



Livingston Place Greenhouse Gas Inventory Report

South Tower: 222 3rd Ave SW
West Tower: 250 2nd Street SW
Calgary, AB, Canada

This report details the GHG emissions
from Livingston Place

Created by:
Created by Stantec Consulting Ltd
200 325 25th Street SE
Calgary AB T2A 7H8
Phone: (403) 716-8000
e-mail: karen.thompson@stantec.com

On behalf of:
Art Skow
Bentall Kennedy LP
Suite 301, 240 - 4th Avenue S.W.
Calgary, AB,
Phone: (403) 303-2423
e-mail: askow@bentallkenedy.com

November 24, 2011

Table of Contents

1.0 SUMMARY	1.1
2.0 BUILDING PROFILE	2.3
2.1 HEATING	2.3
2.2 MECHANICAL CONTROL SYSTEM	2.3

3.0 INVENTORY DESIGN AND DEVELOPMENT	3.5
3.1 ORGANIZATIONAL BOUNDARY	3.5
3.2 OPERATIONAL BOUNDARY	3.5
3.3 EMISSION REPORTING PERIOD	3.6

4.0 QUANTIFICATION	4.1
4.1 NATURAL GAS.....	4.1
4.2 DIESEL	4.1
4.3 REFRIGERATION EQUIPMENT	4.2
4.4 ELECTRICITY.....	4.2

5.0 GHG INVENTORY COMPONENTS	5.3
5.1 EMISSIONS.....	5.3
5.2 ACTIVITIES TO REDUCE GHG EMISSIONS	5.4
5.3 EMISSIONS UNCERTAINTY	5.5

6.0 GHG INVENTORY QUALITY MANAGEMENT	6.7
6.1 GHG INVENTORY MANAGEMENT	6.7
6.2 DOCUMENTATION RETENTION AND RECORD KEEPING	6.8

7.0 ORGANIZATION'S ROLE IN VERIFICATION.....	7.1
---	------------

LIVINGSTON PLACE GREENHOUSE GAS INVENTORY REPORT

Table of Contents

APPENDIX A – GREENHOUSE GAS INVENTORY.....	7.1
APPENDIX B – ACTIVITY DATA & EMISSION FACTORS	7.1
APPENDIX C – STANDARD REPORTING DECLARATION	7.3

November 30, 2011

1.0 Summary

This report details the greenhouse gas emission inventory of Livingston Place located in downtown Calgary, Alberta. The inventory includes direct emissions released at the building, and indirect emissions from electricity consumed on site, but produced at another location in the Province.

Livingston Place is a premier “AAA” two tower multi-tenant office complex. The south tower is located at 222 3rd Ave SW and the west tower is located at 250 2nd Street SW. Each tower has 22 stories and three levels of parking. Provident Energy is the main tenant in the west tower and Pengrowth Corporation the main tenant in the south tower. The south tower was opened in March 2007 and the west tower was opened in January 2008.

Livingston Place is owned by British Columbia Investment Management Corporation (bcIMC) Livingston Place and is managed by Bentall Kennedy LP (Bentall). The building has registered for the Canada Green Building Council’s Leadership in Energy and Environmental Design¹(LEED) for Existing Buildings: Operations and Maintenance (EBOM) program.

Bentall will use the data from this report to disclose the building’s emissions in the CSA CleanStartTM Registry and also as part of the LEED EBOM Credit Emission Reduction Reporting (EA6) documentation package.

Stantec is the LEED Consultant engaged to complete the greenhouse gas (GHG) inventory and reporting in accordance with CAN/CSA-ISO Standard 14064-1:06². Energy Profiles Limited (EPL) has been engaged to provide third party verification of this report.

This report has been written in accordance with CAN/CSA-ISO Standard 14064-1:06 *Greenhouse Gases - Part 1: Specification with Guidance at the Organization Level for Quantification and Reporting of Greenhouse Gas Emissions and Removals*. In addition, the World Resource Institute (WRI)/World Business Council for Sustainable Development (WBCSD) Standard: Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard and CAN/CSA-ISO Standard 14064-3:06³ *Greenhouse Gases - Part 3: Specification with Guidance for the Validation of Greenhouse Gas Assertions* have been used as additional resources.

¹ LEED Canada for Existing Buildings: Operations and Maintenance 2009 Reference Guide. 2009, Canada Green Building Council.

² CAN/CSA ISO 14064-1 Part 1: Specification with guidance at the organization level for quantification and reporting of greenhouse gas emissions and removals. March 2006, International Standards Organization.

³ CAN/CSA ISO 14064-1 Part 3: Specification with guidance for the validation and verification of greenhouse gas assertions. March 2006, International Standards Organization.

November 30, 2011

Stantec calculated the total tonnes of carbon dioxide equivalent (t CO₂e) emissions for Livingston Place between August 1st, 2010, and July 31st, 2011 was 15,801 t CO₂e. Approximately 2,366 t CO₂e are associated with natural gas combustion and diesel combustion, 320 t CO₂e are associated with emissions from refrigerants, and 13,115 t CO₂e are associated with indirect emissions from Alberta's predominately coal-based electricity generation (Scope 2). Other sources have been excluded from quantification.

Direct emissions account of 17% of annual emissions at Livingston Place. The remaining 83% are indirect emissions from electricity.

2.0 Building Profile

Livingston Place located at 2nd Street SW and 3rd Ave SW. Both towers at Livingston Place are connected to the +15 walkway system and downtown via BP Centre. Each tower at Livingston Place is 22 stories (including the mezzanine) downtown office tower comprising of a mechanical penthouse, +15 entrances, and three (3) levels of parking. The south tower was opened in March 2007 and the west tower was opened in January 2008. Space usage is predominately office, with retail on the lower levels.

The south tower is 39,467 m² and the West tower is 39,497 m². The tenants of Livingston Place all follow a standard office-hours occupancy pattern (i.e. approximately 6am to 6pm Monday through Friday, excluding holidays).

2.1 HEATING

The building is heated and cooled via a Variable Air Volume (VAV), ducted ventilation system. The VAV system provides a varying amount of air to a space according to its heating/cooling requirements. This is supplemented by an overhead radiant heating system around the perimeter of the building. In addition there are numerous fan coil units in the parkade and bridge that connects to the +15 walkway system and unit heaters in the mechanical rooms.

The VAV system is fed by the AHUs located on each floor. There are approximately 25 VAV terminal boxes per floor, with each VAV having electric thermostatic control.

All of the AHUs are fitted with Variable Frequency Drives (VFDs) on the supply fans. VFDs improve the efficiency of an AHU by matching the fan speed to the ventilation requirements.

Hot water for the perimeter heating, AHUs and unit-heaters is provided by three gas-fired, Bryan Boilers. They are all forced draft boilers with an efficiency of approximately 84%. The boilers were installed at the time of construction and are only 2 years old. It was determined from discussions with the building operator that during most of the heating season, only one boiler is operated. If the outside air temperature goes below -35°C (-31°F), then the second boiler begins operating. An energy audit completed by Stantec confirmed that the third boiler had never been used.

Domestic hot water is mainly provided by small nine gallon electric domestic hot water (DHW) heaters. There are four additional electric DHW heaters that serve the laundry room and two natural gas DHW heaters that serve Livingston Place's fitness centre.

2.2 MECHANICAL CONTROL SYSTEM

The HVAC system at Livingston Place is controlled by a Metasys computerized Building Energy Management System (BEMS). It controls base building systems including space heating, space

cooling, ventilation, heat reclaim, alarm reporting, and scheduling. It also provides trending and totalization reports. Systems that are not currently controlled by the building automation system (BAS) are hot water heating and lighting. Lighting is controlled by a separate controlled relay system with occupancy and daylight programming components. Bentall uses a general blanket set point of 22°C which is considered reasonable.

Each VAV box is controlled by an individual thermostat, located in the zone which it serves. These are limited-range thermostats that can be adjusted by the occupants to +/- 3°C of the building heating/cooling set point only, which prevents overheating/cooling – and therefore excessive energy consumption – for individual zones. Manual, non-programmable thermostats control the unit-heaters and fan coil units.

3.0 Inventory Design and Development

3.1 ORGANIZATIONAL BOUNDARY

ISO 14064-1:06 states that an organization shall consolidate its' facility-level GHG emissions or removals from one or more GHG sources or sinks by using one of the following approaches:

- a. control the organization accounts for all quantified GHG emission and/or removals from facilities which it has financial or operational control; or
- b. equity share: the organization accounts for all quantified GHG emissions and/or removals from respective facilities.

In order to meet the requirement of EAc6, LEED EBOM requires that the facility track and calculate GHG emissions from building energy consumption. In order to calculate GHG emissions, Livingston Place has been selected as the physical boundary rather than using the organizational boundary approaches identified above. This is consistent with ISO 14064-1:06 as section 4.1 states that the organization may use a different consolidation methodology where specific arrangements are defined by the GHG program or legal contract.

Direct and indirect emissions have been calculated based on the facility boundary. Emissions associated with commuting behavior of building occupants were excluded because the vast majority of building occupants are employees of companies other than Bentall, and deemed to not be under the operational control of Bentall.

3.2 OPERATIONAL BOUNDARY

Operational boundaries are set to prevent the double counting of emissions. Operations boundaries can be separated into direct GHG emissions (Scope 1), energy indirect GHG emissions (Scope 2) and other indirect GHG emissions (Scope 3). This report includes the inventory of Livingston Place's direct GHG emissions and indirect GHG emissions.

Emissions from natural gas and diesel combustion, electricity consumption, and leakage of refrigerant for the entire building were quantified.

Direct Energy GHG Emissions – Scope 1

Direct emissions within the organizational boundary are derived from the combustion of natural gas to provide heat and domestic hot water used in the building.

Emergency generators are operated once a month under load with the transfer switches. Using backup generators Bentall tests the fire alarm system, elevators, pumps, boilers, fire pumps and

November 30, 2011

other equipment each month as per code for each tower. It is estimated that the east and west tower use 3720 L of diesel annually.

There are four (4) chillers located in Livingston Place using refrigerant R-134a. There are twelve (12) air conditioning units using R-22 refrigerant. Emissions from refrigerant leakage have been calculated for Livingston Place.

There is no electricity produced on-site at Livingston Place. Natural gas is invoiced by the utility retailer ENMAX Energy Corp. (ENMAX) and is distributed by ATCO gas (ATCO). The consumption of natural gas was taken from the ENMAX invoices.

Indirect Energy GHG Emissions – Scope 2

Indirect emissions are released by facilities in Alberta. Alberta's electricity production is largely derived from coal-fired thermal power plants. The electricity in the building is metered by two main utility owned meters, and is purchased from ENMAX. Submetering has not been applied building-wide sufficiently to determine end use consumption by systems.

Other Indirect Emission Sources – Scope 3

Other indirect emissions were not included in the inventory.

GHG Removals and Biomass Combustion

There are no GHG removals or biomass combustion at the building.

3.3 EMISSION REPORTING PERIOD

Emissions were calculated for the period beginning August 1st, 2010 and ending July 31st 2011, meeting the requirement of a twelve month minimum performance monitoring period of LEED EBOM.

While emissions have been calculated for the building on a regular calendar year in the past, to comply with LEED EBOM's requirement that all credits that have performance monitoring periods concluding within one week of each other, the calculation has been based on energy consumption data from the period mentioned above.

As this year's data will be the first supplied the CSA Cleanstart™ GHG registry, it shall be considered the 'base year' henceforth, and future emission inventories should use this base year to track future results.

November 30, 2011

4.0 Quantification

As per CAN/CSA-ISO Standard 14064-1:06 Section 4.3.6, the GHG inventory calculation requires two general types of data: activity data and emission factors.

Activity data was collected from site utility bills. Emission factors were obtained from the Intergovernmental Panel on Climate Change (IPCC) Fourth Assessment Report: Climate Change 2007, United States Environmental Protection Agency (EPA) guidance on Direct Hydrofluorocarbon (HFC) and Perfluorinated compound (PFC) Emissions from the Use of Refrigeration and Air Conditioning Equipment (2008), Canada's National Inventory Report (1990-2009), NPRI On-line data, and The Climate Registry (TCR).

In order to calculate emissions for the GHG inventory, the following procedure was applied:

$\text{Activity Data} \times \text{Emission Factor} = \text{Emissions}$

4.1 NATURAL GAS

Activity Data

Activity data is based on ENMAX utility bills that were reported in GJ, and converted to m³ for the purpose of entering into the Stantec EAc6 calculation tool by multiplying the GJ value by 26.1.

Emission Factor

The emission factors were obtained from Canada's National Inventory Report (1990-2009), Annex 8 for Alberta. The factors are represented as metric tonnes of emissions per m³ and are located in Appendix B.

4.2 DIESEL

Activity Data

Diesel consumed by Livingston Place's backup generators has been estimated by Bentall's Chief Engineer. In order to run each towers generator for an hour under load conditions an average of 155 Litres per hour are consumed. With the East and West tower generators running once a month for an hour over the course of August 1, 2010 to July 31, 2011 it is estimated that a total of 3720 Litres is consumed per year.

Emission Factors

The emission factors used were obtained from Canada's National Inventory Report (1990-2009), Annex 8 for Alberta. The factors are represented as metric tonnes of emissions per m³ and are located in Appendix B.

4.3 REFRIGERATION EQUIPMENT

Activity Data

Data for refrigeration and air conditioning equipment was collected directly from Bentall operators as part of LEED EBOM's EAp3. In order to estimate emissions, the refrigerant charge of each piece of equipment was collected.

Emission Factors

Global warming potentials were obtained IPCC's Fourth Assessment Report (2007). Operating emissions (% of capacity/year), were obtained from Table 2, default emission factors for refrigeration/air conditioning equipment obtained from the United States EPA guidance on Direct HFC and PFC Emissions from the Use of Refrigeration and Air Conditioning Equipment (2008).

4.4 ELECTRICITY

Activity Data

Activity data is based on ENMAX utility bills that were reported in kWh. There are two electricity meters in the building, one for each tower, and the sum of both towers represents the total monthly consumption for the building.

Emission Factors

The emission factors used were obtained from Canada's National Inventory Report (1990-2009), Annex 13 for Alberta. The factors are represented as metric tonnes of emission per kWh and are located in Appendix B.

5.0 GHG Inventory Components

5.1 EMISSIONS

The total emissions from direct and indirect GHG emissions sources during the reporting year are 15,801.19 t CO₂e. Livingston Place’s building electricity consumption accounts of 83% of annual emissions, followed by natural gas consumption at 15%, refrigerant at 2%, and diesel emission which are less than 1%.

Table 5-1 Emission Sources

Scope	Source	CO ₂ (t)	CH ₄ (t CO ₂ e)	N ₂ O (t CO ₂ e)	HFCs (t CO ₂ e)	HCFCs (t CO ₂ e)	GHG (t CO ₂ e)
Direct	Natural Gas	2,341.44	0.05	0.04	N/A	N/A	2,355.63
Direct	Refrigerants	N/A	N/A		4.76	315.24	320.00
Direct	Diesel	9.91	0.00	0.00	N/A	N/A	10.38
Indirect	Electricity	13,014.18	0.44	0.30	N/A	N/A	13,115.19
Total		15,365.52	0.49	0.34	4.76	315.24	15,801.19

Figure 1 details monthly GHG emissions (t CO₂e) for electricity and natural gas. During the summer months emissions from natural gas consumption are minimal. Figure 2 summarizes the percent of annual CO₂e emissions by source. Figure 3 summarizes the percent of annual CO₂e emissions by Scope. Indirect emissions account for 83% of the buildings total annual emissions, where direct emissions make up the remaining 17%.

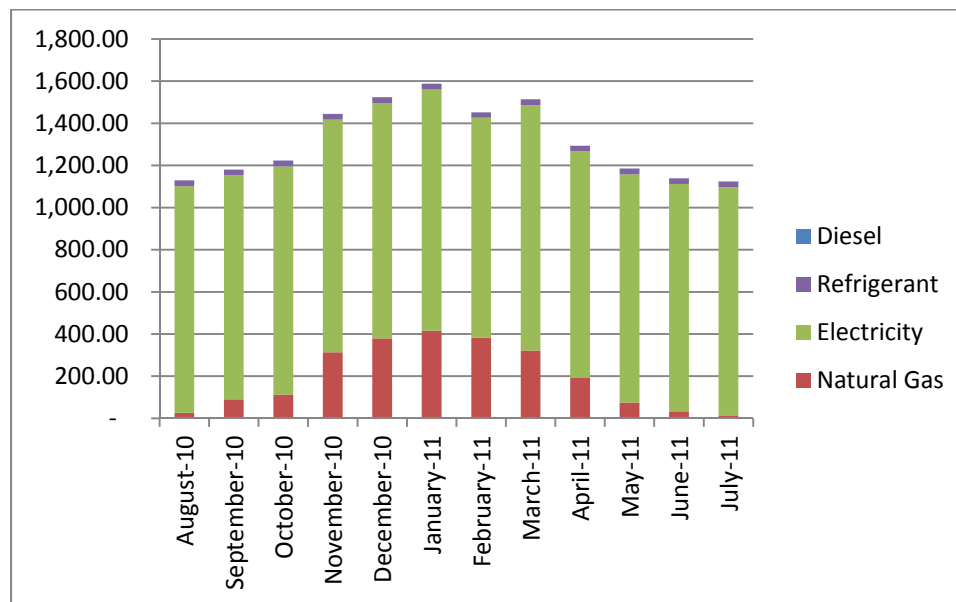


Figure 1 Monthly GHG Emissions by Source (t CO₂e)

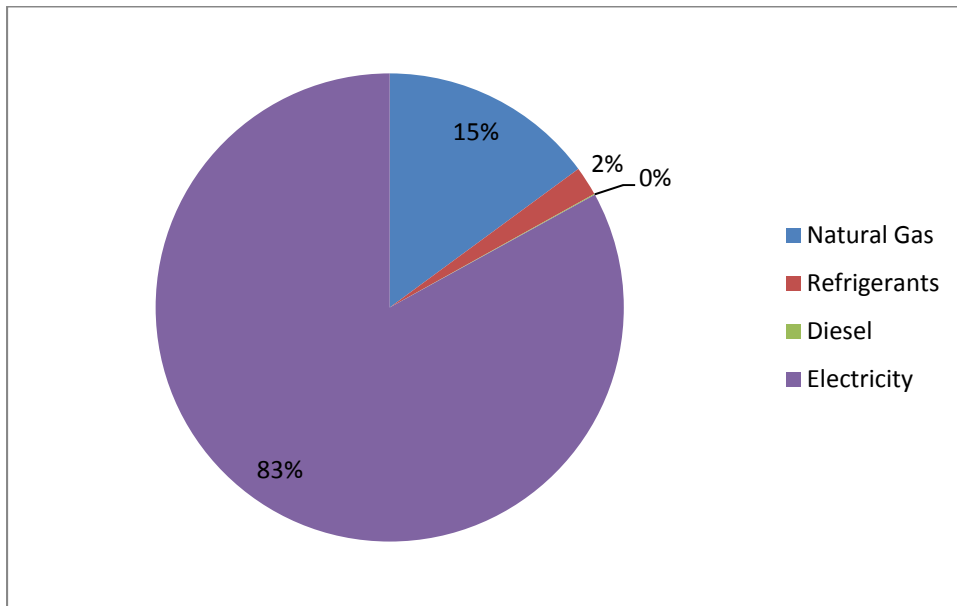


Figure 2 Annual Emissions by Source (% CO₂e)

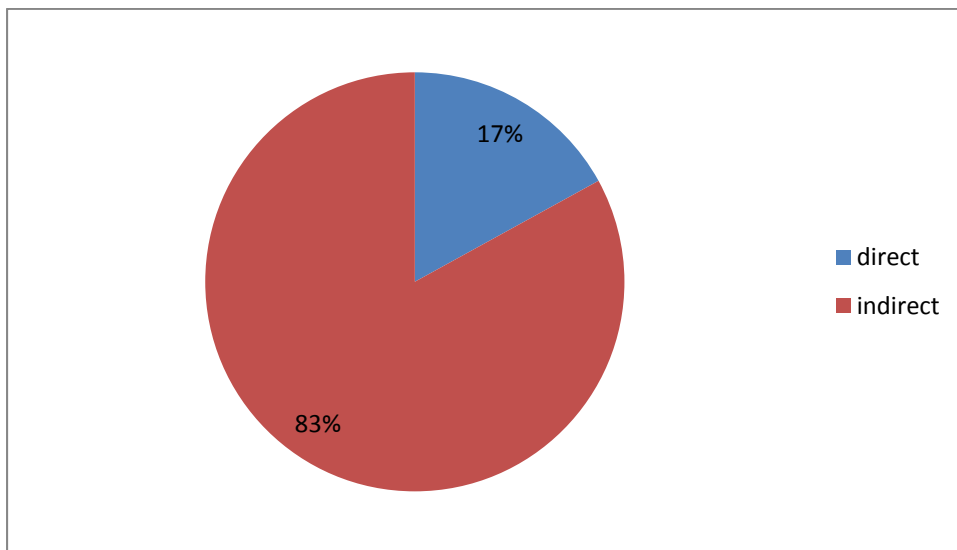


Figure 3 Annual Emissions by Scope (% CO₂e)

5.2 ACTIVITIES TO REDUCE GHG EMISSIONS

Bentall's commitment to Responsible Property Investing (RPI) directly affects how they manage their corporate activities and positively influences their delivery of asset management, leasing, property management and development services. Bentall actively engages with their employees, clients, investors, tenants and communities on environmental matters, and are

November 30, 2011

diligent in working to reduce use of energy and water, as well as waste and greenhouse gas emissions.

As part of RPI activity GHG reductions strategies for Livingston Place have focused on energy reduction. There have been a series of energy conservation measures (ECMs) completed within the past two years, and the facility has had its major systems re-commissioned as a part of its LEED for Existing Building program. As these measures were completed during the utility data capture period that this report evaluates, it is difficult to assign GHG reductions to any of these activities specifically; these measures are expected to reduce the energy intensity of the building, thus the GHG intensity should demonstrate reductions in future GHG reporting.

The following is a list of measures that were published as a part of an ASHRAE Level 1 energy audit of the building completed in May, 2011:

- Reduce setpoint temperature in parkade and mechanical rooms; (Completed)
- Replace/install seals on exterior revolving doors;
- Complete the retrofit of tenant fixture candelabra lighting (50% complete);
- Undertaking a tenant water and energy efficiency awareness program; (In Progress)
- Retrofitting low- or no-flow water technology. (Completed)

In addition to the ECM measures listed above, Bentall is planning to purchase renewable energy certificates (REC's) from ENMAX Energy. REC's will be purchased to cover at a minimum 37.5% of their annual electricity consumption.

5.3 EMISSIONS UNCERTAINTY

Metered data for on-site natural gas combustion and electricity consumption provides a low uncertainty ranking.

Electricity and natural gas measurement apparatus that are required for the measurement of electricity or gas or examination of meters shall be celebrated in accordance with the Electricity and Gas Inspection Regulation⁴

ENMAX Power is accredited by Measurement Canada as a Meter Service Organization⁵ to the S-A-01 specification (ISO 9000 compliant) meter shop. ENMAX Power's meter shop adheres to Quality Assurance Standards in performing seal date extension testing, re-verification of meters, handling repairs and delivery of service.

⁴ Electricity and Gas Inspection Regulation (SOR/86-131) is located at the following link: <http://laws-lois.justice.gc.ca/PDF/SOR-86-131.pdf> (accessed October 21, 2011).

⁵ Electricity accredited service providers are located at the following link: <http://www.ic.gc.ca/eic/site/mc-mc.nsf/eng/lm00525.html>.

LIVINGSTON PLACE GREENHOUSE GAS INVENTORY REPORT

GHG Inventory Components

November 30, 2011

ATCO Gas is also accredited by Measurement Canada as a Meter Service Organization⁶ and is listed as an accredited service provider for the calibration of natural gas meters.

Table 5-2 Uncertainty Ranking

Emission Category	Uncertainty Ranking
Natural gas	Low - Natural gas meters are calibrated in accordance with Measurement Canada requirements. Emission factors are not dependent on location and are consistent with Canadian GHG reporting regulations.
Electricity	Low - Electricity meters are calibrated in accordance with Measurement Canada requirements. Emission factors are provided annually and are based on an annual grid average.
Refrigerant	Poor – Refrigerant leakage is assumed to be 15% of the total refrigerant charge based on the EPA guidance for calculating direct HFC and PFC emissions from the use of refrigeration and air conditioning equipment. This is considered more conservative than the LEED EAc5 guideline.
Diesel	Fair - Diesel consumption for the project was estimated by Bentall's Chief Engineer. Emission factors are not dependent on location and are consistent with Canadian GHG reporting regulations.

⁶ Natural gas accredited service provider are located at the following link: <http://www.ic.gc.ca/eic/site/mc-mc.nsf/eng/lm00525.html>.

November 30, 2011

6.0 GHG Inventory Quality Management

6.1 GHG INVENTORY MANAGEMENT

To develop and maintain an ongoing credible GHG inventory, roles and responsibilities were assigned to ensure consistency, accuracy, completeness, transparency and conformance with CAN/CSA-ISO Standard 14064-1:06.

Table 6-1 Bentall Roles and Responsibilities

Name	Role	Company
Art Skow	Manager	Bentall Kennedy LP
Jonathon Strom	Chief Engineer Livingston Place	Bentall Kennedy LP

Responsibilities:

- Provide required energy data (utility bills).
- Approve and sign CSA CleanStart Registry application form.

Bentall Kennedy is the Building Owner's representative.

Table 6-2 Stantec Roles and Responsibilities

Name	Role	Company
Natasha Samson	LEED Project Manager	Stantec Consulting Ltd.
Karen Thompson	GHG QA/QC Reviewer	Stantec Consulting Ltd.
Cathy Crawford	Peer Reviewer	Stantec Consulting Ltd.

Responsibilities:

- To request and analyze received activity data for acceptable accuracy, to collect appropriate emission factors and perform GHG calculations; and,
- To produce a report consistent with both the CSA CleanStart™ Registry requirements and CAN/CSA-ISO Standard 14064-1:06.

Stantec provided LEED consulting services for Livingston Place's LEED EBOM project.

Table 6-3 Verifier Roles and Responsibilities

Name	Role	Company
Conan O'Connor	Independent Verifier	Energy Profiles Limited

Responsibilities:

- Verify that the GHG report provided by Stantec Consulting meets CSA CleanStart™ Registry requirements and CAN/CSA-ISO Standard 14064-1:06.
- Issue a verification statement.

6.2 DOCUMENTATION RETENTION AND RECORD KEEPING

The following activities, conducted by Bentall Kennedy LP, will maintain a credible GHG inventory for current and future reporting:

- Bentall compiles and maintains a permanent record of Livingston Place's utility bills that correlate to online bill tracking that their utility provides. This has a dual purpose in that it tracks both energy and operating costs; and
- Bentall's inventory contains emission factors, August 1st, 2010 to July 31st, 2011 activity data, GHG emissions and other important information. Bentall should keep this GHG inventory report for their records, and reference the reported emissions as a baseline for future disclosure with the CSA CleanStartTM Registry.

November 30, 2011

7.0 Organization's Role in Verification

Energy Profiles Limited was engaged to provide independent third party verification as per CAN/CSA-ISO Standard 14064-1:06. The verification is to be completed at a reasonable level of assurance. Bentall was responsible for engaging EPL as a verifier, requesting verification to a reasonable level of assurance, and agreeing to verification roles, scope, and materiality criteria

Stantec prepared for the verification by:

- Using an internal QA/QC process of the GHG inventory and report

LIVINGSTON PLACE GREENHOUSE GAS INVENTORY REPORT

APPENDIX A – Greenhouse Gas Inventory

November 30, 2011

APPENDIX A – Greenhouse Gas Inventory

Livingston Place - Natural Gas Consumption

Reading (From Date)	Reading (To Date)	Consumption (GJ)	Consumption (m3)	GHG (t CO ₂)	GHG (t CH ₄)	GHG (t N ₂ O)	GHG (t CO ₂ e)
2011-07-01	2011-07-31	228.51	5,964.01	11.44	0.00	0.00	11.51
2011-06-01	2011-06-30	654.72	17,088.15	32.78	0.00	0.00	32.97
2011-05-01	2011-05-31	1,489.03	38,863.72	74.54	0.00	0.00	74.99
2011-04-01	2011-04-30	3,859.27	100,726.84	193.19	0.00	0.00	194.37
2011-03-01	2011-03-31	6,388.72	166,745.61	319.82	0.01	0.01	321.76
2011-02-01	2011-02-28	7,583.87	197,939.02	379.65	0.01	0.01	381.95
2011-01-01	2011-01-31	8,239.02	215,038.41	412.44	0.01	0.01	414.94
2010-12-01	2010-12-31	7,540.11	196,796.86	377.46	0.01	0.01	379.74
2010-11-01	2010-11-30	6,218.18	162,294.46	311.28	0.01	0.01	313.17
2010-10-01	2010-10-31	2,250.65	58,741.88	112.67	0.00	0.00	113.35
2010-09-01	2010-09-30	1,790.63	46,735.55	89.64	0.00	0.00	90.18
2010-08-01	2010-08-31	530.08	13,835.06	26.54	0.00	0.00	26.70
Total		46,772.78	1,220,769.58	2,231.44	0.05	0.04	2,355.63

LIVINGSTON PLACE GREENHOUSE GAS INVENTORY REPORT

APPENDIX A – Greenhouse Gas Inventory

November 30, 2011

Livingston Place – Electricity Consumption

Reading (From Date)	Reading (To Date)	Consumption (kWh)	GHG (t CO ₂)	GHG (t CH ₄)	GHG (t N ₂ O)	GHG (t CO ₂ e)
2011-07-01	2011-07-31	1,223,025.20	1,076.26	0.04	0.02	1,084.62
2011-06-01	2011-06-30	1,217,253.60	1,071.18	0.04	0.02	1,079.50
2011-05-01	2011-05-31	1,221,139.20	1,074.60	0.04	0.02	1,082.94
2011-04-01	2011-04-30	1,209,318.40	1,064.20	0.04	0.02	1,072.46
2011-03-01	2011-03-31	1,313,315.00	1,155.72	0.04	0.03	1,164.69
2011-02-01	2011-02-28	1,177,996.00	1,036.64	0.04	0.02	1,044.68
2011-01-01	2011-01-31	1,291,640.00	1,136.64	0.04	0.03	1,145.47
2010-12-01	2010-12-31	1,259,128.00	1,108.03	0.04	0.03	1,116.63
2010-11-01	2010-11-30	1,245,492.00	1,096.03	0.04	0.02	1,104.54
2010-10-01	2010-10-31	1,220,126.00	1,073.71	0.04	0.02	1,082.04
2010-09-01	2010-09-30	1,198,629.00	1,054.79	0.04	0.02	1,062.98
2010-08-01	2010-08-31	1,211,778.00	1,066.36	0.04	0.02	1,074.64
Total			13,014.18	0.44	0.30	13,115.19

LIVINGSTON PLACE GREENHOUSE GAS INVENTORY REPORT

APPENDIX A – Greenhouse Gas Inventory

November 30, 2011

Livingston Place – Annual Leakage from Refrigerant

AC Unit	Refrigerant	Capacity (kg)	Annual Leakage Rate (% of capacity)	Time	GWP	CO ₂ e (tonnes/year)
HPU 1 (7.5 tonnes) (Circ 1 & 2) East	HCFC-22	1.47	0.15	1	1500	0.33
HPU 1 (7.5 tonnes) (Circ 1 & 2) West	HCFC-22	1.47	0.15	1	1500	0.33
HPU 2 (4 tonnes) East	HCFC-22	1.88	0.15	1	1500	0.42
HPU 2 (4 tonnes) West	HCFC-22	1.88	0.15	1	1500	0.42
HPU 3 (2.5 tonnes) East	HCFC-22	1.53	0.15	1	1500	0.34
HPU 3 (2.5 tonnes) West	HCFC-22	1.53	0.15	1	1500	0.34
HPU4 East	HCFC-22	2.96	0.15	1	1500	0.67
HPU4 West	HCFC-22	2.96	0.15	1	1500	0.67
HPU 5 (1.5 tonnes) East	HCFC-22	1.37	0.15	1	1500	0.31
HPU 5 (1.5 tonnes) West	HCFC-22	1.37	0.15	1	1500	0.31
HPU 6 (1.5 tonnes) East	HCFC-22	1.37	0.15	1	1500	0.31
HPU 6 (1.5 tonnes) West	HCFC-22	1.37	0.15	1	1500	0.31
Chiller 1	HFC 134A	404.15	0.15	1	1300	78.81
Chiller 2	HFC 134A	404.15	0.15	1	1300	78.81
Chiller 3	HFC 134A	404.15	0.15	1	1300	78.81
Chiller 4	HFC 134A	404.15	0.15	1	1300	78.81
Total						320.00

LIVINGSTON PLACE GREENHOUSE GAS INVENTORY REPORT

APPENDIX A – Greenhouse Gas Inventory

November 30, 2011

Livingston Place – Emissions from Backup Generator Diesel Combustion

From Date	To Date	Fuel (L)	CO ₂ (t)	CH ₄ (t)	N ₂ O (t)	CO ₂ e (t)
2011-07-01	2011-07-31	310.00	0.84	0.00	0.00	0.88
2011-06-01	2011-06-30	310.00	0.81	0.00	0.00	0.85
2011-05-01	2011-05-31	310.00	0.84	0.00	0.00	0.88
2011-04-01	2011-04-30	310.00	0.81	0.00	0.00	0.85
2011-03-01	2011-03-31	310.00	0.84	0.00	0.00	0.88
2011-02-01	2011-02-28	310.00	0.76	0.00	0.00	0.80
2011-01-01	2011-01-31	310.00	0.84	0.00	0.00	0.88
2010-12-01	2010-12-31	310.00	0.84	0.00	0.00	0.88
2010-11-01	2010-11-30	310.00	0.81	0.00	0.00	0.85
2010-10-01	2010-10-31	310.00	0.84	0.00	0.00	0.88
2010-09-01	2010-09-30	310.00	0.81	0.00	0.00	0.85
2010-08-01	2010-08-31	310.00	0.84	0.00	0.00	0.88
Total		3,720.00	9.91	0.00	0.00	10.38

November 30, 2011

APPENDIX B – Activity Data & Emission Factors

Activity Data

Activity data was collected using the methodology summarized below.

Activity Data Collection Methodology

Activity Data	Collection Methodology
Natural gas	Paper utility bills were reconciled against ENMAX online billing reports.
Electricity	Paper utility bills were reconciled against the ENMAX online billing reports.
Refrigerant	Equipment information supplied by operators for LEED EBOM EAp3
Diesel	Estimated annual fuel consumption supplied by Bentall's Chief Engineer

LIVINGSTON PLACE GREENHOUSE GAS INVENTORY REPORT

APPENDIX B – Activity Data & Emission Factors

November 30, 2011

Emission Factors

The Table below summarizes the emission factors and sources used in the calculations completed for

Emission Factor and Source

Type	Province	Emission Factor	Unit	Year	Source
Natural gas	AB	1918	g CO ₂ /m ³	2009	Canada's National Inventory Report 1990-2009, Table A8-1, written 2011
	N/A	0.037	g CH ₄ /m ³	2009	Canada's National Inventory Report 1990-2009, Table A8-2, written 2011
	N/A	0.035	g N ₂ O/m ³	2009	Canada's National Inventory Report 1990-2009, Table A8-2, written 2011
Diesel	N/A	2633	g CO ₂ /L	2009	Canada's National Inventory Report 1990-2009, Table A8-4, written 2011
	N/A	0.133	g CH ₄ /L	2009	Canada's National Inventory Report 1990-2009, Table A8-4, written 2011
	N/A	0.4	g N ₂ O/L	2009	Canada's National Inventory Report 1990-2009, Table A8-4, written 2011
Alberta Electricity	AB	880	g CO ₂ /kWh	2009	Canada's National Inventory Report 1990-2009, Table A13-10, written 2011
	AB	0.03	g CH ₄ /kWh	2009	Canada's National Inventory Report 1990-2009, Table A13-10, written 2011
	AB	0.02	g N ₂ O/kWh	2009	Canada's National Inventory Report 1990-2009, Table A13-10, written 2011
	AB	880	g CO ₂ e/kWh	2009	Canada's National Inventory Report 1990-2009, Table A13-10, written 2011
Carbon dioxide	N/A	1	CO ₂ e	2007	Global Warming Potential from Intergovernmental Panel on Climate Change (IPCC) Fourth Assessment Report: Climate Change 2007
Methane	N/A	21	CO ₂ e	2007	Global Warming Potential from Intergovernmental Panel on Climate Change (IPCC) Fourth Assessment Report: Climate Change 2007
Nitrous oxide	N/A	310	CO ₂ e	2007	Global Warming Potential from Intergovernmental Panel on Climate Change (IPCC) Fourth Assessment Report: Climate Change 2007

LIVINGSTON PLACE GREENHOUSE GAS INVENTORY REPORT

APPENDIX B – Activity Data & Emission Factors

November 30, 2011

Type	Province	Emission Factor	Unit	Year	Source
HFC 134A (CH ₂ FCF ₃)	N/A	1300	CO ₂ e	2007	Global Warming Potential from Intergovernmental Panel on Climate Change (IPCC) Fourth Assessment Report: Climate Change 2007
HCFC-22 (CHClF ₂)	N/A	1500	CO ₂ e	2007	Global Warming Potential from Intergovernmental Panel on Climate Change (IPCC) Fourth Assessment Report: Climate Change 2007

November 30, 2011

APPENDIX C – Standard Reporting Declaration

The following table provides a summary of the reporting information required by CAN/CSA-ISO Standard 14064-1:06 provided in the “declaration” column is Bentall’s assertion for Livingston Place’s inventory.

This GHG inventory report is the first GHG inventory report issued from Bentall for Livingston Place.

Reporting information by CAN/CSA-ISO Standard 14064-1:09 Requirement

No.	CSA Reporting Requirement	Declaration
A	Describe the reporting organization.	Bentall Kennedy LP is the Property Management Company for Livingston Place. The building is registered in the CaGBC's LEED for Existing Buildings: Operations and Maintenance Protocol, and Energy and Atmosphere credit 6: Emission Reduction Reporting. The south tower is 39,467 m ² and the West tower is 39,497 m ² . There are approximately 1363 building occupants. The facility emits GHGs by their use of natural gas, electricity, diesel and potential refrigerant leakage.
B	Person Responsible	Art Skow, of Bentall Kennedy, is the Property Manager of Livingston Place.
C	Reporting Period	August 1 st , 2010 - July 31 st , 2011
D	Documentation of organizational boundary	LEED EBOM uses the “physical facility approach” in order to quantify GHG emissions under EAc6. This is consistent with CSA/ISO14604-4 guidelines/
E	Direct GHG emissions are quantified for each GHG in CO ₂ e	See Appendix A
F	Description of how biomass derived emissions are treated by the inventory	Not applicable
G	Description of how GHG removals were quantified.	Not applicable
H	Description of how any GHG sources or sinks were excluded from the quantification	This inventory includes emissions from natural gas combusted onsite; electricity consumed onsite; diesel consumed onsite; and potential leakage from refrigerant. GHG sinks are not applicable to this inventory.
I	Energy indirect emissions associated with electricity generation are quantified in t CO ₂ e.	See Appendix A

LIVINGSTON PLACE GREENHOUSE GAS INVENTORY REPORT

APPENDIX C – Standard Reporting Declaration

November 30, 2011

No.	CSA Reporting Requirement	Declaration
J	Historical base year selected for inventory	Base year was chosen to be consistent with other LEED energy credits. This report represents the base year for future reporting.
K	Explanation of change to the base year, or other historical GHG data.	Not applicable
L	Description of quantification methodologies include reasons for their selection	Calculations based on activity data multiplied by emission factors.
M	Explanation of changes to quantification methodologies previously used.	Not applicable
N	Reference to emission factors used	See Appendix B
O	Description of the impact of uncertainties on the accuracy of GHG emissions and removals data.	Emission factors were referenced from the most current sources at the time of quantification, and were determined by the most local and credible sources. Utility consumption was supplied directly from ENMAX's online tracking tool. Diesel consumption was estimated by Bentall's Chief Engineer. Refrigerant data is based on total refrigerant charge capacity received from Bentall and EPA default rates. Based on these sources, the level of uncertainty is assumed to be fair.
P	A statement that the GHG report has been prepared in accordance with ISO Standard 14064-1.	This report has been prepared in accordance with the following standard: CAN/CSA-ISO Standard 14064-1:06 - Part 1: Specification with Guidance at the Organization Level for Quantification and Reporting of Greenhouse Gas Emissions and Removals.
Q	A statement describing whether the GHG inventory, report or assertion has been verified, including the type of verification and level of assurance achieved.	Conan O'Connor of Energy Profiles will provide third party verification of this report at a reasonable level of assurance.