Ursinus College
Greenhouse Gas Inventory Report
FY 2008-2009

Prepared for Submission to the
American College and University Presidents' Climate Commitment (ACUPCC)
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by

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Abstract

This is Ursinus College's GHG inventory report for FY 2007-08 and FY 2008-09. It includes data from FY 2000 through FY 2010, along with projections to 2025. We used Clean Air-Cool Planet's Campus Carbon Calculator (Version 6.6) to calculate our emissions and track our data. This data was collected by one of our students and reviewed by staff and faculty in the Facilities Services Department, the Environmental Studies Program and the Office of Sustainability.

During the time between FY 2000 and FY 2010, Ursinus increased its student body by approximately 500 students (a 37 percent increase) and increased its building area by 350,000 square feet (a 42 percent increase). The data show fluctuations in GHG emissions between FY 2000 and FY 2010 between increases of up to 20 percent and a decrease of four percent. Since switching from oil to gas as our primary heating fuel, our GHG emissions have reflected increases of between one and three percent over FY 2000 emissions and one year that indicated a four percent drop from that level of emissions. The years with lower emissions are in part a result of sustainability measures adopted by our Facilities Services Department, and weather also plays a large part. Keeping our emissions under control, though not technically a "success" is nevertheless a substantial achievement, given the growth of our campus.

Ursinus staff members have been working on lowering our GHG emissions without the guidance of a climate action plan. The College currently employs a staff member who is tasked with writing the College's Climate and Sustainability Action Plan, which will outline a course toward net zero greenhouse gas emissions.

Goal

The goal of this report is to provide accurate and easy-to-understand information to the Ursinus community and to the ACUPCC about the College's greenhouse gas emissions. This report is file with the ACUPCC. It is a companion to our CA-CP inventory calculator, which is also filed with the ACUPCC. In addition, this report provides background data for our forthcoming Climate and Sustainability Action Plan.

Methods

Clean Air Cool Planet's Greenhouse Gas Inventory Calculator version 6.6 was used to calculate Ursinus College's carbon footprint. The calculator is one of several created for the purpose of developing a strategic plan to reduce greenhouse gas emissions with the ultimate goal of achieving carbon neutrality (see http://www.cleanair-coolplanet.org/ for more information).

To determine an institution's carbon footprint, the calculator demands past data (dating back to 1990 if possible, in order to track trends) and present data pertaining to institutional demographics, purchased electricity, on campus stationary sources of emissions, transportation, agriculture, solid waste, refrigeration/chemicals, and emissions offsets. There were several areas of potential emissions, including an on campus co-generation plant, incinerated

waste, coal, and animal agriculture, that do not apply to the operations of Ursinus College and were therefore excluded from the inventory.

It is important to acknowledge that while the CA-CP carbon calculator covers most major aspects of greenhouse gas emissions, it falls short in some areas. For example, there is no section that takes into account the emissions associated with transporting food and food supplies to Ursinus for dining. However, despite its imperfections, the calculator continues to be a critical step towards developing plans for emissions reduction and eventual carbon neutrality.

In order to calculate emissions more accurately and avoid having years for which data reflected no emissions, the CACP spreadsheet data for back years was populated with data that shows approximations of items such as building square footage and recycled paper content, for those years (1990-2004). For commuting data, the following assumptions were made in lieu of hard data: 100% of faculty and staff commute; there is no carpooling; eight 15-mile one-way trips are made per week (this accounts for part time employees as well as faculty who work from home); staff commute 49 weeks per year; and faculty commute 40 weeks per year, to account for summer research in other locations, vacation time, sabbaticals, etc. Students who live off campus (ten percent) were assumed to make ten 5-mile, one-way trips per week, for 32 weeks per year. Also, study abroad data for all years except FY 2009 are estimates based in part of FY 2009 data and in part on an internal report on the study abroad program. Data for study abroad travel will be updated for FY 2007 through present in future reports.

The current data reflects a more accurate picture of the College's emissions, however, there are still areas where we have imperfect information. Most notably is our Scope 3 Transportation Emissions. We do not include any information on faculty or staff travel, other than commuting, due to difficulties in collecting this data. We also do not currently include information on the travel emissions related to sports team travel. These are areas that we will be addressing in our next iteration of the GHG inventory for the ACUPCC reporting requirements. Additionally, we do not currently have data on solid waste-related emissions. This, too, will be added to subsequent reports.

In FY 2009, the College purchased offsets for 100 students. Students purchased 10 of these offsets and the College is claiming the remainder of those offsets. These offsets were calculated using the following process:

a) *Offsets: (750 lbs. CO2e offset per unit + 1200 lbs CO2e Offset per unit) x 90 (number of units we're claiming) = 175,500 lbs CO2e =>79.6 MT eCO2*

b) *Wind Power: 585 kWh wind power per unit x 90 (number of units we're claiming) = 52,650 kWh/(6,952 kWh/MT eCO2) = 7.6 MT eCO2*

c) *Combined: 79.6 + 7.6 = 87.2 MT eCO2*

The emissions data in this report is presented first in an overview format, and then by the three scopes that the ACUPCC uses for reporting data. The table below details the types of sources that are in each Scope.

Figure 1: Scope Emissions

	Definition	Examples
Scope 1	Emissions directly resulting from sources owned or controlled by the institution.	• On-Campus Stationary Sources Emissions from all on-campus fuel combustion (non vehicular) • Direct Transportation Sources - emissions from all fuel used in the institution's fleet • Refrigerants • Agriculture - N2O emissions from fertilizer use
Scope 2	Indirect emissions from sources that are neither owned nor controlled by the institution, and which are directly linked to on-campus energy consumption	Purchased electricity purchased steam purchased chilled water
Scope 3	All other indirect emissions associated with the activities of the institution, but produced by sources not owned or controlled by the institution	Schools are only required to report on: • air travel paid for by the institution (business travel) • travel influenced or encouraged by the institution (study abroad travel, daily commuting to and from work (not travel over breaks) Schools are not required to report on: • Solid waste • Upstream emissions

(Clean Air-Cool Planet, 2010) (American College and University Presidents' Climate Commitment)

Overview

Ursinus College's current quantified GHG emissions are the equivalent of approximately 8,900 metric tons (eCO2). Approximately 65% is sourced from On-Campus Stationary generation and on campus transportation (Scope 1); 15% of that amount is sourced from purchased electricity (Scope 2); and another 15% is related to commuting and study abroad travel (Scope 3). The remaining 5% is from waste and T&D losses. The table directly below was imported from Ursinus College's GHG Inventory calculator. It shows CO2, CH4, N20 as well as eCO2 numbers for the 2008-09 fiscal year.

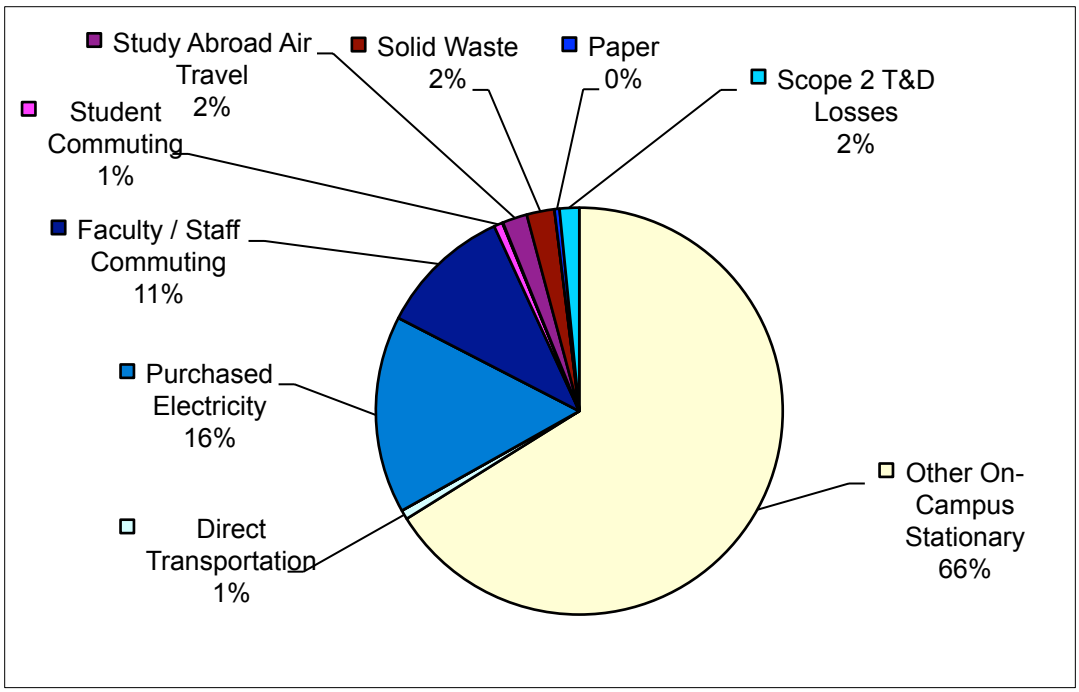
Figure 2: Summary of GHG emissions for FY 2008-09.

MODULE	Summary					
WORKSHEET	Overview of Annual Emissions					
UNIVERSITY	Ursinus College					
Select Year -->	FY 2008-09	Energy Consumption	CO_2	CH_4	N_2O	eCO_2
		MMBtu	kg	kg	kg	Metric Tonnes
Scope 1	Co-gen Electricity	-	-	-	-	-
	Co-gen Steam	-	-	-	-	-
	Other On-Campus Stationary	98,376.6	5,851,493.4	665.4	25.0	5,875.6
	Direct Transportation	930.7	64,346.4	12.0	4.2	65.9
	Refrigerants & Chemicals	-	-	-	-	-
	Agriculture	-	-	-	-	-
Scope 2	Purchased Electricity	103,248.1	1,120,639.8	10.6	921.7	1,395.6
	Purchased Steam / Chilled Water	-	-	-	-	-
Scope 3	Faculty / Staff Commuting	13,054.0	915,354.6	183.1	63.0	938.7
	Student Commuting	854.7	59,930.6	12.0	4.1	61.5
	Directly Financed Air Travel	-	-	-	-	-
	Other Directly Financed Travel	65.7	4,758.0	0.3	0.1	4.8
	Study Abroad Air Travel	1,487.2	291,986.2	2.9	3.3	174.1
	Solid Waste	-	-	7,836.2	-	195.9
	Wastewater	-	-	-	-	-
	Paper	-	-	-	-	35.8
	Scope 2 T&D Losses	10,211.4	110,832.5	1.0	91.2	138.0
Offsets	Additional					-
	Non-Additional					(87.2)
Totals	Scope 1	99,307.3	5,915,839.8	677.3	29.2	5,941.5
	Scope 2	103,248.1	1,120,639.8	10.6	921.7	1,395.6
	Scope 3	25,673.0	1,382,862.0	8,035.5	161.7	1,548.7
	All Scopes	228,228.4	8,419,341.6	8,723.4	1,112.6	8,885.8
	All Offsets					(87.2)
					Net Emissions:	8,798.6

(Source: the "S_Annual" spreadsheet in the CA-CP Calculator)

The graph below indicates a breakdown of our GHG emissions sources by percentage. This is the same information shown in the chart above, but in visual presentation format. This shows that the majority of the College's emissions are produced by our heat plant with commuting and purchased electricity being substantial contributors as well. It should be noted that commuting numbers are estimated and will need to be updated in future reports.

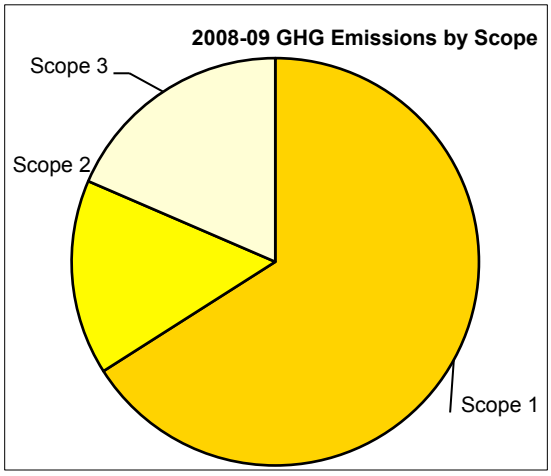
Figure 3: Sources of Ursinus College's FY 2008-09 GHG emissions by percentage.



(Source: the "S_Annual" spreadsheet in the CA-CP Calculator)

Finally, the following pie chart shows a breakdown of the College's GHG emissions by scope. This chart shows that Scope 1 emissions (those that we create on campus primarily from our heat plant) are our primary source of emissions. Our Scope 3 emissions are likely underrepresented in this data, which we hope to rectify in future iterations of our GHG inventory.

Figure 4: Ursinus College's FY 2008-09 GHG emissions by scope.



(Source: the "S_Annual" spreadsheet in the CA-CP Calculator)

Scope 1: (Heating & Cooling)

Given the available data, on-campus stationary sources of energy (i.e., heating and cooling via residual and distillate oil, natural gas, and propane) are responsible for the majority of GHG emissions – 66 percent. We are currently considering options for our heat plant that could reduce our emissions significantly, including shutting down our heat plant during the summer months (this would involve installation of supplemental heating and water heaters in each building). This would be a major step toward meeting our commitment to becoming carbon neutral. Our facilities staff is committed to decreasing our emissions output with a mind toward economic savings as well. The two will have to go hand in hand in order for institutions to afford the shift to carbon neutrality. Our heat plant is beyond its expected life cycle, but has been well maintained and is still functioning. However, we expect that we will have to replace our heat plant in the coming 10-20 years. At that time, we hope to be able to make a substantial reduction to our emissions through a more energy efficient system.

Scope 2 (Purchased Electricity)

The production of our purchased electricity currently contributes 15% of our greenhouse gas emissions. Up until January 2011, Ursinus purchases its electricity from Exelon Corporation. Eighty percent of its electricity was nuclear, 10% percent was coal-generated, 5% was hydroelectric, and 5% was generated by wind and landfill gases. Nuclear power plants do not generate greenhouse gases, although their waste is extremely hazardous. This explains why electricity does not account for a large majority of Ursinus' carbon dioxide emissions. For the period of this report, coal was the only sector of the College's purchased electricity that was a significant source of carbon emissions.

Scope 3 (Transportation)

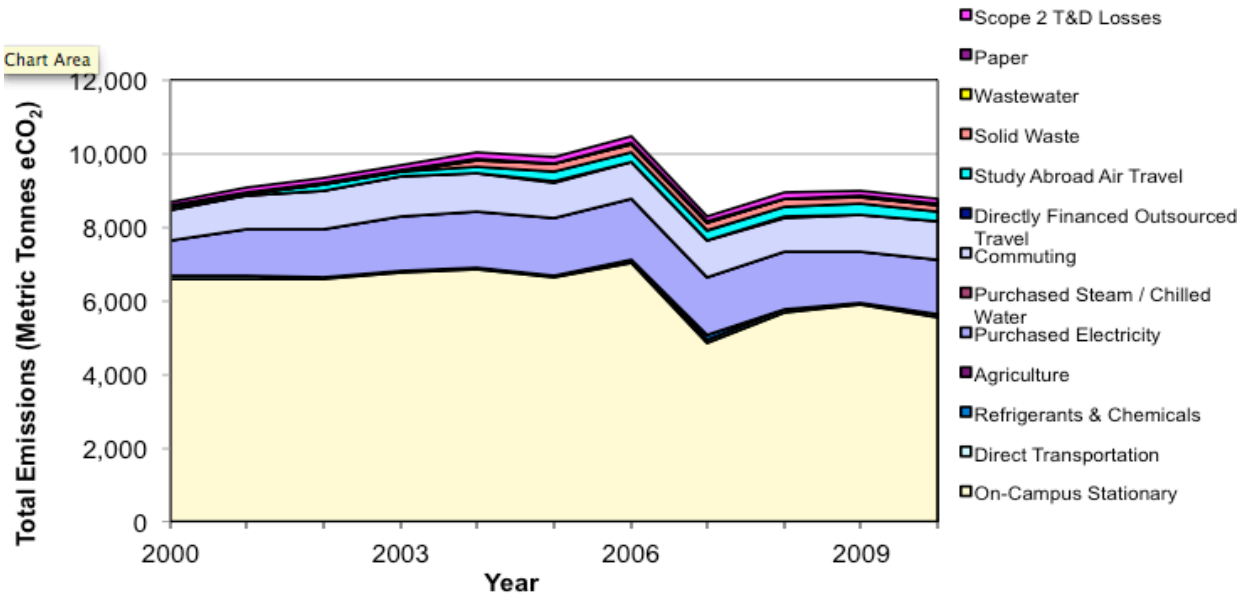
The greenhouse gas calculator divides transportation into three main categories: 1) student commuting and study abroad travel that is paid for, by or through the College; 2) faculty and staff transportation (both commuting and transportation that is job-related); and 3) facilities transportation. The Scope 3-related emissions that are accounted for in our current data set show that these factors make up 14 percent of our overall emissions. However, this number does not reflect our actual emissions. The data that has been collected to date is incomplete and/or estimated with regard to student and faculty/staff transportation for both commuting and job/study-related travel. Therefore the emissions shown for this area are likely lower than they are in actuality. This data will be added as it comes available. The only data that is accurate from this set is the FY 2008-09 study abroad travel miles number.

Trends

Ursinus began implementing sustainability projects in the years before 2007, when we became signatories of the ACUPCC. Projects included switching from oil to natural gas as our primary heat plant fuel, retrofitting buildings

with energy efficient lights, weather-proofing buildings, and coordinating our heating/cooling schedule with the building use calendar, among many others. The emissions impact of these projects can be seen in the figure below, which shows our emissions between 2000 and 2010. Our emissions have increased and decreased in the years between 2000 and 2010, however, it is worth noting that the College has increased its number of students, its building square footage, and its study abroad programming during this time period. The major fall off between FY 2006 and FY 2007, occurred as a result of the switch from using oil to natural gas for our heat plant. Our FY 2010 numbers, while not officially part of this report, do show continued decreases in our emissions.

Figure 5: Total emissions for FY 2000 through FY 2010.



(Source: G-Total Emissions worksheet in the CACP workbook)

Figure 6: Emissions for FY 2000 through FY 2010 with scope data, number of students, building square footage, and percent change from FY 2000 for emissions.

Year	Number of Students	Total Building Sq. Footage	Total Scope 1	Total Scope 2	Total Scope 3	Biogenic	Total Offsets	Total Emissions	Net Emissions	Percent Change from 2000
			MT eCO_2	MT eCO_2	MT eCO_2	MT eCO_2	MT eCO_2	MT eCO_2	MT eCO_2	
2000	1,252	816,727	6,665.8	976.0	1,027.1	-	-	8,591.1	8,591.1	
2001	1,308	816,727	6,663.1	1,284.9	1,132.8	-	-	9,003.1	9,003.1	5%
2002	1,352	1,001,661	6,639.6	1,316.6	1,366.5	-	-	9,167.5	9,167.5	7%
2003	1,468	1,048,049	6,826.3	1,462.0	1,406.8	-	-	9,539.8	9,539.8	11%
2004	1,484	1,048,049	6,885.1	1,539.4	1,591.7	-	-	10,034.8	10,034.8	17%
2005	1,552	1,048,049	6,696.4	1,539.4	1,659.4	-	-	9,797.5	9,797.5	14%
2006	1,548	1,108,320	7,124.5	1,625.6	1,692.8	-	-	10,345.1	10,345.1	20%
2007	1,544	1,108,320	5,061.0	1,566.9	1,677.8	-	-	8,207.9	8,207.9	-4%
2008	1,560	1,160,464	5,766.4	1,544.1	1,624.0	0.5	-	8,836.6	8,836.6	3%
2009	1,656	1,160,464	5,941.5	1,395.6	1,667.7	1.1	(87.2)	8,885.8	8,798.6	2%
2010	1,718	1,160,464	5,622.0	1,483.4	1,675.6	1.1	-	8,683.1	8,683.1	1%

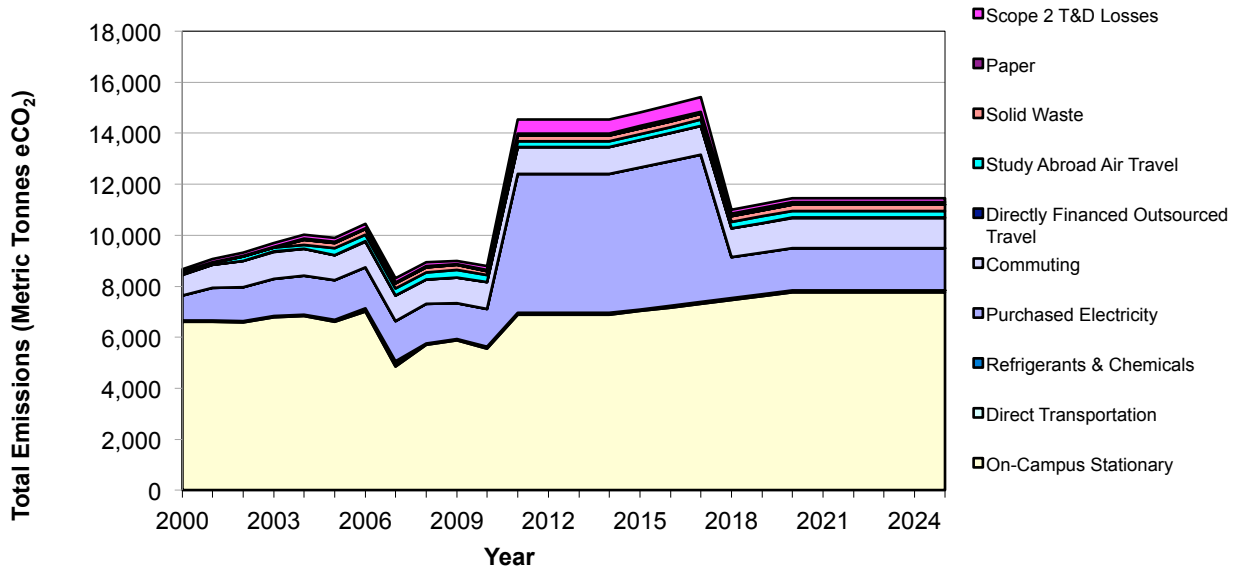
(Source: S_eCO2_Sum worksheet from CA-CP workbook)

Longer term trends are more difficult to predict. The graphs below in Figures 7 and 8 show Ursinus' projected emissions, given a set of assumptions for future years. The assumptions are based on some known variables (such as fuel mix for our electricity provider) and some unknown variables, such as growth of the College in student body and building square footage. The CA-CP calculator allows for customized trends for growth, and this was used to create the trends seen in the chart.

The sharp upswing in purchased electricity emissions in FY 2011 is tied to our current contract with Constellation Energy – a seven-year contract. Constellation has a fuel mix that is much higher in coal (40%) as well as oil and natural gas than our past provider. This change will have a substantial impact on our carbon emissions over the next seven years (the term of our contract) as shown in the figures below. This highlights the difficulties of making decisions that have disparate effects on a school's economics and its emissions. When that contract is renewed, we hope to choose an energy company that can give us a better fuel mix that will lower our emissions. Education campaigns combined with energy reduction strategies are currently in place for addressing the Scope 2 emissions on campus.

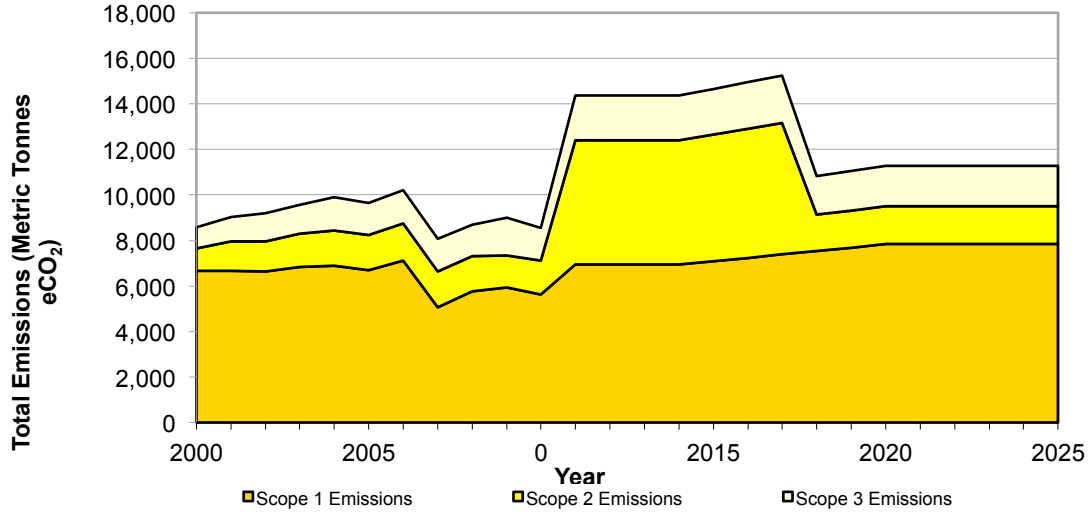
The graphs below do not reflect future projects to limit or reduce our GHG emissions. When project data is entered, it will be reflected in the chart with the lines decreasing toward zero. At this point, we have not used this calculator to assess projects. We hope to do this in the coming years.

Figure 7: Projected emissions (FY 2000 – FY 2025) based on current and projected emissions.



(from the "G-Total Emissions" spreadsheet in the CA-CP Calculator)

Figure 8: FY 2000 – FY 2025 actual and projected emissions by scope.



(Source: "G-ScopeEmissions" spreadsheet in the CA-CP Calculator)

Moving Forward

As we take steps to improve our data collection, particularly in Scope 3 emissions, we will see our emissions numbers rise to more accurately reflect of our real emissions. This will allow us to make informed decisions about the potential impacts of emissions reductions projects that we consider. It will also take the uncertainty out of our GHG inventory and allow us to know what our actual goals are.

The GHG inventory will now be undertaken with supervision and guidance from a member of our Office of Sustainability. We will continue to have a student assisting in the process. Also, the inventory will be undertaken during the school year - after the business office has all of the numbers in place to assist with the data collection. We will be working on facilitating data collection at the source points – this will happen in coordination with employees in various departments.

Also, we expect that our Climate and Sustainability Action Plan will have been adopted before the end of FY 2012, and this will give us an additional tool as we approach lowering our greenhouse gas emissions.