

Vancity ghg inventory and carbon neutral report 2009

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Vancity

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1. SUMMARY

Vancity is Canada's largest credit union in English-speaking Canada. Formed in 1946, we have \$14.4 billion in assets, more than 414,000 members, and 59 branches located throughout Metro Vancouver, the Fraser Valley, Squamish and Victoria. Vancity and our business partners, known collectively as the Vancity Group, are guided by a commitment to improve the quality of life in our communities.

This report provides readers with an account of the Vancity Group's GHG emissions inventory for the fiscal year 2009. It includes information on the design and development of our GHG emissions inventory, emissions quantification methodology and base year selection. In addition, it discusses the actions we have taken to reduce our GHG emissions, a section on assessing and reducing uncertainty, and the processes we have in place to ensure quality management of our GHG emissions inventory.

In 2009, the Vancity Group's carbon footprint was 5,101 tonnes CO₂e, of which 1,163 tonnes are direct emissions (Scope 1), 458 tonnes are from energy indirect emissions (Scope 2), and 3,480 tonnes are other indirect emissions (Scope 3).

This GHG Inventory and Carbon Neutral Report is prepared in accordance with ISO 14064-1, *Specification with Guidance at the Organization Level for Quantification and Reporting of Greenhouse Gas Emissions and Removals*. The greenhouse gas carbon neutral assertions contained in this report have been verified by Ernst & Young LLP, an independent third party.

2. ORGANIZATION PROFILE

Founded in 1946 to provide financial services to people from all walks of life, Vancouver City Savings Credit Union has grown to become the largest credit union in English-speaking Canada, with \$14.4 billion in assets. Vancity serves more than 414,000 members through over 59 branches located throughout Greater Vancouver, the Fraser Valley, Squamish and Victoria. In addition, we employ more than 2,200 employees.

Vancity's reputation for environmental excellence is well-known within British Columbia's borders and beyond. Through our climate change strategy, Vancity supports innovative partnerships involving public transportation and green building projects and through our granting programs, invests in organizations undertaking work in the field of climate change. In 2008 Vancity achieved our target of being the first carbon neutral financial institution in North America by way of a combination of retrofits, reductions and carbon offsets.

During 2009, Vancity was comprised of ten business partners and subsidiaries that were collectively referred to as the Vancity Group. These included: Vancity Credit Union, Citizens Bank of Canada, Inventure Solutions Inc., Inhance Investment Management, Vancity Capital Corporation (VCC), Vancity Enterprises (VCE), Vancity Insurance Services (VISL), Vancity Investment Management (VCIM), Vancity Community Foundation (VCF) and Squamish Savings (see Figure 1).

However, throughout 2009 a number of transactions occurred related to Vancity Group subsidiaries including the removal of Citizens Bank from the personal banking marketplace and the sale of both Vancity Insurance Services and Inhance Investment Management Incorporated. The emissions produced by the sold assets, have been included in Vancity's 2009 CO₂e inventory, up until their respective point of sale.

For the locations of all Vancity group facilities (both owned and leased) by province, refer to Appendix A.

3. GHG INVENTORY DESIGN AND DEVELOPMENT

3.1 ORGANIZATIONAL BOUNDARY

The Vancity Group (Vancity) encompasses a number of business partners and subsidiaries (see Figure 1). Following the requirements of the GHG Protocol Corporate Standard in conjunction with an internally developed protocol, Vancity selected the Operational Control approach, to define our organizational and operational boundaries. Vancity includes in our emissions inventory all sources and sinks associated with the organizations we exercise operational control over, including the transacted subsidiaries stated in Section 2: "Organization Profile" up until their respective point of sale. For 2009, these included: Vancity Credit Union, Citizens Bank of Canada, Inventure Solutions Inc., Inhance Investment Management, Vancity Capital Corporation (VCC), Vancity Enterprises (VCE), Vancity Insurance Services (VISL), Vancity

Investment Management (VCIM), Vancity Community Foundation (VCF) and Squamish Savings.

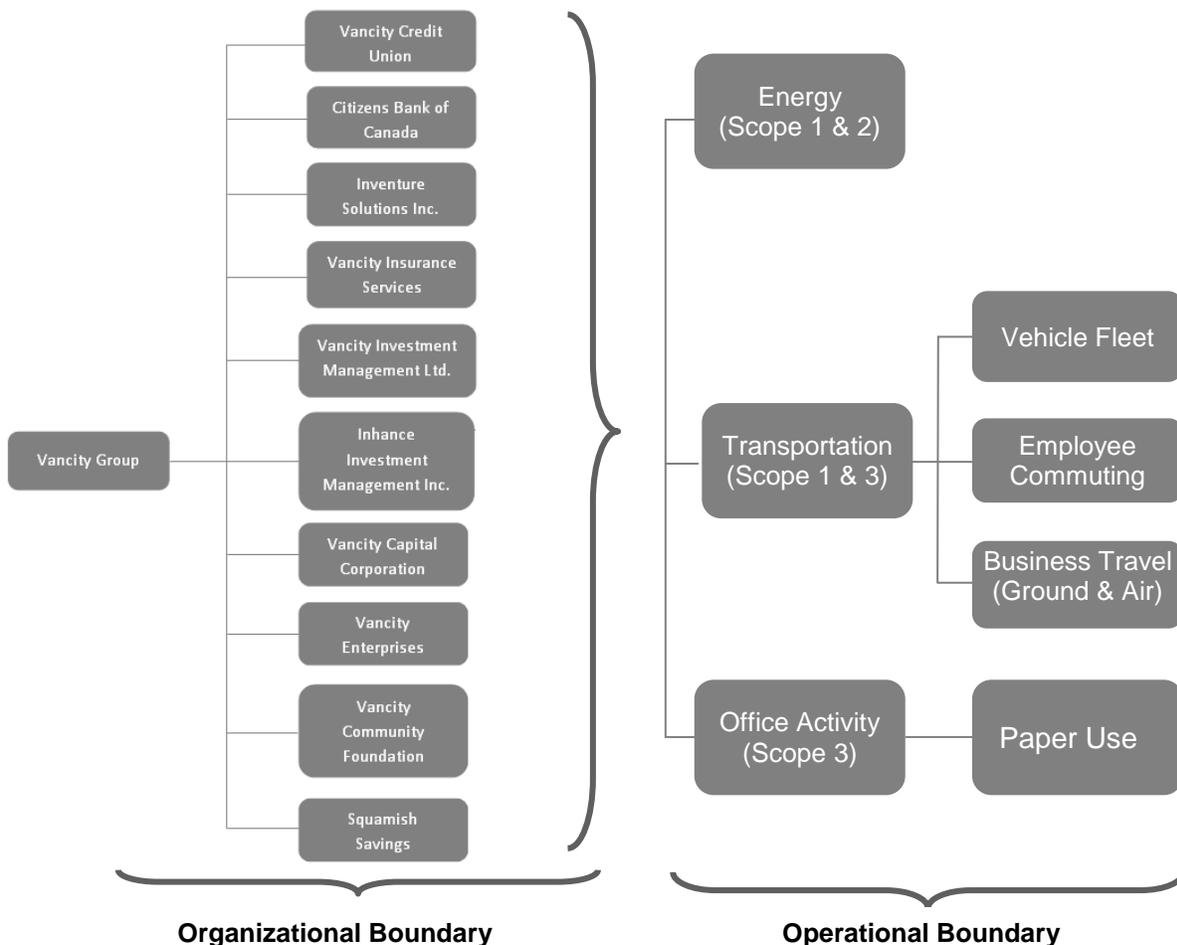


Figure 1 - Vancity's Organizational and Operational Boundaries

3.2 OPERATIONAL BOUNDARY

Vancity includes in our inventory all sources and sinks over which we have operational control and those that are practically and economically feasible to assess (see Figure 1). As a financial institution Vancity has few sources of direct (Scope 1) greenhouse gas emissions. They include a small fleet of light duty vehicles and the operation of boilers and other fuel consuming appliances at our facilities. Vancity controls a range of facilities including office buildings and branches to serve our customers. Energy – delivered either in the form of electricity or natural gas - is required to operate these facilities. The emissions associated with purchased electricity make up Vancity’s Energy Indirect (Scope 2) emission sources. Vancity has identified a number of Other Indirect (Scope 3) emission sources which are pertinent to our business operations and which are reasonable to quantify. In 2007 Vancity established an

operational boundary with regards to Other Indirect emission sources. The sources identified are considered to be within Vancity’s operational control and are thus consistent with Vancity’s objective of reducing or holding constant our greenhouse gas emissions (which includes organic growth) at 6000 tonnes CO₂e per annum. Table 1 describes Vancity’s operational boundary, listing the emission sources and sinks Vancity includes in our inventory.

	Source	Classification / Scope	Description
Energy	Electricity Use	Energy Indirect/2	Vancity uses electricity to heat, cool, light, and run appliances at its facilities.
	Natural Gas Combustion	Direct/1	Vancity burns natural gas for space heating and cooling and to heat water in its facilities.
Transportation	Vehicle Fleet	Direct /1	Vancity leases and operates a small fleet of light-duty vehicles.
	Employee Commuting	Other Indirect/3	Vancity employees commute from their residences to various Vancity facilities.
	Business Related Air Travel	Other Indirect/3	Vancity employees travel by air to conduct business activities.
	Business Related Vehicle Travel	Other Indirect/3	Vancity employees travel by private vehicle to conduct business activities.
	Car Allowance Travel	Other Indirect/3	Vancity employees travel by private vehicle to conduct business activities. Car allowances are used to compensate those employees who travel frequently.
Office Activity	Paper Use	Other Indirect/3	Vancity consumes paper as a result of its business operations.

Table 1 - Greenhouse Gas Sources and Sinks

3.3 QUANTIFICATION METHODOLOGY

Due to the nature of financial institutions, it is neither practical nor in many cases possible to directly measure greenhouse gas emissions from the sources identified in the Operational Boundaries section, therefore emissions were estimated using a model. The model is of the form:

For all emission sources an emission factor was identified. The emission factor specifies the amount of emissions per unit of activity. Activity data was collected or estimated to quantify the activity level. The methodologies and procedures described in Section 3.4 have been adopted from various sources including the World Resources Institute (WRI) [3, 4].

3.4 GHG EMISSIONS SOURCES, FACTORS, AND ACTIVITY DATA

3.4.1 ENERGY

FACILITIES

Vancity owns and/or leases both office space and retail space to service our members, and energy related emissions are associated with the operation of these facilities. Information for each facility is collected on an annual basis in order to estimate these emissions.

ELECTRICITY

See Appendix B for related emission factor and activity data.

NATURAL GAS

See Appendix B for related emission factor and activity data.

3.4.2 TRANSPORTATION

Vancity has a number of transportation related greenhouse gas emission sources within our operational boundary. These primarily include work related travel by air and by vehicle and employee commuting to and from work. ISO 14064-1 requires that emissions inventories be estimated at the facility level (i.e. emissions inventories must be estimated for each Vancity facility); however, business travel (air or ground) is often not associated with a specific facility and is instead associated with a business unit such as a subsidiary within the overall organization. To address this issue, emissions resulting from business travel are associated with the head office of the corresponding subsidiary or business partner with the exception of employee commuting emissions which are tracked at the facility level.

VEHICLE TRAVEL

See Appendix B for related emission factor and activity data.

TRAVEL SURVEY

For some vehicle travel sources neither fuel consumption nor distance travelled is directly tracked. For these sources a travel survey is used to estimate distance travelled and ultimately, the total emissions emitted. Vancity has developed a travel survey in cooperation with Acuere Consulting. The survey is used to estimate emissions associated with employee commuting and car allowances, and to estimate the percentage of diesel and gasoline vehicles.

VANCITY VEHICLE FLEET

Vancity leases and operates a small fleet of vehicles. Actual fuel consumption is not tracked at this time; however, both the type of vehicle and the distance travelled are kept track of.

BUSINESS VEHICLE TRAVEL

Vancity compensates employees for use of their private vehicles for business related travel using two methods: (1) mileage reimbursement (referred to as business vehicle travel) and (2) car allowances. The total mileage reimbursed and the reimbursement rate is used to estimate the mileage driven in private vehicles. Total fuel consumption is calculated for each fuel type (gasoline and diesel) using: $\text{Total Fuel Consumption (L)} = (\text{Total Distance Travelled (km)}) \times (\% \text{ Vehicles of the Fuel Type}) \times (\text{Average Fuel Economy of the Fuel Type (L/100km)/100}$.

CAR ALLOWANCE TRAVEL

Car allowance travel is estimated using responses to specific questions in the transportation survey. Average annual fuel consumption is estimated using: $\text{Total Fuel Consumption (L)} = (\% \text{ Work Related Travel}) \times (\text{Average Spending on Fuel per Week}(\$)) / (\text{Average Annual Fuel Price for the Fuel Type} (\$/\text{L})) \times (\text{Number of Working Weeks in a Year})$.

EMPLOYEE COMMUTING

Greenhouse gas emissions associated with employee commuting are very challenging to estimate and correspondingly, there is significant uncertainty associated with the estimate. The most common estimation approach is to conduct a travel survey to assess how often employees commute, modes of transportation used, distance traveled etc. Vancity uses an annual transportation survey to collect and quantify employee commuting. It should be noted that this model only accounts for emissions from single occupancy employee vehicles; emissions associated with transit and other modes of commuting are not estimated. Total emissions are calculated using: $\text{Total Emissions (t)} = (\text{Emissions per Employee per Week}) \times (\text{Number of Employees}) \times (\text{Number of Working Weeks in a Year})$.

AIR TRAVEL

See Appendix B for related emission factor and activity data.

3.4.3 OFFICE ACTIVITY

PAPER USE

See Appendix B for related emission factor and activity data.

3.5 BASE YEAR

As Vancity revised its procedures in 2007 to meet the ISO 14064-1 standards, Vancity has defined its historical base year as 2007. Refer to Appendix C for base year emissions. As a result of the divestitures made in 2009, the base year will be recalculated and restated in 2010, for future inventories.

4. GHG INVENTORY

1.1 GHG EMISSIONS INVENTORY – 2009

	Tonnes CO ₂ equivalent	Uncertainty (+/- %)
Scope 1	1,163	0.4%
Scope 2	458	12.0%
Scope 3	3,480	4.9%
Totals	5,101	3.5%

Table 2 – 2009 GHG Emissions by Scope

	Tonnes CO ₂ equivalent	Uncertainty (+/- %)
Electricity	458	12.0%
Natural Gas	1,136	0.3%
Vehicle Fleet Travel	26	10.7%
Vehicle Travel	30	22.7%
Car Allowance	364	3.9%
Commuting	2,240	7.6%
Air Travel	315	High*
Paper	532**	High*

*Uncertainty not assessed but is high.

**Paper use is based on amount of paper purchased. Includes: letterhead, copier, printer and fax paper, member statements, marketing materials, communication to members, business cards and envelopes. Ten percent of paper use has been estimated. Paper use totals do not include office paper for Squamish Savings. Accounting systems will be put in place to measure this in 2010.

Table 3 - 2009 GHG Emissions by Source

See Appendix D for a detailed breakdown of total GHG emissions by facility.

1.2 ACTIVITIES TO REDUCE GHG EMISSIONS

EMPLOYEE ENGAGEMENT

In 2009 we engaged employees around a number of local, regional and national initiatives with a focus on encouraging sustainable transportation choices. This included corporate participation in the following programs.

Commuter Challenge

A national program that encourages Canadians to leave their car at home and walk, cycle, take transit, carpool (ride share) or tele-work instead of driving to work alone. 452 employees logged commutes during the week long event, placing Vancity 4th in the 500+ employees category in Metro Vancouver. Participants saved approximately 50,000 km of single-occupant driving – equal to about 10 tonnes of GHG emissions.

Bike To Work Week

An annual week to encourage and promote the use of the bicycle as transportation to work. Vancity employees were offered two free lunchtime workshops in commuter skills, four teams registered and cycled 1,097 km, offsetting an estimated 200 kg in CO₂ in the process. In addition, Vancity offered a bike promotion in partnership with bicycle manufacturers Kona and Norco where staff could purchase select bikes at significant discounts.

TransLink Ride-Share Week

An annual week of promotion and participation in ridesharing in the Metro Vancouver area. TransLink Ride-Share Week is part of a nation-wide initiative to encourage ridesharing throughout Canada.

The focus on sustainable transportation was chosen because GHG emissions from employee commuting and business travel make up the majority of Vancity's carbon footprint (employee commuting was 44%, while business travel was almost 15% of the 2009 footprint).

ENERGY

Over 2009 there were several energy management projects implemented at Vancity offices and branches.

Energy Management Initiatives for Facilities

- DDC installation at branch 32.
- Re-lamping from 30 watt to 25 watt at branches 3, 25, 27, 31, 32
- Energy audits at branches 3, 8, 18, 25, 32, 44

- Installation of Honeywell vision 8000 T-stat at branches 7, 30, 67, 68, 69, 42.

In 2008 Vancity began the installation of solar panels on the roof of Vancity Centre to collect and store heat. In 2009 the panels were completed, and the system now provides first source of heat for 100% of hot water in our kitchens, bathrooms and showers. It is estimated that we will save \$1,560.00 per year, 92Gj per year in gas fuel, and 6 tonnes of CO₂ per year.

Power Savings at the Desktop via Faronics Power Save

As part of our Green IT Program, we installed power-saving software on the majority of Vancity desktop computers in 2009. Faronics Power Save is a centrally managed solution that puts the monitor and computer to sleep after a set time, which reduces the energy consumed and decreases our carbon footprint. This software will save Vancity an estimated 850,000 kWh of energy each year, which would power 85 homes in BC.

Power Savings in the Data Centre via Server Virtualization

In 2009 we partnered with BC Hydro on a brand new PowerSmart initiative where they fund a portion of infrastructure to virtualize a significant number of servers in our data centre. Once approved for the program, 75 servers were identified. These were virtualized and now run on 5 physical servers, a 15:1 consolidation. We anticipate savings of at least 100,000 kWh of power per year.

Power Smart Partner Energy Conservation Pledge

Vancity has renewed its Power Smart Partner Energy Conservation Pledge with BC Hydro. This pledge states our corporate commitment to conserving energy and implementing sustainable energy management in our corporate culture, business practices and facilities. To ensure our best performance, Vancity has an ongoing energy management program that includes various preventive energy initiatives and projects, utility monitoring, behavioural and operational initiatives, and ongoing maintenance to ensure our best performance.

TRANSPORTATION

EMPLOYEE COMMUTING

While it's our employees' decision how they commute to work, we encourage environmentally responsible choices through programs and incentives. Our staff transportation program encourages employees to use sustainable modes of transportation and aims to raise awareness of the link between transportation choices, GHG emissions and climate change. In 2009, 56% of Vancity group staff commuted to work by means other than driving alone (e.g. public transit, carpooling, walking etc). In comparison, the percentage of individuals in Metro Vancouver who commute by means other than by car is about 30%.

Year	Vancity Group
2009	56%
2008	56%
2007	53%

Table 4 - Percent of Employees using Sustainable Modes of Transportation to Commute

In addition, we run an annual transportation survey asking employees how they get to and from work in order to measure progress and to help develop programs to support them to make sustainable transportation choices.

The Vancity Group's online 'Take Sustainable Transportation Directory' provides information on a variety of transportation options so that employees can find the most convenient, low-emission method for their transportation needs. Options include:

Discounted Monthly Parking at Vancity Centre for Carpool Vehicles

Recognizing that automobiles are the single greatest contributor to the significant air pollution problem in Metro Vancouver, Vancity wishes to support those staff members who take the initiative and carpool as a method of reducing pollution problems resulting from automobile emissions. Therefore limited parking spaces have been reserved for car-poolers at our head office and are offered to them at a reduced parking fee.

Employee Transit Pass

Employees who use public transit in Metro Vancouver are eligible for a discounted transit pass.

Guaranteed Ride Home Program

The Guaranteed Ride Home program offers reimbursement to staff members who take alternative transportation to work and need to return home via transit and/or taxi due to unforeseen situations (illness, family emergency, or unanticipated over-time). The intent of the program is to encourage more employees to use sustainable transportation options by providing assurance that they can return home in case of emergency.

Ride-share Programs

Vancity and Citizens Bank are registered with ride-share programs across the country. Employees can easily register online and instantly find carpool matches, either with fellow employees or the general public.

Cycling

Bike rooms are available at Vancity Centre and the Citizens Bank building in Vancouver for employees who ride their bike to work.

Car Sharing

Some Vancity departments have joined the Cooperative Auto Network (CAN), Vancouver's car-sharing cooperative. This allows them to have access to all of the 234 vehicles that the coop has parked around Metro Vancouver. It's a way to have a car when employees really need one while relying on alternatives such as transit, walking or cycling for other trips.

VEHICLE FLEET

Vancity's maintenance team is regularly looking for ways to reduce and reuse in the work that they do. As a team that operates the majority of vehicles within the corporate fleet they are in a great position to find ways to reduce GHG emissions. In 2009, at the suggestion of one of the maintenance staff, the team embarked on a new process for determining their daily work plans. Previously, each team member randomly picked their daily jobs. They could be out at a branch in Mission in the morning, and then at a branch on the west side of Vancouver in the afternoon. This process was time consuming, and they found that they were also 'crossing paths' and driving longer distances than was optimal. Early in 2009 they implemented a rotating 'zone' approach where each team member became responsible for services at several branches in a tight geographic area (or 'zone') for a period of time. Then they took it one step further and assigned permanent zones to each team member who lives close to or within a particular zone. This resulted in reduced driving time, reduced gas consumption and thus reduced CO₂ emissions (by over 25%) from the vehicle fleet. It also resulted in lease wear and tear on the fleet vehicles, increased efficiency and thus productivity.

OFFICE ACTIVITY

Since 2005, The Vancity Group has been using 100 per cent post-consumer waste copy paper. By doing this, we've kept approximately 60 tonnes of greenhouse gases out of the atmosphere per year.

We have made significant strides in tracking the Vancity Group's environmental impact due to paper use. In addition to tracking use of letterhead, copy/fax paper and statement paper, we put into place accounting mechanisms to identify and measure paper used in:

- Marketing materials (brochures, posters, statement stuffers, and tent cards)
- Member communications (newsletters, annual and accountability reports)
- Employee communications
- Business cards
- Envelopes
- Annual General Meeting and board election communications

All printers at Vancity Centre are set to automatically print double-sided and in black and white, and wherever possible, most other printers have been set to the same specifications.

Year	Total Tonnes Consumed*	PCW** Paper as a % of Total Paper Consumed
2009	260	73%
2008	346	71%
2007	404	66%

Table 5 - Paper Use by the Vancity Group

*Paper use is based on amount of paper purchased. Includes: letterhead, copier, printer and fax paper, member statements, marketing materials, communication to members, business cards and envelopes. Ten percent of paper use has been estimated. Paper use totals do not include office paper for Squamish Savings. Accounting systems will be put in place to measure this in 2010.

**PCW stands for post-consumer waste

WASTE

While emissions from waste do not form part of Vancity’s carbon footprint, we continue to implement programs that reduce our overall waste stream and increase the percentage of waste that is diverted from the landfill. In 2009, Vancity initiated a program along with our recycling company that enabled us to recycle anything that was once a tree. Previously non-recyclable paper products - paper towels, paper cups, coffee cups, pizza boxes, frozen entrée boxes, milk cartons etc. – can now all go in the recycle box.

This has huge promise for meeting our corporate commitment to environmental sustainability and meeting our corporate objective to recycle 60% of our waste stream by 2010. In 2009, Vancity diverted 6969 cubic yards of recycled material from the landfill. These recycling efforts sequestered approximately 1,044 tonnes of carbon emissions.

4.3 BASE-YEAR GHG INVENTORY

Vancity’s 2007 GHG Inventory forms the historical base year for future inventories. Vancity’s base-year GHG Inventory is 5,504 tonnes CO₂ equivalent. See Appendix C for a detailed breakdown of the base-year GHG Inventory.

The base year inventory is intended to be revised and recalculated as organizational and operational boundaries of the GHG inventory are expanded or divested in future years. As a result of the divestitures made in 2009, the base year will be recalculated and restated in 2010 and used for future inventories.

4.4 ASSESSING AND REDUCING UNCERTAINTY

This section describes the parameter and model uncertainties that have been identified and assessed. For the purpose of this uncertainty assessment it is assumed that all uncertainties are normally distributed. Although in some cases this may not hold true it is a reasonable

assumption for the scope of this uncertainty assessment. The bias column is used to provide an indication of whether this assumption holds true and if it does not, which direction the bias is believed to be in.

4.4.1 ENERGY

There are three main sources of uncertainty associated with energy related emission estimates:

1. Emission Factors (Electricity and Natural Gas)
2. Natural Gas and Electricity Meters
3. Energy Use Model

EMISSION FACTORS

As part of the national reporting procedure Environment Canada commissioned a study to quantify the uncertainty associated with various fuel emission factors including natural gas. It is assumed that the uncertainty associated with the emission factor captures the uncertainty in the energy content of the fuel and thus the conversion factor from energy to volume (GJ to cubic metres). Neither BC Hydro nor Environment Canada publishes uncertainty estimates of the emission factors (emission intensities) associated with electricity generation. In absence of reported estimates, confidence intervals were calculated for each province using 1990 to 2005 emission factor estimates published by Environment Canada [6]. It is assumed, however, that in all cases a minimum uncertainty of 10% exists, unless otherwise reported.

NATURAL GAS AND ELECTRICITY METERS

Measurements Canada regulates the tolerance of both electricity and natural gas meters under the Electricity and Gas Inspection Act. Uncertainty for electricity meter tolerance is assumed to be 0.5%, and 1.5% for natural gas meter tolerance

ENERGY USE MODEL

Rough estimates of uncertainties are obtained from Natural Resources Canada's survey "Commercial and Institutional Consumption of Energy Survey Summary Report" [23] and using the quality ranking of the statistics (A, B, C, etc.) and the corresponding coefficient of variation. The confidence interval can be calculated by multiplying the maximum coefficient of variation by 1.96. For BC, confidence intervals are calculated using the metered data.

4.4.2 TRANSPORTATION

There are many sources of uncertainty associated with transportation related emissions. The following sources have been assessed:

- Vehicle Odometers
- Fuel Economy
- Fuel Emission Factors
- Fuel Price
- Radiative Forcing Factor
- Aviation Emission Factors
- Flight Routing
- Earth Radius
- Car Allowance Travel Model
- Employee Commuting Model
- Number of Working Weeks

Both commuting and car allowance estimates are based on a survey conducted once per reporting period. The survey provides only a single snap shot of the activity data in a very dynamic organization. Facilities and employees are added and removed throughout the course of a reporting period, some before and some after the survey is conducted. The results of the travel survey will inevitably be biased and reflect the organization and its operations at the time the survey is conducted. In a growing organization this means the estimates would likely be positively biased (estimates would likely be higher than actual reports) and in a shrinking organization, negatively biased, assuming the survey is conducted at the end of the reporting period, as it has in the past. Car allowance results in particular are likely to be biased as there is an incentive for employees to report a higher than actual percentage of work related travel.

VEHICLE EMISSION UNCERTAINTY SOURCES

Odometer

Vehicle odometer tolerance is not specifically regulated; manufactures are only required to specify the tolerance. However, Honda Motor Company was recently sued in the US on grounds that odometers in their vehicles were biased and outside of what was deemed as *reasonable tolerance* [19, 20]. This report assumes that other manufactures either are or will be in compliance with this tolerance.

Fuel Economy

There is uncertainty associated with fuel economy estimates because they are dependent on factors such as the vehicle weight, engine technology, fuel type, and actual operating conditions. Two sources of fuel economy estimates are used: (1) Natural Resources Canada's Fuel Consumption Guide and (2) Natural Resources Canada's Canadian Vehicle Survey. The estimates published in the Fuel Consumption Guide are based on a standard test procedure but there is uncertainty as to what degree the test procedure captures actual real-world driving conditions. A 2005 Consumer Reports study found that in a test of 303 light duty vehicles that actual fuel economy deviated from the published rating by between +21% and -28% [21]. The

study also found that 90% of the vehicles tested had fuel economies worse than the published rating. Although this was a US study, at the time of the study, American and Canadian test procedures were the same. It should be noted that the US has recently revised their test procedure and Canada is likely to follow. The Canadian Vehicle Survey provides rough data quality rankings and corresponding confidence intervals.

Fuel Emission Factors

The IPCC estimates the uncertainty associated with fuel emission factors to be less than 5% (Section 2.1.1.6 [16]). As part of the national reporting procedure Environment Canada commissioned a study to quantify the uncertainty associated with various fuel emission factors. Unfortunately these values were not published in their report.

Fuel Prices

Statistics Canada publishes monthly average fuel prices. Confidence intervals are calculated to estimate the uncertainty of the average annual fuel price.

Employee Commuting Model

The model used to estimate employee commuting does not estimate uncertainty and as previously discussed there will be biases present in the survey. Without having a more detailed understanding of biases present in the survey it is difficult to estimate uncertainty; however, an estimate of uncertainty of 30% was made based on discussions with the model developer and fuel economy uncertainties.

Car Allowance Travel

Assessing uncertainty from a survey is difficult; there is no simple way of assessing the accuracy of estimates made by respondents nor how representative the estimates at the time of the survey are over the course of a year. In addition, there will be biases present in the survey. To provide some measure of uncertainty, confidence intervals are calculated for both the fuel spending per week and percentage of work related travel.

Working Weeks

There is uncertainty associated with the average number of weeks in a year an employee works. Vancity's human resources department provided an estimate and a range from which an uncertainty estimate was derived (10%).

AVIATION EMISSION UNCERTAINTY SOURCES

There is considerable uncertainty associated with both the impact and release of aviation emissions. In particular there is great uncertainty associated with the radiative forcing factor. Recent studies have suggested the value could be as much as two times current estimates but

no specific uncertainty estimate is given [13]. At this time there is no widely accepted measure of uncertainty associated with the radiative forcing of aviation emissions. Because of variations in aircraft, fuels, flight paths, loads, and operating conditions there is significant uncertainty associated with aviation emissions factors that are a function of distance travelled; however, there are no published estimates. Finally, there is model uncertainty associated with estimating the length of a flight. The IPCC suggests that due to air traffic control inefficiencies and indirect flight routing that the flight length be increased by between 9-10% over the direct route [11, 12]. Vancity assumes this value captures the uncertainty in the flight length as well. As there is significant uncertainty associated with radiative forcing and no published estimates of emission factor uncertainties, the uncertainties associated with aviation emissions will not be assessed quantitatively, although it is assumed that they are large.

4.4.3 OFFICE ACTIVITY

PAPER

There are significant uncertainties with regards to both paper consumption activity data and emission factors. There are no published estimates of uncertainty associated with the emission factor but it is believed to be very high, likely orders of magnitude. As a result uncertainties associated with paper are not assessed as the results would be meaningless. It should be noted that the WRI removed paper from their emissions inventory citing that the uncertainty was too great [22]. However, to support improvements of the paper consumption estimate, Vancity estimates are graded (A though F). If an estimate makes up a significant fraction of the total estimate and receives a poor grade, steps are taken to improve that estimate.

4.5 GHG ASSERTIONS

The Vancity group's GHG Emissions Inventory for the fiscal year 2009 has been prepared in conformance with the CSA/ISO 14064-1 standard entitled *Specification with Guidance at the Organization Level for Quantification and Reporting of Greenhouse Gas Emissions and Removals*.

Vancity's GHG emissions for the fiscal year 2009 were 5,101 tonnes CO₂ equivalent.

5. GHG INVENTORY QUALITY MANAGEMENT

5.1 GHG INFORMATION MANAGEMENT - ROLES AND RESPONSIBILITIES

The following table outlines the roles and responsibilities that were assigned before estimating the greenhouse gas emissions inventory. Note that multiple people or a group can be responsible for a single role and that a single person can be responsible for more than one role.

Name	Responsibility	Training Level
Data Collection Officer	This officer is responsible for collecting, managing and logging all data used to estimate Vancity's greenhouse gas emissions inventory, as described in this document. The officer is responsible for ensuring all data is reported to them and that the data adheres to the specified data collection standards and quality assurance procedures. Finally, the officer is responsible for ensuring that all data collection procedures in this document adhere to the relevant standards.	This officer should have a thorough understanding of the relevant data collection procedure and standards as well as quality assurance procedures.
Modeling Officer	This officer is responsible for ensuring the emissions inventory model adheres to the methodologies described in Vancity's GHG Emissions Inventory Handbook. The officer is also responsible for reviewing the methodologies described in this document to ensure they are current and adhere to the relevant standards. Finally, this officer is responsible for running the model and reporting the results of the emissions inventory to the Data Collection Officer.	This officer should have a thorough understanding of the relevant standards and modeling methodologies. The officer needs to possess sufficient quantitative skills to understand and run the model.
Finance Officer	This officer is responsible for collecting and reporting activity data derived from accounting records to the Data Collection Officer.	This officer should be familiar with the accounting system and accounting practices at Vancity.
Energy Assessment Officer	This officer is responsible for collecting and recording energy use (electrical and fuel) at all Vancity facilities and reporting this information to the Data Collection Officer. This officer may be an external contractor.	This officer should be familiar with energy systems and utility reporting processes.
Survey Officer	In some cases, for example employee commuting, a survey may need to be conducted to estimate activity data or other model parameters. The survey officer shall be responsible for conducting and interpreting such a survey. This officer may be an external contractor.	This officer should be familiar with survey methodologies including how to correctly conduct a survey and interpret the results.

Table 6 – Roles and Responsibilities of GHG Inventory Management

5.2 DOCUMENT RETENTION AND RECORD KEEPING

Vancity's Greenhouse Gas Emissions Inventory Handbook outlines the procedures and methodologies Vancity uses to assess and estimate the emissions of greenhouse gases associated with our business and business operations; Vancity's greenhouse gas emission inventory. The procedures were developed to meet both the CSA/ISO 14064-1 standard and the World Resources Institutes' GHG Protocol standard [1, 2]. They were designed to reflect the principles of: relevance, completeness, consistency, accuracy, and transparency [1]. As the standards evolve, these principles will guide the evolution of this document and the procedures described within. Finally, the procedures were developed to be independent of a specific implementation or technology solution.

Documentation supporting the design, development and maintenance of the inventory is retained to support the verification process and provide a historical record. This task is the primary responsibility of the Data Collection Officer. In determining what information needs to be retained the following principles are applied:

1. At any point in time, all past emissions inventories should be able to satisfy an audit.
2. At any point in time, any past emissions inventory should be able to be recalculated from the retained records.

The following information is retained on an ongoing basis:

- The procedures, processes, and methodologies used to estimate the emissions inventory and relevant sources
- All emission factors and their sources
- All activity data, activity data models, and their sources
- All models
- All supporting documentation and sources
- The emissions inventory, reported at the facility level

The following directory structure is in place on a single, backed-up storage location and used to store and maintain all information:

- Procedures and Reporting – Contains a copy of Vancity's Greenhouse Gas Emissions Inventory Handbook and other relevant documents and supporting source material
- Model – Contains a clean copy of all major versions of the model
- Year (2008, 2009, 2010 ...)
 - Report – Contains the Verification Report
 - Data – Contains raw activity data and survey results
 - Model – Contains the emissions inventory model
 - Base Year – Contains the emissions inventory model of the current base year

6. CARBON NEUTRAL

6.1 OFFSETS

In August 2010, Vancity purchased 4,500 tonnes of CO₂ offsets. These offsets were purchased by The Pembina Institute on behalf of Vancity from Offsetters Climate Neutral Society and include:

- 700 tonnes were secured from a biomass boiler installation in Aldergrove, BC, covering the period from January 1, 2009 to December 31, 2009. The verification and certification of the emissions reductions was carried out by A.D. Williams Engineering Inc.
- 3,800 tonnes were secured from a landfill gas capture and flare project in Fredericton, NB, covering the period from January 1, 2009 to December 31, 2009. The verification and certification of the emissions reductions was carried out by Det Norske Veritas Certification AS.

Vancity's 2010 offset purchase did not meet all of its stated offset purchase criteria, namely:

- *Directly reduce energy consumption and/or create some kind of renewable energy* – the landfill gas capture and flare project does not produce offsets from renewable energy or energy efficiency initiatives
- *Be located in British Columbia* – the landfill gas capture and flare project is located in the province of New Brunswick
- *Projects that create more than 5000 tonnes of GHG emissions (tonnes of CO₂e) reductions per year will need to have separate groups do the third-party validation and verification* – these offsets did not have independent third party validation and verification by separate groups

In an under-regulated and immature offset market, all of Vancity's offset criteria could not be met. However, in each instance our focus on purchasing high-quality offsets was not compromised.

To completely offset our 2009 emissions footprint of 5,101 tonnes CO₂e, we drew upon an overstock of offsets that we had acquired in July of 2009, when we purchased 6,000 tonnes of CO₂e offsets to offset an emissions footprint of 5,202 tonnes* CO₂e. Of the remaining offsets (798 tonnes) of our 2009 purchase, 601 tonnes were used to completely offset our 2009 emissions from the following project (also purchased by The Pembina Institute on behalf of Vancity from Offsetters Climate Neutral Society):

- A biomass boiler installation in Aldergrove, BC, covering the period from January 1, 2008 to December 31, 2008. The verification and certification of the emissions reductions was carried out by A.D. Williams Engineering Inc.

Offsets purchased from the biomass boiler installation have been retired through the ISO 14064 registry on Markit Environmental Registry. To view the validation and verification report for this project and the offset credits retired on behalf of Vancity by Offsetters, go to <http://www.tz1market.com/aboutpublic.php>. Offsets purchased from the landfill gas capture and flare project have been retired through the ISO 14064 registry on BlueRegistry. To view the validation and verification report for this project and the offset credits retired on behalf of Vancity by Offsetters, go to <https://www.netinform.de/BlueRegistry/LoginPage.aspx>.

*Data for 2008 was restated for energy use and employee commuting using updated emission factors, which became available after the 2008 Annual Report was published. Emissions from premises energy use are based on estimated energy use. Emissions from employee commuting are based on responses to a survey, and are extrapolated to represent all employees. Vehicle fleet emissions have been subtracted from employee business travel to avoid double counting. This change in methodology has been adopted for each year.

6.2 CARBON NEUTRALITY ASSERTION

The Vancity Group's GHG emissions for the fiscal year 2009 were 5,101 tonnes CO₂e. In August 2010, 4,500 tonnes of carbon offsets were purchased and combined with the extra stock of 601 tonnes of carbon offsets that were purchased the previous year to offset 2009 emissions. Thus for the year 2009, the Vancity Group is claiming Carbon Neutrality.

While there is no universally accepted definition of carbon neutrality, for Vancity, carbon neutrality is the result of an organization offsetting their greenhouse gas (GHG) emissions such that their net impact on the climate is neutral.

To achieve this, Vancity completed the following steps:

1. quantified our carbon footprint
2. made efforts to reduce our carbon emissions, and
3. purchased carbon offsets from emission reducing activities that others had undertaken.

7. VANCITY'S ROLE IN VERIFICATION ACTIVITIES

ISO 14064-1 requires a verification procedure be established with the auditor/verifier. The following describes the general procedures Vancity follows:

1. Before verification is conducted the procedures described in Vancity's GHG Emissions Inventory Handbook shall have been completed.
2. The appointed auditor/verifier shall have the necessary background, training, and competency to perform the verification as defined in ISO 14064-1 (see Section 8.3.3 of [1] for further details).
3. The objectives, scope, level of assurance, materiality, and data sampling and custody criteria shall be discussed and established with the verifier.

4. A verification statement shall be obtained from the verifier that includes as a minimum: a description of the objectives, scope and criteria of the verification activities, a description of the level of assurance, and the verifier's conclusion indicating any qualification or limitations (see Section 8.3.4 of [1] for further details).
5. The verification statement shall be reviewed to ensure it is consistent with criteria established with the verifier.

7.1 VERIFICATION

This GHG Inventory and Carbon Neutral Report was prepared by Vancity management. The greenhouse gas assertions including the 2009 carbon footprint and 2009 carbon neutral assertions have been externally verified by an independent auditor, Ernst & Young LLP, with a reasonable level of assurance, and in a manner consistent with the requirements of ISO 14064-3.

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APPENDICES

APPENDIX A: FACILITIES BY PROVINCE

BRITISH COLUMBIA

Citizens Bank of Canada

400 - 815 West Hastings St.
Vancouver, BC V6C 1B4

Squamish Savings Branches

Squamish Chieftain
Unit 8 – 1335 Pemberton Ave.
Squamish, BC V8B 0J8

Garibaldi Highlands
1 – 1900 Garibaldi Way, Box 939
Squamish, BC V2Z 2C3

Community Capital

530 – 815 West Hastings St.
Vancouver, BC V6C 1B4

Community Enterprises Ltd.

510 – 815 West Hastings St.
Vancouver, BC V6C 1B4

Vancity Community Foundation

510 – 815 West Hastings St.
Vancouver, BC V6C 1B4

Vancity Credit Union

183 Terminal Avenue
Vancouver, BC V6A 4G2

13450 -102nd Ave
Surrey, BC V3T 5X4

301 - 369 Terminal Ave,
Vancouver BC V6A 4C4

Unit 3 - 8433 Harvard Place
Chilliwack, BC V2P 7Z5

1285 Main Street, Vancouver, BC
V6A 4B6

Vancity Credit Union Branches

4th Ave Community Branch
Branch 11
2233 West 4th Avenue, Vancouver, BC
V6K 1N9

Abbotsford Community Branch
Branch 34
32675 South Fraser Way, Abbotsford, BC
V2T 1X9

Blanshard Street Community Branch
Branch 67
1001 Blanshard Street, Victoria, BC
V8W 2H4

Brentwood Community Branch
Branch 43
Unit 106 - 1901 Rosser Avenue, Burnaby,
BC V5C 6R6

Cedar Hills Community Branch
Branch 44
12820 96th Avenue, Surrey, BC
V3V 6A8

Chilliwack Community Branch
Branch 31
45617 Luckakuck Way, Chilliwack, BC
V2R 1A3

Chinatown Community Branch
Branch 28
188 East Pender Street, Vancouver, BC
V6A 1T3

Collingwood Community Branch
Branch 13
3305 Kingsway, Vancouver, BC
V5R 5K6

Commercial Drive Community Branch
Branch 12
1675 Commercial Drive, Vancouver, BC
V5L 3Y3

North Burnaby Community Branch
Branch 6
4806 East Hastings Street, Burnaby, BC
V5C 2K9

North Delta Community Branch
Branch 19
7211 120th Street, Delta, BC
V4C 6P5

North Road Community Branch
Branch 16
3977 North Road, Burnaby, BC
V3J 1S2

North Side Community Branch
Branch 53
130 – 2325 Ottawa Street, Port Coquitlam,
BC V3B 8A4

North Vancouver Community Branch
Branch 21
1290 Marine Drive, North Vancouver, BC
V7P 1T2

Oakridge Community Branch
Branch 41
5594 Cambie Street, Vancouver, BC
V5Z 3Y5

Pinetree Community Branch
Branch 18
Unit 20 - 2991 Lougheed Hwy, Coquitlam,
BC, V3B 6J6

Pitt Meadows Community Branch
Branch 50
750-19800 Lougheed Highway, Pitt
Meadows, BC V3Y 2W1

Point Grey Community Branch
Branch 22
4545 West 10th Avenue, Vancouver, BC
V6R 4N2

Downtown Community Branch
Branch 10
898 West Pender Street, Vancouver, BC
V6C 1J8

Dunbar Community Branch
Branch 45
4445 Dunbar Street, Vancouver, BC
V6S 2G4

Fairview Community Branch
Branch 8
501 West 10th Avenue, Vancouver, BC
V5Z 1K9

Fraser Street Community Branch
Branch 7
6288 Fraser Street, Vancouver, BC
V5W 3A1

Guildford Community Branch
Branch 30
Unit 108 - 15175 101st Avenue, Surrey, BC
V3R 7Z1

Hastings Community Branch
Branch 3
2510 East Hastings Street, Vancouver, BC
V5K 1Z3

Kerrisdale Community Branch
Branch 15
2380 West 41st Avenue, Vancouver, BC
V6M 2A4

Kitsilano Community Branch
Branch 4
3395 West Broadway, Vancouver, BC
V6R 2B1

Kruger Community Branch
Branch 65
1625 – 5th Ave., New Westminister, BC
V3M 1Z7

Port Coquitlam Community Branch
Branch 33
Unit 7100 - 2850 Shaughnessy Street, Port
Coquitlam, BC V3C 6K5

Port Moody Community Branch
Branch 52
5 – 121 Brew Street, Port Moody, BC
V3B 8A4

Richmond Community Branch
Branch 26
5900 No.3 Road, Richmond, BC
V6X 3P7

Royal Oak Community Branch
Branch 59
6632 Royal Oak Avenue, Burnaby, BC
V5H 3P6

Hillside Community Branch
Branch 68
3055A Scott Street, Victoria, BC
V8R 4J9

Semiahmoo Community Branch
Branch 25
#104 - 1790 152nd Street, Surrey, BC
V4A 7Z7

South Burnaby Community Branch
Branch 17
5064 Kingsway, Burnaby, BC
V5H 2E7

South Slope Community Branch
Branch 56
7384 Market Crossing, Burnaby, BC
V5J 0A2

Station Square Community Branch
Branch 35
6100 McKay Avenue, Burnaby, BC
V5H 4L6

Langford Community Branch
Branch 69
100 – 800 Kelly Road, Victoria, BC
V9B 5T6

Langley Community Branch
Branch 23
Unit 100 - 20055 Willowbrook Drive,
Langley, BC V2Y 2T5

Lynn Creek Community Branch
Branch 46
1370 Main Street, North Vancouver, BC
V7J 1C6

Lynn Valley Community Branch
Branch 57
Unit 101 - 1233 Lynn Valley Road , North
Vancouver, BC V7J 2A1

Maillardville Community Branch
Branch 51
1013 Brunette Avenue, Coquitlam, BC
V3K 1E6

Main Street Community Branch
Branch 9
4205 Main Street, Vancouver, BC
V5V 3P8

Maple Ridge Community Branch
Branch 29
22824 Lougheed Hwy, Maple Ridge, BC
V2X 2V6

Marpole Community Branch
Branch 14
8615 Granville Street, Vancouver, BC
V6P 5A2

Mission Community Branch
Branch 36
Unit 150 - 32555 London Avenue, Mission,
BC V2V 6M7

Surrey City Centre Community Branch
Branch 32
10293 King George Hwy, Surrey, BC
V3T 2W6

Telus Community Branch
Branch 63
6th Floor, 3777 Kingsway, Burnaby, BC
V5H 3Z7

Tsawwassen Community Branch
Branch 58
1215 56th Street, Delta, BC
V4L 2A6

Vancity Centre Community Branch
Branch 1
Unit 100 - 183 Terminal Avenue, Vancouver,
BC V6A 4G2

Victoria Community Branch
Branch 42
3075 Douglas Street, Victoria, BC
V8T 4N3

Victoria Drive Community Branch
Branch 2
5590 Victoria Drive, Vancouver, BC
V5P 3W1

Walnut Grove Community Branch
Branch 54
E-103-20159 88th Avenue, Langley, BC
V1M 0A4

West Vancouver Community Branch
Branch 5
1402 Marine Drive, West Vancouver, BC
V7T 1B7

Westend Community Branch
Branch 47
1798 Robson Street, Vancouver, BC
V6G 1C7

Morgan Crossing Community Branch
Branch 70
H120-15795 Croydon Drive, Surrey, BC
V3S 2L6

Westview Community Branch
Branch 49
712 - 2601 Westview Drive, North
Vancouver, BC V7N 3X4

New Westminster Community Branch
Branch 61
511 Sixth Street, New Westminster, BC
V3L 3B9

Newton Community Branch
Branch 27
7555 King George Hwy, Surrey, BC
V3W 5A8

ALBERTA

Citizens Bank of Canada

#150 - 505 - 3rd St SW
Calgary, AB V2P 3B6

ONTARIO

Citizens Bank of Canada

184 Front St
Toronto, ON M5A 4N3

APPENDIX B: GHG EMISSION FACTOR AND ACTIVITY DATA

ELECTRICITY

EMISSION FACTOR

The majority of Vancity's facilities are located in the province of British Columbia and thus, Vancity purchases the bulk of our electricity from BC Hydro. Annually, BC Hydro provides estimates of emission factors in their Annual Report which are used in our calculations. For facilities located outside of BC, the latest emission factors were obtained from Canada's most recent National Inventory Report.

ACTIVITY DATA

Electricity consumption is metered at approximately 67% of Vancity facilities and measured in kilowatt hours. At non-metered facilities, consumption is estimated using a model. The model estimates an average energy use per unit area for all metered Vancity facilities, categorizes these facilities, and then assumes that similar non-metered facilities use approximately the same energy per unit area

NATURAL GAS

EMISSION FACTOR

Combustion of natural gas releases three greenhouse gases, CO₂, CH₄, and N₂O. As a result of the Canadian Government's reporting requirements under the United Nations Framework Convention on Climate Change, the Government commissioned a report on CH₄, and N₂O emission factors and uncertainties [7]. Because the emission factors associated with these gases are both comparatively small (less than 1% of the total CO₂e emissions factor after incorporating global warming potentials (GWP)) and highly uncertain, emissions of CH₄, and N₂O are not included in our emissions inventory. There are also emissions associated with natural gas distribution. However, as distribution emissions are generally small (about 1% based on Terasen Gas' 2005 estimate of 0.539 kg/GJ) they are not included [8].

ACTIVITY DATA

The majority of Vancity facilities are located in the province of British Columbia and thus, Vancity purchases the bulk of our natural gas from Terasen Gas. At this time there is not sufficient gas consumption outside of BC to justify refining the conversion factor for other provinces and therefore the BC conversion factor is used in all cases. Natural gas consumption is metered at most Vancity facilities and reported by the gas company in gigajoules. At non-

metered facilities consumption is estimated using a model. The model estimates average gas use per unit area for all metered Vancity facilities, categorizes these facilities, and then assumes that similar non-metered facilities use approximately the same amount of gas per unit area.

VEHICLE TRAVEL

EMISSION FACTOR

There are a number of categories of vehicle travel within Vancity's operational boundary. For each of these, total fuel consumption (the activity data) is estimated or measured and a set of emission factors are obtained to estimate emissions. Only gasoline and diesel fuel types are modeled as they make up the overwhelming majority of fuel types currently in use [9]. Blended fuels such as biodiesel or ethanol are considered equivalent to the fuel they are blended with (e.g. diesel or gasoline) as the (non-lifecycle) greenhouse gas emissions are nearly equivalent.

ACTIVITY DATA

For the purpose of estimating greenhouse gas emissions, vehicle travel activity data is measured in fuel consumption. As the distance travelled by a vehicle is often known or can be estimated, fuel consumption can be estimated by multiplying the distance travelled by an appropriate estimate of fuel economy. There is some uncertainty associated with fuel economy because it is dependent on many factors including age and vehicle operating conditions; nevertheless this calculation provides the most reasonable estimate of total fuel consumption when it is not directly measured. Fuel economy estimates are obtained from Natural Resources Canada (NRCan), which provides estimates for both specific vehicles and vehicle groups.

AIR TRAVEL

EMISSION FACTOR

The UK Department for Environment, Food and Rural Affairs (DEFRA) publishes the most widely used air travel emission factors [11]. These emission factors are specified as a function of flight length and are based on UK flight patterns. The WRI has adopted these emission factors and reclassified the flight lengths to be compatible with the North American aviation environment. It is widely recognized that the climate change impact of aviation emissions are attributable to more than just carbon dioxide [12, 13]. Various other factors influence the overall total impact. Unfortunately, there is considerable uncertainty associated with many of these other impacts especially with regards to the formation of cirrus clouds. The Radiative Forcing Index (RFI) is the mostly widely used measure to compare impacts. The IPCC originally estimated the ratio between total aviation impact RFI and CO₂ RFI (the radiative forcing factor) to be 2.7, excluding any potential impact of cirrus cloud formation [12]. More recent studies, which have been adopted by the IPCC, have estimated a ratio of 1.9 [13, 14, 15]. In line with

these studies and ratios used by other organizations a radiative forcing factor of 2 shall be used; however this value is reviewed on a regular basis [15]

ACTIVITY DATA

The most common method used to estimate the one way length of a flight is to calculate the great circle distance between the airport of origin and airport of destination; the shortest distance between two points on a sphere. However, as this is the shortest distance between two points, the IPCC recommends adding an additional 9-10% to account for non-direct routing and delays [11, 12]. Air travel is measured in kilometres per person. The flight length determines the flight length classification (e.g. short, medium, or long haul) and the appropriate emission factor to use.

PAPER USE

EMISSION FACTOR

There is significant uncertainty associated with estimating emissions of greenhouse gases resulting from the production and disposal of paper. One of the most comprehensive and relevant studies to date that attempts to quantify these life cycle emissions appears to be a US based study conducted by the Paper Task Force. The study was revised in 2002 and is endorsed by the US Office of the Federal Environmental Executive. The report was commissioned by Environmental Defense, amongst others, and was used to develop an online calculator. The calculator estimates greenhouse gases based on the amount of paper used (measured by weight), the type of paper, and the percent of recycled content. It is important to note that these are life cycle emissions and that there are in fact very few greenhouse gas emissions associated with actual paper use. Also, the calculator does not explicitly list emission factors; however, they can be extrapolated (see Appendix B for details).

The following citation must be included in any report produced that includes values derived from the calculator: *“Environmental impact estimates were made using the Environmental Defense Paper Calculator. For more information visit <http://www.papercalculator.org>.”*

ACTIVITY DATA

Tracking paper use in a large and diffuse organization such as Vancity is difficult. Nevertheless, procedures have been developed to capture this as best as is reasonably possible. It is not feasible to track paper use at the facility level and thus paper use is reported at the subsidiary level; as with transportation emissions, subsidiary level emissions are reported against the subsidiary head office. Paper use estimation procedures have been in place for a considerable period of time at Vancity. Paper use is collected by departmental representatives on a

quarterly basis and the total weight of paper purchased, as well as the percentage of paper that is post consumer waste (PCW) is tabulated and summarized.

APPENDIX C: PAPER USE EMISSION FACTOR SAMPLE DERIVATION

To obtain a paper use emissions factor [Environmental Defense' online calculator](#) is used. The calculator does not explicitly list emission factors; however, they can be extrapolated by calculating the greenhouse gas emissions associated with 1 Metric Tonne of each paper type for the following recycling percentages: 0%, 25%, 50%, 75%, 100%. Presently the relationship is linear ($R^2 = 1$) and a linear regression can be used to determine emission factors as a function of recycled content. For example:

Inputs:

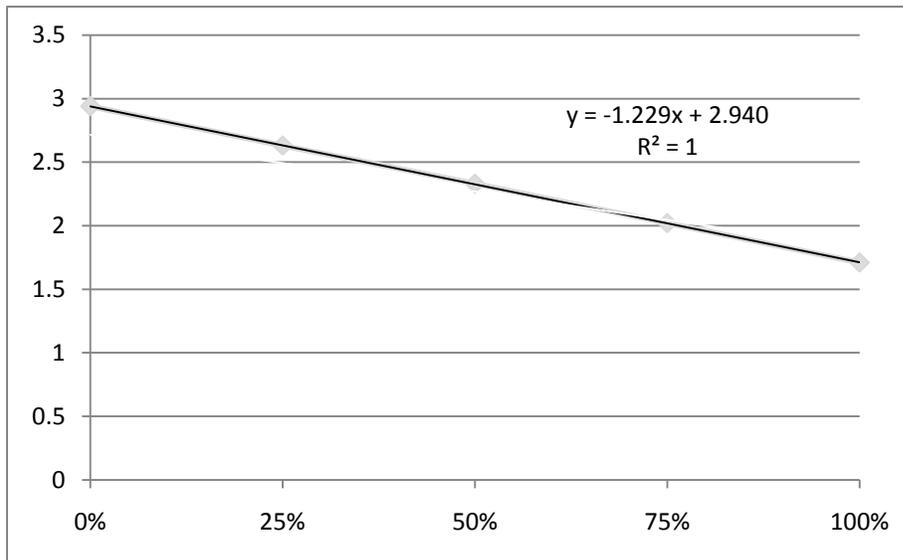
Paper Type: Uncoated Freesheet

Amount: 1 Metric Tonne

% Recycled Content: 0%, 25%, 50%, 75%, 100%

% Recycled Content	lbs of CO2	Kg of CO2	Metric Tonnes of CO2 / Metric Tonne of paper
0%	6,482	2940.185	2.94
25%	5,804	2632.650	2.63
50%	5,127	2325.568	2.33
75%	4,449	2018.032	2.02
100%	3,771	1710.496	1.71

Figure 2: 1 Metric Tonne of Uncoated Freesheet (e.g. copy paper)



This formula ($y = -1.229x + 2.940$) can then be used to calculate the emissions factor as a function of recycled content, where y is the emission factor in Metric Tonnes per Metric Tonne of paper and x is the percent recycled content.

APPENDIX D: BASE-YEAR GHG INVENTORY (2007)

	Tonnes CO ₂ equivalent	Uncertainty (+/- %)
Scope 1	468	15.6%
Scope 2	386	0.0%
Scope 3	4,650	4.8%
Totals	5,504	4.3%

Table 8 – Total 2007 GHG Emissions by Scope

	Tonnes CO ₂ equivalent	Uncertainty (+/- %)
Electricity	386	18.1%
Natural Gas	1,109	7.7%
Vehicle Fleet Travel	36	9.6%
Vehicle Travel	58	19.1%
Car Allowance	402	2.9%
Commuting	2,146	9.1%
Air Travel	498	High*
Paper	868	High*

Data for 2007 was restated for energy use and employee commuting using updated emission factors, which became available after the 2006-2007 Vancity Accountability Report and 2008 Annual Report were published respectively. Emissions from premises energy use are based on estimated energy use. Emissions from employee commuting are based on responses to a survey, and are extrapolated to represent all employees. Vehicle fleet emissions have been subtracted from employee business travel to avoid double counting. 2007 data has been assured by Interpraxis.

*Uncertainty not assessed but is high.

Table 9 - Total 2007 GHG Emissions by Source

APPENDIX E: GHG EMISSIONS SUMMARY BY FACILITY (2009)

Facility ID	Facility Name	Tonnes CO ₂ equivalent	(+/-%)
1	Vancity Centre	1,948.1	8.0%
2	Branch #02	46.8	21.2%
3	Branch #03	37.2	19.4%
4	Branch #04	33.1	17.1%
5	Branch #05	22.9	27.7%
6	Branch #06	63.8	23.3%
7	Branch #07	57.5	19.2%
8	Branch #08	19.7	27.0%
9	Branch #09	23.9	16.9%
10	Branch #10	19.5	17.8%
11	Branch #11	21.4	27.5%
12	Branch #12	46.7	28.8%
13	Branch #13	50.7	14.7%
14	Branch #14	23.6	20.3%
15	Branch #15	16.5	16.4%
16	Branch #16	41.1	28.0%
17	Branch #17	37.1	18.6%
18	Branch #18	70.2	20.7%
19	Branch #19	50.3	24.4%
21	Branch #21	63.6	12.6%
22	Branch #22	23.7	28.2%
23	Branch #23	78.9	23.2%
25	Branch #25	48.7	23.5%
26	Branch #26	34.1	19.1%
27	Branch #27	51.6	23.0%
28	Branch #28	24.9	17.6%
29	Branch #29	42.1	20.7%
30	Branch #30	54.0	22.0%
31	Branch #31	35.6	23.4%
32	Branch #32	49.3	15.1%
33	Branch #33	40.1	25.0%
34	Branch #34	42.4	19.2%
35	Branch #35	17.1	28.3%
36	Branch #36	40.8	21.6%
41	Branch #41	31.5	16.3%

Facility ID	Facility Name	Tonnes CO ₂ equivalent	(+/-%)
42	Branch #42	41.5	22.3%
43	Branch #43	9.3	26.9%
44	Branch #44	64.7	21.9%
45	Branch #45	7.1	26.7%
46	Branch #46	22.8	22.8%
47	Branch #47	8.8	18.2%
49	Branch #49	20.3	8.9%
50	Branch #50	28.7	21.1%
51	Branch #51	61.9	18.3%
52	Branch #52	28.2	19.6%
53	Branch #53	14.2	20.1%
54	Branch #54	36.6	20.8%
75	Branch #56	38.4	23.5%
57	Branch #57	15.0	19.0%
58	Branch #58	30.9	19.4%
59	Branch #59	31.6	23.1%
60	Branch #60	2.2	18.9%
61	Branch #61	23.3	19.1%
62	Branch #62	3.0	28.2%
63	Branch #63	30.7	23.7%
64	Branch #64	21.6	22.7%
65	Branch #65	6.5	24.3%
66	Branch #66 (Metro Insurance)	8.1	22.4%
81	Branch #81	54.2	18.2%
82	Branch #82	54.1	26.3%
100	VCIS @ Br.4	3.7	17.6%
101	VCIS @ Br.6	2.7	26.8%
102	DRS - Inventure & Data Backup	16.8	36.2%
103	Surrey Central	108.9	23.8%
104	815 W. Hastings	562.2	18.4%
105	900 W. Hastings	111.8	22.8%
106	Citizens - Calgary	84.1	35.6%
107	Citizens- Toronto	79.8	39.4%
108	425 Hornby	44.6	24.0%
109	SHOP	9.0	3.5%
110	369 Terminal	49.4	25.7%
111	Branch #1	10.1	30.4%
112	BOSA	15.9	27.9%

Facility ID	Facility Name	Tonnes CO ₂ equivalent	(+/-%)
113	Branch #67	24.8	7.3%
114	Branch #68	2.6	46.0%
115	Branch #69	17.8	27.8%
116	VCIS Branch #98	7.6	19.4%
117	Branch #17 - office	3.6	36.2%

APPENDIX F: OFFSET RETIREMENT STATEMENTS

1. Sunselect Biomass Aldergrove
2. Fredericton Region Solid Waste Commission Landfill Gas Capture and Flare

mark

Markit Environmental Registry Retirement Certificate



Lauron Estabrook
Vice President



Helen Robinson
Managing Director

Offsetters: Clean Technology, Inc.

Company

Subsector: Biomass Aldergrove

Project

2009

Vintage

700 VERs

Quantity Retired

ISO-VT-IR-CA-1000000000000035-01012008-31122009-
312727-313426-MER-0-P

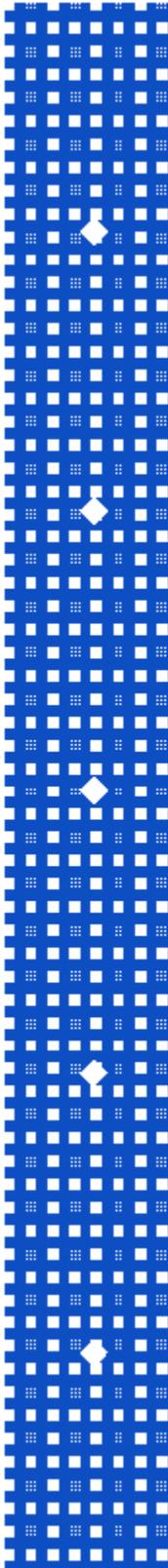
Serial Number

Retired on behalf of Vancity Credit Union

Comment

29 September 2010

Date



Industrie Service

Statement of permanent retirement

**TÜV SÜD Industrie Service GmbH, Carbon Management
Service, Operator of BlueRegistry**

confirms that:



Offsetters Clean Technology Inc.
Suite 1500 - 1055 West Hastings Str.
V6E 2E9 Vancouver, BC
Canada

transferred 3800 VER+ carbon credits (in tCO_{2e}),
certified according to VER+ Standard, vintage 2008
generated by the **Fredericton Region Solid Waste Commission Landfill
Gas Capture and Flare, New Brunswick, Canada**
to the permanent retirement account.

Serial numbers of the retired credits:

BR-VER+-114-CA-0-08.12.2006-30.04.2008-6793-2994

This permanent retirement transfers VER+ carbon credits for final use by

Vancity Credit Union

Vancity

No further selling is allowed.

Retirement ID: 1772

Munich, 1-October-2010