

MMM Group Limited



GHG Inventory Report

Marine Building

355 Burrard St.
Vancouver, BC
V6C 2G6
(416) 342-2500
(416) 342-2515

www.oxfordproperties.com

Report Contact:

Tyler Plante
528 Lancaster Street W,
Kitchener, Ontario N2K 1M3
Tel (519) 743-8777 x2329
Fax (519) 743-8778

plantet@mmm.ca

Date: 29 September 2014

COMMUNITIES

TRANSPORTATION

BUILDINGS

INFRASTRUCTURE



CSA Standards

CSA Climate Change, GHG Registries

155 Queen Street, Suite 1300, Ottawa, ON K1P 6L1 Canada
Tel.: (613) 565-5151

Fax: (613) 565-5743

8501 E. Pleasant Valley Road, Independence, OH USA 44131-5575
Tel: (216) 524-4990

Fax: (216) 520-8979

E-mail: ghgregistries@csa.ca

<http://www.ghgregistries.ca/cleanstart>

TABLE OF CONTENTS

1.0	SUMMARY: MARINE	1
2.0	ORGANIZATION PROFILE	1
3.0	GHG INVENTORY DESIGN AND DEVELOPMENT	1
3.1	Organizational Boundaries	1
3.2	Operational Boundaries	2
3.2.1	Direct GHG Emissions and Removals (Scope 1)	2
3.2.2	Energy Indirect GHG Emissions (Scope 2)	2
3.2.3	Other Indirect GHG Emissions (Scope 3)	2
3.3	Quantification of GHG Emissions and Removals.....	3
3.3.1	Quantification Steps and Exclusions	3
3.3.2	Global Warming Potentials (GWP)	4
3.3.3	Selection of Quantification Methodologies	5
3.3.4	Selection and Collection of GHG Activity Data.....	5
3.3.5	Selection and Development of GHG Emission or Removal Factors	5
4.0	GHG INVENTORY COMPONENTS	5
4.1	GHG Emissions and Removals.....	5
4.1.1	Emissions	5
4.1.2	Removals.....	6
4.2	Organizational Activities to Reduce GHG Emissions or Increase GHG Removals	6
4.2.1	Reduce Emissions	6
4.2.2	Increase GHG Removals.....	6
4.3	Base-Year GHG Inventory	6
4.3.1	Selection and Establishment of Base Year	6
4.4	Assessing and Reducing Uncertainty	7
4.4.1	Uncertainties	7
4.4.2	Reported Numbers	8
5.0	GHG INVENTORY QUALITY MANAGEMENT	8
5.1	GHG Information Management.....	8

5.1.1	Requirements	8
5.1.2	Considerations.....	8
5.2	Document Retention and Record Keeping.....	8
6.0	MMM GROUP'S ROLE IN VERIFICATION ACTIVITIES	9
7.0	APPENDIX A: FULL BREAKDOWN OF EMISSIONS.....	10
8.0	APPENDIX B: FULL BREAKDOWN OF ACTIVITIES	11
9.0	APPENDIX C: GLOBAL WARMING POTENTIALS	12

COPYRIGHT NOTICE
 © MMM Group Limited 2014 All rights reserved

1.0 SUMMARY: MARINE

This report details by scope, activity, and source, the organization's greenhouse gas (GHG) emissions and reductions over the reporting period beginning January 1, 2013 and ending December 31, 2013. This report covers the Marine property, located at 355 Burrard Street, Vancouver, BC, which is managed by Oxford Properties Group (Oxford).

The following sources were measured for GHG emissions:

- ▶ Diesel fuel used for backup generator(s)
- ▶ District steam for heating
- ▶ Electricity

It was determined that the GHG emissions during the reporting period totaled 238.744 metric tonnes CO₂e (rounded to the nearest thousandth).

The purpose of this undertaking is to help Oxford track and understand GHG emissions related to the Marine facility in order to identify possibilities for further GHG reductions. This report and its submission to the CSA CleanStart Registry will be used to support the completion of the LEED-EB EA c6 requirements.

This report was prepared by MMM Group Limited (MMM Group) in accordance with the CAN/CSA-ISO Standard 14064-1-06 and the WBCSD/WRI GHG Protocol Corporate Accounting and Reporting Standard (2004) and previous years reporting. MMM Group provided all emission factors used in the calculations.

2.0 ORGANIZATION PROFILE

The Marine building is located at 355 Burrard Street, Vancouver, BC. The facility is active and is owned by Oxford Properties Group. In 2013, the 25 storey facility had 700 occupants, and a total area of 296,000 sq. ft.

3.0 GHG INVENTORY DESIGN AND DEVELOPMENT

3.1 Organizational Boundaries

CAN/CSA-ISO Standard 14064-1:06 Section 4.1 allows an organization to use a different consolidation methodology where specific arrangements are defined by a GHG program or legal contract. The consolidation methodology followed for this GHG report is from LEED EM Credit EA c6, which is consistent with previous GHG inventories. Specifically, the Marine facility is considered as a physical boundary and the emissions will be consolidated to that boundary.

3.2 Operational Boundaries

The GHG emissions from sources falling within the organizational boundary articulated in Section 3.1 and within the operational control of Oxford are categorized as follows:

- ▶ Within Operational Control:
 - Direct Emissions (Scope 1):
 - Diesel fuel consumption from back-up generator use
 - Indirect Energy Emissions (Scope 2):
 - Electricity (includes electricity purchased from the local grid or supplied by a source outside the site boundary)
 - Imported heat and steam

3.2.1 Direct GHG Emissions and Removals (Scope 1)

The following table displays the Scope 1 emissions activities, with quantified consumption data and emissions for each.

Source	Consumption		Emissions (t CO ₂ e)
Marine - Diesel	1,216.700	L	3.394

No removal projects were completed during this reporting period.

No combustion of biomass occurred during this reporting period.

3.2.2 Energy Indirect GHG Emissions (Scope 2)

The following table displays the Scope 2 emissions activities (e.g., electricity supplied by a source outside the site boundary and imported heat and cooling steam), with quantified consumption data and emissions for each.

Source	Consumption		Emissions (t CO ₂ e)
Marine - Electricity	2,995,200.000	kWh	24.758
Marine - Steam	2,616,040.000	lbs	210.591

3.2.3 Other Indirect GHG Emissions (Scope 3)

As per CAN/CSA-ISO Standard 14064-1:06, no other Indirect GHG emissions (Scope 3) are required to be included in a GHG inventory. The LEED EA c6 credit requires the following: *All energy consumption recorded by the building systems and occupants must be included in the calculations: all electricity used on-site, space heating and cooling, ventilation, water heating, and all process loads, including both direct*

emissions (e.g., burning natural gas to heat water), and indirect emissions (e.g., electricity purchased from the grid).

No known Scope 3 emissions activities occurred during the reporting period.

3.3 Quantification of GHG Emissions and Removals

3.3.1 Quantification Steps and Exclusions

Energy consumption totals were multiplied by emission factors to obtain emissions in tonnes of applicable GHG (e.g. CO₂, CH₄, N₂O). Final emission values in CO₂e are rounded to the nearest thousandth.

Refrigerant leakage was excluded as none was reported during the performance period. This was deemed immaterial as it likely accounts for less than 1% of total emissions based on conservative assumptions. See Section 4.4 for details.

The following table lists activities, consumption material, emission factors, and the sources from which these factors were obtained.

Source	Material	Emission Factor	Emission Material	Emission Factor Source
Diesel	L	2663	g/L	CO ₂ Environment Canada (2014). Canada's National Inventory Report 1990 - 2012
Diesel	L	0.133	g/L	CH ₄ Environment Canada (2014). Canada's National Inventory Report 1990 - 2012
Diesel	L	0.4	g/L	N ₂ O Environment Canada (2014). Canada's National Inventory Report 1990 - 2012
Steam – 2013	lbs	80.5	g/lb	CO ₂ Factors provided by Jim Manson on July 10, 2014 from Central Heat Distribution Limited. Phone: (604) 688-9584 Email: manson.chdl@telus.net
Steam – 2012	lbs	81.9	g/lb	CO ₂ Factors provided by Jim Manson on July 10, 2014 from Central Heat Distribution Limited. Phone: (604) 688-9584 Email: manson.chdl@telus.net
Electricity-BC	kWh	8.1	g/kWh	CO ₂ Environment Canada (2014). Canada's National Inventory Report 1990 - 2012
Electricity-BC	kWh	0.002	g/kWh	CH ₄ Environment Canada (2014). Canada's National Inventory Report 1990 - 2012
Electricity-BC	kWh	0.0002	g/kWh	N ₂ O Environment Canada (2014). Canada's National Inventory Report 1990 - 2012

3.3.2 Global Warming Potentials (GWP)

Non-CO₂ gas values were multiplied by their respective 100-year global warming potentials (GWP). GWP values were drawn from the International Organization for Standardization's (ISO) standard on greenhouse gases (ISO 14064-1).

The GWP values relevant to this report are listed in Appendix C.

3.3.3 Selection of Quantification Methodologies

All quantification of emissions in this report are completed by multiplying consumption data by the emission factors listed under 3.3.1. The table below lists the source of the consumption data for each emission source.

Source	Data Source	Collection Method
Marine - Diesel	4Refuel Canada LP invoices	Manual data entry
Marine - Electricity	BC Hydro utility data export	Manual data entry
Marine - Steam	Central Heat Distribution Limited invoices	Manual data entry

3.3.4 Selection and Collection of GHG Activity Data

A complete list of activity data for all emissions sources is available in Appendix B.

3.3.5 Selection and Development of GHG Emission or Removal Factors

Emission factors were selected by MMM Group to conform to Canadian standard inventory reporting, wherever possible. Where available, emission factors obtained using the most recent National Inventory Report (1990-2012) were employed, to make use of the most up-to-date emission factors.

Emission factors for 2012 and 2013 Steam were supplied by the provider, Central Heat Distribution Limited.

There were no removals reported for this period.

4.0 GHG INVENTORY COMPONENTS

4.1 GHG Emissions and Removals

4.1.1 Emissions

The following table documents the total GHG emissions for all activity types in tonnes of carbon dioxide equivalent (tCO₂e). A full list of emissions by individual equipment is available under Operational Boundaries. A list of individual GHG emissions by source is shown in Appendix A.

Scope	Source	Individual Emissions (t CO ₂ e)	Total Emissions (t CO ₂ e)
1	Stationary Combustion	3.394	3.394
2	Electricity	24.758	235.350
	Steam	210.591	
TOTAL			238.744

4.1.2 Removals

There were no removals reported for this period.

4.2 Organizational Activities to Reduce GHG Emissions or Increase GHG Removals

4.2.1 Reduce Emissions

No reduction projects, or directed actions, were undertaken or completed during the reporting period.

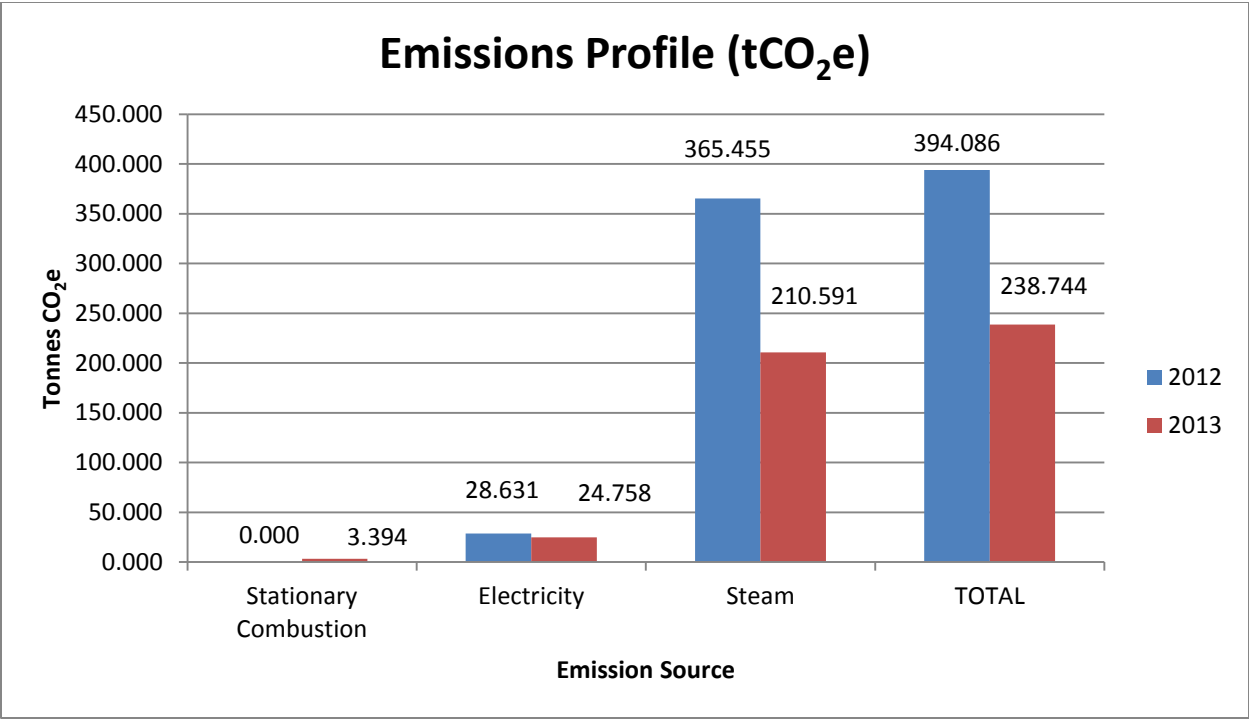
4.2.2 Increase GHG Removals

No removal enhancement projects, or directed actions, were undertaken or completed during the reporting period.

4.3 Base-Year GHG Inventory

4.3.1 Selection and Establishment of Base Year

The base year is 2012. It was the first year Oxford began documenting and reporting the GHG inventory for the Marine building.



4.4 Assessing and Reducing Uncertainty

The following are any uncertainties or assumptions made in calculating emissions.

Scope	Source	Notes
1	Refrigerant	No refrigerants were reported during this performance period. This is considered immaterial, and thus excluded from the inventory, based on the assumption that there is one compressor with a refrigerant leakage rate of 2% per year. Under this assumption, refrigerant leakage would account for approximately 0.03% of total emissions.
1	Diesel	No invoices were provided for the 2012 performance period (base year). This is determined immaterial as it like accounts for approximately 1% of total emissions for 2012.

4.4.1 Uncertainties

The level of uncertainty regarding the aforementioned estimates is considered to be low, since all are based on figures obtained from actual bill data. Furthermore, the assumption and estimate for refrigerant leakage is based conservatively on a compressor used in a building more than twice the square footage of the Marine building.

4.4.2 Reported Numbers

All emission values in this report are rounded up individually to the nearest thousandth. Therefore, emission totals may be 0.001 t CO₂e lower than the sum of individual gas emissions presented.

5.0 GHG INVENTORY QUALITY MANAGEMENT

5.1 GHG Information Management

5.1.1 Requirements

In order to ensure consistency in the information imported and exported into the GHG measurement excel-based tool, specific roles were assigned to both internal and external personnel.

Name(s)	Title(s)	Company	Responsibilities
Steve Patrick	Property Manager	Oxford Properties Group	Provide required utility data
Jolene McLaughlin	Sustainability Consultant	MMM Group	Coordination of LEED submission for 401 West Georgia.
Tyler Plante	Sustainability Coordinator	MMM Group	Upload data to MMM excel tool. Checks for data gaps and verifies accuracy of data. Prepares GHG report.
Clark Gunter	Senior Project Manager	MMM Group	Ensures calculations adhere to ISO 14064 standards.

5.1.2 Considerations

To further ensure consistency of this report, all emissions data is broken down according to month. All data is periodically checked for gaps by MMM Group, as well as at the request of the company.

5.2 Document Retention and Record Keeping

MMM Group retains all project documents in accordance with our internal MMM Document Retention Policy and our Quality Assurance Procedure: QP-2.02 Control of Project Documents and Records. As

such, all electronic records are protected from loss or damage via our eCollaboration system. Reports are retained for a period of 15 years.

6.0 MMM GROUP'S ROLE IN VERIFICATION ACTIVITIES

MMM Group serves as a quantifier of GHG emissions, and supplies software solutions to collect, track, manage data, as well as calculating emissions and reductions. MMM Group does not perform 3rd party verification for inventories that it has quantified.

This GHG inventory report has undergone third party verification to a reasonable level of assurance by Stephen Boles of Kuzuka Ltd. See the third party verification report for further details.

7.0 APPENDIX A: FULL BREAKDOWN OF EMISSIONS

All emissions are in tonnes of CO₂e, rounded to the nearest thousandth.

Category	Source	CO ₂	CH ₄	NO ₂	HFCs	PFCs	SF ₆	tCO ₂ e
Direct	Stationary Combustion	3.240	0.003	0.151	0.000	0.000	0.000	3.394
Indirect	Electricity	24.261	0.126	0.371	0.000	0.000	0.000	28.758
	Steam	210.591	0.000	0.000	0.000	0.000	0.000	210.591
TOTAL		238.092	0.129	0.522	0.000	0.000	0.000	238.744

8.0 APPENDIX B: FULL BREAKDOWN OF ACTIVITIES

Source	Start Date	End Date	Material	Consumption	Unit
Marine - Diesel	12/20/2013	12/20/2013	Diesel	1,216.700	L
Marine - Electricity	12/28/2012	1/25/2013	Electricity-BC	252000.000	kWh
Marine - Electricity	1/26/2013	2/26/2013	Electricity-BC	267600.000	kWh
Marine - Electricity	2/27/2013	3/26/2013	Electricity-BC	230400.000	kWh
Marine - Electricity	3/27/2013	4/25/2013	Electricity-BC	243600.000	kWh
Marine - Electricity	4/26/2013	5/27/2013	Electricity-BC	249600.000	kWh
Marine - Electricity	5/28/2013	6/25/2013	Electricity-BC	236400.000	kWh
Marine - Electricity	6/26/2013	7/25/2013	Electricity-BC	271200.000	kWh
Marine - Electricity	7/26/2013	8/26/2013	Electricity-BC	282000.000	kWh
Marine - Electricity	8/27/2013	9/25/2013	Electricity-BC	259200.000	kWh
Marine - Electricity	9/26/2013	10/25/2013	Electricity-BC	236400.000	kWh
Marine - Electricity	10/26/2013	11/26/2013	Electricity-BC	255600.000	kWh
Marine - Electricity	11/27/2013	12/23/2013	Electricity-BC	211200.000	kWh
Marine - Steam	12/31/2012	1/31/2013	Steam	520740.000	lbs
Marine - Steam	1/31/2013	2/28/2013	Steam	473300.000	lbs
Marine - Steam	2/28/2013	3/31/2013	Steam	439680.000	lbs
Marine - Steam	3/31/2013	4/30/2013	Steam	141550.000	lbs
Marine - Steam	4/30/2013	5/31/2013	Steam	65940.000	lbs
Marine - Steam	5/31/2013	6/30/2013	Steam	80440.000	lbs
Marine - Steam	6/30/2013	7/31/2013	Steam	67900.000	lbs
Marine - Steam	7/31/2013	8/31/2013	Steam	61930.000	lbs
Marine - Steam	8/31/2013	9/30/2013	Steam	68790.000	lbs
Marine - Steam	9/30/2013	10/31/2013	Steam	75420.000	lbs
Marine - Steam	10/31/2013	11/30/2013	Steam	195160.000	lbs
Marine - Steam	11/30/2013	12/31/2013	Steam	425190.000	lbs

9.0 APPENDIX C: GLOBAL WARMING POTENTIALS

Gas	GWP
Carbon Dioxide (CO ₂)	1
Methane (CH ₄)	21
Nitrous Oxide (N ₂ O)	310