SUSTAINABLE GATEWAY

Gateway Technical College Greenhouse Gas Emissions Inventory Report FY 2021-22 FY 2022-23

In fulfillment of the Second Nature Climate Leadership Commitments

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Report developed by:

NATURAL CAPITAL SOLUTIONS

Contents

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The author also thanks other hardworking Gateway employees who generously contributed to this report behind the scenes.

Executive Summary

This report is Gateway Technical College's Greenhouse Gas (GHG) Inventory for two fiscal years (FYs): FY 22 and FY 23. These represent the *8th & 9th* such inventories, with previous ones performed for the fiscal years 2009, 2010, 2011, 2014, 2016, 2017 & 2018.

These GHG inventories have played a key role in informing Gateway's stakeholders on the institution's progress towards its sustainability goals and eventual carbon neutrality. A GHG inventory measures the impact of Gateway's operations, and improvements thereto, on GHG emissions, which are a key driver of global climate change. Furthermore, this report fulfills Gateway's important responsibilities in its climate related commitments, including the American College and University Presidents' Climate Commitment (ACUPCC), signed in 2009, the Second Nature's Climate Commitment, signed in 2015 and the Race to Zero for Universities and Colleges campaign, signed in 2024.

Data for this current inventory were collected in 2024 and cover the following categories:

Institutional data	Energy	Transportation	Solid waste
Budget Student population Physical size	Purchased electricity Natural gas combustion Renewable energy generation	University vehicle fleet Employee air & ground travel Student/faculty/staff commuting miles	Landfill waste with methane (CH_4) recovery

These data were analyzed using SIMAP – the University of New Hampshire's Sustainability Indicator Management & Analysis Platform – a cloud-based carbon and nitrogen-accounting platform. SIMAP utilizes the Greenhouse Gas Protocol (WRI, 2025), the world's most widely used greenhouse gas accounting standards and guidance.

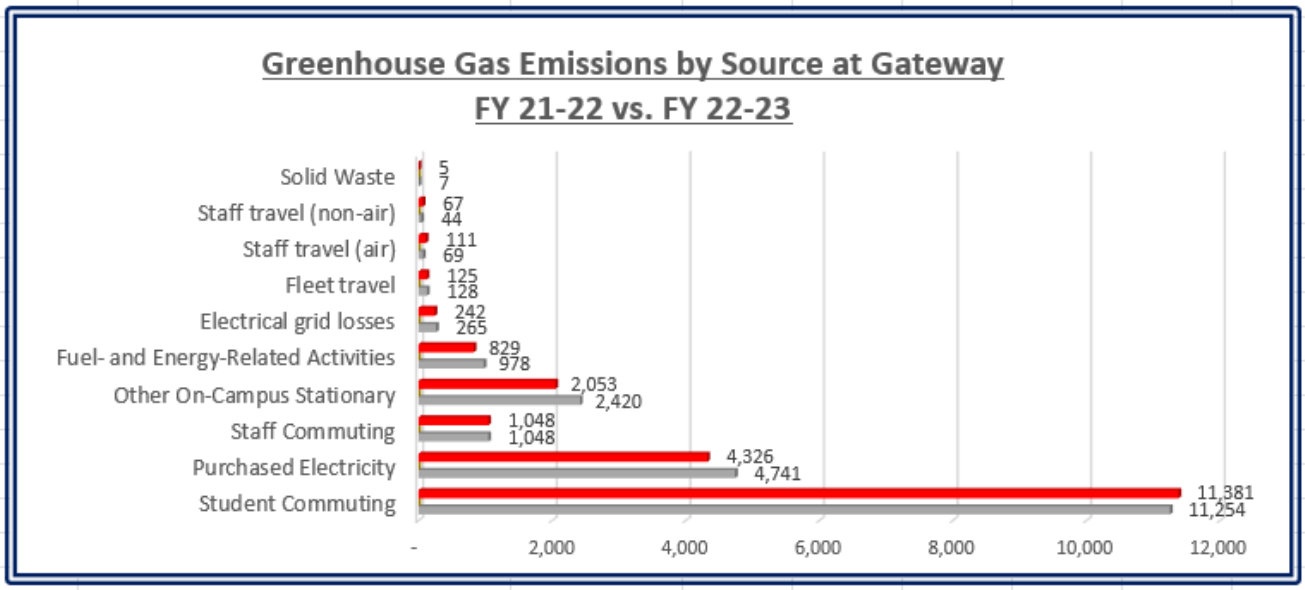
Technical concepts such as emissions "scopes", background on primary greenhouse gases and global warming potential are explained in the report.

The inventory of greenhouse gas emissions revealed that Gateway Technical College emitted a total of approximately **20,954 metric tons of carbon dioxide equivalents**

(MT CO2e) in FY 22 and 20,187 MT CO2e in FY 23. These amounts represent all GHG emissions, i.e. in Scope 1, Scope 2 and Scope 3.

All 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.

The following graph breaks down GHG emissions by source for both FY 22 and FY 23.



Because Gateway has less control over commuting by students, staff and faculty, an examination of emissions from Scope 1 and Scope 2 – those emissions over which Gateway institution exerts the most control – is the most insightful. This subset of emissions more accurately reflects the institution-based efforts towards carbon neutrality than the measurement of all three scopes.

In FY 22, Gateway emitted a total of **7,290 MT CO_2e** in Scope 1 and Scope 2 combined (excluding Scope 3 emissions); in FY 23 the figure for the same subset of emissions was **6,504 MT CO_2e**.

The following table comparing GHG inventories since 2009 was performed for both total emissions (Scopes 1, 2 & 3) and those emissions over which Gateway has the most control (Scopes 1 & 2 only), as well as annual and cumulative changes in emissions over time.

TOTAL GHG EMISSIONS PER YEAR Scopes 1, 2 & 3 vs. Scopes 1 & 2 only ($MT\ CO_2e$) FY 2009 – 2023 (with exceptions)				
FY	Emissions Scopes 1, 2 & 3 ($MT\ CO_2e$)	Cumulative Change in %	Emissions Scopes 1 & 2 ($MT\ CO_2e$)	Cumulative Change in %
2009	34,900	--	10,544	--
2010	32,000	- 8%	9,606	- 9%
2011	31,826	- 9%	9,634	- 9%
2014	30,009	- 14%	9,031	- 14%
2016	26,182	- 25%	7,502	- 29%
2017	24,771	- 29%	6,811	- 35%
2018	23,838	- 32%	5,903	- 44%
2022	20,954	- 40%	7,290	- 31%
2023	20,187	- 42%	6,504	- 38%

During the period FY 09 to FY 23, Gateway achieved a gradual reduction totaling 42% of overall emissions (i.e. Scopes 1, 2 & 3) and 38% when limited to only Scope 1 & 2 emissions.

This report further examines GHG emissions by sector, finding that the top three sources to be student commuting, purchased electricity and combustion of natural gas. While Gateway has minimal control of student commuting, a Scope 3 source, it possesses much greater control over electricity (Scope 2) and natural gas use (Scope 1).

Clearly the key finding of this report is that while Gateway has achieved a 38% reduction in its combined Scope 1 and Scope 2 GHG emissions, the combustion of natural gas and consumption of electricity remain approximately the same as a decade ago. The heavy lifting needed to reduce these emissions is primarily due to

increased efficiencies in electricity production among WE Energies and the other utilities that supply the electrical grid.

A significant portion of this report is dedicated to examining each sector of GHG emissions in detail and reporting on each one's current status, context and long-term trends.

Meanwhile, a section is also dedicated to generation of non-GHG-emitting renewable energy at Gateway. Due to aging and lack of expansion of the solar infrastructure, renewable energy – at 0.1% - remains a small and diminishing proportion of Gateway's electricity consumption in each FY.

In the concluding section, some perspectives on past trends, current developments and future requirements to achieve stated GHG-related goals are provided. Here the author attempts to understand how the COVID-19 pandemic has negatively affected Gateway's trajectory to net zero in 2030 and why utility consumption has increased so significantly, essentially negating a decade of progress.

Are building technologies still being fully leveraged? Or are newly added facilities significantly less efficient than existing ones? Or are there simply errors in the utility-related data?

Regardless of the cause, Gateway stakeholders are strongly encouraged to commit to a post-pandemic regrouping and recommitting the complete institution to its important sustainability goals. Scientists are telling us that the climate crisis is only worsening and sounding the alarm for "all hands on deck – yesterday!" And Higher Education has committed itself to being a leader in solving this crisis.

Gateway can begin this process by improving the collection, monitoring and reduction in its utility data. Furthermore, if Gateway is to achieve this goal must find a way to obtain most, if not all, of its energy in an emissions-free manner. The hard truth is that there is simply no other path to net zero.

Natural Capital Solutions looks forward to continuing to support Gateway in its journey toward net zero in 2030.

Introduction

The inspiration for implementing the greenhouse gas inventory derived from Gateway Technical College President Emeritus Bryan D. Albrecht's signing of the American College and University Presidents' Climate Commitment (ACUPCC) in 2009, which was affirmed when in 2015 when Albrecht signed Second Nature's Climate Leadership Commitment as a charter institutional signatory.

More recently, Gateway, reinforcing its pledge to carbon neutrality by joining Race to Zero. Race to Zero is a global partnership led by the United Nations Framework Convention on Climate Change, Second Nature and The Alliance for Sustainability Leadership in Education (EAUC) that offers guides and toolkits that seek to accelerate progress by universities and colleges toward their climate-related goals.

Through these bold commitments, President Emeritus 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 and Second Nature outline 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 address global climate disruption and help create a thriving, civil and sustainable society. Gateway also seeks to enable students to benefit from the economic opportunities that will arise because of solutions they develop.

Taking a leadership stance on climate action will benefit Gateway in numerous ways, such as reducing long-term energy costs, attracting excellent students and faculty, attracting new sources of funding and increasing goodwill among all stakeholders, especially the local communities it serves.

Doing its part, Gateway has committed to creating a plan to achieve carbon neutrality, i.e. emitting zero net greenhouse gases, by 2030. 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 carbon neutrality is A Sustainability Plan for Gateway Technical College (2016), released in 2012 and updated in 2016, 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), whose mission is to help Wisconsin residents obtain the training they need to compete in today's global job market. WCTS operates 54 campus locations in 16 college districts throughout the state. Approximately 274,000 students enroll in technical colleges each year, with the equivalent of 62,000 full-time students enrolled in career programs (WTCS, 2023-24).

In fulfillment of its mission, WTCS is a significant consumer of natural resources and energy. Mindful of this fact, WTCS has long taken a leadership role and "walked the talk" in the advancement of sustainability and green practices. Wisconsin's technical colleges are providing leadership in the advancement of sustainability and green practices by 1.) Offering a growing number of renewable energy and energy efficiency career programs; 2.) Infusing sustainability into a wide range of traditional occupational education programs; and 3.) Integrating energy-efficient and sustainable practices into the colleges' own operations.

This leadership role inspired five system members to join the original ACUPCC commitment and perform GHG inventories: Gateway, Lakeshore Technical College, Madison Area Technical College, Milwaukee Area Technical College and Western Technical College. Later, only three WTCS institutions, Gateway, Western and Milwaukee Area Technical College joined the 2016 Second Nature Climate Leadership Commitment and continue to develop annual GHG reports.

Methodology for Greenhouse Gas Inventory

Overview

The purpose of a greenhouse gas inventory like this one is twofold. First, it provides a critical benchmark against which Gateway can track progress towards reducing its environmental footprint. Second, it provides reliable data that help Gateway's policy makers perform informed strategic planning to this end.

This report represents Gateway's 8th and 9th inventory of greenhouse gases emissions, covering the periods FY 2022 (July 1, 2021 – June 30, 2022) and FY 2023 (July 1, 2022 – June 30, 2023). Previous greenhouse gas inventories covered the periods FY 2009, FY 2010, FY 2011, FY 2014, FY 2016, FY 2017 & FY 2018. Each report has followed guidelines established by Second Nature.

Henceforth the convention "FY 22" will be used to denote FY 2021-22 and "FY 23" for FY 2022-23.
The consolidation methodology used to determine organizational boundaries is the Operational Control Approach. As such the measurement of greenhouse gases was limited to emissions from operations directly under Gateway's control. Emissions

were included from Gateway's three campuses - in Elkhorn, Kenosha, and Racine - as well as the Horizon Center in Kenosha and iMet facilities 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, where data permit, due to Gateway's operational role.

To efficiently compile, manage and analyze Gateway's greenhouse gas emissions data, the Sustainability Indicator Management & Analysis Platform – or SIMAP – was utilized (University of New Hampshire, 2024). The cloud-based tool was chosen because it: a.) is endorsed by Second Nature; b.) performs its analyses using the Greenhouse Gas Protocol, the world's most widely used greenhouse gas accounting standards and guidance (WRI, 2025); and c.) is compliant with the guidelines from the Intergovernmental Panel on Climate Change (IPCC), the United Nations organization dedicated to providing a scientific basis for organizations to develop informed climate-related policies (IPCC, 2018). Furthermore, SIMAP enables advantages such as importing and long-term storage of GHG data, advanced reporting capabilities and sharing among stakeholders, among others.

In early 2019, data from all pre-2017 GHG inventories that utilized Second Nature's now obsolete Campus Carbon Calculator Excel spreadsheet tool were migrated to SIMAP. Now multi-year reports can be developed using SIMAP.

Data for this current inventory were collected in 2024 and cover the following categories:

Institutional data	Energy	Transportation	Solid waste
Budget Student population Physical size	Purchased electricity Natural gas combustion Renewable energy generation	University vehicle fleet Employee air & ground travel Student/faculty/staff commuting miles	Landfill waste with methane (CH_4) recovery

Data was supplied from a variety of sources including official college reports for institutional and budget-related data (Gateway Technical College, 2022 & 2023), WE Energies billing statements for energy consumption data, an online survey for commuting data and internal reports from administration staff for fleet and travel-

related information. The vendor Green for Life (GFL) provided data documenting the amount of solid waste and recycled materials generated by Gateway.

To enable comparison across emissions categories, 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 coordinated and composed by James Gray of Natural Capital Solutions, East Lansing, Mich. with the support of the important collaborators listed above.

Emissions by Scope: A Comparison of Inventory Reports

Second Nature requirements and the SIMAP tool utilize a concept from the Greenhouse Gas Protocol (WRI, 2025), called "scopes", which are categories of emissions based on the level of responsibility an organization has for them. In addition to helping organizations to understand their 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 these inventories for FY 22 and FY 23, emissions from the required Scope 1 are slightly underreported or uncertain in the following categories:

1. Data for paper utilization were not available
2. Data from fugitive refrigerants – potentially hydrochlorofluorocarbons (HCFCs), perfluorocarbons and/or sulfur hexafluoride (SF_6) – were not available due to logistical constraints with data collection

[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. In this report, the metric ton is utilized when discussing the mass of carbon dioxide equivalents while solid waste is reported in short tons by the waste haulers.

3. Combustion of natural gas and electricity consumption at the LakeView Advanced Technology Center were estimated due to lack of data

In the optional Scope 3, the following emissions data were collected: solid waste, commuting for students, faculty and staff, college-financed air and rail travel for staff and reimbursed automobile mileage. International travel from study-abroad initiatives were not included due to uncertainties in the provided data.

Primary Greenhouse Gases

Gateway's inventory of emissions includes three gases covered under the Second Nature Climate Leadership Commitments and Intergovernmental Panel on Climate Change (IPCC) guidelines (2021), 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 most potent greenhouse gases, these include hydrochlorofluorocarbons (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 (US-EPA).

Calculation Sources & Methods

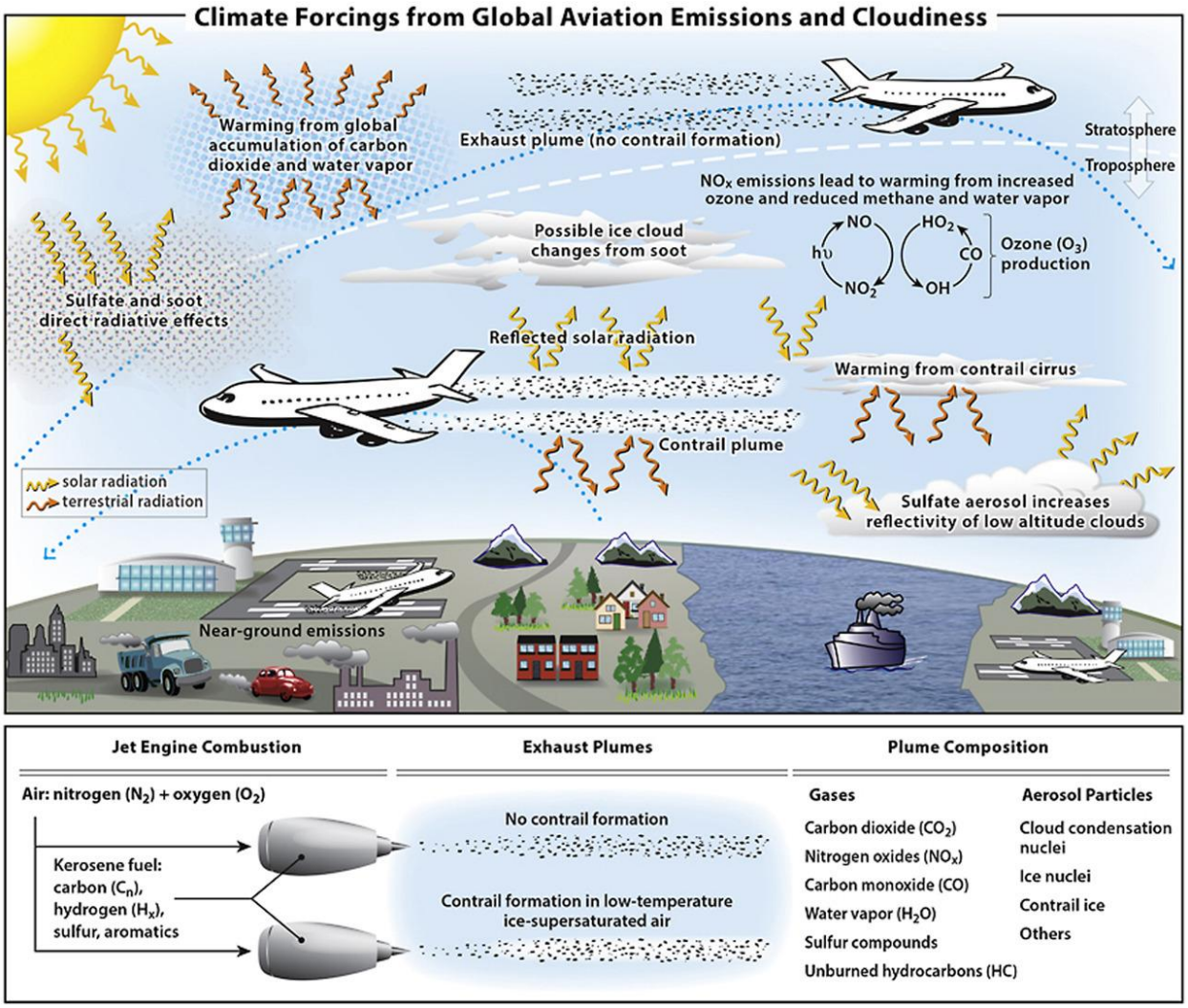
Here is an overview of how the SIMAP platform calculates greenhouse gas emission from the data that is entered.

Emissions factors

An emissions factor is a value that quantifies the amount of greenhouse gases (GHGs) released into the atmosphere by a specific activity or process (US-EPA, 2018). SIMAP currently utilizes the 2022 emissions factors from the International Energy Agency (IEA) (IEA, 2022).

Air Travel Cost Version & Radiative Forcing Factor

Calculating GHG emissions from air travel is complex because. Not only do airplanes emit CO_2 and NO_x (nitrous oxides) but they also emit contrails that modify the chemistry of the atmosphere, resulting in a net warming effect, which is illustrated concisely in the image below (Lee et al. , 2021).



The formula utilized by SIMAP to calculate emissions from air travel is:

Passenger miles x air travel CO2 emissions factor x radiative forcing factor

The IPCC (2021) radiative forcing factor of 2.7 is utilized in SIMAP.

Global Warming Potential Version

GWP values are from the IPCC 6th Assessment Report, which is typically abbreviated “AR6” (IPCC, 2022).

The concept of global warming potential (GWP) is a relative measure of the quantity of heat that a greenhouse gas maintains in the atmosphere. Each gas possesses 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 28, meaning that 1 ton of methane emissions have 28 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)	27	12
Nitrous oxide (N_2O)	273	121
HFC-134A	1,530	13
Sulfur Hexafluoride (SF_6)	24,300	3,200
Source: UNFCCC IPCC Sixth Assessment Report (AR6)		

Scope 2 Calculation Method

The accurate measurement of GHGs that arise from the consumption of electricity purchased from a utility is highly complex. Not only does each utility possess its own methods of producing electricity – each with its own GHG intensity – but utilities also buy and sell electricity with other utilities across the country.

To take these dynamics into account, SIMAP utilizes a "market-based" method of counting Scope 2 emissions (as opposed to "location-based" method) from electricity generation. While the differences are technical and complex, the market-based method is more accurate primarily because it 1.) considers the renewable energy purchase and sales made by the local utility and 2.) applies a supplier-specific emissions factor.

GHG inventory reporting to Second Nature requires the market-based method.

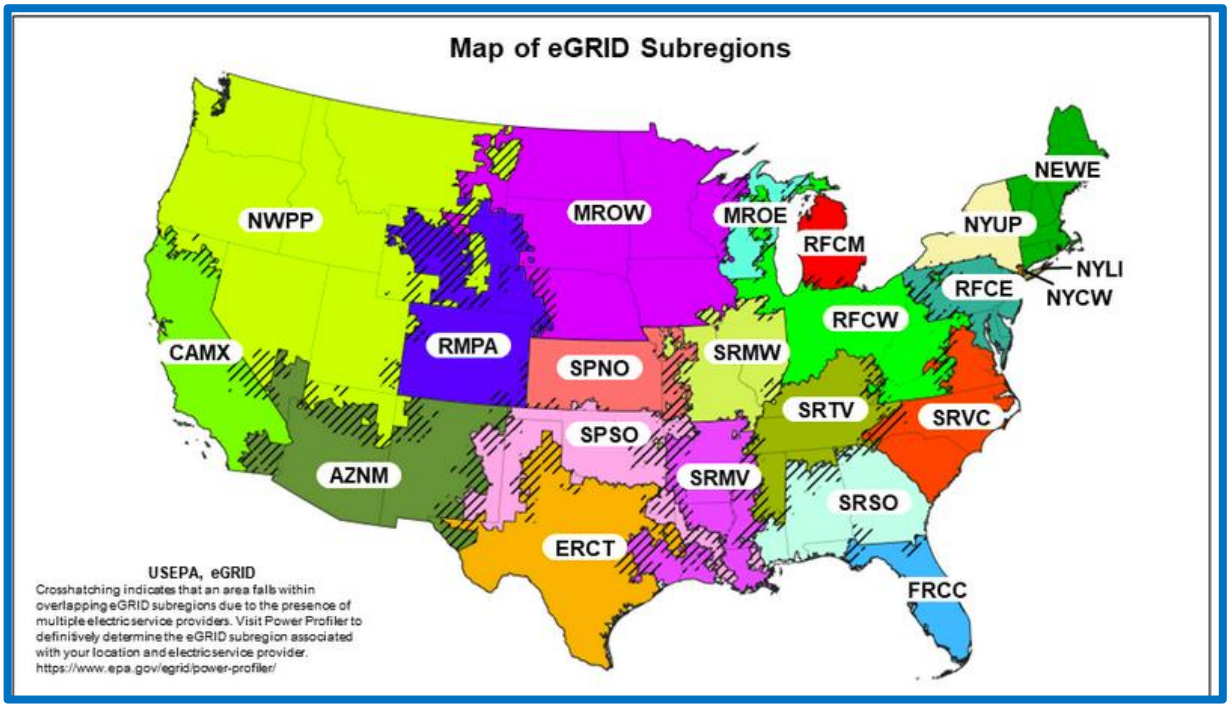
Data Source for Source 2 Emissions

The US Energy Information Administration collects information on the generation of electricity in the United States, including all environmental attributes of that generation. The US-EPA maintains this information in the Emissions & Generation

Resource Integrated Database (eGRID), which allows businesses and consumers transparent insights into the environmental impact of the electricity that they purchase. Key information found in eGRID that assists with greenhouse gas inventories include:

- Emissions of greenhouse gases like carbon dioxide, methane and nitrous oxide
- Generation resource mix, e.g. coal, natural gas, solar, wind, nuclear, hydropower, biomass, etc.

The eGRID database aggregates emissions data by subregions, shown on this map, which contain similar generation characteristics.



Source: eGrid Data Explorer (US-EPA, 2022)

Gateway's service provider, Wisconsin Electric Power Corporation (dba We Energies), is connected to the **RFC West (RFCW)** eGRID Subregion, whose fuel mix was as follows (and compared to national trends) in 2022, the latest available data:

Generation by Fuel Type	US Resource Mix (%)	RFCW Resource Mix (%)	Trend (2018 – 2022)
Coal	19.70	31.40	
Oil	0.70	0.30	
Gas	39.80	31.98	
Nuclear	18.20	27.62	
Hydro	5.90	1.00	
Biomass	1.20	0.43	
Wind	10.20	6.00	
Solar	3.40	0.51	
Geo thermal	0.40	0.00	
Other Fossil	0.50	0.68	
Other Unknown	0.10	0.08	

Source: eGrid Data Explorer (US-EPA, 2022)

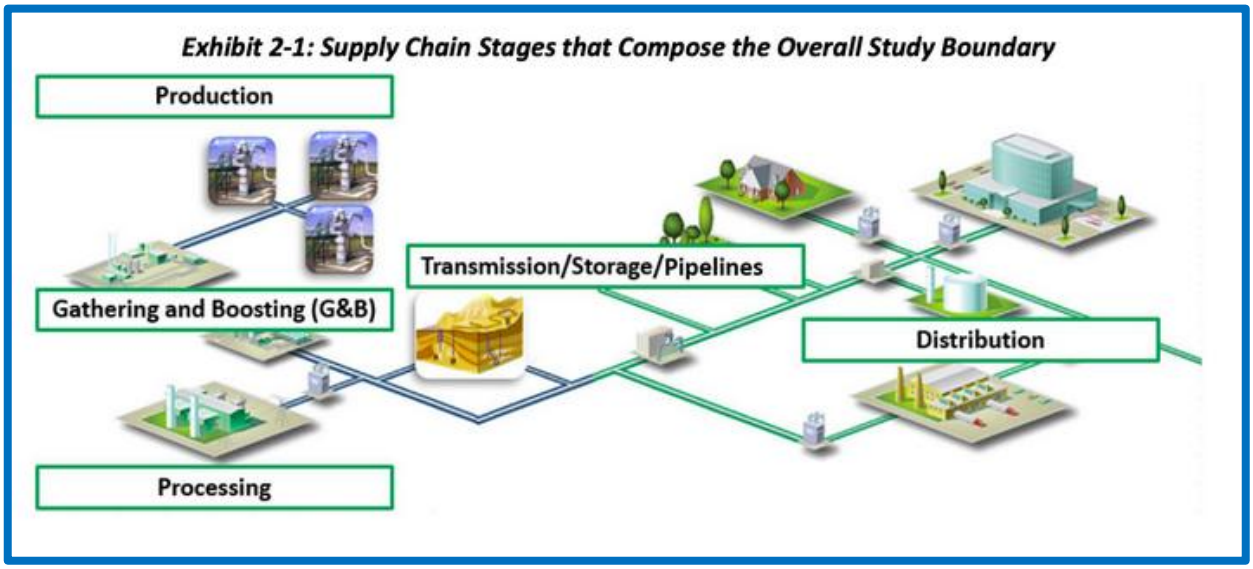
In calculating emissions for Gateway's electricity purchases, the SIMAP platform takes this resource mix into account and applies the US EPA eGRID data on electricity generation. The reductions in energy consumption are compounded by the fact that the electrical grid is becoming less GHG-intensive, with coal being rapidly replaced by natural gas, a less carbon-intensive fossil fuel, and renewable energy sources, primarily wind and, to a lesser extent, hydro, biomass and solar.

Electrical Grid Losses (T&D Losses)

The SIMAP platform quantified the GHG emissions that arose from the losses, or inefficiencies, affiliated with the transmission and distribution of electricity, a.k.a. "T&D losses". Technically T&D losses are Scope 3 emissions for Gateway that are primarily attributable to the electricity provider, We Energies. Nevertheless, as the consumer of that energy, Gateway is primarily responsible for these energy-related emissions. Fortunately, as Gateway's electricity purchases fall, the concurrent T&D losses compound the GHG reductions in this category.

FERA: Natural Gas-Related Losses

To fully account for GHG emissions associated with the combustion of natural gas, SIMAP includes the Scope 3 emissions category called fuel- and energy-related activities category, or FERA. As illustrated in the image below, FERA quantifies emissions that are generated during the entire natural-gas supply chain, such as production, processing, distribution and storage & transmission - including methane leakage into the atmosphere.

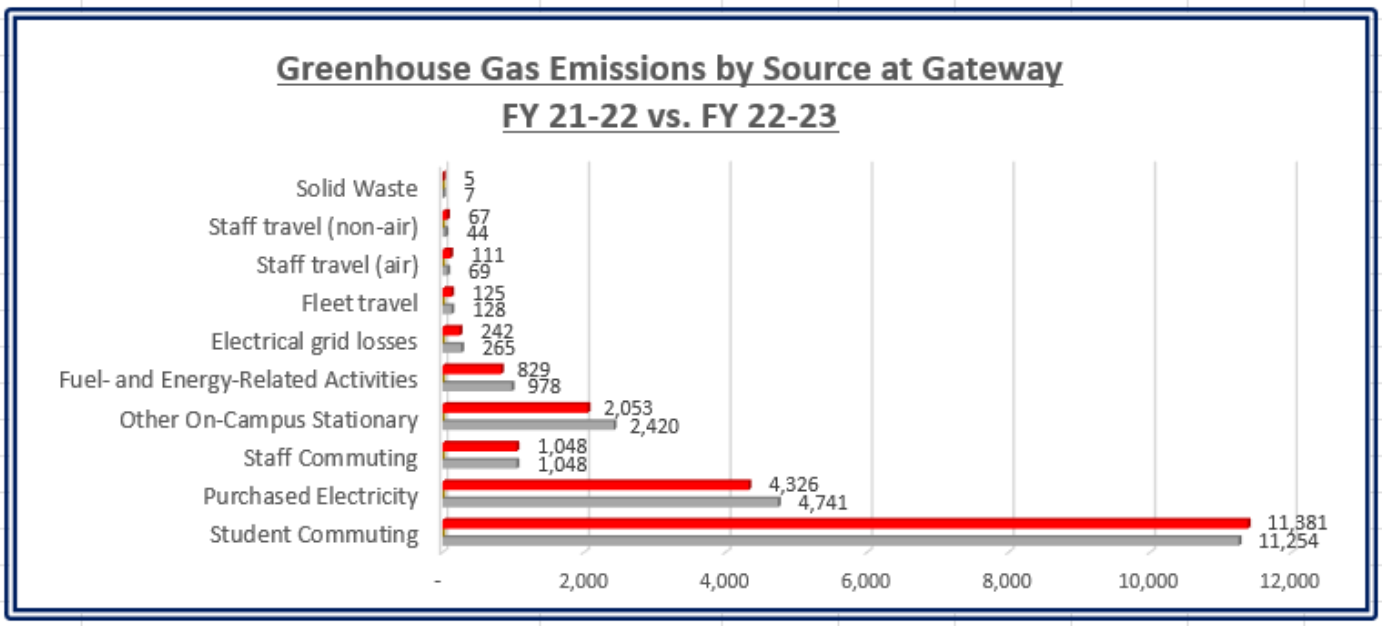


Source: (USDOE/NETL, 2021)

Inventory Results

Summary

The inventory of greenhouse gas emissions revealed that Gateway Technical College emitted a total of approximately **20,954 metric tons of CO_2e in FY 22** and approximately **20,187 metric tons of CO_2e in FY 23.** This amount represents all GHG emissions, i.e. in Scope 1, Scope 2 and Scope 3.



The most significant source of emissions in both fiscal years was transportation, which produced 60% and 63% of GHG emissions in FY 22 and FY 23, respectively.

After transportation, the non-vehicular energy category – encompassing purchased electricity, losses of electricity during its transmission through the electrical grid and combustion of natural gas (including FERA) - at 40% in FY 22 and 37% in FY 23 - makes up most of Gateway's remaining emissions. A marginal amount of emissions originate from solid waste.

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

EMISSIONS BY SECTOR FY 22 & FY 23		
Source*	FY 22 Emissions (MT CO_2e) With percent of total	FY 23 Emissions (MT CO_2e) With percent of total
Student commuting	11,254 54%	11,381 56%
Purchased electricity	4,741 23%	4,326 21%
Natural-gas combustion (On-site stationary)	**2,420** **12%**	**2,053** **10%**
Faculty/Staff Commuting	1,048 6%	1,048 6%
Fuel- and Energy-Related Activities	978 5%	829 4%
Electrical Grid Losses (Transmission & Distribution, "T & D")	265 1%	242 1%
Fleet Travel	128 1%	125 1%
Faculty/Staff Travel (air)	69 > 1%	67 > 1%
Faculty/Staff Travel (non-air)	44 > 1%	67 > 1%
Solid Waste	7 > 1%	5 > 1%
Study Abroad Air Travel	n/a	n/a
TOTAL FY GHG EMISSIONS	20,954	20,187

*Sources not included in this report are: study abroad travel, paper consumption, refrigerants, and wastewater & fertilizers from horticulture and landscaping.

The top three sources of GHG emissions in both FY 22 and FY 23 were student commuting, followed by purchased electricity and faculty/staff commuting. In earlier GHG inventories, the 3rd largest source of emissions was natural-gas consumption, which now is the 4th largest source.

Because Gateway has less control over commuting by students, staff and faculty, an examination of emissions from Scope 1 and Scope 2 – those emissions over which Gateway institution exerts the most control – is insightful. This subset of emissions more accurately reflects the institution-based efforts towards carbon neutrality than the measurement of all three scopes.

In FY 22, Gateway emitted a total of **7,290 MT CO_2e** in Scope 1 and Scope 2 combined (excluding Scope 3 emissions); in FY 23 the figure for the same subset of emissions was **6,504 MT CO_2e**.

Comparison with Previous GHG Reports

In this section, the GHG emissions from the initial inventory in FY 09 to FY 23 are compared. The table below

The following table is a comparison of emissions for all GHG reporting years performed to date, by scope (Scopes 1, 2 & 3 vs. Scopes 1 & 2), as well as by year-over-year change (in percent) and cumulative change in GHG emissions (in percent).

TOTAL GHG EMISSIONS PER YEAR Scopes 1, 2 & 3 vs. Scopes 1 & 2 only (MT CO_2e) FY 2009 - 2023 (with exceptions)				
FY	Emissions Scopes 1, 2 & 3 (MT CO_2e)	Cumulative Change in %	Emissions Scopes 1 & 2 (MT CO_2e)	Cumulative Change in %
2009	34,900	--	10,544	--
2010	32,000	- 8%	9,606	- 9%
2011	31,826	- 9%	9,634	- 9%
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2022	20,954	- 40%	7,290	- 31%
2023	20,187	- 42%	6,504	- 38%

During the period FY 09 to FY 23, Gateway achieved a gradual reduction totaling 42% of overall emissions (i.e. Scopes 1, 2 & 3) and 38% when limited to only Scope 1 & 2 emissions.

During the entire period FY 09 to FY 23 during which GHG inventories have been performed, the average annual reduction has been 3.0% for all scopes and 2.7% for Scopes 1 & 2.

To provide additional context to an institution's GHG emissions, normalizing them by FTE is a common practice. This enables comparisons between institutions. The following table summarizes emissions per FTE in each of Gateway's GHG inventory to date.

NORMALIZED EMISSIONS PER FTE 2009 - 2023 (with exceptions)			
FY	FTE	MT CO_2e per FTE (Scopes 1, 2 & 3)	MT CO_2e per FTE (Scopes 1 & 2)
2009	5,188	6.7	2.0
2010	5,985	5.3	1.6
2011	6,382	5.0	1.5
2014	5,419	5.5	1.7
2016	4,783	5.5	1.6
2017	4,537	5.5	1.5
2018	4,563	5.2	1.3
2022	3,764	5.6	1.9
2023	3,792	5.3	1.7

For FY 22 and FY 23, each FTE was responsible for 5.6 and 5.3 MT CO_2e of emissions in Scopes 1, 2 & 3 in the context of Gateway operations. This proportional decline over time has occurred primarily due to the 28% reduction in FTE since FY 09, which has resulted in a significant decline in the Scope 3 student commuting category.

Limiting the count to Scopes 1 & 2, each FTE was responsible for 1.9 and 1.7 MT CO_2e of emissions in FY 22 and FY 23, respectively.

It is a significant achievement for Gateway to maintain low levels of per-FTE emissions in the face of the significant decline in FTE levels in recent years while maintaining a similar, if not slightly larger, institutional infrastructure.

More impressive still is the steady decline in GHG emissions per unit of facilities space. Historical normalized GHG emissions in MT CO_2e per 1000 square feet of facilities space for Scope 1 and Scope 2 – since these are closely related to facilities operation – are outlined in the table below:

NORMALIZED EMISSIONS PER 1000 SQ. FEET OF SPACE FY 2009 - 2023 (with exceptions)		
FY	Physical Space (sq. ft.)	MT CO_2e per 1000 sq. ft. (Scopes 1 & 2)
2009	856,092	12.3
2010	783,356	12.2
2011	793,611	12.0
2014	836,260	10.8
2016	859,358	8.1
2017	858,794	7.9
2018	874,694	6.7
2022	906,711	8.0
2023	907,977	7.2

Gateway has achieved a reduction in MT CO_2e per 1000 square feet of facilities space for each GHG inventory report. Between FY 09 and FY 23, this value was reduced by 41% in the face of a 6% increase in physical space.

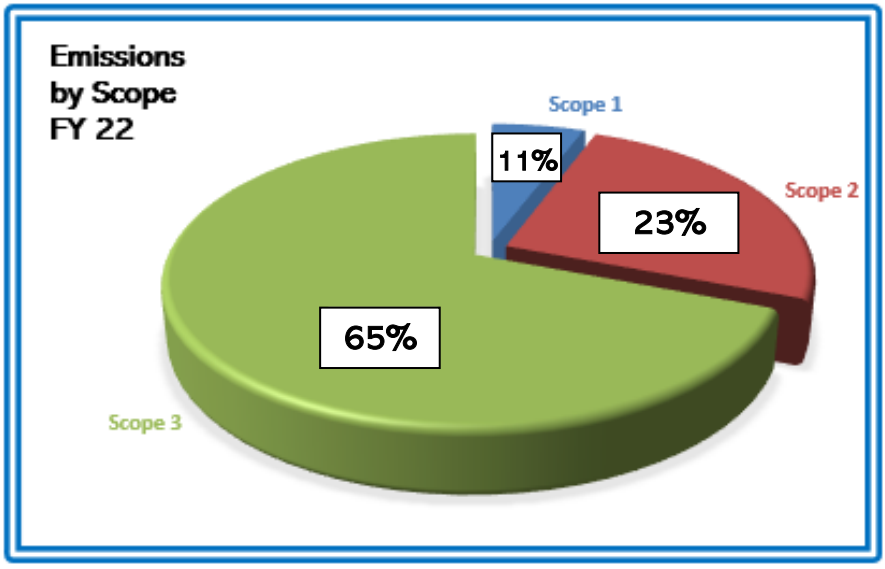
Emissions by Scope

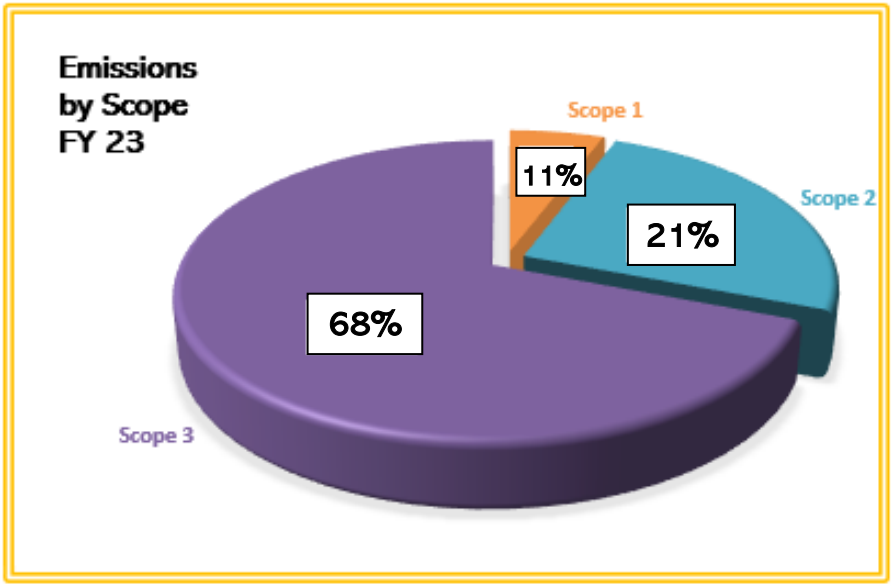
Recall that Scope 1 includes direct GHG emissions occurring from sources that are owned or controlled by the institution; Scope 2 includes indirect emissions generated in the production of electricity consumed by the institution, including losses from inefficiencies in the electricity grid and emissions from the natural-gas-related supply chain; and Scope 3 encompasses all other indirect emissions and are optional to include.

Continuing with past trends, the largest sources of emissions at Gateway were in the categories over which it has least control (Scope 3), while the smallest sources of emissions were in categories over which it has most control (Scope 1).

As depicted in the figure below, in FY 22, 65% of emissions were in Scope 3; 23% in Scope 2 and 11% in Scope 1.

FY 23 emissions figures were 68%, 21% and 11% for Scopes 1, 2 & 3, respectively.





These figures are trending towards:

- Increases in Scope 1 (natural gas combustion) and Scope 2 (purchased electricity) emissions level as institutional footprint expands over time
- A smaller share of emissions in Scope 3 as emissions from student commuting decline with the downwardly trending enrollment

Gateway vs. Wisconsin Technical College System Peers

As a system, the Wisconsin Technical College System (WTCS) has conceded some of its original climate leadership role. Now only three WTCS campuses – Gateway Technical College, Milwaukee Area Technical College and Western Technical College – from a total of sixteen participate in the Second Nature Climate Leadership commitment. Earlier WTCS participants – Madison Area Technical College and Lakeshore Technical College – are no longer reporting regularly, an unfortunate development given the WTCS's original and prominent climate leadership role. Swimming against this trend is Gateway, which has clearly strengthened its climate leadership role where others have fallen behind.

In FY 23, Gateway – with its 1.7 MT CO2e for Scopes 1 & 2 per FTE and 7.2 per 1000 square feet of physical space - found itself competitive though somewhat energy intensive compared with its peers: MATC came it at 1.8 (FTE) and 5.5 (per 1000 ft.^{2}) and Western at 1.0 (FTE) and 2.9 (per 1000 ft.^{2})

Institution	Emissions Scopes 1 & 2 (MT CO_2e)	FTE	MT CO_2e per FTE (Scopes 1 & 2)	Physical Space (sq. ft.)	MT CO_2e per 1000 sq. ft. (Scopes 1 & 2)
Gateway Technical College	6,504	3,792	1.7	907,977	7.2
Milwaukee Area Technical College	14,849	8,169	1.8	2,700,000	5.5
Western Technical College	3,229	3,125	1.0	1,126,610	2.9

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 carbon 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 60% in FY 22 and 63% in FY 23 of Gateway's total greenhouse gas emissions, the greatest source. Furthermore, this sector created the greatest quantity of emissions in not just carbon dioxide but also the greenhouse gases methane and nitrous oxides, as well. The breakdown in the transportation sector is outlined in the table below.

TRANSPORTATION GHG EMISSIONS BY SECTOR - FY 22 & FY 23		
Source	Emissions (MT CO_2e) FY 22 with Percent of total	Emissions (MT CO_2e) FY 23 with Percent of total
Student commuting (Scope 3)	11,254 54%	11,381 56%
Faculty/staff commuting (Scope 3)	1,048 5%	1,048 5%
Vehicle fleet (cars, trucks, aircraft, etc.) (Scope 1)	128 1%	125 1%
Directly financed air travel (Scope 3)	69 > 1%	111 > 1%
Other (non-air) college-financed travel (Scope 3)	44 > 1%	67 > 1%
Study abroad air travel (Scope 3)	DATA UNAVAILABLE	DATA UNAVAILABLE
TOTAL SECTOR EMISSIONS	**12,543 66%**	**12,732 63%**

As in the previous three GHG inventories, student commuting remains the predominant source of transportation-related emissions, followed distantly by faculty/staff commuting.

Commuting habits of students and employees were estimated from data collected in previous online survey. It was determined that 97% of faculty and staff utilized personal vehicles alone, while 1% each walked, utilized a carpool or commuted via bicycle. Of students meanwhile, 95% utilized personal vehicles alone, while 2% either walked or used public bus and 1% commuted via carpool.

The average student using a private vehicle commuted an estimated 38 miles to and from campus and made the trip 4.0 times per week. Employees made trips of a similar length an average of 4.7 times per week, with faculty commuting to campus 40 weeks and staff commuting 45 weeks per year.

Although a typical program of study abroad occurred and included international travel by students and staff members, those emissions were not counted due to uncertainties in the provided data.

Data Collection for Transportation

Gateway Fleet

Gateway maintains a dispersed, decentralized fleet of vehicles, including maintenance vans, vehicles in the public safety programs (police, fire, EMT) and airplanes in the aeronautics program, among others. Estimates of quantities of aviation and automotive fuels were derived by from purchase data provided by the accounting staff and online historical fuel price tools (AFS, 2024).

Because the aviation fuel utilized by Gateway, i.e. Avgas LL100, is not present in the SIMAP platform, a custom emissions factor from the U.S. EPA was entered into the tool (2018).

Here it should be noted that the fuel utilized by service providers or contractors to Gateway was not included in this inventory.

Commuting Estimate

In previous GHG inventory reports, surveys were completed by both staff and students to estimate commuting habits, which were then used to estimate GHG emissions from commuting-related travel.

Because this current report was developed well after the fiscal years in question, it was impossible to implement a similar survey with current staff and students. Therefore, the commuting habits established for both groups in the FY 18 survey was applied to the current staff and student populations in FY 22 and FY 23 respectively.

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

College-funded air and ground travel were calculated from accounts receivable and PCard records. Air miles were calculated from flight segments utilizing an online air mileage calculator (Frequent Flyer Services, 2024).

Flight, mileage and both automotive and aviation fuel information were obtained from the Purchasing Agents.

As noted above, data regarding international study abroad flights provided by the International Education Office contained significant unresolved uncertainties and were therefore excluded from this report.

Non-Vehicular Energy Emissions Inventory

Introduction

Non-vehicular energy is the second-largest category 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:

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

In addition, SIMAP allows the option to consider the mix of fuels that the local utility WE Energies purchases from other electricity providers. This more accurate "market-based" method of counting Scope 2 emissions from electricity generation – as opposed to the "location-based method", which only considers the electricity generation mix found within the boundaries of the eGRID. Reporting to Second Nature requires the market-based method.

Gateway also generates electricity from renewable sources that do not generate GHGs, including photovoltaic (PV) solar and small wind turbines located on the campuses. Of these, only PV solar is tracked.

Key Findings

In FY 22 and FY 23, Gateway was responsible for 8,404 and 7,450 MT CO_2e respectively of emissions related to non-vehicular energy. The spike seen in FY 22 bucked the trend towards reduced combustion of natural gas and the purchase of electricity, resulting in emissions surging back to levels not seen since earlier GHG inventories. The spike in FY 22 was followed up by new reductions in both consumption and emissions in FY 23.

The historical trends are illustrated in the table below.

NON-VEHICULAR ENERGY EMISSIONS 2009 - 2023 (some years excluded)						
Year	MMBtu of natural gas (MT CO_2e)	kWh of electricity (MT CO_2e)	Total MT CO_2e	Cumulative emissions reduction (%)	Heating Degree Days	Cooling Degree Days
2009	n/a (2,185)	n/a (8,359)	**10,544**	n/a	6,962	n/a
2010	42,141 (2,229)	10,526,288 (7,299)	**9,527**	- 9.6%	6,236	n/a
2011	42,935 (2,271)	10,494,754 (7,277)	**9,547**	- 9.6%	6,849	n/a
2014	44,728 (2,378)	9,546,266 (6,557)	**8,935**	- 15.2%	7,926	711
2016	38,267 (2,031)	8,549,804 (5,392)	**7,432**	- 29.5%	5,909	719
2017	36,728 (1,953)	8,274,098 (4,740)	**6,693**	- 36.5%	5,810	1,132
2018	39,763 (2,149)	7,093,452 (3,638)	**5,787**	- 45.1%	6,586	791
2022	45,586 (2,420)	10,531,330 (4,741)	**7,161**	-32.1%	n/a	n/a
2023	38,669 (2,053)	9,608,042 (4,326)	**6,379**	-39.5%	6,008	1,003

For FY 22, the combined GHG emissions of 7,161 MT CO_2e originated from the combustion of 45,586 MMBtu of natural gas and the purchase of 10.5 million kilowatt-hours of electricity.

Meanwhile, the lower emissions for FY 23, at 6,379 MT CO_2e, down 11% year-over-year, occurred due to lower consumption of both natural gas and electricity: 38,669 MMBtu and 9.61 kilowatt-hours, respectively.

This 11% reduction in electricity consumption, i.e. 0.92 million kilowatt-hours, is highly significant and illustrates the environmental impact that a large institution like Gateway can exert. This one-year reduction is the equivalent to taking 85 average homes[2] off the electrical grid (US-EIA, 2022).

[2] The U.S. Energy Information Administration (US-EIA) estimates that the average American home consumes 10,791 kilowatt hours of electricity and 103 MMBtu of natural gas annually.

The 15% reduction in natural gas consumption is likewise significant. The fewer 6,917 MMBtu of natural gas *not* combusted is equivalent to taking 67 homes off of the natural-gas supply system (US-EIA, 2009).

Long-term Trends

Taking a historical view, over the period FY 09 – FY 23, a voluminous 39% reduction in non-vehicular GHG emissions has occurred.

At the same time, the spikes in consumption of both natural gas and electricity that occurred between FY 18 and FY 22 are very worrisome, essentially negating a decade's worth of progress.

On one hand, it is possible that this spike is simply an error in the provided data. Gateway is strongly recommended to improve the collection, monitoring and reduction in its utility data so that it improves its progress towards its sustainability related objectives.

In addition, Gateway was aided significantly in its net GHG emissions due to the ever increasing efficiencies in the electrical grid. Note how consumption of electricity in FY 10 and FY 23 were nearly identical yet the GHG emissions were 35% lower.

Renewable Energy

Renewable energy continues to play a minor but important role by reducing the amount of electricity purchased from the utility provider. This table summarizes Gateway's production during FY 22 and FY 23:

RENEWABLE ENERGY GENERATION FY 22 & FY 23 (kWh)				
FY	HORIZON	IMET	CENTER FOR SUST LIVING	TOTAL
22	4,487	3,864	4,154	**12,505**
23	4,425	3,942	3,240	**11,607**

The 12,505 kWh generated in FY 22 and 11,607 kWh in FY 23 represented around 0.1% of Gateway's annual electricity consumption in each FY. Contributing to this declining share of renewable energy is a reduction in performance from the existing solar arrays: FY 23's 11,607 kWh was a 22% reduction vis-à-vis the figure 14,948 kWh in FY 18.

Electrical Grid Losses (T&D Losses)

Recall that the consumption of electricity creates 'invisible' GHG emissions - a.k.a. "T&D losses" - that arise from the losses affiliated with the transmission and distribution of electricity. These are quantified on the SIMAP platform.

In FY 22, T&D losses added 265 MT CO_2e to Scope 3; the FY 23 figure was 242 MT CO_2e

In each year, T&D Losses then stacked an additional 6% of GHG emissions to the 'official' Scope 2 GHG emissions related to the production of electricity supplied to Gateway.

FERA: Natural Gas Losses

Recall, too, natural gas' 'invisible' Scope 3 emissions counterpart, fuel- and energy-related activities category, or FERA. These are the – even greater - emissions generated during the entire natural-gas supply chain.

FERA figures for FY 22 were an additional 978 MT CO_2e and for FY 23 an additional 829 MT CO_2e.

Data Collection

The Second Nature inventory model offers the ability to input 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 entered per annual kilowatt-hour consumed. On-campus stationary sources include fuels purchased by the college other than gasoline or diesel fuel used in vehicles. Natural gas totals were input into this category per annual MMBtu (million BTUs) consumed.

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

Data for electricity and natural gas consumption were received in the form of an annual Energy Utilization Report from the directors of building services, which in turn are compiled from We Energies billing statements.

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 pre-2017 GHG inventories, landscaping activities were the source of 0.02% of Gateway's total emissions. This amount has been virtually eliminated due to the elimination of turf-related fertilizers on Gateway's campuses.

Data Collection

Confirmation of the elimination of turf-related fertilizers was confirmed by the director of building services for the Kenosha campus.

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

Solid Waste Emissions Inventory

Introduction

Greenhouse gas emissions will arise from the disposal of solid waste mainly from the methane produced from the decomposition process in landfills. The quantity of landfill methane, a more potent GHG than carbon dioxide, can be reduced through capture and either flaring or combusting to generate electricity, both of which result in carbon dioxide rather than methane emissions.

Gateway utilizes Green for Life as its waste disposal provider. The company's landfill captures methane and generates electricity.

Key Findings

The GHG emissions produced by the removal and disposal of solid wastes generated from operations amounted to 5 MT CO_2e in Scope 3 during FY 22; the FY 23 figure was 7 MT CO_2e

Data Collection

Gateway's contacts at Green for Life provided a comprehensive unified report on the volume of solid waste and recycling collected for Gateway for FY 22 and FY 23. These data were entered into SIMAP, which estimates GHG emissions based on these amounts.

Looking Back, Moving Forward

The act of collecting, analyzing and synthesizing data for this GHG inventory helped to reveal the extent to which the COVID-19 pandemic affected our society in ways both large and small. If the utility data are reliable, it is accurate to state that the pandemic set Gateway back several years on its trajectory towards its ambitious goal of reaching net zero GHG emissions by 2030. Only 5 years remain to attain this important goal.

While Gateway has achieved a 38% reduction in its combined Scope 1 and Scope 2 GHG emissions, the combustion of natural gas and consumption of electricity remain approximately the same as a decade ago. The heavy lifting needed to reduce these emissions is primarily due to increased efficiencies in electricity production among WE Energies and the other utilities that supply the electrical grid.

In previous versions of this report, GHG emissions reductions were occurring on an annual basis, which the Gateway directors of building services had attributed to increased use of building automation, among other efficiency improvements. So what then has caused the spike in utility consumption post-pandemic? Are these technologies still being fully leveraged? Or are new facilities significantly less efficient than existing ones? Or are there simply errors in the utility-related data?

Regardless of the cause, Gateway stakeholders are strongly encouraged to commit to a post-pandemic regrouping and recommitting the complete institution – both top-down and bottom-up - to achieving its net zero goal that is coming up in 5 short years.

Scientists are telling us that the climate crisis is only worsening and sounding the alarm for “all hands on deck – yesterday!” And Higher Education has committed itself to being a leader in solving this crisis.

Gateway can begin this process by improving the collection, monitoring and reduction in its utility data. Furthermore, if Gateway is to achieve this goal must find a way to obtain most, if not all, of its energy in an emissions-free manner. The hard truth is that there is simply no other path to net zero.

Natural Capital Solutions looks forward to continuing to support Gateway in its journey toward net zero in 2030.

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