CSA Group
Corporate Greenhouse Gas Inventory for Global Operations

Fiscal Year 2008-2009
Version 2.0

November 26, 2009

CSA Group
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Report Content

This inventory has been conducted primarily for voluntary self-evaluation purposes, but will also be available to the public through the CSA website[1]. The purpose of this report is to summarize the procedure and results of the greenhouse gas (GHG) inventory performed by CSA for the fiscal year 2008/2009.

CSA Group is an independent, non-for-profit membership organization, dedicated to serving business, industry, government and consumers. It is comprised of three major divisions:

- **The Canadian Standards Association**, which develops standards and provides guidance on how to apply them
- **CSA International**, which provides testing and certification services
- **OnSpeX**, which provides consumer product evaluation and consulting services for retailers and manufacturers.

CSA Group has taken a voluntary initiative to maintain a carbon neutral status for its operations. The first CSA greenhouse gas inventory was compiled for the fiscal year of 2006/2007, and accounted for all North American operations. The next inventory was compiled during the fiscal year 2007/2008, and accounted for all Global operations. The new target for the 2008/2009 inventory was to maintain a carbon neutral status for its Global operations, while including emissions resulting from all employee travel by car.

The content of this report has been formulated by the following team members. For any questions or concerns, please contact the project lead.

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This report has been created in compliance with Section 7.3.1 of the CSA/ISO 14064-1 standard, titled as the *Specification with Guidance at the Organization Level for Quantification and Reporting of Greenhouse Gas Emissions and Removals*.

The information provided in this report will be verified by an independent third party, as outlined by the CSA/ISO 14064-3 standard, titled *Specification with Guidance for the Validation and Verification of Greenhouse Gas Assertion*, and will be registered on the CSA's GHG CleanStart™ Registry[2].

[1] http://www.csa.ca/Default.asp?language=english
[2] http://www.ghgregistries.ca/cleanstart/index_e.cfm

1.0 Inventory Details

GHG Assertions

1. CSA Group's, International Operations GHG Inventory for fiscal year 2008/2009 report was 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*.

2. Emissions from CSA Group's GHG Inventory for International Operations covering the described subcategories for the fiscal year 2008/2009 were approximately 11,828.23 tonnes CO_2e, while maintaining a maximum material discrepancy of 5% at the gross organizational level.

Reporting Period

April 1st 2008 to March 31st 2009 (Fiscal Year 2008-2009)

Assets

- Nineteen (19) company fleet vehicles
- Sixteen (16) North American facilities: 4 Owned, 12 Leased, including a head office in Toronto
- Nine (9) leased International facilities

Greenhouse Gases

CO_2, CH_4, N_2O. No other gases have been included in this report.

Consolidation Method

A control approach was selected as the best method of consolidation for corporate GHG emissions. Therefore, any sectors where CSA Group exercised operational control have been quantified in this report. This method had been selected in order to maintain consistency when comparing the inventory to the base year.

Operational Boundaries

Classified using specifications from Section 5.1 of the ISO 14064-1 standard:

Direct Emissions:
- CSA Group Vehicle Fleet
- Testing Emissions
- Some Natural Gas

Energy Indirect:
- Electricity
- Some Natural Gas

Other Indirect
- Employee Travel by Car
- Employee Travel by Air

Other Sources

Other sources were primarily excluded due to the absence of methods by which data could be tracked.

Reservoirs[3]

N/A

Reductions

During the year 2006, CSA had installed a windmill at their head office in Rexdale in order to displace a portion of their

[3] Reservoir: Physical unit or component of the biosphere, geosphere, or hydrosphere with the capability to store or accumulate a GHG either removed from the atmosphere by a sink or captured from a source

	emissions resulting from electricity consumption. For further improvement, two arrays of solar panels, to a total of 10kW were also installed in the Rexdale facility in 2008.
Biomass Combustion	N/A
Base Year	• Rolling base year, such that each inventory is compared to the inventory of the previous fiscal year. • This decision has been made due to the fact that CSA is an expanding organization, resulting in constant changes to organizational boundaries.
Current Base Year	Fiscal Year 2007/2008

2.0 Quantification Methodologies

CSA Group developed a network of various Excel Spreadsheets to automate computation of the total carbon footprint based on entered activity data. A user manual is electronically available.

Though slight differences in calculations existed between the various subsections, the basic principle of calculation was constant:

$$Emissions = Activity\,Data \times Emission\,Factor$$

A considerable level of certainty was feasible while performing the calculations as both, the activity data and emission factors were from reliable sources. Facilities were asked to scan and send all valid documents that could be used to verify the data that was provided. All documents are electronically available. The standard emission factors were collected from reputable organizations, as listed under the References section of this report.

Quantification methods are consistent with CSA Group's 2007/2008 inventory, and no changes have been made.

2.1 Employee Air Travel

2.1.1 Methodology

1. List of all employee air travel during the reporting period was obtained from various sources, as shown in Table 1. For the OnSpeX facility, the air travel data was not readily available, and was estimated in a conservative manner, as shown in Table 2.

Table 1: Sources of Information for Employee Air Travel

Location	Resource
North American	Data obtained from Carlson Wagonlit Travel (CWT) Agency database
Cleveland, Irvine, Mexico	Obtained manually from expense reports. These facilities did not access CWT as a CSA employee, therefore, are not available in the CWT database.
Hong Kong	Swire Travel Agency
India	JV Travels

OnSpeX Shanghai, OnSpeX Shenzhen	Assumption (Table 2)

Table 2: Calculations for OnSpeX Air Travel

Shanghai
The employee with the most travel travels approximately 696 kilometres for each trip. On average, inspectors travel about 10 times each month, and there are 15 inspectors in Shanghai. Therefore: $\frac{696\ km}{Time * inspector} \times \frac{10\ times}{month} \times \frac{12\ months}{year} \times \frac{15\ inspectors}{} = 1{,}252{,}800\ km/year$
Shenzhen
The employee with the most travel, travels about 450 kilometres during each trip. On average, inspectors travel about 10 times each month, and there are 11 inspectors in Shenzhen. Therefore: $\frac{450\ km}{Time * inspector} \times \frac{10\ times}{month} \times \frac{12\ months}{year} \times \frac{11\ inspectors}{} = 594{,}000\ km/year$

2. Flights for which distances were not available, the departure and arrival airports were used to calculate the air travel distance, through an online mapping tool[4].

3. Flights were categorized into three haul-types based on total distance travelled using the classification shown in Table 3.

Table 3: Flight Categorization[5]

Category (Haul)	Distance Travelled (km)
Short	Flights less than 500 km
Medium	Flights between 500 and 1,600 km
Long	Flights greater than 1,600 km

4. Long Haul flights were further categorized into "Economy" and "Business" class based on flight duration.

    a. Seat information was available for many of the flights
    b. For flights with unknown seating: any flights over 5 hours in duration were assumed to be flown in business class. This is because CSA Group policies indicate that all flights under five hours in length must be taken in economy seats. If a direct flight is assumed, then the travel time would be less than five hours[6]. It is therefore assumed that all medium and short haul flights were taken in economy class.
    c. For flights of unknown duration: The average speed for flights (656.56 km/hr, as calculation in the GHG report of 2007/2008)

[4] Great Circle Mapper. http://www.gcmap.com/dist?P=&DU=mi&DM=&SG=&SU=mph

[5] 'For *Air, Rail, Bus and Car Travel, Business Travel, Service Sector, Version 2.0, GHG Protocol Initiative, August 2005*< http://www.ghgprotocol.org/calculation-tools/all-tools>

[6] The Carlson Wagonlit database indicates that the distance from Montreal to Atlanta, Georgia is 1599 km. The Air Canada website was used to determine that the travel time for a non-stop flight is approximately three hours; however for a connecting flight, the travel time may range from four to 6 hours.

was used with the distance travelled to approximate the flight duration, and then categorized accordingly.

5. Total kilometres were calculated separately, for four categories: Short Haul, Medium Haul, Long Haul Economy, and Long Haul Business. Appropriate emission factors were used to find the emissions for each category.

2.1.2 Estimation of Uncertainty

Errors resulting from the assumption taken into account for the OnSpex inspectors are minimal; however, in the case where an error exists, the data obtained is an over-estimation of the true value, thus maintaining a conservative approach. The emission factors were deemed to be fairly accurate, as they were obtained from the 2008 DEFRA Guidelines.

2.2 CSA Group Fleet Vehicles

2.2.1 Methodology

The method used to quantify the emissions resulting from the fleet vehicles consisted of the following steps:

1. Compilation of activity data:

    a. Data provided by Cleveland and Rexdale was based on odometer readings
    b. Data provided by Vancouver was based on quantity of fuel consumed, as extracted from fuel purchase receipts
    c. **Note:** As noted in the 2007/2008 report, Rexdale vehicle data as provided based on the calendar year 2008.

2. Calculation of total CO_2 emissions:

    a. The total distance travelled was used in collaboration with the individual fuel economy for each vehicle, to calculate the quantity of fuel used.
    b. The appropriate emission factors were multiplied by the quantity of each fuel (diesel and gasoline).
    c. Appropriate emission factors were used to calculate the overall CO_2 emissions from the fleet vehicles.

2.2.2 Estimation of Uncertainty

The values provided have a high degree of certainty associated with them, as both the activity data, and the emission factors have been obtained from Canada's 2004 National GHG Inventory Report[7] (The most recent at the time of calculations), which is considered to be reasonably accurate. A second check indicated that the values are also consistent with Canada's 2007 National GHG Inventory Report[8].

[7] www.ec.gc.ca/pdb/ghg/inventory_report/2004_report/2004_report_e.pdf
[8] http://unfccc.int/national_reports/annex_i_ghg_inventories/national_inventories_submissions/items/3929.php

2.3 Electricity and Space Heating

2.3.1 Methodology

For the purpose of this inventory, electricity consumption was considered to be an energy indirect source. Natural gas usage for space heating was considered to be a direct source if CSA was the owner or occupied 100% of the building; space heating was considered an energy indirect source for leased buildings which had multiple tenants.

The quantification method consisted of the following steps:

1. Compilation of activity data:

    a. With the exception of two facilities, data was obtained either from invoices or confirmation letters from facility landlords.
        i. **Joint Venture China:** Verification documents not accessible due to legal reasons.
        ii. **Philadelphia:** Approximated using amount paid and average cost of electricity in Philadelphia.
    b. Many international facilities were located in climates that did not require heating, and therefore did not have any natural gas usage to be quantified.
    c. While some international facilities that did not require heating did require the usage of air conditioning, this has already been quantified. The energy usage of these facilities contributed by air conditioning was reflected in their electricity invoices, and thereby this energy usage has been quantified in the electricity quantification.
    d. For leased facilities where invoices reflected total consumption, it was assumed that the percent of the total building electricity used by leased facilities was equal to the percent of the square footage occupied by CSA.

2. Determination of appropriate emission factors:

    Electricity:

    a. Provincial or state-level emission factors were used for North American facilities. For provinces in Canada, emission factors were obtained from the Canada's 2004 National GHG Inventory[7]. For states in the US, emission factors were obtained from the US Environmental Protection Agency (EPA)[9].
    b. National emission factors were used for international facilities, as obtained from the US Environmental Protection Agency[9].
    c. For Canadian facilities, emission factors had not directly been broken down for each specific gas, and had to be reasonably estimated for each gas type, while not affecting the total emission quantity.

[9] http://www.eia.doe.gov/oiaf/1605/emission_factors.html#emission

2.3.2 Estimation of Uncertainty

The results have been obtained based on the readings summarized on invoices provided by the energy suppliers. These values are taken based on meter readings indicating the energy consumption for natural gas and electricity. The emission factors were also obtained from accurate sources; electricity emission factor sources have been described above, while natural gas emission factors were obtained from the US Environmental Protection Agency[9].

2.4 Employee Travel

2.4.1 Methodology

1. The following data was extracted from each employee expense reports: Name, Date of travel, Distance travelled in original units, Distance travelled in kilometres

   Note: Travel for the facilities in China and Korea has not been included because the most common form of transportation is by bicycle, buses and trains. All three modes of transportation are not included in the scope of this inventory. Facilities in India use rental vehicles for all transportation, which is not included in the scope of the inventory.

2. Since it is not feasible to track the type of car used by each inspector or auditor, it was assumed that all travel was in medium-sized, gasoline vehicles. Emission factors were obtained from the annual DEFRA guidelines.

3. The total distance travelled by all inspectors of CSA was multiplied with the corresponding emission factor to obtain the emissions.

4. The results of calculations performed during the 2006/2007 Inventory indicate that for each gram of gasoline emission, 96.6% is carbon dioxide, 0.1% is methane, and 3.3% is nitrous oxide.

2.4.2 Estimation of Uncertainty

The total emission factors which had been subdivided to account for each individual gas, did not affect the overall calculation, due to the total of the percentages maintaining a total of 100%. Furthermore, the activity data obtained has been determined to be the most accurate method possible using the resources currently available. Future inventories will depend on the new system, Concur, for information, thus eliminating errors resulting from manually entering data.

2.5 Direct Building Emissions

2.5.1 Methodology

Due to the nature of our operations, it is not technically feasible to track fuel consumed during a reporting period, therefore, emissions have been quantified based on the amount of fuel purchased during a reporting period. This method is considered to be accurate because accounting for

purchases ensures that all fuel consumed will be accounted for in either a previous or next inventory.

Note: It was deemed necessary to identify that the Rexdale facility has a 300 kW bi-fuel generator, operational on both, natural gas and diesel. Since the bi-fuel generator has not been used for energy generation as of yet, it is only functional during maintenance checks when required. Since no problems were suspected with the generator during the reporting period, no fuel was purchased or used; therefore, no emissions resulted from the generator.

1. All data was extracted from purchase invoices.

2. Emissions resulting from the use of oxygen, hydrogen, nitrogen, and argon were not accounted for because:
    a. Oxygen is not a greenhouse gas;
    b. Argon is an inert gas
    c. Hydrogen does not act as a greenhouse gas
    d. Nitrogen does not react with oxygen to produce nitrous oxide unless energy is supplied to the reaction. Since this is not the case, nitrogen must be ignored.

3. Combustion reactions were assumed for ethylene and acetylene, thus allowing quantification of the carbon dioxide using stoichiometric calculations. Since methane is directly released into the atmosphere and is a greenhouse gas, no calculation was required, and it was assumed that all of the methane purchased had been eventually released into the atmosphere.

2.5.2 Estimation of Uncertainty

A slight degree of uncertainty may be present due to the assumption that all of the methane used had been released into the atmosphere, and that all of the ethylene and acetylene underwent pure and complete combustion; however, this assumption would provide an overestimation, and will consistently be used. Where required, density for various gases was obtained from MSDS sheets prepared by reputable sources. Emission factors for gases such as propane and gasoline were obtained from Canada's 2004 National Inventory Report[7].

2.6 Carbon Sinks

2.6.1 Methodology

Meter readings for the solar panel and wind mill are taken on a monthly basis, which are then used to determine the consumption for each month. The windmill and solar panel do not act as offset projects, reducing the overall emissions, as their impact would have been reflected in the electricity invoices.

1. Monthly meter readings were obtained for each, the windmill and solar panels (kWh).

2. Reductions were accounted by assuming that if the sinks had not been present, the same amount of kWh usage would have been taken from

the Ontario electricity grid. Therefore, the activity data was multiplied by the electricity emission factor for Ontario to determine the reductions.

2.6.2 Estimation of Uncertainty

A low degree of uncertainty is assumed with the data retrieval and calculations for this section, as both, the activity data and the emission factors were obtained from Canada's 2004 National Inventory[7].

3.0 Data Management System

- All calculations from this point forward will be completed using the network of Excel spreadsheets created for this purpose. All files and verification documents have been saved electronically, on a shared drive.

- The Management Handbook that had been created in 2007/2008 has been updated and made electronic in order to allow for easier updating.

- Two systems developed by the Finance division are used for organization of data: all facility leases and deeds are retained in one system, and all expense reports can now be electronically retrieved from a different system (mandatory as of October 2009).

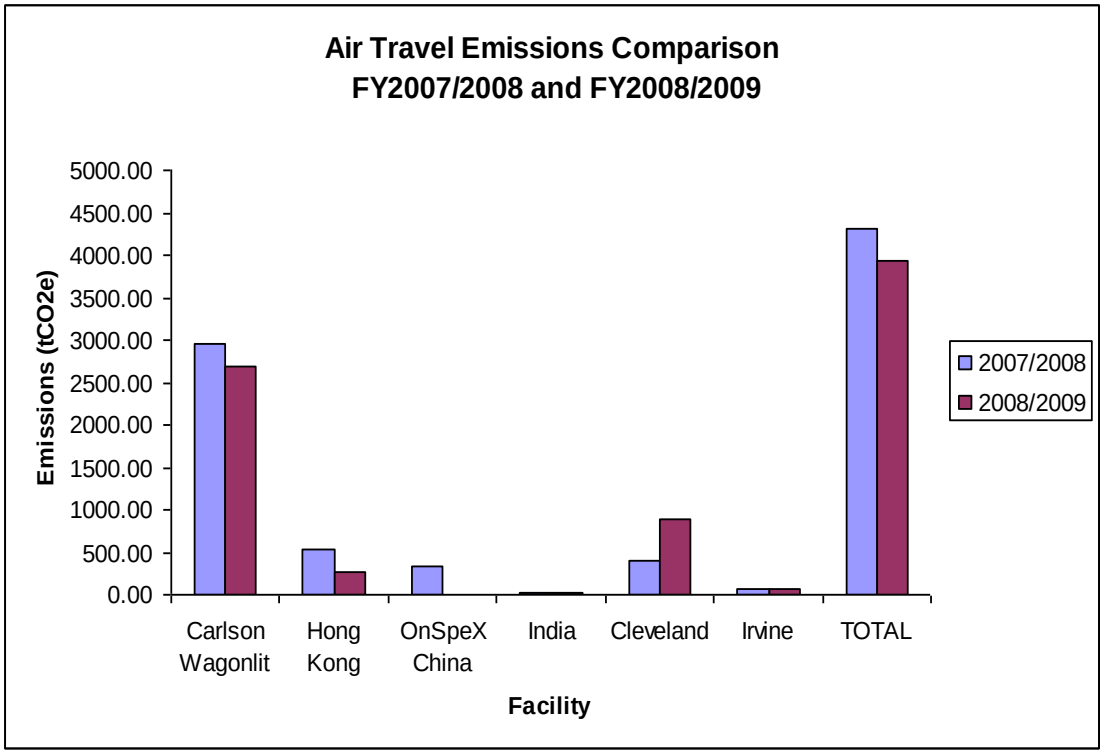
- Joint Venture facilities in China will be storing copies of their electricity invoices starting October 2009.

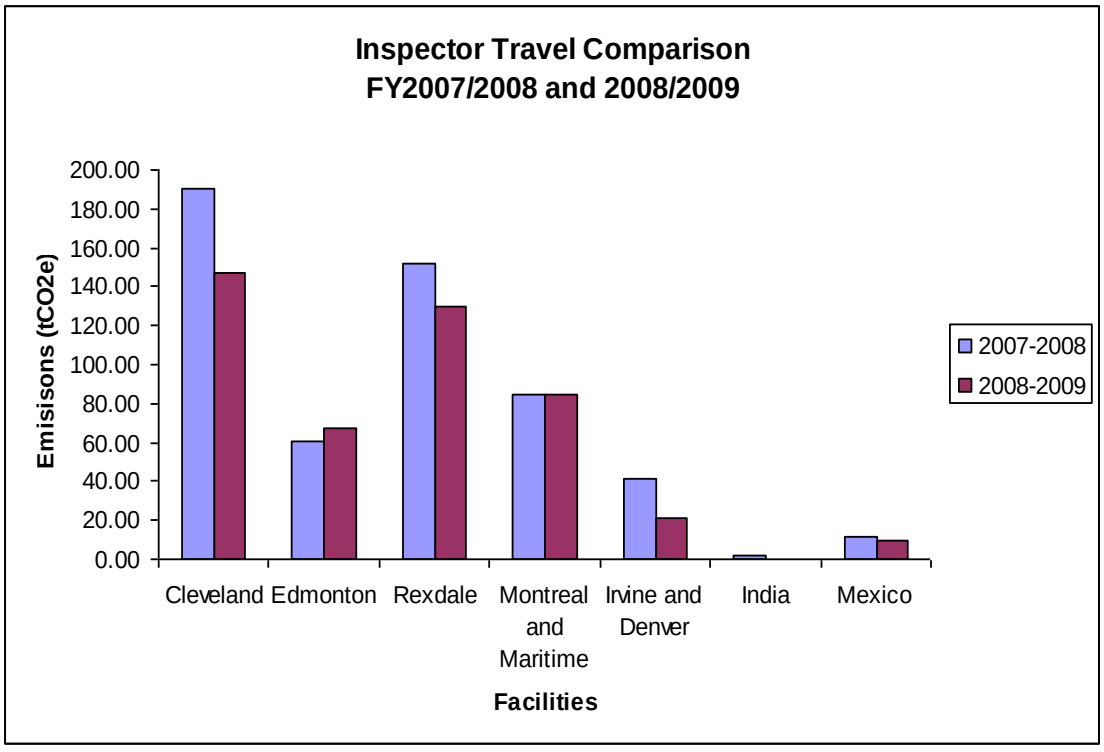
4.0 Comparison to Base Year

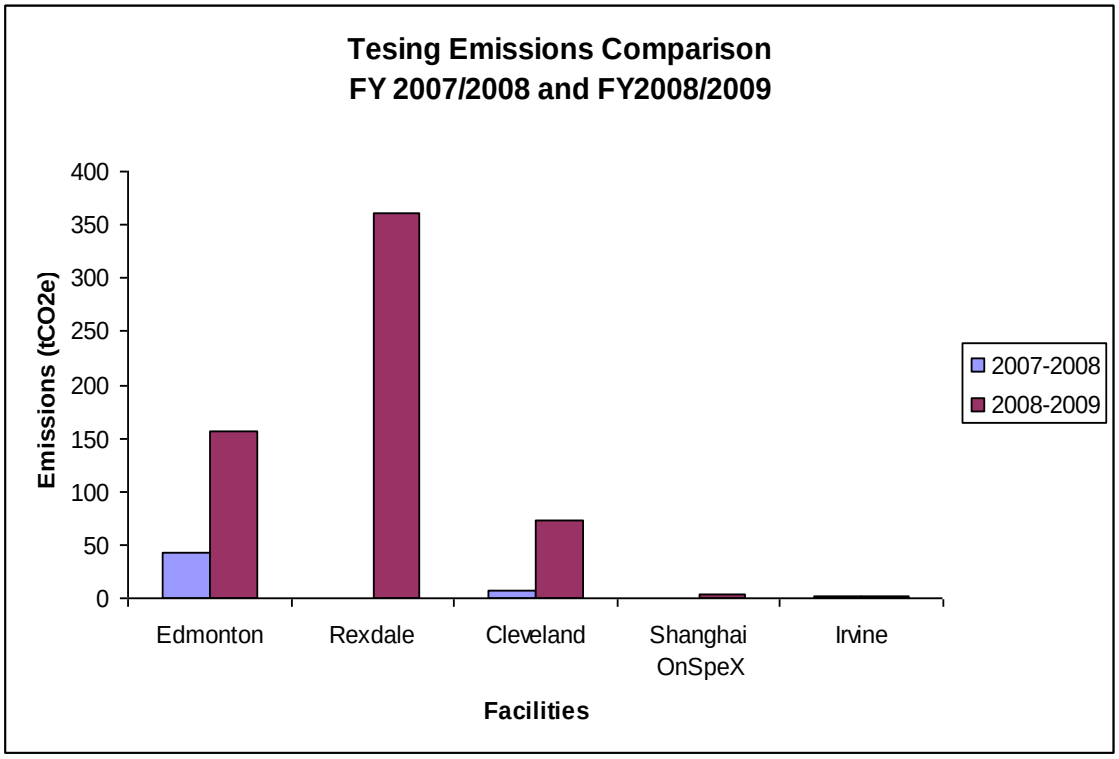
Note: CSA Group facilities in Mexico, Philadelphia, and Hartford were established during the fiscal year 2008/2009, and therefore, no emissions have been recorded for 2007/2008. In order to maintain accurate comparison, the emissions resulting from these facilities have been removed from this section.

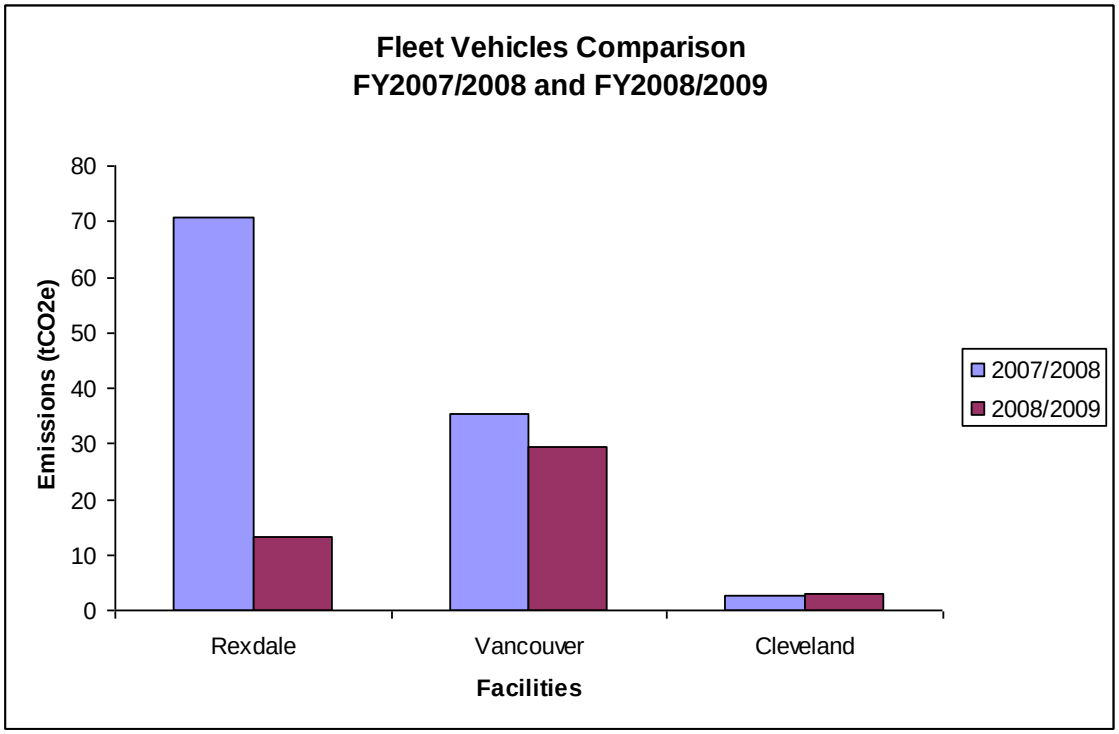
Category	Emissions (tCO2e)		Change (tCO2e)	Reasoning (if applicable)
	2007/08	2008/09		
Electricity	3,647.74	4,347.72	Increased by 699.97	This is primarily contributed by the Cleveland and Rexdale facilities, where electrical testing takes place. Testing is based on the type and quantity of products being tested, inconsistent with each year.
Space Heating	1,824.24	1,794.91	Decreased by 29.34	Relatively constant
Air Travel	4,303.76	4,009.21	Decreased by 294.55	CSA now operates in more locations, reducing the need to travel by air. Also, video and teleconferencing have become relatively common within the workplace, further reducing the need to travel by air.
CSA Fleet Vehicles	108.60	45.60	Decreased by 62.98	Decrease in number of vehicles leased
Inspector Travel	541.79	459.87	Decreased by 81.92	50 tCO_2e decreased from Cleveland, therefore, it is reasonable to assume that the clients that would originally have been serviced by the Cleveland facility were now being served by the new offices in Philadelphia and Hartford, which have been removed from total emissions in this table for accurate comparison, therefore, accounting for this difference.
Testing Emissions	53.53	594.13	Increased by 540.61	The Rexdale facility did not purchase any testing gases during 2007/2008 due to overstock (Rexdale now accounts for 156 tCO2e). Furthermore, each gas is specific to a test being performed, and testing is not consistent with each year.

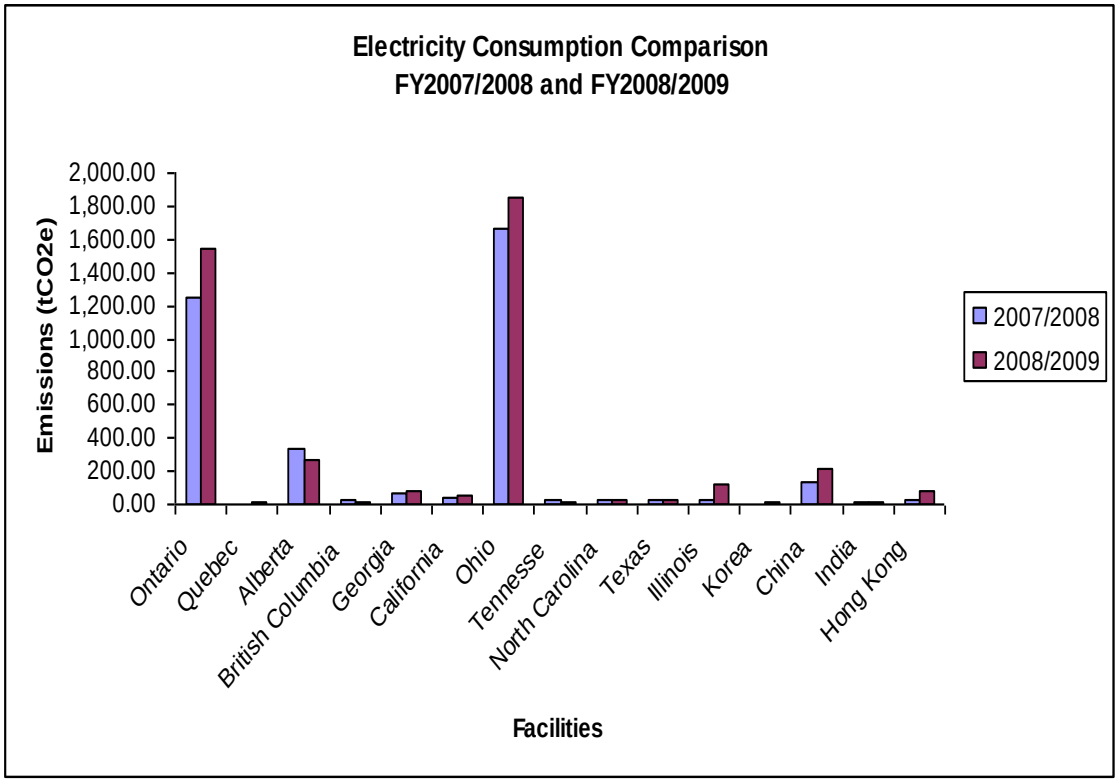
5.0 Visual Comparison

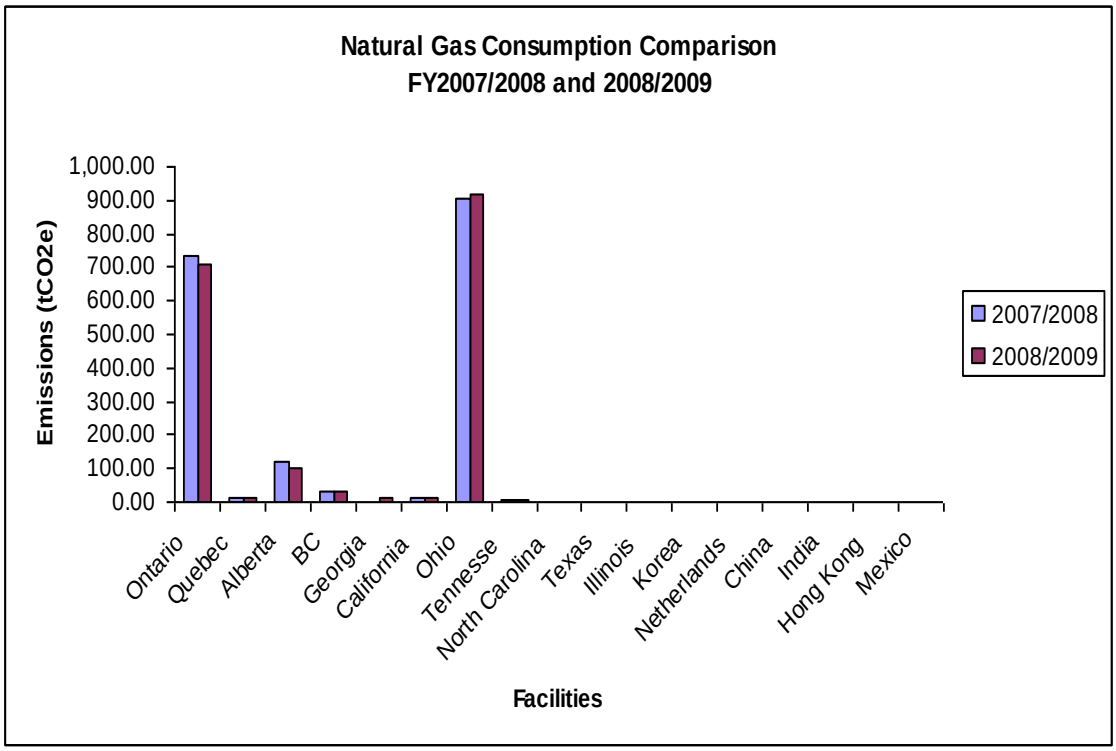




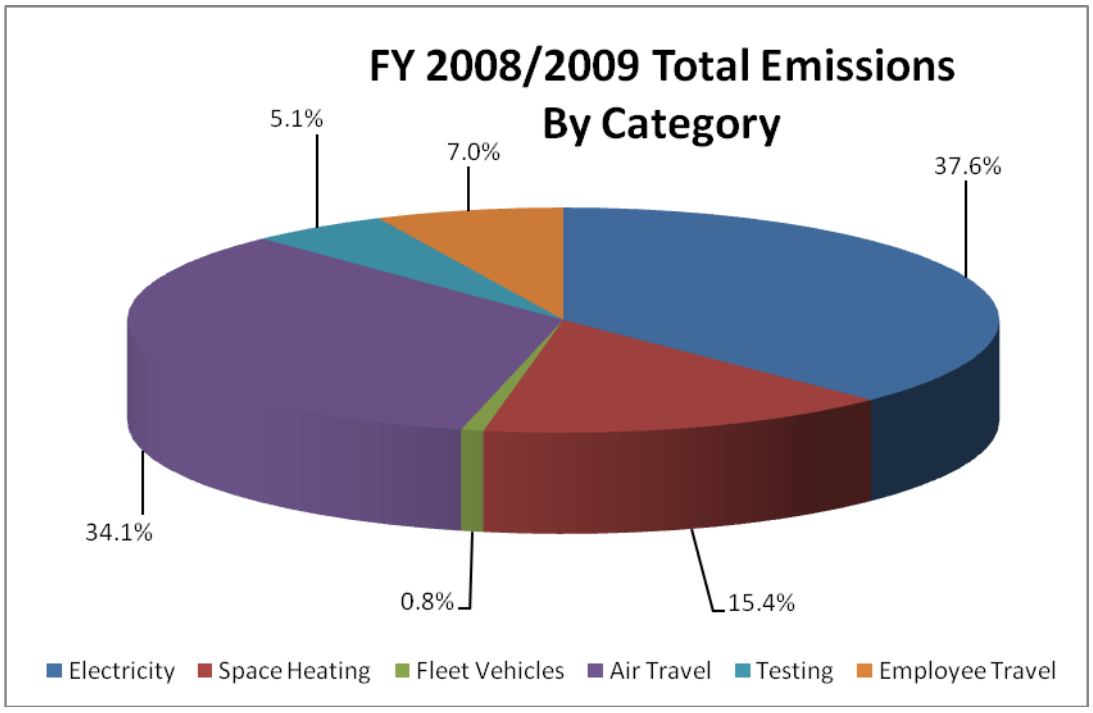

Tesing Emissions Comparison
FY 2007/2008 and FY2008/2009
Emissions (tCO2e)
400
350
300
250
200
150
100
50
0
Edmonton
Rexdale
Cleveland
Shanghai OnSpeX
Irvine
Facilities
2007-2008
2008-2009


Fleet Vehicles Comparison
FY2007/2008 and FY2008/2009
Emissions (tCO2e)
80
70
60
50
40
30
20
10
0
Rexdale
Vancouver
Cleveland
Facilities
2007/2008
2008/2009


Electricity Consumption Comparison
FY2007/2008 and FY2008/2009
Emissions (tCO2e)
2,000.00
1,800.00
1,600.00
1,400.00
1,200.00
1,000.00
800.00
600.00
400.00
200.00
0.00
Ontario
Quebec
Alberta
British Columbia
Georgia
California
Ohio
Tennesse
North Carolina
Texas
Illinois
Korea
China
India
Hong Kong
2007/2008
2008/2009
Facilities


Natural Gas Consumption Comparison
FY2007/2008 and 2008/2009
Emissions (tCO2e)
1,000.00
900.00
800.00
700.00
600.00
500.00
400.00
300.00
200.00
100.00
0.00
Ontario
Quebec
Alberta
BC
Georgia
California
Ohio
Tennesse
North Carolina
Texas
Illinois
Korea
Netherlands
China
India
Hong Kong
Mexico
2007/2008
2008/2009
Facilities

6.0 Inventory Summary



Category Type	CO2 (tCO2e)	CH4 (tCO2e)	N2O (tCO2e)	Total (tCO2e)
Direct Emissions				
Testing Gas	179.98	425.98	3.09	609.04
Natural Gas (Owned/ 100% occupied)	1,675.33	0.69	9.61	1,685.63
Fleet Vehicles	95.41	0.09	2.93	98.43
Total	1,950.72	426.75	15.63	2,393.10
Energy Indirect Emissions				
Electricity	4,418.48	1.82	22.58	4442.88
Natural Gas (Leased/ Less than 100% occupied)	130.53	0.05	0.75	131.33
Total	4,549.01	1.87	23.33	4,574.21
Other Indirect Emissions				
Employee Travel by Air	N/A	N/A	N/A	4,033.83
Employee Travel by Car	798.97	0.83	27.29	827.09
Total	N/A	N/A	N/A	4,863.84
Total Emissions	N/A	N/A	N/A	11,828.23
Carbon Sinks				
Windmill	0.200	8.029E-05	0.001	0.201
Solar Panels	1.608	6.467E-04	0.008	1.617
Total	1.808	0.001	0.009	1.818
Total Sinks	1.808	0.001	0.009	1.818

Emission Factors

National Electricity Emission Factors			
Country	CO_2 (tonne/MWh)	CH_4 (kg/MWh)	N_2O (kg/MWh)
Canada	0.223	0.00390	0.00351
Korea	0.493	0.00758	0.00672
China (including Hong Kong)	0.839	0.01458	0.01841
India	0.999	0.01664	0.01959
Provincial Electricity Emission Factors - Canada			
Country		CO_2 (kg/kWh)	
Quebec		0.006	
Ontario		0.180	
British Columbia		0.020	
Alberta		0.930	
Regional Electricity Emission Factors - US			
Region	CO_2 (kg/kWh)	CH_4 (kg/kWh)	N_2O (kg/kWh)
Georgia	0.619	5.85E-06	1.03E-05
California	0.275	3.04E-06	1.68E-06
Ohio	0.817	5.90E-06	9.62E-06
Tennessee	0.588	4.76E-06	9.62E-06
North Carolina	0.563	4.76E-06	9.21E-06
Texas	0.664	3.36E-06	6.62E-06
Illinois	0.528	3.72E-06	8.16E-06
Fuel Emission Factors			
Fuel Type	CO_2 (g/L)	CH_4 (g/L)	N_2O (g/L)
Propane	1500	0.024	0.108
Butane	1730	0.024	0.108
Gasoline	2289	2.700	0.050
Vehicle Emission Factors			
Gasoline			
Engine Volume	Engine Size	gCO_2 per km	
<1.4L	Small	180.90	
1.4-2.0 L	Medium	213.90	
>2.0L	Large	295.80	
Diesel			
<1.7L	Small	151.30	
1.7-2.0 L	Medium	188.10	
>2.0L	Large	258.00	
Air Travel Emission Factors			
Flight Type	gCO_2 per pkm		
Short Haul			
Weighted Average	175.3		
Medium Haul			
Economy	93.7		
Business	140.5		
Weighted Average	98.3		
Long Haul			
Economy	80.7		
Economy+	129.1		
Business	234.0		
First class	322.8		
Weighted average	110.6		
Fuel Type		$kgCO_2/L$	
Gasoline			

CO_2	2.36000	CH_4	0.00012	N_2O	0.00026
Diesel					
CO_2	2.73000	CH_4	0.00007	N_2O	0.00020

Conversion Factors

Conversion Factors	
Density of Water	1.00 g/mL
1 gallon	3785.4 mL
1 gallon	0.00379 m^3
1 lb	453.5924 g
1 mL	1 cm^3
1 m^3	1000000 cm^3
Acetylene Combustion Reaction	$C_2H_2 + 2.5\ O_2 \rightarrow 2CO_2 + H_2O$
Ethylene Combustion Reaction	$C_2H_4 + 3\ O_2 \rightarrow 2CO_2 + 2H_2O$
Propane Specific Gravity	0.51
Butane Specific Gravity	0.5669
1 tonne	2204.61 lb
1 m^3	35.31 ft^3
1 ft^3 of natural gas	1028 btu

Automobile Fuel Economy				
Make	Model	Year	Fuel Economy (L/100 km)	
			City	Highway
Chevrolet	Cheyenne	1997	18.10	12.40
Mercedes Benz	C Class	2004	15.70	9.80
Mercedes Benz	C350	2007	13.80	8.70
Hummer	H3 SUV	2006	16.80	13.10
Audi	TT	2004	13.10	8.70
Audi	TT	2007	13.10	8.70
Acura	TL	2007	14.70	9.00
Infiniti	G35 Aero M6	2005	16.80	10.70
Ford	Explorer	2006	19.60	13.10
Volvo	S60	2005	14.70	9.80
Lexus	R330	2005	15.70	10.70
Lexus	ES330	2005	13.10	8.70
Chevrolet	Silverado 2500	2001	18.10	13.10
Dodge	Caravan	2003	13.80	9.80
Volkswagen	Jetta	2006	8.10	6.20

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