

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

## **Introduction**

**University of Wisconsin-Green Bay  
Seminar in Environmental Science and Policy  
Capstone Course  
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## Overview

Universities play a critical role in society, not only as educators, but as active participants in creating solutions to some of society's most complex problems. The University of Wisconsin-Green Bay has been given the opportunity to become a leader in the global effort to mitigate the effects of global warming on our planet. Under a directive from Governor Jim Doyle, the university will face the enormous challenge of becoming an energy independent institution within five years (Doyle 2007). The effort is part of Wisconsin's "Declaration of Energy Independence," which sets forth broad, ambitious goals for the state to become the Nation's leader in the drive toward energy independence. UW-Green Bay is one of four universities selected by Governor Doyle to lead this initiative.

The University has also pledged to take a leadership role on sustainability by addressing its greenhouse gas emissions. In 2007, Chancellor Bruce Shepard signed the American College & University Presidents Climate Commitment (ACUPCC). In doing so, the University has agreed to develop a long range plan aimed at reducing and eventually eliminating its greenhouse gas emissions. The Commitment provides a framework to accomplish the following tasks:

- Complete a carbon emissions inventory for the university.
- Within two years, set a target date and interim milestones for becoming climate neutral.

- Take immediate steps to reduce greenhouse gas emissions using short term recommendations outlined in the ACUPCC guidance documents.
- Integrate sustainability into the educational curriculum of the university with a requirement it becomes part of the institution’s educational experience.
- Develop a transparent reporting process whereby the action plan, carbon inventory, and progress reports are available to the public.

Furthermore, UW- Green Bay is a clear advocate of environmental sustainability through its mission statement...“UW- Green Bay provides an interdisciplinary, problem-focused educational experience that prepares students to think critically and address complex issues in a multicultural and evolving world. The University enriches the quality of life for students and the community by embracing the educational value of diversity, promoting environmental sustainability, encouraging engaged citizenship, and serving as an intellectual, cultural and economic resource.”

The following report was written by students enrolled in the Environmental Science and Policy Capstone course to provide UW-Green Bay with the information needed to begin the process of achieving climate neutrality, and ultimately becoming an energy independent institution.

The main goals of this report are:

1. To develop an initial report on the requirements of the ACUPCC Commitment; which will serve as a gap analysis of where UW–Green Bay is and where it wants to be.

2. Focus on the development of a GHG Emissions Inventory for UW-Green Bay by reporting on preliminary findings and proposing recommendations for future refining of reporting processes and standards.

## **Background**

"Global warming will be the greatest environmental challenge in the 21st century."

- Former Vice President and Noble Peace Prize Winner, Albert Gore

On February 2, 2007, the Intergovernmental Panel on Climate Change (IPCC) declared that evidence of a global warming trend is “unequivocal” and that human activity has “very likely” been the driving force behind increased global temperatures (IPCC 2007). There is world wide scientific consensus that the release of carbon dioxide, as well as other greenhouse gases from the combustion of fossil fuels, have played a significant role in raising the average surface temperature of the earth by more than one degree Fahrenheit since 1900 (UCS 2007). Climatologists from the NASA Goddard Institute for Space Studies in New York recently stated that the year 2006 was the fifth warmest year on record since the 1880s. The five warmest years have all occurred in the last two decades. They are in descending order: 2005, 1998, 2002, 2003 and 2006 (NASA 2007).

The IPCC does not stand alone in its conclusion that the Earth’s atmosphere is being adversely affected by human activities. In fact, almost all major scientific bodies whose members have made declarations about climate change have issued similar statements to that of the IPCC. From the Union of Concerned Scientists to the American

Meteorological Society, the consensus is the same. “Human activities ... are modifying the concentration of atmospheric constituents ... that absorb or scatter radiant energy” (AMS 2007). A recent study showed that of 928 abstracts published on climate change between the years of 1998 and 2003, not a single one disagreed with the consensus position (Oresekes 2004). All evidence to the contrary appears to be emanating from the media and misinformed politicians.

Because the federal government has not clearly identified the direction the United States should take in mitigating the effects of global warming, state and local governments have stepped forward in the development of climate change policies and initiatives (Byrne et al. 2007). Many state governments have already set targets for the reduction of greenhouse gas emissions, mandated the purchase of renewable energy, promoted energy efficiency and developed state wide policy initiatives that promote sustainability.

In Wisconsin, Governor Jim Doyle signed the “Declaration of Energy Independence” on July 7, 2007 (WDNR 2007). The Declaration calls for a joint public-private effort by the State of Wisconsin, including the University of Wisconsin, to achieve the following goals:

- To generate 25 percent of our electricity and 25 percent of our transportation fuel from renewable fuels by 2025.
- To capture 10 percent of the market share for the production of renewable energy sources by 2030, helping America reduce our dependence on foreign fossil fuels

and bringing tens of thousands of new jobs to our citizens. Achieving this goal would bring \$13.5 billion annually to Wisconsin's economy by 2030.

- To become a national leader in groundbreaking research that will make alternative energies more affordable and available to all – and to turn those discoveries into new, high paying jobs right here in Wisconsin.

Most recently, in April 2007, the Governor signed Executive Order #191 into action. The executive order created the Governor's task force on Global Warming which is made up of various Wisconsin businesses, industry, energy and environmental leaders. They are confronted with the task of examining the effects of and finding solutions to the challenges presented by global warming on the state's environment and economy. The task force has also been asked to develop a state plan that will be delivered to the governor to reduce the state's contribution to global warming (WDNR 2007). To date, the task force has created many documents showing how global warming will affect Wisconsin's environment and economy.

At the regional level, many states are working collaboratively to form regional plans. Regional efforts may actually be more efficient and effective in that they cover a broader geographical area, thus reaching out to more sources of greenhouse gas emissions. They also eliminate duplication of work among states and bring more uniform rules to the table. Some examples of regional efforts are:

- The Northeastern Regional Greenhouse Gas Initiative (RGGI). Seven governors of the Northeastern and Mid-Atlantic States agreed to a "cap and trade" system aimed at reducing carbon dioxide emissions from power plants.

- Western Governors Association (WGA). The Clean and Diversified Energy Initiative was launched by the WGA. The initiative set forth a series of strategies to increase energy efficiency, expand the use of the renewable energy resources, and creative incentives for carbon capture and sequestration.

These are just a few of the regional initiatives that have been developed by collaborating state governments (PEW 2007).

At the university level, many colleges and institutions of higher education have been leading the charge to reduce greenhouse gas emissions (ASHEE 2007). There are many exemplary institutions to choose from. One model institution is Oberlin College in Oberlin, Ohio. Led by the notable Professor David Orr, the institution has become a flagship for forward environmental thinking and innovation. In 2002, Oberlin contracted with the Rocky Mountain Institute to prepare a document outlining a proposal that would make the college completely carbon neutral by the year 2020 (Hattam 2007). The 125 page document outlines the feasibility of dramatically reducing the college's carbon footprint. The proposal shows how this can be achieved through minimal costs, with potential for long-term profit by selling back to the grid any excess energy the college produces.

Harvard's Greenhouse Gas program is another excellent example of a university wide initiative (Harvard 2007). The program includes a GHG inventory, sustainable building program, green campus energy loan fund, renewable energy program, student internship programs, sustainability courses and a graduate living program. One

unfortunate shortcoming of the program is that it does not set any specific reduction goals or timelines. They simply perform a greenhouse gas audit every year.

The UW-Green Bay has a long history of being a proactive environmental institution. Ecological awareness and environmental stewardship are two of the key principals the university was founded on. There was a point in time when the institution had been known as Eco-U. Many years have past since the founding of the University in 1969. While maybe not as embedded campus-wide as it used to be, the days of Eco-U have not been forgotten. The signing of the ACUPCC Commitment promises to open a new chapter in this history.

### **The UW–Green Bay Commitment**

By signing the ACUPCC Commitment, UW–Green Bay Chancellor Bruce Shepard, began a new chapter in the history of Eco-U, by committing to the development of policies to counter the campuses contribution to the phenomenon of climate change. However, there were already pieces in place that will assist UW – Green Bay in meeting its Climate Commitment. The ACUPCC Implementation Guide (ACUPCC 2007) is used to provide a framework for developing structures and process for UW – Green Bay efforts to comply with the requirements of the ACUPCC Commitment.

### **Implementation Schedules**

With the UW–Green Bay Chancellor signing the commitment in the spring of 2007 it set in motion a series of timelines that are listed below.

- Create and designate institutional structures to guide the development and implementation of a comprehensive plan to achieve climate neutrality by November 15, 2007.
- Complete greenhouse gas inventory by September 15, 2008.
- Develop an action plan for becoming climate neutral and initiate two or more of the six actions described in the Commitment by September 15, 2009.

### **Organizational Boundaries**

One of the first steps in completing a greenhouse gas inventory is to establish organizational boundaries. The organizational boundaries for the campus were obtained from the UW–Green Bay Master Plan (UWGB 2006) and discussions with Chris Hatfield. These boundaries include the university campus, Toft Point, Peninsula Center, Kingfisher Farm, Point au Sauble, and the Chancellors residence. An overview of the university campus can be seen in figure 1.

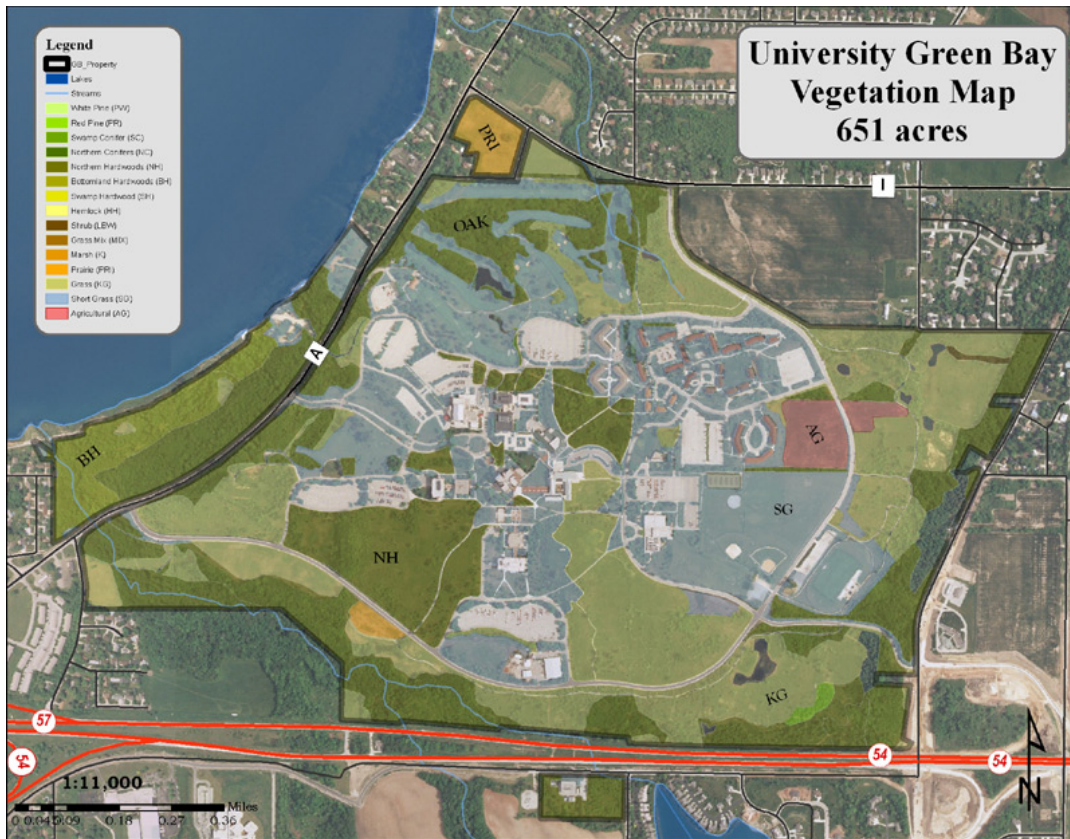


Figure 1. Ariel view of University of Wisconsin-Green Bay campus.

## Institutional Structure

One of the first steps in complying with the requirements of the ACUPCC Commitment calls for the establishment of “...a committee or institutional structure to guide the development and implementation of the school’s plan. This must include faculty, staff and students.” This requirement can easily and quickly be met thanks to the work of a past Capstone course. In their capstone project, *Building on the Master Plan: Toward Sustainability*, Report of the Organizational Work Group (Dybas et al. 2005),” the 2005 Capstone students provided recommendations for the development of a

sustainability committee. This recommendation was picked up by UW–Green Bay and implemented through its 2006 Master Plan.

- The recommendation of the fall 2007 Capstone course is that UW–Green Bay officially charge the Sustainability Committee with ensuring UW–Green Bay meet its Commitment requirements.

### **GHG Emissions Inventory**

The GHG emissions inventory served as the main area of focus for the fall 2007 Capstone course students. When the Commitment was first introduced to the Capstone course, the discussions initially focused on the magnitude of the project. It was finally decided that the most important area to focus on would be the GHG emissions inventory. This was an area identified as the weakest in terms of current initiatives and even as simple as awareness on the part of the students, faculty and staff. It was also identified as necessary work to assist UW – Green Bay in meeting the required timelines found in the Commitment. The Capstone began by dividing the GHG emissions inventory according to the different scopes defined in the ACUPCC implementation guide.

The main workgroups consisted of Scope 1, Scopes 2 and 3, and a carbon offset group that would look at the campuses vegetation inventory. To assist with calculating the campuses carbon footprint once information was obtained, the Capstone decided on using the Clean Air Cool Planet’s (CACP) Campus Carbon Calculator v 5.0 (CA-CP v5.0).

## **Temporal Boundaries**

The temporal boundaries decided on by the fall 2007 Capstone students were as simple as finding out the extent of the data available. Some areas have records dating back further than others. The time period chosen for this project was fiscal years 2001-2007. The fiscal year for UW–Green Bay is July 1<sup>st</sup> of each calendar year to June 30<sup>th</sup> of the following calendar year.

## **Operational Boundaries**

The GHG protocol standards called for by the ACUPCC Commitment expect signatories to provide an accounting of emissions from the six greenhouse gases identified in the Kyoto Protocol. The Capstone followed the requirements of the Commitment and worked to obtain data related to these gases, including: carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), nitrous oxide (N<sub>2</sub>O), hydrofluorocarbons (HFC's), perfluorocarbons (PFC's), and sulphur hexafluoride (SF<sub>6</sub>). But, as suggested by the implementation guide, the main focus was on CO<sub>2</sub> emissions generated within the defined organizational boundaries.

## **Campus Carbon Calculator**

The Clean Air-Cool Planet Campus Carbon Calculator is an Excel workbook that incorporates energy use, agriculture, refrigerant, solid waste, and general reference data to calculate estimates of greenhouse gas emissions from a university. The calculator

includes all greenhouse gases specified by the Kyoto Protocol. These gases include CO<sub>2</sub>, CH<sub>4</sub>, N<sub>2</sub>O, HFC, PFC, and SF<sub>6</sub>. The spreadsheets are based on the workbooks provided by the IPCC for national level inventories, but have been adapted for use at an institution such as a college or university. The calculator divides the data collection up into 3 scopes, as well as general background data.

**Scope 1** - includes all direct sources of GHG emissions from sources that are owned or controlled by an institution, including (but not limited to): production of electricity, heat, or steam; transportation or materials, products, waste, and community members; and fugitive emissions (from unintentional leaks).

**Scope 2** - includes GHG emissions from imports of electricity, heat or steam – generally those associated with the generation of imported sources of energy.

**Scope 3** - includes all other indirect sources of GHG emissions that may result from the activities of the institution but occur from sources owned or controlled by another company, such as: business travel, outsourced activities and contracts, emissions from waste generated by the institution when the GHG emissions occur at a facility controlled by another company, e.g. methane emissions from landfilled waste, and the commuting habits of community members (Clean air cool planet campus carbon calculator users guide).

## **Structure of the Report**

This report is separated into five chapters and a short conclusion/summary. Each chapter is based on a different scope and recommendations by each team for the respective scope are included in the individual chapters. The chapters are:

Chapter 1: Scope 1: All direct sources of GHG emissions from sources that are owned or controlled by the university.

Chapter 2: Scope 2: All GHG emissions from imports of electricity, heat, or steam.

Chapter 3: Scope 3: All other indirect sources of GHG emissions, such as business travel and commuting habits of community members.

Chapter 4: Carbon offsets – Carbon sequestration

Chapter 5: Integration-How the campus carbon calculator works and what it does

Conclusion/Summary

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