UNIVERSITY OF PITTSBURGH GREENHOUSE GAS INVENTORY

PITTSBURGH CAMPUS
FISCAL YEAR 2022

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Acknowledgements

This report presents the greenhouse gas inventory results for the University of Pittsburgh's Pittsburgh campus for Fiscal Year 2022. The authors sincerely thank all Pitt employees who provided data and shared important information regarding their sustainable and carbon mitigating practices; these individuals are fully acknowledged in Appendix A.

Acronyms

AASHE – Association for the Advancement of Sustainability in Higher Education
ACUPCC – American College and University Presidents Climate Commitment
BBP – Bellefield Boiler Plant
CA-CP Calculator – Clean Air-Cool Planet Campus Carbon Calculator
CH_4 – Methane
CO_2 – Carbon dioxide
CO_2e – Carbon dioxide equivalents
COVID-19 – Coronavirus disease 2019
CSSP – Carrillo Street Steam Plant
FTE – Full Time Equivalent
GHG – Greenhouse Gas
GWP – Global Warming Potential
IPCC – Intergovernmental Panel on Climate Change
LEED – Leadership in Energy and Environmental Design
MMBtu – Million British thermal unit
MT CO_2e – Metric tons of carbon dioxide equivalents
N_2O – Nitrous oxide
Pitt – University of Pittsburgh
PPA – Power Purchase Agreement
REC – Renewable Energy Certificate
SIMAP – Sustainability Indicator Management & Analysis Platform
WRI – World Resources Institute

Executive Summary

This report presents and assesses the Greenhouse Gas (GHG) Inventory for the Pittsburgh Campus of the University of Pittsburgh (Pitt) for Fiscal Year (FY) 2022, including direct and indirect activities of the University. Since the initiation of Pitt's GHG inventory process in 2008, this is the University's eighth GHG inventory report for its Pittsburgh campus, building on and comparing to the previous six inventories from fiscal years (FY) 2008, 2011, 2014, 2017, 2019, 2020, and 2021 (Bilec et al., 2020a, 2020b; Bilec & C.B.A., 2010; Bilec & H. G., 2018; Bilec & K. J. K., 2013; Bilec & V. H., 2015).

This report and its precursors serve as evaluation guidelines for the Chancellor's Advisory Council on Sustainability; its Carbon Commitment Committee; and any future committees, groups, or individuals working to reduce the Pitt's GHG emissions, including pursuing carbon neutrality for the Pittsburgh campus by 2037, as elucidated in the 2022 *Pitt Climate Action Plan* (PittCAP) (Pitt Sustainability, 2022b). Understanding the University's GHG emissions progress and trends is a necessary step to inform and further develop the University's strategies to lower future GHG emissions. Though a lagging indicator, the annual GHG inventory process is a part of Pitt's Carbon Commitment, as is a climate action plan every five years (Second Nature, 2022c).

Beyond carbon, Pitt has many other sustainability goals delineated in the 2018 *Pitt Sustainability Plan* in three overarching themes: Exploration, Community & Culture, and Stewardship (Pitt Sustainability, 2022c). Some of these goals align with the Pittsburgh 2030 District (of which Pitt was a Founding Property Partner of the Oakland boundary in 2014) including to reduce water consumption, energy consumption, and commuting-related GHG emissions 50% by 2030 (below baselines) (2030 Districts, 2022; Architecture 2030, 2022). Pitt's incremental GHG emissions reduction goal reflects these 2030 targets, aiming to reduce GHG emissions 50% by 2030 (below 2008 levels); the University's 2020 commitment to carbon neutrality for the Pittsburgh campus by 2037 expands and extends that goal.

For this annual GHG analysis, Pitt's Fiscal Year 2022 is the temporal boundary (July 1, 2020, through June 30, 2021); fiscal years have been used for all Pitt GHG inventories, allowing for result comparisons across all GHG Inventory years.

Overall, the **University of Pittsburgh's FY2 GHG emissions were 173,006 metric tons CO_2e (MT CO_2e), a 20% decrease in GHG emissions from FY19** (the last pre-pandemic-influenced GHG inventory year)**, when they were 215,522 MT CO_2e**.[1] Double digit percentage decreases occurred in several categories, including commuting, vehicle fleet, directly financed travel, paper, purchased electricity, refrigerants, and study abroad**.**

By category and overall, many of the GHG emissions decreases between FY19 and FY22 are influenced by the global COVID-19 pandemic. As both FY20 and FY21 were influenced in part and full by the COVID-19 pandemic, respectively, the increases shown in this FY22 GHG inventory to FY20 and FY21 were an expected post-pandemic rebound.

Since the FY08 baseline, there have been numerous changes in campus operations and infrastructure, resulting in both GHG emissions reductions and opportunities. For FY22, the overall distribution of Pitt's GHG emissions by source activity is shown and detailed in Table 1.

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[1] In line with higher education GHG inventorying best practices, Pitt synthesizes its GHG Inventory data using the SIMAP (Sustainability Indicator Management and Analysis Platform) web software created by the University of New Hampshire's Sustainability Institute (unhsimap, 2022d).

Table 1 - Pitt's GHG Inventory FY08 to FY22 Overview

Category		Previous Fiscal Years							Current FY
		FY08	FY11	FY14	FY17	FY19	FY20	FY21	FY22
SCOPE	SOURCE CATEGORY								
SCOPE 1	On-Campus Steam	-	22,200	32,981	25,623	24,978	29,627	29,644	**27,532**
	Other On-Campus Stationary	9,200	5,700	6,386	5,245	7,470	7,102	8,167	**7,348**
	Direct Transportation	500	700	1,273	1,388	1,992	1,629	1,506	**1,364**
	Refrigerants & Chemicals	800	2,300	2,192	1,266	2,240	789	644	**1,450**
	Fertilizers & Animals	-	1	2	1	1	2	1	**7**
TOTAL SCOPE 1 (MT CO2 eq) *(Direct Emissions)*		**10,500**	**30,901**	**42,834**	**33,523**	**36,681**	**39,148**	**39,962**	**37,700**
SCOPE 2	Purchased Electricity	138,700	135,500	115,341	105,607	73,802	84,753	85,544	**64,777**
	Purchased Steam	55,100	29,400	23,404	17,238	16,892	13,247	15,954	**20,310**
TOTAL SCOPE 2 (MT CO2 eq) *(Indirect Emissions)*		**193,800**	**164,900**	**138,745**	**122,845**	**90,694**	**98,000**	**101,498**	**85,087**
SCOPE 3	Faculty & Staff Commuting	13,600	14,700	9,845	12,433	23,293	15,330	5,672	**9,961**
	Student Commuting	5,200	5,500	6,064	5,962	12,036	10,318	2,927	**2,264**
	Directly Financed Air Travel	24,800	33,600	23,921	24,706	36,560	10,273	4,018	**10,400**
	Other Directly Financed Travel	100	50	211	548	582	1,593	683	**1,140**
	Study Abroad Air Travel	-	1,100	775	4,578	8,816	3,489	153	**626**
	Solid Waste	5,700	1,400	1,437	1,522	1,454	1,793	1,413	**1,445**
	Wastewater	1,500	1,400	136	104	102	107	353	**510**
	Paper	1,600	1,500	1,949	2,441	729	509	167	**214**
	Food	-	-	-	-	-	-	2,861	**5,141**
	Transmission & Distribution Losses	16,600	13,400	7,596	5,523	4,575	5,509	5,395	**4,417**
	Fuel & Energy Related Activities								**14,122**
TOTAL SCOPE 3 (MT CO2 eq) *(All Other Emissions)*		**69,100**	**72,650**	**51,934**	**57,817**	**88,147**	**48,919**	**23,642**	**50,238**
SINKS	Compost	0	0	0	0	0	0	0	19.4
ALL ACCOUNTABLE EMISSIONS (MT CO2 eq)		**273,400**	**268,451**	**233,513**	**214,185**	**215,522**	**186,068**	**165,101**	**173,006**

For FY22, purchased electricity was again the largest GHG emitting source for the University, accounting for 37.4% of all GHG emissions. Total campus-wide electricity usage was 19% lower than FY19 and 10% lower than FY21 (a decrease of 19,433 MWh), in part attributable to a decrease in cooling degree days which dropped from 1,056 in FY21 to 944 in FY22.

Overall, emissions from purchased electricity are down 53% between FY08 and FY22 (20,767 MT CO_2e). Associated Scope 2 transmission and distribution losses from electricity continued their downward trend, reflecting a shift in the regional electricity generation mix to lower carbon sources (i.e., reductions in the percentage of electricity produced by coal, with coinciding increases in the share of electricity generated from nuclear, natural gas, and renewable sources).

The second largest contribution to FY22 GHG emissions was from steam (combined on-campus and purchased), which went up 14.3% (5,971 MT CO_2e) between FY19 and FY22. The University needs to focus on reducing steam consumption, shift to more efficient generation of purchased steam, and explore lower carbon generation sources for thermal energy along with building electrification.

In 2023, SIMAP updated its calculation methodology for Scope 2 steam and chilled water, ensuring that Scope 2 custom fuel mixes are applied when using the market- or location-based methods. Previously, SIMAP was defaulting to the average U.S. emissions factors for steam and chilled water when using the market-based method to calculate GHG emissions. This software improvement resulted in adjusted net GHG emissions for steam in every fiscal year FY14 through

FY22 (generally between 1% and 6% for each year) due to the University's steam being produced entirely by natural gas. This topic is more fully discussed in "Section 6.3 – Purchased Steam;" past GHG Inventory results will not be adjusted.

Behind purchased electricity and steam, the third largest contributor to Pitt's GHG emissions was due to Fuel and Energy Related Activities (FERA), which contributed 14,122 MT CO_2e in FY22. The FERA category is new to SIMAP this year, and provides a mechanism to account for the upstream GHG emissions of purchased fuels and electricity; purchased electricity's transmission and distribution losses are separately accounted for in Scope 2, but in the future the FERA category will include GHG emissions related to the generation of purchased electricity that is sold to end users. This new category is fully addressed in Section 7.9 – Fuel & Energy Related Emissions of this report.

Reflecting a post-pandemic rebound, commuting was Pitt's fourth largest GHG emissions contributor **in FY22,** with **GHG emissions from commuting increasing 42% compared to FY21** (3,625 MT CO_2e more), but still 57% lower than FY19. This sustained reduction in commuting emissions post-pandemic reflects community mode shift changes including avoided commutes from flex work from home and an increase in active commuting.

Overall, Scope 3 emissions were tremendously impacted by the COVID-19 pandemic (FY20 and FY21); however, **for FY22, total Scope 3 GHG emissions were 1.13 times those in FY21, but still 53% below GHG emissions in FY19**, primarily due to sustained reductions in commuting and air travel (Both University-sponsored and study abroad)**.** Notably, GHG emissions from the Scope 3 Paper category maintained their overall downward trend, reflecting a 31% decrease since FY17.

Reflecting the University's commitment to the Coolfood Pledge (Cool Food, 2022), food-related GHG emissions were added to the Pitt GHG inventory process in FY21; this category was up 80% in FY22, likely reflecting more on-campus catering as more events returned to campus post-pandemic.

To help ensure ongoing emissions accounting that helps inform the University of further emissions reductions opportunities, future inventories should pay significant attention to all University-related transportation (i.e., commuting, fleet vehicles, and travel via ground and air) in both analysis and emissions reduction strategies. Additionally, the University should account for carbon offsets via both downstream and upstream purchases, especially relating to directly financed car and air travel.

Future Pitt GHG Inventories should also start to benchmark the University's full physical footprint by including spaces leased by the University (versus owned spaces already included). Pitt's four regional campuses in Bradford, Greensburg, Johnstown, and Titusville, should also be formally added to the GHG accounting process so GHG emissions are trackable for the entire University of Pittsburgh system.

1 - Introduction

For more than 20 years, Greenhouse Gas (GHG) Inventories have been completed by companies and organizations. The *GHG Protocol* (W.R.I., 2022) internationally standardizes accounting and reporting based on the type of organization or region being analyzed. The *GHG Protocol* divides GHG emissions into three scopes (Figure 1):

- Scope 1: Direct emissions from sources owned or controlled by an organization.
- Scope 2: Indirect emissions from purchased electricity, steam, heat, and cooling.
- Scope 3: All other emissions associated with an organization's activities.

The three scopes will each be described at the beginning of their respective chapters.

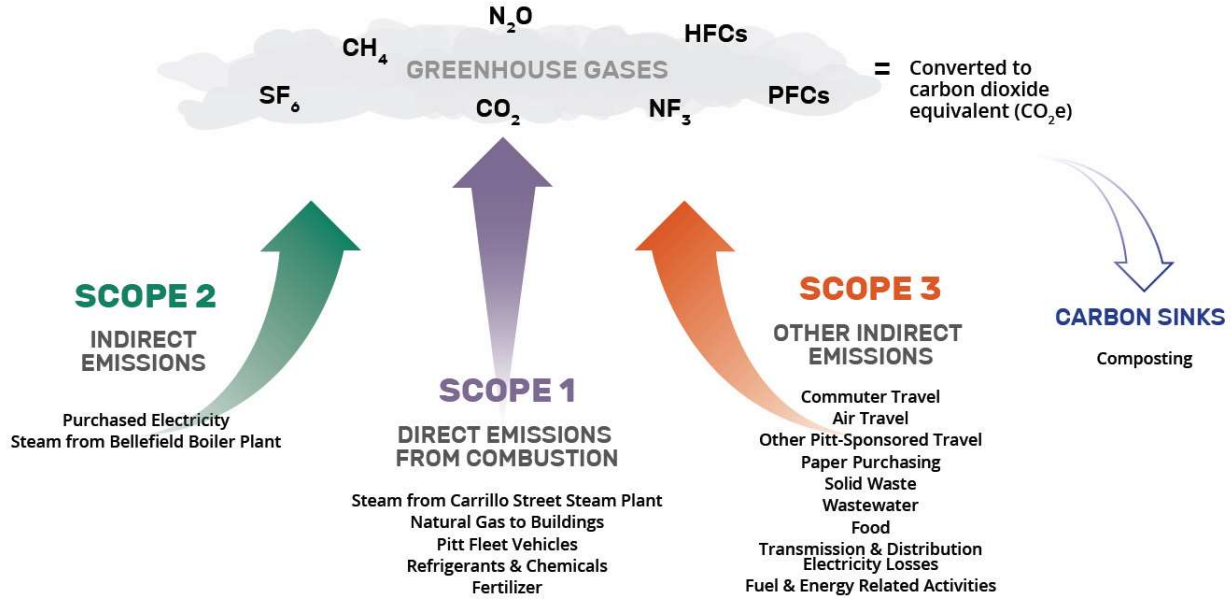


Figure 1 - GHG Inventory Scopes 1, 2, 3 & Sinks

With respect to higher education institutions, Second Nature facilitates university engagement to make and act on climate commitments, while collaboratively identifying innovative climate solutions (Second Nature, 2022b). Pitt signed Second Nature's Carbon Commitment in 2020, when it committed to carbon neutrality for the Pittsburgh campus by 2037, a commitment made possible by the University's GHG emission inventories for the Pittsburgh campus dating back to 2008.

The primary GHG emissions tracking platform used by higher education institutions is SIMAP (Sustainability Indicator Management and Analysis Platform),[2] a comprehensive recollection of recurrent sources, activities, and emissions factors accounting for all three GHG Inventory scopes.

[2] SIMAP was developed by the University of New Hampshire (UNH) and nonprofit Clean Air-Cool Planet (CA-CP, now defunct). Higher Education institutions committed to carbon neutrality though Second Nature report through SIMAP.

To track GHG emissions trends and establish practices to reduce and/or eliminate GHG emissions related to campus activities, the University of Pittsburgh's first GHG Inventory was for Fiscal Year (FY) 2008. This effort helped inform Pitt's *2013 Report on Sustainability* and 2018 *Pitt Sustainability Plan*; starting in FY19, the University made GHG inventorying an annual practice in support of the first University of Pittsburgh Climate Action Plan (PittCAP). Published in March 2022, **the PittCAP presents Pitt's strategy, approach, and details to achieve carbon neutrality by 2037, with the intermediate goal of reducing the GHG emissions 50% below 2008 levels by 2030** (Pitt Sustainability, 2022b); regular GHG inventories are instrumental to benchmarking the University's practices and progress. The three stages of a GHG Inventory are as follows (unhsimap, 2022a):

- **Step 1: Data Collection** – Raw data collected at this stage is used for the GHG Inventory. This data is from all scopes and includes purchased electricity, transportation modes and distances, solid waste quantities, refrigerants utilized, carbon offsets purchased, etc.
- **Step 2: Emissions Calculations** – Collected data becomes SIMAP inputs for SIMAP (Sustainability Indicator Management & Analysis Platform), the tool Pitt uses to estimate its GHG emissions in line with international protocols.
- **Step 3: Data Analysis** – SIMAP converts all inputs into CO_2 equivalents; outputs are collected and interpreted to identify emissions reduction trends and opportunities.

This GHG Inventory identifies applicable system boundaries and analysis. Results are presented under each GHG emissions category, alongside assumptions made in the data collection & calculation phases. Results discussion and comparison to previous GHG Inventories are provided, followed by recommendations for future Pitt GHG Inventories.

1.1 – SIMAP: Sustainability Indicator Management and Analysis Platform

Pitt began using SIMAP for its FY14 GHG Inventory and has used it for all successive inventories (including this FY22 GHG Inventory).

. All data from previous Pitt GHG inventories were uploaded to SIMAP -- and all tables, analyses, and explanations reflect results from the updated SIMAP calculations.[3] SIMAP can also be used to predict total nitrogen emissions, which Pitt completed for the first time in FY19 and now releases annually alongside the GHG Inventory.

SIMAP's capabilities and foundational information are consistently enhanced to gain greater precision of GHG emissions (Appendix D). In 2023, SIMAP upgrades included 10 new specialized Scope 3 segments, including more intricate data entry. The Scope 3 additions include a number of *GHG Protocol* categories such as upstream leased assets, franchises, investments, etc. The University of Pittsburgh GHG Inventory team is evaluating and including new Scope 3 segments of relevance and interest for application in the FY23 GHG Inventory year.

[3] For past inventories, the shift from the CA-CP calculator to SIMAP caused slight changes to official past-reported data (primarily attributed to emissions factor differences between the two tools); specific instances are highlighted in past Pitt GHG Inventory reports as they were identified.

2 - Inventory Boundaries

In calculating Pittsburgh campus GHG emissions, three types of boundaries were considered: Organizational, Operational, and Temporal.

2.1 – Organizational Boundaries

The setting of organizational boundaries is done to determine the portion of the University that will be considered in the GHG analysis. **For this study, the University of Pittsburgh's *Pittsburgh Campus* was selected as the organizational boundary**. The Pittsburgh campus is primarily located in the Oakland neighborhood of Pittsburgh. It includes academic, housing, and other facilities owned and operated by Pitt (both on- and off-campus). Buildings owned and managed by separate nonprofit organization UPMC were excluded, as were the facilities and operations of Pitt's four regional campuses in Bradford, Greensburg, Johnstown, and Titusville. A full list of buildings included in the FY22 inventory is provided in Appendix C.

For FY22, the buildings owned and managed by Pitt at the Pittsburgh Campus totaled 148 facilities for a gross building area of 11.03 million ft^2 (Appendix B) -- a decrease of 935,147 ft^2 from FY21 due in part to the demolition oof the O'Hara Parking Garage (140,000 ft^2), which will eventually be replaced by a new Recreational & Wellness Center. While Pitt has a multitude of older, existing buildings, all large Pitt major renovation and new construction projects pursue Leadership in Energy & Environmental Design (LEED) certification, which includes consideration of energy and water use, indoor air quality, daylight, and views, regional materials, stormwater management, and more. Pitt has LEED certified buildings dating back to 2005, with the most recent certification bestowed upon Salk Hall (LEED Platinum, 2023).

Starting in FY21, University occupied space in buildings owned by third-parties was included in the GHG Inventory data collection process. In FY22, the University leased 1,394,771 ft^2 of space in non-Pitt owned buildings across 134 leases, 39 of which were in UPMC-owned buildings accounting for 466,025 ft^2 (Figure 2). Scope 3 emissions from leased spaces will be included in future inventories.

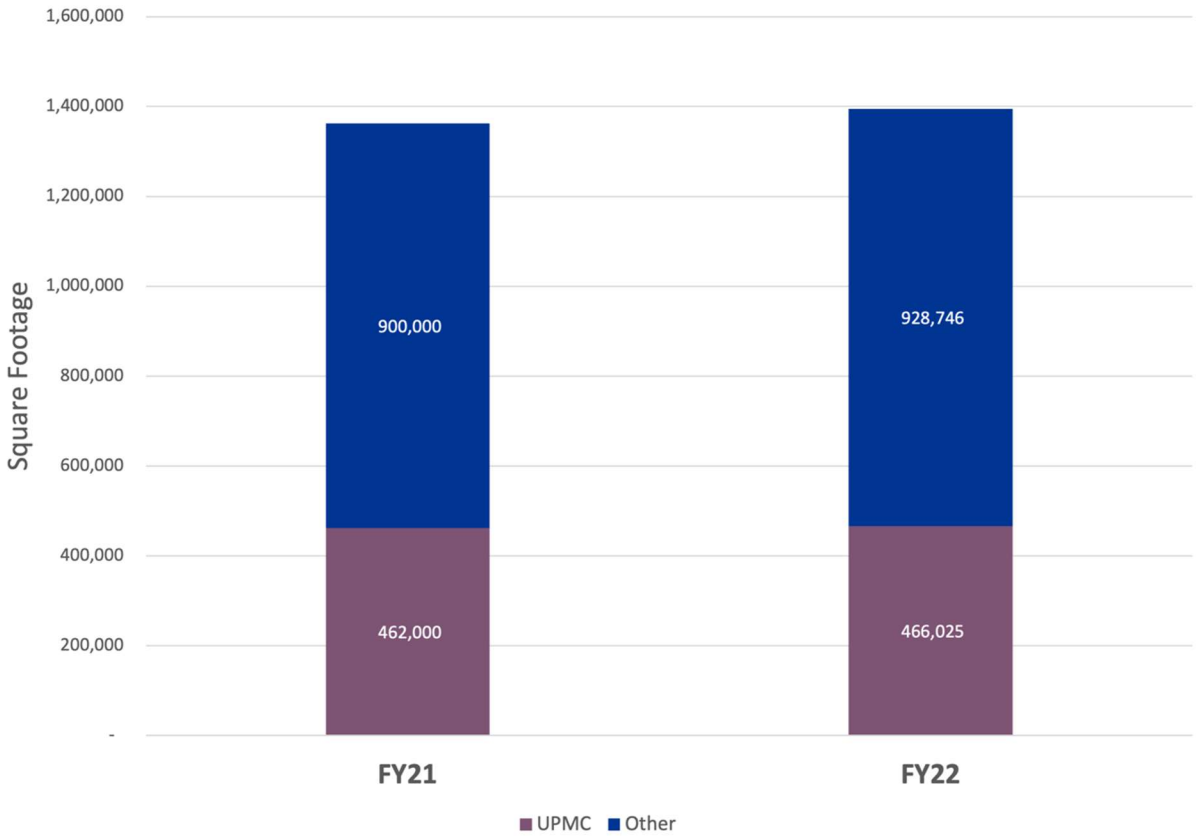


Figure 2 – University of Pittsburgh Leases in Buildings Owned by Third-Parties

2.3 – Operational Boundaries

Operational boundaries identify GHG emitting sources to be included in the inventory. The *GHG Protocol* categorizes emissions into three scopes (W.R.I., 2022). As illustrated in Figure 1, Scope 1 includes "Direct Emissions" from sources owned and controlled by the University, including on-campus electricity and steam generation, on-campus natural gas usage, transportation for campus operations, refrigerant and chemical use, agricultural activities, and generators. Scope 2 emissions include "Indirect Emissions" from sources that are neither owned nor operated by the University, but whose products are linked to campus energy consumption; these include the purchased utilities of electricity and steam. Scope 3 emissions are "Other Sources" neither owned nor operated by the University, but that are either "directly financed" by Pitt (i.e., waste removal and commercial air travel paid for by Pitt) and/or are otherwise linked to the campus via influence and/or encouragement (i.e., air travel for study abroad programs and commuting by both employees and students). Scope 3 also includes food, paper consumption, solid waste disposal, wastewater, electricity transmission and distribution losses; the new "Fuel and Energy Related Activities" category was added to SIMAP in 2023 – and are applicable to the results of this FY22 GHG Inventory.

Under the *GHG Protocol*, tracking Scope 1 and 2 emissions is mandatory and Scope 3 emissions are deemed optional; however, all three scopes combined are the University's cumulative carbon footprint.

2.3 – Temporal Boundaries

Like most universities, the University of Pittsburgh functions on a fiscal year (FY) instead of a calendar year; as a result, FY is the temporal boundary used for Pitt's GHG Inventories. Fiscal years start on July 1 and end on June 30 of the following calendar year. The FY of interest for this Inventory is FY22, which began July 1, 2021, and ended on June 30, 2022.

2.4 - Scope Boundaries

As defined previously, the scope categories GHG emission sources are based on level of organizational responsibility and control, but do not dictate the boundaries that must be used for emissions reporting. Final reporting is left to the reporting organization's discretion; however, guidelines from the *GHG Protocol*, *SIMAP*, and *Second Nature* exist to ensure that reported results are compatible with each other across the higher education sector. GHG tracking and reporting boundaries to consider are as follows:

A) **All Scope 1 & Scope 2 Emission Sources:** Scope 1 and 2 are minimum levels for reporting emissions. The *Greenhouse Gas Protocol* requires reporting of all Scope 1 and 2 emissions, but considers Scope 3 emissions optional (Bhatia & Ranganathan, 2004).

B) **All Directly Financed Emissions:** Includes Scope 1 and 2 emissions, plus directly financed Scope 3 emissions (e.g., air travel and solid waste management).

C) **All Directly Financed Emissions and Select Directly Encouraged Emissions**: In addition to categories in the previous boundary, this boundary includes Scope 3 emissions categories not necessarily financed by the University, but encouraged to be considered. For instance, a university policy requiring students to study abroad for a certain period of time would indirectly require them to use air transportation, although they might not be reimbursed for the trip. Second Nature requires universities to tally Scope 1 and 2 emissions, along with Scope 3 emissions for commuting and directly financed air travel (Second Nature, 2022a)

D) **"All Accountable Emissions" – All Directly Financed or Significantly Encouraged Emissions AND Selected Upstream Emissions**: This reporting boundary includes everything in the previous boundary, plus certain other Scope 3 emissions that help inform decision-makers and further reduce GHG emissions. For example, if a policy to decrease paper consumption was in effect, then the paper category would be included in the GHG inventory to observe the impact of paper reduction policy. Second Nature strongly encourages reporting additional Scope 3 emissions, especially from large and meaningful sources influenced by the institution.

E) **"All Possible Associated Emissions" – All Scope 1, 2, and 3 GHG Emissions Categories Covered by GHG Protocol**: The largest potential boundary for reporting GHG emissions for any organization, this boundary includes GHG emissions across every applicable *GHG Protocol* category. GHG inventorying at this level requires deep and consistent organizational data, including from upstream and downstream suppliers; due to dependence on existing (inter)national data sources, it also usually includes sector average data – and can ignore positive or negative supplier-specific considerations not available to

the reporting organization, including additional carbon reductions or controls. Very few organizations currently report to this level.

Selection of the GHG Inventory study boundary is vital, as limited boundaries exclude important emissions sources and underestimates actual emissions resulting from the institution. On the other hand, developing an inventory for all possible associated emissions requires significant time, resources, data, which is most often not available in all desired categories at the complete and detailed level required for this reporting.

The University of Pittsburgh's reporting category is "All Accountable Emissions," with a growing number of Scope 3 categories included as data becomes reliably available.

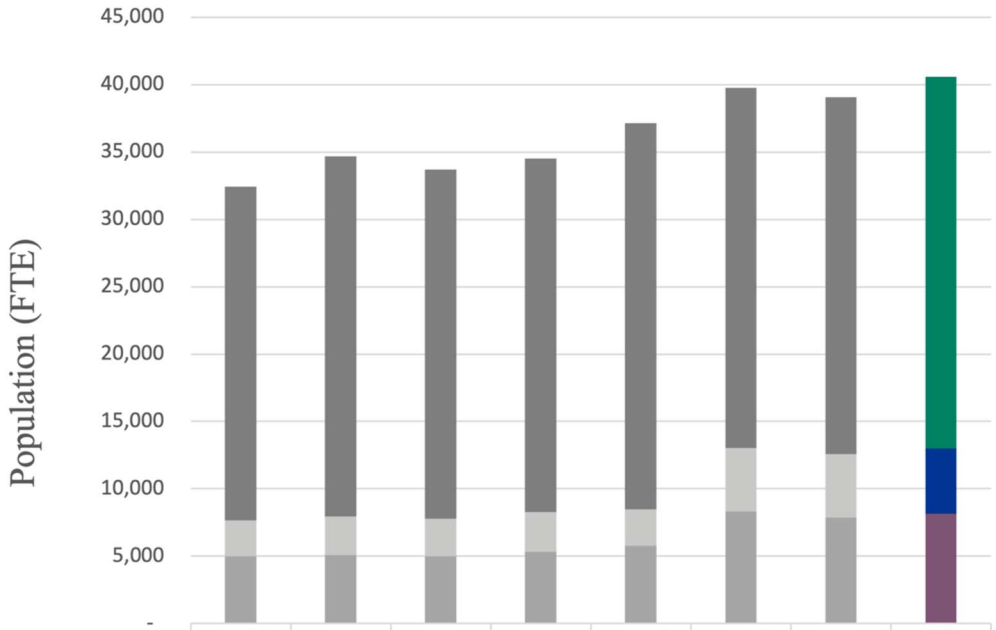
3 - Campus Population

The University of Pittsburgh's population includes students and employees that learn and work at the University. The student category includes undergraduate, graduate, and professional students; a number of students also live in University-owned buildings. The employee category includes faculty, staff, research associates, post-doctoral fellows.

3.1 – Overall Population

In FY22, the University of Pittsburgh had 27,607 full-time equivalent (FTE) students enrolled and 12,993 FTE employees, an increase from FY21 of 1,514 FTEs (1,122 students and 392 employees); this change is illustrated in Figure 3.

Employee FTEs were provided by Human Resources. Following the SIMAP method, part-time students were included in this total, accounted for as half of an FTE student. Pitt population totals include all academic schools, including School of Medicine students, staff, and post-docs (added for the first time in FY19). Due to inextricable linkages of many Pitt School of Medicine *faculty* with UPMC, they are not included in the University's GHG Inventory population.



	FY08	FY11	FY14	FY17	FY19	FY20	FY21	FY22
Students	24,755	26,740	25,917	26,240	28,673	26,730	26,485	27,607
Faculty (full & part time)	2,688	2,878	2,791	2,944	2,704	4,733	4,732	4,857
Staff (full & part time)	4,995	5,079	5,012	5,341	5,769	8,314	7,869	8,137

Figure 3 – Full-Time Equivalent Campus Population, Pittsburgh Campus

3.2 – Student Housing

Student housing owned and operated by the University of Pittsburgh is in the operational boundaries for this analysis, with on-campus student housing occupancy reported annually by the Office of Business, Hospitality, and Auxiliary Services. In FY22, 7,342 students lived on-campus; 2,878 students lived off-campus, but within close proximity of the Pittsburgh campus; and 17,385 students lived off-campus at further distances (Figure 4). In FY22, a total of 118 students lived in hotel space leased by the University.[4]

[4] In FY21, to help reduce spread of the COVID-19 virus, the University de-densified student housing to help limit exposure. As a result, the University signed 4 leases across 1,362,000 square feet in non-Pitt owned hotels to accommodate students who could not be safely housed in Pitt-owned residences.

Figure 4 – Student Population by Pittsburgh Campus Proximity

4 - Accounting for Emissions

The context of each emissions source, results, and assumptions made during calculations are detailed below. Report chapters are divided by scope, with scope subsections subsequently explored. the University of Pittsburgh's FY22 GHG Inventory results by source category for the Pittsburgh Campus by source category is provided in Table 2.

Table 2 - All Accountable Emissions, FY22

Category		Current FY
		FY22
SCOPE	SOURCE CATEGORY	
SCOPE 1	On-Campus Steam	27,532
	Other On-Campus Stationary	7,348
	Direct Transportation	1,364
	Refrigerants & Chemicals	1,450
	Fertilizers & Animals	7
TOTAL SCOPE 1 (MT CO2 eq) *(Direct Emissions)*		37,700
SCOPE 2	Purchased Electricity	64,777
	Purchased Steam	20,310
TOTAL SCOPE 2 (MT CO2 eq) *(Indirect Emissions)*		85,087
SCOPE 3	Faculty & Staff Commuting	9,961
	Student Commuting	2,264
	Directly Financed Air Travel	10,400
	Other Directly Financed Travel	1,140
	Study Abroad Air Travel	626
	Solid Waste	1,445
	Wastewater	510
	Paper	214
	Food	5,141
	Transmission & Distribution Losses	4,417
	Fuel & Energy Related Activities	14,122
TOTAL SCOPE 3 (MT CO2 eq) *(All Other Emissions)*		50,238
SINKS	Compost	19.4
ALL ACCOUNTABLE EMISSIONS (MT CO2 eq)		173,006

5 - Scope 1 Emissions

Scope 1 emissions are direct GHG emissions that occur from sources controlled or owned by an organization (i.e., emissions associated with fuel combustion in boilers, furnaces, and vehicles) (US EPA, 2020b). At the University of Pittsburgh, Scope 1 emissions include sources fully owned and managed by the University. **Pitt's FY22 Scope 1 GHG emissions were 37,700 MT CO_2e, which accounts for 21.8% of the Pittsburgh campus's FY22 GHG emissions**).

5.1 – On-Campus Stationary Combustion (Steam)

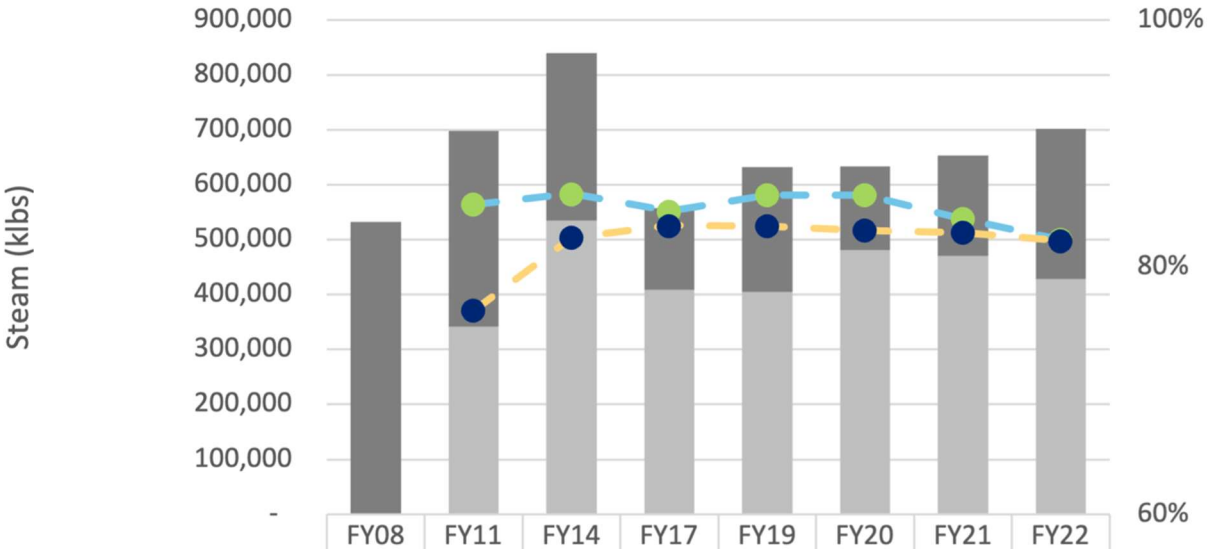
Stationary combustion sources include boilers, heaters, furnaces, kilns, ovens, flares, thermal oxidizers, dryers, and any other non-transport equipment or machinery that combusts carbon-bearing fuels or waste materials; this includes any on-campus electricity generation and gas usage. Carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O) are the primary GHGs related to the above-mentioned activities (US EPA, 2020a).

Prior to November 2009, Pitt purchased all its steam from a single outside generator, the Bellefield Boiler Plant (BBP); as the BBP is not directly owned or operated by Pitt, it is discussed in greater detail in "Section 6.3 – Purchased Steam."

After November 2009, Pitt began operating its own Carrillo Street Steam Plant (CSSP), a natural gas-powered, high efficiency, low NO_x-emitting steam plant located on the upper Pittsburgh campus. Both BBP and CSSP produce only steam; neither is a co-generation heat and power (CHP) facility (and thus do not create electricity along with steam). As a result, "co-generated electricity" for Pitt has always been zero.

Due to its operational timeline, the CSSP was first included in Pitt's FY11 inventory, but was not in full operation until FY14 when it supplied Pitt with 64% of the University's annual Pittsburgh campus steam demand. Thus, since FY11, Pitt's primary steam needs have been provided by CSSP, with the balanced supplied by BBP; CSSP and BBP are interconnected via steam tunnels.

Combining both BBP and CSSP, **Pitt's FY22 steam consumption was 702,650 klbs, a 7% increase from FY21 and a 6% increase compared to FY19** (Figure 5). In part, this consumption increase is due to unexpected emergency maintenance on CSSP in the winter of FY22; as shown in (Table 3), FY21 and FY22 did also experience more heating degree days than all other prior years.



	FY08	FY11	FY14	FY17	FY19	FY20	FY21	FY22
From BBP (klbs)	532,69	356,38	304,88	148,29	227,91	152,09	183,16	274,03
From CSSP (klbs)	-	342,40	535,81	409,23	405,18	481,62	470,98	428,61
CSSP Efficiency		85%	86%	85%	86%	86%	84%	82%
BBP Efficiency		77%	82%	83%	83%	83%	83%	82%

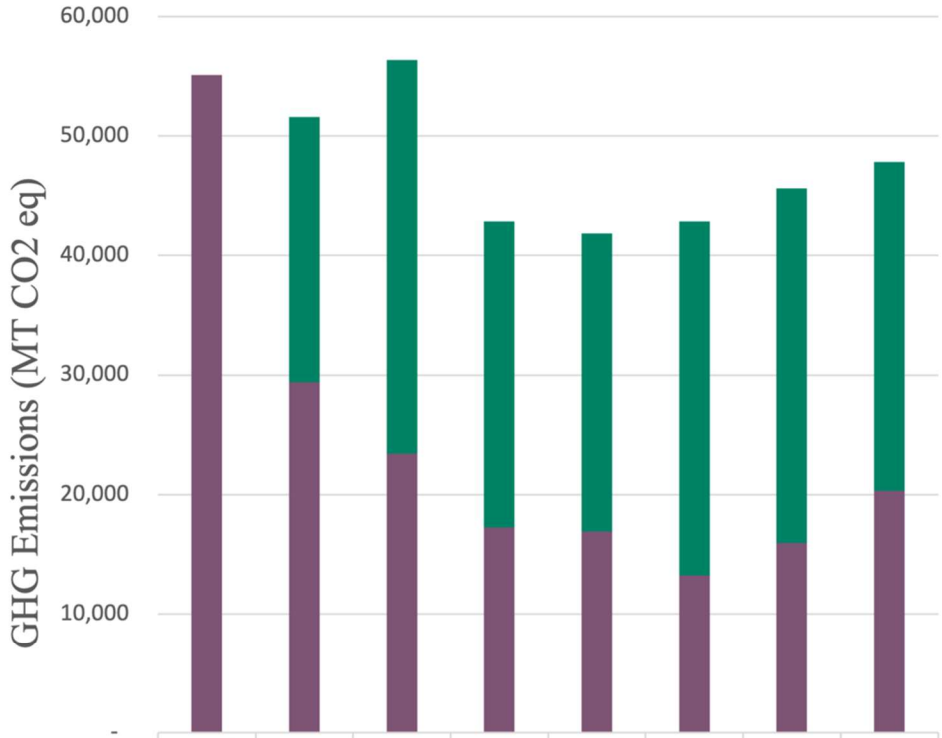
Figure 5 - Total Steam Consumed, Year-to-Year Comparison.

Table 3 – Heating & Cooling Degree Days

Category	Previous Fiscal Years							Current FY
	FY08	FY11	FY14	FY17	FY19	FY20	FY21	FY22
DEGREE DAYS								
Heating Degree Days - HDD - (F)	4194	4525	4605	3508	4236	4071	5147	**4920**
Cooling Degree Days - CDD - (F)	1594	1741	1559	1902	1735	1609	1056	**944**

This translated into total FY22 steam-related GHG emissions of 47,841 MT CO2e which accounted for 28% of Pitt's FY22 GHG emissions; though combined here, it must be noted that steam from CSSP is in Scope 1 whereas steam purchased from BBP is accounted for in Scope 2 (12% and 16% of FY22 GHG Emissions, respectively) (Figure 6).

The CSSP is Pitt's only Scope 1 steam source and supplied 61% of the total Pitt steam demand in FY22; as a result, total Scope 1 "Produced On-Campus Emissions" was 27,532 MT CO_2e. A detailed breakdown and comparison of steam-related GHG emissions are shown in Figure 6. For FY22, a slight increase in emissions was observed, despite a slight decrease in both heating degree decreasing (Table 3) and square footage (Section 2.1 – Organizational Boundaries). Plant efficiencies and SIMAP emission factors vary by year, which is why consumption-to-emission ratios are not constant.



	FY08	FY11	FY14	FY17	FY19	FY20	FY21	FY22
On-Campus Steam Emissions (MT CO2 eq)	-	22,200	32,981	25,623	24,978	29,627	29,644	27,532
Bellefield Purchased Steam Emissions (MT CO2 eq)	55,100	29,400	23,404	17,238	16,892	13,247	15,954	20,310

Figure 6 - Total Steam GHG Emissions by Production Facility

5.2 – Other On-Campus Stationary Combustion

At Pitt, "Other On-Campus Stationary Combustion" includes natural gas used in individual buildings. Natural gas is typically used on-campus for heating air or water and/or laboratory purpose. Pitt's FY22 natural gas usage was 134,513 MCF (thousand cubic feet) reflecting a 10% decrease in usage from the previous FY, when Pitt purchased 149,503 MCF.

While on-campus combustion, the GHG emissions relating to diesel fuel used for building backup generators is reported in "Section 5.3 – University Fleet Vehicles" because the diesel fuel purchase data incorporated fuel use for fleet vehicles as well as for generators.

FY22 GHG Emissions due to natural gas usage totaled 7,348 MT CO_2e, or 4% of total emissions (Table 4).[5] The decrease in natural gas use and resulting GHG emissions is likely attributable to a decrease in heating degree days (HDD) (Table 3).

[5] Emissions factors associated with the combustion of natural gas were provided by SIMAP.

Table 4 - Natural Gas Emissions, Year-to-Year Comparison

Category	Previous Fiscal Years							Current FY
	FY08	FY11	FY14	FY17	FY19	FY20	FY21	FY22
Natural Gas Usage (MT CO2 eq)	9,200	5,700	6,386	5,245	7,470	7,102	8,167	**7,348**
Emissions (% of the total)	3%	10%	17%	14%	15%	20%	23%	**4%**

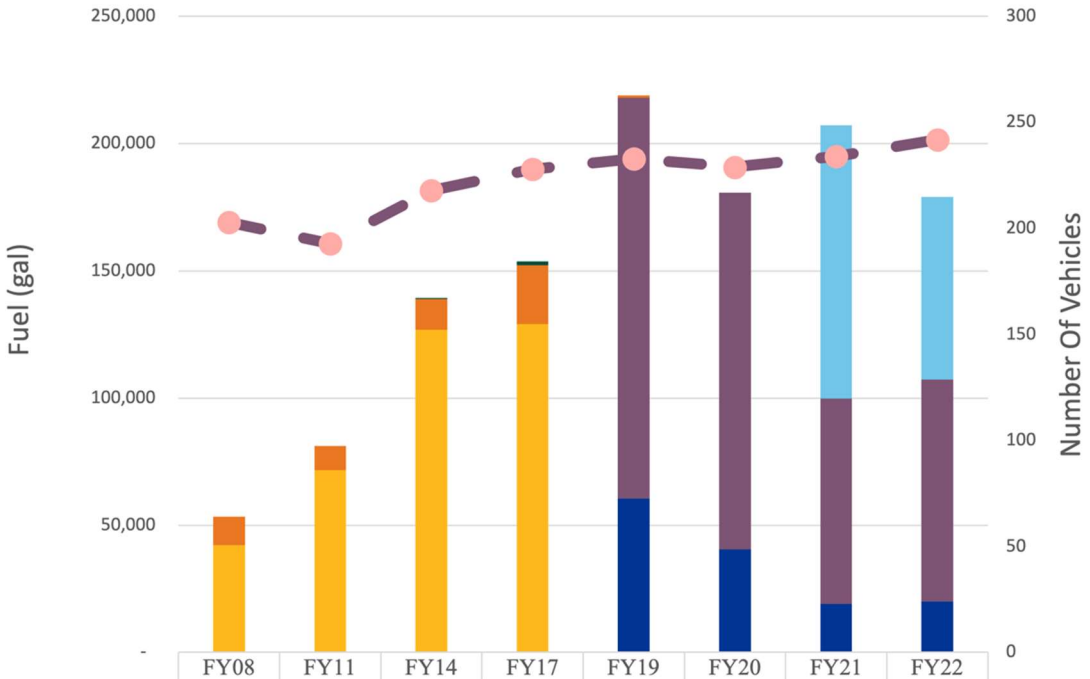
5.3 – University Fleet Vehicles

Pitt's fleet vehicles include all fuel used and financed by the University for campus-wide transportation and select off-campus ground transportation. Fuel in this Scope 1 category is used by campus shuttles, Parking & Transportation, Facilities Management, Dining, Logistics, Real Estate, Athletics, and other vehicles used for the sole purpose of the University; it does not include chartered bus service.

Based on data provided by Pitt's Office of Parking, Transportation, & Services, the University's FY22 vehicle fleet included 242 vehicles. As shown in Figure 7, Pitt's **FY22 fuel use included 20,101 gallons of diesel fuel; 87,172 gallons of gasoline; and 71,752 gallons of propane; which combined to produce 1,364 MT CO_2e (0.8% of total FY22 GHG emissions).** Overall, GHG emissions in this category have decreased since 2019, but are still higher than FY17. FY22 emissions were 9% lower than FY21 and 32% lower than FY19.[6] The FY22 increase in both gasoline and diesel fuel use is attributable both an increase in number of fleet vehicles and a trade out of the University's leased electric box trucks for diesel trucks in May 2022 (Figure 7).[7]

Campus-wide diesel usage also includes diesel used to power the over 80 backup generators in facilities across the Pittsburgh campus. Generator fuel use was not included in GHG inventories prior to FY20; including generator fuel did not significantly increase the overall emissions of this category.

[6] Starting in FY21, Pitt introduced 18 propane-powered shuttle buses, resulting in a dramatic decrease in gasoline and biodiesel use (by 52% and 42%, respectively, compared to FY20) (Pitt Sustainability, 2020).
[7] SIMAP provides emission factors associated with the combustion of diesel and gasoline; the emissions factor for propane was retrieved from the U.S. Energy Information Administration's Carbon Dioxide Emissions Coefficient list (U.S. EPA, 2016b), last updated on February 9, 2022.



	FY08	FY11	FY14	FY17	FY19	FY20	FY21	FY22
Other (gal)	-	-	402	1,487	-	-	-	-
Propane (gal)	-	-	-	-	-	-	107,326	71,752
Biodiesel (gal)	11,220	9,500	11,976	23,050	994	-	-	-
Regular (gal)	42,300	71,800	126,973	129,164	-	-	-	-
Gasoline (gal)	-	-	-	-	157,400	140,172	80,655	87,172
Diesel (gal)	-	-	-	-	60,626	40,578	19,277	20,101
Number of Vehicles	203	193	218	228	233	229	234	242.000

Figure 7 – Vehicle Fleet & Fuel Usage, Year-To-Year Comparison

5.4 – Refrigerants

Hydrofluorocarbons (HFCs) and perfluorocarbons (PFCs) are greenhouse gases often used for refrigeration (each with its own global warming potential (GWP)) – and accounted for under Scope 1 emissions. Under ideal conditions, these gases are used as refrigerants in closed loop systems; however, inevitable leaks in appliances and cooling systems result in refrigerants becoming fugitive emissions that must be included in Pitt's GHG Inventory. The quantity of Pitt's fugitive GHG emissions from refrigerants is assumed to be equal to the number of refrigerants needed to recharge on-campus mechanical systems during regular maintenance.

In FY22, Pitt used a total of 1,523 pounds of refrigerants, which translates to 1,450 MT CO_2e, or 0.8% of total FY21 GHG emissions (Table 5). This is a 123% increase in emissions compared to FY21; however, refrigerant replacement is a category known to be highly variable.

Additionally, Table 5 illustrates that intermittent needs to recharge in older equipment with high GWP refrigerants like R-404A and R-508 (even in small quantities, i.e., 6% of total refrigerants used) heavily influenced final emissions; as a result, a 23% increase in refrigerants by pound translated to a 123% increase in emissions compared to FY21.

Table 5 - Refrigerants Used, Year-To-Year Comparison[8]

Category	Previous Fiscal Years							Current FY		
	FY08	FY11	FY14	FY17	FY19	FY20	FY21	FY22		
REFRIGERANTS										
Total Used (lbs)	1,122	2,342	1,053	1,595	1,707	1,718	1,236	**1,523**		
TYPES									**GWP (100yr)** SOURCE	VALUE
R-123	400	200	200	400	100	800	600	**-**	EPA	77
R-134A	41	840	400	6	35	161	169	**205**	EPA	1,430
R-22	637	754	453	897	718	545	265	**412**	EPA	1,818
R-404A	1	1	-	171	172	36	60	**72**	SIMAP	3,943
R-407C	-	-	-	-	50	69	24	**82**	SIMAP	1,924
R-408A	-	4	-	-	2	-	-	**15**	SIMAP	2,430
R-410A	-	107	-	65	31	107	109	**701**	SIMAP	1,924
R-448A	-	-	-	-	-	-	10	**11**	EPA	1,387
R-508	-	-	-	-	-	-	-	**26**	EPA	13,214
HG-10	-	-	-	-	-	-	-	**-**		
R-11	-	400	-	-	600	-	-	**-**		
R-12	20	36	-	18	-	-	-	**-**		
R-414	19	-	-	-	-	-	-	**-**		
R-500	3	-	-	-	-	-	-	**-**		
R-503	1	-	-	-	-	-	-	**-**		
R-507	-	-	-	37	-	-	-	**-**		

Although a small percentage of Pitt's overall GHG emissions, refrigerants pose significant threats globally and to human health – and can be managed by reducing cooling demand, increasing efficiency, decreasing leakage, ensuring recovery, and shifting to lower GWP refrigerants. **In general, trends demonstrate the University's shift away from more potent GWP refrigerants in preference of lower GWP refrigerants**.

The University should continue shift away from high GWP products (R-11, R-12, R-22) whenever possible, which will help decrease the impact of refrigerants campus-wide. In general, as older mechanical units reach the end of their lifecycles and are replaced, the University should continue to avoid more potent refrigerants.

5.5 – Agriculture & Landscape

[8] SIMAP uses Intergovernmental Panel on Climate Change (IPCC) Fifth Assessment Report (AR5) values (US EPA, 2016b). Pitt inventories through FY19 input R-12 under refrigerant NF3 (with a GWP of 16,100); SIMAP now includes CFC-12 (GWP of 10,200), which is used instead.

Generally, Scope 1 agricultural sources of GHG emissions account for animal herding along with fertilizer, pesticide, or herbicide use for crop growth and landscaping. Pitt does not herd animals on its Pittsburgh Campus; thus, there are no herding-related emissions. However, the University does use fertilizers for landscaping activities.

Fertilizers and herbicides contribute to GHG emissions when a portion of their nitrogen content volatizes and forms the compound N_2O. Because different commercial fertilizers have different nitrogen percentages, a weighted average of nitrogen content is typically calculated based on the amount of fertilizer used and its specific nitrogen content. [9]

In FY22, Pitt used 21,000 pounds of fertilizer with a nitrogen content of 12%; this was a 2% decrease in fertilizer usage compared to FY21. **In FY22, GHG emissions associated to fertilizers was only 7 $MTCO_2e$**. Different from the previous years, two types of fertilizers were used in FY22. The new fertilizer introduced had water-insoluble nitrogen, often referred to as "slow-release" fertilizer because it provides a more gradual and sustained supply of nitrogen to plants, reducing the risk of nutrient leaching and minimizing the need for frequent reapplication. The nitrogen content of water-insoluble nitrogen fertilizers varies based on formulation and manufacturer. However, due to a lack of further information on the specific fertilizer used (and therefore its physical characteristics), a 12% nitrogen content was estimated for FY22.

Though not absolutely large, the relatively significant increase in emissions (from 1 to 7 $MTCO_2e$) is attributed to incorrect accounting for this category since FY08. Though past inventory results will not be adjusted, this category will be correctly accounted for from FY22 forwards.

Table 6 - Fertilizer Used and Relative Nitrogen Content, Year-To-Year Comparison

Category	Previous Fiscal Years							Current FY
	FY08	FY11	FY14	FY17	FY19	FY20	FY21	FY22
FERTILIZERS								
Total Amount (pounds)	475	1,125	2,250	1,892	2,648	4,322	2,532	**21,000**
% Nitrogen Content	12.6%	18.1%	20.3%	10.2%	11.0%	16.1%	11.8%	**12%**
Water Insoluble Nitrogen	-	-	-	-	-	-	-	**1,680**
% Nitrogen Content								**12%**

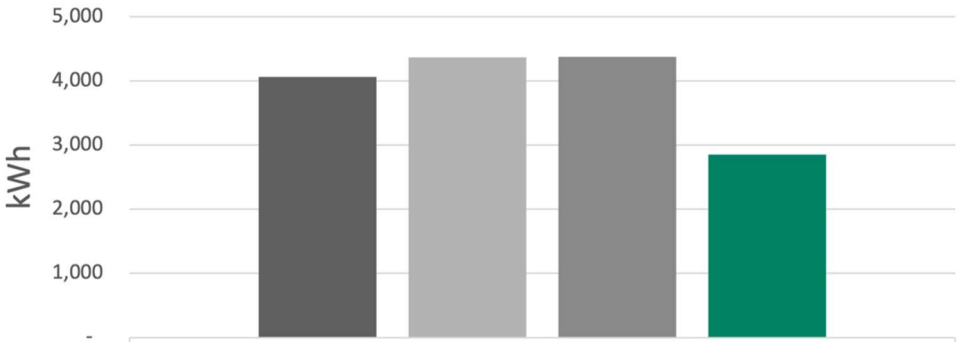
5.6 – On-Site Electricity Production

In FY22, the Pittsburgh campus had one rooftop solar array located on Benedum Hall. A total of 2.9 MWh of renewable electricity was produced in FY22 (Figure 8). FY22 electricity production from this array was down because it was temporarily taken offline to accommodate for additional research use.

Starting in FY24, the University also procures renewable electricity via a 20-year power purchase agreement (PPAs) from the Vesper Gaucho solar farm ~20 miles from the Pittsburgh campus. The University is also committed to procuring electricity from a future run-of-the-river

[9] Synthetic fertilizers are labeled with their chemical makeup using three (3) numbers that represent the percentages of nitrogen (N), phosphorus (P), and potassium (K). For example, Momentum (a pre-emergent crabgrass herbicide) is identified by the numbers 21-0-11, indicating that it consists of 21% nitrogen, 0% phosphorus, and 11% potassium.

hydropower facility being developed by Rye Development at the existing Allegheny Lock and Dam No. 2 on the Allegheny River near the Highland Park Bridge.



	Solar From Benedum PV Array (kWh)
FY19	4,062
FY20	4,367
FY21	4,380
FY22	2,855

Figure 8 - Year-to-Year PV Generation On-Site

6 - Scope 2 Emissions

Scope 2 emissions are indirect GHG emissions associated with the purchase of utilities for electricity, steam, heat, or cooling (US EPA, 2020b, p. 1). **Pitt's FY22 Scope 2 related GHG emissions were 85,087 MT CO_2e** (Table 2)**, which accounts for 49% of Pitt's FY22 GHG emissions**.

6.1 – Purchased Electricity

Scope 2 category includes all electricity consumed by the University for the Pittsburgh campus, primarily purchased from outside suppliers; electricity generated on campus is also included in this category. **Purchased electricity is the largest contributor to Pitt's GHG emissions for all inventoried years**. In FY22, this category accounted for 37.4% of total GHG emissions. As a result, any changes in electricity consumption and mix have a large impact on Pitt's total GHG emissions.

Emissions from purchased electricity are calculated using electricity usage and the electricity generation fuel mix. Electricity generation fuels are organized into the following 10 categories: coal, natural gas, distillate oil, residual oil, nuclear, waste-to-energy, hydroelectric, biomass, renewables, and other. For emissions calculations, SIMAP can use either default regional fuel mix information from the U.S. EPA's eGRID program or a customized, user-input fuel mix (US EPA, 2022).

Starting with FY20, Pitt GHG inventories employ the SIMAP Market-Based method, which defaults Pitt's purchased electricity emission factors to our regional eGRID mix (versus a previously used custom mix). Figure 9 illustrates the electricity generation fuel mixes for all Pitt GHG Inventory years.

From FY08 to FY22, the regional electricity grid mix changed substantially; coal-based electricity generation decreased from 72.8% to 21.3% and natural gas grew from 2.7% to 38.7%. Nuclear power increased from 22.3% to 33.0%. Renewables have increased from 1% to 6.1% of regional electricity production; however, Pitt's renewable procurement extends beyond the regional grid, as described in "Section 6.2 – Purchased Renewable Electricity."

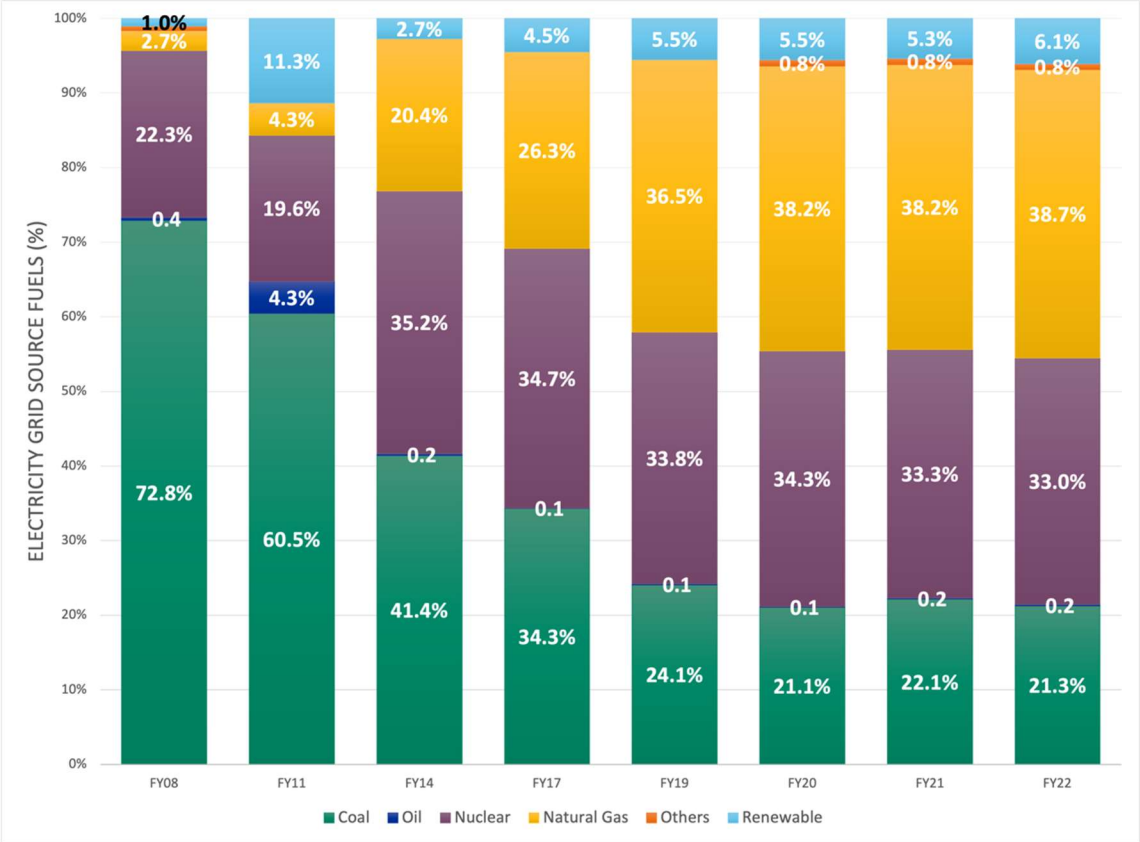


Figure 9 - Regional Electricity Grid Mix[10]

As shown in Table 7, Pitt's FY22 total electricity consumption was 175,333,865 kWh (10% lower than FY21 and 19% below FY19). In part, this decrease is likely due to a decrease in cooling degree days (Table 3); a number of building efficiency upgrades including lighting, cooling, and controls; and a decrease in the overall square footage. It's also notable that electricity usage per square foot has dropped from 21 kWh / ft^2 to 15 kWh / ft^2 since FY08.

[10] Pitt's FY08 GHG inventory used the default fuel mix for the RFC West region, which was dominated at the time by 73% coal and 22% nuclear power. From FY11 through FY19, a custom regional electricity generation fuel mix was used, as summarized below. For FY20, the market based SIMAP method was used (and will be used moving forward):

- **FY11** - Provided by First Energy.
- **FY14** - Provided by PJM Interconnection.
- **FY17** - Provided by University source.
- **FY19** - Provided by EDF on PJM Interconnection.
- **FY20 forward** - Market-based method using eGrid regional mix via SIMAP.

Table 7 - Purchased Electricity, Year-To-Year Comparison

Category	Previous Fiscal Years							Current FY
	FY08	FY11	FY14	FY17	FY19	FY20	FY21	FY22
ELECTRICITY								
Gross sq ft	9,403,627	9,650,285	10,209,646	10,187,967	11,564,332	11,645,940	11,691,649	**11,026,502**
Tota (kWh)	198,040,208	211,101,520	211,614,873	213,621,786	215,390,967	201,482,090	194,766,725	**175,333,865**
kWh per Sq ft	21	22	21	21	19	17	17	**16**

With electricity use decreasing in FY22, GHG emissions from electricity also decreased to **64,777 MT CO_2e, a 24% decrease from the previous FY. Compared to FY08, GHG emissions from electricity have decreased 53%.**

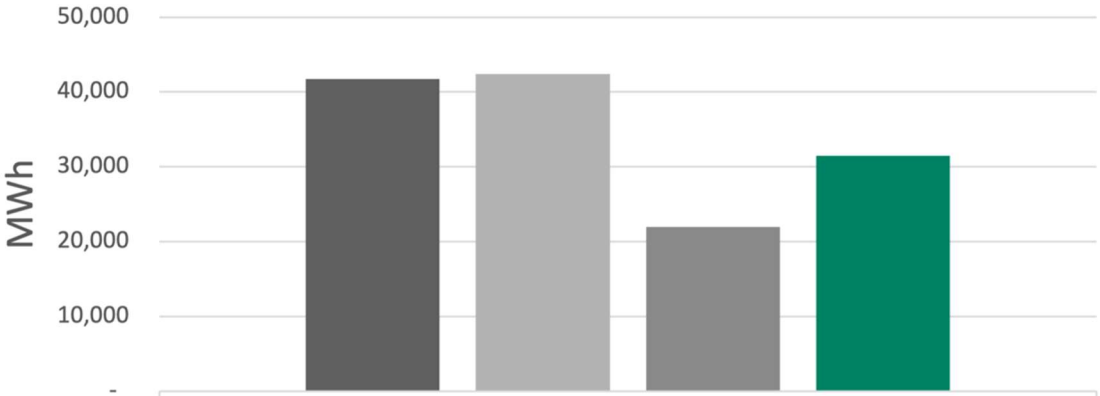
6.2 – Purchased Renewable Electricity

In addition to purchasing electricity directly from retail suppliers that provide it to the University via the regional electricity grid, the University of Pittsburgh procures renewable energy via several different mechanisms. For FY22, almost all of Pitt's renewable electricity attributes were via unbundled renewable energy certificates (RECs), which were acquired both within electrical procurement contracts and separately.[11]

SIMAP only records RECs in the final results, not in any of the Scopes, Sources, or Categories. As a result, RECs are only reflected in the net GHG emissions values. While the University has long-purchased small numbers of RECs specifically for LEED building certifications, they were not accounted for in Pitt's GHG inventories until FY19. In FY22, Pitt had 31,439 unbundled Green-e certified RECs (or 31,439 MWh), a 43% increase from FY21 (Figure 10). As a result, **17.9% of Pitt's FY22 annual electricity consumption is attributed to renewables**. Of the RECs, 13,313 were provided via an electricity contract for general large (GL) meters; 4,153 RECs were included in an electricity contract for general small and medium (GS/GM) meters.

An additional 4.2 MWh of renewable electricity was produced in FY22 by the Pittsburgh campus's only rooftop solar array on Benedum Hall (Section 5.6 – On-Site Electricity Production).

[11] RECs are "a market-based instrument that represents the property rights to the environmental, social, and other non-power attributes of renewable electricity generation. RECs are issued when one megawatt-hour (MWh) of electricity is generated and delivered to the electricity grid from a renewable energy resource" (US EPA, 2022).



	Unbundled RECs (MWh)
FY19	41,736
FY20	42,377
FY21	21,940
FY22	31,439

Figure 10 - Year-to-Year Comparison Renewable Energy Credits

6.3 – Purchased Steam

Pitt does not purchase any chilled water, but it does purchase steam to meet demand not covered by the Carrillo Street Steam Plant (CSSP, co-owned by Pitt and UPMC and operated by Pitt), a Scope 1 asset described in "Section 5.1 – On-Campus Stationary Combustion (Steam)." Pitt's purchased steam is from the Bellefield Boiler Plant (BBP), which is owned by an independent, multi-owner consortium; operated by the Carnegie Museums; and supplies steam to other commercial entities in the Oakland neighborhood of Pittsburgh (i.e., Carnegie Mellon University, Carnegie Library, UPMC, etc.).[12] Because BBP is not owned or operated by the University, Pitt purchases steam from it, which means the GHG emissions resulting from Pitt's BBP steam consumption fall under Scope 2 emissions.

As mentioned in Section 5.1, **Pitt consumed 702,650 klbs of steam, resulting in 51,400 MT CO_2e**. The CSSP supplied 61% of this demand (428,617 klbs) and BBP supplied the remaining 39% (274,034 klbs). With steam created from natural gas and an estimated system efficiency of 82%, **Pitt's GHG emissions associated with BBP steam totaled 20,310 MT CO_2e in FY22.** As shown in Table 8, there was a steam use increase of 7% in FY22 compared to the previous FY, causing a 27% increase in GHG emissions from purchased steam.

[12] Built in 1907, BBP was originally powered by coal and natural gas -- and Pitt's only source of steam until 2009, when CSSP became operational. In 2009, BBP switched to 100% natural gas, which helped increase plant efficiency and lower GHG emissions associated with the steam produced there. This fuel switch had an observable reduction in Pitt's FY11 and FY14 emissions – and continues to help keep Pitt's overall campus GHG emissions down. BBP and CSSP are interconnected via an underground steam tunnel distribution network.

Table 8 – Emissions from Steam Purchased (BBP) - Year-To-Year Comparison

Category	Previous Fiscal Years							Current FY
	FY08	FY11	FY14	FY17	FY19	FY20	FY21	FY22
STEAM (BBP) EMISSIONS								
Emissions (MT CO2 eq)	55,100	29,400	23,404	17,238	16,892	13,247	15,954	**20,310**
Emissions % Compared To Total Emissions	20%	11%	10%	8%	8%	7%	10%	**12%**

In 2023, SIMAP updated its calculation methodology for Scope 2 steam and chilled water, ensuring that Scope 2 custom fuel mixes are applied when using the market- or location-based methods. Previously, SIMAP was defaulting to the average U.S. emissions factors for steam and chilled water when using the market-based method to calculate GHG emissions.

Because the University switched its energy source for generating steam from coal to natural gas in FY14, SIMAP's updates have resulted in steam and chilled water-specific emissions that better reflect Pitt's operational specifics. As a result of this method-based change, Pitt's adjusted net GHG emissions for steam decreased in every fiscal year FY14 through FY22 (between 1% and 6%, depending on the year).

While the University's past published GHG Inventories will not be adjusted, this FY22 GHG Inventory and all future inventories will reflect this important SIMAP change.

7 - Scope 3 Emissions

Scope 3 GHG emissions are other indirect emissions associated with Pitt, but from assets not owned or controlled by the University. This category includes all sources not accounted for in Scope 1 and 2. Scope 3 GHG emissions can also be referred to as value chain emissions -- and often represent the majority of the total GHG emissions for an organization. Scope 3 GHG emissions commonly include any financially sponsored or outsourced activities (i.e., travel, waste management, paper purchasing, etc.) (US EPA, 2016a, p. 3). **Pitt's FY22 Scope 3-related GHG emissions were 50,238 MT CO_2e, or 29% of Pitt's FY22 GHG emissions** (Table 2). Scope 3 emissions increased 112% from FY21, an expected rebound from FY21, which was severely impacted by the COVID-19 pandemic. While an expected rebound, Scope 3 emissions are still 43% lower than FY19's Scope 3 emissions (Figure 11), which was the past inventory year when Scope 3 emissions represented the largest total percentage of all Pittsburgh campus GHG emissions.

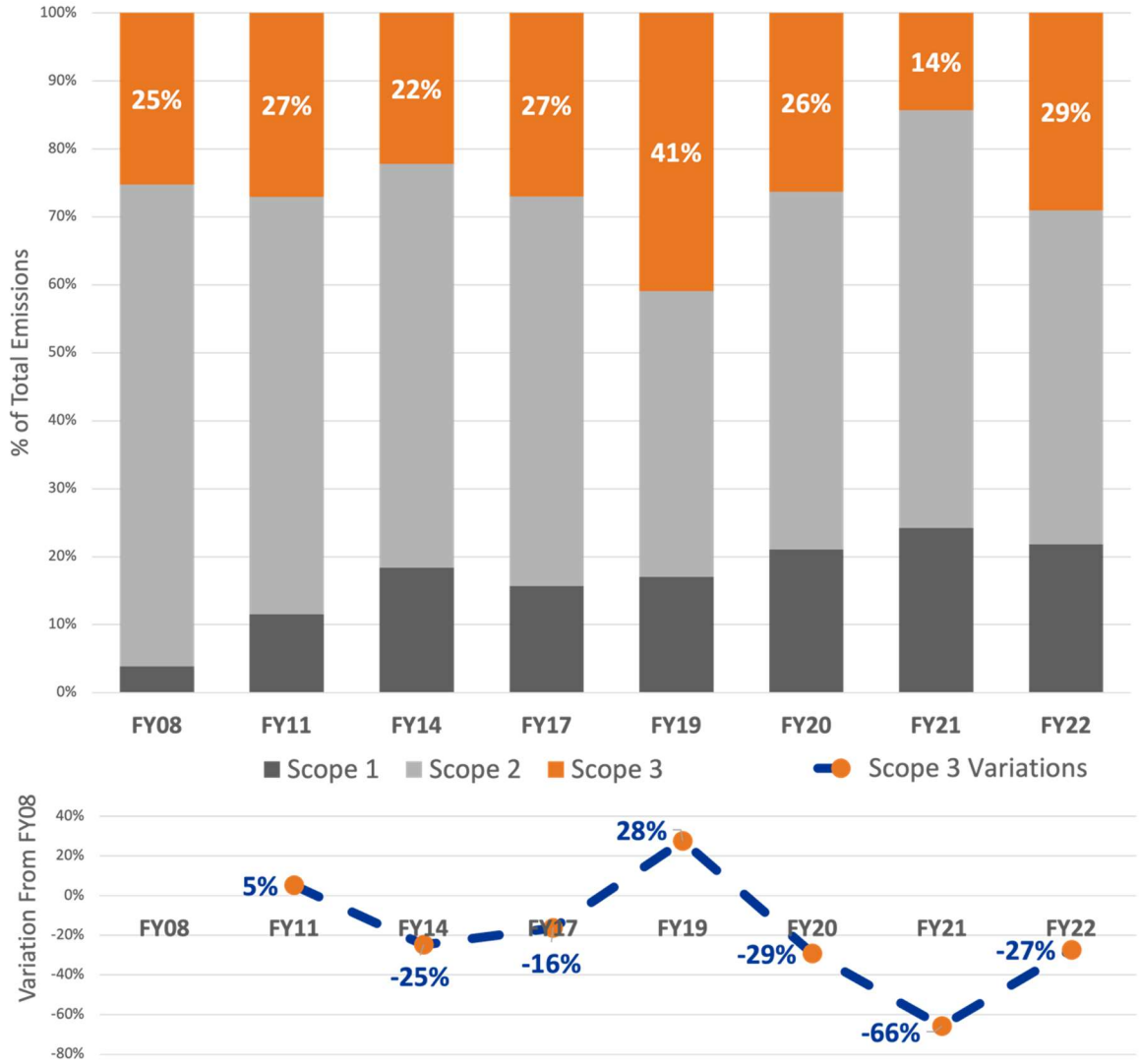


Figure 11 - Scope 3 Emissions Compared to Total GHG Emissions

7.1 – Directly Financed Outsourced Travel

The University of Pittsburgh pays for faculty, staff, and student business travel via various transportation modes, including via bus, train, rental car, airplane, and personal vehicle mileage reimbursement.[13] Pitt Purchasing provides records of both business and Athletic travel from travel card purchases and travel reimbursements; the former is directly billed to the University and includes more detailed and accurate information.

Data accuracy in this category has improved dramatically since FY17, with 90%+ of purchases now coming through travel cards; personal vehicle mileage data was included starting with FY20, but not available for FY22. Inclusion of Athletics travel has also evolved; it was

[13] Detailed information on travel paid for by the University is provided by Purchasing Services, but dependent on a variety of internal sources, including Financial Services, travel tracking software, and others.

first included in FY17, not provided nor included in FY19, but since fully included from FY20 forward.

In FY22, Pitt employees and students traveled 27,852,982 air miles and 2,221,377 land miles (the latter comprised of 2,037,494 car miles and 183,882 train and bus miles**) for University-sponsored travel, resulting in total emissions of 11,540 MT CO_2e** (Table 9 and

Table 10). The 145.5% increase in emissions for this category compared to FY21 is entirely explained by COVID-19 pandemic travel avoidance; for context, Pitt affiliates only traveled 9.2 million air miles in FY21, compared to 27.9 million air miles in FY22; compared to the 111.2 million air miles traveled in FY19, a balloon of future air travel could drive emissions in this category much higher in the future.

Ground travel is provided in dollars spent. Due to the varying levels of detail in reported data, land mile travel estimates have fluctuated since FY08.[14],[15]

FY22 data on car travel was only partially provided. The FY21 inventory included gas reimbursement for personal vehicles used for business purposes, but this data was not provided for FY22. In FY21, reimbursements for personal vehicle use was 66% of the total mileage due to car travel; as FY21 travel was massively impacted by the COVID-19 pandemic, personal car use may have been larger than normal. As a result, despite personal vehicle travel reimbursements missing from FY22 GHG accounting, the resulting emissions gap may be low.

Table 9 - Miles Traveled, Year-To-Year Comparison[16]

Category	Previous Fiscal Years							Current FY
	FY08	FY11	FY14	FY17	FY19	FY20	FY21	FY22
Travel								
Air - Faculty & Staff (miles)	25,418,000	36,094,000	47,063,237	40,470,287	71,175,159	23,382,044	3,406,243	**27,349,474**
Air - Study Abroad (miles)	-	1,418,000	1,524,920	5,378,016	20,035,978	7,940,076	50,674	**503,508**
Air - Athletics (miles)	-	1,418,000	1,524,920	5,378,016	20,035,978	7,940,076	5,739,130	-
Bus - Faculty & Staff (miles)	440,617	188,467	582,693	142,021	151,876	215,055	33,094	**59,602**
Bus - Athletics (miles)	-	-	-	-	72,899	61,055	56,508	**64,679**
Rail - Faculty & Staff (miles)	-	-	149,035	139,652	151,876	154,000	33,094	**59,602**
Car - Faculty & Staff (miles)	-	-	-	-	-	-	968,637	**2,037,494**
Car - Faculty & Staff ($)	-	-	-	-	1,798,395	1,518,233	299,888	**1,166,466**
Totals								
Air (1000 miles)	25,418,000	38,930,000	50,113,077	51,226,319	111,247,115	39,262,196	9,196,047	**27,852,982**
Bus & Rail (miles)	440,617	188,467	731,728	281,673	376,651	430,110	122,697	**183,882**
Car (miles)	-	-	-	-	-	-	968,637	**2,037,494**
Car (dollars)	-	-	-	-	1,798,395	1,518,233	299,888	**1,166,466**

[14] SIMAP requires information be provided in vehicle-mile; therefore, a conversion from dollars spent to mileage is necessary.

[15] The conversion factor for personal vehicle mileage was sourced from the IRS, whose FY22 standard mileage reimbursement rate for employees using a personal vehicle for business travel was $0.5725/mile (Internal Revenue Service, 2022). For University-owned vehicles, conversion of fuel expenditures to mileage utilized the business mileage rate sourced from the FY21, U.S. Department of Defense conversion factor of $0.183/mile(U.S. DOT., 2022).

[16] Starting in FY20, the significant increase in GHG emissions from land travel is attributed to Athletics travel being rightfully included again in the total mileage.

Table 10 - Directly Financed Travel Emissions, Year-to-Year Comparison

Category	Previous Fiscal Years							Current FY
	FY08	FY11	FY14	FY17	FY19	FY20	FY21	FY22
TRAVEL								
Directly Financed Air Travel (MT CO2 eq)	24,800	33,600	23,921	24,706	36,560	10,273	4,018	**10,400**
Other Directly Financed Travel - Car & Other Ground Travel (MT CO2 eq)	100	50	211	548	582	1,593	683	**1,140**
Emissions (MT CO2 eq)	24,900.00	33,650.00	24,132.00	25,254.00	37,142.00	11,866.26	4,700.63	**11,540**

7.2 – Study Abroad Air Travel

Like many universities, the University of Pittsburgh offers students the chance to complete one or more terms of academic study in other countries under a "Study Abroad" program. Due to the nature of higher education decision-making and practice, SIMAP separates these miles from "Directly Financed Travel;" however, GHG emissions resulting from study abroad clearly contributes to the University's Scope 3 emissions.[17]

For FY22, Pitt's total study abroad was 503,508 miles, resulting in 626 MT of GHG Emissions (Figure 12); compared to FY19 (prior to the COVID-19 pandemic), study abroad travel mileage is down 97% and resulting GHG emissions decreased 93%. Compared to FY21, FY22 study abroad emissions increased 310% (from 153 to 626 $MTCO_2e$).

[17] Due to lack of data, Pitt's Study Abroad Air Travel was not included in the FY08 inventory, but has been included in every Pitt GHG inventory since. Starting in FY11, the travel costs for Pitt's study abroad travel has been obtained from Pitt's Study Abroad team; in more recent years, travel mileage has also been provided.

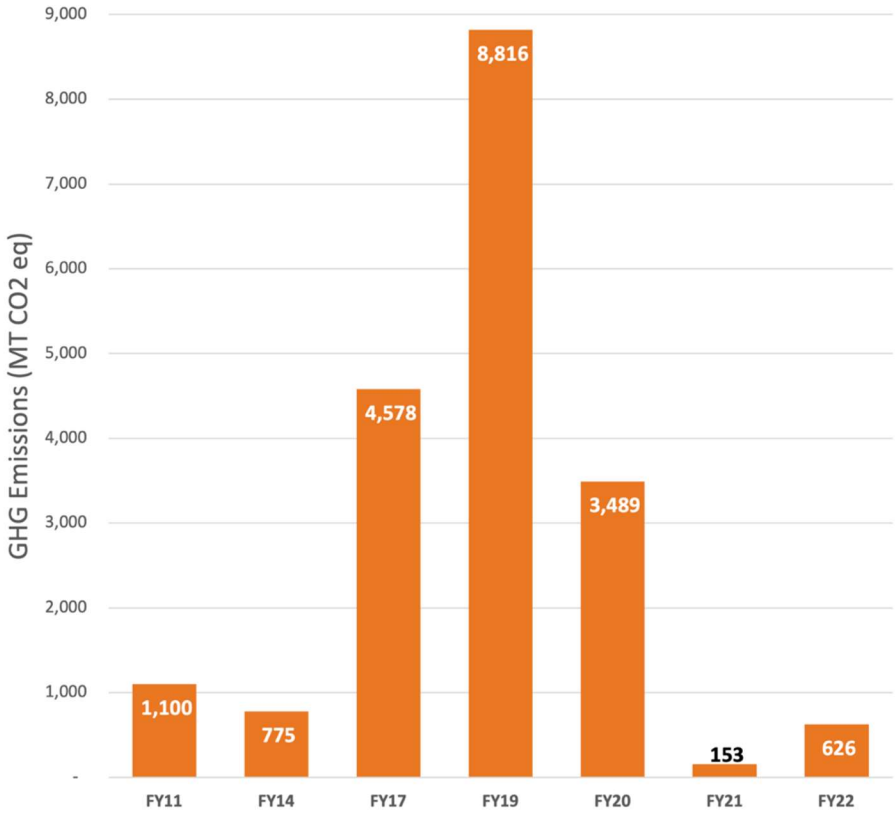


Figure 12 - Study Abroad Travel Emissions, Year-to-Year Comparison

Pre-pandemic, Pitt's Global Experiences programs spanned 75 countries via 350 programs, with utilization as high as 55% in the School of Business, which previously boasted the highest University-wide participation rate. While this report is entirely focused on the GHG emissions of the University (which study abroad travel has an increasing contribution to), studying abroad has obvious benefits for the University and its students.

While study abroad travel has only slightly rebounded post-pandemic, future increases in this category are expected in the future. The *Pitt Climate Action Plan* outlines the University's strategies relating to air travel use reduction and carbon offsets.

7.3 – Commuter Travel

As indicated in prior Pitt GHG inventories and other studies, commuting is a significant contributor to University GHG emissions, yet effectively estimating commuting impacts for Pitt remains challenging. In Fall 2022 the University of Pittsburgh ran a commuter survey for students and employees. Survey results provided valuable insights into Pitt community members' post-pandemic commuting choices; though outside the scope of FY22, results were used to inform the following assumptions for this FY22 GHG Inventory.[18]

[18] University of Pittsburgh. (2023). University of Pittsburgh 2022 Commuter Survey Results. https://www.pts.pitt.edu/university-pittsburgh-2022-commuter-survey

Pitt offers a suite of transportation and mobility solutions that can help reduce GHG emissions resulting from employee and student trips to and from the Pittsburgh campus to work and/or learn. In FY22, alternatives to commutes in single occupancy vehicles abound, including on- and off-campus University-owned student housing, free public transportation and 30-minute bike share rides for all Pitt students and employees, campus and city-wide biking infrastructure, carpool and vanpool programs, limited on-campus parking capacity, and more (Table 11)

Table 11 – Pitt Commute Mode Distributions - Year-to-Year Comparison

Category	Previous Fiscal Years							Current FY
	FY08	FY11	FY14	FY17	FY19	FY20	FY21	FY22
STUDENTS								
Bike	3.2%	4.9%	4.7%	3.3%	3.3%	3.3%	3.0%	**9.4%**
Walk	38.3%	36.2%	40.2%	40.2%	40.0%	38.6%	12.3%	**37.0%**
Drive Alone	3.3%	2.8%	2.4%	2.3%	2.0%	1.7%	0.0%	**1.0%**
Carpool	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	**3.4%**
Bus	55.3%	56.1%	52.7%	54.2%	54.7%	56.4%	33.3%	**48.6%**
Commuter Rail	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	**0.0%**
Electric Vehicle	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	**0.0%**
Light Rail	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	**0.6%**
Telecommuting	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	51.4%	**0.0%**
Total	100%	100%	100%	100%	100%	100%	100.00%	100%
FACULTY								
Bike	3.2%	4.9%	4.7%	3.3%	3.3%	3.3%	3.0%	**4.1%**
Walk	3.2%	4.9%	4.7%	3.3%	3.3%	3.3%	3.0%	**3.7%**
Drive Alone	71.0%	63.4%	49.4%	47.5%	53.4%	45.1%	4.3%	**48.7%**
Carpool	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	**6.1%**
Bus	22.7%	26.8%	41.1%	45.9%	40.1%	48.4%	9.7%	**17.2%**
Commuter Rail	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	**0.0%**
Electric Vehicle	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	**0.2%**
Light Rail	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	**1.0%**
Telecommuting	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	80.0%	**19.0%**
Total	100%	100%	100%	100%	100%	100%	100.00%	100%
STAFF								
Bike	3.2%	4.9%	4.7%	3.3%	3.3%	3.3%	3.0%	**4.1%**
Walk	3.2%	4.9%	4.7%	3.3%	3.3%	3.3%	3.0%	**3.7%**
Drive Alone	29.5%	30.0%	24.7%	23.6%	22.5%	22.8%	31.1%	**44.9%**
Carpool	9.6%	5.2%	4.6%	4.0%	3.6%	6.4%	0.0%	**6.1%**
Bus	54.6%	55.0%	61.2%	65.9%	67.3%	64.3%	12.9%	**17.2%**
Commuter Rail	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	**0.0%**
Electric Vehicle	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	**0.2%**
Light Rail	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	**1.1%**
Telecommuting	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	50.0%	**22.7%**
Total	100%	100%	100%	100%	100%	100%	100%	100%

On-Campus Housing: As illustrated in Figure 4 and Figure 13, in FY22, Pitt's on-campus residence halls housed 7,342 students, with 118 students near campus in hotel rooms leased by the University; due to the Pittsburgh campus's urban density, all of these students are assumed to commute via active modes (walking and biking).

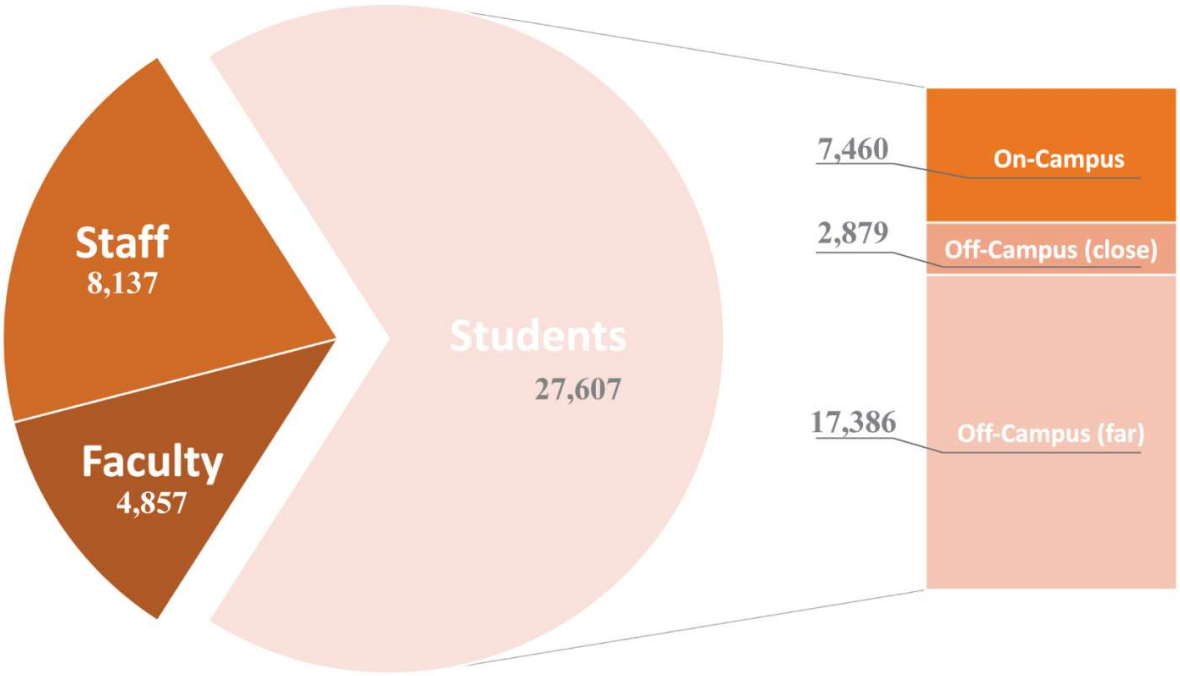


Figure 13 - Pittsburgh Campus Population (FTE)

Active Commutes: In addition to students living on-campus, students, faculty, and staff living off campus also commute via walking, biking, and via scooter (Table 11). In FY22, the Pittsburgh campus offered 393 bike racks providing 1,404 lockable bike spaces (Table 12). Additionally, Pitt continued its bike share partnership with POGOH, providing all Pitt students and employees free and unlimited 30-minute rides on Pittsburgh's bike share system(University of Pittsburgh, 2023a).[19]

Table 12 - Vehicle & Bike Parking Locations, Year-to-Year Comparison

Category	Previous Fiscal Years							Current FY
	FY08	FY11	FY14	FY17	FY19	FY20	FY21	FY22
VEHICLES & LOCATIONS								
Parking								
Garage	4,437	2,563	2,299	2,597	2,802	3,126	2,757	**3,326**
Lot	-	1,833	1,733	1,784	1,867	1,832	1,067	**1,092**
Metered *(4Hours Parking)*	-	1,833	1,733	1,784	1,867	1,832	-	**-**
Bike								
Total Racks	-	181	178	182	182	187	187	**393**
Number of Spaces	1,000	1,670	1,600	1,136	1,136	1,173	1,173	**1,404**
Bike Locker Rental							18	**31**

[19] The University of Pittsburgh's POGOH bike share partnership has been in place since FY20, when only first year students had free access. From FY21 onwards, all Pittsburgh campus students and employees can take unlimited 30-minute rides on POGOH bike share at no cost to them..

Flex Work: The COVID-19 pandemic helped evolve and adapt the University of Pittsburgh's flexible work policy formalized the process for setting and reporting staff work from home.[20] Aggregate flex work tracking by Pitt HR has informed the GHG inventory since FY21 helping inform assumptions about avoided commutes; it is also integral to quantifying telework in FY22 and moving forward. Using past building access data and Fall 2022 commuter survey responses, flex work decreased substantially in FY22 compared to FY21.

Transit: Pitt's Pittsburgh campus is transected by numerous transit routes and the University has a long-term partnership with Pittsburgh Regional Transit that allows all Pitt students and employees to ride for transit free with their Pitt ID. Pre-pandemic, transit had the largest number of Pitt commuters out of all transportation modes. In FY22, transit used by Pitt community members was up compared to the heavily pandemic-influenced FY21 transit use, but getting closer to pre-pandemic values (Table 11). Assumptions were based on Fall 2022 Pitt Commuter Survey (University of Pittsburgh, 2023b).

Personal Vehicles: Regardless of commuting mode, the average commuting distance for Pitt employees is assumed to be10 miles, which is applied in SIMAP to carpools, vanpools, and single occupancy vehicles.[21] For context, the number of total parking spaces and parking permits on the Pittsburgh campus are provided in Table 12 and Table 13.

Table 13 - Pitt Parking Permits & Commute Mileage Assumptions, Year-to-Year Comparison

Category	Previous Fiscal Years							Current FY
	FY08	FY11	FY14	FY17	FY19	FY20	FY21	FY22
PERMITS								
Carpool								
Passengers	382	188	164	159	161	334	191	**236**
Average Milage	12	11	12	11	30	10	10	**10**
Vanpool								
Vans	10	9	9	7	7	7	5	**2**
Passengers	65	57	67	53	49	47	4	**10**
Average Milage	23	24	23	29	30	29	40	**40**
Permit								
Number	3,058	3,153	2,756	2,797	2,887	3,031	2,939	**3,267**
Average Milage	13	13	13	13	12	10	10	**10**
Total Average Mileage	13	13	13	13	12	10	10	**10**

To calculate commuting-related emissions, SIMAP inputs include data related to faculty, staff, and student commute travel distributions by transportation mode (explicitly split across those three Pitt designations); average distance traveled by each commute mode; the number of one-way trips every week; and the number of commuting weeks in the fiscal year. As a result of Pitt-specific

[20] Though not final until October 2, 2023, the University's Flex Work arrangement policy https://www.policy.pitt.edu/er-20-flexible-work-staff-student-workers-and-temporary-employees

[21] In 2020, Pitt IT analyzed home addresses of Pitt employees for the *Pitt Climate Action Plan,* setting the average commuting distance at 10 miles.

and data-informed assumptions, FY22 assumptions for Pittsburgh campus commuting is summarized below:

1) All students living on-campus and close to campus (1-mile radius) walk to campus for class and research.
2) No students telecommuted in FY22.
3) 22.7% of staff telecommuted.[22]
4) All faculty telecommute 1 day per week.[23]
5) Walking, biking, bus, driving alone, light rail, and carpool percentages are informed by Pitt's 2022 Commuter Survey results.
6) The same percentage of faculty and staff walk, bike, and carpool to campus.
7) 0.24% of faculty and staff drive an electric vehicle to campus.[24]

Although some of these assumptions generalize the different Pitt populations' commuting behaviors, they provide a relationship between known data (i.e., Table 13), commuter survey results, and final estimated modal distributions (Table 11). Of all categories in Pitt's GHG inventories, calculating impacts from Pitt's commuting continues to be one of the most challenging and should continue to be closely re-evaluated with each future inventory.

7.4 – Solid Waste

Pitt's solid waste is picked up and managed by Republic Waste Services. Landfilled waste is taken to a landfill with a methane recovery system (i.e., methane is trapped); the trapped methane is then traditionally processed for future use in electricity generation, but not on-site at the landfill. The same system has been used in all inventoried fiscal years except for FY08.

Pitt's solid waste stream data was provided by Facilities Management and is inclusive of campus-wide materials and waste management, including from Housing and Dining. In FY22, the Pittsburgh campus's total solid waste stream totaled 3,843 short tons,[25] an increase of 343 short tons from the previous FY. Alongside overall waste reduction, Pitt's percentage of materials recycled increased from 22% in FY21 to 27% in FY22. Nonetheless, **Pitt's GHG emissions from solid waste for FY22 totaled 1,445 MT CO_2e, a 2% increase from the previous FY (**Table 14).

[22] For FY22, Pitt HR provided aggregate flex work arrangement data for Pitt staff. Only staff have formal flex work arrangements; there is no official record of faculty flex work details.
[23] Faculty and student telecommuting was informed by University policy and practices post-COVID-19 pandemic.
[24] Percentage of electric vehicles equates to the percentage of personal electrical vehicles in Pennsylvania.
[25] All waste, materials, and food streams at Pitt and other U.S. universities are measured in short tons (known to most Americans as "tons"). Except for the Solid Waste and Food sections, all other "tons referenced in this report are metric tons.

Table 14 - Solid Waste & Recycling Rates - Year-to-Year Comparison

Category	Previous Fiscal Years							Current FY
	FY08	FY11	FY14	FY17	FY19	FY20	FY21	FY22
Solid Waste								
Landfilled (tons)	5,246	4,596	4,634	4,384	4,189	3,480	2,742	**2,804**
Recycled (tons)	1,543	1,572	1,764	2,406	2,512	1,900	759	**1,039**
% of Waste Recycled	23%	25%	28%	35%	37%	35%	22%	**27%**

7.5 – Wastewater

As in past years, wastewater was assumed to be equal to the amount of water consumed in campus buildings, utilizing water consumption data provided by Pitt Facilities Management. It is very difficult to measure the actual contribution of Pitt to Allegheny County's central wastewater treatment plant, which uses aerobic treatment of wastewater; this marginal contribution problem has been identified by other researchers.

In FY22 Pitt had 259.85 million gallons of wastewater, a 44% increase compared to the previous FY. GHG emissions resulting from treatment of Pitt's wastewater were 510 MT CO_2e, as shown in Table 15**, which only represents 0.3% of the total GHG emissions**.

The a notable increase in wastewater emissions from FY20 to FY21 is directly attributed to greater campus occupancy and resulting water use post-COVID-19 pandemic (Table 15).

Table 15 - Wastewater Produced & Relative GHG Emissions, Year-to-Year Comparison

Category	Previous Fiscal Years							Current FY
	FY08	FY11	FY14	FY17	FY19	FY20	FY21	FY22
EMISSIONS								
Wastewater (MT CO2 eq)	1,500	1,400	136	104	102	107	353	**510**
CONSUMPTION								
Sewage (1000 gal)	278,350	246,450	280,055	240,165	236,027	201,772	179,836	**259,850**

7.6 – Paper

Communication is vital for all organizations, but doing so with the printed word is essential for large educational facilities; however, the need to physically print material on paper has drastically evolved over the past decade. While tracking GHG emissions from paper is not mandatory under the *GHG Protocol*, Pitt's GHG Inventory has always included it. Pitt Purchasing provides information regarding the quantity of purchased paper in regular, recycled, and carbon neutral varieties.

Since FY08, Pitt has made great strides in both reducing the quantity of paper used and increasing percentages of recycled content and carbon neutral paper. While percentages of overall recycled content varies widely over time, the overall trend has been upward. Total paper use has also varied quite widely, previously due to more comprehensive accounting starting in FY17 and recently due to greater adoption of digital documents reinforced by the COVID-19 pandemic.

In FY22, Pitt purchased 156,390 pounds of paper, with recycled and carbon neutral content totaling 35% (Table 16**). Paper purchasing increased 5 from FY21, but FY22 is still 86% below the baseline year of FY08.** Alongside the decrease in paper use, recycled content use decreased, down to 35% in FY22 from 45% in FY21; the decreases in recycled content is attributed to a reduced availability of both recycled content and carbon neutral paper in supply chains.[26] **As shown in Table 16, Pitt's FY22 total GHG emissions from paper are 214 MT CO_2e (and 0.1% of total emissions).**

Table 16 - Paper Purchased and Relative Emissions - Year-To-Year Comparison

Category	Previous Fiscal Years							Current FY
	FY08	FY11	FY14	FY17	FY19	FY20	FY21	FY22
PAPER								
Total Paper (lbs)	1,113,740	730,725	1,488,165	1,787,020	682,820	461,418	148,880	**156,390**
Overall recycled Content (%)	4%	21%	9%	19%	34%	51%	45%	**35%**
Paper (MT CO2 eq)	1,600	1,500	1,949	2,441	729	509	167	**214**
Emissions (% of the total)	0.6%	0.6%	0.8%	1.1%	0.3%	0.3%	0.1%	**0.1%**

7.7 – Food

The Scope 3 Food category was first accounted for in Pitt's FY21 GHG Inventory. The University has an incredibly complex food service landscape. Compass Group (aka Chartwells) is Pitt's current food vendor, managing most campus dining and retail food facilities, including dining halls, Athletics food, the University Club, and catering;[27] the Pittsburgh campus serves more than 30,000 meals daily across all of its dining locations.

To advance food system sustainability, Pitt has committed to multiple initiatives:

1) **Real Food** - In March 2015, the University of Pittsburgh committed to the Real Food Challenge (Pitt Sustainability, 2015; Real Food Challenge, 2022), with a goal of serving 20% local, fair, ecologically sound, and humane foods by 2020. In 2018, Pitt Dining announced it had met the 20% by 2020 goal for the University's primary dining hall, and the 2018 *Pitt Sustainability Plan* set a new goal of 25% Real Food campus-wide by 2025.
2) **Cool Food** - In September 2019, Pitt joined the Cool Food Pledge to cut food-related GHG emissions by 25% by 2030 (to be accomplished by increasing plant-forward and -based meal choices, changing and reducing the amount of animal products served across campus, etc.) (Cool Food, 2022; Pitt Sustainability, 2019). As part of the Cool

[26] In the FY19 & 20, the large increase in recycled and carbon neutral content paper was due, in part, to Pitt's newly emphasized TreeZero paper offering, a carbon neutral paper product offered for a price less than virgin paper (accounted for as 100% recycled content in SIMAP) (treezero, 2022); TreeZero paper stopped being available sometime in FY22.

[27] A second, separate company (Saxby's) managed two (2) campus coffee shops in FY21.

Food Pledge, the University initiated began working with the World Resources Institute to analyze its food purchasing data for each successive Calendar Year (CY).[28]

3) **Food Recovery -** Pitt has been a Food Recovery Verified campus since 2017 (Food Recovery Network, 2021). Food is recovered from a number of campus dining and retail food locations and donated to the Pitt Pantry and local nonprofits fighting hunger (Pitt Sustainability, 2022a).

Data on purchased food was collected and reflected in Table 17.

Table 17 - Food Purchased, Year-to-Year Comparison

Category	Previous Fiscal Years	Current FY
	FY21	FY22
FOOD PURCHASED		
Total Purchased (kg)	941,092	**1,541,840**
Ruminant Meats	41,567	**48,100**
Dairy	182,823	**264,352**
Pork	13,237	**32,609**
Poultry	59,717	**127,852**
Seafood	4,908	**7,660**
Eggs	21,390	**53,835**
Other animal-based foods	-	**-**
Grains	144,950	**320,704**
Legumes/nuts/seeds	37,387	**80,626**
Plant-based milk subs.	7,864	**15,781**
Fruits & vegetables	283,101	**295,553**
Roots/tubers	90,439	**159,343**
Added sugars	21,841	**88,475**
Vegetable oils	13,602	**20,615**
Alcohol, stimulants, spices	18,267	**26,336**

Pitt's total GHG emissions from food were 5,141 MT CO_2e in FY22, or 3% of total GHG Emissions. This is an 80% increase from FY21, likely due to greater campus occupancy from students and employees being on campus more regularly as the COVID-19 pandemic were waned.

Data on purchased food is available for CY17, CY19, CY20, and CY21.[29] Because food data is only available in calendar year, this FY22 analysis assumes that the food purchased in FY22 was equal to food purchased in CY21 (1,542 short tons). The same practice was used for the FY21 inventory (which used CY20 food data).

[28] The Cool Food Pledge also helps Pitt achieve its 2018 *Pitt Sustainability Plan* goal of serving "meals that put plants at the center of the plate by decreasing the amount of animal-derived products sold by 25% by 2025 (from 2017 baseline)."

[29] While CY17 food purchasing data is available, it was not converted to associated GHG emissions.

7.8 – Sinks

SIMAP has a "Sinks" section, which includes data entry for compost, carbon offsets, and non-additional sequestration (e.g., carbon storage from campus forests and soils). When included, the entire Sinks category reduces the University's GHG footprint. Compost data includes total materials composted from both dining and agriculture (landscaping). Carbon offsets include projects an organization completes above and beyond business-as-usual that will reduce its carbon and/or nitrogen footprint (e.g., reforestation or biogas projects); offset projects can be on- or off-campus and do not require certification in order to be included in this section (treezero, 2022; unhsimap, 2022b, 2022c).

Pitt's renewable energy certificates (RECs) are not carbon offsets, but third-party verified "sinks," which significantly reduce Pitt's total Scope 2 and net carbon emissions, as highlighted in Section 6.2 – Purchased Renewable Electricity.

Compost: Composting was included for the first time in the FY19 GHG inventory. In FY22, 72 short tons of compostable materials were diverted from campus, including food service, events, and select campus buildings (Table 18); this is a decrease from previous years, in part resulting from , part of the solid waste data being missing, including yard waste data (Section 7.4 – Solid Waste). Additionally, this decrease is attributed to a slightly lower reduction in campus occupancy (e.g., from flex work) and a resulting smaller number of events and meals served in FY22.

Table 18 - Composting Year-to-Year Comparison

Category	Previous Fiscal Years					Current FY
	FY08	FY17	FY19	FY20	FY21	FY22
FOOD (short tonnes)						
Food Recovered	-	3	6	9	12	**23**
Food Composted	-		94	176	88	**72**
OTHERS (short tonnes)						
AgRecycle and Pittsburgh Garden Company	-	142,780	345,480	145,460	182,680	**46,663**
Yard Waste	-	170,000	140,000	6,000	102,000	**384,000**

Offsets: The University of Pittsburgh has not directly procured or created carbon offsets to-date; it also did not account for upstream carbon offsets (i.e., offsets resulting from other companies' providing carbon neutral products or services) in FY22. Future inventories should continue to investigate these upstream emissions and their possible future inclusion. The University's strategic carbon offset approach is delineated in the 2022 *Pitt Climate Action Plan*.

7.9 – Fuel & Energy Related Emissions

For this FY22 GHG Inventory, the "Fuel and Energy Related Activities" (FERA) category is new, being added by SIMAP in 2023 – and thus applicable to the results of this FY22 GHG Inventory. FERA will be regularly included in Pitt GHG Inventories moving forward.

Pitt's total FY22 GHG emissions from FERA were 14,122 MT CO_2e, or 8% of total Pittsburgh campus GHG Emissions. The FERA category includes emissions from 4 types of fuel- and energy-related activities:

1) Upstream emissions of purchased fuels
2) Upstream emissions of purchased electricity
3) Transmission and distribution (T&D) losses
4) Generation of purchased electricity sold to end users

SIMAP automatically calculates FERA for all reported Scope 1 stationary fuels (i.e., natural gas, fuel oil, coal, electricity, solar, and wind); however, SIMAP has not yet built in FERA calculations for mobile fuels). Transmission and distribution losses for electricity are separately calculate din Scope 2; additional FERA emissions associated with purchased electricity have not yet been included into SIMAP as of this report). Upstream Scope 3 FERA emissions factors are also not yet included for the following Scope 1 stationary sources: propane, incinerated waste, wood chips, wood pellets, grass pellets, residual bioheat, and distillate bioheat; of these fuels, the University of Pittsburgh only uses propane for shuttles, so it is a very small exclusion currently.

8 - Results

Pitt's FY22 GHG emissions totaled 178,656 MT CO_2e. The distribution of these emissions by source is presented in Figure 14; for context, Appendix C includes all past GHG Inventory results.

To help further contextualize these results, Table 19 compares Pitt's GHG emissions for all GHG inventories, including total CO_2e emissions normalized by number of students, total number of the University community members, and gross building square footage. Emissions are decreasing in every normalized category, reflecting ongoing and steady GHG emissions reductions by the University.

Overall, the Pittsburgh campus saw an 4.8% increase in net GHG emissions in FY22 compared to FY21 (which was drastically impacted by the COVID-19 pandemic). However, **compared to the FY08 baseline, there was a 37% decrease in GHG emission**.

Compared to FY21 results Scope 1 emissions are down 5.7%, Scope 2 emissions down 16.2%, and Scope 3 emissions up 112.5%; obviously Scope 3 emissions were the most impacted by the COVID-19 pandemic and thus rebounding, but still below pre-pandemic values) (Table 19 and Figure 15).

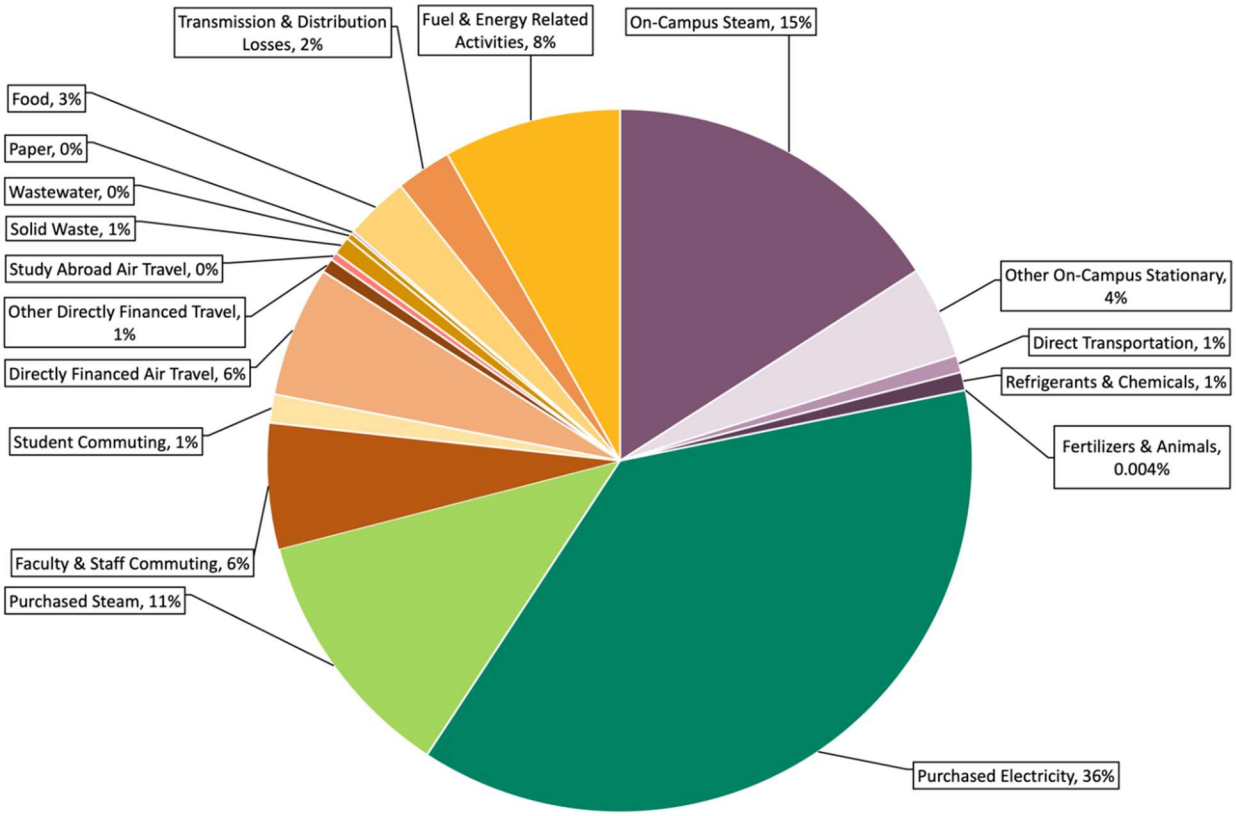
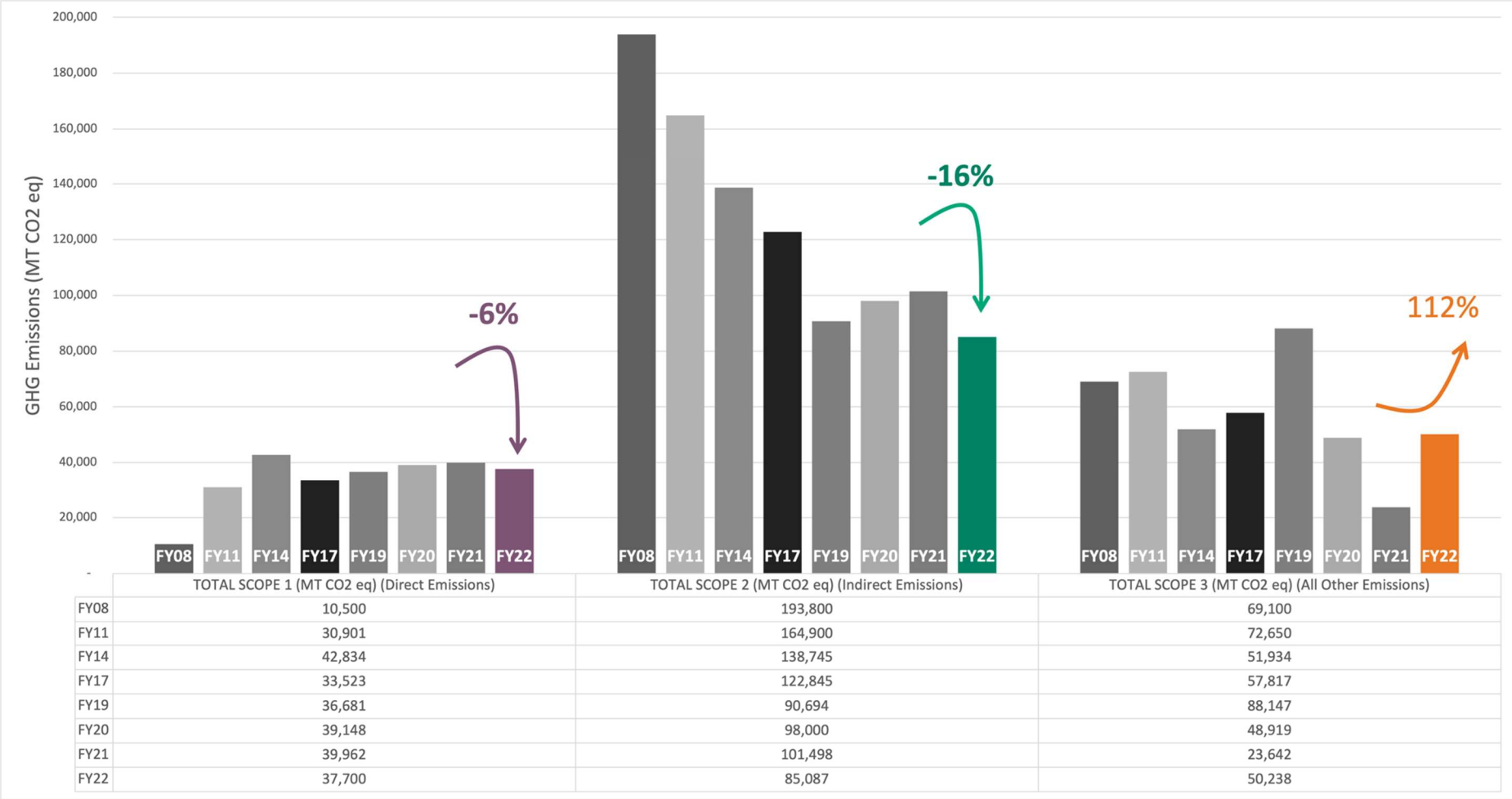


Figure 14 - Pitt FY22 GHG Emissions by Source

Table 19 - Pitt FY22 GHG Emissions Normalized by Students, Total Population, & Building Space

Category	Previous Fiscal Years							Current FY
	FY08	FY11	FY14	FY17	FY19	FY20	FY21	FY22
NORMALIZATIONS								
Students (MT CO2 eq / FTE Students)	11.0	10.0	9.0	8.2	7.5	7.0	6.2	**6.5**
Pitt Community Members (MT CO2 eq / Person)	8.4	7.7	6.9	6.2	5.8	4.7	4.2	**4.4**
Building Space (MT CO2 eq / 1,000ft2)	29.1	27.8	22.9	21.0	18.6	16.0	14.1	**16.2**



	TOTAL SCOPE 1 (MT CO2 eq) (Direct Emissions)	TOTAL SCOPE 2 (MT CO2 eq) (Indirect Emissions)	TOTAL SCOPE 3 (MT CO2 eq) (All Other Emissions)
FY08	10,500	193,800	69,100
FY11	30,901	164,900	72,650
FY14	42,834	138,745	51,934
FY17	33,523	122,845	57,817
FY19	36,681	90,694	88,147
FY20	39,148	98,000	48,919
FY21	39,962	101,498	23,642
FY22	37,700	85,087	50,238

Figure 15 - Pitt GHG Emissions by Scope, Year-to-Year Comparison

8.3 – Comparison of Results with Peer Institutions

To help contextualize and compare the University of Pittsburgh's GHG emissions with other higher education institutions, all benchmarked schools are assumed to include at least all Scope 1 and 2 GHG emissions. Though net GHG emissions can be compared across institutions, this strategy can lead to misleading conclusions, as every school has different student enrollment, total campus population, building square footage, and educational and research activities. Thus, to help compare across institutions, net emissions are also normalized below.

Table 20 shows Pitt's performance with select peer institutions; public SIMAP reports and university GHG inventories were referenced for all values (unhsimap, 2022a).

Table 20 - Higher Education Institution Peer Group Benchmarking for GHG Emissions, Sorted by Net Emissions

Category	PEER GROUP BENCHMARKING FOR GHG EMISSIONS - Sorted By Net Emissions			
HIGHER EDUCATION INSTITUTION	**FY OF REFERENCE**	**Net Emissions (MT CO2 eq)**	**Students (MT CO2 eq / FTE Students)**	**Building Space (MT CO2 eq / 1,000ft2)**
Ohio State University	2022	499,253	8.84	19.47
Pennsylvania State university University Park	2020	369,292	8.03	-
University Of Pittsburgh	**2022**	**173,006**	**6.27**	**15.69**
Duke University	2021	171,808	10.56	10.33
University of Pennsylvania	2022	159,129	6.91	9.84
Cornell University	2022	147,124	6.33	9.29
University of Maryland - College Park	2021	124,555	3.34	7.91
Case Western Reserve	2022	110,786	10.60	13.03
Ohio University - Athens Campus	2022	109,095	5.37	1.32
Georgia Southern University	2022	97,950	4.00	13.29
Duquesne University	2022	54,278	-	6.65
Villanova University (Scopes 1&2)	2021	40,546	4.31	8.34
Carnegie Mellon University (Scopes	2021	34,064	-	-
Chatham University	2018	8,031	3.88	7.30

9 - Recommendations & Conclusions

As with all GHG inventories, assumptions were required to complete analysis for some categories studied in this FY22 GHG Inventory. Despite having a good basis for assumptions from the previous seven inventories, assumptions for this FY22 study were required; these assumptions were made using the SIMAP tool, external sources and references, and the authors' best judgment; regardless, some categories may lack accuracy, precision, and/or may have under or overestimation of their associated emissions. Across all inventory years, the Commuting category

requires the most assumptions; however, this year is the most accurate thus far, as it is informed by the results of the University's 2022 Commuter Survey. Still, lingering COVID-19 pandemic influences impacted FY22 commuting, including relating to flex work and other commute modes. Future commuting considerations will continue to be informed by the Pitt Commuter Survey 2022 and other data-based mechanisms.

Future Pitt GHG inventories should continue to reduce assumptions whenever possible, including via referencing additional studies, reports, and surveys. As the annual GHG Inventories for the Pittsburgh campus are now performed, future process improvements summarized in Table 21 should be easier to integrate. Additionally, more detailed recommendations are provided below by category.

Steam: The University's FY08 GHG benchmark year was strategically selected prior to operation of the Carrillo Street Steam Plant to help benchmark that decision and its impacts. In FY22, there was an 11% decrease in steam produced by CSSP (compared to FY21), paralleled by an 11% increase in steam purchased from BBP. This is the lowest percentage of steam produced from the CSSP since FY19 -- and only the second time the percentage of steam produced by CSSP has decreased, requiring more steam to be purchased from BBP. This shift was due to unexpected CSSP maintenance. The University prefers to produce steam at CSSP (versus buying it from BBP) because CSSP is more efficient and has fewer distribution losses due to its closer proximity to most campus buildings. Additionally, the efficiency of both steam plants decreased in FY22 compared to prior years, down to 82.2% at CSSP and 82.1% at BBP; this is the most similar the efficiencies have ever been (Figure 5).

Electricity: Over the 14-year period of Pitt's GHG inventories, Purchased Electricity has been (and remains) the largest source of emissions, contributing ~ 37.4% of the Pittsburgh campus's total FY22 GHG emissions. Effects of regional electricity grid source changes across the seven inventories are demonstrable, with a shift away from coal-fired electricity generation to natural gas, nuclear, and renewables. More directly under University influence, alongside focused efficiency efforts, Pitt also began purchasing larger amounts of renewable energy for its electricity consumption (via both direct procurement and renewable energy credits), helping r**educing GHG emissions from Purchased Electricity 53% since FY08 and 22% compared to FY21.** Pitt's electricity consumption has also decreased 11% between FY08 and FY22, despite increases in occupied building square footage. University investments in renewable electricity decreased in FY21 due to COVID-19 pandemic fiscal constraints. The only solar generation on campus in FY22 produced 2,855 kWh of renewable electricity, a 34% decrease compared to FY21 (Figure 9).

To continue to reduce GHG emissions from Purchased Electricity and overall, the University should continue to aggressively pursue both building energy efficiency strategies and produce and purchase more renewably-sourced electricity (in line with its *PittCAP* goals to produce or procure 50% renewables by 2030 and 100% by 2037).

Air Travel: As expected, in FY22, domestic and international air travel expectedly rebounded from COVD-19 pandemic. Improved data accounting continued in FY22, which allows for more confidence in this category; however, future attention to the full rebound magnitude is required to continue to keep overall associated emissions in this category low, as is inclusion of Athletics data. *PittCAP* considerations regarding air travel offsets should also be implemented, while sustainable aviation trends that help reduce global emissions by the air travel sector should also be monitored.

Ground Travel: Personal vehicle travel reimbursements should be re-included in future GHG inventories.

Commuting: Assumptions were and will continue to be required to calculate GHG emissions resulting from Pitt employee and student commuting. To minimize assumptions, the University ran its own Fall 2022 commuter survey that was used to inform this FY22 inventory –and future inventories moving forward. Assumptions regarding faculty flex work and parking (on-campus and off-) should also be reviewed, alongside updated transit ridership and POGOH bike share utilization data.

Water & Wastewater: Wastewater represents the 0.3% of FY22 emissions. Water use increased in FY22 compared to FY20 and FY21, likely due to increased on-campus occupancy. Although water consumption is not a focus of this GHG inventory, as local water and sewage rates increase and due to the connection between water and energy, future inventories can help assess campus water usage trends, which are off track from *Pitt Sustainability Plan* reduction goals (Pitt Sustainability, 2023).

Study Abroad: Though study abroad' s contributions to Pitt's GHG emissions were down dramatically in FY20 and FY21, the FY22 rebound in this category was an expected 310% increase from FY21. As further rebound in this category is expected, it remains essential for the University to be aware of its large impact on GHG emissions and ensure data collection and reporting is solid.

Building Energy Conservation & Efficiency: Facilities Management continues its decades of building energy and water efficiency and conservation by performing in-depth energy and water audits and upgrade projects in campus buildings. Over the years, this process has identified (and continues to adapt the list of) which buildings have the largest and/or most impactful opportunities for energy and water consumption reductions. As retrofits are implemented more deeply and widely, these detailed building audits and resulting efficiency projects are crucial to helping reduce campus-wide energy use and GHG emissions. Given Pitt's goals to reduce energy and water use intensity 50% below baselines by 2030, the University should expedite additional energy and water conservation projects (as explained in the *PittCAP*) and expand efforts to include the regional campuses.

Future: Future GHG inventories should consider including contributions and reductions from the following sources, which have not been collected in any prior inventory, but could substantially contribute:

1) Carbon offsets overall and in Pitt's Scope 3 supply chains, specifically for Air Travel and/or otherwise acquired.
2) Scope 3 categories including, but not limited to:
    a) Properties not owned by, but fully leased by the University;
    b) Student travel to / from home;
    c) Purchased goods and services; and
    d) Capital goods.

3) Separate inventories for the four Pitt regional campuses in Bradford, Greensburg, Johnstown, and Titusville.[30]

Table 21 - Pitt FY22 GHG Inventory Results Comparison & Recommendations

Category		Previous FY	Current FY		Reason(s) For Change	Recommendation
SCOPE	SOURCE CATEGORY	FY21 MTCO2e	FY22 - MTCO2e	% Change From Previous		
1	On-Campus Steam	29,644	27,532	-7%		Amplify system level and building use efficiency products to drive down consumption.
1	Other On-Campus Stationary	8,167	7,348	-10%		
1	Direct Transportation	1,506	1,364	-9%		Electrify shuttles.
1	Refrigerants & Chemicals	644	1,450	125%	Higher GWP Refrigerants purchased	
1	Fertilizers & Animals	1	7	783%	Wrong Data Accounting Since FY08	
	TOT S1 (MT CO2 eq)	39,962	37,700	-6%		
2	Purchased Electricity	85,544	64,777	-24%	Decrease due to lift of ventilation regulations related to the COVID-19 pandemic	Continue to advance renewable procurement in line with or exceeding University-wide goals. Install more on-campus renewables.
2	Purchased Steam	15,954	20,310	27%	Increase in BBP purchased steam	
	TOT S 2 (MT CO2 eq)	101,498	85,087	-16%		
3	Faculty & Staff Commuting	5,672	9,961	76%	Increase due to post-pandemic increased campus attendance	Assumptions regarding flex work and parking should be reviewed. Update transit ridership and POGOH bike share utilization data based on Commuting Survey.
3	Students Commuting	2,927	2,264	-23%	Increase due to post-pandemic increased campus attendance	Assumptions regarding flex work and parking should be reviewed. Update transit ridership and POGOH bike share utilization data based on Commuting Survey.
3	Directly Financed Air Travel	4,018	10,400	159%	Increase due to post-pandemic increased campus attendance	Sustainable aviation trends should be monitored. PittCAP considerations to be implemented
3	Other Directly Financed Travel	683	1,140	67%	Increase due to post-pandemic lifted travel restrictions	Sustainable aviation trends should be monitored. PittCAP considerations to be implemented
3	Study Abroad Air Travel	153	626	310%	Increase due to post-pandemic lifted travel restrictions	Sustainable aviation trends should be monitored. PittCAP considerations to be implemented
3	Solid Waste	1,413	1,445	2%	Increase due to post-pandemic increased campus attendance	Ongoing in-depth energy and water audits and upgrade projects in campus buildings
3	Wastewater	353	510	44%		Ongoing in-depth energy and water audits and upgrade projects in campus buildings
3	Paper	167	214	28%	Increase due to post-pandemic increased campus attendance	Keep print utilization down while increasing responsible sourcing.
3	Food	2,861	5,141	80%		
3	T & D Losses	5,395	4,417	-18%		
3	FERA	-	14,122	-	New Voice Added in FY22	
	TOT S 3 (MT CO2 eq)	23,642	50,238	112%		
	ALL EMISSIONS (MT CO2 eq)	165,101	173,025	5%		

9.2 – Conclusions

The University of Pittsburgh's GHG emissions for the Pittsburgh campus for Fiscal Year 22 **totaled 173,006 MT CO_2e from all accountable sources** (122,787 MT CO_2 eq from Scope 1

[30] Regional inventories for the Bradford campus was started in Summer 2022 and expected to finish by 2024.

and 2 alone). While a 36.7% reduction compared to FY08, FY22 did see an increase of 4.8% compared to the COVID-19 pandemic-influenced FY21.

Pitt's Scope 1 emissions decreased by 5.7% between FY21 and FY22, but are up 2.8% from the pre-pandemic FY19, ostensibly due to better data collection and an increase in both building square footage and campus population.

Scope 2 emissions decreased by 16.2% between FY21 and FY22, and are also down 6.2% compared to FY19. Generally, a continued decrease in Pitt's Scope 2 GHG emissions reflects the University's continued commitment to building efficiency and utility use reduction, alongside an increase in renewable electricity procurement.

The University should continue its focus on building efficiency for new and existing buildings, including elevating its carbon strategy towards neutrality by 2037 as delineated in the *Pitt Climate Action Plan*. Even though emissions are down from purchased electricity, natural gas use, and fleet vehicles (including shuttles), constant attention and continued focus on reducing emissions in these categories further is necessary.

Categories most obviously rebounding from the COVID-19 pandemic included commuting, directly financed travel, and study abroad. **The University should continue to focus on both reducing overall steam consumption and decreasing Scope 3 emissions, both of which are large portions of Pitt's overall carbon footprint**.[31]

While Scope 3 emissions increased 112.5% compared to the pandemic-influenced FY21, Scope 3 emissions overall are still 43% below pre-pandemic FY19 values.

While commuting emissions were up 42.2% compared to FY21, commuting-related emissions are down 35% compared to the FY08 baseline year, which is a strong result. Compared to FY21, GHG emissions due to paper were up 28% in FY22; nonetheless, paper purchasing overall is down 87% compared to the FY08 baseline year, so a strong example of maintainable Scope 3 reductions.

Categorical GHG emissions reductions between FY22 and FY19 should be considered a new trend, with special attention paid to keeping pandemic and/or action-influenced categories from further rebounding.

[31] Efforts by Purchasing implemented at the end of FY22 forward to include carbon emissions data when flights are booked by campus stakeholders is a good example of positive behavior change opportunities in the Scope 3 category. (University of Pittsburgh, 2023c)

APPENDIX A: Pitt FY22 GHG Inventory Data Contacts

Meetings and communications with University of Pittsburgh employees from multiple departments is required in order to gather the data required for the annual GHG inventorying process. Table 22 tallies the individuals graciously providing data and information for specific GHG Inventory categories; the authors are incredibly thankful to these individuals, who are integral parts of helping the University of Pittsburgh track and reduce its carbon footprint.

Table 22 – Pitt FY22 GHG Inventory Data Contacts

CATEGORY	CONTACT NAME	CONTACT TITLE	PITT DEPARTMENT	GHG CATEGORY
Athletics	Ryan Varley	Associate Athletic Director of Business Services	Athletics	All Athletics Travel Information (FY17 Excel sheet details what was given before)
	Dustin Gray	Executive Associate Athletic Director for Administration	Athletics	
Budget	Cyndee Pelt	Chief of Staff & Senior Vice Chancellor/ & Chief Financial Officer	Office of Chief Financial Officer	Budget and Financials
Facilities	Lela Loving	Energy Analyst	Facilities Management	Building List with Utilities & Physical Measurements, Steam Production, Electricity Fuel Mix, Natural Gas, Wastewater, RECs, LEED Projects List
	Wayne Eakin	Hazardous Material Specialist	Environmental Health and Safety	Refrigerants & Chemicals
	Ernest Robinson	Senior Manager, Custodial Services		Landfill & Recycling Weights
Fertilizers	Andy Moran (Andrew Moran)	Senior Manager	Grounds, Facilities Management	Fertilizer
Food	Nick Goodfellow	Sustainability Coordinator	Food	Food Purchased FY21, Food Composted, and Recovered
Fuel	Jeffrey Scott Yeaman	Senior Manager of Parking, Transportation, Services	Parking, Transportation, & Services	University Fleet, Fuel Usage, Commuting Data, Carpool & Vanpool
	Corey Anne Robinson			
	Keith Duval	Environmental Manager	Environmental Health and Safety	Natural Gas and Generator Use
Housing	Bannister, Julie Michelle	Assistant Vice Chancellor for Auxiliary Services	On_Off campus students/buildings	Housing
	Nick Goodfellow			
	Ilona Beresford	Director of Projects and Planning		
Leases	Jodi Cardone	Director of Real Estate Administration	Business and Operations	Leases
	Kumar Anish	Vice Chancellor for Real Estate		
Paper	Jennifer Barnes	Supplier Diversity & Sustainability Coordinator	Purchasing Services	Paper
Parking	Jonathan Pearson & Jeff Yeaman & Corey Robinson		Parking, Transportation, & Services	Parking, Carpool, Vanpool, University Fleet
Population	Jason Killmeyer	HRIS Director	Office of Human Resources	Population
Study Abroad	Nazir Noori	Deputy Director of Operations	Center for International Studies	Study Abroad Air Travel
Sustainability	Aurora Sharrard	Director of Sustainability	Office of Sustainability	Renewable Energy, RECs
Travel	Emily Duchene	Travel Program Manager	Purchasing Services	Airfare and Bus/Rail Travel

APPENDIX B: University of Pittsburgh Fiscal Year 2022 Pittsburgh Campus Owned and Operated Properties

In FY22, the Pittsburgh Campus of the University of Pittsburgh managed 148 buildings covering 11.03 million sq. ft. This is 935,147 sq. ft. less than FY21, mainly due to the demolition of the O'Hara Parking Garage (140,000 sq. ft.) for the upcoming Recreational & Wellness Center.

Table 23 – Pitt Building List, Parts 1 & 2

BUILDINGS FY22	
Building Name	**Gross sq. ft.**
Amos Hall	68,000
Bouquet Gardens A-H	-
Bouquet Gardens A-J	-
Bouquet Gardens A	19,708
Bouquet Gardens B	19,708
Bouquet Gardens C	19,708
Bouquet Gardens D	19,708
Bouquet Gardens E	19,708
Bouquet Gardens F	14,781
Bouquet Gardens G	19,708
Bouquet Gardens H	19,708
Bouquet Gardens J	64,800
Brackenridge Hall	55,569
Bruce Hall (Housing)	63,006
Centre Plaza Apartments	138,600
College Gardens Apartments	297,510
Darragh Street Housing	102,217
Forbes Craig Apartments	43,554
Forbes Pavilion	87,114
Offices+Graphics)	-
Franklin Complex	50,753
Fraternity Housing Complex	73,600
Holland Hall	136,958
Hyacinth Place Apartments	25,967
Edward H. Litchfield Towers	465,393
Lothrop Hall	241,770
Mark A. Nordenberg Hall	200,471
Mark A. Nordenberg Hall - Wellness Ctr	-
Mark A. Nordenberg Hall - PNC Bank	-
Mayflower Apartments	14,940
McCormick Hall	43,686
Oakwood Apartments	14,886
Panther Hall	161,542
Pennsylvania Hall/ K. Leroy Irvis Hall	127,835
Ruskin Hall	120,000
Sutherland Hall	223,903
University Club	85,000
Craig Hall Garage	10,409
Wesley W. Posvar Hall Garage	203,746

BUILDINGS FY22 Continued 1	
Building Name	**Gross sq. ft.**
Craig Hall Garage	10,409
Wesley W. Posvar Hall Garage	203,746
Sutherland Hall	223,903
University Club	85,000
Craig Hall Garage	10,409
Wesley W. Posvar Hall Garage	203,746
GSPH Garage	56,941
Halket/Iroquois Lot	-
Joncaire/Boundary Lot	-
Langley Hall Garage	6,904
Information Sciences Garage	38,499
OC Garage	106,629
Soldiers & Sailors Garage	344,626
Sennott Square Garage	See Sennott Sq
Thomas Boulevard Parking	-
3343 Forbes	25,122
3401 Boulevard of the Allies	63,888
480 Melwood St.	44,562
530 Melwood (Motor Pool)	8,200
Allegheny Observatory	30,017
Allen Hall	58,026
Alumni Hall	162,970
Athletic Fields Building	1,312
Bellefield Hall	107,545
Benedum Aud.	19,586
Benedum Hall	433,326
Benedum Hall - Food Services	-
Benedum Hall - MCSI Addition	20,480
Center for Bioengineering	91,123
Cathedral of Learning	599,637
Cathedral of Learning - Chick Fil A	-
Cathedral of Learning - Food Services	-
Carrillo Street Steam Plant	23,500
718 Devonshire Ave.	16,000
Chevron Science Center	236,768
Chevron Science Center - Food Services	-
Chevron Science Center Addition	32,367
Child Development Center	24,517
Clapp Hall	85,893

Table 24 – Pitt Building List, Parts 3 & 4

BUILDINGS FY22 Continued 2	
Building Name	**Gross sq. ft.**
Computer Center (RIDC)	19,355
Charles L. Cost Sports Center	82,977
Craig Hall	55,115
Crawford Hall	87,637
David Lawrence Hall	57,956
Eberly Hall	56,051
Eberly Solvent Storage	380
Engineering Hall	67,859
Eureka Building	36,607
Falk School	28,213
Falk School Addition	38,000
Fitzgerald Field House	105,045
Fitzgerald Field House - Concession	-
Frick Fine Arts	73,088
Gardner Steel Conf. Ctr.	26,714
GSPH - Parran and Crabtree	227,908
GSPH Annex	57,000
Heinz Chapel	18,717
Hillman Library	252,778
Hillman Library - Food Services	-
Iroquois (SHRS)	60,000
Langley Hall	90,592
Langley Hall - Food Services	-
Barco Law Building	139,611
Barco Law Building - Food Services	-
Life Sciences Annex	50,000
Log Cabin	400
LRDC (Removed)	-
Mervis Hall	86,570
Mervis Hall - Food Services	-
Music Building	21,275
Van de Graaff (Nuclear Physics)	36,691
O'Hara Student Center	40,000
Parkvale Building	40,830
Parkvale Plaza	14,821
Petersen Events Center	430,000
Plum Borough Research Facility	41,139
Upper Campus Chilled Water Plant	-
Petersen Sports Complex	50,415

BUILDINGS FY22 Continued 3	
Building Name	**Gross sq. ft.**
Wesley W. Posvar Hall	513,893
Wesley W. Posvar Hall - Einstein Bagels	-
Wesley W. Posvar Hall - Food Prep	-
Lower Campus Chilled Water Plant	-
University Public Safety Building	23,200
Salk Hall Annex	128,767
Salk Hall Main	205,228
Salk Hall Addition	81,000
Sennott Square	248,000
Information Sciences Building	76,130
Space Research Coordination Center	41,849
Stephen Foster Memorial	27,182
Thackeray Hall	99,147
Thaw Hall	51,379
The Twentieth Century Club	54,340
Thomas Boulevard	192,000
Trees Field - Sports Dome	105,608
Trees Field - Sports Dome - Construction	-
Trees Hall	244,412
Victoria Hall	128,759
Victoria Hall - Food Services	-
William Pitt Union	178,726
William Pitt Union - Food Services	-
Biomedical Science Tower 3	326,000
McGowan Inst for Regen Medicine	45,000
Scaife Hall	474,881
Waiting for PSC, Updated GSF	3,273,966
Iroquois (Entire Bldg)	-
Schenley Quad (Total including vendors)	-
Child Day Care	-
Playing Fields	-
TOTAL SQ FT	**11,026,502.00**

APPENDIX C: University of Pittsburgh GHG Emissions Inventory Prior to Fiscal Year 2022

Table 25 - Pittsburgh Campus GHG Emissions - FY08, FY11, FY14, & FY17

Category		Previous Fiscal Years															
		FY08				FY11				FY14				FY17			
SCOPE	SOURCE CATEGORY	CO2 (kg)	CH4 (kg)	N2O (kg)	MT CO2 eq	CO2 (kg)	CH4 (kg)	N2O (kg)	MT CO2 eq	CO2 (kg)	CH4 (kg)	N2O (kg)	MT CO2 eq	CO2 (kg)	CH4 (kg)	N2O (kg)	MT CO2 eq
SCOPE 1	Co-Generation Steam	-	-	-	-	22,120,324	2,212	44	22,200	32,890,427	2,940	59	32,981	25,538,568	2,283	46	25,623
	Other On-Campus Stationary	9,135,679	913	18	9,200	5,675,832	568	11	5,700	6,368,762	569	11	6,386	5,227,507	467	9	5,245
	Direct Transportation	474,287	80	28	500	714,884	130	45	700	1,242,053	244	82	1,273	1,331,518	254	87	1,388
	Refrigerants & Chemicals	-	-	-	800	-	-	-	2,300	-	-	-	2,192	-	-	-	1,266
	Fertilizers & Animals	-	-	1	-	-	-	3	1	-	-	6	2	-	-	3	1
TOTAL SCOPE 1 (MT CO2 eq) (Direct Emissions)		9,609,966	993	47	10,500	28,511,040	2,910	104	30,901	40,501,243	3,753	159	42,834	32,097,593	3,004	144	33,523
SCOPE 2	Purchased Electricity	138,141,644	961	1,824	138,700	134,812,989	1,782	2,242	135,500	113,932,100	12,845	3,649	115,341	119,411,279	1,655	2,332	105,607
	Purchased Steam & Chilled Water	49,293,289	5,173	402	55,100	29,340,701	2,934	59	29,400	23,338,930	2,086	42	23,404	20,167,615	2,252	104	17,238
TOTAL SCOPE 2 (MT CO2 eq) (Indirect Emissions)		187,434,933	6,134	2,226	193,800	164,153,690	4,716	2,301	164,900	137,271,030	14,931	3,691	138,745	139,578,895	3,906	2,437	122,845
SCOPE 3	Faculty & Staff Commuting	13,342,553	2,189	774	13,600	14,377,434	2,336	827	14,700	9,706,561	1,002	379	9,845	12,073,458	1,152	446	12,433
	Students Commuting	5,124,457	375	157	5,200	5,484,669	389	165	5,500	6,003,029	399	170	6,064	5,844,545	392	167	5,962
	Directly Financed Air Travel	24,728,701	244	280	24,800	33,471,585	330	379	33,600	23,833,841	236	272	23,921	19,452,692	193	222	24,706
	Other Directly Financed Travel	110,924	6	3	100	46,280	3	1	50	209,278	11	5	211	65,927	3	2	548
	Study Abroad Air Travel	-	-	-	-	1,096,922	11	12	1,100	772,253	8	9	775	2,585,030	26	30	4,578
	Solid Waste	-	247,311	-	5,700	-	216,687	-	1,400	-	57,462	-	1,437	-	81,183	-	1,522
	Wastewater	-	58,454	412	1,500	-	49,806	351	1,400	-	-	457	136	-	-	392	104
	Paper	-	-	-	1,600	-	-	-	1,500	-	-	-	1,949	-	-	-	2,441
	Food	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	T & D Losses	16,256,744	367	202	16,600	13,331,753	176	222	13,400	7,503,314	846	240	7,596	11,915,988	269	218	5,523
TOTAL SCOPE 3 (MT CO2 eq) (All Other Emissions)		59,563,379	308,946	1,828	69,100	67,808,643	269,738	1,957	72,650	48,028,274	59,964	1,532	51,934	51,937,639	83,218	1,475	57,817
ALL ACCOUNTABLE EMISSIONS (MT CO2 eq)		256,608,278	316,073	4,101	273,400	260,473,373	277,364	4,362	268,451	225,800,547	78,648	5,381	233,513	223,614,127	90,128	4,055	214,185

Table 26 – Pittsburgh Campus GHG Emissions – FY19 through FY22

Category		Previous Fiscal Years												Current FY			
		FY19				FY20				FY21				FY22			
SCOPE	SOURCE CATEGORY	CO2 (kg)	CH4 (kg)	N2O (kg)	MT CO2 eq	CO2 (kg)	CH4 (kg)	N2O (kg)	MT CO2 eq	CO2 (kg)	CH4 (kg)	N2O (kg)	MT CO2 eq	CO2 (kg)	CH4 (kg)	N2O (kg)	MT CO2 eq
SCOPE 1	On-Campus Steam	24,895,329	2,477	50	**24,978**	29,528,859	2,944	59	**29,627**	31,187,695	3,110	62	**31,291**	27,440,528	2,736	55	**27,532**
	Other On-Campus Stationary	7,445,440	741	15	**7,470**	7,078,353	706	14	**7,102**	8,139,600	812	16	**8,167**	7,323,478	730	15	**7,348**
	Direct Transportation	1,977,215	75	49	**1,992**	1,615,428	66	43	**1,629**	1,498,503	38	25	**1,506**	1,355,564	41	27	**1,364**
	Refrigerants & Chemicals	-	-	-	**2,240**	-	-	-	**789**	-	-	-	**644**	-	-	-	**1,450**
	Fertilizers & Animals	-	-	3	**1**	-	-	7	**2**	-	-	3	**1**	-	-	25	**7**
TOTAL SCOPE 1 (MT CO2 eq) (Direct Emissions)		34,317,984	3,293	117	**36,681**	38,222,640	3,716	123	**39,148**	40,825,798	3,960	106	**41,609**	36,119,570	3,507	122	**37,700**
SCOPE 2	Purchased Electricity	72,930,417	7,655	2,480	**73,802**	84,191,611	8,444	1,227	**84,753**	83,731,141	941	6,742	**85,544**	64,412,497	5,613	783	**64,777**
	Purchased Steam	16,835,799	1,675	34	**16,892**	13,187,993	1,472	68	**13,247**	13,613,318	1,520	70	**13,675**	20,242,628	2,014	40	**20,310**
TOTAL SCOPE 2 (MT CO2 eq) (Indirect Emissions)		89,766,216	9,330	2,514	**90,694**	97,379,604	9,916	1,295	**98,000**	97,344,459	2,461	6,812	**99,219**	84,655,125	7,627	823	**85,087**
SCOPE 3	Faculty & Staff Commuting	23,201,248	932	246	**23,293**	15,282,114	227	155	**15,330**	5,607,693	251	217	**1,697**	9,858,175	531	332	**9,961**
	Students Commuting	12,018,918	71	59	**12,036**	10,304,947	52	44	**10,318**	2,902,234	18	93	**532**	2,253,545	49	33	**2,264**
	Directly Financed Air Travel	36,441,399	396	407	**36,560**	10,238,922	112	117	**10,273**	4,004,720	44	46	**4,018**	10,368,036	-	120	**10,400**
	Other Directly Financed Travel	490,196	620	281	**582**	687,766	878	398	**1,593**	624,601	384	178	**683**	1,057,828	544	253	**1,140**
	Study Abroad Air Travel	8,786,941	95	98	**8,816**	3,476,934	38	40	**3,489**	152,334	2	2	**153**	623,969	-	7	**626**
	Solid Waste	-	51,939	-	**1,454**	-	64,026	-	**1,793**	-	50,447	-	**1,413**	-	51,594	-	**1,445**
	Wastewater	-	-	385	**102**	-	-	404	**107**	-	3,215	991	**353**	-	4,646	1,432	**510**
	Paper	-	-	-	**729**	-	-	-	**509**	-	-	-	**167**	213,628	-	-	**214**
	Food	-	-	-	-	-	-	-	-	2,861,330	-	-	**2,861**	5,140,668	-	-	**5,141**
	T & D Losses	11,915,988	269	218	**4,575**	5,472,083	549	80	**5,509**	5,280,873	59	425	**5,395**	4,392,545	383	53	**4,417**
	FERA	-	-	-	-	-	-	-	-	-	-	-	-	4,420,187	346,040	47	**14,122**
TOTAL SCOPE 3 (MT CO2 eq) (All Other Emissions)		92,854,690	54,322	1,694	**88,147**	45,462,766	65,882	1,238	**48,919**	21,433,785	54,420	1,952	**17,271**	38,328,581	403,787	2,277	**50,238**
ALL ACCOUNTABLE EMISSIONS (MT CO2 eq)		216,938,890	66,945	4,325	**215,522**	181,065,010	79,514	2,656	**186,068**	159,604,042	60,841	8,870	**158,098**	159,103,276	414,921	3,222	**173,025**

APPENDIX D: GHG Emissions Calculation & Analysis Software & History

The University of New Hampshire (UNH) and Clean Air Cool Planet (now defunct) collaborated to create the widely-used Clean Air-Cool Planet Campus Carbon Calculator (CA-CP calculator) to calculate GHG emissions for educational institutions.[32] In the late 2000s the CA-CP calculator was used by 90% of the thousands of U.S. colleges and universities publicly reporting their GHG emissions -- and recommended by the American College and University Presidents' Climate Commitment (ACUPCC, the initial mechanism by which higher education institutions committed to and tracked their journeys to carbon neutrality) (Second Nature, 2022c). ACUPCC evolved into the President's Climate Leadership Commitments, now managed by Second Nature (Second Nature, 2022c). As a result, all measurement processes now reference Second Nature's Carbon Commitment "Measurement Progress" Guidance (Second Nature, 2022a), based on the international *Greenhouse Gas Protocol*, which "supplies the world's most widely used greenhouse gas accounting standards" (W.R.I., 2022).

The University of New Hampshire's Sustainability Institute evolved the CA-CP calculator from an Excel tool to an online portal. Beginning in January 2018, it was recommended that all higher education GHG inventories use SIMAP (Sustainability Indicator Management and Analysis Platform) online.

SIMAP functions similarly to the CA-CP Calculator and allows users to upload prior CA-CP Excel results.

[32] Once a Microsoft Excel-based spreadsheet, the CA-CP calculator was designed to facilitate data collection and analysis; its primary purpose was to conduct a GHG inventory, but it could be used to facilitate other tasks also (i.e., emissions and reductions from potential projects). The CA-CP calculator used standard methodologies and emission factors provided by the *GHG Protocol*, which have evolved into and with SIMAP.

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