

Greenhouse Gas Emissions Inventory FY '13

I. Summary

The Fiscal Year 2013 Greenhouse Gas Inventory details greenhouse gases (GHG) emitted by Hobart and William Smith Colleges (HWS) during the 2013 fiscal year, June 1st, 2012 to May 31st, 2013. Initial data collection was conducted in the summer of 2014 by student intern Cameron Benoit H'16, under the supervision of the Sustainability Manager, Adam Maurer. Final data collection and input was completed by the Sustainability Manager using the University of New Hampshire Campus Carbon Calculator.

The FY' 13 GHG Inventory accounts for all direct and indirect sources of greenhouse gasses specified by Campus Carbon Calculator accounting scope and methodology. In FY '13, Hobart and William Smith Colleges' net emissions were 12,834.9 metric tons of carbon dioxide equivalent (MTCDE). This compares to the Colleges' FY '11 net emissions level of 14,357 MTCDE. Much of this decrease can be attributed to the increase of renewable energy credit purchases (RECs) from 529,320 kWh to 12,000,000 kWh—a reduction of 164.7 MTCDE and 2,983 MTCDE respectively.

The format and methodology used in FY '13 Inventory were similar to those used in FY '11, with a couple important exceptions, which did impact total HWS GHG emissions. 1) For electricity emissions, we used the fuel mix obtained from our electric utility, NYSEG, instead of eGrid, because we think this is more accurate for our region. 2) Solid waste emissions were calculated through a "CH₄ Recovery and Electricity Generation" facility. 3) Study Abroad air miles accounted for every participant, which lead to an increase from 198.9 MTCDE to 1775.4 MTCDE.¹

Scope 1 & 2 Emissions represent the most consistent year-to-year performance comparison. In FY '13 emission levels from Scope 1 were 6,782.8 MTCDE and FY '11 were 6,091 MTCDE, respectively. The increase of Scope 1 emissions is mostly attributed to an increase in natural gas use for heating. Scope 2 emission levels were 3,015 MTCDE in FY '13 and 3,443 MTCDE in FY '11. Percent increase of FY '13 and FY '11 Scope 1 and 2 emissions was 2%.

The results from this inventory will help HWS track emission reduction progress and identify emission reduction priorities in its goal to achieve climate neutrality (net-zero greenhouse gas emissions) by 2025.

II. Methods

The University of New Hampshire Campus Carbon Calculator groups GHG emissions into three 'scopes':

Scope 1:

- Heat Generation
- Campus Vehicle Fleet
- Fertilizer Applications
- Refrigerant Chemical Leakages
- Electricity used by Electrically Powered Vehicles

Scope 2:

- Purchased Electricity

¹ In 2007, study abroad air miles were calculated by trip, so if 15 people flew from JFK airport to London, only one trip was recorded. This is not consistent with University of New Hampshire Campus Carbon Calculator methodology. It is assumed not all GHG emissions resultant from study abroad air miles were recorded in 2011 or prior.

Scope 3:

- Faculty, Staff and Student Commuting
- Directly Financed Air Travel
- Directly Financed Vehicle Miles
- Air Travel to Study Abroad Programs
- Solid Waste Disposal

III. Data Collection

All data collection for FY '13 GHG Inventory was gathered upon request by Adam Maurer, Sustainability Manager.

- Data for natural gas use, electricity consumption, the university fleet's fuel consumption, total solid waste production, refrigerant chemical leakage, fertilizer applications, and renewable energy credits was provided by HWS Buildings and Grounds.
- Study abroad data was provided by Tom D'Agostino from the Center for Global Education. The number of participants for each trip was used to calculate the total air mileage. In future reports, we have set up a system to make this data more accurate through the inclusion of land mileage during study abroad trips.
- Transportation data for faculty, staff, and student commuting was compiled from FY'11 commuting survey
 - 272 students responded to the Student Transportation Survey; a 13% response rate, and 290 faculty and staff responded to the Faculty and Staff Transportation Survey; a 41% response rate.
- The FY 2010-2011 survey was modified from a previous FY '08-'09 version. The surveys are provided in Figure 10A and Figure 11A. The survey was distributed electronically using HWS's IT based program, surveyor and submissions were anonymous.
 - FacStaff Survey Title: HWS Faculty and Staff Transportation Questionnaire
 - Student Survey Title: HWS Student Transportation Questionnaire
- Athletic team travel was gathered from the Hobart and William Smith athletics. Coaches indicated the teams mode of transportation next to travel schedules. In addition, coaches were asked to report any team travel that was not formally listed on the schedule, e.g. spring break team trips. Once the coaches had responded the distances travelled in road vehicles (buses, cars or rental vans – excluding campus vans) were calculated using Google Maps.
 - Hobart and William Smith Colleges were assigned as the start point with the final destination being the campus of the scheduled opponent (unless otherwise indicated by the coach).
- Distances travelled by air were calculated using the itineraries provided by Center for Global Education, coaches, and faculty responses from the transportation survey that they completed. The distances were calculated using http://www.webflyer.com/travel/mileage_calculator/. The website calculated the distance travelled by airplanes on each leg of the trip.

IV. Details by Scope

Scope 1

Figure 1 – On-Campus Stationary

- 121,537 MMBtu of Natural Gas
- 6,462 MTCDE – Resulting Greenhouse Gas Emissions
- HWS only uses natural gas or purchased electricity (accounted for in Scope 2) to heat properties
- Data provided was in therms. The Campus Carbon Calculator required on-campus stationary to be reported in MMBtu—conversion was made by multiplying Therms X .1 MMBtu/Therm.
- Data can be accessed from file “GHG_ReferenceSheet_FY’13” Sheet: Energy&Sq.Footage-Table4, Cell: G16.

Figure 2 – University Fleet

- 28,001 gallons of gasoline & 2,402 gallons of B20
- 274 MTCDE – Resulting Greenhouse Gas Emissions
- All university fleet vehicles run on either gasoline or diesel fuel.
- Data can be accessed from file “GHG_ReferenceSheet_FY’13”, Sheet: Campus Owned Vehicle – Table 3, Cell: J16 and K16.

Figure 3 – Electric Fleet

- HWS owns and operates four electric vehicles- three golf carts and one van.
- Electricity consumption from the electric vehicles is not currently distinguishable (not submetered) from the campus’ total electricity consumption and is included in Scope 2 purchased electricity.

Figure 4 – Refrigerants and Chemicals

- 8 pounds of HFC-134a and 18 pounds of R-404a
- 42 MTCDE – Resulting Greenhouse Gas Emissions
- Fugitive Emission Data was calculated by averaging purchases of refrigerants over four years. Data can be accessed from file “GHG_ReferenceSheet_FY’13”, Sheet: Chemicals and Refrigerants, Cell: I50.

Figure 5 – Agriculture

- 3,600 lbs. of Synthetic Fertilizer and 2,400 lbs. of Organic Fertilizer
- 4.8 MTCDE – Resulting Greenhouse Gas Emissions
- Data consisted of fertilizer application to HWS grounds and athletic facilities.
 - The nitrogen content of the fertilizer was calculated by taking the weighted average of the nitrogen contents from the three different types of fertilizer used- 12, 20, and 25 (Average is 19%).
- Data can be accessed from file GHG_ReferenceSheet_FY’13, Sheet: Fertilizer, Cell: B9 and C9.

Scope 2

Figure 6 – Purchased Electricity

- 12,129,332 kWh
- 3,015 MTCDE– Resulting Greenhouse Gas Emissions

- Data can be accessed from file GHG_ReferenceSheet_FY'13, Sheet: HWS Monthly Energy-Monthly, Cell: H33

Scope 3

Figure 7 – Total Air Travel

- 4,586,437 total air miles
- 2,331.1 MTCDE – Resulting Greenhouse Gas Emissions

Study Abroad Air Travel

- 3,493,074 air miles
- 1,775.4 MTCDE – Resulting Greenhouse Gas Emissions
- Only travel to and from the study abroad programs was recorded. Any emissions produced from air travel by students during the abroad programs were not claimed as the responsibility of HWS.
- The distances flown to study abroad programs were calculated using the website http://www.webflyer.com/travel/mileage_calculator/
- Data included Summer '12, Fall '12, and Spring '13 programs.
- Data can be accessed from file GHG_ReferenceSheet_FY'13, Sheet: Study Abroad – Table 1, Cell: I79.

Athletics

- 11,709 air miles
- 6.0 MTCDE – Resulting Greenhouse Gas Emissions
- Distances were calculated using http://www.webflyer.com/travel/mileage_calculator/.
- A number of teams did not provide team travel trips that were not on the schedule.
- Data included the Fall 2012, Winter 2012/13, and Spring 2013 Athletic Seasons
- Data can be accessed from file “GHG_ReferenceSheet_FY'13,” Sheet: Directly Financed Travel, Cell: H2

Faculty and Staff Air Travel

- 1,081,654 air miles
- 839.8 MTCDE – Resulting Greenhouse Gas Emissions
- Air travel data for faculty and staff was collected from the Faculty and Staff Transportation Survey for FY'11.
- FacStaff air travel was gathered from the FacStaff 10-11 survey. Air miles reported were aggregated and reported by a weighted average of the total 10-11 FacStaff population
- Data can be accessed from file “Carbon GHG_ReferenceSheet_FY'13,” Sheet: Directly Financed Travel, Cell: H5

Figure 8 – Total Land Vehicle Travel

- 8,674,207.3 car miles, 58,290.4 bus miles & 3130 train miles
- 3500.6 MTCDE (car), 18.9 MTCDE (bus) & 0.5 MTCDE (train)

Athletics (Bus)

- 58,290.4 bus miles
- 18.9 MTCDE (bus) – Resulting Greenhouse Gas Emissions
- Vehicle miles from 12 passenger vans were recorded under University Fleet Emissions

- Data can be accessed from file Carbon Calculator Reference 7-6-12 , Sheets: Directly Financed Travel, (Bus) Cell: D2, (Car) Cell: F2
- FY'11 data was used

Study Abroad Land Miles (Train)

- 3130 train Miles
- 0.5 MTCDE (train) – Resulting
- Data can be accessed from file GHG_ReferenceSheet_FY'13: Study Abroad – Table 1 Cell: J80

Reimbursed Vehicle Miles (Car)

- 155,775.3 car miles
- 58.7 MTCDE (car) – Resulting Greenhouse Gas Emissions
- Data can be accessed from file Carbon Calculator Reference 7-6-12, Sheets: Directly Financed Travel (Cars), Cell: K160
- FY '11 data was used

Student Commuting²

- 316,680 car miles
- 127.9 MTCDE – Resulting Greenhouse Gas Emissions
- Data can be accessed from file Carbon Calculator Reference 7-6-12 , Sheets: GHG Commuter, Cell: I26
- FY '11 data was used

Faculty and Staff Commuting³

- 8,201,752 car miles
- 3,313.7 MTCDE – Resulting Greenhouse Gas Emissions
- Data can be accessed from file Carbon Calculator Reference 7-6-12 , Sheets: GHG Commuter, Cell: AX26
- FY '11 data was used

Figure 9 – Solid Waste

- 569 tons of municipal solid waste
- -17.1 MTCDE – Resulting Greenhouse Gas Emissions
- HWS Solid Waste is sent to Ontario County Landfill.
- Ontario County Landfill utilizes methane recovery and electricity generation at this facility.
- Solid Waste data can be found in “Carbon GHG_ReferenceSheet_FY'13,” Sheet: SolidWaste-Compost, Cell: K27

Figure 10 – Purchased Electricity Transmission & Distribution Losses

- 186.4 MTCDE – Resulting Greenhouse Gas Emissions
- Emissions resulting from electricity transmission and distribution losses
- Data can be referenced from file “CarbonMapCalculator_FY'13,” Sheet: S_eCO2_Sum, Cell: U34, Scope 2 T&D Losses

² Student Commuting data gathering methodology provided in file: Carbon Calculator_Reference_7-6-2, Sheet: Student Corrected 10-11

³ Faculty and Staff commuting data gathering methodology provided in file: Carbon Calculator_Reference_7-6-12, Sheet: Fac/Staff Corrected 10-11

Figure 10 – Emission Reductions

- 2,983 MTCDE (RECs) Offsets – Resulting Greenhouse Gas Emission Offsets
- Compost weight from on-campus composting at the leaf pit was included in the offsets. Compost taken to an off-campus facility, Cayuga Compost, was not included, because it is not conducted on-campus as is required by the Campus Carbon Calculator
- Offset Data can be found in “GHG_ReferenceSheet_FY’13,” Sheet: Renewable Energy Credits

Table 1 – Details of Source Emission Categorized by Scope

	Source	Source Units	Resulting GHG Emissions
Scope 1	Natural Gas	121,537 MMBTU	6,462 MTCDE
	Direct Transportation	28,001 gallons of gasoline 2008 gallons of diesel	274 MTCDE
	Agriculture	3,600 lbs of Synthetic Fertilizer & 2,400 lbs of Organic Fertilizer	4.8 MTCDE
	Refrigerants	8 lbs HFC-134a & 18 pounds of R-404a	42 MTCDE
	Total (Scope 1)		6,782.8 MTCDE
Scope 2	Purchased Electricity	12,129,332 kWh	3,015 MTCDE
	Total (Scope 2)		3,015 MTCDE
Scope 3	Air Travel	4,586,437 miles	2331.1 MTCDE
	Total Land Vehicle Miles	8,735,627.7 miles	3,519.7 MTCDE
	Solid Waste	569 tons	-17.1 MTCDE
	T&D Electricity Loss		186.4 MTCDE
	Total (Scope 3)		6,020.1 MTCDE
Offsets	Renewable Energy Credits	12,000,000 kWh	2,983 MTCDE
	Compost	37.74 tons	58 MTCDE
	Total (Offset)		3,041 MTCDE
Net Emissions	Net Emissions (Total Emissions - Offset)		12,776.9 MTCDE

Table 2 – Scope 1 & Scope 2 year-to-year Greenhouse Gas Emissions

Year	2006/2007* (June-May)	2008/2009 (June-May)	2010/2011 (June-May)	2012/2013 (June-May)
GHG Emissions	10,028 MTCDE	10,086 MTCDE	9,534 MTCDE	12,834.9 MTCDE
GHG Emissions per Student	5.3 MTCDE/ Student	5 MTCDE/ Student	4.6 MTCDE/ Student	4.6 MTCDE/ Student
GHG Emissions per Campus Sq. Ft.	.007 MTCDE/ Sq.Ft.	.0067 MTCDE/ Sq.Ft.	.0066 MTCDE/ Sq.Ft.	.0066 MTCDE/ Sq. Ft.

*FY '07 serves as GHG inventory baseline, because it is the first comprehensive GHG report completed by HWS

Chart 1 –Scope 1 & 2 Emissions; Referenced from Table 1

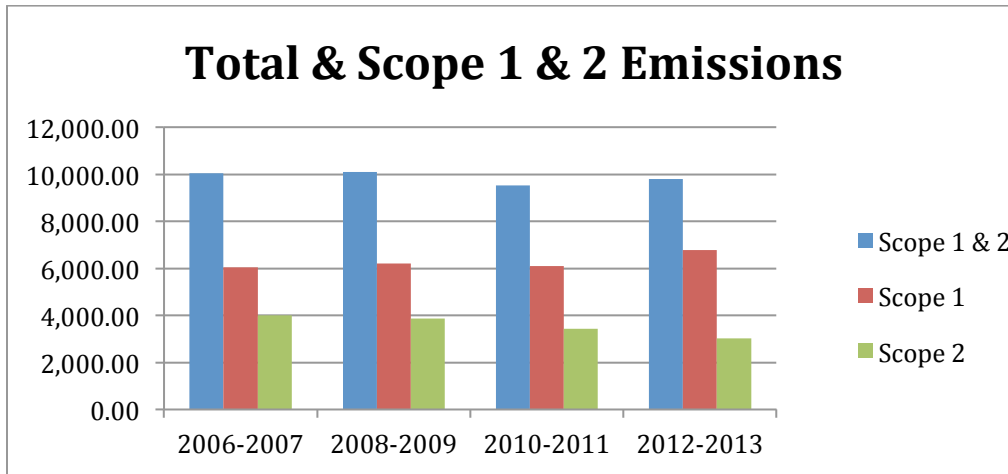


Chart 2 – Scope 1 & 2 Emissions per Student; Referenced from Table 2

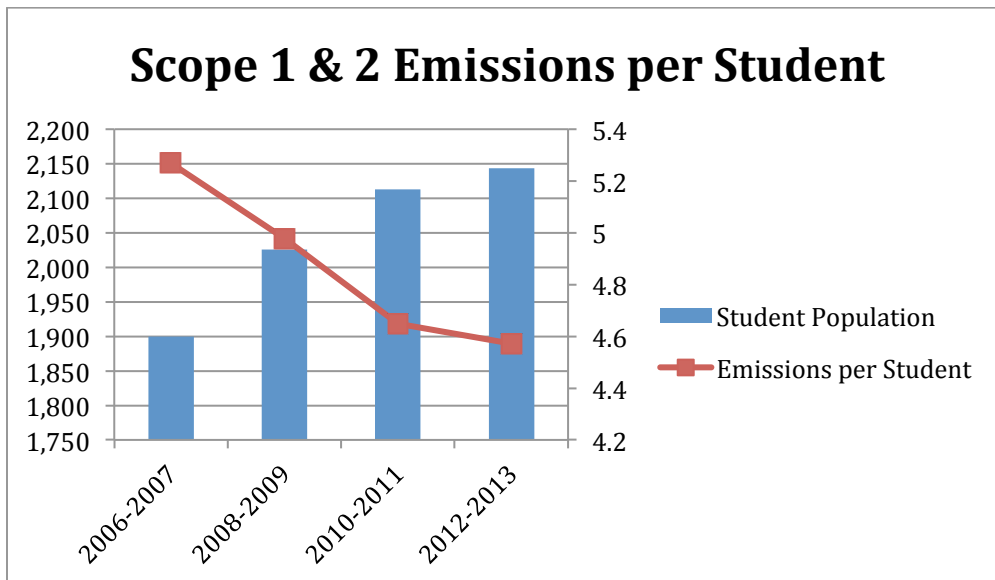


Chart 3– Scope 1 & 2 Emissions per Campus Sq. Ft.; Referenced from Table 2

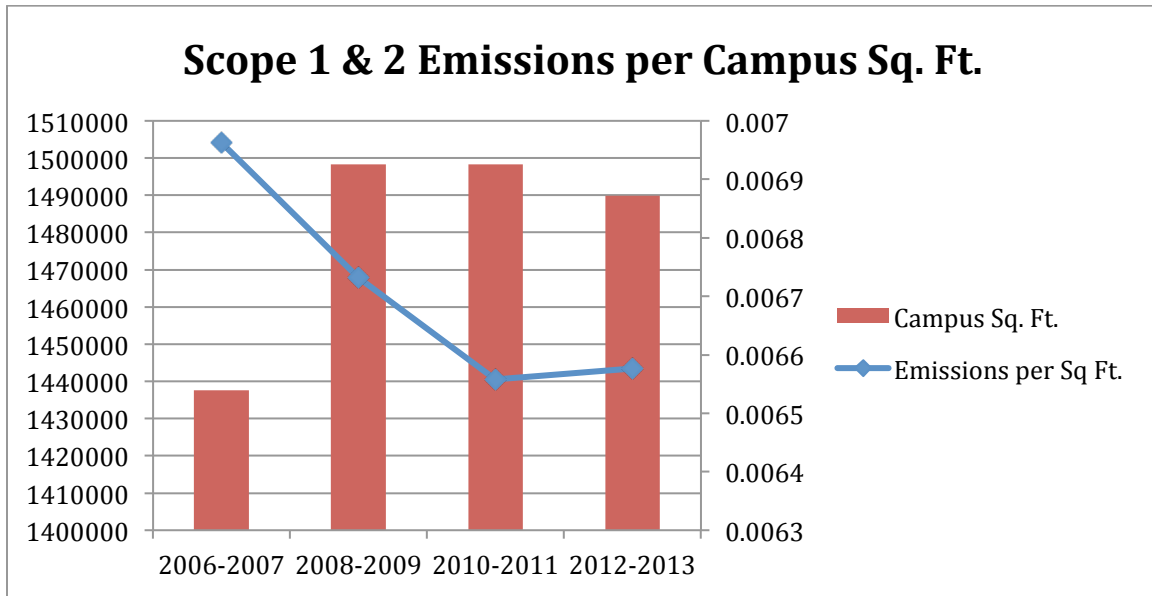


Chart 4– Scope 1, 2 & 3 not adjusted for Offsets; Referenced from Table 1

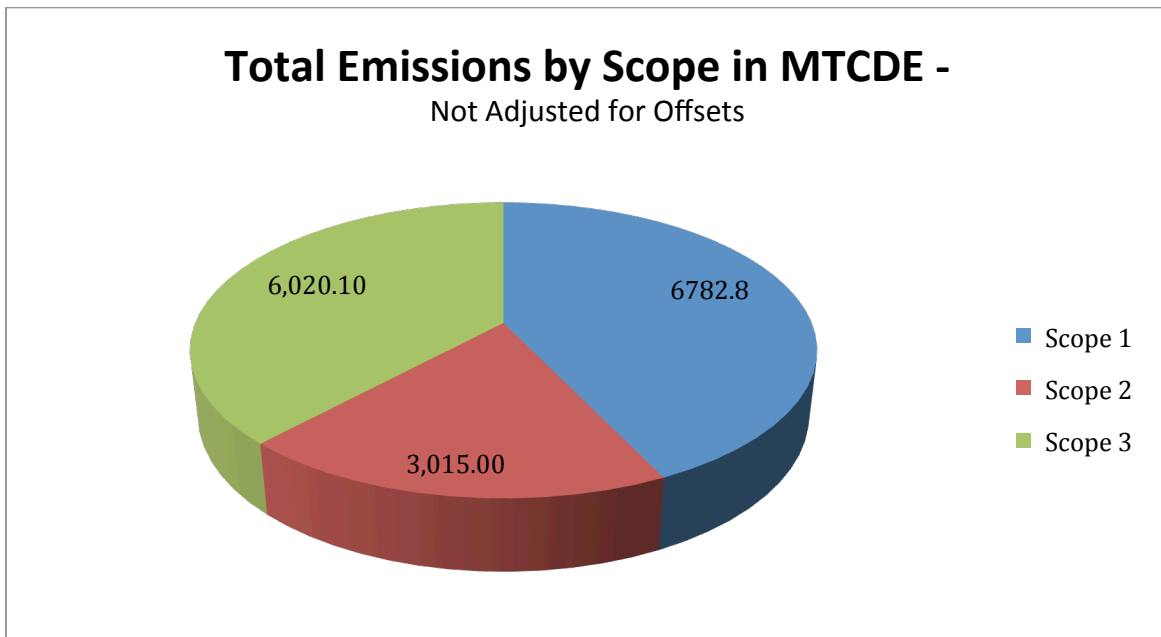


Chart 5– Scope 1 Source Breakdown; Referenced from Table 1

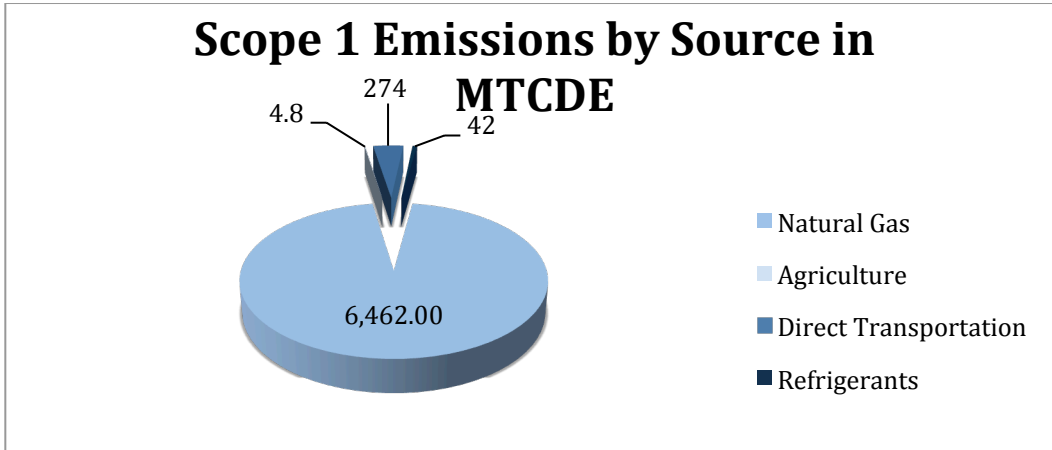


Chart 6 – Scope 2 Source Breakdown; Referenced from Table 1

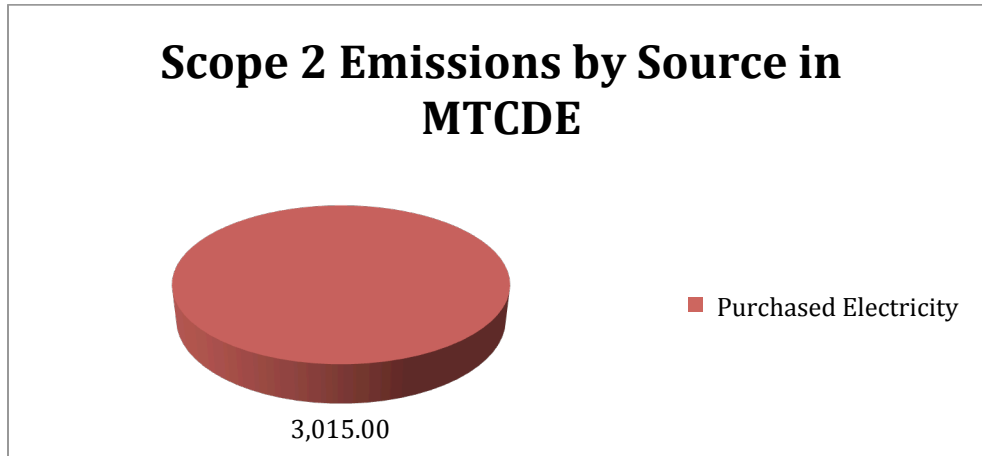


Chart 7– Scope 3 Source Breakdown; Referenced from Table 1

