An aerial photograph of the Hobart and William Smith Colleges campus. The image shows a large green lawn in the foreground with several brick buildings. In the background, there is a large blue lake and a dense forest. The sky is clear and blue.

HOBART AND WILLIAM SMITH COLLEGES

GREENHOUSE GAS
INVENTORY
2016



GREENHOUSE GAS INVENTORY FY 2016

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1.1 OVERVIEW

Hobart and William Smith Colleges (HWS) is required to submit regular updates to its greenhouse gas (GHG) inventory reports in support of its participation in Second Nature’s Climate Commitment. This inventory is an update which summarizes HWS Colleges’ GHG emissions for the 2016 fiscal year (FY) (June 2015 through May 2016) and supplements the previously published inventories for fiscal years 2007, 2009, 2011, and 2013.

In FY 2016, HWS Colleges’ net emissions were 10,792 metric tons of carbon dioxide equivalent (MTCDE). Of the total emissions, 55% were attributable to direct emissions (Scope 1), 0% were attributable to indirect emissions (Scope 2), and 45% were attributable to induced emissions (Scope 3). Indirect emissions were completely offset by the purchase of renewable energy credits (RECs) in the form of wind credits.

1.2 DATA COLLECTION

SCOPE 1 (*Direct Emissions*):

- On-Campus Stationary (*Heating*)
 - 100,185 Decatherms Natural Gas
 - 5,327 MTCDE
- Campus Vehicles
 - 25,712 Gallons Gasoline
 - 5,682 Gallons Diesel
 - 517 MTCDE



- Refrigerants and Chemicals
 - 60 Pounds R-404A
 - 107 MTCDE
- Fertilizers¹
 - 2,900 Pounds Synthetic at 23% Nitrogen
 - 1,000 Pounds Organic at 12% Nitrogen
 - 3 MTCDE

TOTAL SCOPE 1 EMISSIONS: 5,954 MTCDE

NET SCOPE 1 EMISSIONS: 5,954 MTCDE

SCOPE 2 (*Indirect Emissions*):

- Purchased Electricity
 - 10,959,411 kWh
 - 2,279 MTCDE
- Offsets
 - RECs: 13,934,000 kWh²
 - 2,898 MTCDE

TOTAL SCOPE 2 EMISSIONS: 2,279 MTCDE

NET SCOPE 2 EMISSIONS: 0 MTCDE³

SCOPE 3 (*Induced Emissions*):

- Commuting
 - 308,302 Miles (*Students*)⁴
 - 4,093,805 Miles (*Faculty/Staff*)⁵
 - 4,402,107 Miles Total
 - 1,612 MTCDE
 - See Appendix A

¹ Nitrogen content calculated using a weighted average of the different fertilizers used.

² RECs were subtracted from purchased electricity before being converted from kWh to MTCDE.

³ RECs cannot count as offsets towards scope 1 or 3 emissions, so a negative may not be entered for purchased electricity.

⁴ Student commuting data came from the 2011 student commuting survey.

⁵ Faculty/staff commuting data came from the 2017 faculty/staff commuting survey. Miles were found using an average of the miles commuted one-way (faculty 14 miles & staff 15 miles), days commuted per week (faculty 3.5 days & staff 5 days), and weeks commuted per year (faculty 40 weeks, staff 49 weeks).



- HWS Funded Travel
 - 2,663,599 Miles (*Air*)¹
 - 241,855 Miles (*Car*)²
 - Athletic Travel³
 - 53,554 Miles (Bus)
 - 657,572 Miles (Air)
 - See Appendix B
 - 1,707 MTCDE
- Study Abroad⁴
 - 3,163,870 Miles Total⁵
 - 1,526 MTCDE
 - See Appendix C
- Solid Waste
 - 542 Metric Tons (*Landfilled Waste with CH4 Recovery & Electric Generation*)
 - -16 MTCDE
 - Diverted Waste⁶
 - 134 Metric Tons (*Recycled Waste*)
 - 82 Metric Tons (*Composted Waste*)

TOTAL SCOPE 3 EMISSIONS: 4,838 MTCDE

NET SCOPE 3 EMISSIONS: 4,838 MTCDE

Emissions calculated using the UNH Carbon Calculator.⁷

¹ Calculated using total air travel funding divided by average price per mile for airfare (\$0.25/mile), as recommended by *Second Nature*.

² Calculated using total land travel funding divided by the HWS reimbursement rate (\$0.54/mile).

³ Calculated using 2015-2016 athletic team schedules from the HWS website. Miles calculated via *webflyer.com*.

⁴ Assumptions: Each student was flying out of Greater Rochester International Airport in Rochester, NY.

⁵ Air miles calculated using *webflyer.com*. Two trips fell across the fiscal year line, so only one-way was counted.

⁶ Diverted Waste is not included as an offset; it merely decreases our tonnage of landfilled waste.

⁷ UNH Carbon Calculator: <http://campuscarbon.com/Calculator.aspx>



1.3 SUMMARY TABLE

Emissions Source		FY 2007	FY2013 ¹	<u>FY 2016</u>	% Change FY'07 to FY'16	% Change FY'13 to FY'16
Scope 1 Emissions (MTCDE)	On-Campus Stationary	5,606	6,462	5,327	-5%	-18%
	Campus Vehicles	403	274	517	-31%	+2%
	Refrigerants & Chemicals	--	42	107	--	+155%
	Fertilizers	6	4.8	3	-50%	-38%
	Offsets	--	--	--	--	--
	Total Gross Emissions Scope 1	6,015	6,783	5,954	-1%	-12%
	Net Emissions Scope 1	6,015	6,783	5,954	-1%	-12%
Scope 2 Emissions (MTCDE)	Purchased Electricity	3,994	3,015	2,279	-43%	-24%
	Offsets	--	2,983	2,898	--	-3%
	Total Gross Emissions Scope 2	3,994	3,015	2,279	-43%	-24%
	Net Emissions Scope 2	3,994	32	0	-100%	-100%
Scope 3 Emissions (MTCDE)	Commuting	4,398	3,344	1,612	-63%	-52%
	HWS Funded Travel	1,282	923	1,707²	+33%	+85%
	Study Abroad	--	1,776	1,526	--	-14%
	Solid Waste	104	-17	(-16)	-115%	+6%
	Purchased Electricity Transmission and Distribution Losses	--	186.4	--³	--	--
	Offsets	--	-58	--	--	--
	Total Gross Emissions Scope 3	5,784	6,020	4,829	-17%	-20%
	Net Emissions Scope 3	5,784	6,020	4,829	-17%	-20%
TOTAL GROSS EMISSIONS		15,794	15,818	13,062	-17%	-17%
TOTAL NET EMISSIONS		15,794	12,777	10,783	-32%	-16%
NET EMISSIONS PER STUDENT (FULL TIME STUDENTS ONLY)		6.9	5.6	4.9	-29%	-13%
NET EMISSIONS PER SQ. FT. (1.44 Million SQ. FT.)		.011	.0088	.0075	-32%	-15%

¹ FY 2013 was our most recent inventory.

² The significant increase in HWS-funded travel is due to improved methods of capturing actual air miles; previous numbers were likely underestimated.

³ According to the official calculator, transmission and distribution losses are zero because of our REC purchases.



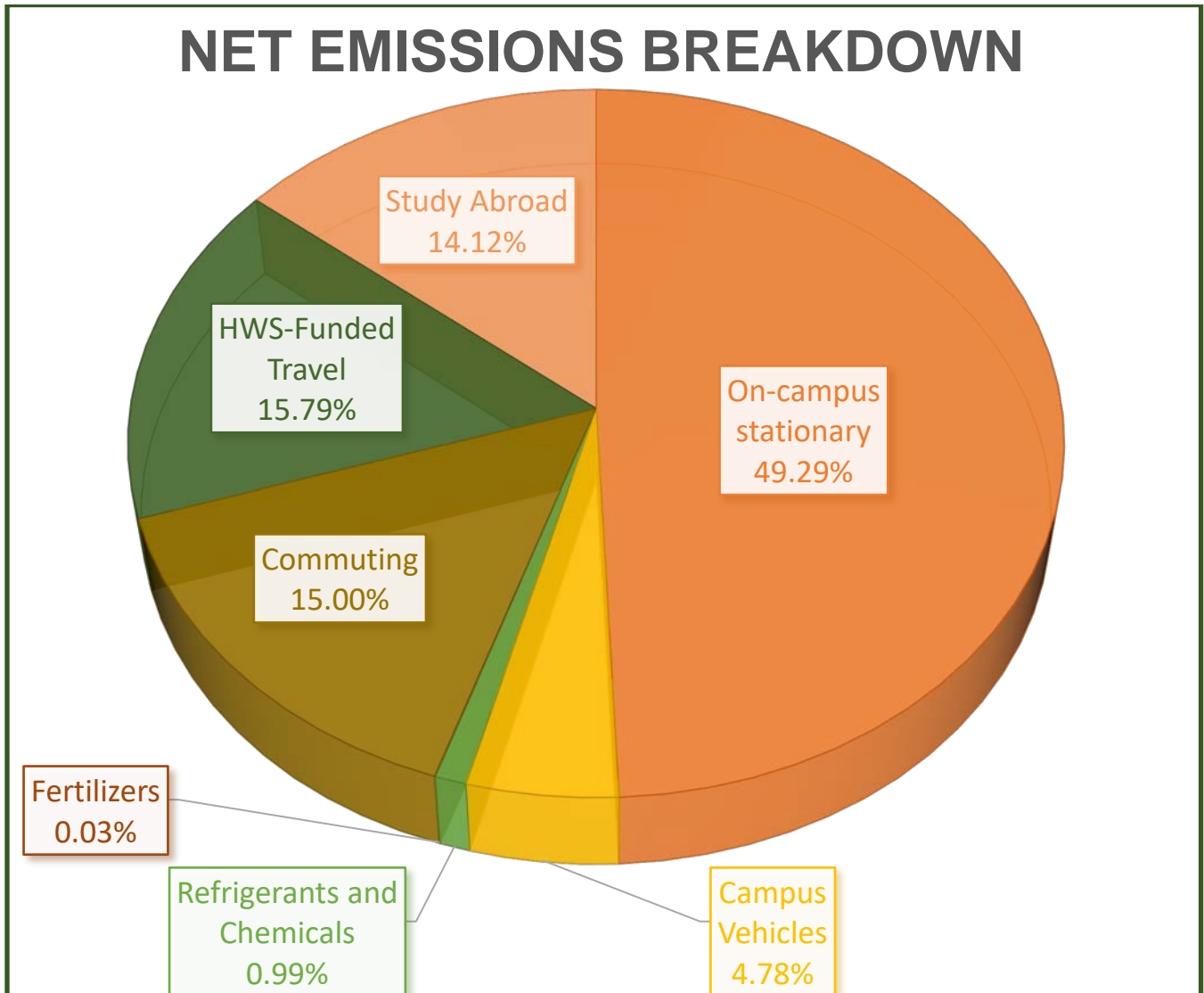
TRENDS FROM FY 2013 TO FY 2016

Net emissions decreased by 16% from FY 2013 to FY 2016 which is attributed to our increased purchase of RECs, as well as a decrease in both our scope 1 and 3 emissions.

From Scope 1, the resulting emissions from on-campus stationary and fertilizers both decreased between the 2013 FY and the 2016 FY. Natural gas consumption decreased and less synthetic fertilizer was used.

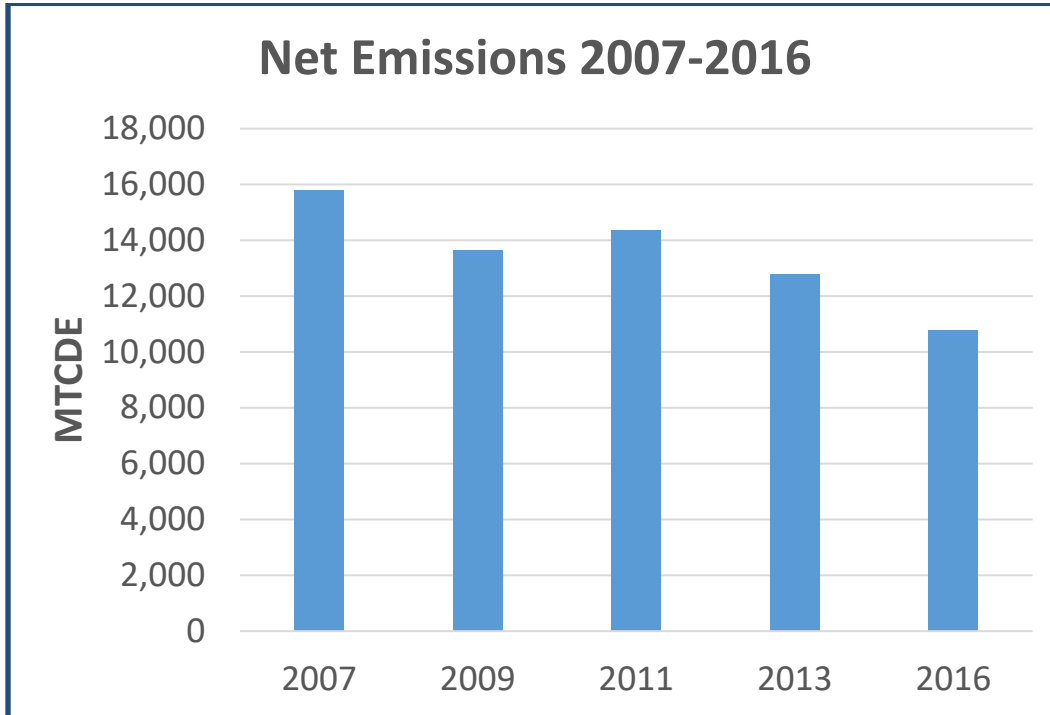
From Scope 3, the resulting emissions from commuting and study abroad travel both decreased due to improved methods of accurately capturing vehicle and air miles.

2.1 NET EMISSIONS BREAKDOWN

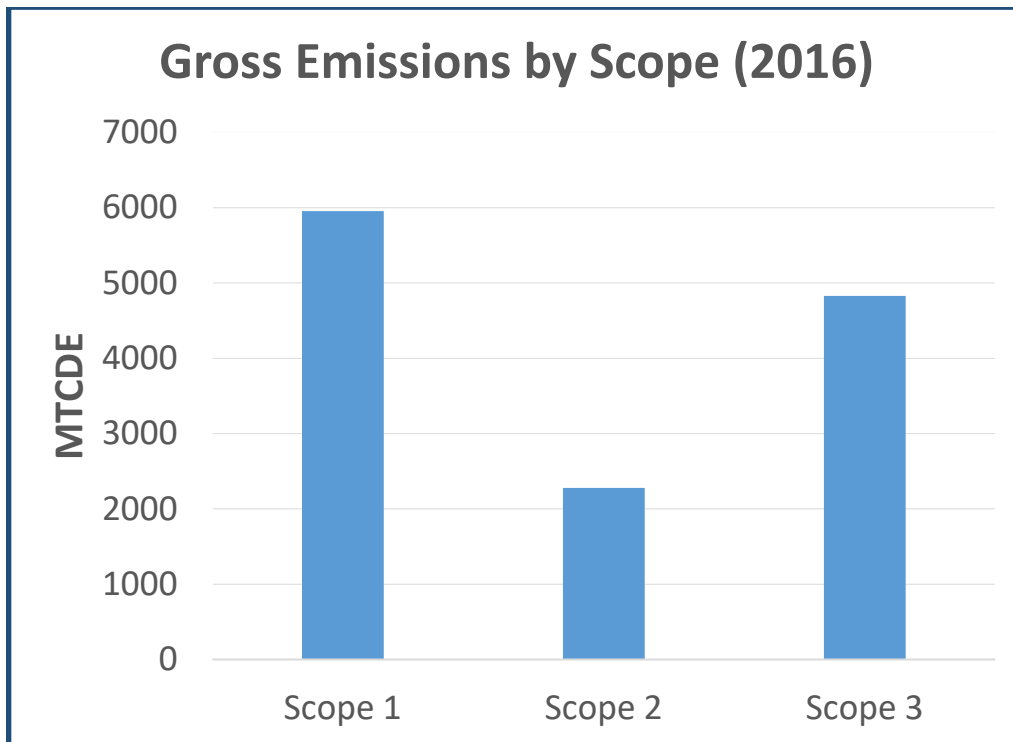




2.2 NET EMISSIONS 2007-2016



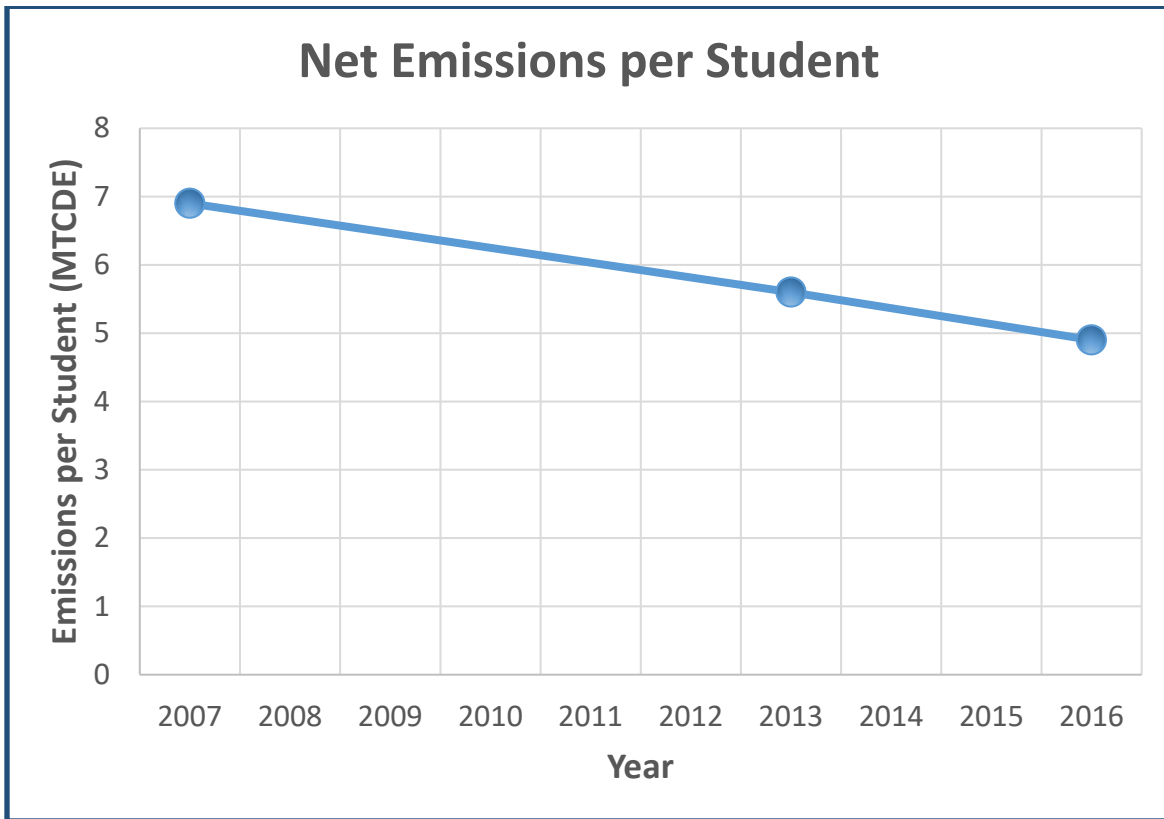
2.3 GROSS EMISSIONS BY SCOPE



- The above shows our gross emissions by scope before offsetting of scope 2 emissions.



2.4 NET EMISSIONS PER STUDENT



3.1 ACKNOWLEDGMENTS

Acknowledgments: Data collection & completion of inventory was conducted in the summer of 2017 by student intern Helen Wagner Maggitti, WS' 19, under the supervision of Professor of Economics and Environmental Studies, Thomas Drennen.

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- Tracy Strutz – Budget and Financial Analyst
- Angela Freeman – Controller



APPENDIX A.

STAFF SURVEY DATA (right-click, open)

FACULTY SURVEY DATA (right-click, open)



APPENDIX C. STUDY ABROAD DATA

<u>CGE Enrollments – Semester Programs Fall 2015-Spring 2016</u>		Round Trip (Miles)	Total
Brisbane, Australia	15	18,840	282,600
Townsville, Australia	4	18,760	75,040
Berlin, Germany	3	7,960	23,880
Sao Paulo, Brazil	1	10,020	10,020
Brussels, Belgium	9	7,400	66,600
Budapest, Hungary	11	8,780	96,580
Nanjing, China	2	14,260	28,520
Copenhagen, Denmark	23	7,700	177,100
Edinburgh, Scotland	16	6,540	104,640
Aix-en-Provence, France	13	7,960	103,480
Rennes, France	5	7,060	35,300
Freiburg, Germany	2	7,860	15,720
Jaipur, India	4	14,620	58,480
Galway, Ireland	22 + 1 faculty	6,220	143,060
Hikone, Japan	2	15,140	30,280
Maastricht, Netherlands	7	7,500	52,500
Auckland, New Zealand	14 + 1 faculty	17,400	261,000
Norwich, England	10	7,060	70,600
Perth, Australia	3	22,800	68,400
Prague, Czech Republic	18	8,200	147,600
Rome, Italy	39 + 3 faculty	8,700	365,400
Seville, Spain	21 +1 faculty	7,360	161,920
Hanoi, Vietnam	7	15,980	111,860
Bath, England	4	6,800	27,200
Bremen, Germany	3	7,600	22,800
San Jose, Costa Rica	5	4,640	23,200
Freiburg, Germany	2	7,860	15,720
Hong Kong	3	15,700	47,100
Amman, Jordan	1	11,560	11,560
Seoul, S Korea	2	13,300	26,600
London, England	16	6,980	111,680
Grahamstown, South Africa	3	16,760	50,280

Short-term Programs

London 5/19/-6/3/15	20 + 1 faculty	3,490 (ONE-WAY)	73,290
Barnaul, Russia 7/2-8/12/15	7 + 1 faculty	11,120	88,960
Panama City, Panama 12/29/15-1/17/16	10 + 1 faculty	4,700	51,700
Guatemala City, Guatemala 5/17-6/4/16	20 + 2 faculty	2,110 (ONE-WAY)	46,420
*Carmarthen, Wales 5/29-6/18/16	21 + 1 faculty	3,490 (ONE-WAY)	76,780

*Group flies in/out of London – bus to Carmarthen

GRAND TOTAL: 3,163,870