161	BioDiesel 5	3,787 litres	146 GJ	\$2,662	9.8 t	146 GJ	\$2,662	9.8 t

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	Type	Consumption	Energy	Costs	CO <sub>2</sub> e	Energy	Costs
2002 FORD F450 CREW CAB - 1172	BioDiesel 5	3,885 litres	150 GJ	\$2,731	10.1 t	150 GJ	\$2,731
2002 IHC FLAT DECK CRANE TRUCK - 1164	BioDiesel 5	6,959 litres	269 GJ	\$4,528	18.1 t	269 GJ	\$4,528
2002 IHC T/A DUMP TRUCK - 1165	BioDiesel 5	8,307 litres	321 GJ	\$5,840	21.6 t	321 GJ	\$5,840
2005 F 550 FORD CRANE TRUCK - 1209	BioDiesel 5	5,647 litres	218 GJ	\$3,970	14.7 t	218 GJ	\$3,970
2005 F-550 FORD - 1264	BioDiesel 5	3,435 litres	133 GJ	\$2,415	8.9 t	133 GJ	\$2,415
2005 F-550 FORD - 1265	BioDiesel 5	3,704 litres	143 GJ	\$2,604	9.6 t	143 GJ	\$2,604
2005 F-550 FORD - 1266	BioDiesel 5	4,152 litres	161 GJ	\$2,919	10.8 t	161 GJ	\$2,919
2005 F-550 FORD CRANE TRUCK - 1263	BioDiesel 5	3,319 litres	128 GJ	\$2,333	8.6 t	128 GJ	\$2,333
2005 FORD F 550 CRANE TRUCK - 1216	BioDiesel 5	4,814 litres	186 GJ	\$3,385	12.5 t	186 GJ	\$3,385
2005 FORD FLAT DECK - 5029	BioDiesel 5	1,475 litres	57 GJ	\$1,037	3.8 t	57 GJ	\$1,037
2005 INTERNATIONAL 7400 - 1251	BioDiesel 5	21,839 litres	845 GJ	\$12,840	56.7 t	845 GJ	\$12,840
2005 INTERNATIONAL 7600 6x4 - 1207	BioDiesel 5	11,194 litres	433 GJ	\$7,869	29.1 t	433 GJ	\$7,869
2005 INTERNATIONAL 7600 6x4 - 1278	BioDiesel 5	11,002 litres	426 GJ	\$5,954	28.6 t	426 GJ	\$5,954
2005 INTERNATIONAL SINGLE AXLE - 1208	BioDiesel 5	8,732 litres	338 GJ	\$5,146	22.7 t	338 GJ	\$5,146
2006 DODGE SPRINTER - 1321	BioDiesel 5	536 litres	21 GJ	\$377	1.4 t	21 GJ	\$377
2006 DODGE SPRINTER - 1322	BioDiesel 5	867 litres	34 GJ	\$609	2.3 t	34 GJ	\$609
2006 DODGE SPRINTER - 1323	BioDiesel 5	755 litres	29 GJ	\$531	2.0 t	29 GJ	\$531
2006 INTERNATIONAL SINGLE AXLE - 1300	Gasoline BioDiesel 5	2,317 litres 10,222 litres	80 GJ 395 GJ	\$1,895 \$7,186	5.8 t 26.6 t	476 GJ	\$9,081
2008 FORD DRUMP TRUCK - 5061	BioDiesel 5	2,257 litres	87 GJ	\$1,592	5.9 t	87 GJ	\$1,592
Diesel Fuel Medium to Heavy Trucks Subtotal	Gasoline BioDiesel 5	4,260 litres 238,478 litres	148 GJ 9,224 GJ	\$3,483 \$161,859	10.7 t 619.4 t	9,372 GJ	\$165,342
Diesel Fuel Medium Truck - Class 2							

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	Type	Consumption	Energy	Costs	CO <sub>2</sub> e	Energy	Costs
1997 FORD STREET SWEEPER - 928	BioDiesel 5	13,101 litres	507 GJ	\$7,723	34.0 t	507 GJ	\$7,723
2001 STERLING / ELGIN SWEEPER - 1138	BioDiesel 5	9,464 litres	366 GJ	\$6,653	24.6 t	366 GJ	\$6,653
Diesel Fuel Medium Truck - Class 2 Subtotal	BioDiesel 5	22,565 litres	873 GJ	\$14,376	58.6 t	873 GJ	\$14,376
<b>Diesel Fuel Misc. Equipment</b>							
MISCELLANEOUS DIESEL FUEL -							
ROAD JERRY CAN   TOOL CLEANING - 3001	BioDiesel 5	855 litres	33 GJ	\$483	2.2 t	33 GJ	\$483
	BioDiesel 5	98 litres	4 GJ	\$74	0.3 t	4 GJ	\$74
Diesel Fuel Misc. Equipment Subtotal	BioDiesel 5	953 litres	37 GJ	\$557	2.5 t	37 GJ	\$557
<b>Diesel Fuel Off Road Vehicles &amp; Equipment</b>							
1988 CATERPILLAR BULLDOZER - 560	BioDiesel 5	824 litres	32 GJ	\$215	2.1 t	32 GJ	\$215
1989 JOHN DEERE GRADER - 570	BioDiesel 5	1,279 litres	49 GJ	\$910	3.3 t	49 GJ	\$910
1989 KOMATSU HYDRAULIC EXCAVATOR - 563	BioDiesel 5	2,056 litres	80 GJ	\$1,338	5.3 t	80 GJ	\$1,338
1992 JOHN DEERE EXCAVATOR - 732	BioDiesel 5	1,377 litres	53 GJ	\$1,024	3.6 t	53 GJ	\$1,024
1995 BOMAG COMPACTOR - 883	BioDiesel 5	120 litres	5 GJ	\$72	0.3 t	5 GJ	\$72
1996 LEROI COMPRESSOR - 907	BioDiesel 5	170 litres	7 GJ	\$119	0.4 t	7 GJ	\$119
1997 CAT EXCAVATOR - 1006	BioDiesel 5	1,657 litres	64 GJ	\$976	4.3 t	64 GJ	\$976
1997 INGERSOLL RAND COMPRESSOR - 932	BioDiesel 5	57 litres	2 GJ	\$40	0.1 t	2 GJ	\$40
1998 CAT EXCAVATOR - 958	BioDiesel 5	1,395 litres	54 GJ	\$645	3.6 t	54 GJ	\$645
1999 VERMEER BRUSH CHIPPER - 1021	BioDiesel 5	327 litres	13 GJ	\$237	0.9 t	13 GJ	\$237
2000 HITACHI EXCAVATOR - 1079	BioDiesel 5	3,769 litres	146 GJ	\$1,915	9.8 t	146 GJ	\$1,915
2001 VERMEER TRENCHER/PULLER - 1177	BioDiesel 5	119 litres	5 GJ	\$45	0.3 t	5 GJ	\$45
2003 CAT FORKLIFT - 1217	BioDiesel 5	1,121 litres	43 GJ	\$659	2.9 t	43 GJ	\$659
2003 DYNAPAC ROLLER - 1189	BioDiesel 5	219 litres	8 GJ	\$110	0.6 t	8 GJ	\$110

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	Type	Consumption	Energy	Costs	CO <sub>2</sub> e	Energy	Costs
2003 FINDLAY SOIL SHREDDER/PILERS - 1185	BioDiesel 5	58 litres	2 GJ	\$68	0.2 t	2 GJ	\$68
2003 SULLAIR COMPRESSOR - 1229	BioDiesel 5	2,014 litres	78 GJ	\$340	5.2 t	78 GJ	\$340
2006 CAT 430 E - 1301	BioDiesel 5	5,218 litres	202 GJ	\$3,669	13.6 t	202 GJ	\$3,669
2006 CAT 430 E - 1302	BioDiesel 5	5,301 litres	205 GJ	\$2,968	13.8 t	205 GJ	\$2,968
2007 VERMEER Bc 1500 BRUSH CUTTER - 1372	BioDiesel 5	638 litres	25 GJ	\$301	1.7 t	25 GJ	\$301
CATEPILLAR RENTAL - 3013	BioDiesel 5	375 litres	15 GJ	\$284	1.0 t	15 GJ	\$284
DUG-PACT ROLLER (OUT OF SERVICE) - 663	BioDiesel 5	7 litres	0 GJ	\$5	0.0 t	0 GJ	\$5
HOLDER & ATTACHMENTS - 1378	BioDiesel 5	565 litres	22 GJ	\$397	1.5 t	22 GJ	\$397
THOMAS SHREDDER - 866	BioDiesel 5	1,244 litres	48 GJ	\$616	3.2 t	48 GJ	\$616
Diesel Fuel Off Road Vehicles & Equipment Subtotal	BioDiesel 5	29,910 litres	1,157 GJ	\$16,954	77.7 t	1,157 GJ	\$16,954
<b>Diesel Fuel Passenger Cars</b>							
2006 SMART CAR - 1311	BioDiesel 5	489 litres	19 GJ	\$344	1.3 t	19 GJ	\$344
2006 SMART CAR - 1312	BioDiesel 5	458 litres	18 GJ	\$322	1.2 t	18 GJ	\$322
2006 SMART CAR - 1313	BioDiesel 5	167 litres	6 GJ	\$88	0.4 t	6 GJ	\$88
2006 SMART CAR - 1314	BioDiesel 5	329 litres	13 GJ	\$231	0.9 t	13 GJ	\$231
2006 SMART CAR - 1328	BioDiesel 5	534 litres	21 GJ	\$375	1.4 t	21 GJ	\$375
2006 SMART CAR - 5037	BioDiesel 5	511 litres	20 GJ	\$293	1.3 t	20 GJ	\$293
2006 SMART CAR - 5038	BioDiesel 5	492 litres	19 GJ	\$346	1.3 t	19 GJ	\$346
2006 SMART CAR - 5049	BioDiesel 5	74 litres	3 GJ	\$52	0.2 t	3 GJ	\$52
2006 SMART CAR - 5050	BioDiesel 5	130 litres	5 GJ	\$56	0.3 t	5 GJ	\$56
2006 SMART CAR - 5051	BioDiesel 5	680 litres	26 GJ	\$478	1.8 t	26 GJ	\$478
2006 SMART CAR - 5052	BioDiesel 5	767 litres	30 GJ	\$539	2.0 t	30 GJ	\$539

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	Type	Consumption	Energy	Costs	CO <sub>2</sub> e	Energy	Costs	CO <sub>2</sub> e
Diesel Fuel Passenger Cars Subtotal	BioDiesel 5	4,629 litres	179 GJ	\$3,124	12.0 t	179 GJ	\$3,124	12.0 t
Diesel Tractors and Mowers								
1992 FORD MOWER - 719	BioDiesel 5	2,782 litres	108 GJ	\$2,066	7.2 t	108 GJ	\$2,066	7.2 t
1994 GROUNDMASTER MOWER - 840	BioDiesel 5	6,406 litres	248 GJ	\$4,126	16.6 t	248 GJ	\$4,126	16.6 t
1995 FORD TRACTOR MOWER - 843	BioDiesel 5	4,496 litres	174 GJ	\$2,958	11.7 t	174 GJ	\$2,958	11.7 t
1995 FORD TRACTOR MOWER - 844	BioDiesel 5	3,650 litres	141 GJ	\$2,118	9.5 t	141 GJ	\$2,118	9.5 t
1997 JOHN DEERE MOWER - 924	BioDiesel 5	3,540 litres	137 GJ	\$2,502	9.2 t	137 GJ	\$2,502	9.2 t
2007 JOHN DEERE MOWER - 1347	BioDiesel 5	16 litres	1 GJ	\$12	0.0 t	1 GJ	\$12	0.0 t
2007 JOHN DEERE MOWER - 1348	BioDiesel 5	91 litres	4 GJ	\$64	0.2 t	4 GJ	\$64	0.2 t
Diesel Tractors and Mowers Subtotal	BioDiesel 5	20,980 litres	812 GJ	\$13,845	54.5 t	812 GJ	\$13,845	54.5 t
Fire Services								
FIRE DEPARTMENT VEHICLES - -								
Fire Services Subtotal	Gasoline	24,714 litres	857 GJ	\$23,867	61.9 t	4,350 GJ	\$107,168	313.1 t
	Diesel Fuel	90,311 litres	3,493 GJ	\$83,301	251.2 t			
Gasoline Bus								
1998 FORD PASSENGER BUS - 967	Gasoline	1,865 litres	65 GJ	\$1,478	4.7 t	65 GJ	\$1,478	4.7 t
1999 GMC BUS 3500 - 1012	Gasoline	1,161 litres	40 GJ	\$993	2.9 t	40 GJ	\$993	2.9 t
2000 FORD PASSENGER BUS - 1080	Gasoline	2,030 litres	70 GJ	\$1,696	5.1 t	70 GJ	\$1,696	5.1 t
Gasoline Bus Subtotal	Gasoline	5,056 litres	175 GJ	\$4,167	12.7 t	175 GJ	\$4,167	12.7 t
Gasoline Equipment								
FAC JERRY CAN   SPRAY UNIT 1321 - 3011	Gasoline	19 litres	1 GJ	\$22	0.0 t	1 GJ	\$22	0.0 t
JERRY CAN   PARK PRESSURE WASHER - 3010	Gasoline	789 litres	27 GJ	\$613	2.0 t	27 GJ	\$613	2.0 t

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	Type	Consumption	Energy	Costs	CO <sub>2</sub> e	Energy	Costs
JERRY CAN   SMALL ENGINE SHOP - 3003	Gasoline BioDiesel 5	8,183 litres 81 litres	284 GJ 3 GJ	\$6,375 \$57	20.5 t 0.2 t	287 GJ	\$6,432
MISCELLANEOUS GASOLINE -	Gasoline	11,966 litres	415 GJ	\$9,799	29.9 t	415 GJ	\$9,799
WATER JERRY CAN - 3004	Gasoline	44 litres	2 GJ	\$48	0.1 t	2 GJ	\$48
WATER JERRY CAN - 3009	Gasoline	111 litres	4 GJ	\$48	0.3 t	4 GJ	\$48
Gasoline Equipment Subtotal	Gasoline BioDiesel 5	21,113 litres 81 litres	732 GJ 3 GJ	\$16,904 \$57	52.8 t 0.2 t	735 GJ	\$16,961
Gasoline Light Trucks, Vans, and SUVs							
1981 CHEVY VAN 2WHDR - 355	Gasoline	201 litres	7 GJ	\$216	0.5 t	7 GJ	\$216
1992 GMC PICK UP TRUCK - 687	Gasoline	264 litres	9 GJ	\$295	0.7 t	9 GJ	\$295
1992 GMC SAFARI VAN - 725	Gasoline	323 litres	11 GJ	\$310	0.8 t	11 GJ	\$310
1992 GMC VAN - 718	Gasoline	5,582 litres	193 GJ	\$4,364	14.0 t	193 GJ	\$4,364
1993 FORD AEROSTAR VAN - 782	Gasoline	1,153 litres	40 GJ	\$1,026	2.9 t	40 GJ	\$1,026
1993 FORD PICK UP TRUCK - 777	Gasoline	2,217 litres	77 GJ	\$1,788	5.5 t	77 GJ	\$1,788
1993 FORD VAN - 788	Gasoline	460 litres	16 GJ	\$437	1.2 t	16 GJ	\$437
1993 FORD VAN - 793	Gasoline	99 litres	3 GJ	\$113	0.2 t	3 GJ	\$113
1993 GMC CREW CAB - 756	Gasoline	3,660 litres	127 GJ	\$3,305	9.2 t	127 GJ	\$3,305
1994 FORD PICK UP TRUCK - 829	Gasoline	1,317 litres	46 GJ	\$832	3.3 t	46 GJ	\$832
1994 FORD PICK UP TRUCK - 830	Gasoline	2,256 litres	78 GJ	\$1,946	5.6 t	78 GJ	\$1,946
1995 FORD PICK UP TRUCK - 845	Gasoline	5,817 litres	202 GJ	\$4,215	14.6 t	202 GJ	\$4,215
1995 FORD PICK UP TRUCK - 871	Gasoline	976 litres	34 GJ	\$752	2.4 t	34 GJ	\$752
1995 FORD VAN - 848	Gasoline	839 litres	29 GJ	\$846	2.1 t	29 GJ	\$846
1995 FORD VAN - 856	Gasoline	1,344 litres	47 GJ	\$1,006	3.4 t	47 GJ	\$1,006

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	Type	Consumption	Energy	Costs	CO <sub>2</sub> e	Energy	Costs
1995 FORD VAN - 867	Gasoline	2,072 litres	72 GJ	\$1,636	5.2 t	72 GJ	\$1,636
1996 DODGE VAN - 896	Gasoline	3,022 litres	105 GJ	\$2,353	7.6 t	105 GJ	\$2,353
1996 FORD ECONO VAN - 922	Gasoline	11,318 litres	392 GJ	\$8,046	28.3 t	392 GJ	\$8,046
1996 FORD ECONO VAN - 923	Gasoline	5,007 litres	174 GJ	\$3,274	12.5 t	174 GJ	\$3,274
1996 FORD PICK UP TRUCK - 1000	Gasoline	4,633 litres	161 GJ	\$3,673	11.6 t	161 GJ	\$3,673
1996 FORD PICK UP TRUCK - 1007	Gasoline	2,392 litres	83 GJ	\$1,252	6.0 t	83 GJ	\$1,252
1996 FORD PICK UP TRUCK - 1008	Gasoline	4,455 litres	154 GJ	\$3,270	11.2 t	154 GJ	\$3,270
1996 FORD PICK UP TRUCK - 1010	Gasoline	1,761 litres	61 GJ	\$1,424	4.4 t	61 GJ	\$1,424
1996 FORD PICK UP TRUCK - 902	Gasoline	2,468 litres	86 GJ	\$1,725	6.2 t	86 GJ	\$1,725
1996 FORD PICK UP TRUCK - 903	Gasoline	4,561 litres	158 GJ	\$3,659	11.4 t	158 GJ	\$3,659
1996 FORD PICK UP TRUCK - 904	Gasoline	1,407 litres	49 GJ	\$1,200	3.5 t	49 GJ	\$1,200
1996 FORD PICK UP TRUCK - 905	Gasoline	2,862 litres	99 GJ	\$2,202	7.2 t	99 GJ	\$2,202
1996 FORD PICK UP TRUCK - 906	Gasoline	3,640 litres	126 GJ	\$3,218	9.1 t	126 GJ	\$3,218
1996 FORD PICK UP TRUCK - 916	Gasoline	10,869 litres	377 GJ	\$8,076	27.2 t	377 GJ	\$8,076
1996 FORD PICK UP TRUCK - 917	Gasoline	12,466 litres	432 GJ	\$10,080	31.2 t	432 GJ	\$10,080
1996 FORD PICK UP TRUCK - 965	Gasoline	2,343 litres	81 GJ	\$1,703	5.9 t	81 GJ	\$1,703
1996 FORD PICK UP TRUCK - 966	Gasoline	4,495 litres	156 GJ	\$3,643	11.2 t	156 GJ	\$3,643
1996 FORD RANGER - 901	Gasoline	2,761 litres	96 GJ	\$2,220	6.9 t	96 GJ	\$2,220
1997 CHEVROLET PICK UP - 940	Gasoline	1,790 litres	62 GJ	\$1,444	4.5 t	62 GJ	\$1,444
1997 CHEVROLET PICK UP - 941	Gasoline	810 litres	28 GJ	\$637	2.0 t	28 GJ	\$637
1997 FORD ECONO VAN - 945	Gasoline	7,101 litres	246 GJ	\$5,468	17.8 t	246 GJ	\$5,468
1997 FORD ECONO VAN - 962	Gasoline	4,204 litres	146 GJ	\$3,117	10.5 t	146 GJ	\$3,117

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Account & Address	Account Consumption & Costs by Energy Type					Account Subtotal	
	Type	Consumption	Energy	Costs	CO <sub>2</sub> e	Energy	Costs
1997 FORD ECONO VAN - 963	Gasoline	6,544 litres	227 GJ	\$4,922	16.4 t	227 GJ	\$4,922
1997 FORD ECONO VAN - 964	Gasoline	6,103 litres	212 GJ	\$4,342	15.3 t	212 GJ	\$4,342
1997 FORD ECONO VAN - 968	Gasoline	4,966 litres	172 GJ	\$3,490	12.4 t	172 GJ	\$3,490
1997 FORD F150 PICK UP TRUCK - 974	Gasoline	848 litres	29 GJ	\$634	2.1 t	29 GJ	\$634
1997 FORD PICK UP TRUCK - 1009	Gasoline	3,080 litres	107 GJ	\$2,280	7.7 t	107 GJ	\$2,280
1997 FORD PICK UP TRUCK - 895	Gasoline	2,467 litres	85 GJ	\$1,827	6.2 t	85 GJ	\$1,827
1997 FORD PICK UP TRUCK - 920	Gasoline	910 litres	32 GJ	\$397	2.3 t	32 GJ	\$397
1997 FORD PICK UP TRUCK - 921	Gasoline	6,623 litres	230 GJ	\$5,089	16.6 t	230 GJ	\$5,089
1997 FORD PICK UP TRUCK - 943	Gasoline	8,389 litres	291 GJ	\$6,284	21.0 t	291 GJ	\$6,284
1997 FORD PICK UP TRUCK - 999	Gasoline	1,084 litres	38 GJ	\$896	2.7 t	38 GJ	\$896
1997 FORD RANGER PICK UP - 931	Gasoline	2,089 litres	72 GJ	\$1,720	5.2 t	72 GJ	\$1,720
1997 GMC JIMMY - 1087	Gasoline	306 litres	11 GJ	\$309	0.8 t	11 GJ	\$309
1997 GMC SAFARI VAN - 946	Gasoline	833 litres	29 GJ	\$637	2.1 t	29 GJ	\$637
1997 PLYMOUTH GRAND VOYAGEUR - 929	Gasoline	1,319 litres	46 GJ	\$991	3.3 t	46 GJ	\$991
1998 DODGE DAKOTA - 950	Gasoline	678 litres	23 GJ	\$532	1.7 t	23 GJ	\$532
1998 DODGE DAKOTA - 951	Gasoline	2,722 litres	94 GJ	\$1,236	6.8 t	94 GJ	\$1,236
1998 FORD ECONO VAN - 969	Gasoline	5,334 litres	185 GJ	\$4,053	13.3 t	185 GJ	\$4,053
2000 GMC 4x4 Pick Up TRUCK - 1030	Gasoline	24,059 litres	834 GJ	\$17,114	60.2 t	834 GJ	\$17,114
2001 FORD E250 CARGO VAN - 1031	Gasoline	1,477 litres	51 GJ	\$1,131	3.7 t	51 GJ	\$1,131
2001 FORD E250 CARGO VAN - 1032	Gasoline	4,350 litres	151 GJ	\$3,239	10.9 t	151 GJ	\$3,239
2001 FORD E250 CARGO VAN - 1033	Gasoline	3,006 litres	104 GJ	\$1,892	7.5 t	104 GJ	\$1,892
2001 FORD E250 CARGO VAN - 1034	Gasoline	3,633 litres	126 GJ	\$2,673	9.1 t	126 GJ	\$2,673

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	Type	Consumption	Energy	Costs	CO <sub>2</sub> e	Energy	Costs
2001 FORD E250 CARGO VAN - 1035	Gasoline	1,428 litres	49 GJ	\$945	3.6 t	49 GJ	\$945
2001 FORD E250 CARGO VAN - 1036	Gasoline	3,283 litres	114 GJ	\$2,506	8.2 t	114 GJ	\$2,506
2001 FORD E250 CARGO VAN - 1037	Gasoline	72 litres	2 GJ	\$59	0.2 t	2 GJ	\$59
2001 FORD E250 CARGO VAN - 1055	Gasoline	2,576 litres	89 GJ	\$2,191	6.4 t	89 GJ	\$2,191
2001 FORD E250 CARGO VAN - 1091	Gasoline	3,704 litres	128 GJ	\$2,703	9.3 t	128 GJ	\$2,703
2001 FORD E250 CARGO VAN - 1139	Gasoline	4,931 litres	171 GJ	\$3,641	12.3 t	171 GJ	\$3,641
2001 FORD E250 CARGO VAN - 1140	Gasoline	5,589 litres	194 GJ	\$4,395	14.0 t	194 GJ	\$4,395
2001 FORD E250 CARGO VAN - 1141	Gasoline	5,259 litres	182 GJ	\$4,231	13.2 t	182 GJ	\$4,231
2001 FORD ESCAPE - 1243	Gasoline	918 litres	32 GJ	\$770	2.3 t	32 GJ	\$770
2001 FORD F-250 PICK UP - 1064	Gasoline	2,089 litres	72 GJ	\$1,910	5.2 t	72 GJ	\$1,910
2001 FORD F-250 PICK UP 2WD - 1056	Gasoline	3,095 litres	107 GJ	\$2,447	7.7 t	107 GJ	\$2,447
2001 FORD F-250 PICK UP 2WD - 1057	Gasoline	3,415 litres	118 GJ	\$2,606	8.5 t	118 GJ	\$2,606
2001 FORD F-250 PICK UP 2WD - 1062	Gasoline	4,764 litres	165 GJ	\$3,584	11.9 t	165 GJ	\$3,584
2001 FORD F-250 PICK UP 2WD - 1063	Gasoline	2,846 litres	99 GJ	\$2,893	7.1 t	99 GJ	\$2,893
2001 FORD F150 SUPERCAB P/U - 1127	Gasoline	4,211 litres	146 GJ	\$3,195	10.5 t	146 GJ	\$3,195
2001 FORD F150 SUPERCAB P/U - 1151	Gasoline	3,627 litres	126 GJ	\$2,577	9.1 t	126 GJ	\$2,577
2001 FORD F150 SUPERCAB P/U - 1158	Gasoline	2,022 litres	70 GJ	\$1,700	5.1 t	70 GJ	\$1,700
2001 FORD F250 REGULAR CAB 2WD - 1065	Gasoline	2,895 litres	100 GJ	\$2,241	7.2 t	100 GJ	\$2,241
2001 FORD F250 REGULAR CAB 2WD - 1066	Gasoline	7,317 litres	254 GJ	\$5,549	18.3 t	254 GJ	\$5,549
2001 FORD F250 REGULAR CAB 2WD - 1067	Gasoline	3,162 litres	110 GJ	\$2,273	7.9 t	110 GJ	\$2,273
2001 FORD F250 SUPERCAB 2WD - 1072	Gasoline	4,602 litres	160 GJ	\$3,909	11.5 t	160 GJ	\$3,909
2001 FORD F250 SUPERCAB 2WD - 1124	Gasoline	3,824 litres	133 GJ	\$3,188	9.6 t	133 GJ	\$3,188

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	Type	Consumption	Energy	Costs	CO <sub>2</sub> e	Energy	Costs
2001 FORD F250 SUPERCAB P/U - 1058	Gasoline	6,860 litres	238 GJ	\$5,020	17.2 t	238 GJ	\$5,020
2001 FORD F250 SUPERCAB P/U - 1059	Gasoline	6,344 litres	220 GJ	\$5,184	15.9 t	220 GJ	\$5,184
2001 FORD F250 SUPERCAB P/U - 1060	Gasoline	5,800 litres	201 GJ	\$4,885	14.5 t	201 GJ	\$4,885
2001 FORD F250 SUPERCAB P/U - 1061	Gasoline	6,384 litres	221 GJ	\$4,973	16.0 t	221 GJ	\$4,973
2001 FORD F250 SUPERCAB P/U - 1069	Gasoline	2,768 litres	96 GJ	\$2,435	6.9 t	96 GJ	\$2,435
2001 FORD F250 SUPERCAB P/U - 1070	Gasoline	4,698 litres	163 GJ	\$4,194	11.8 t	163 GJ	\$4,194
2001 FORD F250 SUPERCAB P/U - 1071	Gasoline	5,031 litres	174 GJ	\$4,019	12.6 t	174 GJ	\$4,019
2001 FORD F250 SUPERCAB P/U - 1073	Gasoline	7,894 litres	274 GJ	\$6,700	19.8 t	274 GJ	\$6,700
2001 FORD F250 SUPERCAB P/U - 1089	Gasoline	2,496 litres	87 GJ	\$2,309	6.2 t	87 GJ	\$2,309
2001 FORD F250 SUPERCAB P/U - 1125	Gasoline	2,230 litres	77 GJ	\$1,789	5.6 t	77 GJ	\$1,789
2001 FORD REG CAB PICK UP TRUCK - 1068	Gasoline	5,342 litres	185 GJ	\$4,307	13.4 t	185 GJ	\$4,307
2001 GMC SAFARI CARGO VAN - 1123	Gasoline	870 litres	30 GJ	\$575	2.2 t	30 GJ	\$575
2001 GMC SAFARI MINI VAN - 1038	Gasoline	4,158 litres	144 GJ	\$3,255	10.4 t	144 GJ	\$3,255
2001 GMC SAFARI MINI VAN - 1039	Gasoline	1,714 litres	59 GJ	\$1,293	4.3 t	59 GJ	\$1,293
2001 GMC SAFARI MINI VAN - 1040	Gasoline	1,839 litres	64 GJ	\$1,536	4.6 t	64 GJ	\$1,536
2001 GMC SAFARI MINI VAN - 1041	Gasoline	3,735 litres	129 GJ	\$2,955	9.3 t	129 GJ	\$2,955
2001 GMC SAFARI MINI VAN - 1126	Gasoline	980 litres	34 GJ	\$726	2.5 t	34 GJ	\$726
2001 GMC SAFARI MINI VAN - 1131	Gasoline	4,587 litres	159 GJ	\$3,553	11.5 t	159 GJ	\$3,553
2001 GMC SAFARI MINI VAN - 1132	Gasoline	5,122 litres	178 GJ	\$4,045	12.8 t	178 GJ	\$4,045
2001 GMC SAFARI MINI VAN - 1148	Gasoline	2,286 litres	79 GJ	\$1,762	5.7 t	79 GJ	\$1,762
2001 GMC SAFARI MINI VAN - 1149	Gasoline	2,324 litres	81 GJ	\$1,890	5.8 t	81 GJ	\$1,890
2001 GMC SAFARI MINI VAN - 1150	Gasoline	2,165 litres	75 GJ	\$1,794	5.4 t	75 GJ	\$1,794

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## Richmond

### Corporate Energy & Greenhouse Gas Emissions Inventory: 2007

Account & Address	Account Consumption & Costs by Energy Type					Account Subtotal	
	Type	Consumption	Energy	Costs	CO <sub>2</sub> e	Energy	Costs
2001 GMC SAFARI VAN - 1088	Gasoline	659 litres	23 GJ	\$501	1.6 t	23 GJ	\$501
2002 FORD F250 SUPERCAB P/U - 1159	Gasoline	2,183 litres	76 GJ	\$1,654	5.5 t	76 GJ	\$1,654
2002 FORD F250 SUPERCAB P/U - 1160	Gasoline	3,715 litres	129 GJ	\$3,054	9.3 t	129 GJ	\$3,054
2002 FORD F250 SUPERCAB P/U - 1170	Gasoline	3,189 litres	111 GJ	\$2,748	8.0 t	111 GJ	\$2,748
2002 FORD F250 SUPERCAB P/U - 1178	Gasoline	5,989 litres	208 GJ	\$4,824	15.0 t	208 GJ	\$4,824
2002 FORD F250 SUPERCAB P/U - 1179	Gasoline	2,394 litres	83 GJ	\$2,231	6.0 t	83 GJ	\$2,231
2002 FORD F250 SUPERCAB P/U - 1180	Gasoline	8,486 litres	294 GJ	\$6,432	21.2 t	294 GJ	\$6,432
2002 FORD F250 SUPERCAB P/U - 1181	Gasoline	2,657 litres	92 GJ	\$2,245	6.7 t	92 GJ	\$2,245
2002 FORD F250 SUPERCAB P/U - 1182	Gasoline	2,881 litres	100 GJ	\$2,455	7.2 t	100 GJ	\$2,455
2002 FORD F250 SUPERCAB P/U - 1183	Gasoline	4,470 litres	155 GJ	\$4,145	11.2 t	155 GJ	\$4,145
2002 FORD F350 SUPERCAB P/U - 1184	Gasoline	4,420 litres	153 GJ	\$3,710	11.1 t	153 GJ	\$3,710
2003 FORD CARGO VAN - 1193	Gasoline	7,258 litres	252 GJ	\$5,770	18.2 t	252 GJ	\$5,770
2003 FORD CARGO VAN - 1194	Gasoline	3,795 litres	132 GJ	\$2,601	9.5 t	132 GJ	\$2,601
2003 FORD CARGO VAN - 1213	Gasoline	1,654 litres	57 GJ	\$1,395	4.1 t	57 GJ	\$1,395
2003 FORD CARGO VAN - RAISED ROOF - 1192	Gasoline	6,657 litres	231 GJ	\$4,984	16.7 t	231 GJ	\$4,984
2003 FORD F-150 PICK UP - 5030	Gasoline	3,526 litres	122 GJ	\$2,478	8.8 t	122 GJ	\$2,478
2003 FORD F-150 PICK UP EXT. CAB - 1190	Gasoline	3,673 litres	127 GJ	\$2,720	9.2 t	127 GJ	\$2,720
2003 FORD F-150 PICK UP EXT. CAB - 1197	Gasoline	4,085 litres	142 GJ	\$3,371	10.2 t	142 GJ	\$3,371
2003 FORD F-150 PICK UP EXT. CAB - 1202	Gasoline	2,920 litres	101 GJ	\$2,337	7.3 t	101 GJ	\$2,337
2003 FORD F-150 PICK UP EXT. CAB - 1214	Gasoline	2,728 litres	95 GJ	\$2,291	6.8 t	95 GJ	\$2,291
2003 FORD F-150 PICK UP EXT. CAB - 1228	Gasoline	2,065 litres	72 GJ	\$1,922	5.2 t	72 GJ	\$1,922
2003 FORD F-150 S/C - 1282	Gasoline	2,297 litres	80 GJ	\$1,846	5.7 t	80 GJ	\$1,846

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	Type	Consumption	Energy	Costs	CO <sub>2</sub> e	Energy	Costs
2003 FORD F-250 PICK UP - 5028	Gasoline	3,061 litres	106 GJ	\$2,027	7.7 t	106 GJ	\$2,027
2003 FORD F-250 PICK UP EXT. CAB - 1201	Gasoline	2,507 litres	87 GJ	\$1,977	6.3 t	87 GJ	\$1,977
2003 FORD F-250 PICK UP EXT. CAB - 1204	Gasoline	5,076 litres	176 GJ	\$4,376	12.7 t	176 GJ	\$4,376
2003 FORD F-250 PICK UP EXT. CAB - 1226	Gasoline	3,472 litres	120 GJ	\$2,516	8.7 t	120 GJ	\$2,516
2003 FORD F-250 PICK UP EXT. CAB - 1227	Gasoline	4,385 litres	152 GJ	\$3,544	11.0 t	152 GJ	\$3,544
2003 FORD WINDSTAR - 1205	Gasoline	1,702 litres	59 GJ	\$1,493	4.3 t	59 GJ	\$1,493
2003 FORD WINDSTAR - 1221	Gasoline	575 litres	20 GJ	\$482	1.4 t	20 GJ	\$482
2003 GMC CARGO VAN - 1195	Gasoline	1,506 litres	52 GJ	\$1,156	3.8 t	52 GJ	\$1,156
2003 GMC CARGO VAN - 1211	Gasoline	2,269 litres	79 GJ	\$1,867	5.7 t	79 GJ	\$1,867
2004 DODGE CARAVAN - 1249	Gasoline	1,796 litres	62 GJ	\$1,341	4.5 t	62 GJ	\$1,341
2004 FORD ECONO VAN - 5027	Gasoline	2,706 litres	94 GJ	\$2,379	6.8 t	94 GJ	\$2,379
2004 FORD F-150 PICK UP TRUCK - 5025	Gasoline	1,822 litres	63 GJ	\$1,740	4.6 t	63 GJ	\$1,740
2004 FORD F-250 EXT. CAB - 1250	Gasoline	4,532 litres	157 GJ	\$3,475	11.3 t	157 GJ	\$3,475
2004 FORD F-250 EXT. CAB - 1252	Gasoline	2,474 litres	86 GJ	\$2,118	6.2 t	86 GJ	\$2,118
2004 GMC CARGO VAN - 1262	Gasoline	2,115 litres	73 GJ	\$1,800	5.3 t	73 GJ	\$1,800
2004 GMC CARGO VAN - 1268	Gasoline	1,807 litres	63 GJ	\$1,604	4.5 t	63 GJ	\$1,604
2006 CHEVY VAN - 5045	Gasoline	568 litres	20 GJ	\$590	1.4 t	20 GJ	\$590
2006 FORD F-150 - 5041	Gasoline	2,640 litres	91 GJ	\$2,174	6.6 t	91 GJ	\$2,174
2006 FORD F-150 PICK UP EXT. CAB - 5031	Gasoline	1,630 litres	56 GJ	\$1,632	4.1 t	56 GJ	\$1,632
2006 FORD F-150 PICK UP EXT. CAB - 5042	Gasoline	1,936 litres	67 GJ	\$1,924	4.8 t	67 GJ	\$1,924
2006 FORD PICK UP - 5059	Gasoline	1,126 litres	39 GJ	\$1,190	2.8 t	39 GJ	\$1,190
2006 FORD PICK UP - 5060	Gasoline	870 litres	30 GJ	\$928	2.2 t	30 GJ	\$928

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### Corporate Energy & Greenhouse Gas Emissions Inventory: 2007

Account & Address	Account Consumption & Costs by Energy Type					Account Subtotal	
	Type	Consumption	Energy	Costs	CO <sub>2</sub> e	Energy	Costs
2006 GMC VAN - 5044	Gasoline	4,627 litres	160 GJ	\$4,705	11.6 t	160 GJ	\$4,705
2007 DODGE CARAVAN - 1318	Gasoline	1,742 litres	60 GJ	\$1,326	4.4 t	60 GJ	\$1,326
2007 DODGE QUAD CAB 3/4 Ton - 1319	Gasoline	6,272 litres	217 GJ	\$4,261	15.7 t	217 GJ	\$4,261
2007 FORD E-250 VAN - 5066	Gasoline	1,354 litres	47 GJ	\$483	3.4 t	47 GJ	\$483
2007 FORD F-150 PICK UP - 5064	Gasoline	264 litres	9 GJ	\$288	0.7 t	9 GJ	\$288
2007 FORD F-150 PICK UP EXT. CAB - 5053	Gasoline	1,361 litres	47 GJ	\$1,440	3.4 t	47 GJ	\$1,440
2008 CHEVROLET SILVERADO - 5067	Gasoline	1,116 litres	39 GJ	\$336	2.8 t	39 GJ	\$336
2008 CHEVROLET SILVERADO - 5068	Gasoline	873 litres	30 GJ	\$150	2.2 t	30 GJ	\$150
2008 CHEVROLET SILVERADO - 5069	Gasoline	482 litres	17 GJ	\$13	1.2 t	17 GJ	\$13
2008 CHEVROLET SILVERADO - 5070	Gasoline	1,163 litres	40 GJ	\$404	2.9 t	40 GJ	\$404
2008 FORD F-250 PICK UP - 5062	Gasoline	2,055 litres	71 GJ	\$1,861	5.1 t	71 GJ	\$1,861
Gasoline Light Trucks, Vans, and SUVs Subtotal	Gasoline	528,599 litres	18,321 GJ	\$412,481	1,323.0 t	18,321 GJ	\$412,481
<b>Gasoline Medium to Heavy Trucks &amp; Vans</b>							
1986 GMC FLATDECK TRUCK - 491	Gasoline	2,183 litres	76 GJ	\$1,160	5.5 t	76 GJ	\$1,160
1989 CHEVROLET FLATDECK TRUCK - 592	Gasoline	2,854 litres	99 GJ	\$2,737	7.1 t	99 GJ	\$2,737
1995 FORD FLATDECK - 849	Gasoline BioDiesel 5	1,421 litres 125 litres	49 GJ 5 GJ	\$1,234 \$65	3.6 t 0.3 t	54 GJ	\$1,300
1995 FORD FLATDECK - 853	Gasoline	2,164 litres	75 GJ	\$2,273	5.4 t	75 GJ	\$2,273
1997 FORD CRANE - 942	Gasoline	4,943 litres	171 GJ	\$3,775	12.4 t	171 GJ	\$3,775
1999 FORD CREW CAB DUMP - 994	Gasoline	7,122 litres	247 GJ	\$5,608	17.8 t	247 GJ	\$5,608
1999 FORD F450 TRUCK - 981	Gasoline	2,801 litres	97 GJ	\$2,477	7.0 t	97 GJ	\$2,477
2000 FORD BUS E-350 VAN - 1014	Gasoline	2,498 litres	87 GJ	\$2,011	6.3 t	87 GJ	\$2,011

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	Type	Consumption	Energy	Costs	CO <sub>2</sub> e	Energy
2001 FORD E350 CARGO VAN - 1128	Gasoline	3,498 litres	121 GJ	\$2,905	8.8 t	121 GJ
2001 GRUMMAN WORKHORSE VAN - 1085	Gasoline	10,306 litres	357 GJ	\$7,841	25.8 t	357 GJ
2001 GRUMMAN WORKHORSE VAN - 1097	Gasoline	4,934 litres	171 GJ	\$3,739	12.3 t	171 GJ
2001 GRUMMAN WORKHORSE VAN - 1098	Gasoline	4,226 litres	146 GJ	\$3,087	10.6 t	146 GJ
2001 GRUMMAN WORKHORSE VAN - 1099	Gasoline	9,564 litres	331 GJ	\$7,392	23.9 t	331 GJ
2001 GRUMMAN WORKHORSE VAN - 1100	BioDiesel 5	6,029 litres	233 GJ	\$4,138	15.7 t	233 GJ
2001 GRUMMAN WORKHORSE VAN - 1101	Gasoline	5,482 litres	190 GJ	\$4,395	13.7 t	190 GJ
2001 GRUMMAN WORKHORSE VAN - 1106	Gasoline	6,061 litres	210 GJ	\$4,655	15.2 t	210 GJ
2001 GRUMMAN WORKHORSE VAN - 1107	Gasoline	4,112 litres	143 GJ	\$2,859	10.3 t	143 GJ
2001 GRUMMAN WORKHORSE VAN - 1108	Gasoline	4,562 litres	158 GJ	\$3,314	11.4 t	158 GJ
2001 GRUMMAN WORKHORSE VAN - 1109	Gasoline	6,998 litres	243 GJ	\$5,273	17.5 t	243 GJ
2001 GRUMMAN WORKHORSE VAN - 1110	Gasoline	6,941 litres	241 GJ	\$5,046	17.4 t	241 GJ
2001 GRUMMAN WORKHORSE VAN - 1112	Gasoline	2,809 litres	97 GJ	\$2,278	7.0 t	97 GJ
2001 GRUMMAN WORKHORSE VAN - 1113	Gasoline	2,564 litres	89 GJ	\$1,974	6.4 t	89 GJ
2001 GRUMMAN WORKHORSE VAN - 1114	Gasoline	3,397 litres	118 GJ	\$2,396	8.5 t	118 GJ
2001 GRUMMAN WORKHORSE VAN - 1115	Gasoline	3,464 litres	120 GJ	\$2,287	8.7 t	120 GJ
2001 GRUMMAN WORKHORSE VAN - 1116	Gasoline	7,771 litres	269 GJ	\$5,784	19.4 t	269 GJ
2001 GRUMMAN WORKHORSE VAN - 1118	Gasoline	6,261 litres	217 GJ	\$4,932	15.7 t	217 GJ
2001 GRUMMAN WORKHORSE VAN - 1119	Gasoline	7,965 litres	276 GJ	\$6,023	19.9 t	276 GJ
2001 GRUMMAN WORKHORSE VAN - 1152	Gasoline	3,927 litres	136 GJ	\$2,951	9.8 t	136 GJ
2001 GRUMMAN WORKHORSE VAN - 1153	Gasoline	4,261 litres	148 GJ	\$2,817	10.7 t	148 GJ
2001 GRUMMAN WORKHORSE VAN - 1154	Gasoline	4,989 litres	173 GJ	\$3,759	12.5 t	173 GJ

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	Type	Consumption	Energy	Costs	CO <sub>2</sub> e	Energy	Costs
2002 FORD E350 CARGO VAN - 1163	Gasoline	4,639 litres	161 GJ	\$3,294	11.6 t	161 GJ	\$3,294
2002 FORD F350 SUPERCAB P/U - 1171	Gasoline	2,902 litres	101 GJ	\$2,557	7.3 t	101 GJ	\$2,557
2007 FORD E-350 CARGO VAN - 5063	Gasoline	363 litres	13 GJ	\$158	0.9 t	13 GJ	\$158
Gasoline Medium to Heavy Trucks & Vans Subtotal	Gasoline BioDiesel 5	147,982 litres 6,154 litres	5,129 GJ 238 GJ	\$112,990 \$4,204	370.4 t 16.0 t	<b>5,367 GJ</b>	<b>\$117,193</b>
<b>Gasoline Off Road Vehicles &amp; Equipment</b>							
1997 STONE ROLLER - 978	Gasoline	9,747 litres	338 GJ	\$7,677	24.4 t	338 GJ	\$7,677
2001 JOHN DEERE GATOR - 1082	Gasoline	32 litres	1 GJ	\$34	0.1 t	1 GJ	\$34
2001 VERMEER STUMP GRINDER - 1176	Gasoline	1,023 litres	35 GJ	\$950	2.6 t	35 GJ	\$950
2004 JOHN DEERE GATOR - 1267	Gasoline	9 litres	0 GJ	\$9	0.0 t	0 GJ	\$9
2006 JOHN DEERE - 1308	Gasoline	535 litres	19 GJ	\$452	1.3 t	19 GJ	\$452
Gasoline Off Road Vehicles & Equipment Subtotal	Gasoline	11,345 litres	393 GJ	\$9,123	28.4 t	<b>393 GJ</b>	<b>\$9,123</b>
<b>Gasoline Passenger Cars</b>							
1994 CHEVROLET CAVALIER - 796	Gasoline	623 litres	22 GJ	\$475	1.6 t	22 GJ	\$475
1995 CHEVROLET CAVALIER - 868	Gasoline	1,804 litres	63 GJ	\$1,211	4.5 t	63 GJ	\$1,211
1995 CHEVROLET CAVALIER - 869	Gasoline	593 litres	21 GJ	\$491	1.5 t	21 GJ	\$491
1995 CHEVROLET CAVALIER - 870	Gasoline	346 litres	12 GJ	\$250	0.9 t	12 GJ	\$250
1996 PLYMOUTH NEON - 897	Gasoline	510 litres	18 GJ	\$412	1.3 t	18 GJ	\$412
1996 PLYMOUTH NEON - 898	Gasoline	1,515 litres	52 GJ	\$1,252	3.8 t	52 GJ	\$1,252
1997 CHEVROLET CAVALIER - 952	Gasoline	1,333 litres	46 GJ	\$1,172	3.3 t	46 GJ	\$1,172
1997 PLYMOUTH NEON - 933	Gasoline	855 litres	30 GJ	\$806	2.1 t	30 GJ	\$806
1997 PLYMOUTH NEON - 934	Gasoline	2,058 litres	71 GJ	\$1,767	5.2 t	71 GJ	\$1,767
1997 PLYMOUTH NEON - 935	Gasoline	898 litres	31 GJ	\$697	2.2 t	31 GJ	\$697
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Account & Address	Account Consumption & Costs by Energy Type					Account Subtotal	
	Type	Consumption	Energy	Costs	CO <sub>2</sub> e	Energy	Costs
1997 PLYMOUTH NEON - 939	Gasoline	1,018 litres	35 GJ	\$560	2.5 t	35 GJ	\$560
1997 PLYMOUTH NEON - 948	Gasoline	577 litres	20 GJ	\$466	1.4 t	20 GJ	\$466
2001 CHEVROLET CAVALIER - 1042	Gasoline	770 litres	27 GJ	\$658	1.9 t	27 GJ	\$658
2001 CHEVROLET CAVALIER - 1043	Gasoline	772 litres	27 GJ	\$681	1.9 t	27 GJ	\$681
2001 CHEVROLET CAVALIER - 1044	Gasoline	1,465 litres	51 GJ	\$1,178	3.7 t	51 GJ	\$1,178
2001 CHEVROLET CAVALIER - 1045	Gasoline	759 litres	26 GJ	\$597	1.9 t	26 GJ	\$597
2001 CHEVROLET CAVALIER - 1046	Gasoline	575 litres	20 GJ	\$416	1.4 t	20 GJ	\$416
2001 CHEVROLET CAVALIER - 1047	Gasoline	1,894 litres	66 GJ	\$1,571	4.7 t	66 GJ	\$1,571
2001 CHEVROLET CAVALIER - 1048	Gasoline	493 litres	17 GJ	\$383	1.2 t	17 GJ	\$383
2001 CHEVROLET CAVALIER - 1049	Gasoline	1,819 litres	63 GJ	\$1,344	4.6 t	63 GJ	\$1,344
2001 CHEVROLET CAVALIER - 1050	Gasoline	586 litres	20 GJ	\$435	1.5 t	20 GJ	\$435
2001 CHEVROLET CAVALIER - 1051	Gasoline	154 litres	5 GJ	\$158	0.4 t	5 GJ	\$158
2001 CHEVROLET CAVALIER - 1052	Gasoline	1,945 litres	67 GJ	\$1,446	4.9 t	67 GJ	\$1,446
2001 CHEVROLET CAVALIER - 1053	Gasoline	3,180 litres	110 GJ	\$2,484	8.0 t	110 GJ	\$2,484
2001 CHEVROLET CAVALIER - 1054	Gasoline	1,306 litres	45 GJ	\$953	3.3 t	45 GJ	\$953
2001 CHEVROLET CAVALIER - 1086	Gasoline	1,993 litres	69 GJ	\$1,498	5.0 t	69 GJ	\$1,498
2001 CHEVROLET CAVALIER - 1129	Gasoline	1,168 litres	40 GJ	\$891	2.9 t	40 GJ	\$891
2001 CHEVROLET CAVALIER - 1130	Gasoline	2,267 litres	79 GJ	\$1,527	5.7 t	79 GJ	\$1,527
2003 CHEVROLET CAVALIER - 1199	Gasoline	2,632 litres	91 GJ	\$2,027	6.6 t	91 GJ	\$2,027
2003 CHEVROLET CAVALIER - 1210	Gasoline	2,598 litres	90 GJ	\$1,988	6.5 t	90 GJ	\$1,988
2003 CHEVROLET CAVALIER - 1212	Gasoline	1,739 litres	60 GJ	\$1,459	4.4 t	60 GJ	\$1,459
2003 CHEVROLET CAVALIER - 1222	Gasoline	2,866 litres	99 GJ	\$2,289	7.2 t	99 GJ	\$2,289

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2003 CHEVROLET CAVALIER - 1235	Gasoline	1,051 litres	36 GJ	\$851	2.6 t	36 GJ	\$851
2003 FORD TAURUS LX - 1224	Gasoline	946 litres	33 GJ	\$690	2.4 t	33 GJ	\$690
2003 HONDA CIVIC (XUNIT 5016) - 1292	Gasoline	801 litres	28 GJ	\$608	2.0 t	28 GJ	\$608
2003 HONDA CIVIC (XUNIT 5017) - 1293	Gasoline	804 litres	28 GJ	\$539	2.0 t	28 GJ	\$539
2004 DODGE SX - 1237	Gasoline	1,641 litres	57 GJ	\$1,209	4.1 t	57 GJ	\$1,209
2004 DODGE SX - 1238	Gasoline	1,282 litres	44 GJ	\$1,011	3.2 t	44 GJ	\$1,011
2005 DODGE SX - 1288	Gasoline	779 litres	27 GJ	\$615	2.0 t	27 GJ	\$615
2005 HONDA CIVIC - 1295	Gasoline	626 litres	22 GJ	\$507	1.6 t	22 GJ	\$507
2005 HONDA CIVIC - 1296	Gasoline	67 litres	2 GJ	\$71	0.2 t	2 GJ	\$71
2005 HONDA CIVIC - 1297	Gasoline	791 litres	27 GJ	\$597	2.0 t	27 GJ	\$597
2005 HONDA CIVIC - 5035	Gasoline	990 litres	34 GJ	\$725	2.5 t	34 GJ	\$725
MERCUY TOPAZ - 771	Gasoline	222 litres	8 GJ	\$228	0.6 t	8 GJ	\$228
MERCUY TOPAZ - 772	Gasoline	74 litres	3 GJ	\$76	0.2 t	3 GJ	\$76
MERCUY TOPAZ - 773	Gasoline	1,106 litres	38 GJ	\$835	2.8 t	38 GJ	\$835
Gasoline Passenger Cars Subtotal	Gasoline	54,286 litres	1,882 GJ	\$42,102	135.9 t	1,882 GJ	\$42,102
<b>Gasoline Tractors &amp; Mowers</b>							
1998 JOHN DEERE TRACTOR MOWER - 986	Gasoline	2,098 litres	73 GJ	\$1,453	5.3 t	73 GJ	\$1,453
2000 JOHN DEERE TRACTOR MOWER - 1023	Gasoline	533 litres	18 GJ	\$536	1.3 t	18 GJ	\$536
2000 JOHN DEERE TRACTOR MOWER - 1024	Gasoline	414 litres	14 GJ	\$442	1.0 t	14 GJ	\$442
2001 JOHN DEERE RIDE ON - 1134	Gasoline	883 litres	31 GJ	\$947	2.2 t	31 GJ	\$947
2001 JOHN DEERE RIDE ON - 1135	Gasoline	174 litres	6 GJ	\$172	0.4 t	6 GJ	\$172
2001 JOHN DEERE RIDE ON - 1136	Gasoline	39 litres	1 GJ	\$37	0.1 t	1 GJ	\$37



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	Type	Consumption	Energy	Costs	CO <sub>2</sub> e	Energy	Costs
2001 JOHN DEERE RIDE ON - 1137	Gasoline	110 litres	4 GJ	\$122	0.3 t	4 GJ	\$122
2003 JOHN DEERE MOWER - 1236	Gasoline	33 litres	1 GJ	\$31	0.1 t	1 GJ	\$31
JOHN DEERE MOWER - 864	Gasoline	290 litres	10 GJ	\$305	0.7 t	10 GJ	\$305
JOHN DEERE MOWER - 865	Gasoline	417 litres	14 GJ	\$449	1.0 t	14 GJ	\$449
<b>Gasoline Tractors &amp; Mowers Subtotal</b>	<b>Gasoline</b>	<b>4,992 litres</b>	<b>173 GJ</b>	<b>\$4,494</b>	<b>12.5 t</b>	<b>173 GJ</b>	<b>\$4,494</b>
<b>Gasoline Vehicles</b>							
STRAWBERRY (SKIFF) - 1289	Gasoline	44 litres	2 GJ	\$52	0.1 t	2 GJ	\$52
<b>Gasoline Vehicles Subtotal</b>	<b>Gasoline</b>	<b>44 litres</b>	<b>2 GJ</b>	<b>\$52</b>	<b>0.1 t</b>	<b>2 GJ</b>	<b>\$52</b>
<b>Gasoline-Electric Hybrid Vehicles</b>							
2002 TOYOTA PRIUS (XUNIT 5015) - 1291	Gasoline	571 litres	20 GJ	\$423	1.4 t	20 GJ	\$423
2002 TOYOTA PRIUS (XUNIT 5018) - 1294	Gasoline	427 litres	15 GJ	\$336	1.1 t	15 GJ	\$336
2006 HONDA CIVIC HYBRID - 1309	Gasoline	1,272 litres	44 GJ	\$1,105	3.2 t	44 GJ	\$1,105
2006 HONDA CIVIC HYBRID - 1310	Gasoline	760 litres	26 GJ	\$564	1.9 t	26 GJ	\$564
2006 HONDA CIVIC HYBRID - 1324	Gasoline	1,795 litres	62 GJ	\$1,544	4.5 t	62 GJ	\$1,544
2006 HONDA CIVIC HYBRID - 1325	Gasoline	1,961 litres	68 GJ	\$1,513	4.9 t	68 GJ	\$1,513
2006 HONDA CIVIC HYBRID - 1326	Gasoline	1,240 litres	43 GJ	\$1,024	3.1 t	43 GJ	\$1,024
2006 HONDA CIVIC HYBRID - 1327	Gasoline	445 litres	15 GJ	\$338	1.1 t	15 GJ	\$338
2007 HONDA CIVIC HYBRID - 1382	Gasoline	157 litres	5 GJ	\$64	0.4 t	5 GJ	\$64
<b>Gasoline-Electric Hybrid Vehicles Subtotal</b>	<b>Gasoline</b>	<b>8,628 litres</b>	<b>299 GJ</b>	<b>\$6,911</b>	<b>21.6 t</b>	<b>299 GJ</b>	<b>\$6,911</b>
<b>Unidentified - Diesel Fuel</b>							
MASTER KEY -	BioDiesel 5	6,075 litres	235 GJ	\$4,313	15.8 t	235 GJ	\$4,313
		Represents Multiple Vehicles					

## Richmond

### Corporate Energy & Greenhouse Gas Emissions Inventory: 2007

Account & Address	Account Consumption & Costs by Energy Type					Account Subtotal	
	Type	Consumption	Energy	Costs	CO <sub>2</sub> e	Energy	Costs CO <sub>2</sub> e
UNIDENTIFIED VEHICLE - 303	BioDiesel 5	216 litres	8 GJ	\$164	0.6 t	8 GJ	\$164 0.6 t
Unidentified - Diesel Fuel Subtotal	BioDiesel 5	6,290 litres	243 GJ	\$4,477	16.3 t	243 GJ	\$4,477 16.3 t
<b>Unidentified - Gasoline</b>							
UNIDENTIFIED VEHICLE - 3012	Gasoline	40 litres	1 GJ	\$43	0.1 t	1 GJ	\$43 0.1 t
UNIDENTIFIED VEHICLE - 5632	Gasoline	32 litres	1 GJ	\$30	0.1 t	1 GJ	\$30 0.1 t
UNIDENTIFIED VEHICLE - 7830	Gasoline	47 litres	2 GJ	\$48	0.1 t	2 GJ	\$48 0.1 t
Unidentified - Gasoline Subtotal	Gasoline	118 litres	4 GJ	\$121	0.3 t	4 GJ	\$121 0.3 t
Vehicle Fleet Subtotal	Gasoline	812,962 litres	28,177 GJ	\$638,133	2,034.8 t	47,533 GJ	\$992,020 3,351.2 t
	Diesel Fuel	90,311 litres	3,493 GJ	\$83,301	251.2 t		
	BioDiesel 5	410,085 litres	15,862 GJ	\$270,585	1,065.2 t		
<b>SOLID WASTE</b>							
<b>Administration Office</b>							
CITY HALL - 6911 No. 3 Rd	Solid Waste		624 cu. yds	93.60	49.6 t		49.6 t
CITY HALL   WEST - 6931 GRANVILLE ST	Solid Waste		624 cu. yds	93.60	49.6 t		49.6 t
Administration Office Subtotal	Solid Waste		1,248 cu. yds	187.20	99.2 t		99.2 t
<b>Arts   Cultural Centre</b>							
BRITANNIA SHIPYARD - 5180 WESTWATER DR	Solid Waste		208 cu. yds	31.20	16.5 t		16.5 t
LONDON FARM - 6511 DYKE RD	Solid Waste		156 cu. yds	23.40	12.4 t		12.4 t
Arts   Cultural Centre Subtotal	Solid Waste		364 cu. yds	54.60	28.9 t		28.9 t
<b>Caretaker House</b>							
BRIGHOUSE PARK - 7840 GRANVILLE AVE	Solid Waste		156 cu. yds	23.40	12.4 t		12.4 t

## Richmond

### Corporate Energy & Greenhouse Gas Emissions Inventory: 2007

Account & Address	Account Consumption & Costs by Energy Type					Account Subtotal	
	Type	Estimation Method	Volume	Mass	CO <sub>2</sub> e	Energy	Costs
HUGH BOYD PARK - 9771 PENDLETON RD	Solid Waste		78 cu. yds	11.70	6.2 t		6.2 t
MIGNAIR PARK - 9460 No 4 Rd	Solid Waste		156 cu. yds	23.40	12.4 t		12.4 t
WORKS YARD - 5400 RIVER RD	Solid Waste		156 cu. yds	23.40	12.4 t		12.4 t
Caretaker House Subtotal	Solid Waste		546 cu. yds	81.90	43.4 t		43.4 t
<b>Community Building</b>							
EAST RICHMOND COMMUNITY HALL   KING GEORGE PARK - 12360 CAMBIE RD	Solid Waste		96 cu. yds	14.41	7.6 t		7.6 t
SEA ISLAND COMMUNITY HALL - 7140 MILLER RD	Solid Waste		156 cu. yds	23.40	12.4 t		12.4 t
Community Building Subtotal	Solid Waste		252 cu. yds	37.81	20.0 t		20.0 t
<b>Community Centre</b>							
DEBECK CENTRE/HOUSE (FAMILY PLACE) - 8660 ASH ST A	Solid Waste		156 cu. yds	23.40	12.4 t		12.4 t
THOMPSON COMMUNITY CENTRE - 5151 GRANVILLE AVE	Solid Waste		312 cu. yds	46.80	24.8 t		24.8 t
WEST RICHMOND COMMUNITY CENTRE - 9180 No 1 Rd	Solid Waste		312 cu. yds	46.80	24.8 t		24.8 t
Community Centre Subtotal	Solid Waste		780 cu. yds	117.00	62.0 t		62.0 t
<b>Education</b>							
RICHMOND NATURE PARK - 11851 WESTMINSTER HWY	Solid Waste		312 cu. yds	46.80	24.8 t		24.8 t
Education Subtotal	Solid Waste		312 cu. yds	46.80	24.8 t		24.8 t
<b>Fire Services</b>							
FIRE HALL #1 - HEADQUARTERS - 6960 GILBERT RD	Solid Waste		156 cu. yds	23.40	12.4 t		12.4 t
FIRE HALL #2 - STEVESTON - 11011 No 2 Rd	Solid Waste		78 cu. yds	11.70	6.2 t		6.2 t
FIRE HALL #3 - BRIDGEPORT - 9100 BRIDGEPORT RD	Solid Waste		78 cu. yds	11.70	6.2 t		6.2 t
FIRE HALL #4 - NOT IN USE - 780 LANCASTER CIRS	Solid Waste		78 cu. yds	11.70	6.2 t		6.2 t
FIRE HALL #4 - SEA ISLAND - 3911 RUSS BAKER WAY	Solid Waste		78 cu. yds	11.70	6.2 t		6.2 t

2007 Energy &amp; Greenhouse Gas Emissions Inventory

2011-03-24

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Hyla Environmental Services Ltd., Port Moody, BC rhaycock@hesltd.ca M: 604.469.2910

## Richmond

### Corporate Energy & Greenhouse Gas Emissions Inventory: 2007

Account & Address	Account Consumption & Costs by Energy Type				Account Subtotal	
	Type	Estimation Method	Volume	Mass	CO <sub>2</sub> e	Energy Costs CO <sub>2</sub> e
FIRE HALL #5 - HAMILTON - 22451 WESTMINSTER HWY	Solid Waste		78 cu. yds	11.70	6.2 t	6.2 t
FIRE HALL #6 - SHELMONT - 9400 No 4 Rd	Solid Waste		78 cu. yds	11.70	6.2 t	6.2 t
FIRE HALL #7 - CRESTWOOD - 5731 No 6 Rd	Solid Waste		78 cu. yds	11.70	6.2 t	6.2 t
Fire Services Subtotal	Solid Waste		702 cu. yds	105.30	55.8 t	55.8 t
<b>Golf Course</b>						
HUGH BOYD PARK - 9751 PENDLETON	Solid Waste		78 cu. yds	11.70	6.2 t	6.2 t
Golf Course Subtotal	Solid Waste		78 cu. yds	11.70	6.2 t	6.2 t
<b>Ice Arena</b>						
MINORU ARENA - 7551 MINORU GATE	Solid Waste		312 cu. yds	46.80	24.8 t	24.8 t
RICHMOND ICE CENTER - 14140 TRIANGLE RD	Solid Waste		1,248 cu. yds	187.20	99.2 t	99.2 t
Ice Arena Subtotal	Solid Waste		1,560 cu. yds	234.00	124.0 t	124.0 t
<b>Indoor Pool</b>						
MINORU AQUATIC CENTER   MINORU POOL - 7560 MINORU GATE	Solid Waste		78 cu. yds	11.70	6.2 t	6.2 t
WATERMANIA - 14300 ENTERTAINMENT BLVD	Solid Waste		624 cu. yds	93.60	49.6 t	49.6 t
Indoor Pool Subtotal	Solid Waste		702 cu. yds	105.30	55.8 t	55.8 t
<b>Leased Buildings</b>						
STEVESTON MARTIAL ARTS - 4251 MONCTON STREET	Solid Waste					
Leased Buildings Subtotal	Solid Waste					
<b>Library</b>						
IRONWOOD LIBRARY - 11688 STEVESTON HWY 8200	Solid Waste		156 cu. yds	23.40	12.4 t	12.4 t
Library Subtotal	Solid Waste		156 cu. yds	23.40	12.4 t	12.4 t
<b>Park Fieldhouse</b>						

## Richmond

### Corporate Energy & Greenhouse Gas Emissions Inventory: 2007

Account & Address	Account Consumption & Costs by Energy Type					Account Subtotal	
	Type	Estimation Method	Volume	Mass	CO <sub>2</sub> e	Energy	Costs
FORSYTHE PARK - 6200 FORSYTHE CIRS A	Solid Waste		45 cu. yds	6.74	3.6 t		3.6 t
<b>Park Fieldhouse Subtotal</b>	Solid Waste		45 cu. yds	6.74	3.6 t		<b>3.6 t</b>
<b>Park Washrooms</b>							
DIXON PARK - 9340 GORMOND RD	Solid Waste		36 cu. yds	5.38	2.9 t		2.9 t
<b>Park Washrooms Subtotal</b>	Solid Waste		36 cu. yds	5.38	2.9 t		<b>2.9 t</b>
<b>Parks &amp; Playing Fields</b>							
LONDON   STEVESTON ATHLETIC PARK - 6500 WILLIAMS RD	Solid Waste		45 cu. yds	6.74	3.6 t		3.6 t
MINORU PARK - 7191 GRANVILLE AVE	Solid Waste		624 cu. yds	93.60	49.6 t		49.6 t
PALMER   GARDEN CITY NEIGHBOURHOOD PARK - 8301 GARDEN CITY RD	Solid Waste		120 cu. yds	18.00	9.5 t		9.5 t
STEVESTON COMMUNITY PARK - 4271 MONCTON ST PARK	Solid Waste		72 cu. yds	10.76	5.7 t		5.7 t
<b>Parks &amp; Playing Fields Subtotal</b>	Solid Waste		861 cu. yds	129.10	68.4 t		<b>68.4 t</b>
<b>Public Works Bldg &amp; Yard</b>							
WORKS YARD - 5555 LYNAS LN	Solid Waste		3,120 cu. yds	468.00	248.0 t		248.0 t
<b>Public Works Bldg &amp; Yard Subtotal</b>	Solid Waste		3,120 cu. yds	468.00	248.0 t		<b>248.0 t</b>
<b>Seniors Centre</b>							
MINORU SENIORS CENTRE - 7660 MINORU GATE	Solid Waste		78 cu. yds	11.70	6.2 t		6.2 t
<b>Seniors Centre Subtotal</b>	Solid Waste		78 cu. yds	11.70	6.2 t		<b>6.2 t</b>
<b>Theatre</b>							
RICHMOND GATEWAY THEATRE - 6500 GILBERT RD	Solid Waste		624 cu. yds	93.60	49.6 t		49.6 t
<b>Theatre Subtotal</b>	Solid Waste		624 cu. yds	93.60	49.6 t		<b>49.6 t</b>
<b>Solid Waste Subtotal</b>	Solid Waste		11,464 cu. yds	1,719.54 t	911.4 t		<b>911.4 t</b>

## Richmond

### Corporate Energy & Greenhouse Gas Emissions Inventory: 2007

Account & Address	Account Consumption & Costs by Energy Type				Account Subtotal	
	Type	Consumption	Energy	Costs	CO <sub>2</sub> e	CO <sub>2</sub> e
<b>UNIDENTIFIED</b>						
<b>Unidentified</b>						
CITY OF RICHMOND - 11135 STEVESTON HWY	Electricity	18,529 kWh	67 GJ	\$1,510	0.4 t	0.4 t
CITY OF RICHMOND - 8763 STEVESTON HWY A	Electricity	8,623 kWh	31 GJ	\$734	0.2 t	0.2 t
UNIDENTIFIED - 7180 CAVELIER CRT	Electricity	6,213 kWh	22 GJ	\$546	0.1 t	0.1 t
UNIDENTIFIED - 5320 OLIVER DR FRIT	Electricity	3,420 kWh	12 GJ	\$327	0.1 t	0.1 t
Unidentified Subtotal	Electricity	36,785 kWh	132 GJ	\$3,117	0.8 t	0.8 t
Unidentified Subtotal	Electricity	36,785 kWh	132 GJ	\$3,117	0.8 t	0.8 t
<b>Total</b>						
Type	Consumption	Energy	Costs	CO <sub>2</sub> e		
Electricity	33,396,041 kWh	120,226 GJ	\$2,257,748	734.7 t		
Natural Gas	104,988 GJ	104,988 GJ	\$908,397	3,937.1 t		
Gasoline	812,962 litres	28,177 GJ	\$638,133	2,034.8 t		
Diesel Fuel	90,311 litres	3,493 GJ	\$83,301	251.2 t		
BioDiesel 5	410,085 litres	15,862 GJ	\$270,585	1,065.2 t		
		Volume	Mass	CO <sub>2</sub> e		
Solid Waste	11,464 cu. yds	1,719.54 t		911.4 t		
		272,747 GJ	\$4,158,164	8,934.3 t		



**Richmond**  
Corporate Energy & Greenhouse Gas Emissions Inventory: 1999

BUILDINGS								
Summary	Energy	Costs	CO <sub>2</sub> e	Emissions Source	Consumption	Energy	Costs	CO <sub>2</sub> e
Summary -	137,731 GJ	\$1,831,237	4,318.6 t					
				Electricity	20,476,629 kWh	73,716 GJ	\$1,360,647	1,044.3 t
				Natural Gas	64,015 GJ	64,015 GJ	\$470,590	3,274.3 t
LIGHTING								
Summary	Energy	Costs	CO <sub>2</sub> e	Emissions Source	Consumption	Energy	Costs	CO <sub>2</sub> e
Summary -	26,693 GJ	\$431,260	378.2 t					
				Electricity	7,414,792 kWh	26,693 GJ	\$431,260	378.2 t
WATER & WASTEWATER								
Summary	Energy	Costs	CO <sub>2</sub> e	Emissions Source	Consumption	Energy	Costs	CO <sub>2</sub> e
Summary -	17,184 GJ	\$399,107	243.4 t					
				Electricity	4,773,247 kWh	17,184 GJ	\$399,107	243.4 t
VEHICLE FLEET								
CNG Vehicles	Energy	Costs	CO <sub>2</sub> e	Emissions Source	Consumption	Energy	Costs	CO <sub>2</sub> e
Cng Vehicles -	2,851 GJ	\$43,590	145.8 t					
				Natural Gas	2,851 GJ	2,851 GJ	\$43,590	145.8 t
Diesel Fuel Vehicles	Energy	Costs	CO <sub>2</sub> e	Emissions Source	Consumption	Energy	Costs	CO <sub>2</sub> e
Clear Diesel - -	11,598 GJ	\$137,205	833.4 t					
				Diesel Fuel	299,841 litres	11,598 GJ	\$137,205	833.4 t
Marked Diesel - -	3,837 GJ	\$32,644	275.7 t					
				Diesel Fuel	99,201 litres	3,837 GJ	\$32,644	275.7 t

1999 Energy & Greenhouse Gas Emissions Inventory

Hyla Environmental Services Ltd., #1708 -400

Capilano Road, Port Moody, BC V3H 0E1

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12/01/2010

## Richmond

### Corporate Energy & Greenhouse Gas Emissions Inventory: 1999

Gasoline Vehicles		Energy	Costs	CO <sub>2</sub> e	Emissions Source	Consumption	Energy	Costs	CO <sub>2</sub> e
Gasoline - -		25,942 GJ	\$389,082	1,869.2 t	Gasoline	748,466 litres	25,942 GJ	\$389,082	1,869.2 t
SOLID WASTE									
Summary		Energy	Costs	CO <sub>2</sub> e	Emissions Source	Estimation Method	Volume	Mass	CO <sub>2</sub> e
Summary -		9,573 cu. yds		761.1 t	Solid Waste		9,573 cu. yds	1,435.98 t	761.1 t





## Richmond Corporate Energy & Greenhouse Gas Emissions Inventory: 1995

BUILDINGS							
Summary	Energy	Costs	CO <sub>2</sub> e	Emissions Source	Consumption	Energy	CO <sub>2</sub> e
Summary -	110,650 GJ	\$1,426,068	3,571.7 t	Electricity	16,956,694 kWh	61,044 GJ	1,034.4 t
				Natural Gas	49,606 GJ	49,606 GJ	2,537.3 t
LIGHTING							
Summary	Energy	Costs	CO <sub>2</sub> e	Emissions Source	Consumption	Energy	CO <sub>2</sub> e
Summary -	20,849 GJ	\$345,417	353.3 t	Electricity	5,791,419 kWh	20,849 GJ	353.3 t
WATER & WASTEWATER							
Summary	Energy	Costs	CO <sub>2</sub> e	Emissions Source	Consumption	Energy	CO <sub>2</sub> e
Summary -	14,771 GJ	\$341,036	250.3 t	Electricity	4,103,180 kWh	14,771 GJ	250.3 t
VEHICLE FLEET							
CNG Vehicles	Energy	Costs	CO <sub>2</sub> e	Emissions Source	Consumption	Energy	CO <sub>2</sub> e
Cng Vehicles --	919 GJ	\$50,219	47.0 t	Natural Gas	919 GJ	919 GJ	47.0 t
Diesel Fuel Vehicles	Energy	Costs	CO <sub>2</sub> e	Emissions Source	Consumption	Energy	CO <sub>2</sub> e
Clear Diesel --	10,976 GJ	\$140,516	788.7 t	Diesel Fuel	283,767 litres	10,976 GJ	788.7 t
Marked Diesel --	4,501 GJ	\$42,239	323.4 t	Diesel Fuel	116,367 litres	4,501 GJ	323.4 t

1995 Energy &amp; Greenhouse Gas Emissions Inventory

Hyla Environmental Services Ltd., #1708 -400

Capilano Road, Port Moody, BC V3H 0E1

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12/01/2010



Energy &amp; Emissions Monitoring and Reporting System™ v4.0

## Richmond

### Corporate Energy & Greenhouse Gas Emissions Inventory: 1995

Gasoline Vehicles		Energy	Costs	CO <sub>2</sub> e	Emissions Source	Consumption	Energy	Costs	CO <sub>2</sub> e
Gasoline - -		30,659 GJ	\$487,158	2,209.1 t	Gasoline	884,578 litres	30,659 GJ	\$487,158	2,209.1 t
SOLID WASTE									
Summary		Energy	Costs	CO <sub>2</sub> e	Emissions Source	Estimation Method	Volume	Mass	CO <sub>2</sub> e
Summary -		12,428 cu. yds		988.0 t	Solid Waste		12,428 cu. yds	1,864.20 t	988.0 t

## Appendix IV - Buildings Excluded from GHG Inventory

Degree of Control	Class	Subsector	Description	Address	Notes
City does not receive bills but pays at least partial share of costs	Libraries, Halls and Community Centres	Library	East Richmond Library	150-11590 Cambie Rd	City leases property, City pays for utility through building owner
	Libraries, Halls and Community Centres	Community Centre	Cambie Community Centre	12800 Cambie Rd (old 4111 Jacombs)	City owns 17.83%, 17.83% of utility costs paid to school board
	Libraries, Halls and Community Centres	Community Centre	Hamilton Community Centre	23400 Gilley Rd	City owns 11%, 11% of utility costs paid to school board
City receives utility bills for these facilities, costs are recouped through agreements	Police Services	RCMP	RCMP Building	6900 Minoru Blvd	
	Police Services	Community Police	South Arm Community Police	8880 Williams Rd	Natural Gas is shared with Community Centre
	Police Services	Community Police	Steveston Community Police	4371 Moncton Street	City owns trailer and land
	External Use	Leased Buildings, Education	Kwantlen Building	5840 Cedarbridge Way	City owns, City runs 8000sqft, 16000sqft leased to BCBC (WSI) property management company
	External Use	Leased Buildings	Minoru Chapel	6540 Gilbert Road	
	External Use	Leased Buildings	Bagel Building - Commercial Lease	5671 No. 3 Rd 2nd Fl	
	External Use	Leased Buildings	C/O Pacific Quorum Properties	8091 Granville Ave	
	Not in use	Leased Buildings	C/O Pacific Quorum Properties	3140 Alymer Ave	City owns land, house demolished.
	Not in use	Leased Buildings	C/O Pacific Quorum Properties	8080 Anderson Road	Uninhabitable
	External Use	Leased Buildings	Daycare Facility	8300 Cook Rd	Society of Richmond Children's Centre
	External Use	Leased Buildings	Rental House	7651 Ash St	Sold to Richmond School Board in Oct 2007
	External Use	Leased Buildings	Rental House	7571 Ash St.	After 2007 No Building, Demolished, Now Neighbourhood Park Site, Paulik Neighbourhood Park
	External Use	Leased Buildings	Rental House	6620 Eckersley Road	Rental House. Will be a house for Olympic athletes until 2010.
	External Use	Leased Building	Scotch Pond	2220 Chatham	Operated by fisherman's assoc.
City owns but does not operate or pay utility costs	External Use	Leased Building	Daycare Treehouse	5500 Andrews Rd	
	External Use	Leased Building	Daycare Terra Nova	6011 Blanshard Drive	
	External Use	Leased Building	Daycare Riverside	5862 Dover Cres	
	External Use	Leased Building	Garratt Wellness Centre	7504 Chelsea Place	Operated by Coastal Health
	External Use	Leased Building	Rod & Gun Club	7891 Cambie Road	





# City of Richmond


## Report to Committee

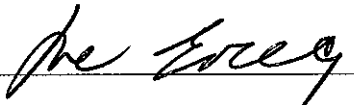
**To:** General Purposes Committee  
**From:** Victor Wei, P. Eng.  
Director, Transportation  
**Re:** **Report from City Representatives on Vancouver International Airport  
Aeronautical Noise Management Committee (YVR ANMC) and Status Update  
of Richmond Airport Noise Citizens Advisory Task Force Report  
Recommendations**

**Date:** June 15, 2011  
**File:** 01-0153-04-01/2010-  
Vol 01

### Staff Recommendation

1. That a letter be sent to the Vancouver Airport Authority to:
  - a) acknowledge the positive efforts made by the Authority towards addressing the Richmond Airport Noise Citizens Advisory Task Force recommendations; and
  - b) request that the Authority provide a status report on its progress towards any outstanding Task Force recommendations as part of its next annual presentation to Council.
2. That the term of the Richmond Airport Noise Citizens Advisory Task Force be extended to March 2012 in order to provide feedback on the initiatives of the Control Zone Procedures Working Group of the YVR ANMC.

  
Victor Wei, P. Eng.  
Director, Transportation  
(604-276-4131)

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<b>ROUTED TO:</b>	<b>CONCURRENCE</b>	<b>CONCURRENCE OF GENERAL MANAGER</b>	
Policy Planning .....	Y <input checked="" type="checkbox"/> N <input type="checkbox"/>		
<b>REVIEWED BY TAG</b>	YES <input checked="" type="checkbox"/> NO <input type="checkbox"/>	<b>REVIEWED BY CAO</b>	YES <input checked="" type="checkbox"/> NO <input type="checkbox"/>

## Staff Report

### Origin

In June 2010, Council directed staff and the City's two appointees to the Vancouver International Airport Aeronautical Noise Management Committee (YVR ANMC) to review the effectiveness of the final recommendations of the Richmond Airport Noise Citizens Advisory Task Force (the Task Force) after one year with the Task Force to be retained during this period to allow for the opportunity to provide comment on the discussions of its report with the relevant federal agencies. At that same meeting, Council endorsed a revised reporting structure for the City's two appointees to the YVR ANMC whereby the appointees would provide semi-annual updates directly to the General Purposes Committee on the agenda items discussed at previous quarterly YVR ANMC meetings. This report provides:

- a memorandum prepared by the City's appointees on the YVR ANMC (see **Attachment 1**);
- an update on the status of the Task Force recommendations; and
- an overview of the agenda items discussed at the YVR ANMC meetings held September 15, 2010, December 1, 2010, February 11, 2011, and May 18, 2011 along with City appointees' and staff comments on these topics.

### Analysis

#### 1. Status Update on the Recommendations of the Richmond Airport Noise Citizens Advisory Task Force

As requested by the City, all three federal agencies (i.e., Vancouver Airport Authority (VAA), Transport Canada and NAV CANADA) provided formal responses to the Task Force report by the September 30, 2010 deadline (see **Attachment 2**). As all three agencies are members of the YVR ANMC, the Task Force recommendations will be co-ordinated through this committee with the VAA being the primary lead, as the identified areas of concern coincide with those to be addressed in the VAA's *2009-2013 Noise Management Plan*. In cases where the objective of the Task Force recommendation is supported but not the particular method, an alternative approach may be suggested.

**Attachment 3** provides the complete status of the 22 Task Force recommendations as of June 2011. During the past year, significant progress has been made on several recommendations and some have been completed; these are highlighted below in Sections 1.1 to 1.6.

##### 1.1 Recommendation 5: Float Plane Operations

##### Recommendation 17: Expand YVR ANMC Membership to include Float Plane Operators

VAA staff analyzed float plane arrival and departure flight tracks during July and August 2010 to determine how closely operators were following the recommended flight paths published in 2009, which are consistent with those recommended by the Task Force. The data indicate 98 per cent compliance with the preferred horizontal alignment of the paths, however, the altitude of the aircraft was not examined. At the initiative of the City's representatives to the YVR ANMC, VAA, Transport Canada and City staff along with the City's YVR ANMC representatives met with the major float plane operators in February 2011 to discuss float plane operations and associated

community concerns. The meeting was very positive and informative for all parties. Short- and long-term action items arising from the meeting include:

#### Short-Term Actions

- undertake recurrent training for flight crews regarding the preferred flight paths;
- invite a float plane operator to become a member of the YVR ANMC, such as the Chair of the newly formed Float Plane Operators Association;
- redistribute the existing map of the recommended float plane flight paths; and
- undertake follow-up monitoring of the arrival and departure flight tracks in Summer 2011.

#### Medium-Term Actions:

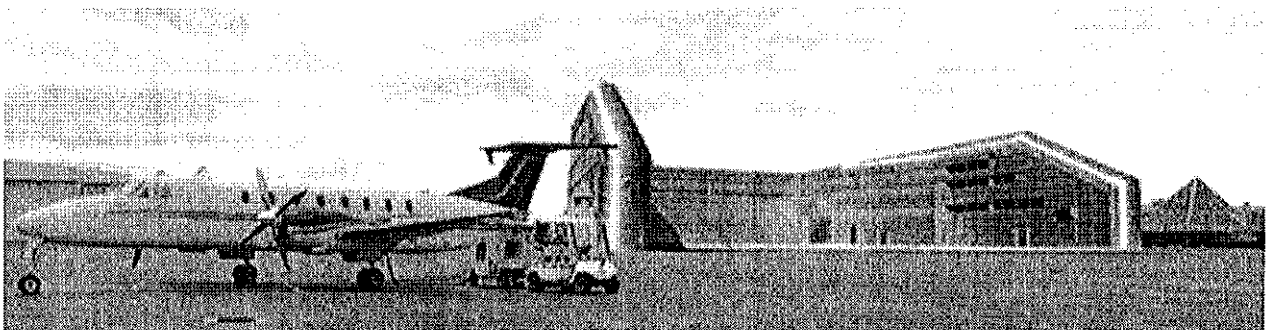
- produce a “best practices” video; and
- update and distribute a new map of the recommended float plane flight paths.

*City Representatives & Staff Comments: noise from float plane operations was a key concern identified by the Task Force. The planned actions are positive steps and, if successful, will address most of the Task Force recommendation with respect to float plane operations.*

### 1.2 Recommendation 6: Ground Run-Up Enclosure

#### Recommendation 8: Reporting, Monitoring and Enforcement System

VAA staff report that approximately 3,600 engine run-ups at various power settings are conducted each year or 12-15 per day. Of these, 65 per cent are propeller engines and 60 per cent occur on the south side of the airport. The VAA receives approximately 50-60 complaints each year regarding the noise generated by the engine run-ups.

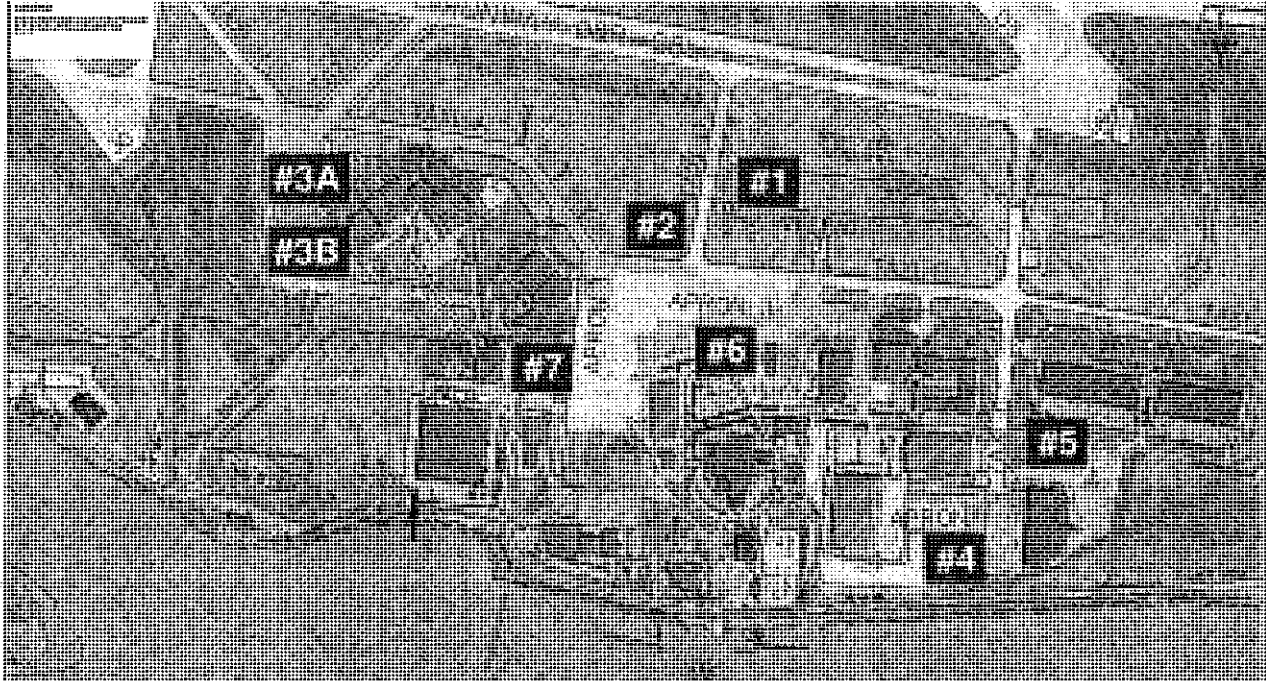


**Figure 1: Conceptual Image of GRE at South Terminal**

During 2009-2010, VAA staff investigated the feasibility of constructing a ground run-up enclosure (GRE) for propeller engines and identified a proposed design (see **Figure 1** for a conceptual image) that is three-sided with no roof and three storeys high (11 m). Seven potential sites for the GRE in the immediate vicinity of the south terminal were evaluated using the prime criterion of minimizing noise impacts on the greatest number of people. A preferred site (Site #7 in **Figure 2**) was identified and the VAA Board approved a recommendation to proceed at its December 9, 2010 meeting. Following design work, construction began in April 2011 with completion anticipated by December 2011.

Upon completion, YVR will be the only airport in Canada with a GRE. VAA staff estimate that, for residents living to the south, the facility will reduce noise levels by 50 per cent (approximately 11 dBA ) from current conditions and the number of residents that are exposed to

>65 dBA (equivalent to a fast moving car at 8 meters away or a cash register at 3 meters away) will be reduced from 1,119 to 273. Verification of pre and post GRE noise reductions will be undertaken by an independent third party to ensure that the GRE meets specified noise reduction criteria. An additional permanent noise monitoring station will be established in Richmond to provide on-going data.



**Figure 2: Potential and Preferred (#7) Sites for GRE at South Terminal**

In addition, in May 2010, VAA established new reporting procedures to document unapproved engine run-ups observed on the airfield. Per the VAA's *2010 Aeronautical Noise Management Report*, 27 suspected unauthorized run-ups were reported to Transport Canada for further investigation as a result of the new procedures. To date, the incidents are still under investigation. Any sanctions issued will be posted on the Transport Canada website.

*City Representatives & Staff Comments: construction of a GRE will measurably decrease the noise from engine run-ups that reaches Richmond residents living opposite the south side of Sea Island. Indeed, this project will primarily benefit Richmond, as propeller engine run-ups are not conducted on the north side of Sea Island.*

### 1.3 Recommendation 12: Reverse Thrust Usage on 26L/08R (South Runway)

VAA staff advise that an application to publish a revised procedure to restrict the use of reverse thrust on the south runway (which is already in effect for the north runway) was submitted to Transport Canada in 2008. The procedural change was published in 2010 and is to include an education and awareness component to advise carriers of the operating restriction.

*City Representatives & Staff Comments: the publication of the revised procedure is a positive change for Richmond, as the use of idle-only reverse thrust reduces aircraft noise when landing.*



#### 1.4 Recommendation 13: Flights over West Richmond

A Control Zone Procedures Working Group comprised of three members of the YVR ANMC (VAA, Transport Canada and NAV CANADA staff) was formed in December 2010 to examine opportunities to improve the safety and efficiency of airspace operations, which may also generate beneficial results in terms of noise mitigation. Per the terms of reference for the Group, its main purpose is to review aircraft arrival and departure routes as well as overflights by aircraft neither arriving nor departing from YVR, and review standard runway operating procedures. Focus areas for the Group include transit routes over the airport (i.e., increase existing minimum 2,500 feet altitude to 4,000 feet), float plane operations and aircraft departure routes. The Group intends to consult with stakeholders upon development of a detailed work plan and recommendations, and anticipates that its work will be substantially completed by March 2012.

In addition, at the February 2011 YVR ANMC meeting, VAA staff presented proposed routes for night-time (midnight to 6:00 am) departures that would direct the ground track of the aircraft over unpopulated areas as much as possible. Further analysis is required to determine how many aircraft are candidates for the suggested routes. Ultimately, the proposed routes will be forwarded to NAV CANADA for its consideration for formalization and publication as Standard Instrument Departures.

*City Representatives & Staff Comments: The formation of the Working Group and the proposed night-time departure routes are significant positive steps towards achieving the objective of minimizing flights over west Richmond as put forward by the Task Force.*

#### 1.5 Recommendation 14: Olympic One Departure for Non-Jet Aircraft

In March 2011, NAV CANADA published the "Stanley One" departure for non-jet aircraft (effective May 5, 2011), which is substantially similar to the "Olympic One" departure (which became effective October 22, 2009) that the Task Force recommended be made permanent. The "Olympic One" departure had the effect of positioning departing non-jet aircraft further east over the less populated residential and more agricultural areas of Richmond.

*City Representatives & Staff Comments: the new departure procedure should benefit the community by measurably decreasing aircraft departure noise generated over north and west Richmond by non-jet aircraft.*

- 1.6 Recommendation 19: Task Force to Report Back on Agency Responses to Recommendations  
 Recommendation 20: Task Force Recommendations to be Widely Disseminated  
 Recommendation 22: Forward Task Force Report to Relevant Agencies

Per Council direction in June 2010, the mandate of the Task Force was extended to June 2011 to provide an opportunity for the Task Force to assess the agency responses. The Task Force report was also distributed to the three primary federal agencies as well as made available on the City's website.

During the past year, the Task Force and City staff met to review and discuss the agency responses to and subsequent progress on the Task Force recommendations. Overall, Task Force members and City staff agree that the VAA is responding seriously and positively to their recommendations and that notable progress has been made towards achieving the objective of

the key recommendations as noted above, and will continue as the VAA develops action items to support its *2009-2013 Noise Management Plan*.

Accordingly, staff recommend that the City send a letter to the VAA to commend the positive efforts made by the agency towards addressing the Task Force recommendations and request the agency to provide a status report on its progress towards any outstanding Task Force recommendations as part of its next annual presentation to Council.

## **2. Potential Permanent City Aeronautical Noise Advisory Committee (Recommendation 21)**

Per the Terms of Reference for the Task Force, its purpose is to “advise Council by providing a City forum for the discussion, consideration and co-ordination of aeronautical noise and aircraft flight path issues affecting the City of Richmond.” The primary work items are cited as

- *identify aeronautical noise complaint sources including holding public meetings to hear public concerns and suggested solutions;*
- *summarize and evaluate the public concerns and develop options and strategies to address the concerns; and*
- *present to Council its final recommendations regarding the issues and identify what actions the City, the VAA and others might do to address them.*

The Task Force clearly completed all of its major work items upon presentation of its final report to Council in June 2010. At that same meeting, Council directed that the Task Force be retained for one year (to June 2011) to allow for the opportunity to provide comment on the discussions of its report with the relevant federal agencies. Notwithstanding that no federal agencies have requested to meet with the Task Force over the past year, staff recommend that the term of the Task Force be extended to March 2012 to allow the Task Force the opportunity to provide feedback on the work of the Control Zone Procedures Working Group (described in Section 1.4), as the focus areas of the Working Group are directly relevant to a number of Task Force recommendations. Members of the Task Force have indicated collective support for the proposed extension. Staff would report back in March 2012 on the status of the Working Group initiatives as well as provide a recommendation regarding the future of the Task Force.

## **3. Additional Agenda Items Discussed at YVR ANMC Meetings**

Sections 3.1 to 3.6 provide summary comments on additional agenda items discussed at YVR ANMC beyond those related to the Task Force recommendations.

### **3.1 YVR ANMC Membership – Citizen Representative for City of Surrey**

In response to a request from the City of Surrey to appoint a citizen representative to the Committee, the Vancouver Airport Authority (VAA) agreed to the request in the interests of fostering a collaborative approach but with the understanding that VAA is not responsible for aeronautical noise beyond 10 nautical miles of the airport (i.e., Surrey is beyond this limit).

*City Representatives & Staff Comments: VAA's accommodation of the request is a positive step towards increased openness and transparency. While Surrey is beyond VAA's geographic sphere of responsibility, there are other Committee members (e.g., NAV CANADA, Transport Canada) that have the ability to effect airspace changes over*

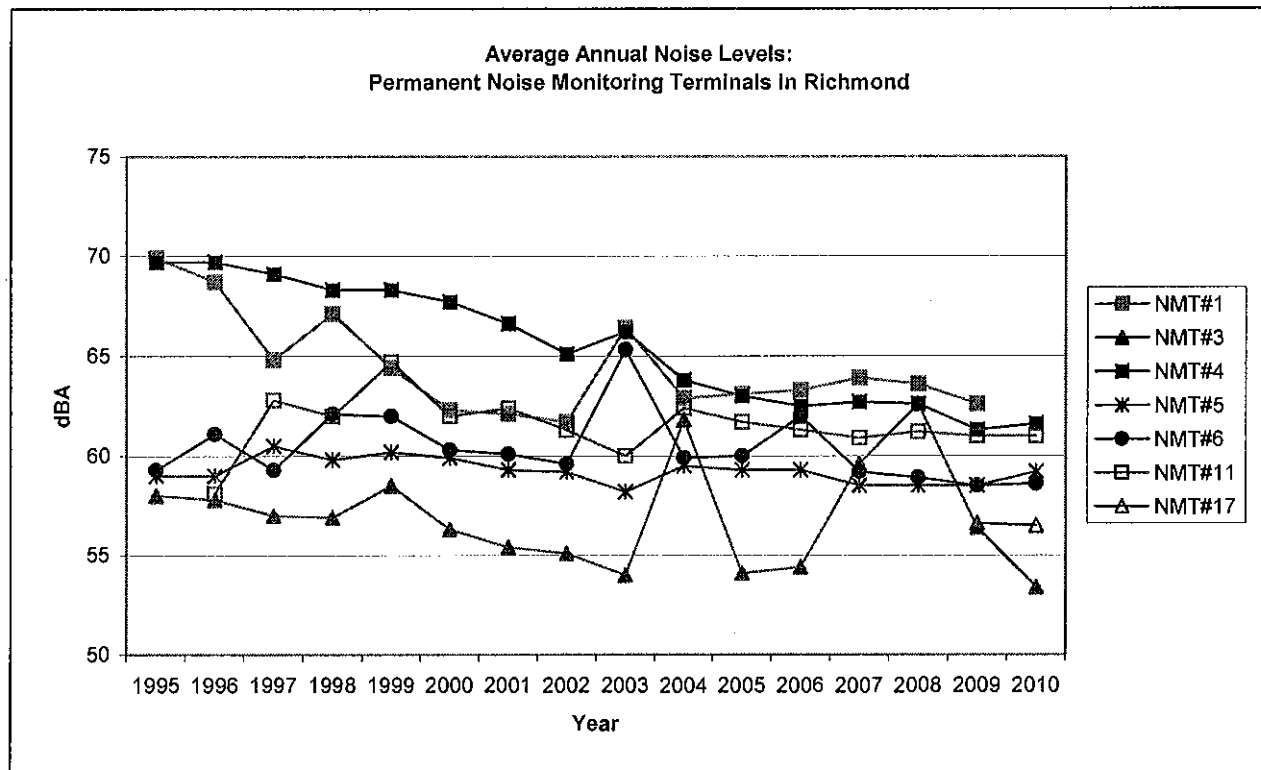
### 3.2 Reports on Noise Management

The number of noise complaints received by VAA in 2010 decreased by 43 per cent compared with 2009. As shown in Table 1, complaints from Richmond residents accounted for 16 per cent of the total received.

As shown in Figure 3, annual data from the seven permanent noise monitoring terminals (NMT) in Richmond (shown in Figure 4) indicates that recorded noise levels at most locations have generally remained steady over the past 15 years with the exception of NMT#4 (located at Tomsett Elementary School on Odlin Road), which appears to exhibit an overall downward trend in recorded noise levels.

**Table 1: Noise Complaints to VAA for 2010**

Municipality/Area	#	%
Surrey	342	28
Vancouver	253	21
South Delta	240	20
Richmond	196	16
North Delta	89	7
Burnaby	46	4
Other/Unknown	64	5
<b>Total</b>	<b>1,230</b>	<b>100</b>



**Figure 3: Average Annual Noise Levels recorded by NMTs in Richmond**

*City Representatives & Staff Comments: with respect to the noise complaints received, reporting only the absolute number of complaints received does not provide sufficient detail for analysis. For example, some complaints may not be related to YVR operations at all (i.e., overflights to Coal Harbour, Boundary Bay operations). It has been suggested to VAA that a breakdown of the type of complaint by municipality would*



**Figure 4: Location of Noise Monitoring Terminals (NMTs) in Richmond**  
**GP - 135**

*aid the Committee in identifying potential mitigating measures.*

### 3.3 Portable Noise Monitoring Stations – Results

Portable noise monitoring stations were located at Crescent Park Annex (2378 124<sup>th</sup> St) in Surrey and at Delta Fire Hall No. 5 (11720 64<sup>th</sup> Ave) in Delta to obtain objective data regarding noise levels in the community. The results indicate that YVR operations are not a significant source of noise at either location. Of the noise events recorded (i.e., the noise level exceeded a predefined decibel level and duration), only 0.8 per cent and 2.4 per cent were aircraft-related for the Delta and Surrey sites respectively. Of the aircraft-related events recorded at the Surrey site, only 12 (0.4 per cent) were related to YVR traffic with the remaining associated with aircraft operating from other airports in the region (i.e., Boundary Bay, Pitt Meadows, Langley, etc).

*City Representatives & Staff Comments: the data illustrates that, of the noise events that were aircraft-related, the majority were due to operations of other nearby regional airports, not YVR. This additional information will help the responsible agencies to develop meaningful mitigation measures that target the noise sources.*

### 3.4 Noise Information Seminars

VAA hosts quarterly noise information seminars for the general public where participants are given an overview of noise management practices at YVR and a bus tour of the airfield. Each seminar can accommodate 10 people and the latest seminars were held on July 17 and November 20, 2010.

*City Representatives & Staff Comments: if the objective of the seminars is to educate and raise the awareness of local residents regarding aeronautical noise sources and mitigation measures, it has been suggested that VAA staff may wish to consider targeting and encouraging past complainants to attend the seminars as they may benefit from gaining the perspective of VAA on the issue of noise management.*

### 3.5 YVR Night Operations

VAA distributed information that summarized YVR night operations (i.e., runway movements occurring between midnight and 6:00 am) over the 1992-2009 period. Statistics indicate that night operations as a percentage of total movements have remained relatively stable for both passengers and cargo. During this period, aircraft operations peaked in 1999 with 323,320 movements; in 2009, runway movements were down by 22 per cent from 1999 traffic levels.

*City Representatives & Staff Comments: the Task Force identified the noise from night operations as a concern and while the night operations at YVR have not decreased over the past several years, it is at least encouraging that these movements have not increased either. One can expect that as more newer and quieter aircraft enter airlines' operating fleets, the impacts of noise will also decrease over time.*

### 3.6 Social Survey Results

Each year, VAA undertakes an on-line survey of 1,000 Metro Vancouver residents to measure their level of annoyance with respect to aeronautical noise. VAA reported that 16 per cent of respondents indicated they were annoyed and, of those, 22 per cent were extremely annoyed and 37 per cent

were disturbed at night. Since 1996, the percentage of people reporting that they were annoyed has been on a decreasing to flat trend while air traffic to YVR have increased 87 per cent over the same time period.

*City Representatives & Staff Comments:* while VAA staff indicated that of the 1,000 survey participants, 200 resided in Richmond and 200 resided on the south slope of Vancouver, there was no further details regarding the distribution of the remaining participants. It has been conveyed to VAA staff that it is not clear what is the objective of the survey or what is the value of the survey results.

#### **4. Parliamentary Standing Committee on Transport, Infrastructure & Communities: Study on Consequences of Noise Caused by Airport Operations in Urban Areas**

During the last Parliamentary session (March 3, 2010 to March 26, 2011), the Standing Committee on Transport, Infrastructure & Communities initiated a "Study of the Consequences of Noise Caused by Airport Operations in Urban Areas." The issue was discussed at two Committee meetings (December 1<sup>st</sup> and 7<sup>th</sup>, 2010) and only preliminary information was exchanged. Representatives from Transport Canada and NAV CANADA provided overviews of each agency's role in managing airport noise and generally stated that aircraft noise issues in urban areas are best handled at the local level (i.e., by local airport authorities), although NAV CANADA stated that it is now corporate policy that it consult with communities when routing changes are proposed within terminal air space that would have a material impact on noise exposure in the community. At this time, there is no indication when the Standing Committee will reconvene.

It has been suggested that Richmond's Members of Parliament (MPs) be invited to a future Committee or Council meeting to discuss the issue of aeronautical noise in Richmond. Given that the parliamentary hearings are currently in abeyance and still at a preliminary stage with no definite end date or outcome identified, it may be premature to engage Richmond MPs on this topic at this time. Staff suggest that a more appropriate time would be if the progress being made by federal agencies to address the Task Force recommendations slows or the parliamentary hearings reconvene and substantive discussions occur.

#### **Financial Impact**

The proposed extension of the term for the Richmond Airport Noise Citizens Advisory Task Force to March 2012 would incur additional staff overtime to facilitate their meetings, which can be absorbed within existing approved operating budget.

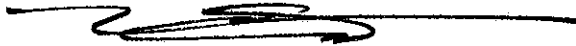
#### **Conclusion**

Members of the Richmond Airport Noise Citizens Advisory Task Force and City staff agree that the VAA is responding seriously and positively to the Task Force recommendations and that notable progress has been made towards achieving the objective of those recommendations and will continue as the VAA develops action items to support its *2009-2013 Noise Management Plan*.

Given that the focus areas of the YVR ANMC Control Zone Procedures Working Group are particularly germane to the recommendations of the Task Force, staff recommend that the term

of the Task Force be extended to March 2012 to allow the Task Force the opportunity to provide feedback on that work, which is anticipated to be substantially completed by that date.

Staff further recommend that the City send a letter to the Vancouver Airport Authority to commend the positive efforts made by the agency towards addressing the Task Force recommendations and request the agency to provide a status report on its progress towards any outstanding Task Force recommendations as part of its next annual presentation to Council.



**for** Joan Caravan  
Transportation Planner  
(604-276-4035)  
(on behalf of Haydn Acheson and Margot Spronk, City Appointees to the YVR ANMC)

**To:** General Purposes Committee  
City of Richmond

**From:** Haydn Acheson, City of Richmond Citizen VANMC Representative  
Margot Spronk, City of Richmond Citizen VANMC Representative

**Date:** June 5, 2011

## **Re: 2011 Status Report Vancouver Airport Noise Management Committee**

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### **Appointee Background**

Haydn Acheson was first appointed to the Vancouver Airport Noise Management Committee (VANMC) in January 2009, and re-appointed in January 2011 for a two year term. Haydn brings his experience as an airline pilot and a senior airline executive to the table. Currently Haydn is President and General Manager at the Coast Mountain Bus Company, and he lives in the Richmond neighbourhood of Terra Nova.

The 2011-12 term is the second VANMC appointment for Margot Spronk. Margot was previously NAV CANADA's General Manager for the Vancouver Flight Information Region, and worked as an air traffic controller at the Vancouver Area Control Centre. Margot lives in Steveston.

We believe that our backgrounds give us the subject matter expertise to understand the complex issues surrounding airport operations, as viewed through the lens of our determination to maintain and enhance Richmond's liveability.

### **Past Year at the Vancouver Airport Noise Management Committee**

The past year at the VANMC has seen the promulgation of the final recommendations of the Richmond Airport Noise Citizens Advisory Task Force (RANCATF) and responses from the 3 involved agencies—Transport Canada, NAV CANADA and the Vancouver Airport Authority. Our task has been to monitor progress on the task force recommendations, as well as to provide the Richmond citizen perspective on issues raised at the quarterly meetings of the VANMC.

### **Highlights**

- Probably the most significant development has been Vancouver Airport Authority's approval to construct a GRE (Ground Run-up Enclosure) at a cost of \$12M to be completed in December 2011.
- At our behest, a meeting between floatplane operators, the Airport Authorities Environmental staff and ourselves was held on February 3, 2011 to review float plane operations vis-à-vis Noise Task Force recommendation #5.

- The establishment of the tripartite Control Zone Procedures Working Group (VAA, NAV CANADA, Transport Canada), to generate solutions to safety, efficiency and environmental concerns.
- Regulations limiting the use of reverse thrust on the south runway were published in January 2011.
- An initiative to reinforce the use of preferred routes by floatplanes over noise sensitive areas was begun.

### **Vancouver Airport Statistical Trends**

Vancouver International Airport continues to be one of North America's premier gateways, having been awarded best airport by airport travelers for the second year running. Notwithstanding its appeal to the public, YVR has not been immune to the impact of the 2008 recession, with traffic off the 2008 peak by almost 9% in 2010.

### **Richmond Specific Noise Trends**

- Overall, the 5-year trend of Richmond citizen complaints is fairly flat.
- Most complaints are about aircraft in the departure phase of flight.
- As would be expected, most Richmond complainants live under the departure path of runways 08L and 08R.
- 15% of complaints are about aircraft **not** landing or departing from Vancouver Airport
- Night-time traffic over the past 5 years remains steady at around 3% of day-time operations, with a slight increase in 2010 in real numbers.

### **Areas for Concentration in 2011-2012**

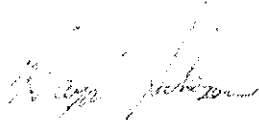
We will:

- continue to monitor progress on RANCATF Recommendations
- As new procedures are brought forward from the Control Zone Procedures Working Group, we will evaluate against the RANCATF recommendations, and analyse with respect to relevant Richmond complaint statistics
- Seek further opportunities to liaise with airport operators (as with the Float-plane group)
- Look for occasions to reinforce and reward quiet flight operations (Fly Quiet Awards)



We are appreciative of the opportunity to work with the City of Richmond and the Vancouver Airport Authority on the environmental noise portfolio, and look forward to helping make a difference to the citizens of Richmond in how airport noise is felt and perceived.

Sincerely,

A handwritten signature in dark ink, appearing to read "Haydn Acheson". The signature is fluid and cursive, with the first name "Haydn" being more prominent.

Haydn Acheson

A handwritten signature in dark ink, appearing to read "Margot Spronk". The signature is cursive, with the first name "Margot" being more prominent.

Margot Spronk

## Responses of Federal Agencies to Task Force Recommendations



VANCOUVER  
AIRPORT  
AUTHORITY

10 September 2010

Malcolm Brodie, Mayor  
CITY OF RICHMOND  
6911 No. 3 Road  
Richmond, BC V6Y 2C1

Dear Mr. Brodie:

RE: Final Report of the Richmond Airport Noise Citizens Advisory Task Force

Thank you for your letter of 21 June 2010 including the *Richmond Airport Noise Citizens Advisory Task Force Report*. The City of Richmond and Vancouver Airport Authority share many common objectives--a thriving City of Richmond along with the diverse air service and economic benefits the airport engenders.

Our mandate is to operate YVR as Canada's Asia Pacific Gateway in the best interests of a broad range of stakeholders, including residents of neighbouring communities and thus we have a comprehensive noise mitigation program that evolves constantly with input from all stakeholders. As such, we read with care and interest the recommendations of the Task Force and Council.

I have asked Larry Berg, President and CEO, to address your correspondence. As was emphasized in your material, these issues entail matters within Federal Government jurisdiction and Larry has been working in collaboration with senior Transport Canada and NAVCANADA officials in considering the matters you raise.

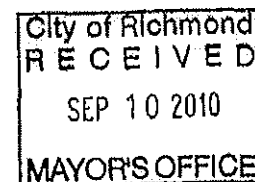
I look forward to working together with the City of Richmond to serve our community.

Sincerely yours,

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Mary Jordan  
Chair, Board of Directors

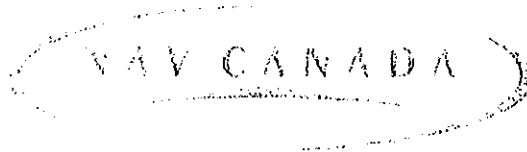
Cc: Peter Dhillon



P.O. BOX 13750  
AIRPORT POSTAL OUTLET  
RICHMOND, BC CANADA V7B 1Y7  
WWW.YVR.CA  
TELEPHONE 604.276.6500  
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## Responses of Federal Agencies to Task Force Recommendations



Doc. Ref./Réf. : FMP No. 2010-395

Direct Line/Ligne directe : (613) 563-7000

September 30, 2010

Via email: [mayorea@richmond.ca](mailto:mayorea@richmond.ca)

Mr. Malcolm D. Brodie  
Mayor, City of Richmond  
6911 No. 3 Road  
Richmond BC  
V6Y 2C1

Dear Mr. Brodie:

Thank you for your letter of June 21, 2010 regarding the Report of the Richmond Airport Noise Citizens Advisory Task Force. Nick Geer has asked that I reply on his behalf.

Changes to aircraft routings at any time, but particularly close in to a major airport like Vancouver International Airport require careful assessment. All routes must be designed in consideration of numerous factors such as aircraft performance, separation requirements, wake turbulence, and flight efficiency in addition to trying to consider the noise impacts for residents living and working in the area.

NAV CANADA and the Airport Authority will be convening a technical aircraft operations working group to examine and assess potential changes to VFR and float plane arrival and departure routes. This committee will be getting underway shortly. The committee will examine some of the recommendations contained in the Task Force Report; in particular those contained in recommendations 5 and 13.

The committee will report back to the Vancouver Airport Noise Management Committee on its findings and recommendations.

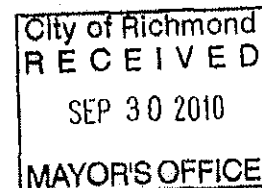
Thank you again for the opportunity to respond on this important issue.

Sincerely,

A handwritten signature in black ink, appearing to read "John W. Crichton".

John W. Crichton  
President & Chief Executive Officer

JWC/mb



## Responses of Federal Agencies to Task Force Recommendations

Minister of Transport,  
Infrastructure and Communities



Ministre des Transports,  
de l'Infrastructure et des Collectivités

Ottawa, Canada K1A 0N5

SEP 23 2010

His Worship Malcolm D. Brodie  
Mayor  
City of Richmond  
6911 No. 3 Road  
Richmond BC V6Y 2C1

Dear Mr. Mayor:

I am writing in response to your correspondence of June 21, 2010, to my predecessor regarding the City of Richmond's Airport Noise Citizens Advisory Task Force report.

I have noted that Richmond City Council has endorsed the report. I have also noted your offer to have City officials meet with Transport Canada representatives to discuss the report's recommendations and options to address them.

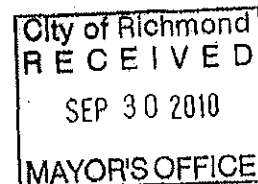
Please note that departmental regional officials are reviewing the report's recommendations and will be providing a response by the end of September 2010.

Thank you for writing.

Sincerely,

A handwritten signature in black ink, appearing to read "Chuck Strahl".

Chuck Strahl



## Responses of Federal Agencies to Task Force Recommendations



Transport  
Canada

Transports  
Canada

Pacific  
Region

Région  
du Pacifique

Suite 620  
800 Burrard Street  
Vancouver, B.C.  
V6Z 2J8

*Your File    Votre référence*

*Our File    Notre référence*  
T 5140-2 P/A P/A  
RDIMS # 6184529

October 5, 2010

His Worship Malcolm D. Brodie  
City of Richmond  
6911 No. 3 Road  
Richmond BC  
V6Y 2C1

Dear Mr. Mayor:

Thank you for the opportunity to comment on the final Richmond Airport Noise Citizens Advisory Task Force Report.

Transport Canada is committed to working with the Vancouver International Airport Authority and NAV CANADA to seek ways to lessen the impact of aviation operations on the surrounding community. In that respect, we will join them in further analysis and the formulation of mitigative actions.

One of Transport Canada's primary roles is to ensure that aviation regulations are appropriate, enforced and updated as required. For example, we will be publishing a new noise abatement procedure regarding use of reverse thrust on the south runway at YVR in January 2011. This responds to a request from Vancouver Airport Authority, made with input from the YVR Noise Management Committee and industry, and addresses Task Force Recommendation 12. Transport Canada will continue working with the Authority and NAV CANADA on the specifics of the remaining recommendations.

Again, thank you for this opportunity.

Yours truly,

David J. Nowzek  
Regional Director, Civil Aviation

DJN/ad

Canada

## Responses of Federal Agencies to Task Force Recommendations

Recommendation			Status Updates
1992 Vancouver International Airport Environmental Assessment Panel (YVR EAP) Report	1	That the appropriate agencies coordinate a response that clearly and comprehensively advises which of the recommendations of the 1992 YVR EAP, as endorsed by the Minister of Transport of the day, have been implemented and to what degree.	<ul style="list-style-type: none"> <li>Jun 2011: not yet received</li> </ul>
	2	In particular, that Transport Canada or other appropriate agencies provide a detailed report on the progress of an airport development plan for the Lower Mainland (metro Vancouver) region and initiatives with Abbotsford International Airport as per YVR EAP Recommendations 21 and 22.	<ul style="list-style-type: none"> <li>June 2011: not yet received</li> </ul>
	3	That the responses as requested in Recommendations 1 and 2 include a detailed implementation plan for all outstanding recommendations approved, endorsed and required by the Minister of Transport of the day.	<ul style="list-style-type: none"> <li>June 2011: not yet received</li> </ul>
	4	That VAA demonstrate how the YVR Aeronautical Noise Management Committee meets the intent of YVR EAP Recommendations 2 and 3.	<ul style="list-style-type: none"> <li>June 2011: not yet received</li> </ul>
Float Plane Operations	5	That VAA, NAV CANADA and other appropriate agencies introduce and publish new procedures for float plane operations to minimize noise impacts that include requiring:	<ul style="list-style-type: none"> <li>Feb 2011: VAA and City staff, Richmond citizen YVR ANMC representatives meet with float plane operators to discuss concerns</li> <li>Jul-Aug 2010: VAA examine arrival and departure paths to determine how closely operators are following the recommended flight paths published in 2009; find 98% compliance with paths but does not consider altitude of the planes</li> </ul>
	(a)	Float planes to use the north part of the Middle Arm of the Fraser River and/or the channel north of Swishwash Island.	
	(b)	No flights over built-up areas below 1,000 ft until on final descent for landing.	
	(c)	No powered float plane operations, including docking or ramping, on or adjacent to the Middle Arm of the Fraser River between 10:00 pm and 7:00 am.	
Aircraft Maintenance & Engine Run-Up Operations	6	That VAA install a proper Ground Run-up Enclosure (GRE), as a high priority capital project, to be used for all aircraft engine maintenance run-ups.	<ul style="list-style-type: none"> <li>April 2011: construction commences</li> <li>Dec 2010: VAA Board approves construction; completion anticipated by Dec 2011</li> </ul>
	7	That until a GRE is operational, VAA discontinue the granting of approval for engine run-ups between 10:00 pm and 7:00 am in airport areas and during wind conditions where the resulting noise is likely to affect residents living on the south side of the Middle Arm of the Fraser River.	<ul style="list-style-type: none"> <li>Jun 2011: status unknown</li> </ul>
	8	That VAA implement an effective reporting, monitoring and enforcement system to better manage noise issues resulting from operations on the south side of the airport.	<ul style="list-style-type: none"> <li>May 2010: VAA establishes new reporting procedures to document unapproved engine run-ups observed on the airfield</li> </ul>
Night Operations	9	That VAA or other appropriate agencies implement the following curfew periods at YVR:	<ul style="list-style-type: none"> <li>Feb 2011: VAA staff identify potential night-time (midnight-6:00 am) departures that would minimize aircraft ground tracks over populated areas by directing aircraft over water or unpopulated areas as much as possible; to be forwarded to NAV CANADA for its consideration</li> </ul>
	(a)	Non-noise certified jet aircraft shall not operate at any time.	
	(b)	All ICAO Annex 16 Chapter 2 aircraft shall not operate between 11:00 pm and 7:00 am.	
	(c)	All ICAO Annex 16 Chapter 3 aircraft shall not operate between midnight and 6:30 am.	
	(d)	All ICAO Annex 16 Chapter 4 aircraft may operate at any time for an initial two year trial period to allow for an assessment of the impact on the Richmond community.	

## Richmond Airport Noise Citizens Advisory Task Force: Status of Recommendations

Recommendation			Status Updates
	(e)	All other aircraft shall not operate between midnight and 7:00 am.	
	10	That VAA or other appropriate agencies develop a program to eliminate the number of curfew exemptions granted over the next three years.	• Jun 2011: status unknown
	11	That VAA or other appropriate agencies publish a quarterly list of all curfew exemptions granted, including a reason for each exemption granted.	• Jun 2011: status unknown
	12	That VAA or other appropriate agencies require aircraft to use idle-only reverse thrust at all times on all runways. <i>(This reverse thrust restriction already exists on the north runway and should be applied to the south runway).</i>	<ul style="list-style-type: none"> <li>• 2010: publication of procedure</li> <li>• 2008: application to publish the revised procedure submitted to Transport Canada; anticipated to be published in next two months</li> </ul>
Flights Operating Over West Richmond	13	That NAV CANADA or other appropriate agencies revise existing and develop new procedures for VFR (Visual Flight Rules) aircraft to better define and regulate the existing Noise Sensitive Area over Richmond as identified on Vancouver Terminal Area (VTA) charts to include:	<ul style="list-style-type: none"> <li>• Feb 2011: focus areas of Group established as transit routes, integration of IFR and VFR operations, float plane operations, and departure procedures; next steps are to develop work plan and consult with stakeholders</li> <li>• Dec 2010: Control Zone Procedures Working Group comprised of three members of the YVR ANMC (VAA, Transport Canada and NAV CANADA staff) formed to examine aircraft arrival and departure routes as well as overflights by aircraft neither arriving nor departing from YVR, and review standard runway operating procedures</li> </ul>
	(a)	Restrict and limit use of the airspace over West Richmond below 2,500 ft.	
	(b)	Amend the published VFR arrival routes for all aircraft, including float planes and helicopters, landing westbound on Runways 26L and 26R, on helipads, or on the Middle Arm of the Fraser River to include: <ul style="list-style-type: none"> <li>i. Revoke the current "Richmond Square" VFR checkpoint and replace it with a new checkpoint near the Blundell Road overpass on the east side of Highway 99.</li> <li>ii. Amend the "Coal Pile Arrival" route to utilize the new Blundell Overpass checkpoint with the route proceeding from the YVR VOR to north of the George Massey Tunnel and then remaining east of Highway 99 to Blundell Road.</li> <li>iii. Require aircraft to remain at an altitude of not below 1,500 ft until final descent for landing.</li> </ul>	
	(c)	Float planes arriving from the north should use a standard circuit for landing westbound on the Middle Arm of the Fraser River but be required to maintain an altitude of at least 1,000 ft on the downwind leg as per Recommendation 5b, and be restricted from turning base until east of the Richmond General Hospital.	
	(d)	For VFR aircraft, including float planes and helicopters, departing eastbound from Runway 08L or 08R, from helipads, or from the Middle Arm of the Fraser River eastbound: <ul style="list-style-type: none"> <li>i. Restrict right turns until climbing to at least 1,000 ft.</li> <li>ii. For aircraft heading south, fly directly to the new Blundell Overpass VFR checkpoint in the area near the Blundell Road / Highway 99 overpass.</li> <li>iii. Remain east of Highway 99 until the George Massey Tunnel.</li> </ul>	
	14	That NAV CANADA and other appropriate agencies cancel the "Richmond One Departure" and require all non-jet aircraft to use only the new "Olympic One Departure."	• May 2011: NAV CANADA publishes the "Stanley One" SID departure for non-jet aircraft, which is substantially similar to the "Olympic One" SID departure.

## Richmond Airport Noise Citizens Advisory Task Force: Status of Recommendations

Recommendation			Status Updates
	15	That a new Aeronautical Information Circular (AIC) or Aeronautical Information Publication (AIP) Supplement, whichever version is most suitable, be published in the Canada AIP to highlight the noise issues of Richmond, reinforce the existence of the Noise Sensitive Area and describe the existing and new noise control procedures.	<ul style="list-style-type: none"> <li>Jun 2011: pending</li> </ul>
Governance and Noise Management	16	That the appropriate agencies, such as the YVR Aeronautical Noise Management Committee, hold a public meeting (not just an open house) in each of Vancouver, Richmond, Delta, and Surrey at least once per year (e.g., evenings or weekends) where citizens are free to voice their concerns, and get feedback as appropriate.	<ul style="list-style-type: none"> <li>Jun 2011: VAA continues to host quarterly noise information seminars that are open to the public</li> </ul>
	17	That the YVR Aeronautical Noise Management Committee membership be expanded to include all flight operators, including float plane operators and members of the Task Force or a permanent City aeronautical noise advisory committee, if established by Council.	<ul style="list-style-type: none"> <li>Jan 2011: YVR ANMC membership expanded to include a representative for float plane operators</li> </ul>
	18	That the appropriate agencies, such as Transport Canada, establish an independent noise monitor agency with the authority to monitor and enforce noise mitigation measures and penalize noise violators consistent with the intent of YVR EAP Recommendation 3.	<ul style="list-style-type: none"> <li>Jun 2011: Parliament's Standing Committee on Transport, Infrastructure &amp; Communities, which initiated a "Study of the Consequences of Noise Caused by Airport Operations in Urban Areas" during the last session, is an appropriate forum for this topic and this recommended action may arise</li> </ul>
Recommendations for Richmond City Council	19	That the mandate of the Richmond Airport Noise Citizens Advisory Task Force be extended until all agencies have received, reviewed and reported back on these recommendations, at which time the Task Force recommends that it review the responses and report to Council with its final assessment of those responses, including any further recommendations, if necessary. After presenting this report to Council, the Task Force would not reconvene until the City receives feedback from VAA, NAV CANADA, Transport Canada or other appropriate agencies.	<ul style="list-style-type: none"> <li>Current recommendation: Term of Task Force to be extended to March 2012</li> <li>Jun 2010: Task Force term extended to June 2011</li> </ul>
	20	That the recommendations of the Task Force, if approved by Council, be publicized as widely as possible by the City, including presentation(s) to senior levels of government, the media and other interested community organizations.	<ul style="list-style-type: none"> <li>Jun 2010: completed – report disseminated to relevant stakeholders and posted on the City's website</li> </ul>
	21	That if the Task Force is permanently disbanded, that a permanent City aeronautical noise advisory committee be established and its membership include the City of Richmond's appointees to the YVR Aeronautical Noise Management Committee.	<ul style="list-style-type: none"> <li>Current recommendation: Term of Task Force to be extended to March 2012</li> <li>Jun 2010: pending staff report in June 2011 regarding future of Task Force</li> </ul>
	22	That this report be forwarded to Transport Canada, NAV CANADA, the Vancouver Airport Authority, and other agencies and persons as deemed appropriate by Council.	<ul style="list-style-type: none"> <li>Jun 2010: completed</li> </ul>