SUSTAINABLE GATEWAY

Gateway Technical College Greenhouse Gas Emissions Inventory Report 2010

In fulfillment of the American College & University Presidents' Climate Commitment

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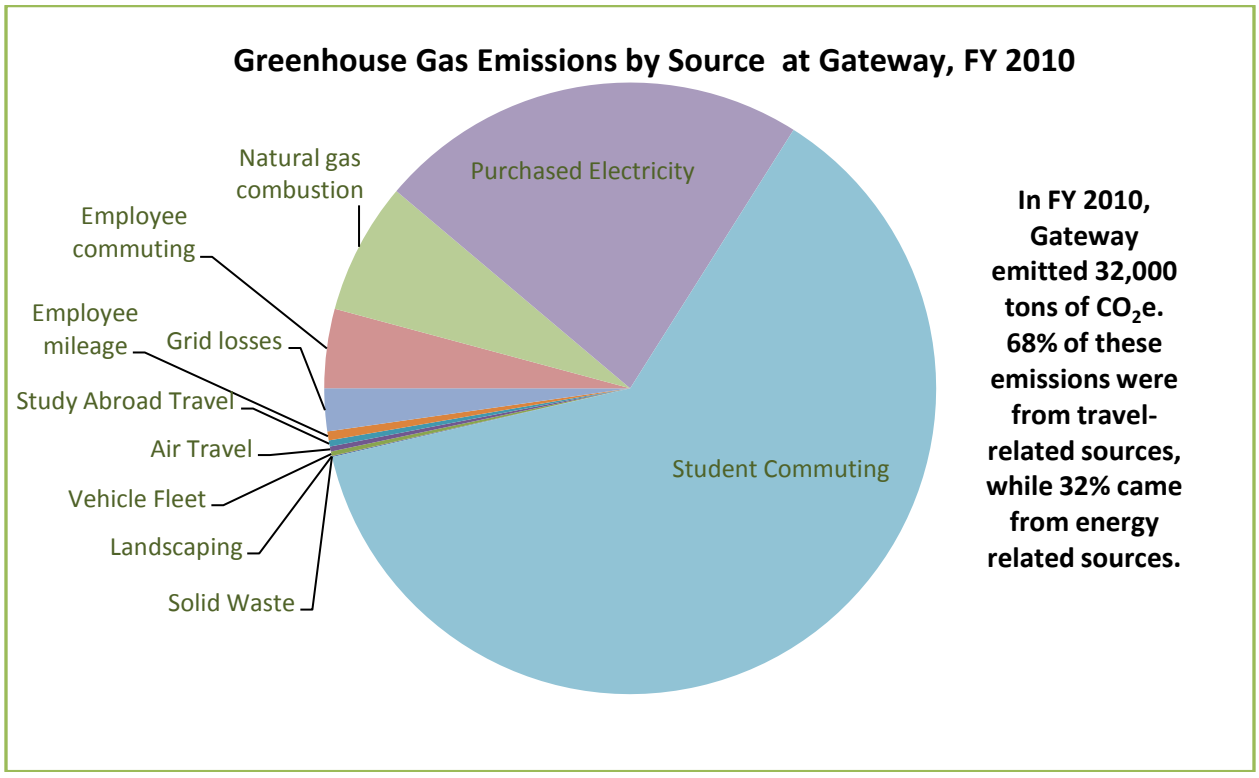
1.0 Executive Summary

This report is Gateway Technical College's Greenhouse Gas Inventory for fiscal year 2010. The inventory quantifies the impact of the Gateway's operations relative to greenhouse gas emissions and serves as a baseline and guide for future reduction strategies as the college moves toward its goal of achieving carbon neutrality. The report is part of Gateway's participation in the American College and University Presidents' Climate Commitment (ACUPCC).

The inventory provides a broad overview of Gateway's greenhouse emissions and breaks down emissions into the following categories: transportation, non-vehicular energy use, landscaping and solid waste. Throughout the report, comparisons are made with peer institutions in the Wisconsin Technical College System that have performed similar inventories.

In FY 2010, Gateway Technical College produced approximately 32,000 MT CO_2e. 68% of these emissions were from travel-related sources, while 32% came from energy-related sources. The emissions by source are outlined below.



On a normalized basis, Gateway produced 5.3 MT CO_2e per FTE, compared with 2.0 MT CO_2e per FTE for Madison Area Technical College, 2.7 MT CO_2e per FTE for Milwaukee Area Technical College, 5.9 MT CO_2e per FTE for Western Technical College and 9.9 MT CO_2e for Lakeshore Technical College.

Wide-ranging recommendations for reducing emissions are included in the coverage of each emissions sector. Other macro-level recommendations that may lead to future emissions reductions include:

- Include the broader public and Gateway students in a Climate Action Task Force
- Implement a greenhouse gas information management system and integrate collection of emissions data into regular work flows
- Create a system for tracking, reducing and eliminating the use of refrigerants
- Improve management of water resources
- Establish a Green Revolving Fund to fund energy-efficiency initiatives

Gateway may wish to integrate these recommendations into its future strategic-planning activities.

2.0 Introduction

In 2009, Gateway Technical College President Bryan D. Albrecht signed the American College and University Presidents' Climate Commitment (ACUPCC)[i]. In doing so, President Albrecht acknowledged on behalf of Gateway that the changing global climate is one of the defining challenges of the 21st Century, and that higher education has an obligation to take a leadership role in addressing that challenge.

The ACUPCC recognizes the unique responsibility that institutions of higher education have as role models for their communities and in educating the people who will develop the social, economic and technological solutions to reverse global warming and help create a thriving, civil and sustainable society. Gateway also seeks to enable students to benefit from the economic opportunities that will arise as a result of solutions they develop.

Taking a leadership stance on climate action will benefit Gateway in numerous ways, such as reducing its long-term energy costs, attracting excellent students and faculty, attracting new sources of funding, and increasing the support of alumni and local communities.

To do its part, Gateway has committed to creating a plan to achieve carbon neutrality, i.e. emitting no net greenhouse gases, by 2030. In order to achieve this goal, an important tool for periodically quantifying its greenhouse gas emissions is a greenhouse gas inventory.

The roadmap that outlines the path to achieving climate neutrality is A Sustainability Plan for Gateway Technical College[ii], which contains the measures the college has taken and will take toward a more sustainable future for the institution, its communities and the people and businesses that it serves.

Wisconsin Technical College System

Gateway Technical College is an integral part of the Wisconsin Technical College System (WTCS), which operates 49 campuses in 16 college districts throughout the state. Approximately 370,000 students enroll in technical colleges each year, with the equivalent of 84,000 full-time students enrolled in career programs.

In fulfillment of its mission to train the state's workforce, the WTCS is a major consumer of natural resources and energy. Mindful of this fact, the System has long taken a leadership role and "walked the talk" in the advancement of sustainability and green practices[iii]. As early as 1976, Wisconsin's technical colleges began aggressively reducing energy use that continues today. In fact, the reduction from nearly 152,000 to 79,000 BTUs used per square foot per year has saved over $100 million in energy costs.

In that spirit, five system members have joined the ACUPCC and performed greenhouse gas inventories. Besides Gateway, fellow WTCS participants include Lakeshore Technical College, Madison Area Technical College, Milwaukee Area Technical College and Western Technical College. This report will compare emissions at each of these institutions.

3.0 Gateway Technical College's Greenhouse Gas Inventory

Overview

A greenhouse gas inventory is useful for Gateway in two ways. First, it provides a critical benchmark against which tracks the college's progress towards reducing its environmental footprint. Second, it provides insights that help Gateway's policy makers formulate informed strategic plans to this end.

This report represents Gateway's second inventory of greenhouse gases emissions; it covers the period FY 2009/2010 (July 1, 2009 – June 30, 2010). The first greenhouse gas inventory covered the period FY 2008/2009. The report follows guidelines established by the ACUPCC.

The consolidation methodology used to determine organizational boundaries is the Operational Control Approach, such that the measurement of greenhouse gases was limited to emissions from operations directly under the college's control. Emissions from Gateway's three college campuses in Elkhorn, Kenosha, and Racine were included, as well as the Horizon Center in Kenosha and iMet (formerly CATI) in Sturtevant. Furthermore, although the LakeView Advanced Technology Center in Pleasant Prairie and the Burlington Center are owned respectively by the Kenosha Unified and Burlington school districts, these facilities are included in the inventory due to Gateway's operational role.

In order to efficiently compile, manage and analyze Gateway's greenhouse gas emissions data, the Clean Air Cool Planet Campus Carbon Calculator v. 6.8[iv] was utilized. The Excel-based tool was chosen because it is endorsed by the ACUPCC and is compliant with the guidelines from the Intergovernmental Panel on Climate Change (IPCC).

Similarly, Clean Air Cool Planet's Campus Carbon Calculator's default emissions coefficients were utilized.

Data for this inventory were collected in Fall 2012 and cover the following areas:

Institutional data	Energy	Transportation	Agriculture/landscaping	Solid waste
Budget Student population Physical size	Purchased electricity Natural gas	University vehicle fleet Employee air & ground travel Student study-abroad air travel Student/faculty/staff commuting miles	Fertilizer application	Landfill waste with methane (CH_4) recovery

Data was provided from a variety of sources including official college reports for institutional and budget-related data, WE Energies for energy consumption data, an online survey for commuting data, administration staff for fleet and travel-related information, Waste Management for waste-related data, and facilities management staff and landscaping contractors for fertilizer-related data.

For uniformity, emissions of all four reported greenhouse gases are reported in Metric Ton Carbon Dioxide Equivalents (MT CO_2e). A metric ton is equivalent to 1000 kg, or 2204.6 lbs[1].

The inventory was carried out by James Gray of Great Lakes Sustainability Consulting.

Emissions by Scope: 2009 vs. 2010 Inventories

ACUPCC requirements and the CA-CP calculator utilize a concept from the Greenhouse Gas Protocol[v], called "scopes", which are categories of emissions based on the level of responsibility an organization has for them. Besides helping organizations to understand its operational boundaries, the scopes concept also helps avoid the double counting of emissions by more than one organization.

The three scopes are defined as follows:

Scope 1	"…direct GHG emissions occurring from sources that are owned or controlled by the institution, including: on-campus stationary combustion of fossil fuels; mobile combustion of fossil fuels by institution owned/controlled vehicles; and fugitive emissions [such as refrigerants]."
Scope 2	"…indirect emissions generated in the production of electricity consumed by the institution."
Scope 3	"…all other indirect emissions, including those generated from commuting to and from campus, institution air travel, waste disposal, the production of purchased products, and more."

In the 2010 inventory, emissions from the required Scope 1 are slightly underreported in this report for three reasons:

1. Fertilizer data from the Horticulture program was not available.
2. Data from fugitive refrigerants – potentially hydrofluorocarbons (HCFCs), perfluorocarbons and/or sulfur hexafluoride (SF_6) – were not available due to logistical constraints.
3. LakeView Advanced Technology Center's emissions from natural gas combustion consumption are conservatively undercounted due to incomplete utility records.

On the other hand, more accuracy has been added to the 2010 report over the 2009 report in respect to Scope 1 emissions since the consumption of aviation fuel by the Aeronautics – Pilot Training program is included for the first time. This data was not present in the 2009 Greenhouse Gas Inventory although emissions from aviation fuel did occur during that year.

[1] In common usage in the United States, the word "ton" typically refers to the "short ton", a unit of mass equal to 2000 lbs., or 907.2 kg.

Regarding Scope 2 emissions for 2010, all electricity-related emissions are reported except for an undercounting of emissions from LakeView Advanced Technology Center due to incomplete utility records.

In the optional Scope 3, emissions from commuting data, college-financed air travel and automobile mileage, study-abroad air travel, and solid waste were reported.

Furthermore, Scope 3 solid waste emissions are likely more accurate in the 2010 inventory due to the correction of an error. Calculations for Gateway's 2010 inventory are correctly based on the fact that Gateway's waste-removal service provider, Waste Management, captures and combusts methane, which prevents a significant portion of methane emissions from entering the atmosphere. This fact results in a notable reduction in total emissions.

Primary Greenhouse Gases

Gateway's inventory of emissions includes three gases covered under ACUPCC and Intergovernmental Panel on Climate Change (IPCC)[vi] guidelines, namely carbon dioxide (CO_2), methane (CH_4) and nitrous oxide (N_2O). These greenhouse gases make up the vast majority of Gateway's greenhouse gas emissions. As mentioned above, Gateway's emissions of refrigerants were not reported in this inventory. Characteristics of these gases are as follows:

> ***Carbon dioxide (CO_2)***: a naturally occurring atmospheric gas that has increased significantly in concentrations during the Industrial Age due to anthropogenic (human-caused) activities. The main causes of increased CO_2 emissions include the burning of fossil fuels (oil, natural gas, coal, etc.) and changing land use patterns such as loss of natural forests and prairies, which hold vast reserves of carbon in the form of biomass.
>
> ***Methane (CH_4)***: this potent greenhouse gas is emitted into the atmosphere during the production of coal, natural gas and petroleum. Large amounts are also produced in landfills as organic waste decomposes. Livestock and agricultural practices are other significant sources.
>
> ***Nitrous oxide (N_2O)***: also very potent, nitrous oxide is produced in a wide range of activities, including the burning of fossil fuels and agricultural and industrial activities.
>
> ***Fluorinated gases***: some of the post potent greenhouse gases, these include hydrofluorocarbons (HCFCs) and sulfur hexafluoride (SF_6). In a campus setting, fluorinated gases are utilized in refrigeration and air conditioning equipment. Sulfur hexafluoride is utilized in the transmission of electricity through the power grid[vii].

Global Warming Potential

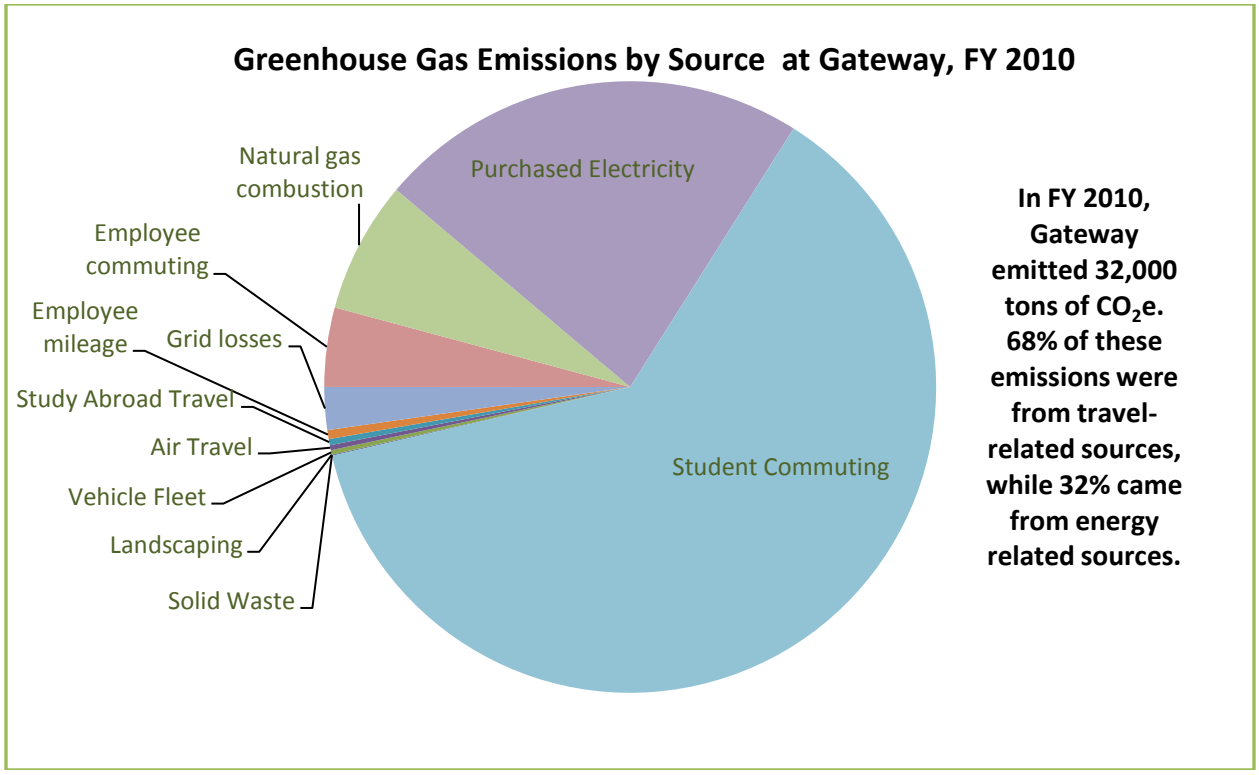
The concept of global warming potential (GWP) is a relative measure of how much heat a greenhouse gas maintains in the atmosphere. Each gas is given a value that compares the amount of heat maintained by a certain amount of the gas in question to the amount of heat maintained by a similar amount of carbon dioxide. For instance, methane has a GWP of 21, meaning that 1 ton of methane emissions have 21 times more impact on global warming than 1 ton of carbon dioxide emissions.

Global Warming Potential (GWP) & Atmospheric Lifetimes of Primary Greenhouse Gases

Greenhouse Gas	Global Warming Potential (GWP) over 100 year interval	Atmospheric Lifetime (in years)
Carbon dioxide (CO_2)	1	50-100
Methane (CH_4)	21	12
Nitrous oxide (N_2O)	310	120
HFC-134A	1300	15
Sulfur Hexafluoride (SF_6)	23,900	3200
Source: UNFCCC[viii]		

4.0 Inventory Results

Summary



The inventory of greenhouse gas emissions revealed that Gateway Technical College emitted approximately 32,000 metric tons of CO_2e in FY 2010. At 68% of the total, transportation is the largest source of emissions, with student commuting (63% of total emissions) the largest single source.

After transportation, purchased energy in the form of electricity and natural gas, at 30%, make up the second largest source of emissions.

The remaining 3% of emissions came from losses in the electrical grid associated with Gateway's energy demand, the application of fertilizers and the methane generated in landfills by solid waste.

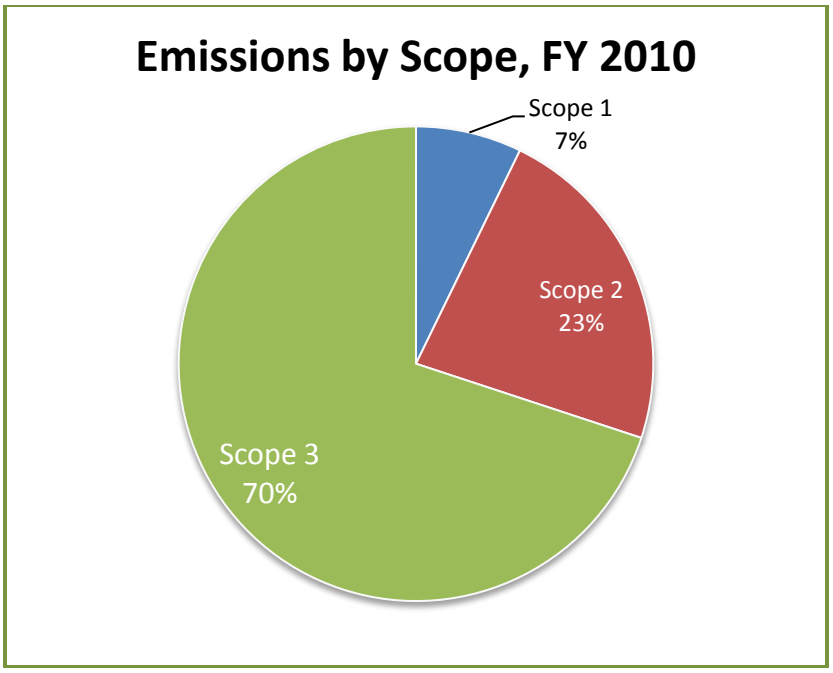
Emissions by category and their percentage of the total are outlined in the table below.

EMISSIONS BY SECTOR (2010)		
Source	Emissions (MT CO_2e)	Percent of total
Student commuting	19,963	63%
Purchased electricity	7,299	23%
Natural gas combustion	2,229	7%
Employee commuting	1,338	4%
Losses from electrical grid	722	2%
Employee mileage	152	1%
Study abroad travel	103	<1%
Air travel	85	<1%
Vehicle fleet (cars, trucks, airplanes, etc.)	74	<1%
Landscaping	5	<1%
Solid waste	-16.2	n/a
Refrigerants	n/a	n/a

On a normalized basis for FY 2010, each FTE was responsible for 5.3 MT CO_2e and each person (including employees) was responsible for 4.8 MT CO_2e.

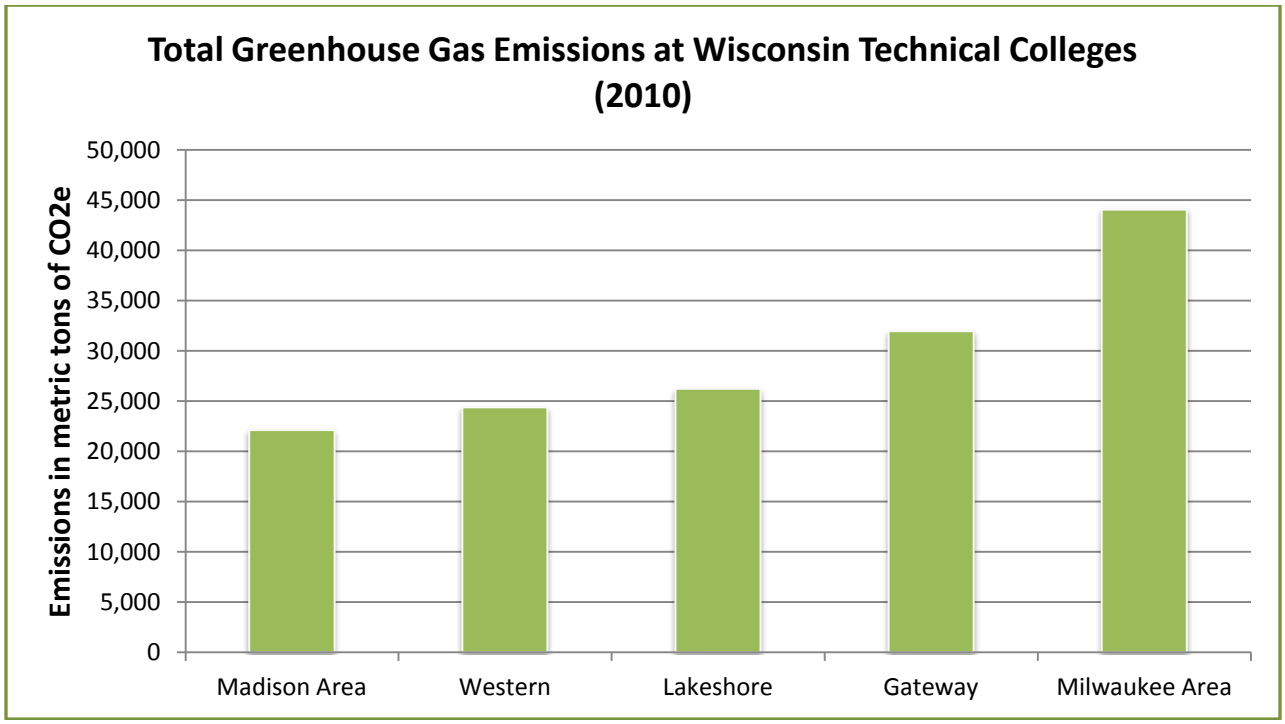
Emissions by Scope

The largest sources of emissions at Gateway were in the categories over which it has least control, while the smallest sources of emissions were in categories over which it has most control. As shown in the figure on the subsequent page, 70% of emissions were in Scope 3; 23% in Scope 2 and 7% in Scope 1.



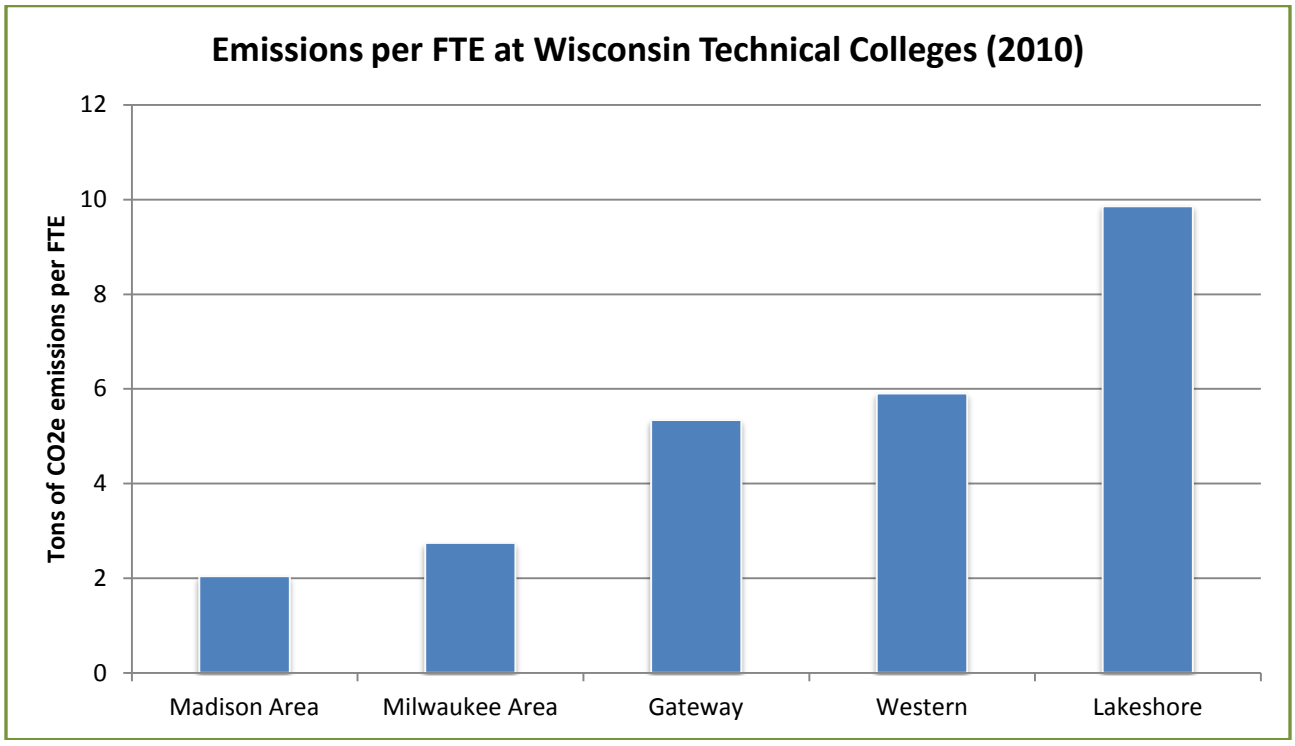
Gateway vs. Wisconsin Technical College Peers

The graph below compares total emissions at the five technical college districts that completed greenhouse gas inventories in 2010.



Interestingly, Madison Area Technical College, the institution in the group with the fourth-largest FTE level, had the lowest overall emissions. Otherwise, the amount of total emissions tracked the size of the student body.

The reason for this performance is that Madison Area Technical College's rate of 2.0 MT CO_2e per FTE is the lowest of the group. Close behind was Milwaukee Area Technical College (2.7 MT CO_2e/FTE), followed by Gateway Technical College (5.3 MT CO_2e/FTE), Western Technical College (5.9 MT CO_2e/FTE) and Lakeshore Technical College (9.9 MT CO_2e/FTE).



5.0 Transportation Emissions Inventory

Introduction

As a commuter institution with dispersed campuses and no on-campus housing, the reduction of greenhouse gas emissions related to transportation represents the greatest challenge to achieving the goal of climate neutrality. Although transportation is the largest source of emissions, Gateway exerts direct control only over its own assets. Creativity and positive incentives will be required to reduce emissions in this category.

Key Findings

Transportation accounted for 69% of Gateway's greenhouse gas emissions for 2010, the largest source. Furthermore, this sector created the greatest amount of emissions in not just carbon dioxide but methane and nitrous oxides, as well. The breakdown in the transportation sector is outlined in the table on the following page.

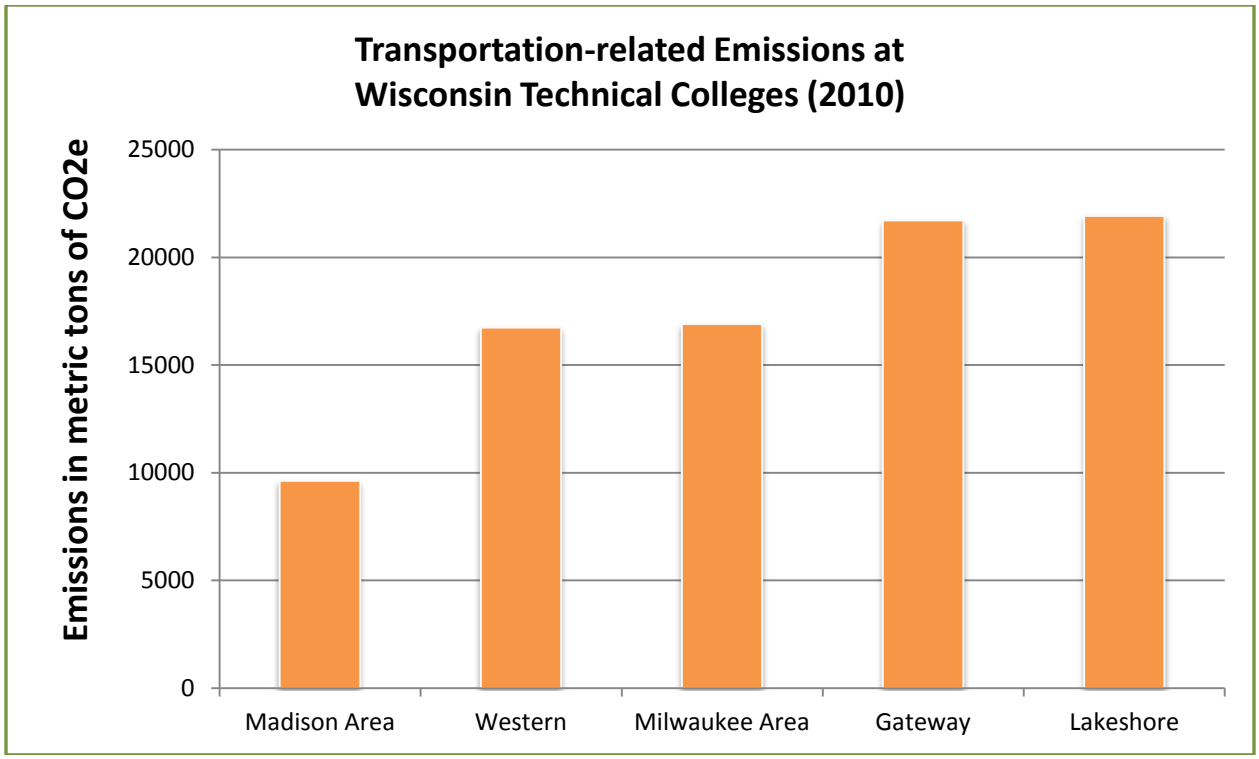
TRANSPORTATION EMISSIONS BY SECTOR		
Source	Emissions (MT CO_2e)	Percent of total
Student commuting	19,963	63%
Employee commuting	1,338	4%
Employee mileage	152	1%
Study abroad air travel	103	<1%
Employee air travel	85	<1%
Vehicle fleet (cars, trucks, airplanes, etc.)	74	<1%
TOTAL EMISSIONS	**21,715**	**69%**

Student commuting continues to be the largest source of emissions, followed by employee commuting and college-financed ground transportation for employees. Emissions from study abroad travel, college-financed air travel for employees and operation of the vehicle fleet each made up less than 1% of Gateway's emissions.

In order to understand the commuting habits of students and employees, an online commuting survey was performed. It was determined that over 97% of both groups utilized personal vehicles, while less than 1% commuted via a carpool, bicycle or walking. The average student commutes 23 miles to and from campus and makes the trip 3.5 times per week. Employees make trips of a similar length an average of 4.7 times per week.

Gateway vs. Wisconsin's Other Technical Colleges

At 21,715 and 21,930 MT CO_2e respectively, Gateway and Lakeshore represent the highest transportation-related emissions among their Wisconsin Technical College System peers. Madison Area Technical College had the lowest emissions (9,618 MT CO_2e), followed by Western Technical College (16,740 MT CO_2e) and Milwaukee Area Technical College (16,900 MT CO_2e). This result is illustrated in the graph on the following page.



It is hypothesized that Madison Area and Milwaukee Area, despite their large enrollments, outperformed their smaller counterparts in transportation due to factors such as readier access to mass transit and the ability for these institutions to concentrate more operations at each campus due to their higher population densities.

Data Collection for Transportation

Gateway Fleet

Gateway has a dispersed, decentralized fleet of vehicles, including among others maintenance vans, vehicles in the public safety programs (police, fire, EMT) and airplanes in the aeronautics program. In order to capture all of these vehicles, fuel purchases made on PCards were obtained the Purchasing Technician and the Controller. Because a system for recording these purchases was not in place in FY 2010, it is known that a small percentage of fuel purchases were not captured. In addition, no difference was recorded between gasoline and diesel fuel, which have different emissions factors, a fact that slightly reduced the accuracy of the inventory.

Because the aviation fuel utilized by Gateway, i.e. Avgas LL100, is not present in the CA-CP calculator, an emissions factor from the U.S. Department of Energy was adapted and entered into the calculator[ix].

It should be noted that the fuel utilized by the service providers was not included in this inventory. This includes the providers of security, courier and landscaping services.

Commuting Survey

A total of 292 students and 324 employees completed the online survey. Due to the complexity of commuting patterns and the low response rates, especially among students, it would be worthwhile to explore a survey based on individual interviews with a smaller group of students and employees in order to increase accuracy.

Associates from Research, Planning, & Development, Community & Government Relations and Marketing departments assisted with development and compiling of the survey.

College-funded air and ground travel, study abroad air travel

College-funded air and ground travel, as well as study abroad air travel were calculated from accounts receivable and PCard records. Air miles were calculated from flight segments utilizing an online air mileage calculator[x].

Flight and mileage information were obtained from the Purchasing Technician, Finance Specialist and Controller. Aviation fuel data was supplied by the Dean of Campus Affairs. Additional assistance for study abroad flights was provided by the office of the Vice President/Provost.

Recommendations

The 2009 greenhouse gas inventory proposed three excellent measures for reducing emissions:

- An online ride-share system
- More online and hybrid courses
- A shuttle between campuses

In addition, Gateway should consider replacing older vehicles with new, more efficient hybrid models as the selection for vehicles in this category improves.

Emissions and costs associated with employee travel can be reduced by expanding the use of online meetings. For air travel, employees can be automatically offered the option to purchase carbon offsets at their own expense.

Promoting alternatives to commuting by personal vehicle will not only reduce greenhouse gas emissions but also improve stakeholder health and reduce strain on parking resources. Bicycle transportation could be improved by promoting a bicycle culture through efforts like hosting a "Bike & Walk to School/Work Day", offering "Bike to Campus 101" workshops, improving bicycle parking facilities and creating a bike station with lockers and showers. Bus transportation could be expanded in several ways, e.g. by offering free or deeply discounted bus passes to students and employees and by commissioning Gateway's IT students create a bus-related smart-phone app.

Finally, although emissions from contractors are not included in this inventory, Gateway should consider offering incentives for contractors to improve efficiency, thus reducing overall emissions for which Gateway bears a share of responsibility.

6.0 Non-Vehicular Energy Emissions Inventory

Introduction

Non-vehicular energy is the second-largest source of greenhouse gas emissions at Gateway. The principal greenhouse gases associated with the production of energy include carbon dioxide, nitrous oxide and methane.

Gateway generates emissions from the generation of non-vehicular energy in two ways:

1. On-site natural gas combustion for on-site heating and hot water (both in Scope 1)
2. The purchase of electricity (Scope 2)

Emissions for purchased electricity depend on the mix of fuels used in electricity generation. Gateway's service provider, Wisconsin Energy Corporation (dba We Energies), is connected to the RFC West (RFCW) eGRID subregion[2], whose fuel mix is as follows:

Fuel	Percent of generation resource mix in RFCW eGRID subregion
Coal	69.9%
Nuclear	23.6%
Natural gas	3.5%
Wind	0.9%
Biomass	0.5%
Source: US EPA[xi] Note that values for fuels <0.5% are not included	

In calculating emissions for Gateway's electricity purchases, the CA-CP calculator takes this mix into account.

The fact that the RFCW is dominated by coal, a relatively carbon-intensive fuel, is marginally offset by the fact that a significant amount of electricity is provided through nuclear generation, which is much less carbon intensive.

Key Findings

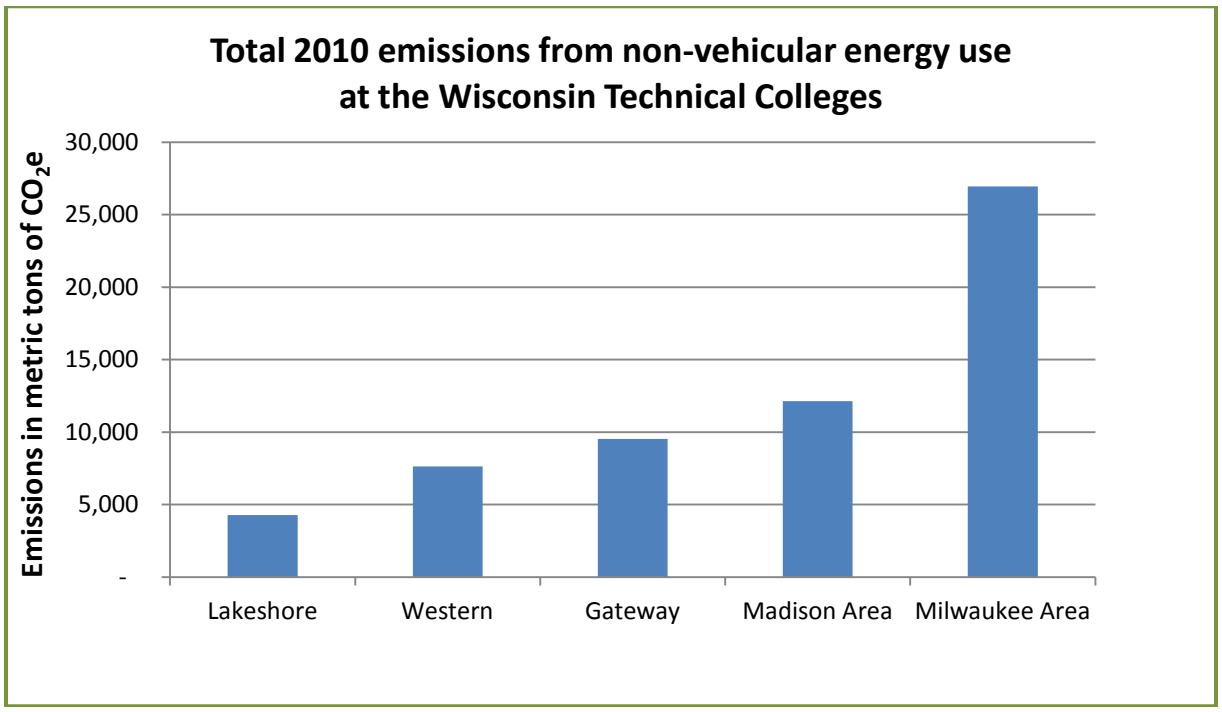
In 2010, Gateway produced 9,527 metric tons of CO_2e of emissions related to non-vehicular energy. Of this amount, 2,229 tons, or 23% of the category total, were from the combustion of 42,141 MMBtu of natural gas for on-site heating and hot water, while 7,299 tons, or 77% of the category total, were from consumption of 10,526,288 kWh of purchased electricity.

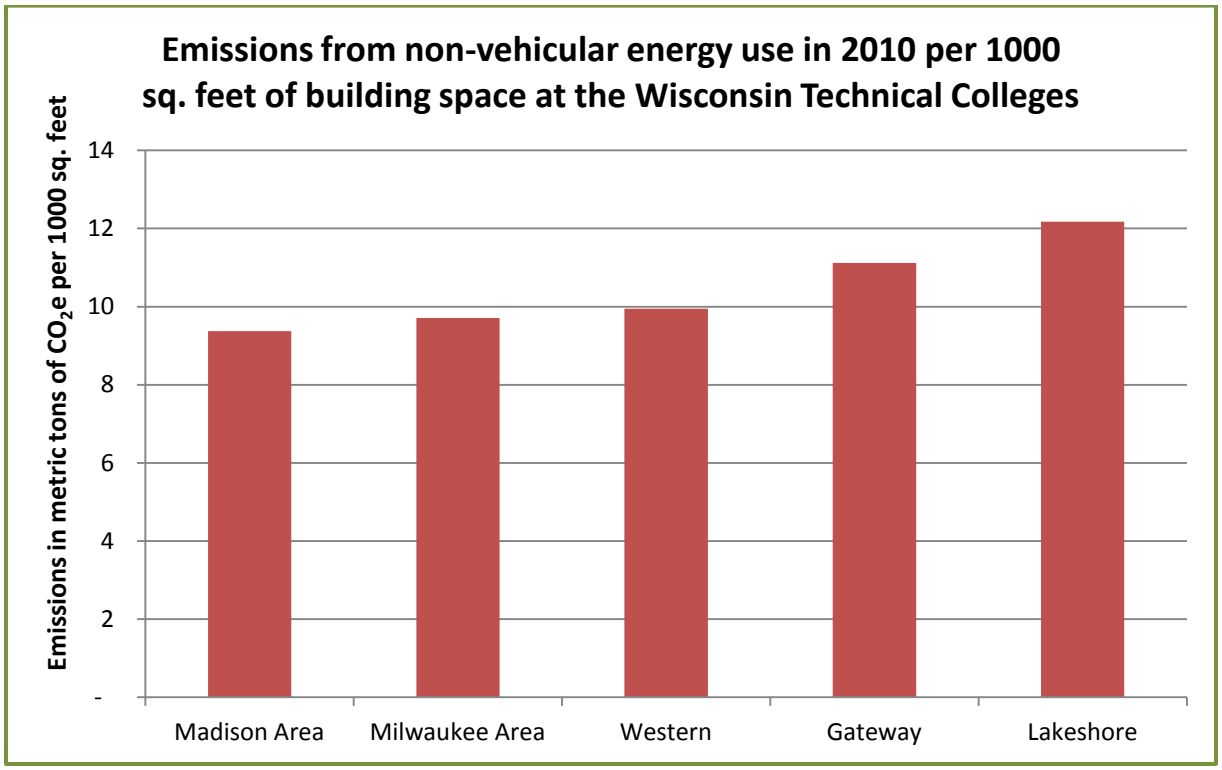
Gateway vs. Wisconsin's Other Technical Colleges

A comparison with Gateway's peers in energy consumption, an area over which an institution exercises a relatively high level of control, is a useful benchmark for measuring progress. Of particular interest is the energy consumption per unit of building space. The tables below compare Gateway's total greenhouse gas emissions and emissions in relation to campus

[2] The 2009 inventory incorrectly designated the eGRID region to be MROE, which has a different mix of energy sources. This error most likely reduced the accuracy of that inventory. The MROE region is characterized by less generation from nuclear sources than the RCFW region.

building space with peers in the Wisconsin Technical College System that have performed inventories.





While total emissions at the colleges are commensurate with the size of the respective community and student body, Gateway is below average on the basis of emissions per area of building space.

Additional Information

Version 6.8 of the CA-CP calculator provided information on the greenhouse gas emissions that arose from the losses affiliated with the transmission and distribution (T&D losses) of electricity. Technically T&D losses are Scope 3 emissions that belong to the electricity provider, in this case WE Energies. Nevertheless, as the consumer of the energy, Gateway is largely responsible for these energy-related emissions. Renewable energy and energy efficiency measures would have the added benefit of reducing T&D losses. Note that T&D losses were not counted in Gateway's 2009 GHG report. Including T&D losses added 722 MT CO_2e, or 2.3%, to total emissions.

Regarding renewable energy, Gateway has actively increased its on-campus renewable energy sources. In March 2010, Gateway installed a solar array at the Horizon Center[3], which began offsetting the college's energy consumption. In 2011, additional arrays were added on the Kenosha and Racine campuses. Therefore, beginning with the FY 2011 greenhouse inventory, it would be valuable to analyze the impact of renewable energy generation in order to inform Gateway's energy strategy.

Data Collection

The ACUPCC inventory model requires input of energy data from two categories:

1. Purchased electricity & purchased steam/chilled water
2. On campus stationary sources

Gateway does not purchase steam or chilled water, nor does it operate a co-generation plant, nor does it perform other types of combustion of fossil fuels besides natural gas. Purchased electricity data was input per annual KWh consumed. On-campus stationary sources include fuels purchased by the university other than gasoline or diesel fuel used in vehicles. Natural gas totals were input into this category per annual MMBtu (million BTU) consumed.

The university does use small amounts of diesel fuel to power equipment, such as generators. Data for the consumption these fuels is not tracked directly.

Data for electricity and natural gas consumption were received in the form of an annual Energy Utilization Report from the directors of building services and the Vice President of Finance/CFO. Data on the LakeView Advanced Technology Center was provided by the Finance Specialist.

Recommendations

As a large consumer of energy, Gateway is subject to the complexities and risks that are inherent in today's energy market. Energy prices are increasingly volatile and trending higher; the energy grid is increasingly antiquated to users' needs and climate change will continue to

[3] Real-time and historical energy generation can be obtained at https://enlighten.enphaseenergy.com/public/systems/Mnan3820

present numerous unforeseen risks. A strategic and proactive energy management policy that faces these risks offers numerous benefits beyond the reduction of costs and environmental impact, including the improvement of risk management, stakeholder relations and public perception.

A large part of this policy involves integrating energy awareness as a self-sustaining part of the organizational culture and decision making. A robust policy extends equipment life, reduces maintenance and makes an organization more competitive. Furthermore, the goal of saving energy can energize employees, leading to higher productivity and increased morale.

The greenhouse gas inventory is a useful tool because it begins the process of understanding energy use and, thanks to its macro perspective, establishes an insightful baseline from which goals can be proposed.

This macro-level perspective is clearly not a micro-level energy audit, however, which means that recommendations on micro-level are outside the bounds of this report. Nevertheless, macro-level observations from the perspective of the consultant offer the following insights:

1. Gateway would benefit from greater micro-level visibility in each facility. This visibility into parts of facilities would allow energy-consuming assets, including 'energy hogs', to be managed more effectively. In addition, indicators beyond energy intensity (consumption per unit of area) that capture the activity being done at a facility will assist in efficient, customized management of the facility.

2. Gateway is in a strong position to scale up renewable energy generation. After installing several renewable energy systems, including PV solar, solar hot water, small wind and geothermal, Gateway now has the experience and know-how to make these technologies a greater share of its energy mix. Gateway also has other unique advantages in the form of in-house expertise in these technologies, as well strong partnerships with companies that produce HVAC equipment. The cost situation is only improving. Prices for PV solar technologies have dropped approximately 80% in the past five years; Gateway may be able to leverage its partnerships in order to further reduce equipment costs. It is therefore recommended that Gateway create an ambitious renewable energy strategy as part of its energy plan.

7.0 Landscaping Emissions Inventory

Introduction

The application of nitrogen-containing fertilizers results in the emission of nitrous oxides, which are highly potent greenhouse gases.

Key Findings

In FY 2010, landscaping activities resulted in 4.8 MT CO_2e of emissions, amounting to 0.02% of Gateway's total emissions.

Data Collection

Data for fertilizer application was obtained from the directors of building services for the Kenosha and Racine campuses who generously obtained the required data from the firms contracted to perform landscaping services.

Data for fertilizers applied in the context of the Horticulture Program were not available and are therefore not included in this inventory.

Recommendations

For aesthetic reasons, there may be little support for eliminating fertilizers in most high-traffic areas. However support may exist for converting a small portion of the high-traffic areas and a larger portion of the low-traffic areas to no-mow landscaping. This option, in addition to reducing emissions, would reduce the cost of both inputs and maintenance.

8.0 Solid Waste Emissions Inventory

Introduction

Significant greenhouse gas emissions can arise from the disposal of solid waste mainly from the methane produced from the decomposition process in landfills. To be sure, generating solid waste is never a net reducer of greenhouse gases. The laws of physics dictate that the creation, transportation and disposal of solid waste generate greenhouse gas emissions, most of which would be captured by a greenhouse gas inventory of the solid waste hauler, in this case Waste Management. However, Gateway's emissions in this category are actually *negative* due to the fortunate fact that Waste Management captures methane[4] from the Orchard Ridge Landfill in Germantown, Wisc., the final destination for the college's solid waste. The methane, rather than wind up in the atmosphere as a super potent greenhouse gas, is burned to create electricity, whose byproduct is the less potent carbon dioxide.

Key Findings

During FY 2010, Gateway disposed of approximately 490 metric tons (540 short tons) of solid waste, resulting in a net *avoidance* of emissions to the atmosphere of 16 metric tons of CO_2e. Therefore, solid waste was not a major source of emissions for Gateway in 2010.

Data Collection

Information about Gateway's annual production of solid waste production, as well as the destination for that waste, was generated by a sales coordinator at Waste Management. Details about account numbers, invoicing and contact information were provided by the Purchasing Technician.

Recommendations

Several opportunities exist for reducing the amount of solid waste produced by Gateway. Besides reducing greenhouse gas emissions, waste reduction has other positive benefits,

[4] Gateway's 2009 Greenhouse Gas Inventory did not take methane capture into account, even though the practice was in place by Waste Management at the time. Therefore, the emissions in this category for the 2009 inventory are most likely overstated.

including the reduction of waste removal costs, a positive 'green image' to attract and retain high-quality staff and students and a concrete source of compelling sustainability projects for motivated students to work on.

Although Gateway offers recycling on campus, participation is minimal, presence of appropriate containers is inconsistent and a great deal of contamination occurs. Waste Management has set high internal goals related to sustainability, the reduction of waste and the increase of recycling. Therefore, the company performs a great deal of outreach to help organizations of all kinds set up state-of-the-art waste reduction programs, including specific ones for college campuses, i.e. the Think Green Campus Model.

Furthermore, students could be recruited to a greater extent to assist with educational efforts that encourage waste reduction across campus.

A useful goal to focus these efforts would be to reduce the dumpster size at every location across Gateway's facilities. The savings from reduced waste removal fees could be applied to purchasing improved on-campus recycling facilities.

9.0 Going Forward

As required by the ACUPCC, Gateway Technical College took action on the results and recommendations from its 2009 greenhouse gas inventory and created a climate action plan, which at Gateway took the form of a comprehensive sustainability plan. This report builds on historical progress, and it is hoped that the institutionalization of measures that will eventually lead to climate neutrality by 2030 will continue. This report will conclude with broader recommendations as Gateway goes forward, which include:

1. Include the broader public and Gateway students in a Climate Action Task Force
As a public institution, Gateway relies on broad support of citizens to perform its mission effectively. Including dynamic community members who can engage the public about the risks that climate change presents our communities would provide invaluable outreach related to climate leadership in the spirit of Gateway's ACUPCC commitment. Furthermore, involving students in this task force will provide a wide range of ideas regarding campus sustainability.

2. Implement a greenhouse gas information management system
At the time of this writing, a Web-based version of the CA-CP calculator is currently in beta testing. An information management system of this type could be used to decentralize and automate future greenhouse gas inventories, as well as integrate duties into employee work flows. An additional benefit would be real-time tracking of emissions rather than waiting a year or more for results.

3. Create a system for tracking, reducing and eliminating the use of refrigerants
Currently Gateway does not monitor emissions of HFC-based refrigerants, some of the most potent greenhouse gases. While these emissions are comparatively small, as Scope 1 emissions, Gateway exercises a high level of control over them, and small measures can bring large gains. They are therefore 'low hanging fruit.' Refrigeration equipment that utilizes hydrocarbons, carbon dioxide or ammonia is available. While the challenge remains more difficult for air conditioning equipment, climate-friendly refrigerants are coming onto the market. In any case, proactive management and vigilant attention to refrigerant recycling, not to mention newer, more efficient equipment, can prevent escapes of these gases.

4. Improve management of water resources
Although the procurement of drinking water and treatment of wastewater are greenhouse gas-intensive activities, these emissions are not included in this report. Instead, accounting convention places them on the 'balance sheet' of the respective water utilities. Energy costs are embedded in the utility's billing.

Fortunately, the CA-CP calculator is able to track emissions related to both drinking and wastewater. Adding the wise use of water as a sustainability indicator to Gateway's sustainability plan would have numerous advantages. Both costs and net greenhouse gases would be reduced. Most importantly, however, improved management of our water resources - which are so essential to the well-being of current and future generations - would have a measurable impact on their long-term sustainability.

5. Establish a Green Revolving Fund
Up-front investment is required to finance the efficiency efforts that will bring about reductions in greenhouse gas emissions and improvements in other sustainability indicators. An elegant solution to procuring these funds over the long term is the Green Revolving Fund. The initial funds often come from a philanthropic organization, and the savings that result from initial investment can be used to finance subsequent rounds of measures indefinitely.

Finally, it is important to note that these recommendations are presented to Gateway by the consultant and may or may not be implemented. The college's Sustainability Team will review and discuss these recommendations and prioritize potential future initiatives.

10.0 Notes

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[ii] Gateway Technical College. Sustainability Plan for Gateway Technical College. Publication accessed 11/8/12 at http://www.gtc.edu/sustainability/college-initiatives.

[iii] Wisconsin Technical Colleges. Wisconsin Technical Colleges: Leading in Sustainability. Publication accessed 11/8/12 at http://www.witechcolleges.org/sustainability/pdf/sustainabilityfactsheet.pdf

[iv] Clean Air-Cool Planet. Clean Air-Cool Planet Carbon Calculator v6.8. Tool accessed 10/1/12 at http://www.cleanair-coolplanet.org/toolkit/inv-calculator.php.

[v] World Business Council for Sustainable Development (WBCSD). *The Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard (Revised Edition)*. Document accessed 11/15/12 at http://www.wri.org/publication/greenhouse-gas-protocol-corporate-accounting-and-reporting-standard-revised-edition

[vi] Intergovernmental Panel on Climate Change (IPCC). *Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, 2007*. Document accessed 10/30/12 at http://www.ipcc.ch/publications_and_data/ar4/wg1/en/contents.html.

[vii] United States Environmental Protection Agency. *Greenhouse Gas Emissions: Emissions of Fluorinated Gases*. Document accessed 11/7/12 at http://www.epa.gov/climatechange/ghgemissions/gases/fgases.html#Trends.

[viii] United Nations Framework Convention on Climate Change (UNFCCC). *Climate Change 1995, The Science of Climate Change: Summary for Policymakers and Technical Summary of the Working Group I Report, page 22*. Document accessed 11/8/12 at http://unfccc.int/ghg_data/items/3825.php.

[ix] Value=69.19 kg CO_2/MMBtu. Source: U.S. Environmental Protection Agency. Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2005, EPA 430-R-07-002, Annex 3.2, (April 2007). Document accessed 10/1/12 at http://www.eia.gov/oiaf/1605/excel/Fuel%20Emission%20Factors.xls

[x] Service accessed in November 2012 via the site http://www.webflyer.com/travel/mileage_calculator/.

[xi] US EPA. *eGRID2012 1.0 Year 2009*. Document accessed 11/20/12 at http://www.epa.gov/egrid