What is UW-Whitewater Doing to Lessen its Carbon Footprint?

**Whitewater--** Did you know that human activities are responsible for almost all of the increase in greenhouse gases in the atmosphere over the last 200 years? According to an extensive report by the National Climate Association in 2014, the largest source of greenhouse gas emissions from human activities in the United States is from burning fossil fuels for electricity, heat, and transportation.

Though the most recent numbers provided by the EPA (Environmental Protection Agency) on greenhouse gas emissions in the U.S. are not uplifting, the University of Wisconsin-Whitewater has made a promise to change the course of climate change. By implementing enhanced strategies to track its greenhouse gas emissions and partnering with other colleges and universities in the state of Wisconsin to develop climate action plans, UW-Whitewater is one of the leaders in the march for sustainability. This research looks at the story of sustainability in Whitewater, WI. In order to understand and interpret the following greenhouse gas emissions data, this feature story utilized in-depth interviews with community leaders and professionals around Whitewater to come up with a common theme. A theme focused on an institution doing its part to lessen its carbon footprint. So, just how has a university of only 12,000 students made such a large impact on such a daunting topic?

**Importance of Collecting Greenhouse Gas Emission Data**

Understandably, it’s not only humans contributing to the level of greenhouse gases in the atmosphere. Natural factors such as the carbon cycle, variations in the sun’s output, the Earth’s orbit, volcanic activity, and others, also effect Earth’s radiative balance. However, beginning in the late 1700s, the net global effect of human activities has been a continual increase in greenhouse gas concentrations (Boulton, McInally & Pallant, 2014). This change in concentrations causes warming and is affecting several aspects of climate, including ocean temperatures, ocean temperatures, precipitation, sea levels, and surface air. Human health, agriculture, water resources, forests, wildlife, and coastal areas are all vulnerable to climate change.

With such great risk to all life and agriculture, it’s no wonder why the University of Wisconsin-Whitewater and its Sustainability Council push for clean, sustainable living. UW-W Sustainability Coordinator, Wesley Enterline, is the person to talk to about all issues surrounding climate change and sustainability. “We are the ones who have to make a stand,” said Enterline. “If environmental problems seem too overwhelming to solve, there are issues in our area that we can tackle.” The fight against climate change certainly won’t happen overnight. The individual issues of greenhouse gas emissions, rising temperatures, and poor composting, are all issues that can be addressed at a local level. One thing is certain, emissions are increasing in almost all areas of the world. Yet, there are still many citizens who disregard the facts of climate change.

**What are Greenhouse Gases?**

Greenhouse gas (GHG) emissions are produced by mobile sources as fuels are burned. Carbon dioxide (CO²), methane (CH4), and nitrous oxide (N²O) are emitted directly through the combustion of fuels in different types of mobile equipment. Carbon Dioxide enters the atmosphere through burning fossil fuels (coal, natural gas, and oil), solid waste, trees and other biological materials. Carbon dioxide is removed from the atmosphere when it’s absorbed by plants as part of the biological carbon cycle. Methane is emitted during the production and transport of coal, natural gas, and oil. Methane emissions also result from livestock and by the decay of organic waste in municipal solid waste landfills. Nitrous oxide is emitted during agricultural and industrial activities, combustion of fossil fuels and solid waste, as well as during treatment of wastewater (Bruen, 2014).

According to the Environmental Protection Agency, these types of mobile equipment are those that use gasoline or diesel fuel. On-road vehicles like cars, heavy-duty trucks, and buses are the most contributory to GHG emissions. Non-road vehicles like construction equipment, agricultural equipment, and forklifts are not always used as frequently as on-road vehicles, but need more fuel to operate. The University of Wisconsin-Whitewater had a mobile combustion of 247.898 MTCO²E in 2007 according to the UW-W Greenhouse Gas Inventory. We will get into the meaning of these numbers in the “Understanding the 2007-08 UW-W Greenhouse Gas Report” section.

In the United States, greenhouse gas emissions caused by human activities increased by seven percent from 1990 to 2014 (Intergovernmental Panel on Climate Change, 2013). Since 2005, however, total U.S. greenhouse gas emissions have decreased by 7 percent. Carbon dioxide accounts for most of the nation’s emissions and most of the increase since 1990. Electricity generation is the largest source of greenhouse gas emissions in the United States, followed by transportation. These numbers reflect a nationwide effort to reverse the effects of climate change. These numbers indicate that a drastic change is possible in the U.S. and it’s one that is currently underway. If a whole country can lessen its carbon footprint in a handful of years, there is no reason a small college in Wisconsin can’t do the same.

**What is UW-Whitewater Doing About its Greenhouse Gas Emissions?**

UW-Whitewater is a participant of the American College & University Presidents' Climate Commitment (ACUPCC), committed to generating a greenhouse gas inventory annually and developing a climate action plan to set goals for achieving climate neutrality.  The logic of the ACUPCC is to, “accelerate progress towards climate neutrality and sustainability by empowering the higher education sector to educate students, create solutions, and provide leadership-by-example for the rest of society.” Holding those accountable is one of the many difficulties of climate neutrality. Since there are so many greenhouse gases spiraling though the atmosphere at any given time, it’s hard to point fingers. This climate commitment is a promise to not only the Whitewater campus, but to every other university involved as well as the rest of the country’s population. UW-Whitewater conducted its first greenhouse gas inventory for Fiscal Year 2007-08, which runs from July 2007 - June 2008.  The inventory was conducted using a new and improved Campus Carbon Calculator, most commonly used by comparable institutions within our own university system, as well as nationwide campuses of comparable size.

The Clean Air-Cool Planet Campus Carbon Calculator Excel spreadsheet document is a tool to help organizations determine how much they are contributing to global climate change, and how they can manage their greenhouse gas (GHG) emissions better. After being released to the public in 2004, usage grew from a few early adopters to nearly 200 users during the first year. Today, there are thousands of institutions in the U.S. that use the calculator to track their greenhouse gas emissions, including more than 90% of the U.S. colleges and universities that publicly report their emissions (Sharp, 2002). As part of the commitment, UW-Whitewater has also developed a [Climate Action Plan.](http://reporting.secondnature.org/cap/cap-public!902) While the plan is non-binding, the university is extremely serious about making changes. Noted in the plan is a 10 percent reduction on scopes 1, 2, 3 by 2018 and 22 percent reduction in scopes 1, 2, 3 by 2022. “It’s great to have our name in such a positive spotlight,” said Sustainability Assistant, Ashley Flor. “We spent weeks learning about the calculator and were extremely shocked by our greenhouse gas emissions over the last 15 years.”

**Difficulties in Accumulating Followers**

It seems that most of our nation’s problems turn into political ones, even if they don’t appear so. At the root of every issue stems a politician trying to suffocate it. In practice, you can’t be a modern Republican in good standing unless you deny the reality of global warming, assert that it has natural causes or insist that nothing can be done about it without destroying the economy. Mark Reynolds of the Citizen’s Climate Lobby said it best, “You also have to either accept or comply in wild claims that the overwhelming evidence for climate change is a hoax, that it has been fabricated by a vast global conspiracy of scientists”. Mark’s job as Executive Director of the Citizen’s Climate Lobby is to connect everyday citizens with their state officials. Climate change is a bipartisan issue and needs to be treated as such. In a fight against ourselves and against time, we need to stick together and find common ground in order to survive. Probably the biggest objection to monitoring one’s carbon footprint is the willingness to give up their comfortability of living. Once we get into a daily routine, it’s hard to break that routine. Especially if it comes to giving up that dryer, using less water or using the often crowded public transportation instead of your own vehicle.

I cannot blame those who deny climate change. On one hand, scientists throw out some statistics and analysis, and on the other are politicians who try to make sense of those same numbers, but generally fail to do so. Another common objection to fighting climate change is the cost. Why pay for something upfront when there is a possibility it won’t work in the long run? Solar panels are one of the most beneficial pieces of equipment at our disposal, and the University of Wisconsin-Whitewater uses them as much as possible. Rooftop solar panels like those on the newly built Hyland Hall, College of Business and Economics building typically provide enough power to sustain the electrical needs of the Hyland’s Trading Room and adjoining research computer lab. That is just one building on our medium-sized campus that is becoming self-sufficient.

According to [EnergySage,](https://news.energysage.com/how-much-does-the-average-solar-panel-installation-cost-in-the-u-s/) the average solar panel cost range for a 10 kilowatt system (10,000 watts) in Wisconsin is between $19,040 and $23,240. That is surely a large sum of money for any institution. However, the same website noted that institutions using these specific solar panels made their money back in energy saved within the first five years of installation. The tradeoff in my eyes is second to none, no matter the cost.

**Findings from 2007-2008 Greenhouse Gas Inventory**

As stated earlier, the University of Wisconsin-Whitewater joined thousands of other institutions in creating a climate plan and monitoring its GHG emissions. Although numbers from other fiscal years are not yet available online, statistics from Wisconsin-Whitewater’s 2007-08 emissions are representative of its climate plan and its projected numbers regarding institutional emissions in the future. The metric used to calculate these gas emissions is known as metric tons of carbon dioxide equivalent or MTCO²E. The not so simple equation takes the carbon dioxide (CO²), nitrogen (N²O), and methane (CH4) emissions and adds them all together to get the total emissions (MTCO²). It is used to compare the emissions from different greenhouse gases based upon their global warning potential. Global warming potential is the ability of one unit of a greenhouse gas to trap heat in the atmosphere as compared to one unit of carbon dioxide over a given time period (Moore, 2005). In other words; it’s a measure of how much a given mass of greenhouse gas is estimated to contribute to global warming. This is a great improvement in determining how many gases are truly being emitted by a single institution.

The most important or honest data collected in all gas reports is the mobile and stationary combustion numbers. These numbers reflect the amount of gases released into the ozone by both mobile causes (like motor vehicles) and stationary causes, such as boilers and heaters. While these numbers aren’t simple to calculate, UW-Rock County biology professor and sustainability group member, Benjamin Riley, says “they are very reliable and indicative of an institution’s greenhouse gas responsibility or lack thereof.” Let’s take a closer look at the UWW Greenhouse Gas Report and see how the Sustainability Council conducted its research.

**Understanding the 2007-08 UW-W Greenhouse Gas Report**

I now understand why it is sometimes difficult for an everyday citizen to commit to fighting against climate change. There are simply too many numbers and too much data to try and understand one’s effect on our world’s carbon footprint. [The 2007-08 data](http://reporting.secondnature.org/ghg/ghg-public!197) begins with “Scope One Stationary Combustion”. Sources of emissions from stationary combustion include boilers, heaters, furnaces, kilns, ovens, flares, thermal oxidizers, dryers, and any other equipment or machinery that combusts carbon bearing fuels or waste stream materials. The method used for estimating greenhouse gas emissions from stationary combustion sources is through a Direct Measurement. Direct measurement of CO² emissions is performed through the use of a Continuous Emissions Monitoring System (CEMS). Continuous emissions monitoring is the continuous measurement of pollutants emitted into the atmosphere in exhaust gases from combustion or industrial processes. There are actually three different equations used to calculate CO2 emissions. The first equation is used only in mass or volume units, and when no information is available about the fuel or heat content or carbon content. This equation is fairly unreliable, but still a great measuring point for institutions with little resources. The third equation is recommended when the actual carbon content of the fuel used is known. The university used the second of three equations to calculate its CO² emissions. This equation is the most preferred, because it uses emission factors that are based on energy units as opposed to mass or volume units ([EPA.gov](https://www.epa.gov/sites/production/files/2016-03/documents/mobileemissions_3_2016.pdf)., page 4). In order for Whitewater to calculate its CO² emissions, they must also individually calculate emissions for methane (CH4) and nitrogen (N²O). Now this is where people really start to get lost.

There are two equations that can be used to calculate methane and nitrogen emissions for each type of fuel combusted. Equation 1 (Emissions=Distance x EF4) is applicable to on-road vehicles such as cars, trucks, and buses. Where the distance is the distance the used vehicles travel and EF4 is the CH4 or N²O emission factor per distance unit. Equation 2 (Emissions=Fuel x EF5) is applicable to non-road vehicles such as construction or agricultural equipment, forklifts, ships, boats, rail vehicles, or aircraft. Where fuel is the volume or fuel combusted and EF5 is the CH4 or N²O emission factor per distance unit.

Surprisingly, the levels of GHG emissions from stationary combustion at 236.669 MTCO²E is very close to that of mobile combustion (247.898 MTCO²E). According to a case study done by the Journal of the Air & Waste Management Association in 2010, the average annual GHG for Baccalaureate and Master Colleges is between 27,758 and 36,936 MTCO²E. That puts Whitewater way above the average. Obviously higher emissions are a function of the size of the institution (enrollment and building space) and the operations of the institution. There is always some sort of construction being done on campus, which causes some other problems on top of emitting greenhouse gases.

The last set of data in the 2007-08 report that helps calculate GHG emissions is called the “Fugitive Emission”. Fugitive emissions are accidental emissions of gases or vapors from pressurized equipment due to leaks and other unintended or irregular releases of gases, mostly from industrial activities. With the key word in that definition being “accidental”. As a past member of the Students Allied for a Greener Earth organization (S.A.G.E.) on the Whitewater campus, these fugitive are numbers that can be better regulated. The UW-Whitewater greenhouse and all of its responsibilities are handled by elected students and volunteers. While they take it seriously and receive compensation, at the end of the day, they are still students who are learning. Fugitive emissions contribute to air pollution and climate change and are very dangerous. For example, [a 2009 assessment of greenhouse gas emissions in the Canadian Oil Sands](https://fas.org/sgp/crs/misc/R42537.pdf)estimated that 4% of all GHG emissions came from fugitive sources. Whitewater’s fugitive emissions were nearly 84.051 MTCO²E, which is considerably low for a campus of this size (Carlson, 2008).

**Some Solutions**

The University of Wisconsin-Whitewater uses heaters, furnaces, and dryers more than any other on that combustion list. The U.S. Climate Data suggests living in a frigid, Wisconsin area can simply be one of the biggest outliers to the contribution of stationary combustion. With an average temperature floating around 11 degrees Fahrenheit in Whitewater, WI in the months of November through February, the heaters and furnaces are constantly being used in campus buildings and in campus housing units. While being warm is a necessity for some people, especially in the winter months, the harmful tradeoff should raise some questions.

The simple solution is to decrease the amount of heat the university puts off in those selected winter months. By coming up with a plan to only use the heaters and furnaces when the temperature hits a specific number, 30 degrees Fahrenheit for example, could help reduce the level of stationary combustion emissions tremendously. But, it is one that most students and staff are probably not willing to get behind. Another issue the campus is faced with regarding stationary combustion is dryer usage. According to University Housing, there are six functioning dryers in each of the 14-housing facilities, including the 12 dryers in Wells West (96 total dryers). It is very possible that there are too many dryers on campus and a simple adjustment can reduce emissions greatly. In many American households, the dryer is the third-most energy-hungry appliance, after the refrigerator and washer. Since there are very few refrigerators in the dormitories, this could be a very feasible solution. Air-drying your clothes can reduce the average household’s carbon footprint by a whopping 2,400 pounds a year (Leal, 2002).

**Conclusion**

There are many avenues to travel when trying to reduce our carbon footprint. Simply monitoring our output of greenhouse gas emissions by using a carbon calculator is a great start, but isn’t quite enough. Converting to solar power has its initial drawbacks, but studies show these self-sustaining energy machines end up paying for themselves in the end. Giving up household dryers seems like a hassle, but the feeling of knowing that you can reduce the average household’s carbon footprint by 2,400 pounds per year is pretty powerful. In the UW-W Climate Plan, the Sustainability Council vows to reach climate neutrality by 2050. While it seems like a long period of time to wait for climate neutrality, we now understand how serious greenhouse gas emissions really are. This research looked at the story of sustainability in Whitewater, WI and its efforts to lessen its carbon footprint. The analysis of these results have brought light to the environmental profile of the University of Wisconsin-Whitewater, its student body and its staff, and their intentions for greening its campus. As well as the barriers that obstruct its attempts to promote sustainability at the University. “People are stronger in numbers”, said Jeanne Hoffman, Sustainability Initiative Manager of Madison Sustainability. “I will never give up on the good fight and neither should you.”

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Interviews:

Wesley Enterline- UW-Whitewater sustainability Coordinator

Ashley Flor- UW-Whitewater Sustainability Assistant

Benjamin Riley- UW-Rock County Biology Professor/Sustainability Group Member

Jeanne Hoffman- Sustainability Initiative Manager of Madison Sustainability

Mark Reynolds- Citizens Climate Lobby Executive Director

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