FINAL REPORT

Fiscal Year 2020 Greenhouse Gas Inventory for the University of Pittsburgh, Pittsburgh Campus

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Acknowledgements

This report presents the greenhouse gas inventory results for the University of Pittsburgh (Pitt) for Fiscal Year 2020.

The authors sincerely thank all Pitt staff members who provided us data and shared important information regarding their sustainable practices; these individuals are fully acknowledged in Appendix A.

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) 2020, including direct and indirect activities of the University. Since the initiation of a GHG inventorying process in 2008, this is Pitt's sixth GHG inventory report, building on and comparing to the previous five inventories from FY 2008, 2011, 2014, 2017, and 2019 [1]–[5].

This report and its precursors serve as guidelines for the Chancellor's Advisory Council on Sustainability, its Carbon Commitment Committee, and any future committees, groups, or individuals working to reduce the GHG emissions of Pitt. Especially given Pitt's February 2020 commitment to achieve carbon neutrality for its Pittsburgh campus by 2037, this report has new bearing and urgency [6]. Understanding current GHG emissions is a necessary step towards developing the strategies that will help achieve Pitt's carbon goals by lowering future GHG emissions. An annual GHG inventorying process is a part of Pitt's Carbon Commitment, as is a climate action plan every five years [7]; still under internal review upon publication of this report, the first Pitt Climate Action Plan builds from the FY19 GHG inventory.

Beyond carbon, Pitt has set specific goals related to its sustainability activities. The *Pitt Sustainability Plan* was published in January 2018, detailing 61 goals over 15 impact categories that fall into three overarching themes: Exploration, Community & Culture, and Stewardship [8]. Some of these goals align with those of the Pittsburgh 2030 District, of which Pitt is a Founding Property Partner of the Oakland boundary [9]. The Pittsburgh 2030 District Goals are to reduce water consumption, energy consumption, and GHG emissions from transportation 50% by 2030 below baselines [10]. Pitt also intentionally aligned its original *Pitt Sustainability Plan* GHG goal with those of the Pittsburgh 2030 District, aiming to reduce GHG emissions 50% by 2030 (below 2008 levels); carbon neutrality for the Pittsburgh campus by 2037 expands and extends that goal. The *Plan* also includes many more goals across the full spectrum of sustainability.

For this analysis, Pitt's Fiscal Year 2020 was selected as the temporal boundary, July 1, 2019, through June 30, 2020; fiscal years have been used for all past Pitt GHG inventories, allowing for result comparisons across all GHG Inventory years, which previously include FY 2008, 2011, 2014, 2017, and 2019.

Overall, **the University of Pittsburgh's FY20 GHG emissions were 186,068 metric tons CO_2e (MT CO_2e) – a 13.6% decrease in GHG emissions from FY19, when they were 215,522 MT CO_2e.** Decreases were seen across several categories, including purchased steam, commuting, directly financed travel, and study abroad. By category and overall, part of this large year-over-year decrease was due to a complete, then partial University shut down from March 16, 2020, through June 30, 2020 (and beyond) due to the global COVID-19 pandemic. FY20 accounts for 3.5 months of the pandemic, and we anticipate similar pandemic-influenced trends for FY21.

In line with widespread higher education GHG inventorying 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 [11]. The University's FY 2008, 2011, and 2014 GHG inventories used a SIMAP predecessor called "Clean Air-Cool Planet," and subsequently imported into the SIMAP tool, causing slight changes to official past-reported data. These differences can be primarily attributed to changes in emissions factors between the two tools;

specific instances are highlighted and addressed throughout the report as relevant, as they may result in unexpected emissions changes.

Of primary relevance to this FY20 GHG Inventory**, SIMAP's Market-Based method is now the recommended approach to calculate Scope 2 electricity emissions.** Past Pitt GHG inventories used the Custom Fuel Mix Method, which is no longer recommended as a best practice. As a result, beginning with this FY20 GHG Inventory, the Market-Based method is used to calculate GHG emissions resulting from electricity. A resulting jump in electricity emissions for FY20 did occur because of this method update, despite electricity consumption and renewables holding steady.

Since FY08, there have been numerous changes in campus operations and infrastructure, resulting in ongoing GHG emissions reductions and opportunities. For FY20, the overall distribution of Pitt's GHG emissions by source activity is shown and detailed in

Table 1.

For FY20, purchased electricity was again the largest GHG emitting source for the university, accounting for 45.5% of the University's emissions. Overall, total campus-wide electricity usage was 6.46% lower than FY19, a decrease of 13,909 MWh despite a modest number of building additions to the inventorying process, which resulted in a 0.71% increase in gross building area served (by 81,620 square feet). Since FY08, marked changes in the regional electricity generation mix have significantly reduced the percentage of electricity produced by coal, with coinciding increases in electricity generated from nuclear, natural gas, and renewable sources. Additionally, Pitt purchased a larger volume of renewable energy certificates in FY19 and FY20 to help reduce emissions from electricity purchases. As summarized above, a shift to the SIMAP Market-Based method for electricity emissions starting with FY20 caused an 18.48% increase in GHG emissions (10,951 MT CO_2e) compared to FY19, despite an electricity consumption decrease. Overall, emissions from purchased electricity is still down 38.89% between FY08 and FY20 (53,497 MT CO_2e).[1] Despite this methods-related increase, Scope 2 transmission and distribution losses related to electricity continued their regular decrease through FY20, due to lower regional emissions factors. SIMAP concurred that these differences are reasonable and in line with changes made to the SIMAP methods, software, and science, which reflect international best practices and evolution in greenhouse gas inventory protocols, emission factors, and tracking renewable energy.

The second largest contribution to FY20 GHG emissions was from combined on-campus and purchased steam, which went up 2.4% (1,004 MT CO2e) between FY19 and FY20. The University could continue to reduce its steam consumption, shift to more efficient generation of purchased steam, and explore lower carbon generation sources for thermal energy.

Behind purchased electricity and combined on-campus and purchased steam, the third largest contributor to Pitt's GHG emissions was commuting, which contributed 9,681 fewer MT CO_2e in FY20 than FY19. This significant 24.7% drop is attributed to both more accurate employee commuting distances and 3.5 months of avoided commutes resulting from the COVID-19 pandemic.

As Pitt did not resume in-person classes until August 2021, the FY21 GHG Inventory (July 1, 2020 to June 30, 2021) will also reflect the GHG emissions impacts of the COVID-19 pandemic. To help ensure ongoing emissions accounting that helps inform the University of further emissions reductions, 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, though not significantly accounted for to-date, the University should account for carbon offsets via both downstream and upstream purchases, especially relating to directly financed car and air travel.

The FY21 GHG Inventory should also benchmark the University's full physical footprint by including spaces leased by the University, but not owned. A future deep dive could assess building specific GHG performance by building based on space types, energy sources, energy use, and occupancy. Based on the University's commitment to the Cool Food Pledge,[2] food-related GHG emissions should also be

[1] For the sake of comparison, GHG emissions were calculated for past inventories utilizing the now recommended Market-Based method. GHG emissions from purchased electricity would have decreased 9.98% reduction from FY19 (9,398.89 MT CO_2e) and 39.48% since FY08 (55,282.19 MT CO_2e).

[2] The University of Pittsburgh was one of the first three universities to sign the World Resources Institute's Cool Food Pledge in 2019, committing to reducing the GHG emissions associated with the food served on-campus 25% by 2030 from a 2015 baseline. https://wri.org/initiatives/cool-food-pledge

included in future inventories, even if it is tracked as a category outside of the official inventory boundary. The four Pitt regional campuses in Bradford, Greensburg, Johnstown, and Titusville, should also be added to the GHG accounting process so that GHG emissions are trackable for the entire University of Pittsburgh system.

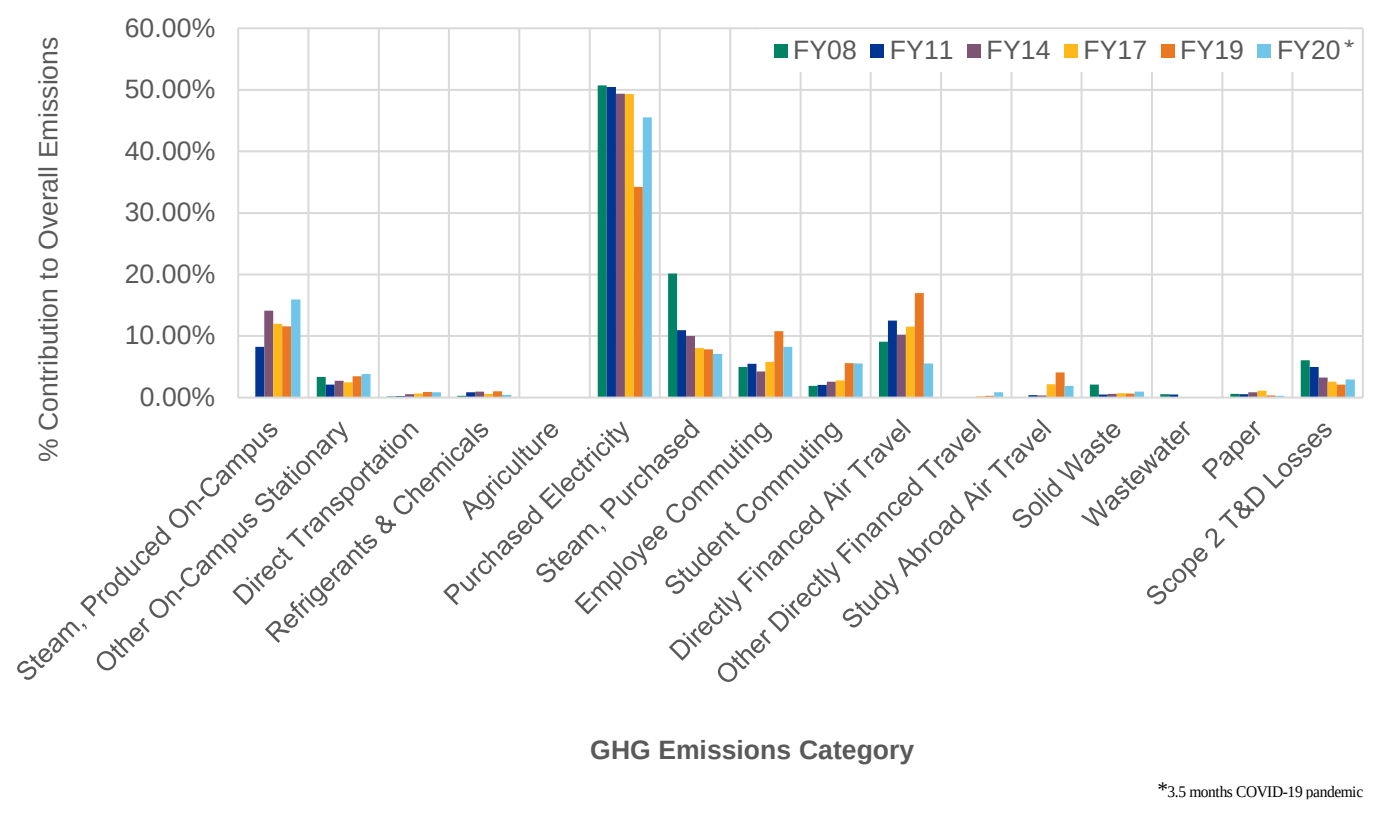


Figure 1 - Pitt GHG Emission Source Distributions by GHG Inventory Year

Table 1 - Pitt GHG Emissions by GHG Inventory Year

(All emissions in metric tons of carbon dioxide equivalent (MT CO_2e)

	Source Category	FY08	FY11	FY14	FY17	FY19	FY20*
Scope 1	Steam, Produced On-Campus	0	22,200	32,981	25,623	24,978	**29,627**
	Other On-Campus Stationary	9,200	5,700	6,386	5,245	7,470	**7,102**
	Direct Transportation	500	700	1,273	1,388	1,992	**1,629**
	Refrigerants & Chemicals	800	2,300	2,192	1,266	2,240	**789**
	Agriculture	0	1	2	1	1	**2**
Scope 2	Purchased Electricity	138,700	135,500	115,341	105,607	73,802	**84,753**
	Steam, Purchased	55,100	29,400	23,404	17,238	16,892	**13,247**
Scope 3	Employee Commuting	13,600	14,700	9,845	12,433	23,293	**15,330**
	Student Commuting	5,200	5,500	6,064	5,962	12,036	**10,318**
	Air Travel, Directly Financed	24,800	33,600	23,921	24,706	36,560	**10,273**
	Other Directly Financed Travel	100	50	211	548	582	**1,593**
	Air Travel, Study Abroad	0	1,100	775	4,578	8,816	**3,489**
	Solid Waste	5,700	1,400	1,437	1,522	1,454	**1,793**
	Wastewater	1,500	1,400	136	104	102	**107**
	Paper	1,600	1,500	1,949	2,441	729	**509**
	Scope 2 T&D Losses	16,600	13,400	7,596	5,523	4,575	**5,509**
	Scope	**FY08**	**FY11**	**FY14**	**FY17**	**FY19**	**FY20***
Totals	Scope 1 (Direct Emissions)	10,500	30,901	42,834	33,523	36,681	39,148
	Scope 2 (Indirect Emissions)	193,800	164,900	138,744	122,845	90,694	98,000
	Scope 3 (All Other Emissions)	69,100	72,650	51,933	57,817	88,147	48,919
	Reporting Metric	**FY08**	**FY11**	**FY14**	**FY17**	**FY19**	**FY20**
Totals	Required (Scope 1 & 2)	204,300	195,801	181,578	156,368	153,928	137,148
	All Accountable Emissions	**273,400**	**268,451**	**233,511**	**214,185**	**215,522**	**186,068**

***3.5 months COVID-19 Pandemic**

1 INTRODUCTION

Universities can create sustainable campuses at many levels, including by reducing greenhouse gas emissions; via sustainability certificates, majors, and degrees; by offering sustainability-focused and -related academic courses; and via increased numbers of student sustainability groups. Today's students have an increasing zest for on-campus sustainability activities, along with exploring sustainability both as and in their future professions. Higher education institutions educate about and conduct research on sustainability, including how global concerns like climate change are interwoven with racism, equity, and economic injustice. As a result, higher education institutions have a multitude of opportunities to lead society towards solutions to climate change, which is a shared human threat regardless of country and location.

This annual report builds from this understanding and aims to quantify and facilitate strategies that support greenhouse gas (GHG) emissions reductions from the University of Pittsburgh's (Pitt) activities. A GHG inventory is both a first and repeatable step towards creating effective GHG reduction strategies, as inventories help quantify and identify hotspots or critical areas to address among various GHG sources.

There are three stages to a GHG Inventory process: data collection, GHG emissions calculation, and data analysis for climate action planning [12].

Step 1: Data Collection – Many pieces of raw data are required to conduct a GHG inventory, including purchased electricity, transportation modes and distances, solid waste quantities, refrigerants utilized, carbon offsets purchased, etc.

Step 2: Emissions Calculations – Collected data becomes inputs into a tool that estimates resulting GHG emissions. Pitt uses SIMAP (Sustainability Indicator Management & Analysis Platform), a comprehensive online software tool for college campuses to measure, calculate, and report carbon and nitrogen footprints in order to meet their sustainability goals effectively and efficiently.

Step 3: Data Analysis – In order to compare GHG sources and identify emissions reduction opportunities, SIMAP converts all emissions into CO_2 equivalents.

This report begins by introducing SIMAP, the study boundaries, and scope. Results are presented under each category together with assumptions made during calculations. Discussion of results and comparison to previous Pitt GHG Inventory results are provided, followed by recommendations for updating this report in the future. The last chapter of the report is conclusions.

2 SIMAP: SUSTAINABILITY INDICATOR MANAGEMENT AND ANALYSIS PLATFORM

The University of New Hampshire (UNH) and now defunct nonprofit Clean Air Cool Planet (CA-CP) collaborated to create a widely used Clean Air-Cool Planet Campus Carbon Calculator (CA-CP calculator) to calculate GHG emissions. Specifically designed for educational institutions, the CA-CP calculator was used by 90% of the thousands of U.S. colleges and universities that publicly report their GHG emissions -- and recommended by the American College and University Presidents' Climate Commitment (ACUPCC) [7]. ACUPCC became the President's Climate Leadership Commitments, which are managed by Second Nature [7]. As a result, all measurement processes now reference Second Nature's Carbon Commitments "Measurement Progress" Guidance [13], which leans on the

international Greenhouse Gas Protocol, which "supplies the world's most widely used greenhouse gas accounting standards" [12].

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 greenhouse gas inventory, but it could be used to facilitate other tasks also. If data regarding carbon reduction projects are available, such as the amount of reduction expected for a certain commodity, the tool can be used to estimate future GHG emissions taking into account common emissions and reductions from potential projects. The CA-CP calculator used standard methodologies and emission factors provided by the GHG Protocol.

The University of New Hampshire's Sustainability Institute evolved the CA-CP calculator from an Excel tool to an online portal. As of January 2018, it is recommended that all higher education GHG inventories use SIMAP (Sustainability Indicator Management and Analysis Platform) online. **Pitt began using SIMAP for its FY14 GHG Inventory and all successive inventories (including this FY20 GHG Inventory)**. SIMAP functions similarly to the CA-CP Calculator and allows users to upload prior CA-CP Excel results. All data from previous Pitt GHG inventories were uploaded to SIMAP and all tables, analyses, and explanations reflect results from the updated SIMAP calculations. SIMAP can also be used to predict total nitrogen emissions, which Pitt completed for the first time in FY19.

3 BOUNDARIES OF THE INVENTORY

Three boundaries exist for calculating the campus GHG emissions: organizational, operational, and temporal. Each is described in the sections below.

3.1 ORGANIZATIONAL BOUNDARIES

Organizational boundaries are the broadest of the three boundaries, and therefore the first boundaries drawn during the creation of a GHG Inventory. Organizational boundaries state whether GHG emissions are measured for one department, school, a campus, or the entire organization. Setting the organizational boundary helps determine which facilities and operations must be included in the GHG analysis. **For this study, the University of Pittsburgh's Pittsburgh Campus (primarily located in the Oakland neighborhood of Pittsburgh) was selected as the organizational boundary.** Student Housing facilities located owned and operated by Pitt both on- and off-campus were included in the analysis. Buildings owned and managed by the separate nonprofit organization University of Pittsburgh Medical Center (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 FY20 inventory is provided in Appendix B.

Within the organizational boundary for FY20, buildings owned and managed by Pitt at the Pittsburgh Campus totaled 109 buildings with a gross building area of 11.65 million ft^2 -- **an increase of 81,618 square feet from the FY19 inventory**. Table 2 summarizes all changes in the campus building stock between FY19 and FY20, including the addition of Hyacinth Place (an off-campus apartment building) and the Parkvale Building and Plaza (now an on-campus building).

Table 2 - Pitt Building Stock Data Changes between FY19 and FY20 GHG Inventories

Building Name	Gross Square Footage
Hyacinth Place	25,967
Parkvale Building	40,830
Parkvale Plaza	14,821
Total	**81,618**

LEED (Leadership in Energy and Environmental Design) is the dominant U.S. green building rating system created and implemented by the U.S. Green Building Council. LEED certification distinguishes buildings designed, constructed, operated, and maintained to offer occupants a host of sustainability benefits, including lower energy and water consumption, better indoor environmental quality, and a plethora of other sustainable features [14]. Pitt has LEED certified buildings dating back to 2005, and the Clapp Hall Renovation achieved LEED Silver in FY20. Table 3 summarizes Pitt's active Pittsburgh campus building projects pursuing LEED certification in FY20 and beyond.

Table 3 - Pittsburgh Campus Buildings Recently Awarded & Pursuing LEED Certification

Building Name	Certification	Year
Clapp Hall Renovation	LEED Silver	2020
GSPH Renovations	LEED Silver	2021
Petersen Sports Complex	Tracking Silver	Pending
Alan Magee Scaife Hall Addition and Renovation	Tracking Gold	In Construction
Hillman Library Renovation	Tracking Gold	In Construction
Salk Hall Renovations	Tracking Gold	In Construction
Campus Recreation & Wellness Center	Tracking Gold	In Design
Arena & Sports Performance Center	In Design	In Design
Hillside Housing	In Design	In Design

In FY20, there were 26,730 full–time equivalent (FTE) students enrolled at Pitt, a slight decrease from FY19. Following the SIMAP method, part-time students are included in this total, accounted for as half of a full-time equivalent student. In FY20, Pitt's Pittsburgh campus had 4,733 faculty and 8,314 staff. The staff total includes individuals listed as staff, research associates, postdoctoral associates, executives, and union-eligible at the Pittsburgh campus. Totals include all academic schools including the School of Medicine students, staff, and post-docs, which were added for the first time in FY19. Due to inextricable linkages of most Pitt School of Medicine faculty with UPMC, they are not included in the University's GHG Inventory. Table 4 compares Pitt's FY20 inventory population numbers to previous years in, with a 7.09% increase from FY19 and a 22.63% increase from FY08.

Table 4 - University of Pittsburgh Population, All GHG Inventory Years

Community	FY08	FY11	FY14	FY17	FY19	FY20
Students (FTE)	24,755	26,740	25,917	26,240	28,673	26,730
Faculty	2,688	2,878	2,791	2,944	2,704	4,733
Staff	4,995	5,079	5,012	5,341	5,769	8,314
Total	**32,438**	**34,697**	**33,720**	**34,525**	**37,146**	**39,778**

3.2 OPERATIONAL BOUNDARIES

Operational boundaries identify GHG emitting sources to be included in the inventory. The GHG Protocol categorizes emissions into three scopes [15]. Scope 1 includes "direct emissions" from sources owned and controlled by Pitt, such as on-campus steam and electricity generation, on-campus natural gas usage, transportation for campus operations, refrigerants and chemical use, and agricultural activities. Scope 2 emissions include "indirect emissions" from sources that are neither owned nor operated by Pitt, but whose products are linked to campus energy consumption; Scope 2 includes purchased electricity, steam, and chilled water. Scope 3 emissions are "other sources" neither owned nor operated by Pitt, but that are either "directly financed" by the University (i.e., commercial air travel paid for by Pitt, waste removal) or are otherwise linked to the campus via influence and/or encouragement (i.e., air travel for study abroad programs; daily employee and student commuting). Scope 3 emissions also include paper consumption, solid waste disposal, wastewater treatment, and electricity transmission and distribution losses.

Under the GHG Protocol, tracking Scope 1 and 2 emissions is mandatory and Scope 3 emissions are deemed optional. Reflecting higher education best practices, Pitt includes as many emission sources as possible and relevant to obtain a realistic GHG inventory for the institution. **The University's GHG reduction goals specified in and after the *Pitt Sustainability Plan* include to Scope 1, 2, and 3 emissions**. Pitt's carbon goals include 50% reductions in GHG emissions below 2008 levels by 2030 and carbon neutrality for the Pittsburgh campus by 2037 [6].

3.3 TEMPORAL BOUNDARIES

The final boundary is the temporal boundary. Because Pitt (and most universities) functions on a fiscal year instead of a calendar year, the fiscal year is used for Pitt's GHG Inventory. Fiscal years at Pitt begin on July 1 and end on June 30 of the following calendar year. This study focused on evaluating Fiscal Year 2020, which began July 1, 2019, and ended on June 30, 2020. Previous inventories included Fiscal Years 2008, 2011, 2014, 2017, and 2019. One goal of this expanding compendium of Pitt GHG inventory work is to understand the changes in Pitt's carbon footprint since 2008.

4 EMISSIONS

The context of each emission source, results obtained, and assumptions made during calculations are detailed under each section below. Table 24 summarizes all Pitt FY20 GHG Inventory information. Individual data points that are SIMAP inputs are provided at the end of each subsection.

4.1 SCOPE 1 EMISSIONS

Scope 1 emissions cover sources fully owned and managed by the University of Pittsburgh.

4.1.1 STATIONARY COMBUSTION

Scope 1 stationary combustion emissions include any activities where fuel is burned, or gases are directly released into the atmosphere. This includes any on-campus electricity generation, steam generation, and gas usage. In Pitt's first GHG Inventory for FY08, Scope 1 emissions had a smaller impact because the University purchased all its steam from single outside generator, the Bellefield Boiler Plant.

In November 2009, Pitt began operating the Carrillo Street Steam Plant (CSSP), a natural gas powered, high efficiency, low NO_x-emitting steam plant located on the upper Pittsburgh campus. The CSSP is operated by Pitt; jointly owned and by Pitt and UPMC (University of Pittsburgh Medical Center); and serves Pitt, UPMC, and other Oakland buildings connected to a cooperative commercial district steam network.

The CSSP is not a co-generation heat and power (CHP) facility and thus does not create electricity along with steam. As a result, "Co-generated Electricity" for Pitt has always been zero.

The CSSP was first included in Pitt's FY11 inventory, but was not in full operation at that time, supplying Pitt with only 49% of its total annual steam demand. FY14 was the first inventoried year where CSSP was in full operation, supplying Pitt with 64% of its annual steam demand. At that time, the other 36% of Pitt's steam need was supplied by the Bellfield Boiler Plant (BBP), the Oakland district steam plant to which CSSP is interconnected; the BBP is not directly owned or operated by Pitt -- and is discussed in greater detail in Section 4.2.2 covering Scope 2 Purchased Steam Emissions.

Between FY08 and FY14, Pitt's total steam demand increased by roughly 150,000 klbs every three years, increasing from 533,000 klbs in FY08 to 841,000 klbs in FY14, as detailed in Table 6. In FY17, Pitt's total steam usage dropped to 642,000 klbs with only slightly variations since; Pitt's FY20 total steam consumption was to 633,710 klbs. This translated into **total FY20 steam-related GHG emissions of 42,874 MT CO_2e, which accounted for about 26% of Pitt's total GHG emissions.**

Because the CSSP is Pitt's only Scope 1 steam source and supplied 76% of the total Pitt steam demand in FY20, total Scope 1 "Produced On-Campus Steam Emissions" were 29,627 MT CO_2e. A detailed breakdown and comparison of steam-related GHG emissions are shown in Figure 2 and detailed in Table 6. Steam plant efficiencies and emission factors vary between years, which is why consumption-to-emission ratios are not constant year-to-year. For FY17, an overall decrease in heating degree days (shown in Table 5) explains a significant drop in steam demand; for FY19, continued steam use reduction is attributed to campus-wide operational efficiency efforts by Facilities Management. FY20 showed a decrease in overall steam use, but an increase in GHG emissions. This increase is attributed to a SIMAP process limitation and verification that Pitt's steam production is not part of a combined heat and power system (CHP, which would co-generate steam and electricity). Additionally, labeling the systems in this way allows emissions to be allocated to CSSP, BBP, and natural gas the University uses for other purposes.

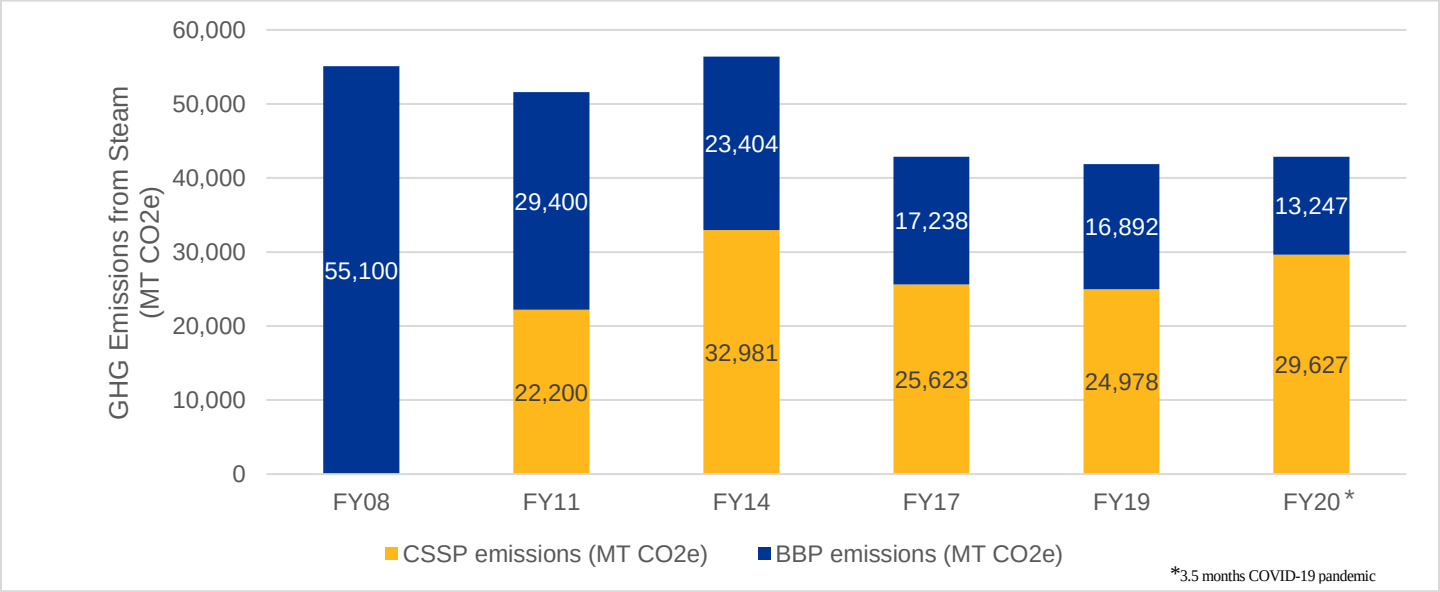


Figure 2 - GHG Emissions from Pitt's Steam Consumption by GHG Inventory Year

(CSSP = Carrillo Street Steam Plant, BBP = Bellefield Boiler Plant)

Table 5 - Heating Degree Days by GHG Inventory Year

Category	FY08	FY11	FY14	FY17	FY19	FY20
Heating Degree Days	4,194	4,525	4,605	3,508	4,236	4,071
Cooling Degree Days	1,594	1,741	1,559	1,902	1,735	1,609

"Other On-campus Stationary Sources" at Pitt includes natural gas used in individual buildings. Natural gas on-campus is typically used for air heating, water heating, backup generators, and/or laboratory purposes. Pitt's total FY20 natural gas usage was 130,011 MCF, which translates to 7,102 MT CO_2e (3.8% of total Pitt GHG emissions). Emission factors associated with the combustion of natural gas were provided by SIMAP and the results are summarized in Table 6.

Table 6 - Pitt Stationary Combustion Data by GHG Inventory Year

(CSSP = Carrillo Street Steam Plant, BBP = Bellefield Boiler Plant)

	FY08	FY11	FY14	FY17	FY19	FY20*
CSSP Steam (klbs)	n/a	342,405	535,812	409,236	405,180	481,620
BBP Steam (klbs)	532,693	356,381	304,889	148,299	227,913	152,090
Total Steam (klbs)	**532,693**	**698,786**	**840,701**	**641,819**	**663,093**	**633,710**
CSSP Emissions (MT CO_2e)	n/a	22,200	32,981	25,623	24,978	29,627
BBP Emissions (MT CO_2e)	55,100	29,400	23,404	17,238	16,892	13,247
Total Steam-Related GHG Emissions (MT CO_2e)	**55,100**	**51,600**	**56,385**	**42,861**	**41,870**	**42,874**
Natural Gas [a] (MCF)	168,289	104,555	120,120	98,595	140,427	130,011
Total GHG Emissions from Natural Gas Usage (MT CO_2e)	**9,200**	**5,700**	**6,386**	**5,245**	**7,470**	**7,102**

[a] On-campus natural gas usage for non-CSSP activities.

*3.5 months COVID-19 pandemic

4.1.2 UNIVERSITY FLEET VEHICLES

Another source of Scope 1 emissions is fuel usage by University fleet vehicles. This category includes all fuel used and financed by the University for campus-wide transportation and select off-campus ground transportation. Fuel in this 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.

Pitt has traditionally used three (3) tracking systems for its fleet fuel use:

1) Guttman Oil tracking includes fuel purchased strictly for fueling on Pitt's Pittsburgh campus;
2) Voyager tracking includes additional University of Pittsburgh purchased fuel, including both the Pittsburgh campus and regional campuses; and
3) Fuelman tracking includes fuel purchased by Pitt for shuttle buses.

Starting in FY20, the Voyager data was provided in a new form that allowed for less pre-processing and is thus likely more accurate. Previously, it was difficult to accurately extract Pittsburgh campus-related fuel purchases from the Voyager system because not all purchases had identification corresponding to a campus or a department. However, a combination of credit card numbers and "fill up" addresses was used to identify fuel purchases by Pittsburgh campus personnel, which were allocated to past inventory. For past Pitt GHG inventories, the FY14, FY17, and FY19 processes were similar, but varied from data collection for the FY08 and FY11 inventories.

Weekly Guttman Oil fuel reports were provided for FY20, but since diesel fuel was purchased in advance, it only was purchased 5 times throughout the fiscal year. Voyager and Fuelman reports are generated weekly and monthly between Transportation and Motor Pool vehicles, respectively, and were available for all FY20 months.

The Guttman, Voyager, and Fuelman reports consistently identify the purchased fuel as either gasoline or diesel across all inventory years. From FY08 to FY19, Pitt used blended biodiesel instead of pure, petroleum-based diesel in appropriate vehicles. Biodiesel can be mixed with petroleum diesel to create

different blends suitable for different vehicle engines and performance. Pure biodiesel is labeled as B100; a mix of 5% biodiesel and 95% petroleum diesel is labeled as a B5 mix. Although different grades of biodiesel are currently available in the market, only B5 and B100 are available in Pittsburgh; a B5 blend was assumed to be used by University fleet vehicles. Biodiesel was not purchased for use in FY20.

Based on data provided by Pitt's Office of Parking, Transportation, & Services, Pitt's FY20 vehicle fleet included 269 vehicles, of which 229 were Pittsburgh campus vehicles and 61 were regional campus vehicles. As shown in Table 7, Pitt's **total estimated FY20 fuel use was 140,172 gallons of gasoline and 40,578 gallons of diesel, translating into total GHG emissions of 1,629 MT CO_2e (0.88% of total GHG emissions).** This included total fuel consumption reported from:

- Fuelman of 45,740 gallons of gasoline and 45 gallons of diesel;
- Guttman Oil of 30,000 gallons of diesel;
- Voyager of 94,433 gallons of gasoline and 10,534 gallons of diesel.

From FY19 to FY20, Pitt's total gasoline consumption decreased by 17,228 gallons (10.9% less than FY19), while diesel usage decreased by 20,048 gallons (nearly 33%). Biodiesel was not purchased for use in FY20. Pitt's FY20 fuel use decrease is primarily attributed to the COVID-19 shutdown the university experienced for the last 3.5 months of FY20. More accurate recordkeeping and a slight decrease in the size of the fleet also contributed to decreases in fuel usage and emissions.

In FY21, 18 of Pitt's 20 shuttles shifted to propane, which is expected to reduce GHG emissions resulting from University fleet vehicles.

Table 7 - University Fleet Data by GHG Inventory Year

	FY08	FY11	FY14	FY17	FY19	FY20*
Number of Vehicles	203	193	218	228	233	229
Gasoline (gallons)	42,300	71,800	126,973	129,164	157,400	140,172
Diesel (gallons)	-	-	-	-	60,626	40,578
Biodiesel (gallons)	11,220	9,500	11,976	23,050	994	0
GHG Emissions (MT CO_2e)	**500**	**700**	**1,273**	**1,388**	**1,992**	**1,629**

*3.5 months COVID-19 pandemic

4.1.3 REFRIGERANTS

Hydrofluorocarbons (HFCs) and perfluorocarbons (PFCs) are greenhouse gases often used for refrigeration – and accounted for under Scope 1 emissions. Under ideal conditions, these gases are used as refrigerants in closed loop systems, not contributing to fugitive GHG emissions. However, inevitable leaks in cooling systems result in refrigerants becoming fugitive emissions that must be included in Pitt's GHG Inventory because refrigerants often have high global warming potentials (GWP). The quantity of Pitt's fugitive GHG emissions from refrigerants is assumed to be equal to the amount of refrigerants needed to recharge on-campus mechanical systems during maintenance activities.

In FY20, Pitt used total of 1,718 pounds of refrigerants, which translates to 789 MT CO_2e (0.42% of total GHG emissions). This total is similar to the FY19 inventory, though there was a large decrease in emissions (~65%), primary attributed to refrigerants with lower GWP being utilized.

Due to the erratic nature of refrigerant leakage, disposal, and replenishment, Pitt's overall refrigerant use is part of required refrigerant maintenance and cannot be attributed to any change in facilities or campus policies. This makes it difficult to compare refrigerant emissions between GHG inventories, with the exception of reviewing general consumption trends of refrigerants by GWP.

Table 8 summarizes the type and amount of refrigerant used by Pitt for each inventoried fiscal year, along with the GWP of each refrigerant. It should be noted that SIMAP uses Intergovernmental Panel on Climate Change (IPCC) Fifth Assessment Report (AR5) values, which varies slightly from IPCC AR4, which was used in previous inventories [16]. Additionally, all past inventories through FY19 input R-12 under refrigerant NF3 (which has a GWP of 16,100); SIMAP now includes CFC-12 (which has a GWP of 10,200), which is now used instead.

Table 8 - Pitt Refrigerant Quantities by GHG Inventory Year [15]

	Quantity Used (lbs)							
Type	**FY08**	**FY11**	**FY14**	**FY17**	**FY19**	**FY20**	**GWP100**	**Source**
R-134a	41	840	400	6	35	161	1,430	EPA
R-12	20	36	0	18	0	0	10,890	EPA
R-404a	1	1	0	171	172	36	3,943	SIMAP
R-22	637	754	453	897	718	545	1,810	EPA
R-123	400	200	200	400	100	800	77	EPA
R-11	0	400	0	0	600	0	4,600	SIMAP
R-407c	0	0	0	0	50	69	1,924	SIMAP
R-408a	0	4	0	0	2	0	2,430	SIMAP
R-410a	0	107	0	65	31	107	1,924	SIMAP
R-414	19	0	0	0	0	0	1,450	FY08
R-500	3	0	0	0	0	0	37	FY08
R-503	1	0	0	0	0	0	15,000	FY08
R-507	0	0	0	37	0	0	3,985	EPA
GHG Emissions (MT CO_2e)	**799**	**2,251**	**2,192**	**1,266**	**2,240**	**789**		

Note: GWP100 = global warming potential for a 100-year horizon

Although they make up a small percentage of Pitt's overall GHG emissions, refrigerants pose significant threats globally and to human health –and should be minimized whenever possible. **In general, trends show Pitt shifting away from more potent GWP refrigerants in preference of lower GWP refrigerants.** The University should continue to use the annual GHG Inventory process and this report to continue to shift away from high volume usage of high GWP products (R-11, R-12, R-22), 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 also avoid further use of the more potent refrigerants. Pitt replaced its last two (2) R-11 chillers in 2020 and is seeking to replace its remaining small R-22 split systems in the near-term, which is evident in the decreased use of both R-11 and R-22.

4.1.4 AGRICULTURAL ACTIVITIES

Scope 1 agricultural sources of GHG emissions account for animal herding as well as fertilizer, pesticide, or herbicide use for crop growth and landscaping. As Pitt does not herd animals on its

Pittsburgh Campus, there are no herding-related emissions. However, Pitt does use herbicides for landscaping activities.

Synthetic herbicides 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. Fertilizers and herbicides contribute towards 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. Because Pitt only used one type of fertilizer in FY20, this calculation was not necessary.

In FY20, Pitt used 4,322 pounds of fertilizer with a nitrogen content of 16.1%. Overall, this was a 63.2% increase in fertilizer usage, as shown in Table 9. In addition to the total amount used, the % nitrogen increased from the 11% version used in FY19 **which led to 1.74 MT CO_2e is associated with Pitt's FY19 GHG emissions from fertilizers** (using SIMAP emission factors). These increases were attributed to less expensive fertilizer purchased due to COVID-19 budget cuts.

Table 9 - Pitt Fertilizer Data by GHG Inventory Year

	FY08	FY11	FY14	FY17	FY19	FY20
Total Fertilizer (pounds)	475	1,125	2,250	1,892	2,648	4,322
Nitrogen Content (%)	12.6%	18.1%	20.3%	10.2%	11.0%	16.1%
GHG Emissions (MT CO_2e)	**0.26**	**0.85**	**1.89**	**0.72**	**0.73**	**1.74**

4.2 SCOPE 2 EMISSIONS

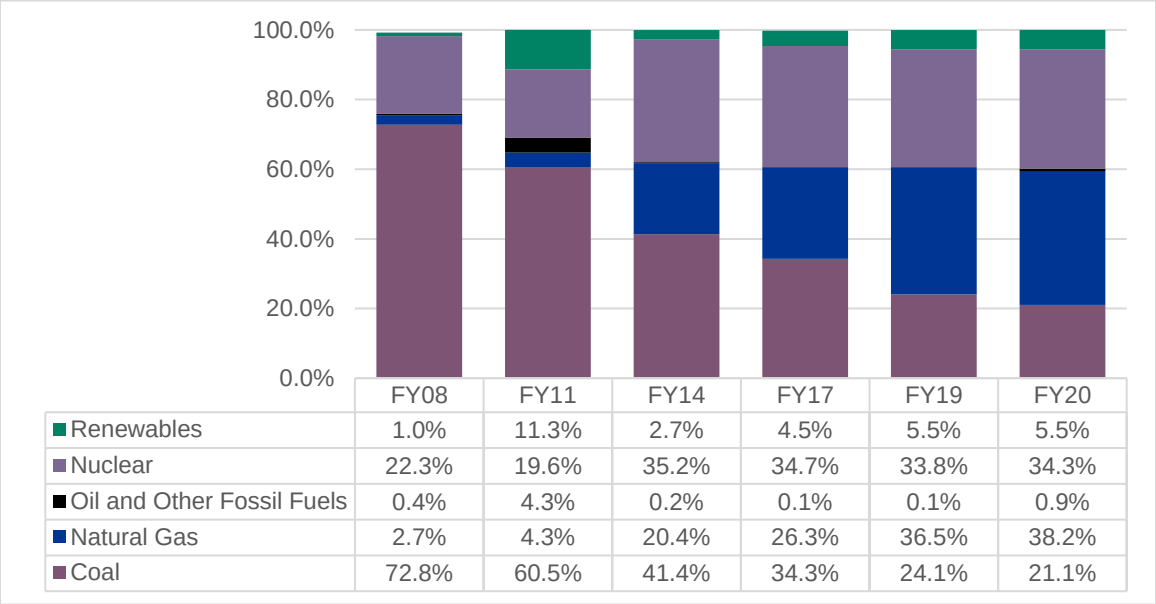
Scope 2 emission sources cover purchased electricity and steam, which are vital to support the activities of Pitt's urban campus, which primarily occur in buildings. Purchased electricity and steam make up the majority of emissions for many higher education institutions.

4.2.1 PURCHASED ELECTRICITY

The Scope 2 "Purchased Electricity" category includes all electricity consumed by the University, but not generated on Pitt's campus (thus purchased from outside suppliers). **Purchased electricity is the largest contributor to Pitt's GHG emissions for all inventoried years.** Emissions from purchased electricity are calculated using reported electricity usage and the electricity generation fuel mix. As a result, any changes in electricity consumption and mix have a large impact on the Pitt's total GHG emissions.

The SIMAP tool can use either default regional fuel mix information from the U.S. EPA's eGRID program or a customized, user-input fuel mix for its calculation [17]. Electricity generation fuels are organized into the following 10 categories: coal, natural gas, distillate oil, residual oil, nuclear, waste-to-energy, hydroelectric, biomass, renewable (wind, solar), and other. **Starting with this FY20 GHG inventory, the Market-Based method in SIMAP will be utilized because it is the recommended method for the tool. Due to this process decision, Pitt's purchased electricity emission factors now default to our regional eGRID mix.** Utilizing this method brings Pitt into alignment with newly recommended SIMAP protocols and all other higher education institutions.

A detailed comparison of electricity generation fuel mixes is shown in Figure 3 for all Pitt GHG Inventory years. From FY08 to FY20, the regional electricity grid mix has changed substantially; coal has decreased from 72.8% to 21.1%, while natural gas has grown from 2.7% to 38.2%. Renewables have increased from 1% to 5.5% of the grid, though the University's renewables go beyond the regional grid, as described in Section 4.2.1.1.



	FY08	FY11	FY14	FY17	FY19	FY20
Renewables	1.0%	11.3%	2.7%	4.5%	5.5%	5.5%
Nuclear	22.3%	19.6%	35.2%	34.7%	33.8%	34.3%
Oil and Other Fossil Fuels	0.4%	4.3%	0.2%	0.1%	0.1%	0.9%
Natural Gas	2.7%	4.3%	20.4%	26.3%	36.5%	38.2%
Coal	72.8%	60.5%	41.4%	34.3%	24.1%	21.1%

Figure 3 - Regional Grid Electricity Generation Fuel Mix by GHG Inventory Year

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** = Decrease to 60.5% coal and 19.6% nuclear, with significant increase in electricity generation from oil and gas (8.6%) and renewables (11.3%). *Provided by First Energy.*
- **FY14** - 41.1% coal, 35.2% nuclear, 20.4% natural gas, 2.7% renewables, and 0.2% oil. *Provided by PJM Interconnection.*
- **FY17** - 34.3% coal, 35.2% nuclear, 26.3% natural gas, 3.5% renewables, and 0.1% oil. *Provided by USource.*
- **FY19** - 24.1% coal, 33.8% nuclear, 36.5% natural gas, 5.5% renewables, and 0.1% oil. *Provided by EDF on PJM Interconnection.*
- **FY20 –** 21.1% coal, 34.3% nuclear, 38.2% natural gas, 5.5% renewables, and 0.9% oil and other fossil fuels. *Market-based method using eGrid regional mix*

Table 10 - eGrid and Custom Fuel Mix Emission Factors (kg CO_2/kWh)

Fiscal Year	eGrid Emission Factor	Custom Fuel Mix Emissions Factor
2008	0.704	0.742
2011	0.682	0.652
2014	0.626	0.540

2017	0.568	0.488
2019	0.529	0.413
2020	0.484	N/A

As shown in Table 11, Pitt's FY20 total electricity consumption decreased by 6.46% (13,909 MWh) from FY19. This decrease is likely due to the 3.5 months of COVID-19 shutdown, when campus occupancy (and thus electricity demand) decreased significantly. Additionally, the number of cooling degree days decreased from FY19, likely resulting in decreased electricity consumption from reduced building air conditioning systems.

Even though electricity demand decreased for FY20, there was also an unexpected increase in GHG emissions. **This emissions increase is attributed to the switch to using the Market-Based method for calculations beginning in FY20.** To help contextualize this method change, Market-Based results for all inventory years are provided in Row 3 of Table 11, which also illustrates the expected decrease in GHG emissions given electricity usage reduction. However, to maintain consistency, past GHG inventory results have not been altered, will continue to be used moving forward, and are shown in Row 2 of Table 11.

As a result of the method changes discussed above, **Pitt's FY20 GHG emissions from purchased electricity increased by 10,951 MT CO_2e in FY20, a 14.8% increase compared to FY19 and a 38.9% decrease since FY08.**

Table 11 - Pitt Electricity Data by GHG Inventory Year with Market-Based Data Included

	FY08	FY11	FY14	FY17	FY19	FY20*
Electricity Usage (MWh)	198,040	211,101	211,614	213,622	215,391	201,482
GHG Emissions (MT CO_2e)	138,700	135,500	115,341	105,607	73,802	84,753
Market-Based GHG Emissions (MT CO_2e)	140,035	144,640	133,511	121,317	94,152	84,753

*3.5 months COVID-19 pandemic

4.2.1.1 Purchased Unbundled Renewable Energy

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 FY20, these included unbundled renewable energy credits (RECs), which were acquired both within electrical procurement contracts and separately. 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" [18].

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 FY20, Pitt had a total of 42,377 unbundled Green-e certified RECs (or 42,377 MWh, a 1.53% increase from FY19). **As a result, 21% of Pitt's FY20 annual electricity consumption is attributed to renewables (via RECs)**. Of the RECs, 1,204 were provided via an electricity contract for GL (general large) meters; 9,173 RECs were included in an electricity contract for GS/GM (general small and medium) meters; and 32,000 unbundled RECs were purchased under separate contract.

SIMAP records RECs only 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. As a result, the impact of RECs on Pitt's GHG emissions is bundled together with consumption and reflected in the emissions shown in Table 11.

Starting in FY23, the University will also procure renewable energy via long-term power purchase agreements (PPAs) that bundle the electricity and renewable energy attributes for local, renewable power from a solar farm being built by Vesper Energy on the Allegheny / Beaver County line. Starting in FY24, the University will also procure its electricity from a run-of-the-river 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.

4.2.2 PURCHASED STEAM

Pitt does not purchase any chilled water, but it does purchase steam to offset demand not covered by the Pitt owned and operated Carrillo Street Steam Plant (CSSP) described in Scope 1 in Section 4.1.1. Pitt's purchased steam comes from the Bellefield Boiler Plant (BBP), which is owned by a third-party consortium of multiple owners, operated by the Carnegie Museums, and supplies steam to many other commercial entities in Oakland (e.g., Carnegie Mellon University, Carnegie Library, etc.). Because BBP is not owned by the University and Pitt purchases steam from it, the GHG emissions resulting from Pitt's BBP steam consumption falls under Scope 2 emissions.

Built in 1907, the Bellefield Boiler Plant was the only steam plant in Oakland until 2009, when the CSSP came online. The two plants are interconnected to the underground steam tunnel distribution network, but CSSP was not fully operational until FY14. Until 2009, BBP was powered by coal and natural gas and nicknamed the "The Cloud Factory" due to the plume of water vapor and air emissions resulting from the plant's conversion of coal to steam (which also caused Pitt to have higher GHG emissions from purchased steam in FY08). 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 contribute to lower overall campus GHG emissions.

As mentioned in Section 4.1.1 for Scope 1 Stationary Combustion, in FY20, Pitt consumed 633,710 klbs of steam, resulting in GHG emissions of 42,874 MT CO_2e. CSSP supplied 76% of this demand (481,620 klbs) and BBP supplied the remaining 24% (152,090 klbs). With steam created from natural gas and an estimated efficiency of 83%, Pitt's GHG emissions associated with BBP steam totaled 13,247 MT CO_2e in FY20. As shown in Table 12, this was a fairly significant reduction of 3,645 MT CO_2e over Pitt's FY19 GHG emissions from purchased steam.

Table 12 - Pitt Purchased Steam & GHG Emissions by GHG Inventory Year

(CSSP = Carrillo Street Steam Plant, BBP = Bellefield Boiler Plant)

	FY08	FY11	FY14	FY17	FY19	FY20 *
CSSP Steam (klbs)	n/a	342,405	535,812	409,236	405,180	481,620
BBP Steam (klbs)	532,693	356,381	304,889	148,299	227,913	152,090
Total Steam (klbs)	**532,693**	**698,786**	**840,701**	**641,819**	**663,093**	**633,710**
CSSP GHG Emissions ($MT CO_2e$)	n/a	22,200	32,981	25,623	24,978	29,627
BBP GHG Emissions ($MT CO_2e$)	55,100	29,400	23,404	17,238	16,892	13,247
Total GHG Emissions ($MT CO_2e$)	**55,100**	**51,600**	**56,385**	**42,861**	**41,870**	**42,874**
						*3.5 months COVID-19 pandemic

4.3 SCOPE 3 EMISSIONS

Sources that emit greenhouse gases, but are indirectly related to Pitt are accounted for under Scope 3. This includes any financially sponsored or outsourced activities including travel, waste management, paper purchasing, etc.

4.3.1 DIRECTLY FINANCED OUTSOURCED TRAVEL

Pitt pays for faculty, staff, and student business travel via various transportation modes, including via bus, train, rental car, airplane, and personal vehicle mileage reimbursement. 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. In FY17, separately funded Athletics travel was included; it was not provided nor included in FY19. Athletics travel is included for FY20 and will continue to be included in subsequent inventories.

Pitt Purchasing has records of both business and Athletic trave via travel card purchases and travel reimbursements; the former is directly billed to the University and includes more detailed and accurate information. In FY08, the various modes of financed travel were recorded as a single entry into the reimbursement statement, which also included other trip items such as hotels, meals, and per diem reimbursements. In FY11, university departments began switching to a network-based system for recording reimbursements and travel card purchases, which provided more comprehensive travel expense data. This system continues to be used, so travel data for inventory years from FY11 forward includes descriptions on the nature of the expenses, allowing for more accurate disaggregation of air and land travel expenses. In FY11, it is estimated that 30% of all reimbursements were filed using the new system, which was used for up to 70% of travel purchases in FY14 and 90% in FY17, FY19, and FY20. Increasing data inclusion and accuracy makes it difficult to directly compare GHG emissions between FY08, FY11, FY14, FY17, and FY19 for this category. However, in FY20, the Pitt Purchasing data was organized and totaled to allow for better accounting of direct business travel, a practice that is expected to continue for subsequent inventories. Differing from previous years, FY20 data was also provided in miles, which allows for more accurate GHG emissions estimates.

Additionally, it was previously common for employees to book travel through a Pitt travel agent, which meant a third source of travel expense data. However, travel services are now integrated into Pitt's larger travel system so that all travel card and reimbursement charges are internally tracked via Concur.

In FY20, Pitt faculty and staff traveled 23,382,044 air miles and traveled an estimated 369,055 land miles, resulting in total emissions of 11,866 MT CO_2e. From FY19 to FY20, land miles increased by about 22% (a total of 65,483 miles), in part due to better data. In all previous inventories, the air mileage was estimated from the travel expense data and showed an increase in miles traveled with each inventory. As shown in Table 13, for FY19, air travel GHG emissions were calculated by SIMAP based on travel expense in dollars. Because FY20 air travel data was provided in miles, there is now less uncertainty in the GHG emissions calculations for this category.

Over past inventories, GHG emissions increases due to Air Travel from FY08 to FY14 is attributed to improved documentation. The drop between FY14 and 17 is not explained, but the resurgence of emissions in FY19 indicates that university-related air travel rebounded. The decrease from FY19 to FY20 is largely due to the COVID-19 pandemic, during which travel of all kinds did not occur for 3.5 months in the second half of the Spring semester, when conferences, Athletics recruiting, and campus visits often occur.

Due to the varying levels of detail in reported data and changing conversion factors used to translate dollar values to miles over all Pitt GHG inventories, land mile estimates have fluctuated rapidly since FY08. For FY20, the significant increase in GHG emissions from land travel is largely attributed to Athletics travel being rightfully included again in the total mileage. **Increased and improved data tracking emissions conversion for both land and air travel is needed in future inventories.**

Table 13 - Pitt's Directly Financed Outsourced Travel by GHG Inventory Year

	FY08	FY11	FY14	FY17	FY19	FY20*
Air Travel ($)	$4,193,961	$5,912,251	$8,461,970	$7,256,322	$11,769,526	$3,559,327
Air Travel (miles)	25,417,945	36,094,326	47,063,237	40,470,287	n/a	23,382,044
Land travel (miles)	440,001	514,306	731,728	281,673	303,572	369,055
GHG Emissions (MT CO_2e)	**24,900**	**33,650**	**24,132**	**25,254**	**37,142**	**11,866**

*3.5 months COVID-19 pandemic

4.3.2 STUDY ABROAD AIR TRAVEL

Like many universities, Pitt offers students the chance to complete one or two terms of academic studies in other countries under a "Study Abroad" program. Due to the nature of higher education decision-making and practice, the SIMAP calculator separates these miles from "Directly Financed Outsourced Travel." However, GHG emissions resulting from them contribute to the University's Scope 3 emissions.

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. For FY20, Pitt's total air miles traveled and total related GHG emissions from study abroad were 7,940,076 miles and 3,489 MT CO_2e; as shown in Table 14, **this was a significant**

decrease from FY19 by just over 12 million miles, equating to a 60.4% decrease in GHG emissions (Table 14). This drastic decrease is likely due to the global and University COVID-19 pandemic shutdown, during which students completed all courses remotely and study abroad experiences were not available due to travel restrictions and closed borders. This decrease is expected to continue in the FY21 inventory for the same reasons.

Pitt's Study Abroad programs span 75 countries via 350 programs, with utilization as high as 55% in the School of Business, which has boasted the highest University-wide participation rate [19]. 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. As part of the forthcoming *Pitt Climate Action Plan*, the University will create strategies relating to air travel carbon offsets and/or choosing carbon neutral flights and airlines. While study abroad travel is massively down due to the pandemic, flights and related GHG emissions are expected to rebound in the future.

Table 14 - Pitt Study Abroad Travel by GHG Inventory Year

	FY08	FY11	FY14	FY17	FY19	FY20*
Distance (miles)	n/a	1,417,847	1,524,920	5,378,016	20,035,978	7,940,076
GHG Emissions ($MT\ CO_2e$)	**n/a**	**1,100**	**775**	**4,578**	**8,816**	**3,489**

*3.5 months COVID-19 pandemic

4.3.3 COMMUTER TRAVEL

As indicated in prior Pitt GHG inventories and other studies, commuting can be a significant contributor to GHG emissions; however, without regular, organizationally specific and representative commuter survey data, it has been difficult to effectively estimate for the University until the FY19 GHG inventory. As a result (and similar to other universities and organizations), there are many assumptions made about Pitt student, faculty, and staff commuting in the GHG inventory process.

Pitt offers a suite of transportation and mobility solutions that can help reduce GHG emissions resulting from trips to and from the Pittsburgh campus. In FY20, these alternatives to single occupancy vehicle commutes include on- and off-campus student housing, free public transportation and unlimited 30-minute bike share rides for Pitt first year students, campus and city-wide biking infrastructure, carpool and vanpool programs, limited on-campus parking capacity, and more.

In FY20, Pitt's on-campus residence hall capacity was 7,649 students, which encourages walking and biking around campus. In FY20, Pittsburgh campus bike amenities also increased slightly from FY19, up to 187 bike racks and 1,173 lockable bike spaces in (Table 15).

A major bus transportation corridor runs through Pitt's Pittsburgh campus -- and Pitt has a partnership with the local transit agency (Port Authority of Allegheny County) that allows all active Pitt students and employees to ride for transit free with their Pitt ID. In FY20, the University also offered all first-year students unlimited 30-minute rides on Pittsburgh's "Healthy Ride," bike share system.

However, commuter habits are influenced by a wide variety of factors, with individuals making daily commute decisions based on distance, number of destinations, infrastructure, access, reliability, traffic

patterns, transit schedules, parking availability, childcare, and much more. To assist this process, Pitt IT analyzed home addresses of Pitt employees for the *Pitt Climate Action Plan*, allowing the average commute distance of carpoolers and single occupancy vehicle commuters (i.e., parking permit holders) to be set at 10 miles.

In FY20, Pitt had 5,034 total parking spaces on the Pittsburgh campus, including 4,958 parking spaces in garages or lots and 76 metered parking spaces for public use. Pitt issued 3,031 parking permits and had a combined 381 registered carpoolers and vanpoolers in FY20.

Table 15 - Pitt Commuting Data by GHG Inventory Year

		FY08	FY11	FY14	FY17	FY19	FY20 *
Campus Population	Faculty	2,154	2,487	2,791	2,944	2,704	3,360
	Staff	4,662	4,734	5,012	5,341	5,769	5,977
	Students	24,755	26,740	25,917	26,240	28,673	26,730
	Total	**31,571**	**33,961**	**33,720**	**34,525**	**37,146**	**36,067**
Student Housing	On-campus	7,000	7,000	7,825	7,928	7,891	7,649
	Off-campus (close)[a]	2,475	2,674	2,592	2,624	2,867	2,673
	Off-campus (far)	15,279	17,066	15,500	15,688	17,915	16,408
	Total	**24,755**	**26,740**	**25,917**	**26,240**	**28,673**	**26,730**
Carpool	Passengers	382	188	164	159	322	334
	Average Mileage	11.87	11.27	11.73	11.00	12.55	10.00
Vanpool	Vans	10	9	9	7	7	7
	Passengers	65	57	67	53	49	47
	Average Mileage	23.1	23.9	22.9	29.0	29.70	28.97
Permit	Number	3,058	3,153	2,756	2,797	2,887	3,031
	Average Mileage	12.95	12.95	12.74	12.82	12.44	10.00
Total Driving	**Average Mileage**	**12.86**	**12.88**	**12.72**	**12.77**	**11.97**	**10.04**
Parking Spaces	Garage	4,437[b]	2,563	2,299	2,597	2,802	3,126
	Lot		1,833	1,733	1,784	1,867	1,832
	Metered	165	147	119	118	97	76
Bike	Racks	0	181	178	182	182	187
	Spaces	1,000	1,670	1,600	1,136	1,136	1,173

a - Based on assumption that 10% of students living off-campus live within a walking distance to Pitt.

b - Garage and lot spaces were reported together in FY08.
* 3.5 months of COVID-19 pandemic

To calculate commuting-related emissions, SIMAP inputs include data related to faculty, staff, and student commute travel distributions by mode (explicitly split across those three Pitt designations); the average distance traveled by each commute mode; the number of one way trips each week; and the number of commuting weeks in the fiscal year. To account for the COVID-19 pandemic shutdown during FY20, SIMAP allowed users to input multiple commuting entries. As a result, during Pitt's shutdown (March 16 through June 30, 2020 in FY20), commuting assumptions varied from those used for the rest of the year.

The data documented in Table 15 was supplemented with the assumptions listed below:

1) In FY20, there were 27 in-person working weeks for faculty and staff, and 25 in-person school weeks for students. There were 15 remote working weeks for faculty and staff and 6 remote school weeks for students. Both assumptions are inclusive of both the Fall and Spring semester.
2) All students living on-campus walk to school.
3) 10% of students living off-campus live in close enough proximity to campus that they walk to school.
4) All bike spaces fill up completely once a day, proportionately by faculty, staff, and student ratios.
5) The same percentage of faculty and staff walks and bikes to campus based on a calculation and assumption from FY08.
6) Faculty hold 95% of all parking permits *(simplified for SIMAP)*.
7) Students hold 5% of all parking permits and fill up all metered parking spaces 4 times each day.
8) Only staff carpools and vanpools *(simplified for SIMAP)*.
9) The remaining (and largest) portion of each population takes transit to campus, which in Pittsburgh is primarily the bus.

Although some of these assumptions generalize the different Pitt populations' commuting behaviors, they provide a relationship between some of the known data in Table 15 and estimated modal distributions in Table 16. Of all categories in Pitt's GHG inventories, calculating impacts from Pitt's commuting continues to be one of the most challenging and should be re-evaluated with each future inventory.

Table 16 - Pitt Commute Mode Distributions by GHG Inventory Year

		FY08	FY11	FY14	FY17	FY19	FY20
Students	Bike	3.2%	4.9%	4.7%	3.3%	3.1%	3.3%
	Walk	38.3%	36.2%	40.2%	40.2%	48.7%	38.6%
	Drive Alone	3.3%	2.8%	2.4%	2.3%	1.9%	1.7%
	Carpool	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	Bus	55.3%	56.1%	52.7%	54.2%	46.4%	56.4%
Faculty	Bike	3.2%	4.9%	4.7%	3.3%	3.1%	3.3%
	Walk	3.2%	4.9%	4.7%	3.3%	3.1%	3.3%
	Drive Alone	71.0%	63.4%	49.4%	47.5%	53.4%	45.1%
	Carpool	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	Bus	22.7%	26.8%	41.1%	45.9%	40.5%	48.4%
Staff	Bike	3.2%	4.9%	4.7%	3.3%	3.1%	3.3%
	Walk	3.2%	4.9%	4.7%	3.3%	3.1%	3.3%
	Drive Alone	29.5%	30.0%	24.7%	23.6%	22.5%	22.8%
	Carpool	9.6%	5.2%	4.6%	4.0%	3.6%	6.4%
	Bus	54.6%	55.0%	61.2%	65.9%	67.7%	64.3%

For FY20, many of the same assumptions made for previous inventories were maintained; however, known population and mobility amenity data shown in Table 15 has gradually shifted assumptions since the FY08 inventory. Commuting impact estimations in the FY08 and FY11 GHG Inventories were

based primarily on assumptions and incorporated only a portion of the Pitt-provided data shown in Table 16. From FY14 to present, an adapted approach provides a more comprehensive evaluation of the different factors influencing Pitt's commuters' choices, providing explainable, quantitative framework for this assessment in addition to improved tracking and data in more recent years.

4.3.4 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 in place (i.e., that methane is trapped and stored before it is emitted to the atmosphere). The trapped methane is then traditionally processed for future use in electricity generation). The Republic Waste Services landfill utilized for Pitt solid waste captures methane, but does not process it for electricity generation on site. 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 FY20, Pitt's total solid waste stream totaled 5,380 tons, a decrease of 1,321 short tons between FY19 and FY20. **Opposite to past trends, Pitt decreased in the percentage of waste recycled campus-wide to 35.3% of the solid waste stream** (only 1,900 tons total)**.** This was a 2.1% decrease from FY19, but a 12.6% net increase in recyclables diverted % between FY08 and FY20, over which the combined solid waste volume has remained relatively constant, meaning that landfill volume has decreased while recyclables have increased (with the slight exception for FY20). As shown in Table 17, **Pitt 1,793 MT CO_2e emissions due to methane released from landfilling 3,480 tons of material in FY20.**

As mentioned previously under Purchased Electricity, the FY20 shift to the market-based method also impacted the Solid Waste category. As a result, this category experienced a small, but unexpected increase for FY20 despite less overall solid waste being produced in FY20 compared to FY19. As illustrated in Table 18, with past results were calculated using the market-based method, which demonstrate that the FY20 GHG emission increase in solid waste can be is most likely attributed to this method change, along with evolutions in SIMAP emission factors and calculations. Future inventories should continue to utilize the market-based method for emissions, as it is the recommended method.

Table 17 - Pitt Solid Waste by GHG Inventory Year

	FY08	FY11	FY14	FY17	FY19	FY20*
Landfilled (tons)	5,246	4,596	4,634	4,384	4,189	3,480
Recycled (tons)	1,543	1,572	1,764	2,406	2,512	1,900
% of Waste Recycled	22.7%	25.5%	27.6%	35.4%	37.5%	35.3%
GHG Emissions ($MT\ CO_2e$)	**5,700**	**1,400**	**1,437**	**1,522**	**1,454**	**1,793**

*3.5 months of COVID-19 pandemic

Table 18 - Pitt Solid Waste by GHG Inventory Years (Market-Based Method)

	FY08	FY11	FY14	FY17	FY19	FY20*
Landfilled (tons)	5,246	4,596	4,634	4,384	4,189	3,480
Recycled (tons)	1,543	1,572	1,764	2,406	2,512	1,900
% of Waste Recycled	22.7%	25.5%	27.6%	35.4%	37.5%	35.3%
GHG Emissions ($MT\ CO_2e$)	**18,214**	**1,596**	**2,387**	**2,259**	**2,158**	**1,793**

*3.5 months of COVID-19 pandemic

4.3.5 WASTEWATER

Wastewater was assumed to be equal to the amount of water consumed in almost all 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. However, even if the assumptions made for this report are an overestimation Pitt's GHG emissions resulting from treatment of its wastewater, the impact on Pitt's total GHG emissions is low **only 107 MT CO_2e** (0.06% of total emissions)**,** as shown in Table 19**.**

Similar to Purchased Electricity and Solid Waste, the Wastewater category saw a small, unexpected increase for FY20, considering less wastewater was used in FY20 compared to FY19. As with previous categories, the results were calculated again using the market-based method, which demonstrated a FY20 decrease in GHG emissions as illustrated in Table 20. As a result, the increase was attributed to this method change, along with evolutions in SIMAP emission factors and calculations. Future inventories should continue to utilize the market-based method for calculating emissions, as it is the recommended method.

Table 19 – Pitt Wastewater Data by GHG Inventory Year

	FY08	FY11	FY14	FY17	FY19	FY20*
Wastewater (million gallons)	278,350	246,450	280,055	240,165	236,027	201,772
GHG Emissions (MT CO_2e)	**1,500**	**1,400**	**136**	**104**	**102**	**107**

*3.5 months of COVID-19 pandemic

Table 20 – Pitt Wastewater Data by GHG Inventory Year (Market-Based Method)

	FY08	FY11	FY14	FY17	FY19	FY20*
Wastewater (million gallons)	278,350	246,450	280,055	240,165	236,027	201,772
GHG Emissions (MT CO_2e)	**1,784**	**1,603**	**148**	**127**	**125**	**107**

*3.5 months of COVID-19 pandemic

4.3.6 PAPER

Paper is vital for most businesses, but seemingly essential for large educational facilities where printed material is consumed and produced daily in great quantities. While tracking GHG emissions from paper is not mandatory under the GHG Protocol, Pitt's GHG Inventory has always included it, as it is a potentially significant emissions source. 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 using larger quantities and increasing percentages of recycled paper content paper. While percentages of overall recycled content have varied over the years, its overall trend has been upward, though total paper used has varied quite widely. This variation is due in part to more comprehensive accounting in FY17. In FY20, Pitt purchased 461,418 pounds of paper, with recycled and carbon neutral content totaling 50.7%; this is both the lowest total amount of paper Pitt has purchased since FY08 and the highest recycled and carbon neutral content of that paper. The large increase in recycled and carbon neutral content paper is due in part to Pitt's newly emphasized TreeZero paper offering, a carbon neutral paper product (accounted for as 100% recycled content in SIMAP) and whose purchase volume has grown each year [20]. As shown in Table 21, due to both consumption decreases and recycled content increases, **Pitt's total GHG emissions from paper was 509 MT CO_2e in FY20 (and only 0.27% of total emissions, the lowest it has ever been).**

Table 21 - Pitt Paper Data by GHG Inventory Year

	FY08	FY11	FY14	FY17	FY19	FY20*
Total Paper (lbs)	1,113,740	730,725	1,488,165	1,787,020	682,820	461,418
Overall Recycled Content	4.2%	20.7%	9.4%	18.6%	34.0%	50.7%
GHG Emissions ($MT\ CO_2e$)	**1,600**	**1,500**	**1,949**	**2,441**	**729**	**509**

* 3.5 months of COVID-19 pandemic

5 SINKS

SIMAP has a "Sinks" section in which the University can enter data for compost, carbon offsets, and non-additional sequestration such as carbon storage that comes from campus property (e.g., forests and soils). The compost section includes the total amount of materials composted from both dining and agricultural waste (which will reduce the total footprint when included in the inventory). The carbon offsets section includes projects a university completes above and beyond business-as-usual that will reduce the carbon and/or nitrogen footprint (e.g., reforestation or biogas projects). Projects can be on- or off-campus and do not require certification in order to be included in this section [20–22].

As part of this Sinks section, it is also worth reemphasizing part of Section ***4.2.1.1*** on "Purchased Unbundled Renewable Energy," that Pitt's first sizable purchase of renewably-sourced energy occurred in FY19. Though not carbon offsets, Pitt's RECs are third-party verified "sinks," which created significant reductions in Pitt's net emissions for both FY19 and FY20.

Compost: Composting was included for the first time in the FY19 GHG inventory -- and again in this FY20 inventory. Pitt's compostables from pre-consumer dining waste totaled to 17,556 pounds (~4,800 pound increase from FY19) and compost from the rest of campus (including events, housing, and select campus buildings) totaled 175.87 short tons (an 81 short ton increase from FY19). The inclusion of this compost data reduced overall net emissions. However, a total amount of diverted emissions is not reported in SIMAP, only subtracted from the final net emissions total.

Offsets: Through FY20, the University of Pittsburgh had not strategically considered carbon offsets – or even accounted for incidental offsets that may already be in its upstream emissions (i.e., resulting from other companies' commitments to carbon neutrality). Future inventories should continue to highlight and include these upstream emissions, while continuing to include the downstream emissions already included in this and prior inventories. The University is developing a strategic carbon offset approach as part of the forthcoming *Pitt Climate Action Plan*.

6 RESULTS DISCUSSION

Pitt's Fiscal Year 2020 GHG emissions totaled 186,068 MT CO_2e and the distribution of these emissions by source is presented in Figure 4. For comparison, Appendix C includes all detailed past GHG Inventory results, including for Fiscal Years 2008, 2011, 2014, 2017, and 2019.

To contextualize these results, Table 22 compares Pitt's GHG emissions for all inventories normalized by number of students, total number of University community members, and gross building square footage. Pitt's total Scope 1, 2, and 3 CO_2e emissions are used as the numerator for each calculation. To date, every Pitt GHG Inventory has shown a decrease in every normalized category, which reinforces University-wide progress in GHG emissions reductions.

FY20 saw a decrease in all emissions categories (~7 to 19% decreases). Any categorical GHG emissions increases were generally attributable to process or method changes alongside student, community, and/or building space counts.

Table 22 - All Pitt Accountable Emissions per Student, Community Member, and Building Square Footage

All Accountable Emissions	FY08	FY11	FY14	FY17	FY19	FY20
Students (MT CO_2e / FTE students)	11.0	10.0	9.0	8.2	7.5	7.0
Pitt Community Members (MT CO_2e / Person)	8.4	7.7	6.9	6.2	5.8	4.7
Building Space (MT CO_2e / 1,000 ft^2)	29.1	27.8	22.9	21.0	18.6	16.0

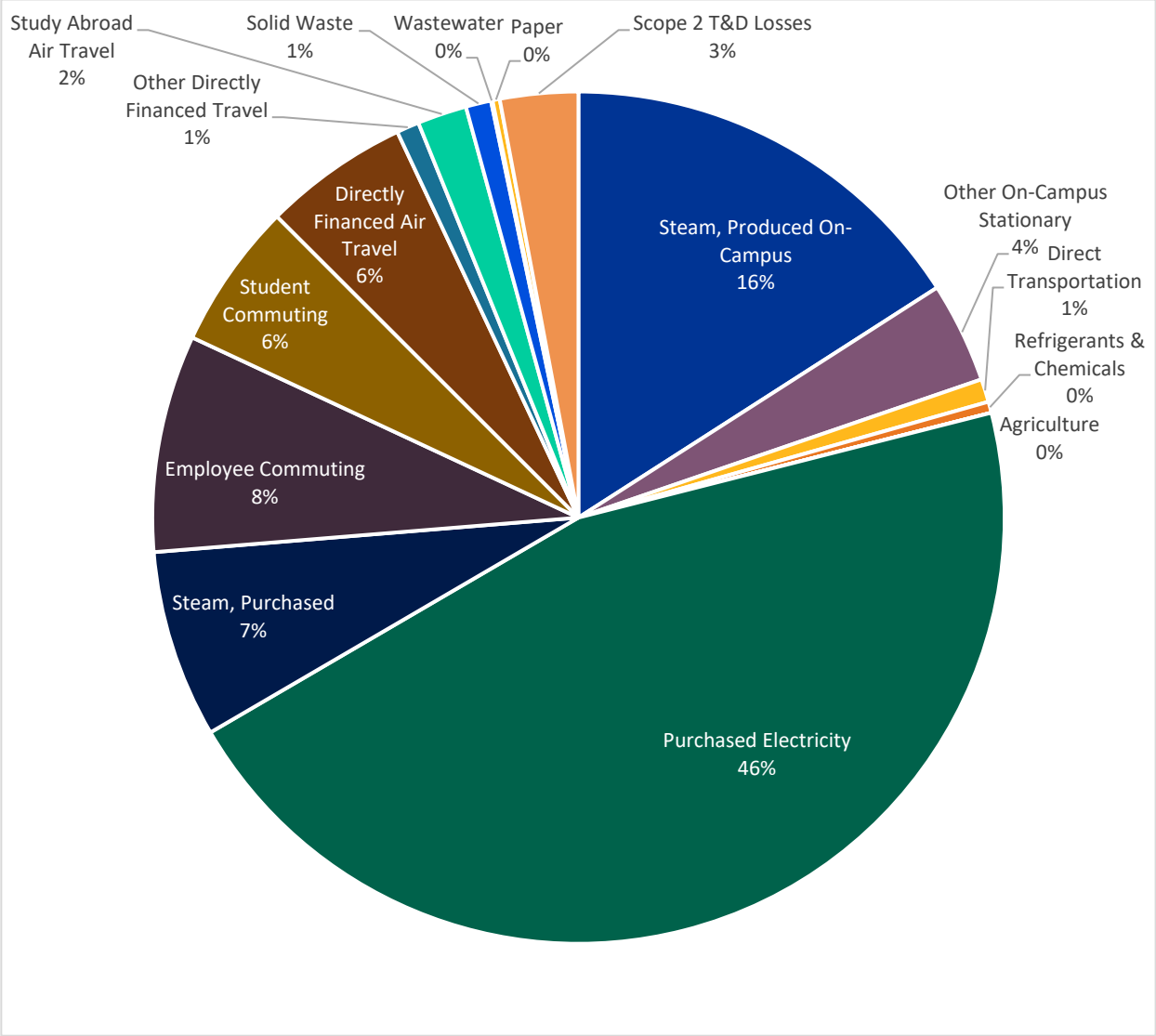


Figure 4 - Pitt FY20 GHG Emissions by Source

Table 23 - GHG Emissions by Category for FY20

		CO_2	CH_4	N_2O	CO_2e
		kg	kg	kg	Metric Tons
Scope 1	**Steam, Produced On-Campus**	29,528,859	2,944	59	29,627
	Other On-Campus Stationary	7,078,353	706	14	7,102
	Direct Transportation	1,615,428	66	43	1,629
	Refrigerants & Chemicals	-	-	-	789
	Agriculture	-	-	7	2
Scope 2	**Purchased Electricity**	84,191,611	8,444	1,227	84,753
	Steam, Purchased	13,187,993	1,472	68	13,247
Scope 3	**Employee Commuting**	15,282,114	227	155	15,330
	Student Commuting	10,304,947	52	44	10,318
	Directly Financed Air Travel	10,238,922	112	117	10,273
	Other Directly Financed Travel	687,766	878	398	1,593
	Study Abroad Air Travel	3,476,934	38	40	3,489
	Solid Waste	-	64,026	-	1,793
	Wastewater	-	-	404	107
	Paper	-	-	-	509
	Scope 2 T&D Losses	5,472,083	549	80	5,509
Offsets	Additional				0
	Non-Additional				0
Totals	Scope 1	38,222,640	3,716	123	39,148
	Scope 2	97,379,604	9,916	1,295	98,000
	Scope 3	45,462,766	65,882	1,238	48,919
	All Scopes	**181,065,010**	**79,514**	**2,656**	**186,068**
	All Offsets				

Net Emissions: 186,068 MT CO_2e

6.1 RESULTS COMPARISON

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

- **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 Scope 2 emissions, but considers Scope 3 emissions optional [24].
- **All Directly Financed Emissions:** This boundary includes Scope 1 and Scope 2 emissions along with directly financed Scope 3 emissions, such as air travel and solid waste management. Second Nature requires that universities tally Scope 1 and 2 emissions, along with some of the Scope 3 emissions for commuting and directly financed air travel [13].

- **All Directly Financed Emissions and Select Directly Encouraged Emissions:** In addition to the previous boundary, this boundary includes Scope 3 emissions that are encouraged, but not necessarily financed by the University. For instance, a university policy that requires 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.
- **"All Accountable Emissions" - All Directly Financed or Significantly Encouraged Emissions AND Selected Upstream Emissions:** This is the largest potential boundary for reporting campus GHG emissions. In addition to the previous boundary, certain other Scope 3 emissions are also included to 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 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.

Selection of a study boundary is vital for any GHG Inventory study. Selection of a limited boundary excludes important emissions sources and results in an underestimation of the actual emissions resulting from the institution. On the other hand, developing an inventory for all actual emissions requires significant time and resources – and detailed and/or complete data is often not available in all desired categories.

For FY20, there was a 36% increase in Pitt's GHG emissions by going beyond the most limited reportable boundary (Scope 1 and 2 only) to the most extended reportable boundary (Scopes 1, 2, and 3). Table 24 showcases Pitt's GHG emissions from each inventoried year.

Table 24 – Pitt GHG Emissions for All Inventory Years (MT CO_2e)

	Category	FY08	FY11	FY14	FY17	FY19	FY20*
Scope 1	**Steam, Produced On-Campus**	0	22,200	32,981	25,623	24,978	29,627
	Other On-Campus Stationary	9,200	5,700	6,386	5,245	7,470	7,102
	Direct Transportation	500	700	1,273	1,388	1,992	1,629
	Refrigerants & Chemicals	800	2,300	2,192	1,266	2,240	789
	Agriculture	0	1	2	1	1	2
Scope 2	**Purchased Electricity**	138,700	135,500	115,341	105,607	73,802	84,753
	Steam, Purchased	55,100	29,400	23,404	17,238	16,892	13,247
Scope 3	**Employee Commuting**	13,600	14,700	9,845	12,433	23,293	15,330
	Student Commuting	5,200	5,500	6,064	5,962	12,036	10,318
	Directly Financed Air Travel	24,800	33,600	23,921	24,706	36,560	10,273
	Other Directly Financed Travel	100	50	211	548	582	1,593
	Study Abroad Air Travel	0	1,100	775	4,578	8,816	3,489
	Solid Waste	5,700	1,400	1,437	1,522	1,454	1,793
	Wastewater	1,500	1,400	136	104	102	107
	Paper	1,600	1,500	1,949	2,441	729	509
	Scope 2 T&D Losses	16,600	13,400	7,596	5,523	4,575	5,509
	Scope	**FY08**	**FY11**	**FY14**	**FY17**	**FY19**	**FY20**
Totals	Scope 1 (Direct Emissions)	10,500	30,901	42,834	33,523	36,681	39,148
	Scope 2 (Indirect Emissions)	193,800	164,900	138,744	122,845	90,694	98,000

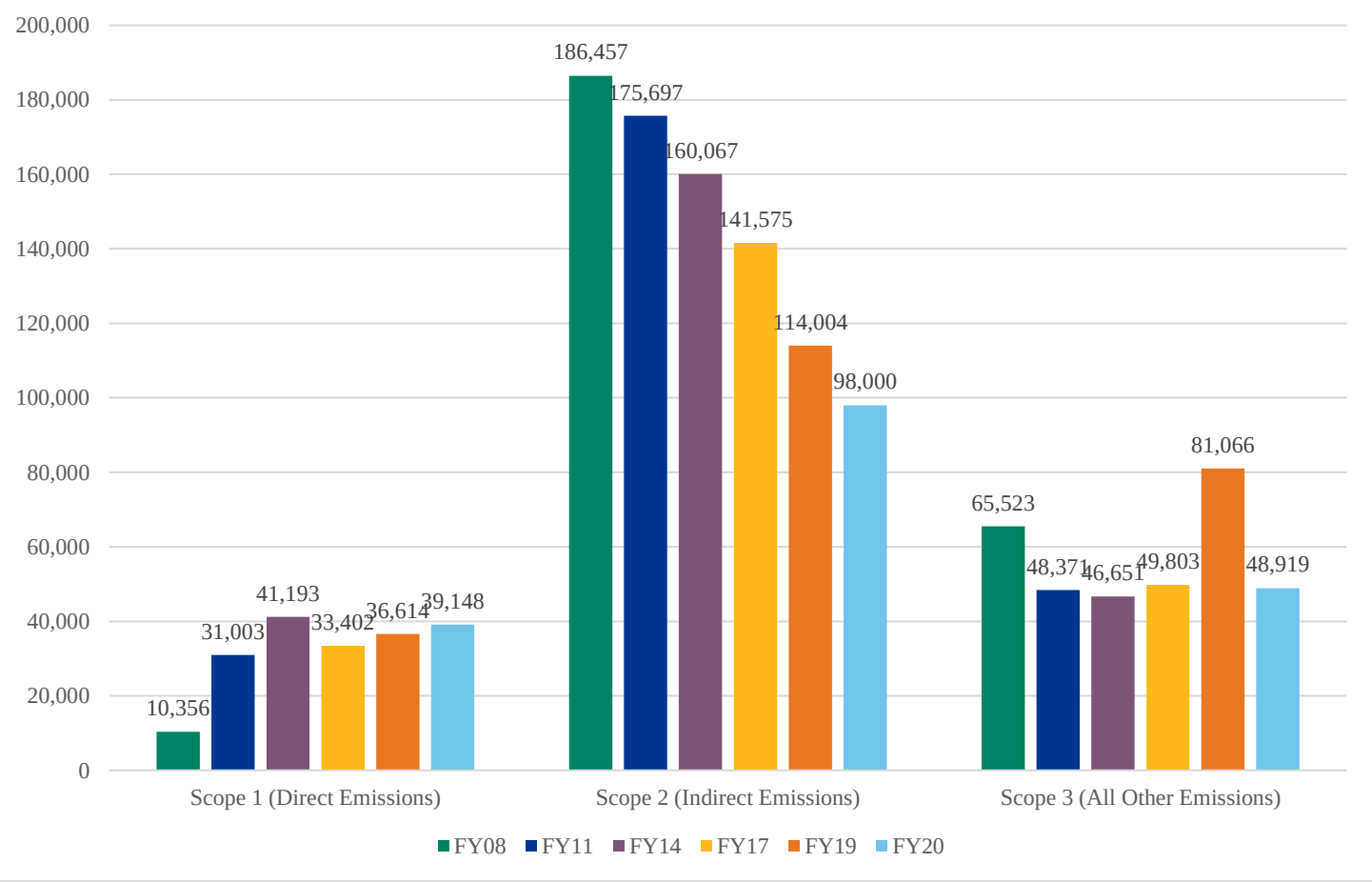
	Category	FY08	FY11	FY14	FY17	FY19	FY20*
	Scope 3 (All Other Emissions)	69,100	72,650	51,933	57,817	88,147	48,919
	All Accountable Emissions	**273,400**	**268,451**	**233,511**	**214,185**	**215,522**	**186,068**
				* 3.5 months of COVID-19 pandemic			

6.1.1 RESULTS COMPARISON – RECOMMENDED MARKET-BASED METHOD

As mentioned throughout the report, there were a few categories in the FY20 GHG Inventory that saw unexpected increases from FY19. These categories include Purchased Electricity, Solid Waste, and Wastewater in Scopes 2 and 3. For each one of these categories, there was actually a reduction in usage for FY20, but once calculated, the emissions did not show this. Relevant to this unexpected increase, the FY20 inventory saw a calculation method change in SIMAP from the custom fuel mix to the recommended market-based method and due to this, there were some increases in unexpected areas.

In order to confirm that the decreases in usage were accompanied by decreases in GHG emissions (and thus that emissions increases were due to method changes, not consumption), the results were calculated again using the market-based method for all inventory years. Figure 5 shows the expected decreases in Scopes 2 and 3 as they relate to utilizing the market-based method due to the decrease in usage in those categories.

Figure 5 - Pitt GHG Emissions for All Years Market-Based Method



6.1.2 COMPARISON OF RESULTS WITH PEER INSTITUTIONS

For comparing GHG emissions results with other institutions of higher education, the scope discussion above is important, but all schools are assumed to be including Scope 1 and 2 GHG emissions at a minimum. Comparing schools based on net emissions only can result in misleading conclusions, as every school has different student enrollments, number of buildings, and educational and research activities. For a logical comparison, emissions results are usually converted into one of the normalized metrics given below.

Table 25 shows Pitt's performance among a group of peer institutions commonly used for benchmarking purposes. Published university GHG inventory reports and Second Nature's reporting tool were referenced for other universities' normalized performance data.

Table 25 - Higher Education Institution Peer Group Benchmarking for GHG Emissions, Sorted by Net Emissions [17-19]

HIGHER EDUCATION INSTITUTION	STUDY YEAR	NET EMISSIONS (MT CO_2E)	MT CO_2E / FTE STUDENT	MT CO_2E / 1,000 FT^2
Chatham University	2018	8,031	3.88	7.30
Duquesne University	2020	21,908	-	-
Carnegie Mellon University	2019	40,485	2.06	6.56
Villanova University	2019	67,037	7.00	14.10
Case Western Reserve	2017	116,133	10.70	19.50
University of Maryland - College Park	2019	133,221	3.56	7.77
University of Pittsburgh	**2020**	**186,254**	**6.97**	**15.99**
Cornell University	2019	203,000	8.60	12.67
University of Pennsylvania	2019	244,748	9.20	15.40
Duke University	2018	257,031	16.90	15.70
University of Florida	2018	389,917	7.90	23.40
Pennsylvania State University - University Park	2017	435,465	4.40	13.6
Ohio State University	2020	568,984	10.20	22.6

7 RECOMMENDATIONS FOR FUTURE PITT GHG INVENTORIES

As with all GHG inventories, general assumptions were required to complete analysis for some categories studied in this FY20 GHG Inventory; as a result, some categories may lack accuracy, precision, and/or may have under or over estimation of their associated emissions. These assumptions were made using the SIMAP tool, external sources and references, and the best judgement of the authors; they are expected to roughly represent the true GHG emissions levels of Pitt's Pittsburgh campus. This FY20 study has a good foundation of assumption basis from the previous five inventories -- and attempted to improve or solidify assumptions where possible.

Future inventories should continue this effort and try to eliminate the need for assumptions via use of additional studies, reports, and surveys. As the University of Pittsburgh is committed to doing annual GHG Inventories, process improvements should be easier to integrate; to help ensure that happens, Table 26 summarizes recommended process recommendation improvements for the FY21 GHG Inventory. The additional challenge of accounting for changes from the COVID-19 shutdown in the latter half of FY20 should also help inform the FY21 inventory, which was entirely impacted by the pandemic. Detailed descriptions of select recommendations follow the table.

Table 26 - Pitt FY20 GHG Inventory Results Comparison & FY21 Process Recommendations

		% Change in Category Between FY19 and FY20		Reason(s) for Changes			FY21 Recommendation
				More Complete Data	Change in Emissions Factors / Calculation	Activity Change	
Scope 1	**Co-generated Electricity**	n/a		n/a	n/a	n/a	n/a
	Steam, Produced On-Campus	**18.6%**	▲	-	-	More steam consumption from co-owned Carrillo Plant than BBP purchased steam	When combined with purchased steam from BBP, overall decrease
	Other On-Campus Stationary	**4.9%**	▼	-	-	Natural gas consumption decreased slightly	-
	Direct Transportation	**18.2%**	▼	-	-	Vehicle fuel consumption decreased	Use more fuel efficient & electric vehicles
	Refrigerants & Chemicals	**64.8%**	▼	-	-	Less reliance on high GWP refrigerants	Continue to phase out high GWP Refrigerants
	Agriculture	**138.4%**	▲	-	-	High required year, per Grounds	Keep lowest % nitrogen as possible
Scope 2	**Purchased Electricity**	**14.8%**	▲	-	Shift to Market-Based method	-	Continue to purchase RECs & renewables in increasing volume
	Steam, Purchased	**21.6%**	▼	-	-	Less reliant on purchased steam from Bellefield Boiler Plant	Continue to hone Pitt building stock list
Scope 3	**Employee Commuting**	**34.2%**	▼	More accurate average commute distance for faculty & staff	-	Decrease due to COVID-19 campus shutdown	Continue to review & refine all assumptions. Incorporate new bike share benefit.

		% Change in Category Between FY19 and FY20		Reason(s) for Changes			FY21 Recommendation
				More Complete Data	Change in Emissions Factors / Calculation	Activity Change	
	Student Commuting	**14.3%**	▼	-	-		Reference regional & national commuter surveys
	Directly Financed Air Travel	**71.9%**	▼	-	-	Decrease due to COVID-19 travel restrictions	-
	Other Directly Financed Travel	**173.7%**	▲	Included rental cars	-	Rental cars included in FY20 results	Research other car services that have carbon offsets for future use
	Study Abroad Air Travel	**60.4%**	▼	-	-	Decrease due to COVID-19 travel restrictions	-
	Solid Waste	**23.3%**	▲	-	Shift to Market-Based method	% recycled decreased due to regional & global recycling challenges	Emphasize diverting more materials from landfill
	Wastewater	**4.8%**	▲	-	Shift to Market-Based method	Water consumption decreased	-
	Paper	**30.2%**	▼			Consumption decrease & increased carbon neutral paper %	-
	Scope 2 T&D Losses	**20.4%**	▲		Linked to electricity factors		-
Offsets	Additional	n/a		n/a	n/a	n/a	• Investigate offsets in purchases & supply chains. • Create strategy for future in/offsets

Fleet: The vehicles registered in the University fleet and their fuel consumed is tracked under three separate programs. Obtaining data from the Guttman Oil and Fuelman system is simple (as it only includes Pitt's Pittsburgh campus fuel use). Obtaining Pittsburgh campus data from the Voyager system is more challenging because it includes regional and other Pitt fuel use as well -- and each transaction is not clearly identified with a particular campus. FY14, FY17, and FY19 utilized a method that associated individual card numbers to a particular campus based on the location of majority of purchases with that card. However, in FY20, total fuel use for each of the systems were provided, which allowed for more calculation certainty. This same approach should be used in future inventories to maintain consistency and shorten the time required to investigate fuel reports.

Steam: The University's GHG benchmark year of FY08 was strategically selected prior to operation of the Carrillo Street Steam Plant to help benchmark that decision and its impacts. As expected, switching steam production from BBP to CSSP decreased steam-related emissions ~6% between FY08 and FY11, despite total steam consumption increasing due to the addition of new facilities. In FY14, the CSSP was in full operation, but steam-related emissions continued to increase. In FY17, overall steam demand decreased due to a reduction in heating degree days; FY19 showed a small decrease in GHG emissions from steam, despite summer CSSP maintenance that required steam supply to be provided from BBP. In

FY20, there was a 19% increase in steam produced by CSSP, paralleled by a 22% decrease in steam purchased from BBP (compared to FY19). These shifts show an ongoing move from relying on produced steam instead of purchased steam, which is recommended for continuation in future years, along with overall review of both steam plants' efficiencies and fuel sources.

Electricity: Over the 13-year period Pitt's six GHG inventories cover, **Purchased Electricity remains the largest source of emissions for Pitt, contributing ~ 46% of the Pittsburgh campus's total GHG emissions for FY20**. Varying electricity fuel mixes across the six inventories exemplify regional changes. Previously a coal-dominated electricity fuel mix region, federal emissions regulations have forced both a national and regional shift away from coal-fired electricity generation, helping grow natural gas, nuclear, and renewable power's contribution to the grid. More importantly for the University, via both direct procurement and renewable energy credits, **Pitt began purchasing larger amounts of renewable energy for its electricity consumption, which has contributed to a 39% reduction in GHG emissions from Purchased Electricity since FY08**; electricity consumption decreased 7% between FY19 and FY20, but has seen an overall 2% increase between FY08 and FY20. To continue to reduce GHG emissions from Purchased Electricity and overall, the University should continue to aggressively pursue building energy efficiency strategies and implementation, while also continuing to purchase more renewably-sourced electricity, in line with its goal to produce or procure 50% renewables by 2030 – and become carbon neutral by 2037.

Air Travel: With the upgrading of purchasing systems that simplify the travel reimbursement process for Pitt employees, recording Pitt's air travel has improved since FY08. Though a new system was implemented by FY11, participation is still not at 100% and completeness should continue to be pursued moving forward. FY20 saw improved data accounting, which allows for more confidence in this category. The re-inclusion of Athletics in FY20 (after a FY19 exclusion) must persist. Continuing to increase and improve data tracking and conversion to emissions for both land and air travel is needed for future inventories.

Commuting: Because up-to-date, representative data on commuting preferences of Pitt faculty, staff, and students was not utilized prior to FY20, assumptions were and will continue to be required to calculate GHG emissions resulting from commuting. The use of a campus-wide commuting survey that generates a representative response is ideal; however, due to the size of the University's population, this approach is not temporally or fiscally feasible annually. This FY20 inventory used an updated faculty and staff daily commuting mileage value, which was transformative. In an effort to continue to improve estimates from this category, subsequent inventories should continue to revisit all commuting data sources and assumptions. Additionally, commuter survey data from the national American Community Survey, the triennial regional Make My Trip Count survey, and/or a Pitt-focused commuter survey should be explored more deeply for future inventories [25]. After generating over 2,000 responses from Pitt in both 2015 and 2018, Make My Trip Count's future is unclear; it was not delivered in 2021 and no 2022 planning has commenced.

Water: Although water consumption is not a focus of this inventory, it should be noted that Pitt began installing more water meters across the Pittsburgh campus in 2018. Due to the connection between water and energy, future inventories should take advantage of the increase in more accurate campus water data. As local water and sewage costs increase, this inventory process could positively contribute to campus wide cost-benefit analyses related to implementing more sustainable stormwater management practices on campus that simultaneously help mitigate city-wide combined sewer overflow issues, while reducing water consumption on via reuse of rainwater.

Study Abroad: The total number of study abroad miles increased significantly from FY17 to FY19 due to increased popularity of spending undergraduate time abroad and data improvements. It is important to note for future inventories that data must be understood and reported with the highest accuracy to avoid erratic increases. The large FY20 decrease in FY20, mostly due to COVID-19 pandemic travel restrictions; however, a rebound in this category is expect in the next few years, so it remains essential for the University to be aware of its large impact on GHG emissions.

Conservation & Efficiency: Facilities Management has continued its decades of efficiency and conservation projects and practices by performing in-depth energy and water audits of campus buildings. Over the years, this process has identified (and continues to adapt the list of) which buildings are the largest consumers of energy and water. As a large campus, Pitt still has many opportunities for both energy and water use reductions that continue to be implemented (e.g., lighting retrofits). As more is accomplished, detailed building audits are crucial to identifying ongoing opportunity areas that help reduce campus energy usage and GHG emissions. **Given Pitt's goals to reduce energy and water usage 50% below baselines by 2030, the University should expedite these energy and water conservation projects -- and expand efforts to include the regional campuses.**

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

1) Backup building generators throughout campus.
2) Carbon offsets in Pitt's Scope 3 supply chains, specifically for Directly Financed Car and Air Travel.
3) Properties not owned by, but fully leased by the University.
4) Dining and retail food sales (in line with Pitt's Cool Food Pledge tracking)
5) Separate inventories for the four Pitt regional campuses in Bradford, Greensburg, Johnstown, and Titusville.

8 CONCLUSIONS

Pitt's FY20 GHG emissions total 186,068 MT CO_2e from all accountable sources (137,148 MT CO_2e from Scope 1 & 2 alone)**; this is an overall reduction of 31.9% compared to FY08 and a decrease of 13.7% from FY19.**

The largest decrease between FY19 and FY20 was in Scope 3 emissions, which decreased 45%, primarily due to reductions in commuting, directly financed travel, and study abroad during the COVID-19 pandemic. Pitt's Scope 3 emissions have decreased 29% since FY08, which includes increased and improved data accounting and reductions due to the COVID-19 pandemic. Paper usage and sourcing strategies also continue to be successful, with increasing utilization of electronic documentation (especially in the FY20 pandemic work shift) alongside a shift to using more carbon neutral paper.

FY20 saw a few Scope 3 increases over FY19 in the categories of Other Directly Financed Travel, Solid Waste, Wastewater, and Scope 2 Transmission and Distribution Losses. Travel saw the largest increase over FY19 due to the new inclusion of rental car purchases and re-inclusion of Athletics travel. While solid waste and wastewater saw consumption decreases, their emissions contributions increased due to a

shift to the SIMAP market-based process for FY20 (a best practice). Future inventories must continue to compute results with SIMAP-recommended methods, which is currently the market-based method. Increases in emissions from Scope 2 transmission and distribution losses are linked to the Scope 2 purchased electricity emissions increases. The University should continue to decrease Scope 3 emissions, which have a large impact on Pitt's overall carbon footprint.

Pitt's Scope 1 and 2 emissions went up slightly between FY19 and FY20 (by 7% and 8%, respectively), primarily due to steam use and electricity method change. The increase in produced steam use in Scope 1 (from the co-owned Carrillo Steam Plant) was coupled with a decrease in Scope 2 purchased steam use (from the Bellefield Boiler Plant). Despite electricity consumption decreasing by about 7% from FY19, purchased electricity emissions increased by about 15% over FY19. Despite consumption decreases, the purchased electricity, wastewater, and solid waste categories all saw unexpected emissions increases, which are attributed to the shift of calculating GHG emissions via the newly recommended market-based method and other updates in SIMAP emissions factors and calculations. A comparison of past years' data analyzed with this method did illustrate around a 10% decrease in electricity GHG emissions compared to FY19, along with slight decreases in emissions from wastewater and solid waste. For continuity, market-based results from past years are not reported alongside final FY20 results, just used as a reference point to determine if emissions increases were unexpected. As emphasized previously, to avoid unexpected results in future inventories, SIMAP-recommended calculation methods should be utilized annually moving forward.

There was also a small increase in GHG emissions from agriculture due to the spread of higher Nitrogen content fertilizer; however, its contribution to total emissions is negligible in comparison with other categories.

Though Scope 1 saw a slight increase in total emissions, there were some large decreases. Other on-campus stationary sources saw a slight emission decrease due to lower natural gas use; emissions from direct transportation also decreased due to fleet gasoline and diesel fuel use reductions. The largest comparative Scope 1 emissions decrease came from a 65% reduction in emissions resulting from Refrigerants and Chemicals compared to FY19. This large decrease was due to a significant reduction in higher GWP refrigerant use (replaced by refrigerants with lower GWPs). This shift should continue in the future to further decrease GHG emissions.

In general, the continued decrease in Pitt's GHG emissions indicates that the University's past actions are resulting in the planned outcomes. The University should continue its focus on building efficiency for new and existing buildings, including elevating its carbon strategy towards neutrality by 2037 as it committed to in February 2020. Significant GHG emissions decreases reflected in this FY20 inventory due to the COVID-19 shutdown should also be considered in future strategies to help minimize the impact of the rebound that will occur in future inventories.

Acronyms

AASHE – Association for the Advancement of Sustainability in Higher Education

ACUPCC – American College and University Presidents Climate Commitment

AA – Airlines for America

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

N_2O – Nitrous oxide

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

Pitt – University of Pittsburgh, Pittsburgh Campus

PPA – Power Purchase Agreement

REC – Renewable Energy Certificate

SIMAP – Sustainability Indicator Management & Analysis Platform

WRI – World Resources Institute

Appendix A: Pitt FY20 GHG Inventory Data Contacts

Meetings and communication with University of Pittsburgh staff from several departments were required in order to gather the data required for the inventorying process and SIMAP tool. Table 27 shows the list of individuals providing data and information for specific GHG Inventory categories.

Table 27 - Pitt Contacts Providing FY20 GHG Inventory Data & Information

Contact Name	Contact Title	Pitt Department	Information
Andy Moran	Senior Manager	Grounds, Facilities Management	Fertilizer
Aurora Sharrard	Director of Sustainability	Sustainability	Renewable Energy & RECs
Brice Lynn	Assistant Director	Study Abroad Office	Study Abroad Air Travel
Cyndee Pelt & Narahari Sastry	Chief of Staff & Senior Vice Chancellor/Chief Financial Officer	Office of Chief Financial Officer	Budget & Financials
Emily Duchene	Travel Program Manager	Purchasing Services	Airfare & Bus/Rail Travel
Jennifer Barnes	Supplier Diversity & Sustainability Coordinator	Purchasing Services	Paper, Airfare Travel, & Rental Cars
Jonathan Pearson & Jeff Yeaman & Corey Robinson	Director & Senior Manager & Mobility Specialist and Customer Service Representative	Parking, Transportation, & Services	Parking, Carpool, Vanpool, & University Fleet
Keith Duval	Environmental Manager	Environmental Health & Safety	Natural Gas & Generator Use
Lela Loving	Energy Analyst	Facilities Management	Building List with Utilities & Physical Measurements, Steam Production, Electricity Fuel Mix, Natural Gas, Wastewater, & RECs
Mary Rugh & Will Mitchell	Director of Engineering & Director of Facility Services	Facilities Management	LEED Projects List, Refrigerants & Chemicals, and Landfill & Recycling Weights
Ryan Varley & Dustin Gray	Associate Athletic Director of Business Services & Executive Associate Athletic Director for Administration	Athletics	Athletics Travel

Appendix B: University of Pittsburgh FY20 Pittsburgh Campus Owned and Operated Properties

Building Name	Gross Square Footage	Managed by
3343 Forbes	25,122	Facilities Management
480 Melwood Street	44,562	Facilities Management
530 Melwood (Motor Pool)	8,200	Facilities Management
718 Devonshire Ave.	16,000	Facilities Management
Allegheny Observatory	30,017	Facilities Management
Allen Hall	58,026	Facilities Management
Alumni Hall	162,970	Facilities Management
Amos Hall	68,000	Auxiliaries, Housing
Athletic Fields Building	1,312	Facilities Management
Barco Law Building (includes Food Services)	139,611	Facilities Management
Bellefield Hall	107,545	Facilities Management
Benedum Auditorium	19,586	Facilities Management
Benedum Hall – MCSI Addition	20,480	Facilities Management
Benedum Hall (includes Food Services)	433,326	Facilities Management
Biomedical Science Tower 3	326,000	Facilities Management
Bouquet Gardens A	19,708	Auxiliaries, Housing
Bouquet Gardens B	19,708	Auxiliaries, Housing
Bouquet Gardens C	19,708	Auxiliaries, Housing
Bouquet Gardens D	19,708	Auxiliaries, Housing
Bouquet Gardens E	19,708	Auxiliaries, Housing
Bouquet Gardens F	14,781	Auxiliaries, Housing
Bouquet Gardens G	19,708	Auxiliaries, Housing
Bouquet Gardens H	19,708	Auxiliaries, Housing
Bouquet Gardens J	64,800	Auxiliaries, Housing
Brackenridge Hall	55,569	Auxiliaries, Housing
Bruce Hall	63,006	Auxiliaries, Housing
Carrillo Street Steam Plant	23,500	Facilities Management
Cathedral of Learning (includes Food Services)	599,637	Facilities Management
Center for Bioengineering	91,123	Facilities Management
Centre Plaza Apartments	138,600	Auxiliaries, Housing
Charles L. Cost Sports Center	82,977	Facilities Management
Chevron Science Center (includes Food Services)	236,768	Facilities Management
Chevron Science Center Addition	32,367	Facilities Management
Clapp Hall	85,893	Facilities Management
College Gardens Apartments	297,510	Auxiliaries, Housing

Building Name	Gross Square Footage	Managed by
Crabtree Garage	56,941	Auxiliaries, Parking & Transportation
Craig Hall	55,115	Facilities Management
Craig Hall Garage	10,409	Auxiliaries, Parking & Transportation
Crawford Hall	87,637	Facilities Management
Darragh Street Housing	102,217	Auxiliaries, Housing
David Lawrence Hall	57,956	Facilities Management
Eberly Hall	56,051	Facilities Management
Eberly Solvent Storage	380	Facilities Management
Edward H. Litchfield Towers	465,393	Auxiliaries, Housing
Engineering Hall	67,859	Facilities Management
Eureka Building	36,607	Facilities Management
Falk School & Addition	66,213	Facilities Management
Fitzgerald Field House (includes Concessions)	105,045	Facilities Management
Forbes Craig Apartments	43,554	Auxiliaries, Housing
Forbes Pavilion (includes Added Offices + Graphics)	87,114	Auxiliaries, Housing
Franklin Complex	50,753	Auxiliaries, Housing
Fraternity Housing Complex	73,600	Auxiliaries, Housing
Frick Fine Arts	73,088	Facilities Management
Gardner Steel Conference Center	26,714	Facilities Management
GSPH (includes Crabtree)	227,908	Facilities Management
GSPH Annex	57,000	Facilities Management
Halket/Iroquois Parking Lot	-	Auxiliaries, Parking & Transportation
Heinz Chapel	18,717	Facilities Management (Auxiliaries in FY22)
Hillman Library (includes Food Services)	252,778	Facilities Management
Holland Hall	136,958	Auxiliaries, Housing
Information Sciences Building	76,130	Facilities Management
Information Sciences Garage	38,499	Auxiliaries, Parking & Transportation
Iroquois Building	60,000	Facilities Management
Joncaire/Boundary Parking Lot	-	Auxiliaries, Parking & Transportation
K. Leroy Irvis Hall	127,835	Auxiliaries, Housing
Langley Hall (includes Food Services)	90,592	Facilities Management
Langley Hall Garage	6,904	Auxiliaries, Parking & Transportation
Life Sciences Annex	50,000	Facilities Management
Log Cabin	400	Facilities Management
Lothrop Hall	241,770	Auxiliaries, Housing
Lower Campus Chilled Water Plant	-	Facilities Management

Building Name	Gross Square Footage	Managed by
LRDC (Demolished in FY22)	99,734	Facilities Management
Mark A. Nordenberg Hall (includes Student Wellness Center & Retail)	200,471	Auxiliaries, Housing
Mayflower Apartments	14,940	Auxiliaries, Housing
McCormick Hall	43,686	Auxiliaries, Housing
McGowan Institute for Regenerative Medicine	45,000	Facilities Management
Mervis Hall (includes Food Services)	86,570	Facilities Management
Music Building	21,275	Facilities Management
Oakwood Apartments	14,886	Auxiliaries, Housing
OC Garage	106,629	Auxiliaries, Parking & Transportation
O'Hara Garage (Demolished in FY22)	140,000	Auxiliaries, Parking & Transportation
O'Hara Student Center	40,000	Facilities Management
Panther Hall	161,542	Auxiliaries, Housing
Petersen Events Center	430,000	Athletics
Petersen Sports Complex (includes concessions & 3 sports fields)	23,200	Athletics
Plum Borough Research Facility	41,139	Facilities Management
Public Safety Building	23,200	Facilities Management
RIDC Computer Center	19,355	Facilities Management
Ruskin Hall	120,000	Auxiliaries, Housing
Salk Hall Addition	81,000	Facilities Management
Salk Hall Annex	128,767	Facilities Management
Salk Hall Main	205,228	Facilities Management
Scaife Hall	474,881	UPMC
Sennott Square (includes Garage and Retail)	248,000	Facilities Management
Soldiers & Sailors Garage	344,626	Auxiliaries, Parking & Transportation
Space Research Coordination Center	41,849	Facilities Management
Stephen Foster Memorial	27,182	Facilities Management
Sutherland Hall	223,903	Auxiliaries, Housing
Thackeray Hall	99,147	Facilities Management
Thaw Hall	51,379	Facilities Management
Thomas Boulevard	192,000	Facilities Management
Thomas Boulevard Parking Lot	-	Auxiliaries, Parking & Transportation
Trees Field - Sports Dome	105,608	Facilities Management
Trees Hall	244,412	Facilities Management
University Child Development Center	24,517	Facilities Management
University Club	85,000	Auxiliaries
Upper Campus Chilled Water Plant	-	Facilities Management
Van de Graaff (Nuclear Physics)	36,691	Facilities Management

Building Name	Gross Square Footage	Managed by
Victoria Hall (includes Food Services)	128,759	Facilities Management
Wesley W. Posvar Hall (includes Food Services)	513,893	Facilities Management
Wesley W. Posvar Hall Garage	203,746	Auxiliaries, Parking & Transportation
William Pitt Union (includes Food Services)	178,726	Facilities Management
TOTAL for FY20	**11,564,322**	

Appendix C: Pre-FY20 Pitt GHG Emissions Inventory Results

Table 28 - Pitt's GHG Emissions for Fiscal Year 2019

		CO2	CH4	N2O	CO_2e
		kg	kg	kg	Metric Tons
Scope 1	**Co-gen Electricity**	0	0	0	-
	Co-gen Steam	24,895,329	2,477	50	24,978
	Other On-Campus Stationary	7,445,440	741	15	7,470
	Direct Transportation	1,977,215	75	49	1,992
	Refrigerants & Chemicals	-	-	-	2,241
	Agriculture	-	-	3	0.7
Scope 2	**Purchased Electricity**	72,930,417	7,655	2,480	73,802
	Purchased Steam / Chilled Water	16,835,799	1,675	34	16,892
Scope 3	**Faculty / Staff Commuting**	23,201,248	932	246	23,293
	Student Commuting	12,018,918	71	59	12,037
	Directly Financed Air Travel	36,441,399	396	407	36,560
	Other Directly Financed Travel	490,196	620	281	582
	Study Abroad Air Travel	8,786,941	95	98	8,816
	Solid Waste	-	-	-	-
	Wastewater	-	51,939	-	1,454
	Paper	-	-	385	102
	Scope 2 T&D Losses	4,521,086	475	154	4,575
Offsets	Additional				0
	Non-Additional				0
Totals	Scope 1	34,317,984	3,293	117	36,682
	Scope 2	89,766,216	9,330	2,514	90,694
	Scope 3	85,459,788	54,528	1,630	88,148
	All Scopes	**209,543,988**	**67,151**	**4,261**	**215,522**
	All Offsets				

Net Emissions: 215,522 MT CO_2e

Table 29 - Pitt's GHG Emissions for Fiscal Year 2017

		CO_2	CH_4	N_2O	CO_2e
		kg	kg	kg	Metric Tons
Scope 1	Co-generated Electricity	0.0	0.0	0.0	-
	Produced Steam	25,538,568	2,283	46	25,623
	Other On-Campus Stationary	5,227,507	467	9	5,245
	Direct Transportation	1,331,518	254	87	1,388
	Refrigerants & Chemicals	-	-	-	1,266
	Agriculture	-	-	3	1
Scope 2	Purchased Electricity	119,411,279	1,655	2,332	105,604
	Purchased Steam	20,167,615	2,252	104	17,238
Scope 3	Employee Commuting	12,073,458	1,152	446	12,433
	Student Commuting	5,844,545	392	167	5,962
	Directly Financed Air Travel	19,452,692	193	222	24,706
	Other Directly Financed Travel	65,927	3	2	548
	Study Abroad Air Travel	2,585,030	26	30	4,578
	Solid Waste	-	81,183	-	1,522
	Wastewater	-	-	392	104
	Paper	-	-	-	2,441
	Scope 2 T&D Losses	11,915,988	269	218	5,523
Offsets	Additional				-
	Non-Additional				-
Totals	Scope 1	32,097,593	3,004	144	33,523
	Scope 2	139,578,895	3,906	2,437	122,842
	Scope 3	51,937,639	83,218	1,475	57,817
	All Scopes	223,614,127	90,128	4,055	214,181
	All Offsets				

Net Emissions: 214,181 MT CO_2e

Table 30 - Pitt's GHG Emissions for Fiscal Year 2014

		CO2	CH4	N2O	CO2e
		kg	kg	kg	Metric Tons
Scope 1	Co-generated Electricity	0	0	0	0
	Produced Steam	32,890,427	2,940	59	32,981
	Other On-Campus Stationary	6,368,762	569	11	6,386
	Direct Transportation	1,242,053	244	82	1,273
	Refrigerants & Chemicals	0	0	0	2,192
	Agriculture	0	0	6	2
Scope 2	Purchased Electricity	113,932,100	12,845	3,649	115,341
	Purchased Steam	23,338,930	2,086	42	23,404
Scope 3	Employee Commuting	9,706,561	1,002	379	9,845
	Student Commuting	6,003,029	399	170	6,064
	Directly Financed Air Travel	23,833,841	236	272	23,921
	Other Directly Financed Travel	209,278	11	5	211
	Study Abroad Air Travel	772,252	8	9	775
	Solid Waste	0	57,462	0	1,437
	Wastewater	0	0	456	136
	Paper	0	0	0	1,949
	Scope 2 T&D Losses	7,503,314	846	240	7,596
Offsets	Additional				0
	Non-Additional				0
Totals	Scope 1	40,501,243	3,753	159	42,834
	Scope 2	137,271,030	14,931	3,691	138,744
	Scope 3	48,028,274	59,964	1,532	51,933
	All Scopes	225,800,547	78,648	5,381	233,511
	All Offsets				0

Net Emissions: 233,511 MT CO_2e

Table 31 - Pitt's GHG Emissions for Fiscal Year 2011

		CO2	CH4	N2O	CO2e
		kg	kg	kg	Metric Tons
Scope 1	Co-generated Electricity	0	0	0	0
	Produced Steam	22,120,324	2,212	44	22,189
	Other On-Campus Stationary	5,675,832	568	11	5,693
	Direct Transportation	714,884	130	45	732
	Refrigerants & Chemicals	0	0	0	2,251
	Agriculture	0	0	3	1
Scope 2	Purchased Electricity	134,812,989	1,782	2,242	135,526
	Purchased Steam / Chilled Water	29,340,701	2,934	59	29,432
Scope 3	Employee Commuting	14,377,434	2,336	827	14,682
	Student Commuting	5,484,669	389	165	5,543
	Directly Financed Air Travel	33,471,585	330	379	33,593
	Other Directly Financed Travel	46,280	3	1	47
	Study Abroad Air Travel	1,096,922	11	12	1,101
	Solid Waste	0	56,173	0	1,404
	Wastewater	0	0	402	120
	Paper	0	0	0	1,477
	Scope 2 T&D Losses	13,333,153	176	222	13,404
Offsets	Additional				0
	Non-Additional				0
Totals	Scope 1	28,511,039	2,910	104	30,866
	Scope 2	164,153,690	4,716	2,301	164,957
	Scope 3	67,810,043	59,418	2,008	71,371
	All Scopes	260,474,772	67,043	4,413	267,194
	All Offsets				0

Net Emissions: 267,194 MT CO_2e

Table 32 - Pitt's GHG Emissions for Fiscal Year 2008

		CO2	CH4	N2O	CO2e
		kg	kg	kg	Metric Tons
Scope 1	Co-generated Electricity	0	0	0	0
	Produced Steam	0	0	0	0
	Other On-Campus Stationary	9,135,679	913	18	9,162
	Direct Transportation	474,287	80	28	484
	Refrigerants & Chemicals	0	0	0	799
	Agriculture	0	0	1	0
Scope 2	Purchased Electricity	138,141,644	961	1,824	138,704
	Purchased Steam / Chilled Water	49,293,289	5,173	402	55,093
Scope 3	Employee Commuting	13,342,553	2,189	774	13,622
	Student Commuting	5,124,457	375	157	5,180
	Directly Financed Air Travel	24,728,701	244	280	24,817
	Other Directly Financed Travel	110,924	6	3	112
	Study Abroad Air Travel	0	0	0	0
	Solid Waste	0	247,311	0	5,688
	Wastewater	0	58,454	412	1,466
	Paper	0	0	0	1,626
	Scope 2 T&D Losses	16,256,744	367	202	16,618
Offsets	Additional				0
	Non-Additional				0
Totals	Scope 1	9,609,966	993	47	10,446
	Scope 2	187,434,933	6,134	2,226	193,796
	Scope 3	59,563,379	308,945	1,827	69,129
	All Scopes	256,608,278	316,073	4,101	273,372
	All Offsets				0

Net Emissions: 273,400 MT CO_2e

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