Sustainability—The Next Step: Estimating UW-Green Bay’s Carbon Footprint

December 4, 2007

Graduate Seminar in Environmental Science and Policy Annual Project
Global Climate Change - Polarization?

- "We're doing great, thank God. The American economy is flourishing. We're using more fossil fuels. We're putting more CO$_2$ in the air. The coal plants are running at record levels. Business has never been better. We're doing great!"

Fred Palmer, Western Fuels Association
Global Climate Change

- February 2, 2007 Intergovernmental Panel on Climate Change (IPCC)
  - “Unequivocal” evidence that human activity was “Very Likely” the driving force of increased global temperatures
  - Awarded Noble Peace Prize on October 12, 2007
- NASA Goddard Institute for Space Studies declared 2006 the 5th warmest year on record since the 1880s
- A recent study showed that of 928 submitted papers on climate change between 1998-2003 none disagreed with the consensus position (*Science*, 2004)
Wisconsin - Declaration of Energy Independence

- Public-Private joint effort to achieve the following goals:
  - Generate 25% of electricity & fuel from renewables by 2025
  - Capture 10% market share for production of renewables by 2030
  - National Leader in groundbreaking research on alternative energies
  - UW-Green Bay will be 1 of 4 of the UW campuses to become “energy independent” by 2012
American College & University Presidents Climate Commitment

- Signed September 2007
  - Long range plan to reduce & eventually eliminate greenhouse gas emissions
  - Complete carbon emissions inventory
  - Within 2 years set target date to become climate neutral
  - Take immediate steps to reduce GHG emissions
  - Integrate sustainability into curriculum
  - Develop transparent reporting system of carbon inventory, make available to public
Project Overview

- Within 1 year (September 2008) carbon inventory is due.
  - Annual inventory reporting requirements
- Carbon inventory = carbon footprint
- Initial attempt to calculate the carbon inventory
- This effort will assist the Campus Sustainability Committee.
Project Approach

- Used the Clean Air-Cool Planet Emission Inventory Calculator
- Time frame for project original goal FY 2000-2007, presenting FY 2001-2007
- Direct and Indirect Emissions of GHG’s converted to eCO$_2$
- Calculated the amount of carbon sequestered
What is eCO$_2$?

A metric measure used to compare the emissions from various greenhouse gases based upon their global warming potential.

An internationally accepted measure that expresses the amount of global warming of greenhouse gases in terms of the amount of carbon dioxide that would have the same global warming potential.
Capstone Project

- **Scope 1**: direct GHGs from institutional owned or controlled sources
- **Scope 2**: indirect emissions generated by the production of electricity consumed by the institution
- **Scope 3**: all other indirect emissions
- **Carbon Sequestration**: Carbon sequestered on managed properties
Scope 1

On Campus Stationary Sources
Sources of Emissions

SCOPE 1
DIRECT

SCOPE 2
INDIRECT

SCOPE 3
INDIRECT

CO₂
SF₆
CH₄
N₂O
HFCs
PFCs

Purchased Electricity for Own Use
Fuel Combustion
Company Owned Vehicles
Outsourced Activities
Production of Purchased Materials
Employee Business Travel
Waste Disposal

NZBCSD, 2002
What sources are included in Scope 1?

- Stationary sources of Greenhouse Gases
  - Natural Gas
  - Gasoline
  - Diesel
  - Fertilizer
  - Refrigerants
General Summary of Scope 1

Objectives

- Determining the Greenhouse Gases emitted from the on-campus burning of fossil fuels and the leaking of Hydrofluorocarbons from refrigeration and air conditioning equipment
- The calculations in this scope also figured in the effects of solar energy generated on campus
Gathering the Data

- Data collection for this scope entailed contacting and meeting with several campus operational supervisors and managers
- Facilities
  - Residential Life
  - University Union
  - Golf Course
  - Heating/Cooling
  - AC/Refrigeration
Facilities Management

- Provided natural gas records for the academic buildings and some other buildings on campus
Academic Building Natural Gas Usage

Natural Gas Usage of Academic Buildings By Fiscal Year

<table>
<thead>
<tr>
<th>Fiscal Year</th>
<th>Natural Gas Usage (MMbtu)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000-2001</td>
<td>77496</td>
</tr>
<tr>
<td>2001-2002</td>
<td>99986</td>
</tr>
<tr>
<td>2002-2003</td>
<td>111479</td>
</tr>
<tr>
<td>2003-2004</td>
<td>122170</td>
</tr>
<tr>
<td>2004-2005</td>
<td>124811</td>
</tr>
<tr>
<td>2005-2006</td>
<td>116486</td>
</tr>
<tr>
<td>2006-2007</td>
<td>111174</td>
</tr>
</tbody>
</table>
Other Natural Gas Data

- Facilities Building, Golf Course Pro Shop, Language House, Chancellor’s House, University Union, Lambeau House
Natural Gas Usage in the Residence Halls

- UWGB has two major residential life complexes: Traditional Apartments and Dorms
- Residential life also controls three other campus buildings
Natural Gas Usage in the Dorms

![Graph showing natural gas usage by year]

Natural Gas Usage in Dorms by Year

- Year: 2002, Natural Gas Usage (MMbtu): 7709
- Year: 2003, Natural Gas Usage (MMbtu): 9215
- Year: 2004, Natural Gas Usage (MMbtu): 10206
- Year: 2005, Natural Gas Usage (MMbtu): 10327
- Year: 2006, Natural Gas Usage (MMbtu): 9097
- Year: 2007, Natural Gas Usage (MMbtu): 7633
Natural Gas Usage in Apartments

Traditional Apartment's Natural Gas Usage by Year


Natural Gas Usage (MMbtu):
- 2002: 2250
- 2003: 1954
- 2004: 8407
- 2005: 6988
- 2006: 5851
- 2007: 4180
Natural Gas Usage in Other Residential Life Buildings

Natural Gas Usage of Other Res Life Buildings by Year

Year

2002  2003  2004  2005  2006  2007

Natural Gas Usage (MMbtu)

0  200  400  600  800  1000  1200

123  131  300  419  369  340
Gasoline and Diesel Fuel Usage

This data was collected for the maintenance and golf course vehicles.
Distillate Fuel Oil Usage

- Occasionally, distillate fuel oil is burned to supplement natural gas during the winter months

<table>
<thead>
<tr>
<th>Year</th>
<th>Fuel Oil (gallons)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>1415</td>
</tr>
<tr>
<td>2001</td>
<td>203319</td>
</tr>
<tr>
<td>2002</td>
<td>0</td>
</tr>
<tr>
<td>2003</td>
<td>155</td>
</tr>
<tr>
<td>2004</td>
<td>3634</td>
</tr>
<tr>
<td>2005</td>
<td>185</td>
</tr>
<tr>
<td>2006</td>
<td>685</td>
</tr>
<tr>
<td>2007</td>
<td>470</td>
</tr>
</tbody>
</table>
Solar Energy

- Solar energy was also produced via photovoltaic cells on MAC Hall
- Solar hot water for the swimming pool
Solar Energy Produced

Solar Energy Generated by Fiscal Year

- 2004-2005: 367 mmbtu
- 2005-2006: 463 mmbtu
- 2006-2007: 71 mmbtu

Fiscal Year
## Scope 1 eCO₂ by Year

<table>
<thead>
<tr>
<th>Fiscal Year</th>
<th>eCO₂ (metric tonnes/year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2001</td>
<td>4433</td>
</tr>
<tr>
<td>2002</td>
<td>10966</td>
</tr>
<tr>
<td>2003</td>
<td>12313</td>
</tr>
<tr>
<td>2004</td>
<td>16833</td>
</tr>
<tr>
<td>2005</td>
<td>16432</td>
</tr>
<tr>
<td>2006</td>
<td>14896</td>
</tr>
<tr>
<td>2007</td>
<td>12964</td>
</tr>
</tbody>
</table>
Scope 1 eCO$_2$

UW-Green Bay GHG Emissions for Scope 1

Total Emissions (Metric Tonnes eCO$_2$)

Year

2001 2002 2003 2004 2005 2006 2007
Recommendations

- Record keeping
- Maintenance vehicles
- Exploring alternative sources of energy
Scope 2

Indirect emissions generated in the production of electricity consumed by the institution.
Sources of Emissions

- **SCOPE 1**: Direct
- **SCOPE 2**: Indirect
- **SCOPE 3**: Indirect

**Sources:**
- Purchased electricity for own use
- Fuel combustion
- Company owned vehicles
- Production of purchased materials
- Product use
- Outourced activities
- Contractor owned vehicles
- Employee business travel
- Waste disposal
# Campus Electrical Usage

<table>
<thead>
<tr>
<th>Year</th>
<th>kWh</th>
</tr>
</thead>
<tbody>
<tr>
<td>2001</td>
<td>15,416,691</td>
</tr>
<tr>
<td>2002</td>
<td>16,379,730</td>
</tr>
<tr>
<td>2003</td>
<td>16,973,063</td>
</tr>
<tr>
<td>2004</td>
<td>17,007,414</td>
</tr>
<tr>
<td>2005</td>
<td>18,364,911</td>
</tr>
<tr>
<td>2006</td>
<td>18,884,357</td>
</tr>
<tr>
<td>2007</td>
<td>17,416,444</td>
</tr>
</tbody>
</table>
# Residence Life Electrical Usage

<table>
<thead>
<tr>
<th>Year</th>
<th>kWh</th>
</tr>
</thead>
<tbody>
<tr>
<td>2001</td>
<td>NA</td>
</tr>
<tr>
<td>2002</td>
<td>1,441,575</td>
</tr>
<tr>
<td>2003*</td>
<td>1,926,062</td>
</tr>
<tr>
<td>2004*</td>
<td>2,562,366</td>
</tr>
<tr>
<td>2005*</td>
<td>2,716,035</td>
</tr>
<tr>
<td>2006</td>
<td>2,529,988</td>
</tr>
<tr>
<td>2007</td>
<td>*1,977,206</td>
</tr>
</tbody>
</table>
## Total Electrical Usage

<table>
<thead>
<tr>
<th>Year</th>
<th>Total kWh</th>
<th>MT eCO$_2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>2001</td>
<td>16,826,869</td>
<td>14,690</td>
</tr>
<tr>
<td>2002</td>
<td>17,880,023</td>
<td>15,609</td>
</tr>
<tr>
<td>2003</td>
<td>18,978,817</td>
<td>16,568</td>
</tr>
<tr>
<td>2004</td>
<td>19,664,559</td>
<td>17,167</td>
</tr>
<tr>
<td>2005</td>
<td>21,170,351</td>
<td>18,482</td>
</tr>
<tr>
<td>2006</td>
<td>21,496,982</td>
<td>18,767</td>
</tr>
<tr>
<td>2007</td>
<td>19,472,362</td>
<td>16,999</td>
</tr>
</tbody>
</table>
Scope 3

All other indirect emissions including commuting to and from campus, air travel, waste disposal, production of purchased products, etc.
Sources of Emissions
## Campus Drinking Water

<table>
<thead>
<tr>
<th>Year</th>
<th>Gallons</th>
</tr>
</thead>
<tbody>
<tr>
<td>2001</td>
<td>18,050,168</td>
</tr>
<tr>
<td>2002</td>
<td>20,277,278</td>
</tr>
<tr>
<td>2003</td>
<td>22,504,388</td>
</tr>
<tr>
<td>2004</td>
<td>29,032,367</td>
</tr>
<tr>
<td>2005</td>
<td>26,711,656</td>
</tr>
<tr>
<td>2006</td>
<td>28,026,363</td>
</tr>
<tr>
<td>2007</td>
<td>31,566,617</td>
</tr>
<tr>
<td>Year</td>
<td>Gallons</td>
</tr>
<tr>
<td>--------</td>
<td>-----------</td>
</tr>
<tr>
<td>2001</td>
<td>7,277,315</td>
</tr>
<tr>
<td>2002</td>
<td>7,804,752</td>
</tr>
<tr>
<td>2003*</td>
<td>14,948,257</td>
</tr>
<tr>
<td>2004*</td>
<td>16,785,420</td>
</tr>
<tr>
<td>2005*</td>
<td>16,887,596</td>
</tr>
<tr>
<td>2006</td>
<td>15,845,184</td>
</tr>
<tr>
<td>2007*</td>
<td>*12,423,532</td>
</tr>
</tbody>
</table>
## Total Drinking Water

<table>
<thead>
<tr>
<th>Year</th>
<th>Total Gallons</th>
<th>kWh</th>
</tr>
</thead>
<tbody>
<tr>
<td>2001</td>
<td>25,327,482</td>
<td>53,360</td>
</tr>
<tr>
<td>2002</td>
<td>28,082,030</td>
<td>58,718</td>
</tr>
<tr>
<td>2003</td>
<td>37,452,644</td>
<td>79,692</td>
</tr>
<tr>
<td>2004</td>
<td>45,817,786</td>
<td>94,779</td>
</tr>
<tr>
<td>2005</td>
<td>43,599,252</td>
<td>89,405</td>
</tr>
<tr>
<td>2006</td>
<td>43,871,546</td>
<td>82,637</td>
</tr>
<tr>
<td>2007</td>
<td>43,990,149</td>
<td>78,712</td>
</tr>
</tbody>
</table>
## Campus Wastewater

<table>
<thead>
<tr>
<th>Year</th>
<th>Gallons</th>
</tr>
</thead>
<tbody>
<tr>
<td>2001</td>
<td>NA</td>
</tr>
<tr>
<td>2002</td>
<td>NA</td>
</tr>
<tr>
<td>2003</td>
<td>29,673,751</td>
</tr>
<tr>
<td>2004</td>
<td>26,347,679</td>
</tr>
<tr>
<td>2005</td>
<td>25,181,906</td>
</tr>
<tr>
<td>2006</td>
<td>23,146,972</td>
</tr>
<tr>
<td>2007</td>
<td>25,363,483</td>
</tr>
<tr>
<td>Year</td>
<td>Gallons</td>
</tr>
<tr>
<td>--------</td>
<td>-----------------</td>
</tr>
<tr>
<td>2001</td>
<td>7,277,315</td>
</tr>
<tr>
<td>2002</td>
<td>7,804,752</td>
</tr>
<tr>
<td>2003</td>
<td>14,948,257</td>
</tr>
<tr>
<td>2004</td>
<td>16,785,420</td>
</tr>
<tr>
<td>2005</td>
<td>16,887,596</td>
</tr>
<tr>
<td>2006</td>
<td>15,845,184</td>
</tr>
<tr>
<td>2007</td>
<td>*12,423,532</td>
</tr>
</tbody>
</table>
## Total Wastewater

<table>
<thead>
<tr>
<th>Year</th>
<th>Total Gallons</th>
<th>kWh</th>
</tr>
</thead>
<tbody>
<tr>
<td>2003</td>
<td>44,622,007</td>
<td>148,519</td>
</tr>
<tr>
<td>2004</td>
<td>43,133,098</td>
<td>140,536</td>
</tr>
<tr>
<td>2005</td>
<td>42,069,502</td>
<td>125,846</td>
</tr>
<tr>
<td>2006</td>
<td>38,992,155</td>
<td>124,023</td>
</tr>
<tr>
<td>2007</td>
<td>37,787,015</td>
<td>114,559</td>
</tr>
</tbody>
</table>
Water/Wastewater

- kWh of electricity included in Scope 2 purchased electricity.
- MMBTUs of natural gas included in Scope 1 Campus Stationary Nat. Gas.
- Gallons of fuel oil included in Scope 1 Stationary Sources Distillate Oil #1- #4.
Commuter Information

- This information was part of the 2005 Capstone project titled “Building on the UW-Green Bay Master Plan: Promoting Sustainability” within the Transportation Management section.
Recommendations

- Meter and bill students for actual electrical usage.
- Use Energy Star vending machines.
- Install proximity switches in Cofrin Library and stairwells for reduced lighting.
- Lengthen the timeframe for “dorm wars” with incremental incentives.
Carbon Offsets

Carbon Sequestration
Objectives

- Determine vegetation type and area for UW-Green Bay’s managed properties
- Estimate sequestration rate for each vegetation type using published peer-reviewed data
- Estimate the amount of eCO$_2$ sequestered by UW-Green Bay’s managed properties
UWGB’s Properties

- Toft Point
- Peninsula Center
- Point au Sauble
- UWGB Campus
- Kingfisher Farm
Conifer, Swamp

Marsh

Grasses, Uncut

Conifer, Northern
Hardwoods
Grasses, Mowed
Grasses, Uncut
UWGB Vegetation Type by Area

Total Area: 677 hectares
Sequestration Rates

- Determining rates requires several years worth of data
- Rates are affected by water availability, nitrogen levels, temperature, stand age, and levels of atmospheric gases (Gower and Ahl, 2006)
- Rates used are averages from several sources
<table>
<thead>
<tr>
<th>Vegetation Type</th>
<th>eCO₂ Sequestration (MTeCO₂ha⁻¹yr⁻¹)</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agricultural</td>
<td>1.172</td>
<td>Johnson, et al. 2005</td>
</tr>
<tr>
<td>Brush, Bottomland</td>
<td>0.843</td>
<td>Ferguson, 2003</td>
</tr>
<tr>
<td>Conifer, Northern</td>
<td>2.492</td>
<td>Campbell, et al. 2004</td>
</tr>
<tr>
<td>Conifer, Red Pine</td>
<td>2.492</td>
<td>Campbell, et al. 2004</td>
</tr>
<tr>
<td>Conifer, Swamp</td>
<td>0.806</td>
<td>Campbell, et al. 2004</td>
</tr>
<tr>
<td>Conifer, White Pine</td>
<td>2.492</td>
<td>Campbell, et al. 2004</td>
</tr>
<tr>
<td>Grasses, Mowed</td>
<td>2.931</td>
<td>Qian, et al. 2003</td>
</tr>
<tr>
<td>Grasses, Prairie</td>
<td>2.070</td>
<td>Kucharik, et al. 2006</td>
</tr>
<tr>
<td>Grasses, Uncut</td>
<td>2.107</td>
<td>Kucharik, et al. 2006</td>
</tr>
<tr>
<td>Hardwoods, Bottomland</td>
<td>1.869</td>
<td>Campbell, et al. 2004</td>
</tr>
<tr>
<td>Hardwoods, Maple</td>
<td>1.869</td>
<td>Campbell, et al. 2004</td>
</tr>
<tr>
<td>Hardwoods, Northern</td>
<td>1.869</td>
<td>Campbell, et al. 2004</td>
</tr>
<tr>
<td>Hardwoods, Oak</td>
<td>2.675</td>
<td>Campbell, et al. 2004</td>
</tr>
<tr>
<td>Hardwoods, Swamp</td>
<td>0.806</td>
<td>Campbell, et al. 2004</td>
</tr>
<tr>
<td>Marsh</td>
<td>0.916</td>
<td>Nebraska DNR, 2001</td>
</tr>
</tbody>
</table>
Carbon Dioxide (e) Sequestered by Vegetation Type

<table>
<thead>
<tr>
<th>Vegetation Type</th>
<th>MT CO₂e/yr</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conifer, Northern</td>
<td>413</td>
</tr>
<tr>
<td>Conifer, Red Pine</td>
<td>262</td>
</tr>
<tr>
<td>Conifer, Swamp</td>
<td>316</td>
</tr>
<tr>
<td>Grasses, Uncut</td>
<td>214</td>
</tr>
<tr>
<td>Hardwoods, Maple</td>
<td></td>
</tr>
<tr>
<td>Hardwoods, Northern</td>
<td></td>
</tr>
<tr>
<td>Hardwoods, Oak</td>
<td></td>
</tr>
<tr>
<td>Hardwoods, Swamp</td>
<td></td>
</tr>
<tr>
<td>Marsh</td>
<td></td>
</tr>
</tbody>
</table>
1403 MTeCO$_2$yr$^{-1}$

eCO$_2$ sequestered per year
Results

- UWGB has 677 ha of vegetation
- Sequestration rates vary from 0.8 to 3 MTeCO$_2$ha$^{-1}$yr$^{-1}$
- 1403 MTeCO$_2$yr$^{-1}$ is sequestered with a range of 323 to 2730 MTeCO$_2$yr$^{-1}$
- Carbon sequestered offsets <4% of UWGB carbon emissions
Recommendations

- Maintain native species and allow natural succession
- Reduce fertilization and mowing of grass areas
- Update vegetation inventory
Clean Air-Cool Planet

Campus Carbon Calculator
What is it?

- Includes greenhouse gases specified by Kyoto Protocol
- Spreadsheets based on the IPCC workbooks for national level inventories
- Will calculate emissions by each greenhouse gas, as well as, eCO$_2$
General Raw Data

- Operating Budget
- Research Dollars
- Energy Budget
- Full Time/Part Time/Summer School Students
- Faculty/Staff
- Total Building Space
Total emissions eCO$_2$ per year
Emissions per person at UWGB

Metric Tons eCO2 / Community members

Total Emissions per Student
(Metric Tons eCO2 / Community)
2007 eCO$_2$ outputs

- Purchased Electricity: 46%
- Stationary Sources: 34%
- Transport Total: 19%
- Refrigeration: 1%
Are we offsetting any emissions?

- Sequestration is a way of offsetting emissions and it is NOT enough.
- We are only offsetting, through sequestration, 1403 Metric Tons eCO$_2$, out of ~37,000 Metric Tons eCO$_2$.
- Offsetting our emissions will not make this campus energy independent (zero emissions) by 2012.
Are any emissions being offset?

Total Emissions, Total Offsets, and Net Emissions

- Total Emissions (MT eCO2)
- Net Emissions (MT eCO2)
- Total Offsets (MT eCO2)

Year

Emissions (metric tons eCO2)

2001 2002 2003 2004 2005 2006 2007
What can we do with the Calculator?

- Examine our emissions
  - Where are they coming from?
  - Can we reduce them?
- See the emissions reductions of different potential projects
- Make recommendations for emission reductions and energy savings
From Carbon to Sustainability
Link from carbon to sustainability

- Understanding the University’s carbon footprint is the **First Step**
  - Reducing global warming emissions
  - Working towards sustainability
    - Using our resources wisely today for the next generation
- Opportunity to set a positive example in the community
UW-Green Bay

- Long history of being a proactive environmental institution
  - Ecological awareness and environmental stewardship founding principals
  - Once known as Eco-U
  - Will UW-GB resurrect itself & become a “greener” institution????
Oberlin College

- **Rated #1** Green College in US
- 60% electricity is bought from renewables
- 1/3 food served is grown locally
- Student activity fees subsidize public transportation
- Real time monitoring of energy usage in dorms
CAMPUS RESOURCE MONITORING SYSTEM

Oberlin College is developing a comprehensive system to monitor and display electricity and water consumption in dormitories. The objective is to provide real-time feedback that allows students to better conserve environmental resources.

GOALS & EXPLANATIONS

OBERLIN & THE ENVIRONMENT

PARTNERS
“Universities educate most of the people who develop and manage society’s institutions. For this reason, universities bear profound responsibilities to increase awareness, knowledge, technologies, and tools to create an environmentally sustainable future.”
Recommendations

- **Education is KEY**
- **Integrate Sustainability into coursework**
  - Modify the Curriculum
  - General Educational Requirement
    - Education and Business Majors
    - Major component of:
      - Intro to Environmental Science
      - Environment and Society
  - Student Orientations
Reducing Our Footprint

- Heating and cooling is a big part of total emissions
  - 2002: 10,966 eCO$_2$ = 33%
  - 2007: 12,964 eCO$_2$ = 35%
- Building efficiency is critical.
- Conventional building ventilation standards and mechanisms can be wasteful.
DCV - Demand - Control Ventilation

- Most Significant, Feasible, Cost-effective means to saving Energy and $

- Ventilates on Real Time Occupancy
  - Self Calibrating CO$_2$ Sensors

- Demo Projects savings of 5% - 80%
DCV Costs

1 Sensor per 5,000 ft\(^2\)
- LS 22 sensors
- Campus 220 sensors
- Sensor Cost ~ $66,000
- Installation Cost ~ $126,000
- Payback of 2 to 10 months
DCV $ Savings

- Laboratory Sciences Building (LS)
  - Savings $14,790 - $41,330
    - 33% - 57%
- Entire Campus
  - $250,000 - $780,000
    - 52% - 77%
DCV CO₂ Savings

- Results in terms of CO₂ savings

![Bar Chart](image_url)

- 37,216 MT CO₂
- 18,864 MT CO₂
- 8,560 MT CO₂

52% 77%
Final Recommendation

- UW receives money via General Purpose Revenues (GPR)
  - Any unencumbered balance is reverted back to GPR
  - Unspent Utility Appropriations also revert back to GPR
- Change Appropriations so that $ saved through Energy Efficiency projects can be used by the University
  - Ex. Continuing Appropriation s. 20.01(3)©
UW-Green Bay’s Mission Statement

- "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.”
Acknowledgements

- Dennis Bailey - UWGB
- Dan Busch - Green Bay Metropolitan Sewage District
- John Campbell - Stanford University
- SuAnn Detampel - UWGB
- Diane Eastman - UWGB
- Vern Everson - WI DNR
- Debbie Furlong - UWGB
- Steve Gering - Residence Life
- Thompson Gower - UW-Madison
- Russ Hardwick - Green Bay Water Utility
- Chris Hatfield - UWGB
- Ingrid Kelley - WI Focus on Energy
- Eric Kruger - UW-Madison
- Paul Pinkston - UWGB
- Dean Rodeheaver - UWGB
- Nate Rusch - Shorewood Golf Course
- Bruce Shepard - UWGB
- Patricia Theyerl - UWGB
- Sheryl Van Gruensven - UWGB
- Rick Warpinski - UWGB
Questions???
UW-Green Bay Environmental Science and Policy Capstone Seminar Participants 2007

- Graduate Students/Project Authors:
  - Adam Baldwin
  - Chris Caldwell
  - Janet DeVito
  - Patrick A. Koss
  - Devany Martin
  - Wade Oehmichen
  - Bill Oldenburg
  - Charles Piette
  - Bethany Reinholtz
  - Tracy Valenta
  - Jay Watson

- Faculty:
  - Michael Kraft, Professor, Public and Environmental Affairs
  - Kevin Fermanich, Associate Professor, Natural and Applied Sciences