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The Campus Environment Committee (CEC), in collaboration with President's Cabinet and Facilities Services, has conducted a comprehensive campus greenhouse gas emission inventory. This inventory quantifies the gases released by college-related activities that contribute to global climate change. We utilized an energy management firm to help us with survey design, data collection and verification. They are an independent consulting firm that works on comprehensive energy and carbon management programs for educational facilities across the country.

This initiative is driven by Goal III (Informed, Responsible Citizenship) of Skidmore's Strategic Plan, which states in part that Skidmore will "enhance our ability to function as a socially and environmentally responsible corporate citizen," and "make the Skidmore campus an environmental laboratory, increase our emphasis on responsible planning for sustainable operation and continue efforts to reduce the College's 'environmental footprint'."

One of our primary goals in this process was to establish a quantitative baseline of Skidmore's greenhouse gas emissions to inform our carbon reduction goals and strategies and thereby contribute to our overall goals for sustainability.

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Climate change mitigation has risen to the forefront as one of the most critical issues facing society today. The Intergovernmental Panel on Climate Change (IPCC), the international scientific body charged with evaluating the causes of climate change and its potential impacts, stated in its most recent report, "Unmitigated climate change would, in the long term, be *i e y* to exceed the capacity of natural, managed and human systems to adapt."(IPCC, 2007) Some observations of climate change include: "increases in global average air and ocean temperatures, widespread melting of snow and ice and rising global average sea level" (IPCC, 2007). According to a report released on January 21st, 2010 by the National Aeronautics and Space Administration (NASA), the past decade was the warmest on record (since 1880). These observations are followed by observed effects of climate change, which include: changes in terrestrial biological systems such as bird migration patterns, changes in species' geographical ranges changes in disease vectors, and increases in coastal damage from flooding in many areas (IPCC, 2007). These are just a few of the changes that are beginning to arise due to the influence of climate change. Although these changes are coming faster than scientists anticipated, according to the IPCC, "Societies can respond to climate change by adapting to its impacts and by reducing GHG [greenhouse gas] emissions (mitigation), thereby reducing the rate and magnitude of change" (IPCC, 2007).

n o B c g o nd

A greenhouse gas (GHG) is a gas that is tra7.65072(g)9.06211(r)-756417(a)3.15789(n)-0.956417(H8208(()2.3612.5545

scientists, and all other GWP are based on this metric. For example, methane has a GWP 23 times that of CO2, so it has a value of 23.

Using the GWP of each gas, scientists can convert emission amounts of each individual gas into an equivalent carbon dioxide emission amount (or Carbon Dioxide equivalent, CDE), so all the emitted greenhouse gases can be added together to obtain a total footprint. For example, 1 metric tonne of emitted CO2 (GWP of '1') plus 1 metric tonne of emitted methane (GWP of 23) equals 24 metric tonnes of CDE (MTCDE)[1].

According to the GHG Protocol, there are six anthropogenic (human-generated) gases to inventory.
1. Carbon Dioxide (CO2) - Enters the atmosphere through the burning of fossil fuels (oil, natural gas, coal, and gasoline), solid waste, trees and wood products. CO2 is also the result of various chemical reactions in manufacturing or raw resource extraction.
2. Methane (CH4) – Is emitted during the production and transport of coal, natural gas, and oil, and results from livestock, agricultural practices, and decay of organic wastes.
3. Nitrous Oxide (N2O) – Is emitted during agricultural and industrial activities and is a byproduct of combustion of fossil fuels and solid waste.
4. Hydrofluorocarbons (HFCs)
5. Perfluorocarbons (PFCs)
6. Sulfur Hexafluoride (SF6).

Numbers 4,5, and 6 are generically called fluorinated gases, which arise from chemical processes, and are used in a variety of substitutes for previously identified ozone-depleting substances. These are typically emitted in small quantities, but they are potent GHG. Various forms of fluorinated gases have GWP from 300 to as high as 3300 times greater than an equivalent measure of CO2 alone[2].

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A greenhouse gas emission inventory is a report that documents the total GHG footprint, in metric tonne carbon dioxide equivalents (MTCDE), for which the College is either directly or indirectly responsible.

GHG emissions arise from the consumption or use of carbon-based fuels, products, and chemicals in the following activities to condition space, produce goods, generate purchased electricity, transport people and products, and build, operate, and maintain facilities, housing, and grounds.

Several organizations have developed greenhouse gas emission inventory protocols to help entities account for their greenhouse gas emissions. The IPCC defined a methodology for countries to account for their national inventories. In 1998, a collaboration between the World Resources Institute and The World Business Council for Sustainable Development created the Greenhouse Gas Protocol, which is now the internationally accepted GHG accounting and reporting standard that has been voluntarily adopted by dozens of governments and thousands of enterprises, including the U.S. EPA Cl

An organization's carbon footprint is analogous to an "MPG sticker" that shows how efficiently/sustainably an organization is functioning in terms of natural resource consumption and the impact upon the environment[3].

M odo o y

Based on the Greenhouse Gas Protocol, emissions are separated into three categories or "scopes" defined by the College's level of control of the emissions. **S cop** includes direct emissions from sources that are owned and controlled by the College. **S cop** includes indirect emissions resulting from the generation of purchased energy (for example, electricity), and **S cop** includes indirect emissions that are a result of activities related to the College, but are not owned or controlled by the College (for example, employee commuting). A greenhouse gas inventory not only accounts for activities that generate greenhouse gas emissions, but it also gives credit to activities that reduce greenhouse gas emissions such as carbon sinks (contractually preserved forests), renewable energy credits (RECs) and offset purchases. RECs are purchased certificates that represent energy generated by renewable sources such as wind or solar. Carbon sinks and offset purchases are investments in projects that reduce carbon emissions such as a tree planting project. Below is a table showing examples of standard Scope 1, 2 and 3 emissions as well as the emissions from Skidmore that fall under each category.

Greenhouse Gas Protocol and Skidmore Scope Emission Boundaries

S cop c p on	**o oco' S nd d Bo nd**	**S d o ' S cop Bo nd**
S cop c on **ó n d nd con o d y**		

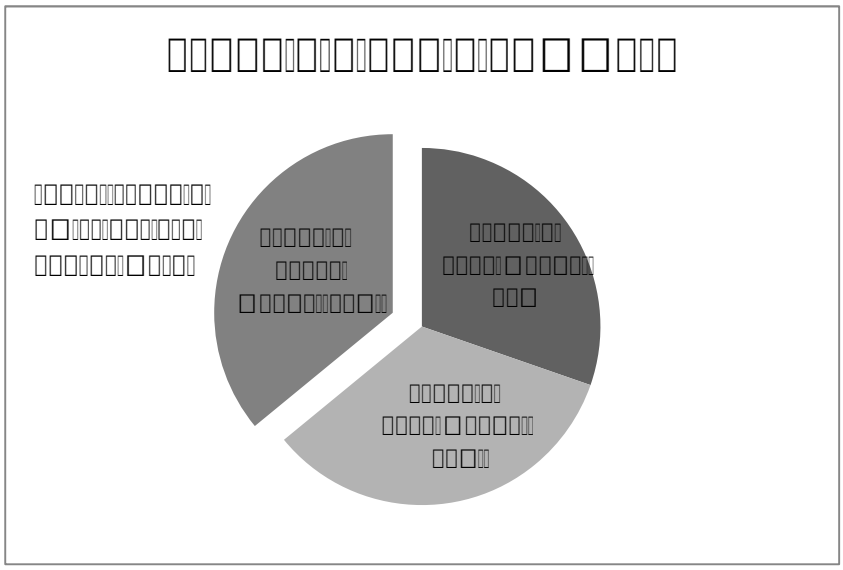
Skidmore's Scope 3 Emission Details

[illegible]	[illegible]
Faculty/Staff daily commuting	GHG inventory survey was extrapolated to create a daily commuting emission average per person
Faculty/Staff business/academic train travel	GHG inventory survey was extrapolated to create an average train travel emission per Faculty/Staff
Faculty/Staff business/academic air travel	Travel agency as well as GHG survey. Data was *not* extrapolated to create an average per person for agency booked travel, but air travel collected from the survey was extrapolated.
Chartered bus travel	Bus company usage and mileage report
Student travel to and from home to Skidmore	GHG inventory survey was extrapolated to create an emission average for the student population
Study abroad travel	Office of Off Campus Study & Exchanges
Solid Waste	Waste hauler bills.

Scope 3 emissions are an optional reporting category; extrapolation of some data to make estimates for the community was required.

In February 2009, 30% of the Skidmore community completed the Greenhouse Gas Inventory Commuting/Travel Survey and Environmental Attitude and Awareness Survey. The Clean Air Cool Planet Campus Emissions Calculator requires a 10% participation rate in order to use the data. The survey was devised to collect not only driving distances, but also commuting and travel habits. Since we had a 30% participation rate, the carbon emission equivalent data was extrapolated to a MTCDE average for Faculty/Staff commuting, train travel, individually booked air travel, and student travel to and from home. The extrapolated data was then "back checked" using a zip code analysis for commuting; however, the extrapolated survey data was the data used for the final report. The travel data reported for travel agency-booked air, athletic air, chartered bus and study-abroad air were used directly to calculate emissions and were not extrapolated.

During fiscal year 2009 Skidmore emitted approximately 27,288 MTCDE with 8,277 MTCDE in Scope 1, 9,203 MTCDE in Scope 2 and approximately 9,808 in Scope 3 (Figure 1).



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This greenhouse gas inventory reveals a relatively even spilt between the College's Scope 1, 2 and 3 emissions: 30, 34, 35 percents respectively. However, it is important to note the distinct difference in data confidence and data types among the three Scopes. Scope 1 and 2 data came primarily from utility bills, so we can be relatively confident about their accuracy.

For Scope 3 emissions, some of the data came directly from sources: study abroad air travel, travel agency-booked faculty/staff academic/business air travel, chartered bus travel and athletic air travel so, as with scope 1 and 2, we can have confidence in the accuracy of these data. The scope 3 emissions calculated for faculty/staff commuting, non-travel agency-booked air travel, faculty/staff train travel and student travel to and from home were collected from the survey and then extrapolated to the community. Although this methodology is well within the boundary of compliance with the Greenhouse Gas Protocol and Clean Air Cool Planet Campus Carbon Calculator, the results should be treated as a grosser approximation than those from Scope 1 and 2.

end of the year waste reduction program, “Give and Go”. To learn more about Skidmore’s sustainability initiatives, please visit http://cms.skidmore.edu/sustainability/.

This greenhouse gas emission inventory will be updated in two years.

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n o –Atmospheric gases, such as carbon dioxide and methane, that affect the Earth’s average temperature by trapping infrared radiation (heat) in the atmosphere.

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