

UW-Eau Claire Carbon Emissions Inventory, Spring 2008



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Abstract

➤ In spring 2008, ten UW-Eau Claire students formed the class IDIS 352 to conduct an inventory of current carbon dioxide (CO₂) emissions of the UW-Eau Claire campus under the direction of Dr. Kristina Beuning. This class and project quantified the equivalent carbon emissions (eCO₂) generated over one academic year at UW-Eau Claire from the emissions categories of electricity and cooling, heating, transportation, and waste and chemicals.

➤ The combined total of these emissions categories comprise the annual UW-Eau Claire carbon footprint, which initially equated 41,560 metric tons of eCO₂ per academic year but was then reduced to 39,964 metric tons of eCO₂ after including three present CO₂ offsets.

➤ This research was performed in response to requirements of the American College and University President's Climate Commitment (ACUPCC), which Chancellor Brian Levin-Slankevich signed in August, 2007. In September 2008, the results of this work were released as a public document.

Low Impact Recommendations

All actions or improvements to reduce >1% of eCO₂ from our carbon footprint.

➤ Behavioral shifts in energy use, participation in the nation-wide university RecycleMania program, and setting long-term limits on the use and amount of appliances on campus currently define UWEC low impact actions to reduce our carbon footprint.

Medium Impact Recommendations

All actions or improvements to reduce >1%, but < 5% of eCO₂ from our carbon footprint.

➤ Changing personal commuting habits to promote "Clean Commuting" via alternative modes of transportation (i.e. public transit, biking, walking, skating, etc.) currently define medium impact recommendations to reduce our carbon footprint.

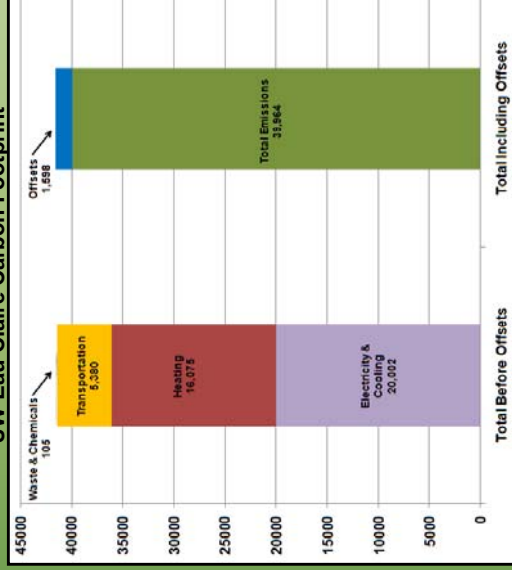
Effects if 1/3 and 1/2 "Clean Commute"

	Δ in Metric Tons eCO ₂	Δ in Total Transportation Emissions	Δ in Total Emissions
Students	-481	-9%	-1%
Faculty/Staff	-392	-7%	-1%
Total	-873	-16%	-2%

	Δ in Metric Tons eCO ₂	Δ in Total Transportation Emissions	Δ in Total Emissions
Students	-722	-13%	-2%
Faculty/Staff	-588	-11%	-1%
Total	-1,310	-24%	-3%



UW-Eau Claire Carbon Footprint



The Carbon Neutral Team (CNT)



Electricity and Cooling

➤ Electricity is the university's largest contributor to eCO₂ emissions. Electricity powers university cooling elements and other necessary electrical items. Kilowatt hour (kWh) consumption from both the 2005 and 2006 fiscal years were obtained, input into the Clean-Air-Cool Planet Campus Carbon Calculator (CACPCC) and averaged. Data included: electricity consumed by all university-owned facilities.

	2005	2006	Average
Electricity Consumed (kWh)	30,879,350	27,072,436	28,975,893
eCO ₂ Emitted (metric tons)	21,316	18,688	20,002

Transportation

➤ Transportation data focused on the human aspect of university-related transportation.

Data was separated into the areas of: university-owned vehicles, commuting, university-contracted vehicles, and university-related travel by personal vehicle and airplane.

Source	Metric Tons eCO ₂
University-Owned	1,587
University-Contracted and University-Related travel	2,620
Commuting	1,173
Air Travel	5,380
Total	

Waste & Chemicals

➤ To find the approximate values of solid waste generated, we obtained data confirming the size of the dumpsters that contain all solid waste collected from commercial bins on campus and in all university residence halls. After confirming the monthly frequency in which they were maintained, we estimated a total of 15,427 cubic yards of solid waste generated in the fiscal year of July 2006 through June 2007. We omitted the CO₂ emissions generated from solid waste transportation.

➤ To calculate the amount of eCO₂ emissions generated from the composition and disposal of refrigerants and chemicals on campus, we obtained waste shipment reports for the 2005, 2006, and 2007 calendar years. Shipment reports of chemicals and gas species for academic use were also obtained and input into the CACPCC.

Data included: all other chemical material that are shipped out for incineration.

Data omitted: pertaining to sequestered material and all other material that do not produce GHG emissions.

Commuter Offset – Transit Agreement

➤ This offsets represents the carbon emissions that were saved by student, faculty and staff use of the Public Transit System rather than individually driving personal vehicles to commute. To find this difference, a campus-wide survey was implemented to determine the frequency with which commuters used different forms of transportation to and from campus.

Commuter Offset: Bus Versus Individual Commuter Emissions	Students	Faculty	Staff	Total
Emissions A: generated by bus commute (metric tons eCO ₂)	191 tons	2 tons	1 ton	194 tons
Emissions B: potential generation if riders had traveled by personal vehicle (metric tons eCO ₂)	1,123 tons	73 tons	2 tons	1,198 tons
Emissions Credit: A-B (metric tons eCO ₂)	932 tons	71 tons	1 ton	1,004 tons
Total Emissions Credit (metric tons eCO ₂)				~1,005 eCO ₂

Preserved Lands (Carbon Sequestration) Offset

➤ UW-Eau Claire and the UW-Eau Claire Foundation own several parcels of preserved lands whose photosynthetic properties act as a "carbon sink." Research of biome type, acreage data, and net primary production (NPP) rates of these preserved lands to determine CO₂ sequestration were conducted to calculate estimates of carbon sequestration of CO₂ emissions generated by university activities.

Biome	Area (m ²)	x NPP (@ C/m ² /yr) = grams C sequestered/yr
Temperate Forest	315,394	702
Temperate Grassland	3,158	409
Wetland	298,001	1,229
Total		366,115,457
Total CO₂ sequestered (assuming a 1:1 ratio of C:CO ₂)		~590 metric tons eCO₂
		588,786,898

Waste to Energy Offset

➤ The Waste-to-Energy program of Veolia Environmental Services (VES) that utilizes methane (CH₄) recovery in solid waste treatment to generate energy. CO₂ emissions generated from Waste-to-Energy disposal of tons of solid waste are compared with potential CO₂ emissions that would have been produced without using VES CH₄ recovery program. To calculate the entire CO₂ emissions value generated by university solid waste disposal, CO₂ emissions generated through the use of CH₄ recovery are subtracted from the value of potential CO₂ emissions generated from landfill disposal of solid waste.

Waste Disposal Program	CO ₂ Emissions Generated
Land-filled Waste w/ no CH ₄ Recovery	789 Tons
Land Filled Waste w/ CH ₄ Recovery and Electricity Generation	104 Tons
Waste-to-Energy Offset Value = Potential Emissions w/out program – Actual Emissions	678 Tons Offset

Heating

➤ Coal, #2 fuel oil and natural gas are burned throughout the year to heat the three boilers in the University Heating Plant (UHP). These boilers convert water to steam to heat all campus buildings and several surrounding facilities.

Data included: amounts of all fuels consumed in the 2005 and 2006 fiscal years were obtained and input into the CACPCC; it was then reduced by the percentage of steam sold to non-university facilities.

Data omitted: CO₂ emissions generated from transportation of purchased coal are not included in our carbon footprint. Veolia Environmental Services (VES) currently has a contract for ash from UHP coal burning and transports it to their Seven Mile Creek landfill outside of Eau Claire. CO₂ emissions generated from this transport are not included in our carbon footprint.

Commuter	2005	2006	Average	2005	2006	
CVT	3.6%	4.2%	3.9%	Short Tons Coal	8,588	9,378
State Office	0.6%	0.6%	0.6%	MIBTU Natural Gas	51,113	56,817
Boiler Plant	15.8%	17.5%	16.6%	Gallons #2 Fuel Oil	13,582	28,094
Veolia	20.6%	22.3%	21.1%	Total Metric Tons eCO ₂	19,395	21,371
UWEC	86.6%	77.7%	78.9%	UWEC Metric Tons eCO ₂	15,924	16,603

High Impact Recommendations

Actions or improvements that reduce >5% of eCO₂ from our carbon footprint.

➤ Upgrading windows on campus buildings to Energy Star recommendations would significantly reduce the amount of energy needed to heat and cool campus buildings, which would reduce carbon emissions.

➤ Upgrading Schneider Hall's windows would result in up to a 25% reduction of energy used to heat and cool Schneider Hall - this translates to an annual reduction of 72 metric tons of eCO₂ from our carbon footprint!

➤ Increasing light efficiency in campus buildings ranges from efficient use to using more efficient bulbs. Replacing fluorescent light bulbs from two 32-watt lamps to one 25-watt lamp can reduce electrical consumption by up to 50%.

If all of the dorm rooms in the Horan Hall dorm switched to one 25-watt lamp, 4 metric tons of eCO₂ would be reduced from our carbon footprint!

➤ Future improvements include construction of a new heating plant that uses alternative fuels, a gas turbine, introducing geothermal technology, and LEED certification of new campus buildings. An eventual purchase of carbon credits to offset irreducible carbon emissions may be feasible if all other recommended improvements have been implemented.