University of Wisconsin-Eau Claire
Greenhouse Gas Inventory &
Recommendations for Achieving Climate Neutrality
2012

Presented to Chancellor James Schmidt

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Executive Summary

The total University Carbon Footprint for the 2011/12 fiscal year was 38,100 MT of eCO$_2$, with contributions from the on-campus steam heating plant (33%), electricity purchased from Xcel Energy (22%), transportation-related emissions from commuting and university-related travel (43%), and waste disposal and other chemical emissions (2%) as shown in Figure 1.

![Figure 1: Total eCO$_2$ for the UW-Eau Claire 2011-2012 Year.](image)

Compared to the previous three carbon tracking estimates, emissions due to electricity use have decreased while transportation emissions have increased (Figure 2). Electricity-related emissions have declined in part due to the State of Wisconsin’s increasing purchases of “green power” credits on behalf of UW-System schools, as well as the changing fuel portfolio of Xcel Energy. Some of the variability in category emissions from year-to-year may be attributed to improvements in data collection, accounting, and analysis techniques, most notably the transportation emissions category. However, no attempt has been made to adjust data from previous greenhouse gas reports. The values below are shown as originally reported.

The overall result of this analysis is that the University’s reported carbon footprint has decreased slowly, by approximately 800-900 MT eCO$_2$ (about 2.2%) per year over the past three reporting periods. Since 2010, several improvements have been made to reduce the university’s carbon footprint. The main focus has been on significant reductions in electricity and fuel use due to lighting upgrades, greater heating and cooling efficiency, in addition to multiple energy efficiency improvements throughout Facilities Management, Housing and Residence and University Centers. The increased use of natural gas rather than fuel oil and coal has also led to reduced emissions. Partially offsetting these improvements
in this and future inventories is the construction of new campus buildings, adding to the total gross square feet (GSF) of buildings to light, heat and cool.

![Reported UW-Eau Claire Carbon Footprint, MT eCO₂](image)

**Figure 2: Reported UW-Eau Claire Carbon Footprint, MT eCO₂ from 2007-2012.**

The elements of the carbon footprint analysis with the greatest uncertainty make up the balance of eCO₂ emissions. As indicated above, part of the increase in emissions estimates from transportation was due to better accounting of transportation-related emissions that are not easily quantified. These include the largest contributors to emissions from the transportation component: university-related air travel (49%) and commuting (22%), and are elements for which we have no objective records. Therefore, estimates must rely upon self-reported survey data. Each year, the survey has been modified to be more comprehensive and to better capture the full impact of university-related travel. Those two categories are followed by study abroad/national student exchange (17%), for which we have much more comprehensive records, and do not need to depend upon survey data.

Those resulting from landfilling of waste (the largest portion of the component related to waste disposal and direct chemical emissions) changed in part due to different recycling practices of our contracted waste hauler as they moved to a “single stream” system that no longer counted paper waste separately, eliminating a previously reported emission source in the current report. But the most significant difference was related to changes in assumptions in the calculation of greenhouse gases emitted from landfilled waste. Because Veolia captures methane emitted from the landfill for electricity generation, the eCO₂ emissions factor is reduced; this was considered in the current report but not in the previous report, so that emissions from that source was over-reported in 2010.

By acting on the recommendations listed in this report and by utilizing AASHE and American College & University Presidents’ Climate Commitment (ACUPCC) resources, the carbon footprint at UW-Eau Claire can be further reduced. Additionally, the university should work with sustainability groups on campus to increase awareness among students, faculty, staff and administrators about the values and importance of working towards the goal of climate neutrality.
Recommendations

The following recommendations were chosen based on their feasibility and impact on the total University Carbon Footprint

High Priority Recommendations

Provide access and convenience for non-drivers and education for all

Walking, biking, or taking the bus should be made more appealing. This can be done through better availability of and access to bike parking, more convenient bus schedules to reduce crowding, and improved biker and pedestrian safety.

Transportation survey respondents indicated that there is not enough bicycle parking on campus to meet the needs of bikers and potential bikers. Survey respondents were concerned about abandoned bikes taking up bike rack spaces and poorly designed or positioned bike racks that damage bikes or prevent both sides of the rack from being used.

The bus is often overcrowded, especially in the winter. Buses often have to drive past the last few stops on a route without picking up any passengers because there is no room left. Additional busses could be added in high demand times. Another example of poor bus planning is the mismatch between bus schedules and class schedules. For example, buses often leave the University just before or just as classes are ending or they arrive on campus seconds before or just after classes are starting. In order to encourage bus ridership, bus schedules should be adjusted to better align with class start and end times.

Students also desire more bus availability after 4pm. Students with late afternoon classes are finding it difficult to use the bus when they have to wait for up to an hour for their bus to arrive and then experience delays at the transfer center. Instead, many students elect to drive to campus in order to avoid delays and excessive wait times.

The transportation survey also indicates concerns regarding biker and pedestrian safety. Pedestrians and bikers would both prefer clearly defined bike routes through campus and improvements in safety at the main campus end of the pedestrian bridge. Both of these are addressed in the campus master plan. The University should address this portion of the plan as soon as possible.

Bikers and pedestrians would also like city enforcement of snow removal, better lighting on and off campus, designated bike lanes on city streets, and education of bikers, pedestrians, and drivers on the rights and responsibilities of each group (for example, cars must yield to pedestrians in crosswalks according to state law, and cars must provide bikes with at least three feet of clearance when passing in the same lane).

Many of these recommendations require collaboration with the City of Eau Claire and with Eau Claire Transit. For more details about these recommendations, please see the transportation recommendations section.
Invest in sustainable energy generation on campus

Installing renewable energy technologies for generating electricity, such as a wind turbine or solar panels, are important steps toward becoming carbon neutral. Although purchase and installation costs may be high, these investments will be offset through savings in energy costs. This longer-term solution would have three major effects for the campus.

Generating the electricity on campus would reduce the amount of electricity purchased from Xcel energy. This savings alone, over the lifetime of the wind turbine or solar panel, may exceed the cost of installation. A solar assessment conducted in 2010 indicated a positive return on investment for solar panels on McIntyre Library. Generating the electricity from renewable energy sources would also decrease the carbon footprint of the campus. Electricity purchased from Xcel energy is derived from fossil fuels and thus has high carbon emissions. Solar or wind energy are both carbon-neutral and thus could substantially lower the campus carbon footprint.

Although investing in sustainable energy generation on-campus has a high start-up cost, it leads to two different returns on investment: reductions in UW-Eau Claire’s energy costs, and reductions in purchased RECs currently used to offset our greenhouse gas emissions.

For further details on the feasibility of installing wind and solar energy generation, please see the energy recommendations section.

Increase access to properly labeled recycling and trash bins

Composting and recycling do not contribute to the UW-Eau Claire carbon footprint. Sending garbage to the landfill does. It is important to educate students on what happens when they throw items into the trash bin so that they become more likely to use the recycling and composting bins.

In order to change campus behavior, trash cans should be relabeled with the word “landfill.” Educating students on what is happening to the items they are disposing of (i.e. whether it is going to the landfill or to be recycled) will make them more aware of their behaviors. This can be done either by covering up the word “trash” on existing waste receptacles with the word “landfill” with a sticker, or by putting clear signage near every trash can.

There should also be more composting bins. Composting bins should be available with clear signage near every food service area. Finally, recycling and composting bins should be provided in outdoor areas. For further details and feasibility of relabeling trash cans and increasing availability of composting bins, including specific location recommendations, please see the waste recommendations section.

General Recommendations
Transportation Recommendations
Short-Term Goals

1. Purchase Offsets
At UW-Eau Claire, nearly 50% of the transportation footprint and 20% of the total carbon footprint is caused by air travel. Air travel is used by the Study Abroad and National Student Exchange programs as well as many university-related trips to conferences or sporting events. The University prides itself on the high amount of students participating in study abroad, national student exchange, and traveling to conferences for research because it improves the quality of their experience at Eau Claire. Because the University values these travel experiences, it is difficult to reduce emissions from these sources.

Instead, the University should purchase carbon offsets. Carbon offsets are a way of purchasing credits for initiatives that compensate for the emissions generated from travel; these credits can then be applied to reduce the campus carbon footprint. The University would be funding certified companies to plant trees or generate renewable energy elsewhere. To avoid these offset purchases, it makes more sense for the University to first install renewable energy on campus (see top recommendations) and have on-campus tree planting certified as an offset before purchasing offsets from outside companies.

2. Collaborate to Improve Bus Schedules
Encouraging University members to use the bus systems avoids emissions due to individual automobile travel, so it is important that the buses are as convenient as possible for commuters. In the transportation survey (see appendix), when asked to choose an option which would most encourage respondents to ride the bus more often, the most popular response was “Bus routes/stops which fit my schedule.” Thus, we recommend performing a detailed analysis of the bus schedules. UW-Eau Claire should work closely with the City of Eau Claire and Eau Claire Transit on this project to try to make bus schedules that align more closely with class schedules. It might be possible to adjust bus schedules and routes to allow more people to ride the buses. Some additional examples can be found in the top recommendations section.

3. Collaborate to Enforce Snow Removal
Respondents to the transportation survey asked for better enforcement of snow removal during the winter months. UW-Eau Claire should collaborate with the City of Eau Claire in order to make walking easier, safer, and more feasible in the winter months through snow removal on sidewalks. Encouraging walking would decrease the carbon footprint by decreasing the need for personal automobile travel.

4. Provide a Hub for Commuters
Bus riders need a warm place in the winter to wait for the bus on campus. In the past, they have used the hallway just outside Kjer Theater. The University should create a designated space; it could even be in that same location, where bus riders know they are welcome to wait for the bus. The only additions that would need to be made would be a seating area to make waiting more comfortable, signage indicating that it is a designated waiting space, and perhaps computer terminals.

The location just outside Kjer Theater is ideal because it is an enclosed space near the bus stop. It already has a route map and a place for brochures to be provided. It is also already known as an unofficial place to wait for the bus. However, a commuter hub may also benefit others. This location has the added benefit of being near Zorn Arena, which has shower and changing facilities that should be made available to bikers.
Long-Term Goals

1. Collaborate to Make Area More Bike Friendly
In order to improve safety for bikers, drivers, and pedestrians, the University should collaborate with the City of Eau Claire to create clear bike lanes in the surrounding area and to make intersections safer for bicycles. This will require extensive civic planning and infrastructure, but the result will be beneficial both to the city and to UW-Eau Claire. Increasing the safety for bikers will increase the number of people biking to campus, decreasing the carbon footprint from automobile use.

Energy Recommendations
Immediate or Ongoing Improvements

1. Steam Line replacement
As the steam lines become older, their insulation becomes less effective, making them less efficient. Several pipes were replaced in a project that began at the end of the 2011-12 fiscal year; the 2011-12 steam data represents steam requirements of the steam lines at the least efficient point in their lifetime. Hopefully, the ongoing steam pipe replacement increases the efficiency of the campus heating system, decreasing the steam requirements on the heating plant. This would improve efficiency, decrease the amount of fossil fuels consumed, reduce costs, and decrease the carbon footprint of the campus.

2. New Davies Center
The new Davies Center will continue to participate in Xcel Energy’s Windsource program; 100% of the electricity used by that building in the 2012-13 fiscal year will be produced by Xcel Energy wind farms in the region.

3. Smart Power strips in Towers Hall
Students in the largest residence hall, Towers Hall, were provided with two smart power strips per room. Smart power strips moderate the flow of electricity through outlets by turning on outlets only if they are actively being used. This removes “phantom energy” loads. Phantom energy is the electricity used by all electronic devices that are plugged in, even if the devices are turned off and not in use. The smart power strips were awarded to Towers Hall by UW-Eau Claire Housing as a prize for winning the Trash Fashion Show during Earth Week 2012. It is recommended that this ongoing project is continued.

4. Coal Reduction at Steam Plant
The steam plant has been reducing the amount of coal used in creating steam and is instead substituting natural gas. James Franklin, the superintendent of the plant, has said that they will be further reducing cola use by using more natural gas. Coal produces more eCO\(_2\) per amount of energy than natural gas. Mining methods aside, the use of natural gas rather than coal will reduce the University’s carbon footprint. It will probably not be feasible to completely exclude coal, as it provides more energy per mass than natural gas and will be needed during peak steam production times. The trend to reduce the amount of coal burned with natural gas or renewable energy should continue.

5. Install Solar Panels
The installation of renewable energy sources on campus will be a significant benefit to the University, as already outlined in the top recommendations section. A solar assessment of the campus, conducted in 2010, found that UW-Eau Claire “…has some good potential for both photovoltaics (PV) and solar hot water (SHW), with multiple site opportunities for both technologies.” The report used a very
conservative method of calculating the simple payback time and indicated that it would take 25 years for the solar panels to pay for themselves. Using a return on investment calculation would give a much more favorable perspective. The solar assessment indicated that the most favorable location to install PV panels would be McIntyre Library and would cost about $95,400 for a 15.84 kW system.

Short-Term Goals

1. Certify Replacement Trees and University Land Holdings as Offsets
On-campus construction has caused the removal of many campus trees. The Campus Master Plan suggests that a policy is needed for tree replacement, such as requiring three new trees to be planted for every tree cut down. These trees cannot be considered offsets unless their planting is certified by an outside agency. If certified, the estimated carbon they consume each year can be applied as an offset to the carbon footprint.

2. Educate Residents about Energy Use
Students, especially those living on-campus in residence halls, need to be educated about their energy use. Those living in residence halls often do not pay attention to their energy use because they are not being directly billed for it. In order to decrease their energy use, they need to be made aware of just how much energy they consume and effective ways to decrease that amount. This should be done through a two-pronged approach.

First, an energy reduction marketing campaign could be designed by students from the marketing department that would both educate campus residents and provide marketing students with the opportunity to apply their knowledge to an important energy sustainability project. The campaign could be developed through a contest or through an assignment in a marketing class. The campaign should target students living on-campus and should encourage them not to leave their windows open in the winter, to turn off their lights and unplug their electronic devices (especially chargers) when not in use, and to take shorter showers.

Second, energy dashboards could be installed to show students exactly how much energy they are using. Energy dashboards measure electricity use in real time and display it on a screen so that students can see their energy use. Energy dashboards in the residence halls could allow for energy competitions. One school held an energy reduction competition that caused such a drastic decrease in energy use over the time period of the competition that the savings in electricity covered the cost of installing the dashboards. In addition, the information from energy dashboards could provide teaching and learning opportunities.

Long-Term Projects

1. Reconfigure Residence Hall Heating
Residence hall heating needs to be reconfigured. Currently, the amount of heat provided to an entire wing is based on the temperature of one room and often the heat level is set too high. This causes students to open their windows to cool down their rooms. This both wastes energy and causes even more steam to be sent to their rooms, overheating students whose windows have been left closed and causing even more windows to be left open. Temperature control needs to be more accessible to
responsible parties, such as with the resident assistant (RA) of each wing, who can then turn the thermostat down.

2. Replace Steam Plant
Eventually, the heating plant needs to be replaced with a different method of heating that does not use fossil fuels. This will remove the entirety of the heating portion of the carbon footprint, reducing the overall footprint by approximately one third of current totals. At the time we see no path to accomplish this recommendation.

Waste and Chemicals Recommendations

Short-Term Goals

1. Re-label Trash Cans with “Landfill”
Trash sent to the landfill represented nearly 60% of the 2011-12 waste and chemicals carbon footprint and just over 1% of the total footprint. In contrast, recycling and composting are both carbon-neutral. In order to reduce the carbon footprint of the campus, students need to be encouraged to recycle and compost instead of sending things to the landfill. All the plates, cups, and utensils from the food court are specially purchased to be compostable. This is of little use if students do not compost them.

In order to increase recycling and composting, perceptions of “trash” need to be changed. This can be done by labeling the trash cans with “landfill” so that students are more aware of where exactly their garbage is going. Stickers could easily be printed that said “landfill” and placed on waste receptacles over the word “trash,” or signage could be placed near garbage cans to provide more information to students.

2. Increase Prevalence of Composting Receptacles
Since 2010, composting was expanded from the old Davies Center to the Hilltop Recreation Center. This was mostly operational composting from the cafeterias. The only consumer composting receptacles were in the food court in the Davies Center and not in all of the seating areas in Davies Center. In the new Davies Center, there are more seating areas than in the old one. In addition, there is a seating area near the bowling alley in Hilltop Recreation Center where students purchase food from “Simply to Go” food carts in Haas Fine Arts Center, Hibbard Humanities Hall, and the McIntyre Library, pizza at the front desks of all the residence halls, and kitchens in all the residence hall basements. Also, every time Blugold Dining caters an event, they bring compostable plates, cups, and utensils. These locations and events have not been provided with a way to compost their waste. In order to increase composting, UW-Eau Claire should place composting bins near every dining area in the new Davies Center. Composting receptacles should also be brought to every event catered by Blugold Dining. Every “Simply to Go” food cart should have a composting bin nearby.

The largest difficulty with increasing the prevalence of composting bins will be educating students on what exactly is compostable and what is not. Contamination of composting bins by non-compostable items can get in the way of reducing the waste carbon footprint. Therefore providing signage and educational materials will be critical.

3. Establish Chemical Waste and Wastewater Treatment as “de minimis”
For the past three greenhouse gas inventories, the eCO₂ contribution of chemicals such as acetylene has been calculated and every year it has been a negligible amount. The only chemical contribution to the 2011-12 carbon footprint was a refrigerant leak that has been resolved. Unless campus behavior
changes drastically, future UW-Eau Claire greenhouse gas inventories do not need to include contributions from chemicals other than refrigerant leaks, which ordinarily do not happen. This is the first year that wastewater treatment has been analyzed, and similar to chemical waste is negligible and need not be included in future inventory efforts.
Transportation & Commuting

Project Background

This section focuses on the emissions of eCO\(_2\) due to vehicle use on campus and in the furthering of the University mission. Transportation is the largest part of UW – Eau Claire’s Carbon Footprint. With **16,349 metric tons eCO\(_2\)** total emissions, it compromises 42.9% of the University’s total carbon footprint.

![Emissions Breakdown](image)

*Figure 3: Emissions breakdown for transportation sources.*

- University-Related Air Travel – 7,882 metric tons eCO\(_2\)
- Commuting – 3,749 metric tons eCO\(_2\)
- Study Abroad/NSE – 2,795 metric tons eCO\(_2\)
- University-Related Ground Travel – 1,674 metric tons eCO\(_2\)
- Direct Transportation – 249 metric tons eCO\(_2\)

Top Policy Recommendations

1. **Purchase Offsets:** A lot of the transportation emissions come from travel cannot realistically be reduced, such as Study Abroad, NSE, and conference air travel, so we need to look into ways to offset these emissions. Air travel as represented by these categories is the single largest contributor to our carbon footprint.

2. **Advocate for Better Bus Transportation:** Numerous respondents to the survey commented on the lack of alternative transportation to compensate for the lack of parking on campus. Advocating for bus routes that align better with class schedule and allow better flexibility in the evening would help the transportation situation immensely.
3. **Improve Snow Removal**: Snow removal was the number one issue for pedestrians and cyclists, especially off campus. The city of Eau Claire does not enforce sidewalk or bike trail snow removal enough to facilitate widespread walking or biking to campus in the winter.

4. **Create a Hub for Bus Commuters**: Having a hub that protects commuters from weather effects while they wait for the bus on campus would encourage more people to ride the bus.

5. **Make the Campus and Surrounding Area More Bike Friendly**: Many survey respondents also commented on the issue of safety while walking or biking to and on campus. Bike lanes would help separate pedestrians and cyclists on campus and make biking safer on the roads off campus. More bike parking and/or better removal of abandoned bikes also requires attention.

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**Direct Transportation**

Direct Transportation consists primarily of university owned vehicles that are responsible for the day-to-day workings of the campus.

**Total Emissions**

Amount of eCO$_2$ emitted in the past year: **249 metric tons**

Percent of transportation emissions: 1.5%

Percent of total University emissions: 0.7%

**Sources**

- Maintenance vehicles / Cushman utility vehicles
- Departmental vehicles
- Landscaping vehicles
- University Police
- Disability Shuttle Service

**Methodology**

We received data from Lynn Peterson of University Facilities Planning and Management on the number of gallons of gasoline and diesel used by University vehicles from July 2011 to June 2012. The fuel comes from holding tanks on campus. When fuel for University vehicles is purchased off campus, a “Voyager” card is used that records the number of gallons purchased. We used conversion factors provided by the Clean Air – Cool Planet Campus Carbon Calculator to find the CO$_2$ emissions.

**Data**

There were a total of 22,255 gallons of gasoline and 4,998 gallons of diesel used during the 2011-2012 fiscal year. This resulted in a total 249 metric tons eCO$_2$.

**Results**

There was a total of **249 MT eCO$_2$** emitted by university vehicles during the 2011-2012 fiscal year.

**Policy Recommendations**

In order to reduce emissions in this category we recommend that the University invest in additional fuel-efficient vehicles, hybrids, or electric vehicles when replacing old or inefficient campus vehicles. The University should also promote carpooling or use of public transportation when possible for trips. The university could consider the use of biofuels to offset fossil fuel use and reduce emissions.
The removal of the campus fleet since the 2010 report helped to reduce the direct transportation emissions from 324 metric tons eCO₂ to 249 metric tons eCO₂.

Commuting
Not all forms of commuting to campus contribute to our carbon footprint. The forms of commuting analyzed for this report were by city bus, automobile and mopeds or motorcycles.

Total Emissions
Amount of eCO₂ emitted in the past year: 3,749 metric tons
Percent of transportation emissions: 22.9%
Percent of total University emissions: 9.8%

Sources
- Driving Alone
- Carpooling
- Mopeds and Motorcycles
- City Bus

Methodology
The data were split into two parts for commuting:

1. Car Travel – provided by the transportation survey
2. Bus Travel – calculated using schedules and Google Maps

Car Commuting
The eCO₂ was calculated by totaling the miles driven by the survey respondents, then using conversion factors found in the Clean Air Cool Planet Campus Carbon Calculator (CACPCCC) to calculate amount of eCO₂ produced. There were a total of 2404 responses to the transportation survey (full text included in the appendix), detailed below in Figure 4. The data from the survey were given in numbers of trips taken on average by the respondents, the distance for their commute, the number of people in a carpool, and the gas mileage of their car, moped or motorcycle. The data were broken into sub-groups based on classification at the University: Undergraduate Student, Graduate Student, Faculty, Staff/Other, and Administration.

Total miles driven were calculated by multiplying the average number of trips by the number of respondents for that question – only respondents that have traveled by car, moped, or motorcycle were able to answer and additionally multiplying by twice the average distance for each commute; twice the distance was used, because this is a round trip commute. The total mileage reported for the survey was then multiplied by the inverse of the responding rate for each sub-group to extrapolate for the entire University.
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Figure 4: Survey responses for the transportation survey by classification.

City Bus Commuting
The bus data was not collected by the survey. Eau Claire transit provides the university with Route 9 bus, which is accessible by faculty, staff and students free of charge with their Blugold ID. The bus has 4 distinct routes: Water St, Stein Blvd, Route 9 evening, and Route 9 Saturday. All of these routes travel different distances per each roundtrip. Google Maps was used to assess the number of miles driven per roundtrip, separately for each route. Since the buses schedule vary based on the season, the number of roundtrips a day during each of the time periods were estimated using the bus schedules, available on the EC transit website. Then, for each of these time periods, numbers of weekdays and Saturdays were calculated using the online tool, http://kalender-365.de/weekdays.php.

This information was used to estimate the number of miles driven by each route over the year. Those were then summed for a total of 69,983 miles. Fuel efficiency was assumed to be 7 miles to a gallon of diesel. The resulting amount, 9,998 gallons, was multiplied by a factor from CACPCCC to get the amount of eCO2 produced by the Route 9 bus.

Data
Car Commuting

![Bar chart showing commuting methods]

Figure 5: Transportation survey responses for travel methods for commuters.
**City Bus Commuting**

Total miles driven (September 2011-May 2012): 69,983 miles; volume of diesel used: 9,888 gallons.

![Eau Claire, Route 9 Buses](image)

*Figure 6: Percentage of diesel fuel used per route.*

**Results**

**Car Commuting**

There was a total of 3,648 metric tons eCO₂ emitted by car commuting during the 2011-2012 fiscal year.
Figure 7: Upper: car commuting emissions by classification and commute type, carpool or alone. Lower: per person car commuting emissions by classification and commute type.

City Bus Commuting

There was a total of 101 metric tons \(\text{eCO}_2\) emitted by city bus commuting during the 2011-2012 fiscal year.

Policy Recommendations

Many survey respondents were unhappy with the commuting situation to campus. These complaints included: lack of parking, overcrowded buses, unreliable buses, lack of bus routes, bicycle safety, pedestrian safety, lack of sidewalk snow removal, and lack of bicycle parking.

Therefore, we see very real solutions to help reduce the carbon footprint and at the same time improve the ease of accessing the University from off campus. With increasingly scarce parking, alternative modes of transportation need to be increased or congestion of parking on side streets will continue to be a problem.

Advocating for more bus routes and bus routes that align better with class schedules is a good way to increase alternative transportation, especially in the winter. Right now the evening bus takes an hour to complete a round trip, with the buses only available every hour after 4:30 PM. Replacing the evening bus with extended Stein Blvd and Water St routes would make it more convenient for students to get to and from campus at night.

Currently, the university lacks an organized transit center, so those who wish to ride the bus wait outside Kjer Theater. Having a hub similar to the Transit Center downtown would protect commuters from the cold temperatures and other weather effects and increase the number of persons willing to wait for the bus.
The amount of eCO₂ emitted by the bus attributable to the University does not depend on how many people ride the bus, so encouraging commuters to take the bus instead of driving to and from campus will cut the emissions.

Snow removal was the top concern from both pedestrians and cyclists in the Transportation Survey. The city has an ordinance regarding the removal of snow from sidewalks and fines for not following the ordinance. However, there is little to no enforcement of those fines. Snow on sidewalks greatly discourages walking to campus in the winter as the snow readily turns to ice and is dangerous. Also, the sidewalks on the Water St. Bridge are especially treacherous; the snow plows push snow from the street on to the sidewalks and leave the snow there for days after a storm. This makes the bridge virtually impassable for pedestrians and cyclists. Currently, bike trails and the entrances/exits to the bike trails are not plowed in a timely manner after snow fall. This has a big impact on cyclists on those days.

Making bike lanes on campus would help with safety by separating cyclists from pedestrians. Also more bike racks and/or better removal of abandoned bikes would help encourage more people to bike to campus. Additionally, if bike lanes could be made on streets leading to campus more people would feel safe to bike, especially on Water St. and Harding Ave. These bike lanes would help with the snow removal issue for cyclists.

One other solution to the commuting situation would be to encourage more widespread use of telecommuting, teleconferencing, and online classes. We already have technology on campus capable of doing all of these things, but they are not utilized to their full potential.

Study Abroad/ National Student Exchange

The Study Abroad and NSE programs at UW – Eau Claire are highly regarded, however sending students and faculty to other parts of the world emits a significant amount of CO₂.

Total Emissions

Amount of eCO₂ emitted in the past year: **2,795 metric tons**
Percent of transportation emissions: 17.1%
Percent of total University emissions: 7.3%

Sources

We contacted the Study Abroad and NSE departments and received data on the number of students and faculty that traveled to different locations during the 2011-2012 fiscal year.

Methodology

We calculated the distance between the Minneapolis/St. Paul International Airport and the capitals of the destinations using Google Maps. The round trip total miles for each destination were multiplied by the number of students and faculty that traveled there. We also added in one trip made by a faculty member for a Fulbright Scholar award using the same method. The sum of these air miles was input into the Clean Air–Cool Planet Campus Carbon Calculator.

Data

During the 2011-2012 fiscal year there was a total of 3,599,550 air miles traveled by the UW-Eau Claire campus community for the Study Abroad, NSE, and Fulbright programs. This resulted in 2,795 metric tons eCO₂.
Results
The 3,559,650 miles flown for Study Abroad, NSE, and Fulbright programs resulted in a total of 2,795 metric tons eCO$_2$.

<table>
<thead>
<tr>
<th></th>
<th>Air Miles</th>
<th>MT eCO$_2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Study Abroad</td>
<td>3,487,666</td>
<td>2,707.7</td>
</tr>
<tr>
<td>NSE</td>
<td>103,106</td>
<td>80.0</td>
</tr>
<tr>
<td>Fulbright</td>
<td>8,878</td>
<td>6.9</td>
</tr>
<tr>
<td>Total</td>
<td>3,599,650</td>
<td>2,794.6</td>
</tr>
</tbody>
</table>

*Figure 8: Breakdown of air miles and MT eCO$_2$ for each campus community.*

Policy Recommendations
Study Abroad and National Student Exchange are programs that UW – Eau Claire prides itself on and is a highly valued element of the educational experience for many students. Expecting a reduction in air miles for this category is unrealistic, so we are proposing that the University purchase offsets to counteract these emissions.

A carbon offset involves financially supporting initiatives to reduce emissions elsewhere to compensate for your own emissions. These initiatives include many things, from planting trees to financing renewable energy projects such as wind farms or hydroelectric dams.

University-Related Air Travel
UW – Eau Claire sends numerous students and faculty to conferences, collaboration with other institutions, sporting events, recruitment activities and many other functions. These activities increase the value of education at UW – Eau Claire, but emit a very large amount of CO$_2$. This subcategory is the single largest contributor to the carbon footprint, accounting for nearly half of the transportation category.

Total Emissions
Amount of eCO$_2$ emitted in the past year: **7,882 metric tons**
Percent of transportation emissions: 48.2%
Percent of total University emissions: 20.7%

Sources
To calculate eCO$_2$ for University-Related Travel by air, we used survey responses of how many miles people have flown since July 2011. The data were separated into subgroups based on the classification of the respondents at UW-Eau Claire: Undergraduate Students, Graduate Students, Faculty, Staff/ Other, and Administration.

Methodology
Respondents were given a range of miles to choose from. The exact number of miles corresponding to each category was determined by the average value of the range (ex: “100 – 1000 miles” was recorded as 550 miles). Since the survey asked for travel information based on a 10 month period instead of the
full fiscal year, the total miles was multiplied by 12/10ths. Then, each sub-group was multiplied by the inverse of the respondent rate to extrapolate the total miles traveled by the entire population. There were 303 responses to this portion of the transportation survey.

The total miles traveled were then entered into the Clean Air Cool Planet Campus Carbon Calculator (CACPCCC). Then the CACPCCC calculated eCO₂.

Data

![Bar chart showing number of air miles traveled from survey responses.](image)

*Figure 9: Number of air miles traveled from survey responses.*

Results

There was a total of 10,152,873 miles during the 2011-2012 fiscal year. This resulted in a total of 7,882 metric tons eCO₂.
Figure 10: Upper: air travel emissions by classification. Lower: per person air travel emissions by classification.

Policy Recommendations
Again, UW – Eau Claire prides itself on programs such as undergraduate research and other academic endeavors. Air travel to conferences and competitions is unlikely to be reduced. Therefore the
University should consider buying carbon offsets to reduce our carbon footprint. Or alternatively, travelers could be given the option to buy offsets for their trips.

A carbon offset involves financially supporting initiatives to reduce emissions elsewhere to compensate for your own emissions. These initiatives include many things, from planting trees to financing renewable energy projects such as wind farms or hydroelectric dams.

**University-Related Ground Travel**

UW – Eau Claire sends numerous students and faculty to conferences, collaboration with other institutions, sporting events, recruitment activities and many other functions. These activities increase the value of education at UW – Eau Claire, but emit a large amount of CO₂.

**Total Emissions**

Amount of eCO₂ emitted in the past year: **1,674 metric tons**
Percent of transportation emissions: 10.2%
Percent of total University emissions: 4.4%

**Sources**

1. Personal Car travel
2. Travel in a tour bus
3. Class field trips
4. Student Teaching

**Methodology**

The data were split into two parts for University-related ground travel:

1. Car Travel - provided by the Transportation survey
2. Bus Travel - provided by Kobussen and Lammers.

**Car Travel**

To calculate eCO₂ for University-Related Travel by car, we used survey responses of how many miles people drove either alone or in a carpool. The following methodology applies to both cases. The data were separated into subgroups based on the classification of the respondents at UW-Eau Claire: Undergraduate Students, Graduate Students, Faculty, Staff/ Other, and Administration.

Respondents were given a range of miles to choose from. The exact number of miles corresponding to each category was determined by the average value of the range (ex: “1 – 50 miles” was recorded as 25 miles). Since the survey asked for travel information based on a 10 month period instead of the full fiscal year, the total miles was multiplied by 12/10ths. Then, each sub-group was multiplied by the inverse of the respondent rate to extrapolate the total miles traveled by the entire population.

The total miles traveled was then entered into the Clean Air – Cool Planet Campus Carbon Calculator (CACPCCC). The CACPCCC accounted for carpoolers by supplying the spread sheet with the ratio of reported miles by car poolers to total miles. Then the CACPCCC calculated eCO₂.

**Bus Travel**

Vickie Gardner of University Accounts Payable provided data from Kobussen consisting of miles with no passengers (“Deadhead/DH” miles) and miles with passengers (“Livehead/LH” miles). These two
statistics were added to yield the total miles traveled. The total miles traveled was inputted in the CACPCCC to determine the CO₂ emissions.

Gardner also provided data consisting of the only trip that the University took through Lammers. Total amount of miles driven were not provided; however, points of departure and arrival were provided, and the distance between them was approximated through Mapquest.

Data

Car Travel

<table>
<thead>
<tr>
<th>Classification</th>
<th>Total Miles</th>
</tr>
</thead>
<tbody>
<tr>
<td>Undergraduate</td>
<td>4,921,731</td>
</tr>
<tr>
<td>Graduate</td>
<td>187,042</td>
</tr>
<tr>
<td>Faculty</td>
<td>186,510</td>
</tr>
<tr>
<td>Staff/Other</td>
<td>423,283</td>
</tr>
<tr>
<td>Administration</td>
<td>53,141</td>
</tr>
<tr>
<td>Total</td>
<td>5,771,707</td>
</tr>
</tbody>
</table>

*Figure 11: Total miles for the University-related car travel survey by classification.*

Bus Travel

During the 2011-2012 fiscal year, 11,448 DH miles and 73,848 LH miles were accumulated through Kobussen, with a total of 85,296 miles. In the same year, 178 miles were accumulated through Lammers.

Thus, in total, contracted bus travel totaled 85,474 miles and emitted approximately 123.1 metric tons CO₂.

Results

Car Travel

Based on survey responses, there was a total of 5,771,707 miles for University-related ground travel by car. This resulted in a total of 1,550 metric tons eCO₂. Below is a breakdown of results by category:
Bus Travel
There was a total of 85,296 miles for University-related ground travel by bus. This resulted in a total of 123.1 metric tons eCO$_2$.

Policy Recommendations
To reduce emissions from car trips it is important to encourage carpooling to University-related activities as well as more sustainable transportation methods. Because the University outsources its bus travel, it has little say in the fuel efficiency of the vehicles used. However, using tour buses is far more efficient than car transportation if the buses are filled. More widespread use of buses could reduce the footprint from car emissions.
Heating & Electricity

Project Background
This section focuses on the emissions of eCO$_2$ due to heating and electricity. Total net emissions for the past fiscal year from heating and electricity are **20,985 metric tons of eCO$_2$**. Together, these comprised 55.1% of UW-Eau Claire’s carbon footprint. After accounting for “green power” renewable energy credit purchases, electricity accounted for a net of 8,380 metric tons eCO$_2$ and heating for 12,605 metric tons eCO$_2$, or 22.0% and 33.1% of greenhouse gas emissions, respectively.

Top Policy Recommendations
1. Invest in renewable electricity production capacity on campus.
2. Conduct a marketing campaign to increase awareness of electrical and heating use in residence halls.
3. Go above and beyond UW-System’s standard expectation for energy efficiency requirements for all future building projects.
4. Adopt an energy-efficient appliance purchasing policy that requires the purchase of only Energy Star certified products.

Electricity
UWEC’s net carbon footprint contribution due to electricity was **8,380 metric tons of eCO$_2$** for the 2011-12 fiscal year. The total electricity use for the fiscal year was 22,119,349 kWh, and was offset by the purchase of 3,831,720 kWh of renewable energy credits (RECs) by the Department of Administration of the State of Wisconsin on behalf of UW—Eau Claire.

Methodology
To collect information on energy usage due to electricity, we contacted Mike Traynor of UW-Eau Claire facilities management to get our electrical use data. The electricity data came from billed amounts from Xcel Energy, and was given as kilowatt-hours (kWh) per month. The purchased REC data (also provided in kWh, for the entire fiscal year) were provided by Greg Wanek of the WI-State Department of Administration (DOA).

These values were input into the CACPCCC spreadsheet, using the “Custom Fuel Mix” input to the spreadsheet, instead of relying upon the NERC (North American Electric Reliability Corporation) eGRID (Emissions & Generation Resource Integrated Database) fuel source estimates for our respective sub-region, which is the default setting for the CACPCCC analysis.

The graph below shows the Xcel Energy electricity generation fuel mixture for the 2010-11 (the most recent available data) for Wisconsin. It should be noted that, in the 2010 report, the fuel mix was derived from Xcel Energy’s national data rather than its regional data, so this may have led to a bias in those results. In the 2008 report, the eGRID fuel mixture values were used. This complicates year-to-year comparisons. The graph below, showing the carbon footprint over 12 years of heating and electricity use on campus uses only the default eGRID fuel mixtures for the sake of comparison.

Data
The total electricity use for the fiscal year was 22,119,349 kWh and 3,831,720 kWh of renewable energy credits (RECs).
Results

UWEC’s carbon footprint contribution due to electricity was 8,380 metric tons of eCO₂ for the 2011-2012 fiscal year, including an offset of 1,756 metric tons of eCO₂ from REC purchases. The total electricity use for the fiscal year was 21,991,197 kWh.

Below is a graph of the monthly electricity use in kWh for the past fiscal year.

Figure 13: Xcel Energy electricity generation fuel mixture for the 2010-11 for Wisconsin.

Figure 14: Monthly electricity use in kWh for the past fiscal year.
Below is a graph of the past seven years of electricity use on campus, along with the five years of RECs purchased by the DOA on behalf of the University.

![Graph of electricity use and RECs](image)

Figure 15: Past seven years of electricity use on campus and five years of REC’s purchased by DOA on behalf of the University.

**Heating**

UWEC’s carbon footprint contribution due to heating was **12,605 metric tons of eCO2** for the 2011-12 fiscal year. Throughout the fiscal year, 2,343 short tons of coal, 6,169 gallons of heating oil, and 151,694 MCF of natural gas were used to produce the steam attributed UWEC.

**Methodology**

To collect information on carbon contributions from the steam plant, we contacted James Franklin of the University Heating Plant. Data was provided as monthly and yearly totals of natural gas in BTU, coal in short tons, and heating oil in gallons. Not all steam produced by the plant went to UWEC – some is sold to the WI State office building and to Chippewa Valley Technical College (and historically was sold to Sacred Heart Hospital), so we were also given the amount of steam that went to UWEC as a fraction of the total amount of steam generated. These values were converted to eCO2 emissions using the CACPCC spreadsheet, assuming that our heating oil was equivalent to “distillate #1-4” and that our amounts of natural gas, given in MCF (millions of cubic feet) was equivalent to MMBTU (million British thermal units of heat) both reasonable and standard assumptions.

**Data**

Heating data was received from the University Heating Plant, as MCF natural gas, short tons coal, and gallons of oil as well as amount of steam produced and amount of steam sold to non-UWEC entities.

We included data dating back to the 2000/01 fiscal year because that is all that was available electronically. The university heating plant does have data on paper dating back to 1966, which would be interesting to add in the future but was not necessary to consider at this time. Historical data (from 2000 to present) was used to establish a trend of heating use on campus.
Throughout the 2011-2012 fiscal year, 2,343 short tons of coal, 6,169 gallons of heating oil, and 151,694 MCF of natural gas were used to produce the steam attributed to UWEC.

Results
We calculated that UWEC’s carbon footprint contribution from heating was 12,605 metric tons eCO$_2$ for the 2011-2012 fiscal year. Throughout the fiscal year, 2,343 short tons of coal, 6,169 gallons of heating oil, and 151,694 MCF of natural gas were used to produce the steam attributed to UWEC.

Below is a graph of the monthly heating eCO$_2$ emissions for the past fiscal year. Note that coal is only used during the winter months, when the most heat is consumed on campus. Both this and the following graph use different emission factors (somewhat simplified – representing only CO$_2$ production from basic chemical calculations) than the CACPCCC uses. But the general trends should remain consistent.

![Figure 16: Monthly heating eCO$_2$ emissions for the 2012 fiscal year.](image)

Below is a graph of heating eCO$_2$ emissions (attributed to UW—Eau Claire) dating back to the 2000/01 fiscal year. Changes in fuel choices can be clearly observed over this time as well as a reduction in overall steam production and associated greenhouse gas emissions.
Below is a graph summarizing all available data of eCO₂ emissions from heating and electricity use at UW—Eau Claire. These data are taken from the CACPCCC, based on those calculations.

Figure 17: Heating eCO₂ emissions (attributed to UW—Eau Claire) dating back to FY2001.

Figure 18: All of eCO₂ emissions from heating and electricity use at UW—Eau Claire.
**Recommendations**
The following are recommendations to reduce UW-Eau Claire’s carbon footprint due to heating and electricity.

1. **Invest in sustainable energy generation on campus**
   Installing sustainable methods of generating electricity, such as a wind turbine or solar panels, is a very important step towards becoming carbon neutral. Although it has an initial installation cost, the money required is an investment. This is a longer-term solution than purchasing offsets and would have three major effects for the campus.

   First, generating the electricity on campus would reduce the amount of electricity purchased from Xcel energy. This savings alone, over the lifetime of the wind turbine or solar panel, would exceed the cost of the installation.

   Second, generating the electricity sustainably would decrease the carbon footprint of the campus. Electricity purchased from Xcel energy comes with the carbon emissions associated with the production of that electricity from the use of fossil fuels. Electricity generated sustainably comes without any carbon emissions because wind and solar energy are both carbon-neutral. Decreasing the amount of electricity purchased from Xcel energy would directly decrease the carbon footprint of the campus.

   Third, for every megawatt of electricity produced sustainably on campus, the school would own one renewable energy credit (REC). RECs are a way of trading carbon offsets and can be applied to a carbon footprint to offset one metric ton of carbon emissions. So in addition to directly decreasing the carbon footprint by generating the electricity on-campus, the University can also apply the RECs that are simultaneously generated to the carbon footprint to further decrease it. RECs are useful because they can decrease our carbon footprint from areas such as study abroad transportation that would be troublesome to reduce without offsets. Generating our own offsets through the RECs would decrease the need to purchase offsets from outside companies, further saving money for the University.

   Although investing in sustainable energy generation on-campus has a high start-up cost, it could lead to three different returns on investment: the reduction of the UW-Eau Claire electricity bill, the reduced need to purchase offsets from a directly reduced carbon footprint, and the further reduced need to purchase offsets from the generation of RECs. Conduct a marketing campaign to increase awareness of electrical and heating use in residence halls.

2. **Educating students about the effects of their energy use, in an environment where they do not see the immediate costs**, can help them to realize that their decisions do have a financial and environmental impact on them and on the University. This could also provide an excellent opportunity for students in the marketing department to design and implement a large-scale marketing campaign.

3. **Go above and beyond UW-System’s standard expectation for energy efficiency requirements for all future building projects**
   In the face of the upcoming construction projects, it is important to ensure that the buildings will reduce carbon emissions throughout the lifetime of the building. New buildings are prime opportunities for implementing innovative sustainability strategies. UW-System requires new
buildings to meet criteria roughly equivalent to a previous version of the LEED (Leadership in Energy and Environmental Design) Silver standard, however in order to provide a better energy profile for the future, going above and beyond the minimum would be recommended.

4. *Adopt an energy-efficient appliance purchasing policy that requires the purchase of only Energy Star certified products.*

The UW-System policy is currently that energy star appliances are only required to be a fraction of new appliance purchases. Purchasing only energy star appliances would be a more effective way to reduce the carbon footprint of the campus.
Waste, Recycling & Composting

Project Background
This section focuses on the emissions of eCO₂ due to waste. The emissions from each category are:

- Chemicals/Hazardous Waste: 324.8 metric tons eCO₂
- Landfill Waste: 440.7 metric tons eCO₂
- Wastewater: 0.6 metric tons eCO₂

![Waste/Chemicals Emissions Breakdown](image)

Note: of the total emissions from chemicals & hazardous waste, 324.4 MT was due to an uncommon refrigerant leak.

**Figure 19: Breakdown of emissions resulting from waste and chemical use.**

Total emissions for the past fiscal year 2011-2012 from waste are **766 metric tons of eCO₂**. This comprises 2.0% of the eCO₂ emissions of the entire University.

Recycling, E-Waste, and Composting are not included in the emissions total because the carbon emissions from recycling and e-waste do not fall in the scope of the University footprint. In addition, composting is considered carbon neutral, as detailed in the sections below.

Top Policy Recommendations
1. Improve waste diversion rate through better education of the campus community: minimize landfilled waste and improve recycling.
2. Further expand the composting program across campus to reduce the amount of landfilled waste.

Chemicals / Hazardous Waste
The University of Wisconsin – Eau Claire uses various chemicals for facilities maintenance as well as educational purposes. In addition, UWEC produces some hazardous waste which must be disposed of properly. This section covers eCO₂ emissions contributed by chemicals and hazardous waste products.
Methodology

Acetylene (Chemicals):
An acetylene conversion factor was used to calculate emissions resulting from combustion of acetylene in vehicle maintenance, and by the Chemistry and Art Departments. Data for acetylene was given in the form of weight and volume by Jason Lanka (Art Department) and Jody Schneider (Facilities Management). There was also an assumption that the Chemistry Department uses a consistent annual amount of acetylene each year since no data was available.

Propylene (Chemicals):
Data was given in the form of weight by Jody Schneider (Facilities Management). Therefore, a simple mass conversion factor was used. Propylene CO$_2$ emissions pertain only to UWEC vehicle maintenance.

Hazardous Waste:
Randy Saheim (Office of Loss Prevention and Safety) provided data in the form of weight. Hazardous waste produced at UWEC was either disposed of through either incineration or fuel-blending techniques. The CACPCCC was used to calculate the eCO$_2$ emissions.

Refrigerants:
In a unique event since greenhouse gas emissions have been recorded on campus, one refrigerant leak occurred throughout the last couple of years. The amount of R-134A or tetrafluoroethane that escaped was recorded in terms of weight by Ron Tischer (University Facilities Planning and Management). It was assumed that the amount of R-134A released was equal for both years. The Clean Air Cool Planet Campus Carbon Calculator (CACPCCC) was used to convert the amount of R-134A released into eCO$_2$ emissions.

Miscellaneous:
Additional CO$_2$ was purchased by weight so this was equivalent to eCO$_2$. This data was provided by Denis Setwyn (Chemistry Stockroom).

Note: All data was given for the 2011-2012 fiscal year.

Data

Acetylene:
- Vehicle Maintenance: 30 m$^3$=1080 ft$^3$
- Art Department: 265 ft$^3$
- Chemistry Department: 20 m$^3$=720 ft$^3$

Propylene:
- Vehicle Maintenance: 25 lbs.

Hazardous Waste:
- Waste Fuel Blended: 1396 lbs.
- Waste Incinerated: 1926 lbs.

Refrigerants:
- Leak of R-134A: 1100 lbs. over 2 years = 550 lbs. during previous fiscal year

Miscellaneous:
- Chemistry Stock Room: Purchase of 350 lbs. CO$_2$
## Results

It is important to note that refrigerants produced the vast majority of eCO$_2$ from chemicals/hazardous waste during the 2011-2012 fiscal year. The amounts of eCO$_2$ from chemicals, hazardous waste, and refrigerants are relatively small compared to the overall carbon footprint generated on campus.

- emissions from Acetylene combustion = $0.12 + 0.03 + 0.08 = 0.23$ MT eCO$_2$
- emissions from Propylene combustion = $0.11$ MT eCO$_2$
- emissions from Hazardous Waste incineration = $-0.1$ MT eCO$_2$
- emissions from Refrigerant emissions = $324.4$ MT eCO$_2$
- emissions from direct CO$_2$ emissions = $0.16$ MT eCO$_2$

TOTAL eCO$_2$ = $0.23 + 0.11 + 2.19 + 324.3 + 0.16 = 324.8$ MT eCO$_2$

## Composting

The University of Wisconsin – Eau Claire uses composting through Veolia Environmental Services to reduce the amount of organic waste disposed of in landfills. Collection receptacles for compostable waste are currently in place in Davies Student Center and Hilltop Recreation Center. Composting is considered carbon-neutral by the Association for the Advancement of Sustainability in Higher Education (AASHE), so our emissions due to composting is **0.0 metric tons of eCO$_2$**.

## E-Waste

UW – Eau Claire has recently begun collecting electronic waste (e-waste), such as old computers, cell phones, etc., and sending them away for recycling. We were planning to track the amount of CO$_2$ emitted as a result of this recycling process. However, there was limited data available; in addition, we decided that e-waste is outside of our scope and not part of the university’s campus footprint. We have agreed that e-waste contributes **0.0 metric tons eCO$_2$** to our campus carbon footprint.

## Methodology

E-Waste is a relatively new program at the University of Wisconsin Eau Claire. The program was developed by the UWEC Chapter of the Student National Environmental Health Association (SNEHA). In addition, a proposal was submitted and approved to have E-Waste receptacles placed in Davies, Hilltop, McIntyre Library, and Hibbard. We contacted Brittany Schoenick in the Student Office of Sustainability and Lynn Peterson in Facilities Management for our data.

## Data

The University currently has E-Waste data that only dates back to December 2011. Due to the low amount of data, the high variability in that data, and the lack of knowledge of the contents of said E-Waste, it is tough to accurately go from E-Waste to eCO$_2$. In our received data, the Student National Environmental Health Association (SNEHA) equated every pound of E-Waste collected to 2 lbs of eCO$_2$ being saved, however we are unsure of the accuracy of this value, and if we can consider this to be a legitimate offset. Currently, we have the following data:

**Pounds of E-Waste Collected Per Month**

- December 2011: 30

---

32 | Page
January 2012: 42
February 2012: 28
March 2012: 12

We also were informed that .74 tons of videotapes were recycled during this academic year. Due to the lack of information regarding the recycling/incineration of videotapes and the CO₂ that results, paired with the fact that this was a single occurrence, this total value will be insignificant, especially to future reports.

Results
In a similar manner to Recycling, once E-Waste is picked up from the University of Wisconsin Eau Claire campus, it falls outside of the University’s scope for eCO₂ emissions. The University simply offers the service of collecting the old electronics and do not actually produce the products or use them; therefore, it falls outside of the University’s scope. In regards to the .74 tons of videotapes recycled, this was a one-time large scale recycling project that will not be repeated. The total contribution of eCO₂ would be 0.0 metric tons.

Landfill Waste
This section covers eCO₂ emissions contributed by landfill waste. Trash is collected by Veolia Environmental Services where it is placed into a landfill for decomposition. As the organic material in the trash decomposes, it emits methane gas. Veolia does recapture the methane and use it to fuel energy; however, there are still resulting emissions. UW – Eau Claire’s emissions due to landfilled trash are 440.7 metric tons eCO₂.

Methodology
We obtained information from Veolia Environmental Services about the amount of trash disposed of in landfills for the previous year through Lynn Peterson. Veolia provided volume in cubic yards and weight in short tons. The total amount of trash in short tons was entered into the Clean Air Cool Planet Campus Carbon Calculator (CACPCCC) under the category, “CH₄ Recovery and Electric Generation,” to result in MT of eCO₂ emitted. This is a substantially smaller value than if there was no CH₄ recovery or if it was recovered and flared. To the degree that the 2010 report indicated higher levels of eCO₂ emissions from landfilled waste, this is the most probable reason.

Data
We received totals for landfilled trash from the University from April 1, 2011 – June 30, 2012. Veolia reported that the estimated total amount of trash disposed in landfills in the previous fiscal year was 1682.45 short tons.

Results
The CO₂ emitted due to waste disposed of in landfills by UWEC was 440.7 MT.

Recycling
This section covers eCO₂ emissions contributed by recycled materials. UW – Eau Claire collects recyclable materials (paper, cardboard, plastic, glass, tin, aluminum, etc.) in most buildings on campus. The materials are picked up by Veolia Environmental Services. We have determined that recycling emissions are not part of the university’s carbon footprint. Therefore, the university’s emissions due to recycling are 0.0 metrics tons of eCO₂.
Methodology
Our contact for recycling information was Lynn Peterson. This information was obtained from Veolia Environmental Services. We received totals for volume and weight as calculated by Veolia. So far, we are unsure of how to convert the amounts into eCO₂.

Data
The amounts of recyclables in weight as reported by Veolia were:

- 409.9 short tons of cardboard/paper mix
- 690.3 short tons of commingled recyclables
- 83.26 short tons of compacted cardboard

Results
We have determined that any carbon emissions resulting from the process of recycling materials would fall beyond the university's scope. Furthermore, they are part of the carbon footprint of Veolia Environmental Services. Recycling differs from disposal of trash into a landfill because the recyclable materials are reconstituted and sold again for use in the production of goods. Therefore, we assert that once the university passes those materials to Veolia they take responsibility for any future emissions related to those materials.

Thus, our carbon emissions due to recycling is 0.0 metric tons of eCO₂.

Wastewater
UW-Eau Claire uses a large amount of municipal water. Used water is sent to the Eau Claire Treatment plant for treatment before it can be recharged to the Eau Claire River. Our total emissions from waste water treatment are 0.6 metric tons of eCO₂.

Methodology
Our wastewater data was provided by Rebecca Helland in the Accounts Payable Department. We were given three quarters' worth of bills. Each bill had multiple categories of water use, however, we only used the Sewer Volume categories. This value reflected the wastewater produced by the University and not rain water or other values. We added the Sewer Volumes of all the University buildings together to get a total sewage volume for each quarter.

The total value calculated was 71,502 gallons of sewage. We inputted this value into the Clean Air Cool Planet Campus Carbon Calculator (CACPCCC) using the most conservative assumption that the waste was treated by anaerobic means. The calculator yielded a value of 0.6 MT of eCO₂. In the case that either aerobic treatment or anaerobic digestion is used instead, the value decreases to 0.0 MT of eCO₂, so this represents an upper limit. It should be noted that this amount falls well within the limit for a de minimis exception, and may be excluded from future analyses. Wastewater emissions were not calculated during the 2010 campus carbon inventory.

Data
The total estimated value of the sewage volume for campus was 71,502 gallons.

The calculated value of eCO₂ generated by the Clean Air Cool Planet Campus Carbon Calculator was 0.6 MT of eCO₂.
Results
The eCO$_2$ emitted due to wastewater was 0.6 MT.

Recommendations
We recommend that all receptacles in which landfill trash is collected be labeled as “Landfill Trash” to make it clear to users where their trash is going. These receptacles should be present especially in food service areas. We hope that this will encourage more users to compost and recycle where possible.

Landfill waste was the largest component of the Waste, Recycling, and Compost carbon emissions. Thus, it is crucial to limit the amount of landfill waste the University generates in order to decrease our footprint.

As for composting, there are still only receptacles in Davies Student Center and Hilltop Recreation Center. We recommend that at least one composting receptacle be placed near the entrance of each campus building. In addition, several others be placed in each dorm and near food service areas in Hibbard Humanities Hall and Haas Fine Arts Center.

For nearly all of our sources of chemical emissions, our data were based on purchasing records of the chemicals. These records do not always reflect our actual use. If records that better tracked our actual use of acetylene, propylene, and CO$_2$ in each department were required, our ease and accuracy of calculations would be greatly improved.
Appendix A: 2012 Transportation Survey

I. Pre-Survey

The University of Wisconsin Eau Claire (UWEC) is a participant in the American College and University Presidents’ Climate Commitment. With your help, the information that you share in this survey will help us meet our obligations to this commitment and calculate our campus carbon footprint. All information that you share will remain confidential. Thank you so much for your time.

1. Are you willing to take this survey?
   A. Yes
   B. No

II. Background Questions

1. Which best describes your status at UWEC?
   A. Student
   B. Staff
   C. Faculty
   D. Administrator
   E. Other

2. Are you part time or full time?
   A. Part time
   B. Full time
   C. Don’t know

3. What year are you in school?
   A. Freshmen
   B. Sophomore
   C. Junior
   D. Senior
   E. Longer than Senior
   F. Graduate
   G. Non-Degree

4. Do you live on or off campus?
   A. On-campus
   B. Off-campus

III. Commuting Questions

1. What is the distance from your local residence to campus? If you are unsure about the distance, please click here: Google maps and input your local address. The distance will be calculated for you. (15 blocks is roughly 1 mile)
   A. ___ miles

2. Between July of 2011 to the present, what travel methods have you used to COMMUTE to campus (select all that apply):
   A. Walking
   B. Bike
   C. Skate Board/Roller Blades/Push Scooter
3. Which ONE of the above choices do you use MOST OFTEN when you commute to campus?
   A. Walking
   B. Bike
   C. Skate Board/Roller Blades/Push Scooter
   D. Bus
   E. Moped/Motorcycle/Scooter
   F. Automobile (including carpooling)

4. Please estimate the average city miles per gallon for your primary commuting vehicle. You may input your make, model, and year into this calculator to do the calculation for you. (If you are a rider in a carpool, please estimate to the best of your ability the gas mileage for that car)
   A. ___ miles per gallon

5. Between July of 2011 and now, have you ever carpooled when you commuted to campus (as a driver or rider)?
   A. Yes
   B. No

6. You indicated that you have CARPOOLED to campus. On average, how many people do you carpool with including yourself?
   A. ___ people

7. Now thinking about your CARPOOLING activities: For each term, approximately how many TRIPS PER TERM do you make between your local residence and campus by carpool: (Spring and Fall semesters are 16 weeks long, Interim and Winterim are 3 weeks long, and Summer Semester is 8 weeks long)
   A. Summer/Interim 2011 ___ trips
   B. Fall 2011 ___ trips
   C. Winterim 2011-2012 ___ trips
   D. Spring 2012 ___ trips

8. Now we want to know about your commuting activities when you are ALONE in an automobile, moped, or motorcycle. For each term, approximately how many ROUND TRIPS PER TERM do you make between your local residence and campus by automobile, moped, or motorcycle, alone: (Spring and Fall semesters are 16 weeks long, Interim and Winterim are 3 weeks long, and Summer Semester is 8 weeks long)
   A. Summer/Interim 2011 ___ trips
   B. Fall 2011 ___ trips
   C. Winterim 2011-2012 ___ trips
   D. Spring 2012 ___ trips

Now we would like to find out about any university related travel you have done between July of 2011 and now. For example, this may include travel for meetings, student teaching, volunteer activities, sport or activity clubs (not in a tour bus), spectator events, conferences, recruiting, training sessions, etc.
9. Between July of 2011 and today, which of the following modes of transportation have you traveled by for University related travel? Select all that apply.
This EXCLUDES:
- Commuting
- Study Abroad
- Vacation Travel
- Travel between Eau Claire and a permanent residence (Parents’ house)
- Transportation on tour buses
- Transportation on University owned vehicles
  A. I have not done any University related travel between now and July 2011
  B. Car, alone only
  C. Car, carpooling
  D. Airplane

10. How many trips have you taken for University related travel by CAR, ALONE between July 2011 and now?
A. ___ trips

11. Please estimate how many TOTAL miles you traveled for University related activities by CAR, ALONE.
A. ___ miles

12. How many trips have you taken for University related travel by CAR, CARPOOLING between July 2011 and now?
A. ___ trips

13. Please estimate how many TOTAL miles you traveled for University related activities by CAR, CARPOOLING.
A. ___ miles

14. How many trips have you taken for University related travel by AIRPLANE between July 2011 and now?
A. ___ trips

15. Please estimate how many TOTAL miles you traveled for University related activities by AIRPLANE.
A. ___ miles

16. Which one of the following parking permits do you have:
A. I do not have a permit
B. S
C. F
D. R
E. G
F. B
G. E
H. Motorcycle/moped

17. What lots and or street areas do you primarily park in? (If you or your carpool ride do not park near campus, skip this question) You may select more than one option.
<table>
<thead>
<tr>
<th></th>
<th>Permit Lots</th>
<th>Metered Lots</th>
<th>Street Parking</th>
</tr>
</thead>
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<td>□</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td><strong>Upper Campus</strong></td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td><strong>Water St. Campus</strong></td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>(near Haas)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

18. On average, how many minutes do you spend circling around campus parking areas in search of a parking space each time?
   A. ___ minutes

19. Earlier you mentioned that your primary mode of transportation for commuting to UWEC was by bicycle. Please select the primary reason for why you choose to bike.
   A. I live on/near campus
   B. I do not want to pay for a parking permit or gas
   C. Faster than other methods
   D. It is environmentally friendly
   E. It is a good form of exercise
   F. I enjoy it
   G. Convenient
   H. Other _____

20. Earlier you mentioned that your primary mode of transportation for commuting to UWEC was by Skate Board/Roller Blades/Push Scooter. Please select the primary reason for why you choose to Skate Board/Roller Blade/Scoot.
   A. I live on/near campus
   B. I do not want to pay for a parking permit or gas
   C. Faster than other methods
   D. It is environmentally friendly
   E. It is a good form of exercise
   F. I enjoy it
   G. Convenient
   H. Other _____

21. Earlier you mentioned that your primary mode of transportation for commuting to UWEC was by bus. Please select the primary reason for why you choose to take the bus.
   A. The bus stop is near my house
   B. I don’t want to walk up the hill
   C. I meet with my friends on the bus
   D. I do not want to pay for a parking permit or gas
   E. It is faster than other methods
   F. It is more environmentally friendly than other methods
   G. I don’t want to be exposed to the weather
   H. I don’t want to exert myself physically
   I. Convenient
   J. Other _____
22. Earlier you mentioned that your primary mode of transportation for commuting to UWEC was by automobile. Please select the primary reason for why you choose to ride in an automobile.
   A. I am too busy
   B. I have irregular work or school hours
   C. It is convenient
   D. It is faster than other methods
   E. I live too far away from campus for other methods to be practical
   F. I need a car to do my job
   G. I run errands during the day
   H. I need my car in case of an emergency
   I. I have a disability and need to travel by car
   J. I drop off a family member or friend along the way
   K. I think driving is safer than walking or biking
   L. I don’t want to be exposed to the weather
   M. I don’t want to physically exert myself
   N. Other ___

23. Earlier you mentioned that your primary mode of transportation for commuting to UWEC was by Moped/Motorcycle/Scooter. Please select the primary reason for why you choose to ride a Moped/Motorcycle/Scooter.
   A. I have irregular work/class hours
   B. I am too busy
   C. I live too far away from campus for other methods to be practical
   D. I run errands during the day
   E. I need it in case of emergency
   F. It is faster than other methods
   G. I think riding is safer than walking or biking
   H. I drop off a family member or friend along the way
   I. I don’t want to walk up the hill
   J. I don’t want to physically exert myself
   K. I enjoy it
   L. There are better parking spots than for cars
   M. Convenient
   N. Other ___

24. Earlier you mentioned that your primary mode of transportation for commuting to UWEC was by walking. Please select the primary reason for why you choose to walk.
   A. I live on/near campus
   B. I enjoy it
   C. It is a good form of exercise
   D. It is environmentally friendly
   E. I walk with friends
   F. Convenient
   G. Other ___
25. Which of the following transportation options do you have ACCESS to, even if you do not use it: (select all that apply)
   A. Walking
   B. Bike
   C. Skate Board/Roller Blades/Push Scooter
   D. Bus
   E. Motorcycle/Moped/Scooter
   F. Carpool
   G. Car/Truck

26. If you were to consider an alternative to driving a car to campus, which one of the following options would you choose? (You may only choose one answer).
   A. I would not consider an alternative
   B. Walking
   C. Biking
   D. Skate Board/Roller Blade/Use a Push Scooter
   E. Bus
   F. Moped/Motorcycle/Scooter
   G. Other ___

27. Please select the best option that would most likely encourage you to WALK to campus. (You may only select one answer)
   A. I would never be encouraged to walk any more than I do now.
   B. Better sidewalks between my home and campus
   C. Better lighting on campus
   D. Better lighting off campus
   E. Snow and ice removal on sidewalks during the winter
   F. Shower or changing facility
   G. Car parking permits were significantly more expensive
   H. Other ___

28. Please select the best option that would most likely encourage you to BIKE to campus. (You may only select one answer)
   A. I would never be encouraged to bike any more than I do now.
   B. Better snow and ice removal from trails in the winter
   C. Better trails between campus and my home
   D. Clearly marked bike lanes on campus
   E. Clearly marked bike lanes off campus
   F. Controlled sidewalk intersections on campus (i.e. stop signs)
   G. Easier access to campus from city streets
   H. Secured/covered bike racks
   I. Bike racks that are better designed/easier to get in and out of
   J. More convenient bike rack parking
   K. Shower/changing facility for bikers
   L. Car parking permits were significantly more expensive
   M. Other ___
29. Please select the best option below that would encourage you to SKATE BOARD/ROLLER BLADE/PUSH SCOOTER to campus. (You may only select one answer)
   A. I would never be encouraged to Skate Board/Roller Blade/ride a Push Scooter more than I do now
   B. Enforced sidewalk snow removal by the city
   C. Clearly marked bike lanes on campus, accessible to Skate Boards/Roller Blades/Push Scooters
   D. Clearly marked bike lanes off campus, accessible to Skate Boards/Roller Blades/Push Scooters
   E. Controlled sidewalk intersections on campus (i.e. stop signs)
   F. Shower/Changing facilities with lockers on campus
   G. Discounts on equipment
   H. Car parking permits were significantly more expensive
   I. Other ___

30. Please select the best option below that would encourage you to ride the BUS more often. (You may only select one answer)
   A. I would never be encouraged to ride the bus any more than I do now
   B. Less crowded buses
   C. Bus routes/stops that fit my schedule
   D. More reliable bus departures/arrivals
   E. Bus routes nearer to my residence
   F. A heated, covered waiting area on campus
   G. The bus went from campus to the downtown transit center on weekends
   H. The bus ran on Sundays
   I. Park and ride lots
   J. Car parking permits were significantly more expensive
   K. Other ___

31. Please select the best option below that would encourage you to ride a MOPED/MOTORCYCLE/SCOOTER to campus more often. (You may only select one answer)
   A. I would never be encouraged to ride a moped/motorcycle/scooter any more than I do now
   B. More preferential parking available
   C. It was safer to ride a moped/motorcycle/scooter
   D. More convenient parking
   E. Secured/covered parking
   F. Car parking permits were significantly more expensive
   G. Other ___

32. Please select the best option below that would encourage you to CARPOOL more often.
   A. I would never be encouraged to carpool any more than I do now
   B. People to carpool with whose schedule was compatible
   C. Priority parking was given to carpoolers
   D. Discount on parking permits for carpoolers
   E. More widespread use of the Zimride electronic ride board
F. Information about the Zimride electronic ride board
G. Car parking permits were significantly more expensive
H. Other ____

33. What is your sex?
   A. Male
   B. Female
   C. Transgendered

34. What age group do you belong to?
   A. <18 years old
   B. 18-22 years old
   C. 22-26 years old
   D. 26-30 years old
   E. 30-40 years old
   F. 40-50 years old
   G. 50-60 years old
   H. 60-70 years old
   I. >70 years old

35. Are there any other strategies that UWEC could pursue that would encourage the use of alternative transportation methods?
   A. ______________________

36. Please feel free to share any additional thoughts about this survey or other related issues
   A. ______________________

   Thank you for your time. Click the next button to record your answers and be redirected to the prize entry.

*Please note that not all respondents viewed all questions of the survey. The responses to certain questions determined whether other questions were asked. For example, only those respondents who selected “Student” as the answer to question II-1 were asked question II-3.*
Appendix B: Carbon Sequestration

Carbon emissions can be sequestered through their removal from the atmosphere by carbon sinks such as oceans, forests, or soil. Carbon sequestration is only considered an offset if it falls within the Association for the Advancement of Sustainability in Higher Education (AASHE) requirements. Any sequestration that does not follow those rules cannot be subtracted from the UW-Eau Claire carbon footprint.

Putnam Park is a 230 acre land preserve owned by UW-Eau Claire, about half of which is a Wisconsin State Designated Natural Area. The land was donated to the University with the intention that it remain in its natural state. This campus preserve, along with four other land parcels held by the University Foundation each provide a carbon sink, but do not fulfill all of the requirements for being defined as an offset. For more details, see the 2010 report.
Appendix C: Transportation Technical Addendum

These subsections include detailed information on data collection, actual data, and calculations. This is to make the process as transparent as possible and to give aid to those who wish to replicate our study in the future.

Direct Transportation

The Clean Air – Cool Planet Campus Carbon Calculator (CACPCCC) provides conversion factors which were used to convert gallons of gasoline and diesel into metric tons eCO₂. There were 21,845.63 gallons of gasoline and 4,984 gallons of diesel used during the 2011-2012 fiscal year.

Gasoline

The 21,845.63 gallons needed to be multiplied by three different factors for CO₂ (8.706632 kg CO₂/gallon), CH₄ (.001742 kg CH₄/gallon), and N₂O (.000599 kg N₂O/gallon). These three factors were found in the CACPCCC on the EF_Transportation page. This resulted in 190,201.9 kg CO₂, 38.045784 kg CH₄, and 13.095729 kg N₂O.

These numbers then needed to be multiplied by the global warming potentials, found in the CACPCCC on the EF_GWP page, to get kg CO₂. The global warming potential for CO₂ is 1, for CH₄ is 23, and for N₂O is 296. This resulted in 190,201.9 kg CO₂, 875.053 kg CO₂, and 3876.203 kg CO₂. The sum of these is 194953.1 kg CO₂. To get metric tons divide by 1000 kg, which equals 194.9531 metric tons eCO₂.

Diesel

The procedure for diesel is the same except for the initial conversion factors. The 4,984 gallons of diesel was instead multiplied by 9.98006 kg CO₂/gallon, 0.000567 kg CH₄/gallon, and 0.000257 kg N₂O/gallon. These factors were also found in the CACPCCC on the EF_Transportation page. This resulted in 49,775.24 kg CO₂, 2.825928 kg CH₄, and 1.280888 kg N₂O.

The global warming potentials are the same as above resulting in a sum of 50,219.38 kg CO₂. After dividing by 1000 kg, the total is 50.21938 metric tons eCO₂.

The sum of the gasoline and diesel emissions is 245.17 metric tons eCO₂.

Eau Claire Transit Route 9

The number of miles driven by each route per round trip were estimated using Google Maps:

Water St: 4 miles, Stein Blvd: 3.3 miles, Evening: 8.7, Saturday: 11.4 miles.

Distance traveled by each route, Sep. 6, 2011 – May 18, 2012:

Water St: 31,620 miles, Stein Blvd: 26,087 miles, Evening: 9083 miles, Saturday: 2394 miles. Total for all routes: 69,183 miles. The fuel economy was assumed to be 7 miles to a gallon, about the national average.

The conversion factors were acquired from Clean Air – Cool Planet Campus Carbon Calculator (CACPCCC) on the EF_Transportation page. The 9,883 gallons of diesel were multiplied by 9.98006 kg CO₂/gallon, 0.000567 kg CH₄/gallon, and 0.000257 kg N₂O/gallon. This resulted in 98,702.6 kg CO₂, 5.6 kg CH₄, and 2.5 kg N₂O. Masses of CH₄ and N₂O were multiplied by 26 and 297 respectively, to account for the global warming potential, totaling in 99.6 metric tons eCO₂.
Study Abroad/ NSE
357 students and 14 faculty traveled for the Study Abroad program, 41 students traveled for the National Student Exchange program, and 1 faculty traveled for the Fulbright program during the 2011-2012 fiscal year. We received the destinations of these 413 trips and used Google Maps to calculate the distance between the Minneapolis/St. Paul International Airport and the capitals of the destinations.

The round trip total miles for each destination were multiplied by the number of students and faculty that traveled there. The sum of these air miles (3,599,550 miles) was input into the Clean Air – Cool Planet Campus Carbon Calculator. This resulted in a total of 2,795 metric tons eCO₂.

Tour Buses
Kobussen data were gathered from Vickie Gardner of Accounts Payable, consisting of a document which listed each trip, and at the last line of the last page listed the total deadhead (without passenger) miles and livehead (with passenger) miles, the sum of which is 85,296 miles during the 2011-12 fiscal year. According to the Clean Air – Cool Planet Campus Carbon Calculator (CACPCCC), the conversion factor during the year 2011 to be used is 0.0002478 metric tons eCO₂/mile driven by bus. So 85,296 miles * (0.0002478 metric tons eCO₂/mile) = 22 metric tons eCO₂.

Lammers data were also gathered from Vickie Gardner of Accounts Payable. Only one trip was made through Lammers during the 2011-12 fiscal year; the place of departure and arrival were given in an invoice and the total amount of miles was approximated through Mapquest. The approximation was given to be 178 miles. So 178 miles * (0.0002478 metric tons eCO₂/mile) = 0.0441 metric tons eCO₂.

Thus, in total, busing emitted approximately 22 metric tons of eCO₂, at 85,474 miles of driving by bus.

Survey Analysis
The survey provided sources of eCO₂ for three categories: Car commuting, University-Related Air Travel, and University-Related Car Travel. Also, the survey contained questions related to policy implications for commuting.

Car Commuting
The survey included numerous questions related to commuting in an effort to be more vigorous and accurate than the previous report. These questions asked for the distance to campus from a local residence, gas mileage of their primary vehicle, how many people they carpool with, and how many trips they took per term since July 2011 by car, carpool, or moped/motorcycle.

The data was then divided up by classification of respondents: undergraduates, graduates, faculty, staff, and administration. For each category, the total number of trips taken per this fiscal year was calculated by multiplying the average trips by the number of respondents for the two questions (carpool and alone). The total miles driven was then calculated by multiplying by twice the average distance to the local residence. For the carpooling miles, the total miles was divided by the average carpool size. The total miles was then divided by the average gas mileage. To extrapolate the amount of gasoline to the entire population for each category, the gallons of gasoline was multiplied by the inverse of the respondent rate. The population for each category was found in the most recent UW System Factbook from 2010-2011 fiscal year.

The gallons of gasoline was then converted into eCO₂. There are 3 main greenhouse gasses that comprise eCO₂: CO₂, CH₄, and N₂O. The Clean Air – Cool Planet Campus Carbon Calculator (CACPCCC) contained conversion factors for gallons of gasoline to kg of each greenhouse gas on the
“EF_Transportation” page. Also the CACPCCC contained the global warming potentials (GWP) for CH₄ and N₂O, these conversion factors are the relative potency of CH₄ and N₂O for their greenhouse effect compared to CO₂. The gallons of gasoline was multiplied by the conversion factors to determine the mass of greenhouse gases and then multiplied by their respective GWPs to calculate eCO₂.

University-Related Air Travel
There was only one question directly related to the amount of eCO₂ emissions from air travel. The question asked respondents to estimate the number of miles traveled by air since July 2011. The answers were given in ranges and the actual mileage for each answer was assigned to be the arithmetic mean of the range (ex: the answer “100-1000 miles” was recorded as 550 miles). The same separation based on classification and subsequent extrapolation was used here. Since the question only pertained to 10 months out of the fiscal year, the total miles was multiplied by 12/10ths. The number of miles was then input into the CACPCCC unaltered to calculate eCO₂.

University-Related Car Travel
There were two questions directly relating to emissions from car travel. One question was for travel alone and the other was for travel by carpool. Again ranges were used for these questions. Also, the separation and extrapolation was applied to this data set as well. These questions pertained to the same time frame as air travel and the total miles was again multiplied by 12/10ths. However, entering this data into the CACPCCC was more involved than air travel.

The data was input into the “Input_Commuter” page. Cells that required a number, for the calculation to work (# of respondents, trips/wk, wks/year), were given a number of “10.” The value entered into the “Average Distance per Trip” was the total miles driven for both categories divided by 1000 (due to the extra “10s”). The “% carpool” cell was given the percentage of carpooling miles to the total, the “% alone” cell was given the percentage of alone miles to the total. The CACPCCC then calculated eCO₂.

To calculate the contribution of each category (alone vs carpool) to the total, the total carpool miles (divided by 1000) was input into the average distance per trip cell and the % carpool cell was designated as 100%. This calculated the eCO₂ from carpooling and the alone emissions were calculated by subtracting the carpool emissions from the total emissions.
Appendix D: Acknowledgements

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