

Brookfield Place, Toronto ON
Greenhouse Gas Inventory Report

May 5, 2011



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1 SUMMARY

This report details the greenhouse gas (GHG) emissions inventory of 181 Bay St., 161 Bay St., and 30 Yonge St., Toronto, Ontario (collectively known as Brookfield Place). A GHG inventory lists the sources¹ of GHG emissions and the quantity of emissions released from each source during the reporting period².

Brookfield Place is managed by Brookfield Office Properties, (Brookfield), and also owns the property except the TD Canada Trust Tower at 181 Bay Street, which is owned by Oxford Properties Group (Oxford). Brookfield and Oxford are registering Brookfield Place in the Canadian Green Building Council's (CaGBC) LEED Canada EB: O&M Program (LEED EB) and are targeting this rating system's Energy and Atmosphere Credit 6: Emission Reduction Reporting (EAc6)³. Brookfield and Oxford will use the data from this report to disclose the buildings' emissions in the CSA CleanStart™ Registry and also as part of Brookfield Place's LEED EB Credit EAc6 documentation package.

Loop Initiatives (Loop) is the Agent to Brookfield Place's property management company, Brookfield, and is responsible for the completion of Brookfield Place's GHG inventory and reporting in accordance with CAN/CSA-ISO Standard 14064-1-06⁴. 3P Analysis and Consulting has been engaged to provide independent third party verification.

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 Standard⁵ and CAN/CSA-ISO Standard 14064-3-06 *Greenhouse Gases - Part 3: Specification with Guidance for the Validation of Greenhouse Gas Assertions* have been used as additional resources.

We have determined that Brookfield Place emitted 20,948 tonnes of CO₂e for the April 2010 to March 2011 reporting year. Direct GHG (Scope 1) emissions account for 29% of the reported emissions. Energy indirect GHG (Scope 2) emissions

¹ Examples of GHG sources include: boilers (natural gas combustion), electricity production (mixed fossil fuel combustion), etc.

² The reporting period is defined as the one year duration for which the quantity of GHG emissions from all sources is calculated.

³ *LEED Canada for Existing Buildings: Operations and Maintenance 2009 Reference Guide*. 2009, Canadian Green Building Council.

⁴ *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.

⁵ *Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard*. March 2004. World Resources Institute and World Business Council for Sustainable Development.

account for 71% of the reported emissions. Other indirect GHG emissions (Scope 3) were not reported. The emissions were calculated from data and other documentation collected from Brookfield and Halsall.

Please refer to Section 5 and Appendix A for Brookfield Place's detailed GHG inventory.

2 ORGANIZATION PROFILE

Brookfield Place, located in Toronto, Ontario and built in 1992, consists of two towers (the 49-storey Bay-Wellington Tower and the 53-storey TD Canada Trust Tower) and the Hockey Hall of Fame (30 Yonge St.). These buildings share retail areas and 4 levels below ground for parking and storage. The property is managed by Brookfield.

As reported by Halsall Associates Limited (Halsall), the office space gross floor area (GFA) is 3,665,665 ft². This includes:

- 2,604,269 ft.² of occupied office space;
- 9,960 ft.² of vacant office space;
- 25,008 ft.² data centre;
- 342,436 ft.² of retail concourse; and
- 683,992 ft.² parking.

As reported by Halsall and HFM:

"Primary heating for both buildings is provided with 6 natural gas boilers and by electric reheat coils installed in the air supply ductwork. There are 3 boilers installed in the TD Canada Trust Centre 52nd floor mechanical penthouse and 3 boilers installed in the Bay-Wellington Tower mechanical penthouse.

Perimeter areas are served by radiant heating units.

Primary cooling is provided by 8 chillers, 5 of which are original, located in the Bay-Wellington Tower. The 3 new energy efficient chillers provide 90% of the total cooling. The chillers provide a total of 8,780 tons of cooling for both the TD Canada Trust tower and the Bay-Wellington Tower. The heat is dissipated by three rooftop cooling towers.

The HVAC components are monitored and controlled by a Building Automation System, which is located in the Bay-Wellington Tower. The BAS is a Direct digital Control (DDC) system that monitors and operates over 5,000 variable air volume (VAV) boxes.

Domestic water is heated electrically.

Base building lighting consists of T8 or T5 fluorescents throughout. The lighting is controlled by an automated General Electric lighting controller with 12 zones per floor. Exit signs are lit with light emitting diodes (LED). Lighting schedules are typically 7:30am – 6:30pm, Monday to Friday and 9am – 5pm on Saturdays. Additional lighting is available for individual zones, with timed shut-off.

The Bay-Wellington tower ventilation air is supplied to office floors via a single air shaft from two 100% fresh-air ventilation fans. Ventilation fan SFC-2 (capacity 115,315 CFM) feeds floors 2-22, and is located on the concourse level. Ventilation fan SF49-1 (capacity 95,011 CFM) feeds floors 23-47, and is located in the mechanical penthouse on floor 49. Floor 48 is a mechanical floor. Ventilation air flows through the vertical shaft and enters compartment units on each floor through a dampered opening. Dampers do not modulate during regular system operation.

Ventilation fans SFC2 and SF-49 are each controlled by inlet vanes which modulate by static pressure (ie: airflow is a function of total demand by compartment units). Compartment units have VFDs which are modulated by static pressure (responsive to VAV demand). Compartment unit VFDs have a minimum setting of 20%. VAVs inspace have a minimum setting of 10% flow. VAVs are on DDC control, and flow rates can be read from the base-building BAS.

Ground and concourse floors are non-office spaces (atria, concourse and retail space); these are fed by a separate ventilation system. One exception to this is that fan SFC2 feeds Richtree restaurant as well as lower office floors. Concourse and ground floor units were not evaluated as part of this analysis.

At the TD Canada Trust Tower, Supply Air Fan SF-04 along with the Exhaust Fan EF-6 serves from 2nd Floor through 25th Floors and Supply Air Fan SF-13 along with the Exhaust Fan EF-8 and EF-10 serves from 26th Floor through 50th Floors. Each Supply Air Fan is equipped with a Pre-Cooling Coil and the Re-Cooling Coil as well as the spray water pump.”

The following figure (Figure 1) shows the breakdown of Brookfield Place’s tenants by industry sector.

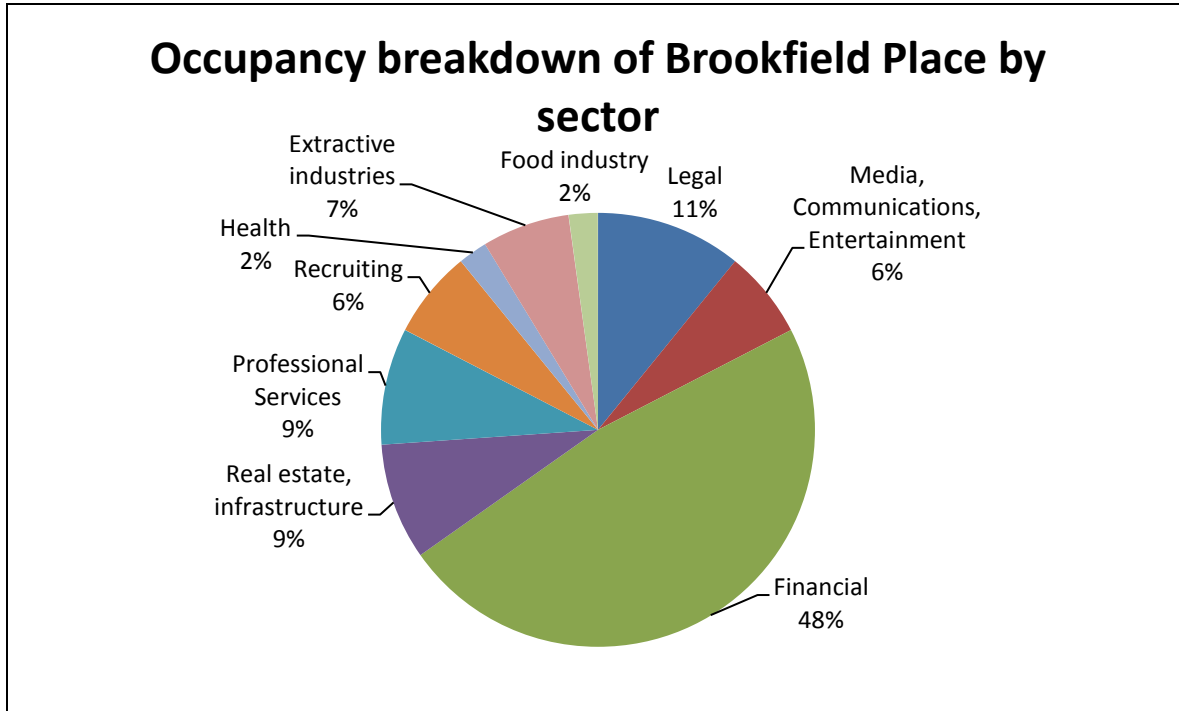


Figure 1: Breakdown of Tenants at Brookfield Place by Sector

Brookfield and Oxford have made a commitment to “greening” this facility, including participating in the LEED Canada EB: O&M Program, which includes evaluating energy, water efficiency and waste management. To achieve LEED EB EAc6, Brookfield and Oxford are reporting Brookfield Place’s GHG emissions to the CSA Clean Start™ Registry.

3 GHG INVENTORY DESIGN AND DEVELOPMENT

3.1 Organizational Boundaries

For any GHG inventory, an organizational boundary is used to determine how GHG emissions are accounted for. Typically, one of the following approaches is used⁶:

1. Equity share approach: accounts for GHG emissions based on share of equity in the operation;

⁶ *Hot Climate, Cool Commerce: A Service Sector Guide to Greenhouse Gas Management*. May 2009, World Resources Institute.

2. Financial control approach: accounts for GHG emissions based on the financial control over the operation; or
3. Operational control approach: accounts for GHG emissions based on the control of operations. The organization must report emissions from the sources over which it has operational control.

CAN/CSA-ISO Standard 14064-1-06 Section 4.1 states that the organization may use a different consolidation methodology where specific arrangements are defined by a GHG program or legal contract.

Since LEED-EB evaluates facilities rather than organizations, to meet EAc6 requirements, the Brookfield Place facility was used as a physical boundary, rather than using any of the organizational boundaries described above. As such, the emissions from the base building equipment and the tenant equipment (including energy and refrigerant GHG emissions) were included in the GHG inventory without taking into consideration whether Brookfield or the tenants have control or ownership. In addition, since LEED EB: O&M credit EAc6 does not take transportation into consideration, emissions from building-owned or leased vehicles are excluded from the inventory.

3.2 Operational Boundaries

Operational boundaries are defined to prevent double counting of reported emissions. These boundaries can be separated into the following three emission types:

Direct GHG emissions (Scope 1):

Direct emissions within the organizational boundary are released from fuel combustion, HFC emissions, generation of electricity, steam, or heat in equipment, business travel or employee commuting in company owned or leased vehicles.

Energy Indirect GHG emissions (Scope 2):

Indirect GHG emissions are released by the production of electricity, steam and/or chilled water, purchased by the facility users.

Other Indirect GHG emissions (Scope 3):

Other indirect GHG emissions are released from all other activities outside of the organizational boundaries. They may include business travel, employee commuting, third party production or manufacture of materials and resources, outsourced activities, and transmission and distribution losses from the electricity network.

3.2.1 Direct GHG Emissions at Brookfield Place

Direct GHG emissions released from sources at the facility level include Brookfield Place's emissions from the combustion of natural gas and diesel and the release of refrigerant gases.

Natural gas is supplied by Enbridge Gas Distribution Inc. (Enbridge Gas). As reported in HFM's energy breakdown calculations, all natural gas use is for space heating.

As reported by Halsall, 8 chillers containing refrigerants R-123 and R-22 are on site. The emissions from the refrigerant are limited to the leakage from the refrigerant loop. R-123 and R-22 are refrigerants that have been identified as not having a "global warming potential" (GWP) by the UN Intergovernmental Panel on Climate Change (IPCC) and have therefore not been included in the GHG inventory. There were also no PFC's or SF₆'s reported in the building.

There are five 9,000 litre diesel tanks on site. The last time these were refilled was in June of 2008 and as such, would have been included in the GHG inventory for the 2008-2009 period. For the accounting year, diesel generator consumption has been calculated based on the testing schedule reported by Brookfield.

As transportation emissions are excluded in LEED EB credit EAc6, Brookfield-owned vehicles, considered direct GHG emissions, were not included in the GHG inventory.

3.2.2 Energy Indirect GHG Emissions at Brookfield Place

This report includes Brookfield Place's indirect GHG emissions inventory from electricity. Imported chilled water and steam are not used at the facility.

Electricity at Brookfield Place is purchased from the Toronto Hydro Corporation (Toronto Hydro). Consumption is measured from one main meter and is submetered for 100% of the tenants. As reported by HFM's energy breakdown calculations, the building's energy breakdown is as follows:

- Ventilation contributes the highest load at 45%;
- Lighting uses 28% of electrical energy; and
- Pumps (for chilled water, cooling towers and boilers) use 26% of electrical energy.

3.2.3 Other Indirect GHG Emissions at Brookfield Place

Other indirect GHG emissions were not included as part of the GHG inventory.

3.2.4 GHG Removals and Biomass Combustion at Brookfield Place

GHG removals or combustion of biomass are not present at Brookfield Place.

3.3 Baseline Year Selection

Emissions were calculated for the time period between April 2010 and March 2011 to meet LEED-EB's 12 month Performance Period requirement.

Since this is the first year that Brookfield Place is externally disclosing and reporting to the CSA registry its GHG emissions, this GHG inventory becomes the building's "base year"⁷ emissions. Future annual inventories should be compared to this base year to track the results of emissions reduction efforts.

4 QUANTIFICATION

The GHG inventory calculation requires two general types of data. As per CAN/CSA-ISO Standard 14064-1-06 Section 4.3.6, we obtained the appropriate "activity data" and "emission factor" to apply to the following equation:

$$\text{activity data} \times \text{emission factor} = \text{GHG emissions}$$

Activity data was collected from site utility bills. Emission factors from Canada's National Inventory Report (1990-2008)⁸ were used.

4.1 Natural Gas

4.1.1 Activity Data

Activity data for natural gas is based on Enbridge Gas monthly utility bills. Natural gas consumption is metered and reported by the utility in m³.

4.1.2 Emission Factor

Loop Initiatives used the National Inventory Report (1990-2008)⁸ natural gas emission factors to calculate Brookfield Place's GHG emissions. Ontario-specific CO₂ emission factors from Part 2, Annex 8, Table A8-1 were used. Since CH₄ and N₂O emissions are dependent on a specific sector rather than regional fuel properties, national commercial CH₄ and N₂O data from Part 2, Annex 8, Table A8-2 were used.

⁷ The base year is the first reporting period for which a GHG inventory is reported.

⁸ *National Inventory Report (1990-2008) Greenhouse Gas Sources and Sinks in Canada*. April 2010, Environment Canada GHG division.

The natural gas emission factor units are in metric tonnes of emission per m³.

4.2 Refrigerant R-123 and R-22

4.2.1 Activity Data

Activity data for refrigerants R-123 and R-22 have not been included in this report since they are refrigerants that have been identified as having a GWP by the UN's IPCC and are therefore not required to be reported.

4.2.2 Emission Factor

Loop Initiatives used the ISO-14064-1:2006 Annex C refrigerant global warming potential (GWP) factors for Brookfield Place's GHG calculations. The refrigerant GWP factor is a quantity without a physical unit. This document confirms that R-123 and R-22 are refrigerants that have been identified as not having a GWP by the UN's IPCC.

4.3 Electricity

4.3.1 Activity Data

Activity data for electricity is based on Toronto Hydro monthly utility bills. Electricity is provided through one main meter to Brookfield Place. Electricity consumption is metered and reported on by the utility in unadjusted kWh and adjusted kWh. As required by Energy Star and consequently the LEED-EB Program, unadjusted kWhs were used for this GHG inventory.

4.3.2 Emission Factor

Loop Initiatives used the National Inventory Report (1990-2008)⁸ electricity emission factors.

As Brookfield is reporting on only one facility in Ontario, the calculations used provincial CO₂, CH₄ and N₂O emission factors from the National Inventory Report's Part 3, Annex 13, Table A13-7.

The electricity emission factor is measured in metric tonnes emission per kWh.

Published electricity grid emission factors do not account for Transmission and Distribution (T & D) losses. As per the Greenhouse Gas Protocol, companies that purchase electricity from a T & D grid but do not own any part of the system should not include T & D losses in a scope 2 inventory. For this reason, T & D losses have not been included in the calculations for Brookfield Place.

Refer to Appendix B for summary of data collection sources and emission factor sources.

5 GHG INVENTORY COMPONENTS

5.1 Emissions

The total emissions from direct and indirect GHG emissions sources during the reporting year are 20,948 tonnes of CO₂e. Building natural gas, refrigerant leakage, diesel and electricity account for 100% of the Brookfield Place’s reported emissions. The breakdown as follows (Table 1):

Table 1: Emissions Results

Source of GHG Emissions	CO ₂ e (tonnes)	% of total
Natural Gas	5,869	28%
Diesel	156	1%
Electricity	14,923	71%
TOTAL	20,948	100%

CO₂ emissions account for over 99% of the total GHG emissions, while CH₄ and N₂O emissions combined account for less than 1% of total GHG emissions. However, to meet CAN/CSA-ISO 14064-1-06⁹ requirements, they have been included in the greenhouse gas inventory.

Refer to Figure 2 for the monthly energy consumption and Figure 3 for a detailed GHG breakdown.

⁹ 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.

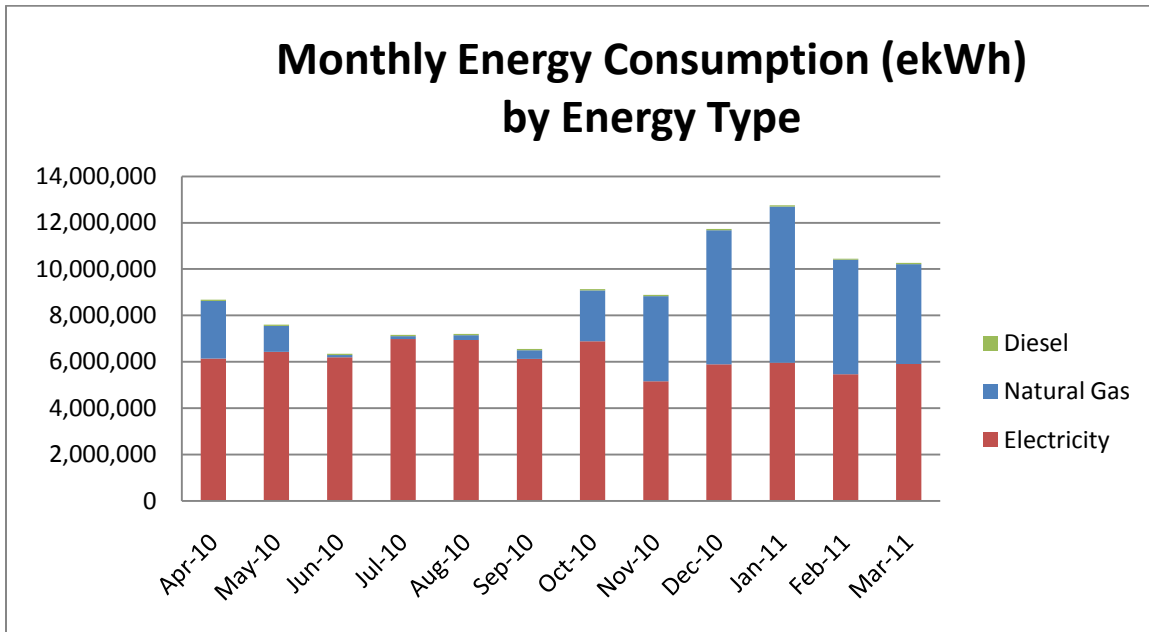


Figure 2: Energy Consumption Breakdown

Annual Energy Consumption is approximately 106,746,522 ekWh

Note the lack of natural gas use from June 2010 – September 2010 - this is due to natural gas only being used for heating purposes (Section 3.2.1).

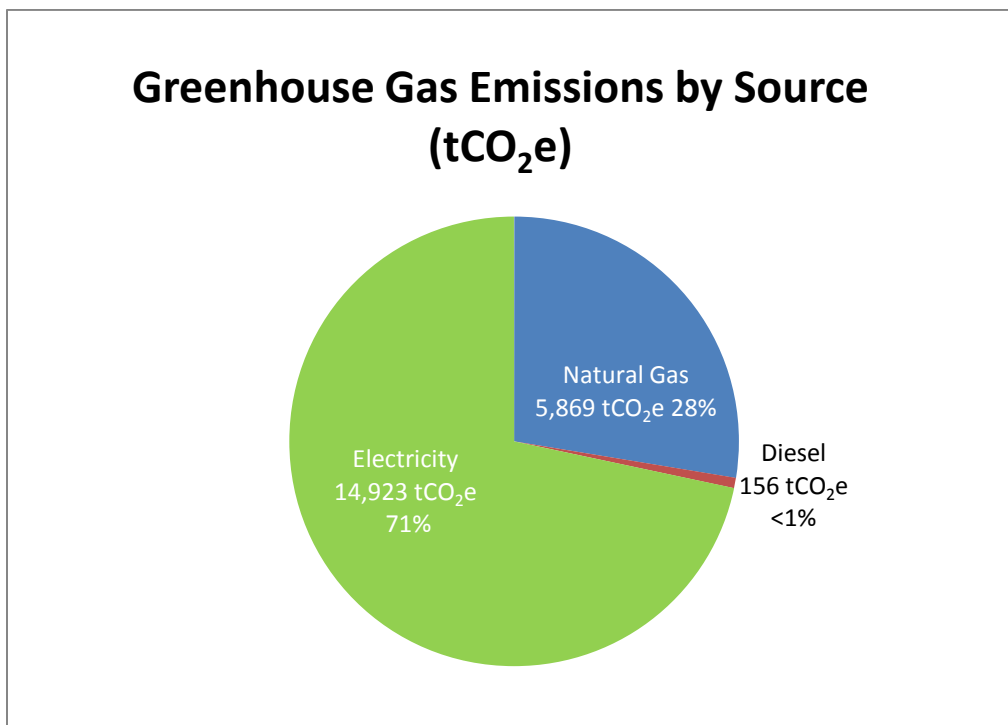


Figure 3: Greenhouse Gas Breakdown
Annual GHG emissions are 20,948 tCO₂e

With a carbon intensity of 7.0 kg CO₂e/ ft², Brookfield Place’s carbon footprint is higher than the average of other office buildings in Toronto that Loop has analyzed energy and carbon intensity for. Within the Loop building database, Loop has observed a range of carbon intensities between 4.4 kg CO₂e/ ft² and 10.3 kg CO₂e/ft²., averaging at 6.0 kg CO₂e/ ft². The high intensity is likely due to a large amount of data servers being operated in the building.

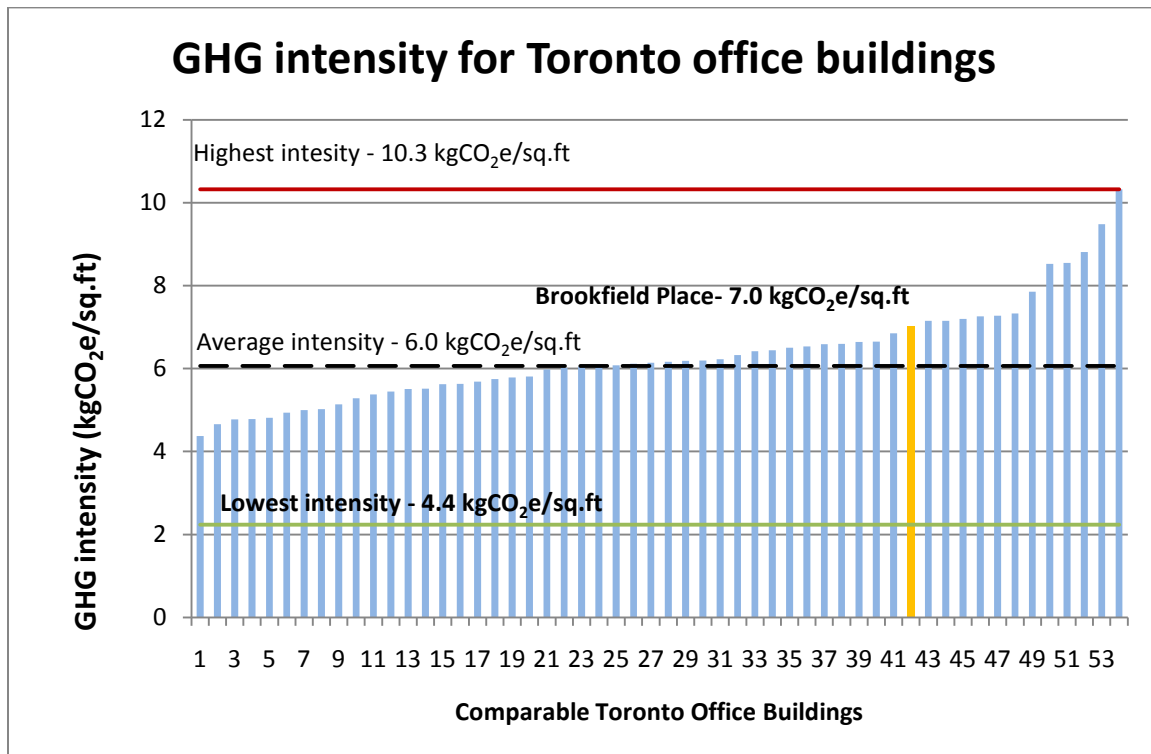


Figure 2: GHG Intensity for Comparable Toronto, Office Buildings¹⁰

5.2 Activities to Reduce GHG Emissions

GHG reduction strategies for this facility have focused on energy measures. In Brookfield Place’s current baseline, implemented energy saving retrofits have resulted in energy and carbon reductions compared to the previous years. An emissions reduction of approximately 512 tonnes of CO₂e (2%) was calculated between the April 2010-March 2011 reporting year and the previous 12 month period.

¹⁰ Halsall Associates Ltd./Loop Initiatives Energy and Carbon database (2006-2009). Data is not weather normalized. Intensity is calculated using the Energy Star™ definition of gross floor area.

HFM prepared a LEED retro-commissioning plan in which several strategies for energy conservation have been recommended. Brookfield has decided that the following measures will be implemented in the future. Table 2 indicates the potential emissions savings of the suggested strategies.

Table 2: Carbon Saving Strategies

Building Performance Parameters	Estimated Emissions Savings	Activity Unit
Install temperature sensors in fresh air systems (SFC2, SF49-1, SF13, SF4)	32	t CO ₂ e
Lower static pressure set points at compartment units	118	t CO ₂ e
Clean cooling coils every two years	3	t CO ₂ e
Annual Carbon Savings Implementation	153	t CO₂e

5.3 Estimation of Uncertainty¹¹

Table 3 presents our opinion of the level of uncertainty related to this GHG inventory. Our opinion of uncertainty is based on *Table 3: Certainty Ranking for Common Emission Sources*, found in “Measurement and Estimation Uncertainty of GHG Emissions” by the Greenhouse Gas Protocol Initiative.

¹¹ *Measurement and Estimation Uncertainty of GHG Emissions*. 2003, The Greenhouse Gas Protocol Initiative.

Table 3 – Uncertainty Ranking

Major Emission Category	Certainty Ranking
Natural Gas	High – The meter is calibrated and verified by Enbridge Gas. Natural gas emission factors are less dependent on location and are almost always standard and accurate. Uncertainty may be derived from fluctuations in measurement equipment.
Refrigerant	High – Refrigerant leakage has not been included since R-123 and R-22 are refrigerants that have been identified as not having a GWP by the UN’s IPCC.
Diesel	Poor- The only data provided was the capacity and annual run-times for 2010 provided by Brookfield. They confirmed that similar usage patterns occurred during the reporting year. No bills or other evidence were provided to verify this figure. To obtain an estimate of monthly usage it was assumed diesel consumption was evenly distributed throughout the year.
Electricity	Fair – The emission factor is based on an annual provincial grid average, containing multiple fuel sources such as coal, natural gas, hydro and nuclear.

6 GHG INVENTORY QUALITY MANAGEMENT

6.1 GHG Information Management

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

Name	Role	Company
Richard Pike	Vice President, Operations	Brookfield ¹²

Responsibilities:

- To provide Halsall/Loop with required energy data (via utility bills);
- To provide Halsall with refrigerant data information; and,
- To approve and sign the CSA CleanStart™ Registry application form.

¹² Brookfield is the Owner’s Representative

Name	Role	Company
Adrien Deveau	Project Principal	Halsall Associates ¹³
Monica Montefiore	Project Manager	Halsall Associates
Brian Campbell	Project Associate	Halsall Associates

Responsibilities:

- To provide Loop Initiatives with required energy data (via utility bills); and,
- To provide Loop Initiatives with refrigerant data information.

Name	Role	Company
Francisca Quinn	Project Director	Loop Initiatives
Jia Shin	Project Manager	Loop Initiatives
Caryn Levin	Project Analyst	Loop Initiatives
Jennifer Hearn	Project Analyst	Loop Initiatives

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.

Name	Role	Company
Evan Jones	Independent Verifier	3P Analysis and Consulting

Responsibilities:

- To verify that Loop Initiatives' 14064-1 report meets CSA CleanStart™ Registry requirements and CAN/CSA-ISO Standard 14064-3-06; and,
- To issue a verification statement.

6.2 Document Retention and Record Keeping

The following activities, conducted by the property management company, maintain credible GHG inventory and reporting:

- Brookfield compiles a record of Brookfield Place's utility bills and maintains them through spreadsheet tracking. This has a dual purpose in that it tracks both energy and operating costs; and
- This is the first year that Brookfield will register Brookfield Place's greenhouse gas emissions. This inventory contains emission factors, April 2010 to March 2011 activity data, refrigerant history, GHG emissions and other important information. Brookfield should keep this GHG inventory report for their records, should they choose to register Brookfield Place or

¹³ Halsall is the LEED-EB Consultant for Brookfield Place

other organizations within Brookfield Place next year with the CSA CleanStart™ Registry.

7 ORGANIZATION'S ROLE IN VERIFICATION ACTIVITIES

Evan Jones from 3P Analysis and Consulting was engaged to provide independent third party verification as per CAN/CSA-ISO Standard 14064-3-06. The verification is to be completed at a reasonable level of assurance.

Loop Initiatives prepared for Brookfield Place's verification by:

- Engaging a third party verifier to provide a reasonable level of assurance;
- Agreeing to verification objectives, scope, materiality and criteria with the verifier;
- Reviewing each section using the CSA Registry checklist; and,
- Using an internal review process for quality control for the inventory and the document.

Third party verification is required by LEED EB. This provides an impartial and objective review of the reported GHG emissions.

Reporting content summary for declarations to the CSA standard is presented in Appendix C.

We hope this report meets your expectations and will assist Brookfield in successfully managing your ongoing efforts to reduce GHG emissions. Loop Initiatives would be pleased to contribute further if you wish, by proceeding with a GHG reduction plan.

Please do not hesitate to contact us at (416) 644-0625.

Yours truly,

LOOP INITIATIVES

A handwritten signature in blue ink, appearing to read "Jia Shin".

Jia Shin, M.Sc.(Eng.), P.Eng., LEED AP
Project Manager

A handwritten signature in black ink, appearing to read "Francisca Quinn".

Francisca Quinn, M. Sc.
Project Director

APPENDIX A – GREENHOUSE GAS INVENTORY

Table A1.1 – Summary by Source Greenhouse Gas Inventory
(April 2010 to March 2011) – Base Year

Source and Fuel	Quantity of Activity	Activity Unit	Emissions (t CO _{2e})
DIRECT GHG EMISSIONS			
Natural Gas			
Apr-10	241,186	m ³	456
May-10	108,953	m ³	206
Jun-10	10,201	m ³	19
Jul-10	12,126	m ³	23
Aug-10	20,002	m ³	38
Sep-10	36,093	m ³	68
Oct-10	212,547	m ³	402
Nov-10	355,830	m ³	673
Dec-10	559,706	m ³	1,058
Jan-11	653,130	m ³	1,235
Feb-11	477,724	m ³	903
Mar-11	416,790	m ³	788
Total Natural Gas	3,104,288	m³	5,869
Diesel			
Total Diesel	56,062	L	156
ENERGY INDIRECT EMISSIONS			
Electricity - Mixed Fossil Fuels			
Apr-10	6,136,061	kWh	1,236
May-10	6,423,407	kWh	1,294
Jun-10	6,188,568	kWh	1,247
Jul-10	6,984,102	kWh	1,407
Aug-10	6,940,149	kWh	1,398
Sep-10	6,129,112	kWh	1,235
Oct-10	6,886,299	kWh	1,387
Nov-10	5,161,810	kWh	1,040
Dec-10	5,893,979	kWh	1,187
Jan-11	5,953,435	kWh	1,199
Feb-11	5,468,705	kWh	1,102
Mar-11	5,911,489	kWh	1,191
Total Electricity	74,007,116	kWh	14,923
TOTAL BUILDING EMISSIONS			20,948
CARBON INTENSITY			7.0 kg CO_{2e} /sq.ft.
			1.6 tCO_{2e} /Occupant

**Table A1.2 – Summary by Emission Type Greenhouse Gas Inventory
(April 2010 to March 2011) – Base Year**

Source and Fuel	Quantity of Activity	Activity Unit	CO ₂ Emissions	CH ₄ Emissions	N ₂ O Emissions
DIRECT GHG EMISSIONS					
Natural Gas					
Breakdown Conversion	3,065,253	m ³	5,833 tCO ₂	0.11 tCH ₄	0.11 tN ₂ O
CO ₂ e emissions	5,869	tCO ₂ e	5,833 tCO ₂ e	2 tCO ₂ e	34 tCO ₂ e
Diesel					
Breakdown Conversion	56,062	L	149 tCO ₂	0.01 tCH ₄	0.02 tN ₂ O
CO ₂ e emissions	156	tCO ₂ e	149 tCO ₂ e	0 tCO ₂ e	7 tCO ₂ e
ENERGY INDIRECT EMISSIONS					
Electricity - Mixed Fossil Fuels					
Breakdown Conversion	74,698,589	kWh	14,815 tCO ₂	0.74 tCH ₄	0.30 tN ₂ O
CO ₂ e emissions	14,923	tCO ₂ e	14,815 tCO ₂ e	16 tCO ₂ e	92 tCO ₂ e
TOTAL Breakdown Conversion			20,849 tCO₂	0.86 tCH₄	0.43 tN₂O
TOTAL CO₂e emissions	20,948	tCO₂e	20,797 tCO₂e	18 tCO₂e	133 tCO₂e

APPENDIX B – ACTIVITY DATA AND EMISSION FACTORS

ACTIVITY DATA

Activity data was collected by Loop Initiatives using the methodology summarized in Table B1.

Table B1 – Activity Data

Activity Data	Collection Methodology
Natural Gas	Halsall submitted Brookfield Place’s Enbridge Gas monthly utility bills to Loop Initiatives on behalf of Brookfield.
Refrigerant	Halsall provided the number of chillers and their respective refrigerant charge as well as information indicating that no PFC’s or SF ₆ exist on the premises. This was provided to Loop Initiatives on behalf of Brookfield Properties. Note the types of refrigerants used by the chillers have been identified as not having a GWP by the UN’s IPCC.
Diesel	Brookfield submitted 2010 diesel usage data to Loop Initiatives. Diesel usage was recorded in full load run time hours, which were converted to liters.
Electricity	Halsall submitted Brookfield Place’s Toronto Hydro electricity monthly utility bill to Loop Initiatives on behalf of Brookfield Office Properties.

EMISSION FACTORS

Table B2 summarizes the emission factors and sources used in the calculations completed for the Brookfield Place GHG inventory.

Table B2 – Emission Factors

Emission Source	Emission Factor	Source of Emissions Factor
Natural gas (Carbon Dioxide) (Ontario)	1.879 g/m ³	Canada's National Inventory Report, 2010, Part 2, Annex 8, Table A8-1
Natural gas (Methane) (Residential, Construction, Commercial, Institutional and Agricultural)	0.037 g/m ³	Canada's National Inventory Report, 2010, Part 2, Annex 8, Table A8-2
Natural gas (Nitrous Oxide) (Residential, Construction, Commercial, Institutional and Agricultural)	0.035 g/m ³	Canada's National Inventory Report, 2010, Part 2, Annex 8, Table A8-2
Diesel (Carbon Dioxide)	2663 g CO ₂ /L	Canada's National Inventory Report, 2010, Part 2, Annex 8, Table A8-4
Diesel (Methane)	0.133 g CH ₄ /L	Canada's National Inventory Report, 2010, Part 2, Annex 8, Table A8-4
Diesel (Nitrous Oxide)	0.4 g N ₂ O/L	Canada's National Inventory Report, 2010, Part 2, Annex 8, Table A8-4
Electricity (Carbon Dioxide) (Ontario): 2007	200 g CO ₂ /kWh	Canada's National Inventory Report, 2010, Part 3, Annex 13, Table A13-7 (most recent year: 2007)
Electricity (Methane) (Ontario): 2007	0.01 g CH ₄ /kWh ⁴	Canada's National Inventory Report, 2010, Part 3, Annex 13, Table A13-7 (most recent year: 2007)
Electricity (Nitrous Oxide) (Ontario): 2007	0.004 g N ₂ O /kWh ⁴	Canada's National Inventory Report, 2010, Part 3, Annex 13, Table A13-7 (most recent year: 2007)
Carbon Dioxide Conversion (100-yr)	1	CAN/CSA ISO 14064-1 Part 1: Specification with guidance at the organization level for quantification and reporting of greenhouse gas emissions and removals. Annex C. March 2006, International Standards Organization.
Methane Conversion (100-yr)	21	
Nitrous Oxide Conversion (100-yr)	310	

APPENDIX C – STANDARD REPORTING DECLARATION

1 REPORTING INFORMATION

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 Brookfield’s assertion for Brookfield Place’s inventory.

Note: This GHG inventory report is the first GHG inventory report issued from Brookfield for Brookfield Place.

Table C1 – Reporting Information

No.	CSA Reporting Requirement	Declaration
A	Description of the reporting organization.	Brookfield Office Properties is the property management company for Brookfield Place. Brookfield is registered in the Canadian Green Building Council’s LEED-EB Program and is targeting LEED-EB Energy and Atmosphere credit 6: Emission Reduction Reporting. As part of Brookfield and Oxford’s initiative to green this 49 floor and 53 floor complex, they are reporting the Brookfield Place greenhouse gas (“GHG”) emissions with the CSA Registry. Brookfield Place emits GHG’s through their use of natural gas, diesel, and electricity. The total gross floor area of the building is approximately 2,981,673 sq. ft. (excluding parking) and the building occupancy is approximately 13,382 people.
B	Person responsible	Francisca Quinn, Project Director and Agent to Richard Pike at Brookfield
C	Reporting period covered	April 2010 to March 2011
D	Documentation of organizational boundary.	“Physical facility approach” defined by the LEED-EB Canada Energy and Atmosphere credit 6 Emissions Reduction Reporting Program; this is a different consolidation methodology than typically defined, but is still within CSA/ISO14064-1 guidelines.
E	Direct GHG emissions, quantified separately for each GHG, in tonnes of CO _{2e} .	See Appendix A.
F	A description of how CO ₂ emissions from the combustion of biomass are treated in the GHG inventory.	Not applicable to this inventory.
G	If quantified, GHG removals, quantified in tonnes of CO _{2e} .	Not applicable to this inventory.

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No.	CSA Reporting Requirement	Declaration
H	Explanation for the exclusion of any GHG sources or sinks from quantifications.	This inventory includes all energy indirect GHG emissions. GHG sinks are not applicable to this inventory.
I	Energy indirect GHG emissions associated with the generation of imported electricity, heat or steam, quantified separately in tonnes of CO ₂ e.	See Appendix A.
J	The historical base year selected and the base-year GHG inventory.	Base year: April 2010 to March 2011 This base year for the CSA CleanStart Registry was chosen due to the performance period requirements of the Canadian Green Building Council LEED-EB program. It is a starting point for potential future GHG inventories. See Appendix A for the CSA CleanStart Registry's base year GHG emission summary.
K	Explanation of any change to the base year or other historical GHG data, and any recalculation of the base year or other historical GHG inventory.	Not applicable to this inventory.
L	Reference to, or description of, quantification methodologies including reasons for their selection.	Calculations are based on GHG activity data multiplied by GHG emission factors.
M	Explanation of any change to quantification methodologies previously used.	Not applicable to this inventory.
N	Reference to, or documentation of, GHG emission or removal factors used.	See Appendix B for details.
O	Description of the impact of uncertainties on the accuracy of the GHG emissions and removals data.	Uncertainties in calculations include error margins in emissions factors and measured activity data. Emission factors were determined by the most local and credible source available at the time of reporting. Activity data is based on utility bills received by Halsall from Brookfield. Refrigerant data is based on total refrigerant charge received from Brookfield and default leakage 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.

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No.	CSA Reporting Requirement	Declaration
Q	A statement describing whether the GHG inventory, report or assertion has been verified, including the type of verification and level of assurance achieved	Evan Jones at 3P Analysis and Consulting will provide third party verification for this GHG inventory report and will provide a reasonable level of assurance. See the third party verification report for further details.