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# Cornerstone Architecture:

## 2009 Greenhouse Gas Inventory Report

**zerofootprint**<sup>TM</sup>

# Cornerstone Architecture

## 2009 Greenhouse Gas Inventory

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## 1.0 INTRODUCTION

→ Cornerstone Architecture Inc. (“Cornerstone”) has engaged Zerofootprint Software Inc. (“Zerofootprint”) to calculate the greenhouse gas (GHG) emissions for its business operations for the 2009 calendar year. Cornerstone, established in 1991, has expertise in a variety of institutional, educational, administrative and assembly projects with sustainable design being a core focus of the business. Zerofootprint has conducted Cornerstone’s 2007 (base year) and 2008 GHG inventories. Choosing to continue to track and measure GHG emissions illustrates Cornerstone’s commitment towards responsible environmental management. Based in London, Ontario, Cornerstone operates with 13 employees and occupies 3,187 square feet of office space in 2009.

Zerofootprint has determined the GHG emissions associated with Cornerstone’s electricity consumption, employee ground travel, paper usage, waste, shipping and food. This was done through data collection, calculation and analysis. This report describes the methodology and results of the 2009 GHG inventory.

## 2.0 METHODOLOGY

This greenhouse gas inventory was undertaken in accordance with the World Resources Institute (WRI) and World Business Council for Sustainable Development (WBCSD)’s “*Greenhouse Gas Protocol – A corporate accounting and reporting standard (revised edition)*.” Launched about a decade ago, the Greenhouse Gas (GHG) Protocol provides organizations with the tools needed to assess organizational and operational boundaries, measure their carbon footprints and report the results. It is recognized internationally as the preeminent methodology for quantifying and reporting corporate GHG emissions and forms the basis of national and international voluntary reporting frameworks.

### 2.1 BOUNDARIES

One of the first steps in establishing a GHG inventory is to determine the boundaries upon which the inventory will be built. The scope of a corporate inventory is defined by both organizational and operational boundaries.

#### ORGANIZATIONAL BOUNDARIES

Under the GHG Protocol, organizations can use either the Equity Share or Control approach. The equity share approach uses an organization’s share of equity, or the financial ownership percentage, to account for its share of GHG emissions.

Similarly, the control approach accounts for the GHG emissions for all operations that the organization has control over (financial or operational).

An operational control approach has been taken to collect and report on Cornerstone's 2009 GHG emissions.

## OPERATIONAL BOUNDARIES

The GHG Protocol defines the operational boundary as the scope of direct and indirect emissions, broken down as scopes 1, 2 or 3. Scope 1 emissions are direct emissions that occur from sources owned or controlled by the organization. Scope 2 emissions are indirect emissions attributed to purchased electricity. Scope 3 emissions are optional and include all other indirect emissions. The following activities (sources) and scopes have been included in Cornerstone's 2009 inventory:

**Scope 1** – There are no reported scope 1 emissions in Cornerstone's inventory. Natural gas consumption for heating is the most common Scope 1 emissions for offices in Canada. However, electricity is used to run a heat pump system at Cornerstone and hence, captured as part of Scope 2 emissions.

**Scope 2** – Electricity consumption. Electricity consumption is considered as Scope 2 emissions, which occur off-premise and not directly at Cornerstone.

**Scope 3** – Employee ground travel, paper, waste, shipping and food. These are all Scope 3 indirect emissions included in the inventory as Cornerstone has operational control over.

## 2.2 DATA COLLECTION & CALCULATIONS

→ Cornerstone provided data for the following activity types for 2009: electricity consumption, renewable energy purchases, employee ground travel, paper usage, waste, shipping and food. In order to accurately and completely calculate an organization's carbon footprint, Zerofootprint looked at all significant and measurable elements that produce GHG emissions. Table 1 outlines the information provided for each activity type.

All greenhouse gas emissions were calculated using GHG emission factors sourced from government and international agencies including Environment Canada, the United States Environmental Protection Agency, the Greenhouse Gas Protocol and others. Where emission factors differ, the local emission factor or calculation methodology took precedence. Emission factors are specific to each activity type and convert activity data into a quantity of greenhouse gas emissions.

**Table 1: Data information**

Activity	Scope	Information provided for 2009
<b>Electricity</b>	2	Total consumption in kWh.
<b>Purchase of green electricity from Bullfrog power</b>	NA	Amount purchased in kWh.
<b>Ground travel</b>	3	Employee breakdown of total distance driven and car type. Emission factors for each car type were also provided.
<b>Paper usage</b>	3	Paper type, number of sheets used and % recycle content.
<b>Waste</b>	3	Total weight of each material type.
<b>Shipping</b>	3	Shipping method, weight transported and total distance traveled.
<b>Food</b>	3	Number and type of meals.

**3.0 RESULTS** → Zerofootprint has assessed the emissions resulting from Cornerstone’s business operations for 2009. Greenhouse gas emissions are expressed in carbon dioxide equivalents (CO<sub>2</sub>e).

Table 2 provides a grouping of emissions by scope. Scope 3 (indirect) emissions represent the largest source of emissions at approximately 60%. Scope 1 emissions totaled 0.000 tonnes since Cornerstone does not consume any fuel (or natural gas) on-site and does not own fleet vehicles. Total emissions normalized by area and by employee are also shown in Table 2.

Figures 1 and 2 summarize Cornerstone’s 2009 emissions breakdown for each activity type expressed in tonnes of CO<sub>2</sub>e and by percentages, respectively. The largest contribution of emissions comes from employee ground travel at 6.925 tonnes of CO<sub>2</sub> in 2009 or 44% of total emissions. At a very close second are the emissions from electricity, at 6.265 tonnes of CO<sub>2</sub>e or 40% of total emissions. Greenhouse gas emissions from paper and waste make up the bulk of the remainder at 9% and almost 6% respectively.

Table 2: 2009 Emissions summary by scopes

Scope	Tonnes CO <sub>2</sub> e	% of total emissions	Tonnes CO <sub>2</sub> e / m <sup>2</sup>	Tonnes CO <sub>2</sub> e / employee
Scope 1	0.000	0.0%	0.000	0.000
Scope 2	6.265	40.1%	0.021	0.482
Scope 3	9.340	59.9%	0.032	0.718
<b>Total</b>	<b>15.605</b>	<b>100.0%</b>	<b>0.053</b>	<b>1.200</b>

Figure 1: 2009 Emissions breakdown by activity type in tonnes CO<sub>2</sub>e

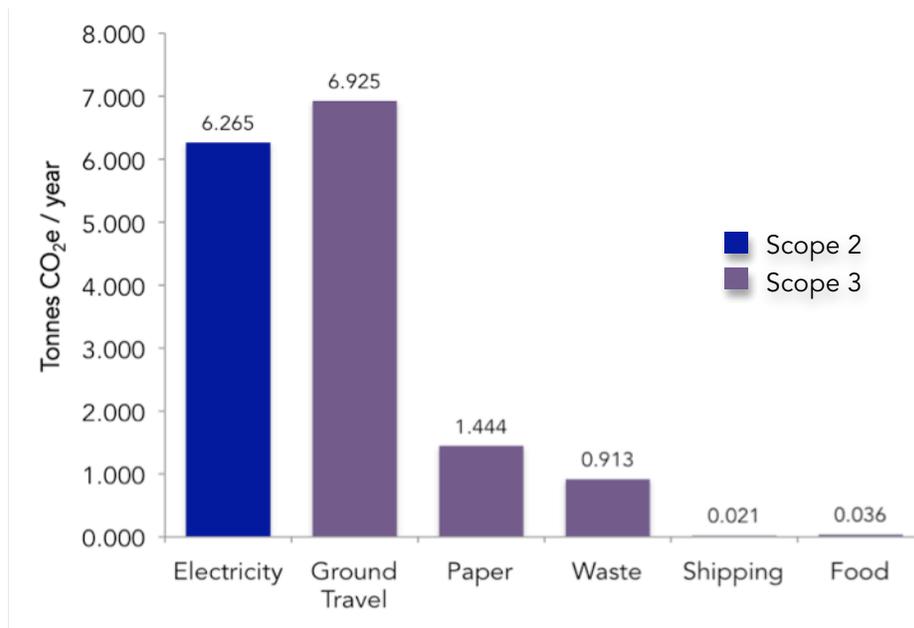
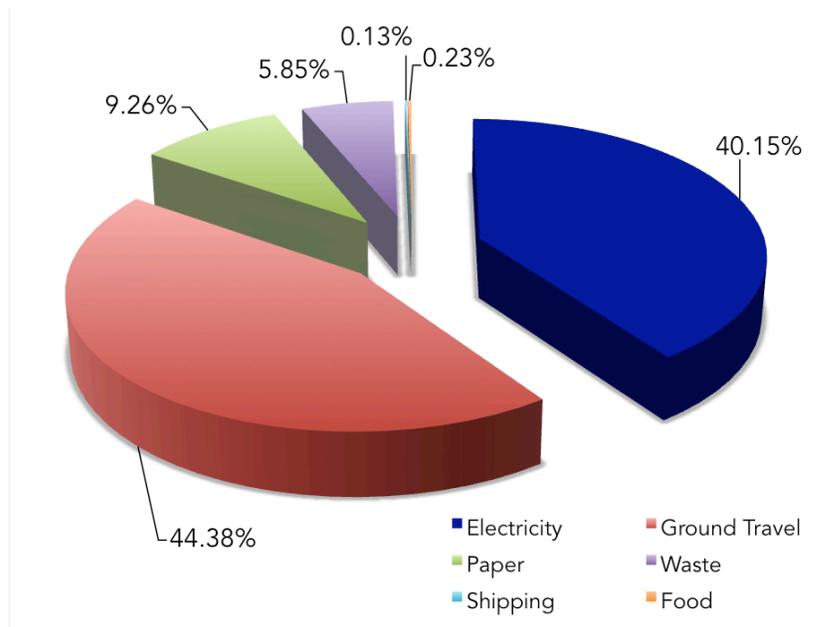


Figure 2: 2009  
Percentage  
breakdown by activity  
type



### 3.1 DETAILED EMISSIONS BREAKDOWN

→ The following tables provide a more detail breakdown of emissions for each activity type. (Please note: numbers in tables may not sum due to rounding.)

#### ELECTRICITY

Cornerstone continues to purchase EcoLogo-certified green electricity from Bullfrog Power. In 2009 Cornerstone purchased green electricity totaling 37,680 kWh to offset emissions from electricity. Table 3 displays the amount of carbon emissions avoided as a result. Both electricity from consumption and purchased green electricity were calculated using the average Ontario grid electricity emission factor from *Canada's National Inventory Report: 1990-2008*.

Table 3: 2009 Summary of emissions from electricity consumption and purchased green electricity

Electricity	kWh / year	Tonnes CO <sub>2</sub> e / year
Electricity consumed	36,854.03	Emissions = 6.265
Purchase of green electricity from Bullfrog Power	37,680.00	Emissions offset = 6.406

## GROUND TRAVEL

Table 4 provides a breakdown of employee travel for 2009. Emission factors, expressed in carbon per distance traveled, were provided by Cornerstone. To increase calculation accuracy, Zerofootprint recommends collecting data on direct fuel consumption.

**Table 4: 2009  
Summary of  
employee business  
travel**

Employee	Primary vehicle	Total distance traveled (km / year)	Tonnes CO <sub>2</sub> e / year
Alison Hannay	Saturn VueV6	3238.04	0.78
Brad Beharrell	Saturn Vue, Chevrolet Cavalier	8160.00	1.87
Jason McIntyre	Mazda5	1287.00	0.31
Mallory Blaine	Pontiac Bonneville	876.00	0.24
Richard Hammond	Honda Accord	9502.14	2.09
Robert Reed	Honda Accord	6221.00	1.43
Travis Conrad	Hyundai Sante Fe	848.00	0.21
<b>Total</b>		<b>30132.18</b>	<b>6.925</b>

## PAPER USAGE

Emissions from paper usage are calculated using lifecycle analysis research from the United States Environmental Defense Fund based on paper type, number of sheets and basis weights. Cornerstone's majority paper use comes from Corporate Express Multi-purpose paper and Cascades' recycled paper, summarized in Table 5.

**Table 5: 2009  
Summary of paper  
usage**

Paper type	Total # of sheets (per year)	Tonnes CO <sub>2</sub> e / year
Corporate Express: Multi-purpose, 92 bright	49,500	0.639
Corporate Express: Multi-purpose	7,000	0.181
Corporate Express: Laser, 96 bright	1,000	0.013
Corporate Express: Quad pad	5,760	0.060
Corporate Express: 100% recycled, 92 bright	45,000	0.366
Cascades Enviro: 100 copy white recycled, 90 bright	23,000	0.187
<b>Total</b>	<b>131,260</b>	<b>1.444</b>

## WASTE

Greenhouse gas emissions from waste are calculated using the United States Environmental Protection Agency's report "Solid Waste Management and Greenhouse Gases: A Life-Cycle Assessment of Emissions and Sinks, 2006." The weight of each material were provided by Cornerstone and used in the calculations. Table 6 provides the summary of waste emission results.

Table 6: 2009  
Summary of waste

Material	Total weight disposed (kg / year)	Tonnes CO <sub>2</sub> e / year
Food	104	0.164
Glass	208	0.146
Plastic	52	0.120
Paper and cardboard	52	0.280
Aluminum	104	0.203
<b>Total</b>	<b>520</b>	<b>0.913</b>

## SHIPPING

Emissions from shipping by road freight are calculated using emission factors from the Greenhouse Gas Protocol. Cornerstone provided the product weight and distance traveled for all shipments made in 2009. Table 7 summarizes information on shipping and the associated greenhouse gas emissions.

Table 7: 2009  
Summary of shipping

Shipping mode	Total weight (kg / year)	Total distance traveled (km / year)	Tonnes CO <sub>2</sub> e / year
Road freight	182.34	13,835.84	0.021
<b>Total</b>			<b>0.021</b>

## FOOD

Cornerstone provided information on the number of meals and meal type in order to calculate the emissions associated with food consumed during 2009. Table 8 summarizes this information. Emissions from food were calculated using assumed meal sizes and applying data on the average national diet according to the United Nations Food and Agriculture Organisation Statistical database (FAOSTAT).

**Table 8: 2009  
Summary of food**

Type of meal	Total # of meals (per year)	Tonnes CO <sub>2</sub> e / year
Lunch – non-vegetarian	7	0.018
Breakfast – coffee/muffins	12	0.018
<b>Total</b>	<b>19</b>	<b>0.036</b>

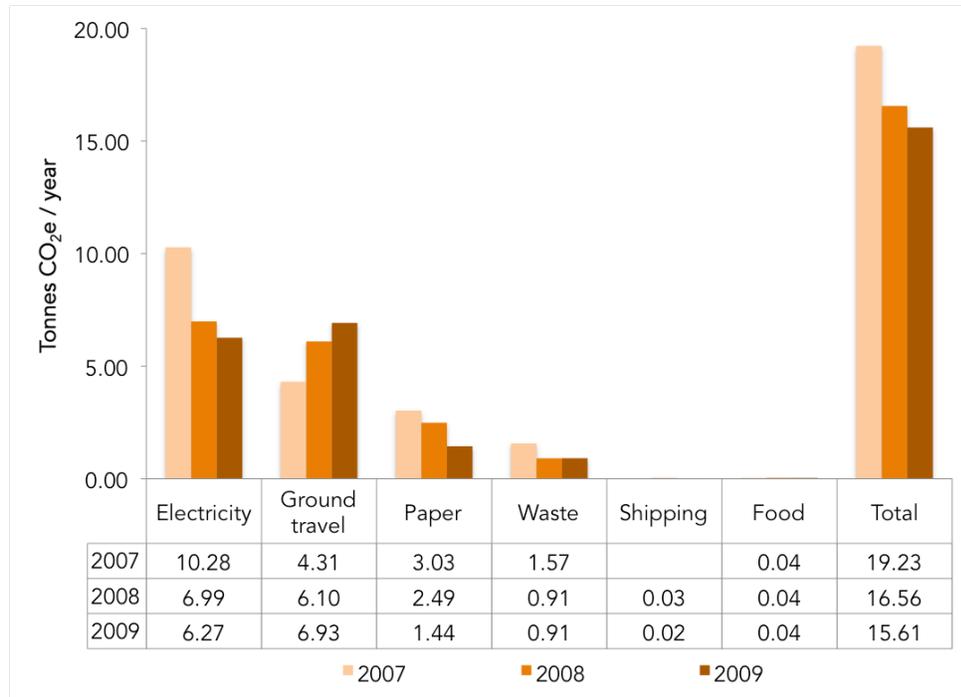
### 3.2 EMISSIONS COMPARISONS

→ In order to track progress and assess Cornerstone's performance, emissions were compared over time. Zerofootprint had previously conducted Cornerstone's greenhouse gas emissions inventories for 2007 (baseline) and 2008. Figure 3 displays these results by activity types for 2007, 2008 and 2009. The square footage of office space remained the same at 3,187 square feet while the number of employees ranged from 12 and 13 over the reporting years. The activity types included in the inventories remained the same, with the exception of shipping, which was not included in the 2007 report. Emissions from all activities showed a decreasing trend or remained the same with the exception of emissions from ground travel.

Comparing results from 2007 to 2008, Cornerstone significantly reduced its total emissions from 19.23 to 16.56, a total of 2.67 tonnes of CO<sub>2</sub>e or nearly 14%. The largest emissions reduction is from electricity consumption at 3.29 tonnes of CO<sub>2</sub>e per year. The largest percentage reduction is from waste, with a 42% reduction from 2007 to 2008. In order to make a more accurate comparison, emissions from shipping are omitted. With this omission, a reduction amount of 2.70 tonnes of CO<sub>2</sub>e was observed from 2007 to 2008.

Once again, Cornerstone’s total greenhouse gas emissions from 2008 to 2009 continued to decrease. Emissions decreased from 16.56 to 15.61, a total of 0.95 tonnes of CO<sub>2</sub>e or nearly 6%. The largest emissions reduction and percentage reduction comes from paper usage at 1.05 tonnes of CO<sub>2</sub>e or 42%. Ground travel is the only activity type that resulted in an increased in emissions (increase of 0.83 tonnes of CO<sub>2</sub>e or 14%).

Figure 3: 2007, 2008 and 2009 Emissions breakdown

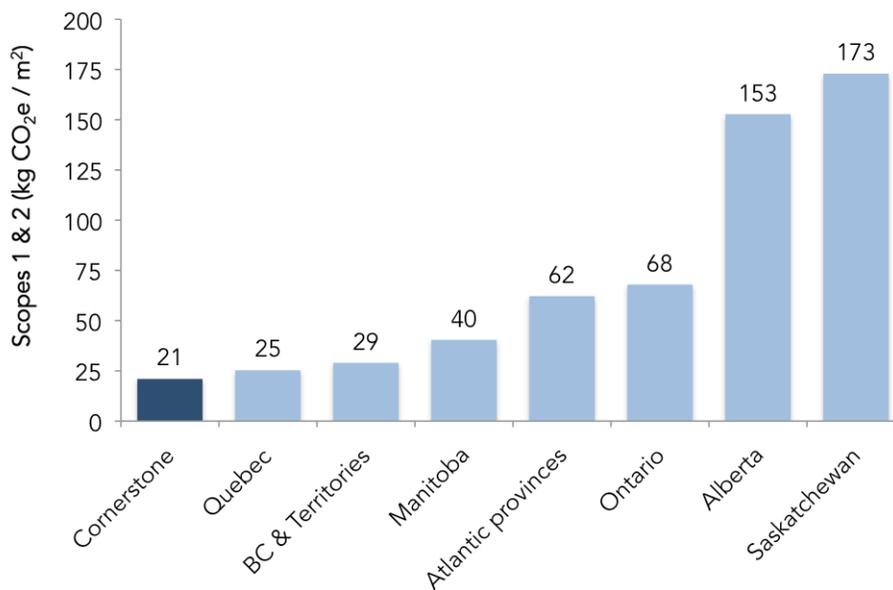


#### 4.0 → COMPARISONS BETWEEN OFFICES IN CANADIAN PROVINCES BENCHMARKING

Greenhouse gas emissions from Cornerstone were benchmarked against the “Office” sector across Canadian provinces. The office sector consists of insurance, real estate, rental and leasing, professional, scientific and technical services and public administration. Data was obtained from Natural Resources Canada – Office of Energy Efficiency using the most recent year available (2007). Zerofootprint also performed additional calculations using the data obtained to derive the following metrics for comparisons. Figure 4 compares emissions from the sum of scope 1 and 2 emissions between Cornerstone (highlighted by the darker shade) and the office sector in Canadian provinces. The results are arranged from lowest to highest

emitters and are displayed in kg of CO<sub>2</sub>e per square metre. It is important to note the difference in reporting years between Cornerstone and the provinces. Differences in reporting years may impact resulting greenhouse gas emissions due to changes in weather patterns influencing the demand on energy consumption. Scope 1 and 2 emissions from the office sector across Canadian provinces averaged 79 and ranged from 25 to 173 kg of CO<sub>2</sub>e per square metre. Cornerstone was the lowest emitter among the group, emitting only 21 kg of CO<sub>2</sub>e per square metre. When compared to the office sector in Ontario, Cornerstone's GHG emissions were approximately 3 times less.

**Figure 4:**  
Comparisons of  
emissions between  
Cornerstone and  
Canadian office  
Sector



## COMPARISONS BETWEEN OTHER ORGANIZATIONS

→ Data used for benchmarking other organizations in the banking and accounting industries is based on publicly available information on websites, responses to the Carbon Disclosure Project and published sustainability reports. The data years ranged from 2007 to 2009. Zerofootprint also performed additional calculations using the data obtained to derive the following comparison metrics. To normalize emission results across organizations, comparisons were made based on emissions (sum of scope 1 and 2) on a per area and per employee basis.

Figure 5 shows a comparison between Cornerstone with other financial institutions in Canada. The data is displayed in kg CO<sub>2</sub>e per square metre for the sum of scope

1 and 2 emissions. The emissions from these organizations, including Cornerstone, ranged from 21 to 103 with an average of 82 kg of CO<sub>2</sub>e per square metre. Cornerstone is the lowest emitter among the group.

**Figure 5:**  
Comparisons of  
emissions by area

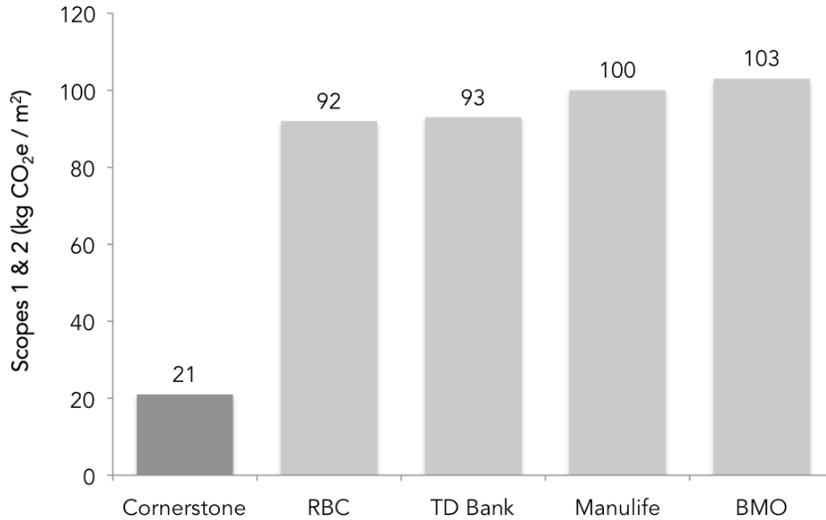
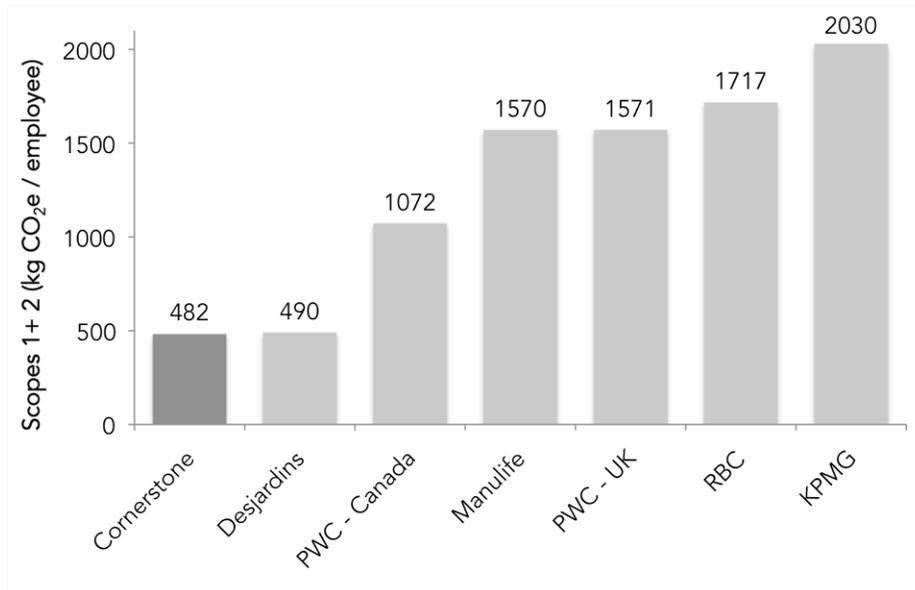


Figure 6 shows the distribution of financial and accounting firms along with Cornerstone based on a per employee basis for the sum of scope 1 and 2 emissions. Emissions ranged from 482 to 2,030 with an average of 1,276 kg of CO<sub>2</sub>e per employee. Again, Cornerstone is the lowest emitter among the group. Its emissions are comparable to that of Desjardins when normalized by employees.

**Figure 6:**  
Comparisons of  
emissions by  
employee



## 4.0 ANALYSIS & CONCLUSIONS

→ Cornerstone Architecture has taken steps towards becoming a sustainable, carbon conscious company. Between the 2007 baseline year and the current 2009 inventory, Cornerstone has reduced its total greenhouse gas emissions by 3.6 tonnes of CO<sub>2</sub>e, along with the purchase of green electricity leading to the offset in over 13 tonnes of CO<sub>2</sub>e emissions.

In 2009, Cornerstone's greenhouse gas emissions from its business operations are primarily from business ground travel and electricity consumption. The focus of future reduction efforts should be around minimizing the impact of business travel since it makes up the largest percentage of Cornerstone's 2009 footprint and is the only activity type that increased in emissions over the three years.

Cornerstone can explore alternative transportation methods including biking or walking for short distances, and public transportation for longer distances. Enrolling in a car-share program and utilizing more fuel-efficient vehicles for the office are other options for reduction.

Cornerstone's reduction in emissions from electricity consumption comes from a combination of an absolute decrease in consumption and a decrease in the Ontario grid electricity emission factor. Absolute electricity consumption decreased by nearly 2,000 kWh from 2008 to 2009. Also, with the purchase of green electricity, Cornerstone is able to 'offset' its electricity carbon footprint. These efforts are to be applauded. A continued interest in pursuing energy reduction strategies will help enhance Cornerstone's sustainability initiatives.

It was mentioned in Cornerstone's 2008 GHG inventory that emissions from paper made up a significant percentage of its total footprint. Since then, it is evident that efforts have been made to reduce Cornerstone's paper footprint. Although paper use increased from 2008 to 2009, the transition to paper with recycled content has helped the organization reduce its emissions from paper use.

Zerofootprint also benchmarked Cornerstone's greenhouse gas emissions with other offices across Canada and with the banking and accounting industries using emissions normalized by area and by employee. These comparisons showed that Cornerstone was amongst the lowest emitters in all categories.

**5.1 EQUIVALENCIES** The emissions resulting from Cornerstone’s business operations can be expressed in equivalences using activities or metrics that are easier to relate to. Table 8 provides a summary of these metrics.

**Table 8: Equivalencies**

Cornerstone’s 2009 emissions of 15.605 tonnes of CO <sub>2</sub> e are equivalent to...
→ Taking 4 average-sized cars off the road in Canada.
→ Not burning 36 barrels of oil.
→ The carbon sequestered by growing 400 seedlings to 10 years of maturity.
→ Avoiding 14 one-way flights between Toronto and Los Angeles.
→ Avoiding the use of 650 BBQ propane cylinders.

**6.0 REDUCTIONS** → This section outlines some recommendations for Cornerstone including simple reduction measures for the office to reduce its environmental impact.

**ELECTRICITY**

Although Cornerstone is already making efforts to reduce its electricity consumption and to purchase green electricity, simple energy saving measures are also meaningful steps not only to save money and energy but also to involve employees in Cornerstone’s sustainability initiatives.

Power down your electronics. Did you know that it takes the equivalent of 200 coal-fired plants to run the world’s screensavers? To minimize your footprint, turn off your monitors, switch to a black screensaver and activate the energy-saving settings on office computers. Also, plug computers and other appliances into a power bar that can be switched off at the end of the workday. Appliances and other electronic devices continue to draw energy even when they are idle. Leave non-essential items like scanners and photocopiers unplugged until they are needed.

Adjust the thermostat. Heating and air conditioning consumes a significant amount of energy. Minimize what you can by setting the temperature to a moderate level. Window blinds can also be lowered to prevent heat lost or heat gain during the winter and summer months.

## **GROUND TRAVEL**

Ground travel is the largest emission source from Cornerstone's 2009 greenhouse gas inventory. This presents many opportunities to save fuel and prevent CO<sub>2</sub> emissions. Driving habits can significantly impact a vehicle's fuel efficiency and CO<sub>2</sub> emissions. Aggressive starts and stops, driving at higher speeds, excessive idling and carrying excess weight can all significantly impact fuel efficiency. Make sure tires are properly inflated and your air filter is clean. Proper maintenance of your vehicles can increase fuel efficiency up to another 5%.

Instead of driving to business meetings, consider web-conferencing. If meetings are necessary, try biking or walking for short distances and taking public transportation for longer distances. Cornerstone can also join a car-share program to utilize more fuel-efficient vehicles when needed.

## **PAPER**

Based on information provided by Cornerstone, it is evident that a transition to using office paper with recycled content is already underway. Cutting down on the amount of paper usage is the next obvious step. Encourage employees to not print or photocopy unnecessary emails or documents. In cases where hard copies are required, only reproduce what is needed and print double-sided. Finally, set aside scraps and reuse the blank side as notepaper.

## **WASTE**

Encourage employees to reduce, recycle and reuse when possible. Make it easy for staff to recycle by having recycling bins throughout your office. Cornerstone can also consider introducing a composting program for the office to reduce organic waste.

## **SHIPPING**

When it's absolutely necessary to ship packages, consider using bike couriers if possible. Also, try to reduce the amount of packaging material for each shipment, which will reduce weight and material used and thus reducing GHG emissions. Try shredding wasted paper so it can be used as packing material.

## **FOOD**

Consider serving local and organic meals for business events. Buy local and from farmers' markets as the shipping of food increases the carbon emissions by a huge factor. One study estimated that a basic North American meal travels approximately 2,400 kilometers from field to table – roughly the driving distance from London, Ontario to Regina, Saskatchewan.

## **OFFSETTING**

Zerofootprint encourages an approach to carbon footprint reduction that begins with accurate measurement, followed by actions for reduction, and finally, the acquisition of carbon offsets to balance the remaining carbon emissions. Offsetting your carbon emissions provides a responsible option to neutralizing the climate change impacts of the emissions that are not easily reducible, or that are not within your organization's control. Zerofootprint maintains a diversified offset portfolio with projects that are registered on the Canadian Standards Association (CSA) Reductions Registry or the GHG CleanProjects Registry and have been verified by a third-party.