Tulane University 2013 & 2014 Greenhouse Gas Emissions Inventory

Introduction

As the urgency of climate change increases, it is crucial that major institutions take responsibility for their contribution to the issue as well as take actions to significantly reduce their impact. Tulane University, as a prominent institution situated in one of the cities in the world most vulnerable to climate change--New Orleans, Louisiana--has an even greater responsibility to confront global warming. An important part of reducing the university's greenhouse gas (GHG) emissions is determining the annual emissions that result from university activities.

Since 2006 the Tulane Office of Sustainability has taken an annual inventory of the university's GHG emissions. The Greenhouse Gas Emissions Inventory acts as an easily accessible tool for the Tulane community and beyond to monitor the university's progress in reducing GHG emissions. It also encourages the institution to improve environmental sustainability and take responsibility in addressing climate change. To compile the 2013 and 2014 inventory and produce the report, we collected bills and information from departments across the entire university regarding Tulane's energy usage for these two years. We entered these data into a calculator that multiplies each energy use by the amount of greenhouse gases it emits.

All greenhouse gas inventories categorize GHG emissions into three categories called Scope 1, Scope 2, and Scope 3. Scope 1 includes direct emissions from the institution, including both stationary fossil fuel combustion (such as boilers and power plant equipment) and mobile fossil fuel combustion (such as university vehichles). Scope 2 includes indirect emissions resulting from electricity, steam, and chilled water purchased by the university from a utility. Scope 3 consists of indirect emissions that are not directly released on campus, but result from university activities. Scopes 1 and 2 are easier to calculate than Scope 3, as the measurement is largely based on actual fuel bills. Greenhouse gas emissions inventories vary in the Scope 3 emissions they include. The Scope 3 emissions included in Tulane's inventory are student and staff commuting, business travel, study abroad, and solid waste disposal.

Since 2006, GHG emissions have remained relatively stable, as this report will show. This demonstrates Tulane's success in improving efficiency and reducing energy use, since the university has grown in population and size between 2006 and 2014. Still, there is much room for further improvement, as very large reductions of greenhouse gases will be needed to avoid catastrophic climate change.

Methods

Calculator

Since 2006, the Tulane University Office of Sustainability has used the Clean Air-Cool Planet (CA-CP) Campus Carbon Calculator, the tool officially recommended by the American College and

University President's Climate Commitment (ACUPCC), to calculate Tulane's GHG emissions. In 2014 CA-CP released their newest version of the carbon calculator, Version 7.0. For the 2013 and 2014 GHG Emissions Inventory Report we used this version of the calculator.

Building Data

Within the university, buildings represent the greatest contributor of GHG emissions. Buildings generate GHG emissions in a variety of ways by using different resources. For this report we collected data regarding their usage of electricity, natural gas, steam, chilled water, propane, and refrigerants.

Electricity and Natural Gas

Entergy provides Tulane's two main campuses with electricity and natural gas. We were able to obtain most of Tulane's Entergy bills and enter energy usage data into the CA-CP calculator to obtain GHG emissions information. The Entergy bills show electricity usage in kilowatt hours and natural gas usage in CCF. Natural gas data must be in MMBtu to be entered into the calculator. To convert CCF to MMBtu, we multiplied the natural gas usage by 0.1028. Previous years used 0.1026 as a conversion factor, but the effect that this difference has on the results is insignificant.

Not all bills were available to us due to both time constraints and a reorganization of Facilities Services in July 2014. The table below lists locations that lacked data and the method we used to account for the missing data.

Table 1

Location	Utility	Method of Accounting for Missing Data
Aron Residence Hall	Electricity	Aron apartments have individual electrical meters. HRL used to provide these data, but we could not determine who now has these bills. We averaged electricity usage from 2011, 2012, and 2013 to get a figure for 2014 due to lack of data
1555 Poydras Street	Electricity	As of April 2014, the owner of 1555 Poydras no longer includes overall building energy data in its month bill to Tulane. We averaged electricity usage from 2011, 2012, and 2013 to get a figure for 2014 due to lack of data
1555 Poydras Street Servers	Electricity & Natural Gas	We were missing data for March, May and June 2014. To obtain an annual electricity total we used the average of the 9 months of data that we did have and substituted that figure for March, May and June. Natural gas usage was so small and irregular that we did not account for the 3 missing months of data.
Biloxi, MS Campus	Electricity	Carried electricity usage from 2012 for both 2013 and 2014 due to lack of data
Madison, MS Campus	Electricity & Natural Gas	Carried electricity usage from 2012 for both 2013 and 2014 due to lack of data
Houston, TX Campus	Electricity	Carried electricity usage from 2012 for both 2013 and 2014 due to lack of data

Purchased Steam
The bills that we received listed steam usage in Mlb, or million pounds. To convert this to MMBtu we multiplied Mlb by 1.003342.

Purchased Chilled Water
The bills that we received listed chilled water usage in ton-hours. To convert this to MMBtu we multiplied ton-hours by 0.012.

Propane
The buildings that use propane include Hebert Center, the Primate Center, and the Tulane Medical Center. In previous years we had propane usage data from A Studio in the Woods, but we did not receive this data since 2009. If this building did use propane, the amount would be so small as to be considered insignificant. 2014 was the first year we received propane bills from the Tulane Medical Center. For the Primate Center, the 2014 data came without units. We were unable to get back in contact with the person who provided us with the data, so we assumed that the units were in gallons, as is standard for propane, and which also seemed to align with previous years' data.

Refrigerants
Refrigerants are included in the annual GHG Inventory because they are a significant contributor to global warming. They are often substantially more potent greenhouse gases than carbon dioxide, meaning that they capture more heat in the atmosphere and warm the climate more. "Global Warming Potential" (GWP) measures how much heat GHGs trap using the heat-trapping capacity of a similar mass of carbon dioxide as a reference, and is commonly used in refrigerant reporting.

Facility Services provided us with the refrigerant data for 2013 and 2014. Table 2 below shows the amount of refrigerants used in 2013 and 2014 and their corresponding GWPs.

Table 2

Refrigerants Used in 2013 and 2014		
Refrigerant	**GWP (100-year values)**	**Amount Used (lbs)**
HFC-134a	1,430	2,600
HCFC-22	1,810	550
R-11	4,680	600
HFC-134a	1,430	1,170
R-123	76	600

Key: orange = 2012; blue = 2014
Sources: IPCC 4th Assessment Report; LEED Reference Guide Version 4

Vehicle Fleet

In July 2012 Tulane began using a new fuel card system for campus vehicles. When pumping gas from the Uptown motor pool or purchasing gas off-campus, each department charges their fuel purchases to this special credit card. Retif Oil & Fuel, our fuel supplier, is able to provide us with a summary that lists the type and amount of fuel purchased by each

department. This system allows us to track fuel usage more comprehensively and accurately, as the numbers are streamlined and do not require individuals within departments to self-report using receipts. Because the type of fuel purchased is listed on the summary, we were able to track not only gasoline and diesel usage, but also to see that several departments in 2013 and 2014 used Ethanol (E85), a more environmentally-friendly fuel, for the first time. Ethanol users included Tulane CPREG, the Downtown Tulane University Police Department and Tulane Sports Club.

In addition to the fuel card summary report, in 2014 the vehicle fleet fuel use includes fuel purchased by the Tulane National Primate Research Center and downtown campus Facilities Services.

Commuting

In March 2014 we conducted a new transportation survey to understand commuting habits of students, faculty and staff by sending out a campus-wide email. We received 2,826 replies by the first week of April, which accounted for almost 16 percent of the total campus population, a percentage large enough to represent campus commuting patterns. The survey participants included 1,429 students, 405 faculty and 992 staff. We used the 2014 survey for both the 2014 and 2013 GHG Inventory, assuming similar commuting habits for both years, as the survey before that was conducted in 2010 and therefore less relevant.

Because both the commuting survey and the vehicle fleet fuel card included data from the Tulane Shuttles, some emissions from the shuttles may have been counted twice. In the commuting survey, those who take the shuttle are considered the same as those who take the bus, with their emissions added to the overall commuting total (Scope 3), while emissions from the fuel use of the shuttles are included in Scope 1. This double-counting will need to be investigated. Those who drive cars, SUVs or trucks are calculated together under the "drive alone" category (without regard to the fuel efficiency of the vehicle) as the calculator does not provide the option to distinguish them from each other.

Waste

To obtain the tonnage of waste that went to a landfill we used both estimates and actual weighed measurements. For the Downtown Health Sciences Center, we estimated the tonnage based on the number of container pickups for 2013 and 2014. Uptown waste data was not reported in 2013 due to a switch in waste management companies in December 2013. Therefore, we carried estimates from 2012 for the 2013 Uptown waste, which were estimated from both weighed waste for some locations and periodic sampling for others. For 2014, the all Uptown campus trash was weighed as it was picked up or delivered to the landfill.

Study Abroad

To calculate emissions that resulted from students studying abroad, we first collected information regarding the number of students that traveled to each country in 2013 and 2014. We then used the website http://www.transtats.bts.gov/Distance.asp?pn=0 to calculate the mileage to each study abroad destination with the assumption that each student left from the closest international hub to

New Orleans – Houston George Bush Intercontinental Airport. We also assumed that students arrived in the largest international airport of the destination country. The website generated the miles in between the airports, which we then multiplied by the number of students going to that site. We totaled the miles then multiplied by two to account for a round-trip. We believe there was an oversight in GHG Inventory Reports from 2006-2012 because the total number was not multiplied by two. We did not go back to previous reports to correct this mistake, and the graphs in this report show emissions from one-way trips for 2006-2012, and round-trips for 2013 and 2014.

Business Travel

The data regarding emissions from business travel came from Tulane's accounting department's business travel reimbursement records. We received information regarding reimbursements for money spent on traveling within the US by car, within the US by air, and traveling internationally by air. We used the money spent on travel and divided it by the cost per mile for each mode of transportation in order to obtain the total miles traveled. We put the miles traveled both by air and ground into the CA-CP calculator to calculate GHG emissions due to business travel.

Results

Total emissions from all sources in 2013 were 129,712metric tons of carbon dioxide equivalents ($MTCO_2e$), and total emissions in 2014 were 114,193$MTCO_2e$.

Graph 1

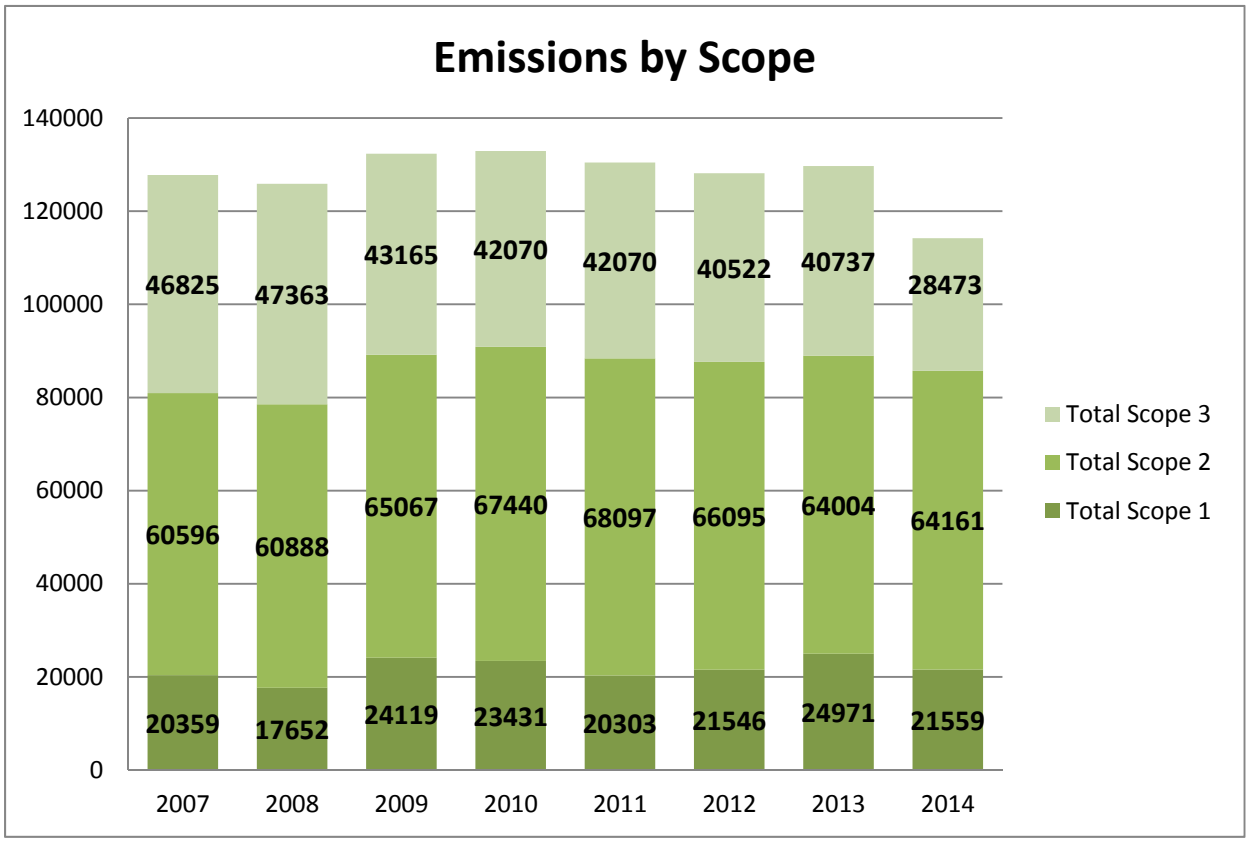

Table 3

Total Emissions by Sector (MTCO2e)								
Sector	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**
Buildings	86,183	83,855	94,065	96,554	94,138	92,855	87,849	84,601
Travel	32,746	33,178	28,223	24,807	25,925	24,216	20,002	7,942
Commute	5,630	5,728	6,261	6,423	6,616	7,108	13,284	12,713
Waste	1,053	1,072	987	1,249	1,579	1,383	1,031	1,029
Study Abroad	1,578	1,524	1,440	3,126	1,358	1,301	2,469	2,831
Fleet	590	545	1,376	781	852	1,301	1,127	1,118
Offsets	0	0	0	0	-82	0	0	0
Total	127,781	125,902	132,352	132,940	130,386	128,164	125,762	110,234

Discussion

When analyzing GHG emissions of an institution, the most significant categories of emissions are Scopes 1 and 2. These represent energy that Tulane generates itself or purchases directly. Scope 3 is less critical in the evaluation because it represents emissions over which Tulane does not have direct control. We did calculate several types of Scope 3 emissions, because these activities can result in a significant amount of GHG emissions.

Since 2007 total emissions have changed very little, with Scopes 1 and 2 slightly higher in 2013 and 2014 than in 2007. When comparing 2007 to 2014's total emissions, there was a 10.6% decrease. However, when looking only at Scope 1 and 2, emissions have increased by 5.6% from 2007 to 2014. This increase may be due to both an increasing student population and increased building area. Total emissions decreased slightly from 2013 to 2014 despite the fact that both Yulman Stadium and Greenbaum Residence Hall came online in August 2014.

Before the next inventory, Tulane Office of Sustainability staff should reevaluate the way Scope 3 emissions data are collected and calculated. 2014's business travel data showed a striking decrease from previous years. It is likely that this is due to changes in how these emissions were calculated, rather than a large decrease or change in actual business travel. We calculate business travel emissions by using the amount of money that Tulane reimbursed those who traveled on business, so it is possible that changes made in the accounting procedures, such as the use of Concur, could explain these differences. Conversely, the commuting GHG emissions for 2013 and 2014 are significantly higher than in previous years, even though commuting has shifted slightly away from driving. Due to time constraints, we were unable to determine why we found commuting emissions to almost double from 2012 to 2013/2014. It may be due to the method of the new survey, or changes in the calculator.

Conclusion

This report has given a comprehensive overview of Tulane University's total greenhouse gas emissions for 2013 and 2014. Although total emissions have decreased since 2007, Scope 1 and Scope 2 emissions have increased by 5.6%. At the same time, the Intergovernmental Panel on Climate Change states that we must reduce GHG emissions globally by 40-70% (with 2010 as a baseline) by 2050, and to near-zero by 2100, if we are to have a likely chance of not surpassing a 2°C increase in warming.[1] In 2015 President Michael Fitts approved a Climate Action Plan for Tulane, which recommends specific measures to reduce Tulane's greenhouse gas emissions. The plan includes a first target of reducing emissions 15% below 2007 levels by 2020, and a second target of 30% below 2007 levels by 2025. Future Greenhouse Gas Inventory Reports will serve as crucial checks to ensure that Tulane is achieving reductions and making steady progress towards these targets.

Tulane University's 2013-14 Greenhouse Gas Emissions Inventory was authored by Jamie Garuti, Environmental Studies 2015 and Jiaxin Fan, M.B.A. 2014. Jiaxin Fan collected the 2013 emissions data, prepared preliminary tables, and drafted a 2013 report. Jamie Garuti collected the 2014 data and wrote the final 2013-14 report.

[1] http://www.ipcc.ch/pdf/ar5/pr_wg3/20140413_pr_pc_wg3_en.pdf