Sustainability: The Next Step
Estimating the University of Wisconsin – Green Bay's Carbon Footprint

Chapter 5
Integration-How the Campus Carbon Calculator Works and What it Does

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Integration

How the Campus Carbon Calculator Works and What It Does

The Clean Air – Cool Planet Carbon Calculator was used to determine the carbon footprint of the University. It is available for use by universities who are signatories of the ACUPCC Commitment. In order to successfully utilize the calculator demographic and background data must first be collected. This data includes number of students, faculty, and staff, research budget, energy budget, university budget, and square footage of buildings. This data was gathered from many sources (Appendix A).

It is highly recommended that before anyone begins using the Clean Air-Cool Planet Campus Carbon Calculator that they read through the user's guide, as it details exactly where data should and shouldn't be entered. It will also explain what each module does and how to use it. There are six modules within the calculator: 1) inputs module, 2) summary module, 3) project module, 4) emission factors module, 5) advanced energy demand and cost module, and the 6) reference module. The input module should be the only module that data is entered into, unless using the project module to develop emissions estimates for a project. All summary sheets are updated as data is entered or changed on the input sheets. Once the data is entered into the input sections of the spreadsheet, the program will provide analysis and graphs of emissions by both individual gases, as well as, by carbon dioxide equivalents (eCO_2). An eCO_2 is the international standard unit used to compare the amount of emissions from various greenhouse gases based upon the amount of CO_2 that would have the same global

warming potential. The campus carbon calculator will make graphs for outputs for an individual year as well as graphs of emissions over time. It will also take into account any carbon offsets due to composting, purchase of renewable energy credits, and sequestration of carbon by managed lands.

Most of the data needed for the inputs section of the calculator was acquired from various university personnel. However, there were many assumptions made in the commuter data. While much of the data for commuting came from the fall 2005 Capstone class report, some of it was estimated. The 2005 capstone report provided very good information regarding number of miles driven each day to class and the number of trips made by students, however, there was no data regarding miles traveled by faculty and staff. The report did provide the average number of trips made per week and number of weeks per year for both faculty and staff. We decided to use the estimates for distance traveled, as well as, number of trips made per day, for faculty and staff as was used for students.

Once the data was entered into the calculator, the calculator gave us a total output of emissions. In 2007, emissions were approximately 37,000 metric tons of eCO_2. As can be seen in figure 5.1, the amount of eCO_2 steadily rose from 2001 to 2004, leveled off, and then had a slight decrease in 2007.

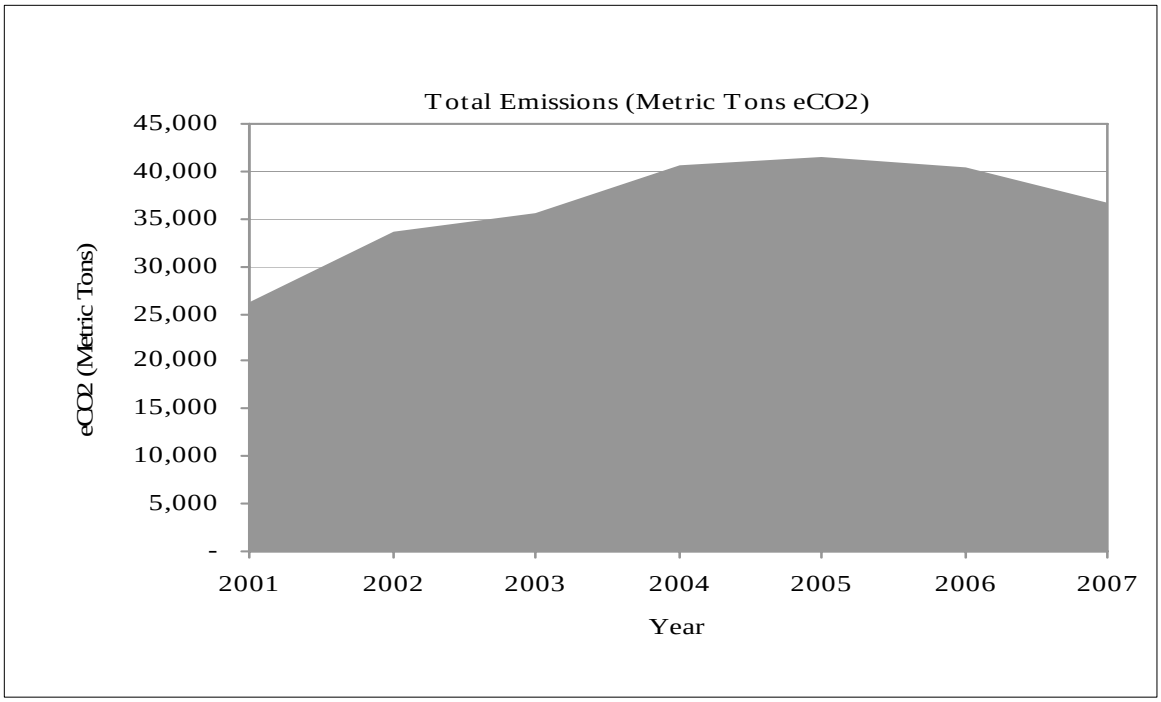

Figure 5.1. Total emissions in metric tons eCO_2 per year for UW-Green Bay.

If the university is to be energy independent by 2012, as per Governor Jim Doyle's "Declaration of Energy Independence" program, these emissions need to go down to zero. In addition, this needs to happen while the university in increasing in size. The current projection for the university is an increase of about 2000 students in the next few years. This will mean many changes in order to get our emissions to zero, and some of them will be more difficult than others. There are some things that the university has control over, such as the types of light bulbs used and the temperature of classrooms which may be relatively simple to lower energy use and thus emissions. However, there are some things the university has less control of, such as the driving habits of students, faculty, and staff, which will be much more difficult to decrease emissions for. Fortunately, in regard to the Governor's "Declaration of Energy Independence" program, driving habits of students, faculty, and staff are not something that must be changed. The

university must be “off the grid” in regards to energy usage on campus. The university also manages land that may help offset some of these emissions.

A better understanding of where the emissions are coming from can be seen in figure 5.2. The largest percentage of the university’s emissions, almost half of the total, is coming from purchased electricity (scope 2). The remainder of the university’s emissions are coming from on campus stationary sources, about one-third (scope 1), and the smallest portion are from transportation (scope 3). The campus does not purchase any steam or chilled water and we were unable to gather data related to solid waste. Therefore, the graph shows no emissions from these sources.

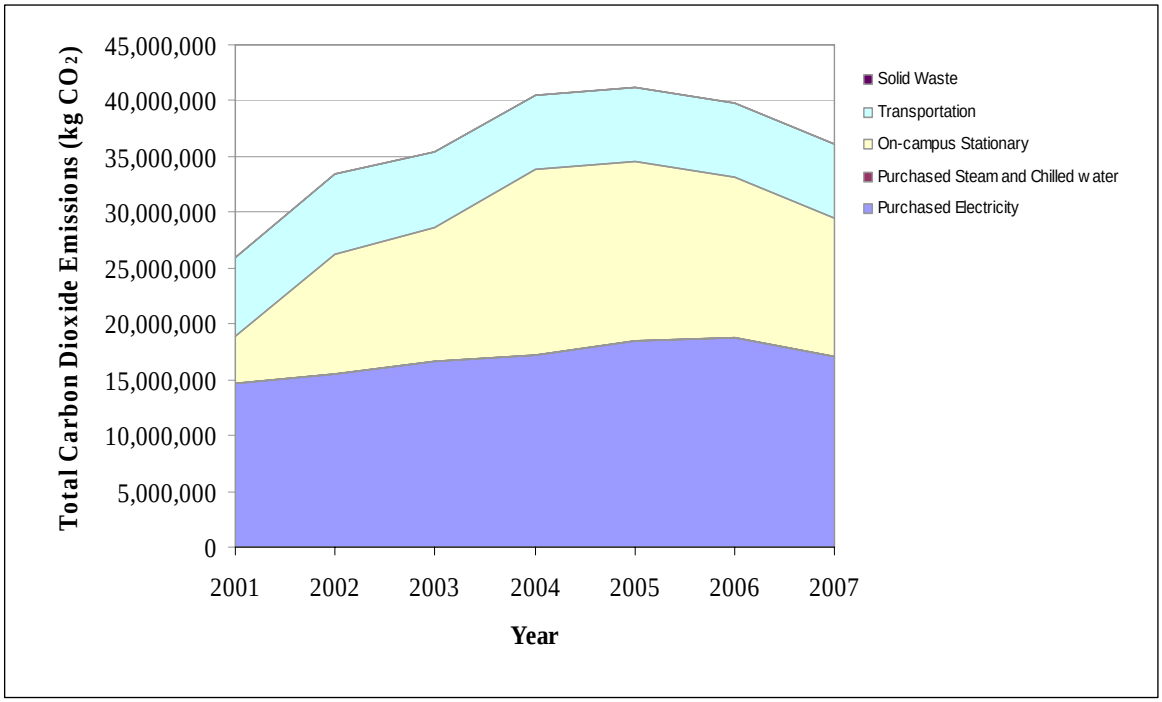

Figure 5.2. Total kg of CO_2 emissions broken down by scope.

As stated earlier, emissions for transportation is not something that must be eliminated for the governors program. However, even without those emissions, this still

leaves the majority of the other emissions to be decreased to zero. All purchased electricity, natural gas, and fuel oil must be eliminated completely.

Carbon sequestration by lands managed by the university is ~1403 metric tons per year of eCO_2. The universities emissions, less transportation, are still slightly over 30,000 metric tones eCO_2 for 2007. By examining figure 5.3, it is obvious that CO_2 sequestration by our managed lands is not enough to help decrease our net emissions by a significant amount, and therefore should not be considered one of the ways to help make the campus carbon neutral. Unfortunately, this graph is one example of a problem that I came across using the calculator. Figure 5.3 was created in a separate Excel file, using data from the calculator. Unfortunately, the graph from the calculator is inaccurate and when viewed gives the impression that our offsets are helping to decrease our eCO_2 by a large amount when in reality, our offsets are helping very little. In figure 5.3, our total emissions, net emissions and offsets are depicted accurately and give a clear representation of how little our offsets help to decrease our total emissions.

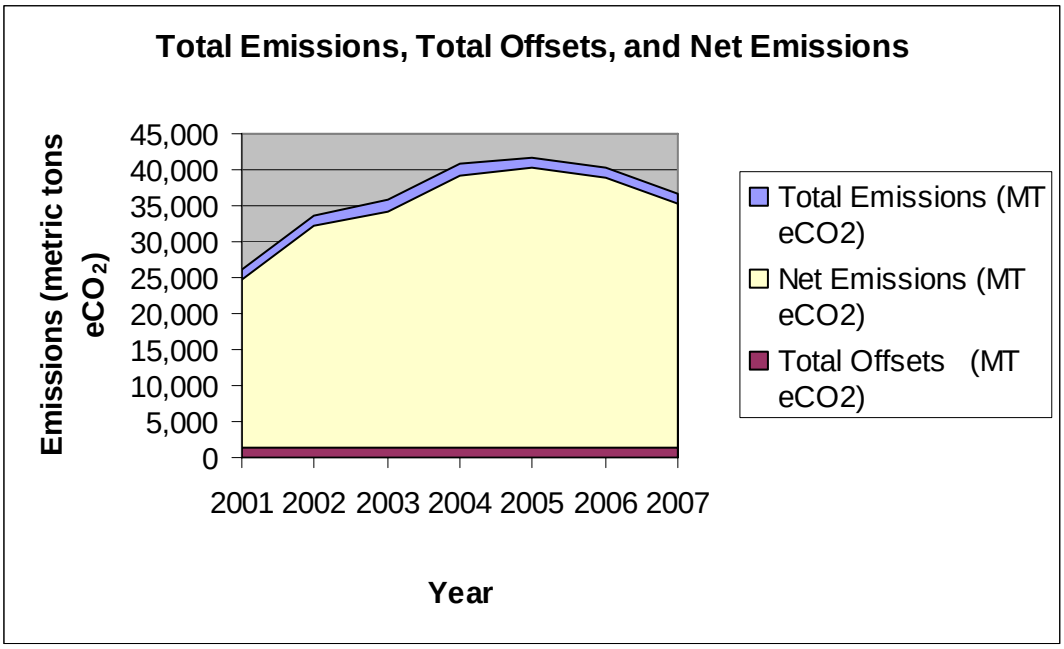

Figure 5.3. Total emissions, net emissions, and offsets per year.

According to the calculator, in 2007, approximately 1% of our emissions were from refrigeration sources; this would include any leaks of HCFC, HFC, PFC, and SF_6. Hopefully, this number will go to zero in subsequent years as any leaks that were found should have been sealed. All data and graphs can be further looked at in the calculator itself. The calculator also provides a project module which allows you to develop an emissions estimate for a potential project or event. This module was not used for this initial greenhouse gas inventory, but may be useful in the future as the campus is becoming energy independent and working on becoming climate neutral.

The calculator does have some shortcomings in the design. There is no input area for wastewater, drinking water, and business travel (other than by air plane) even though this should be included in scope 3 emissions. In order to include the energy used for wastewater and drinking water they have been added into the natural gas, fuel oil, and

electricity totals, for scopes 1 and 2. Further, some of the graphs, specifically the graph comparing the total emissions, net emissions, and carbon offsets (figure 5.3 above), don't seem to use the correct reference frames when calculating the data and the graphs don't make sense when examined. One of our group members used the data from the calculator and made our own graph for the presentation given on December 5th, 2007, and thus it will not be the same one that would be viewed in the calculator outputs or in this paper. Finally, while the frames in the input section allow for a comment to be inserted, to allow for any estimates or assumptions to be noted, the commuter input frames do not allow for comments to be added, and thus are mentioned within the context of the paper and will hopefully be adjusted as better data is made available or gathered.

Work Cited

Clean Air Cool Planet Campus Carbon Calculator Users Guide. Retrieved, September 8, 2007. From http://www.cleanair-coolplanet.org/toolkit/calculator/v.5_UserGuide.doc

Dybas, Angel, Barbara Janesh, Jennifer Kelly, Luann Rudolph. Building on the UW-Green Bay Master Plan: Promoting Sustainability-Transportation Management. December 13, 2005. http://www.uwgb.edu/esp/Courses/Capstone05/TransWorkgroup.doc

Chapter 5 - Appendix 1

Contacts for demographic and institutional data

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UWGB Factbook	Student population			uwgb site search: electronic factbook