Emory University 2022 Greenhouse Gas Inventory Report[1]

Executive Summary

On October 13, 2021, Emory University joined Second Nature's Presidents' Climate Commitment, which includes 450 higher education institutions committed to achieving net-zero carbon emissions and building resilience to the impacts of climate change. A key component of this commitment is to publicly report an institution's Greenhouse Gas (GHG) emissions on an annual basis and report on all climate action planning efforts. Emory has reported its GHG emissions since 2010, but this inventory is the second to be reported through the Second Nature platform.

In 2019, Emory updated its greenhouse gas reduction goals to mirror the latest scientific evidence and recommendations of the United Nations Intergovernmental Panel on Climate Change (IPCC). At that time, scientific evidence showed that in order to stabilize global mean surface temperature to a 1.5-degree Celsius (°C) target or lower, net anthropogenic emissions of greenhouse gases must decrease by 45% by 2030 (from 2010 levels), and the worldwide economy must achieve decarbonization by 2050. In light of this evidence, University leadership approved updating Emory's baseline inventory year to 2010 and matching its GHG emissions reduction goals to these global targets.

Since 2010, Emory has reduced its GHG emissions by 39.14%. Emory emitted a net quantity of 210,742.76 MT CO2e (metric tons of carbon dioxide equivalent) in 2022. Emory's net emissions increased by 1.14% from 2021. An increase in emissions from 2021 to 2022 was expected as the University resumed pre-COVID-19 pandemic operations, however this increase in emissions is much lower than anticipated. Emory's GHG emissions by scope were:

- Scope 1: 49,858.55 MT CO_2e representing a 29.93% reduction from 2010 and 5.99% reduction from 2021
- Scope 2: 104,358.86 MT CO_2e representing a 45.03% reduction from 2010 and 7.66% reduction from 2021
- Scope 3: 56,525.35 MT CO_2e representing a 33.86% reduction from 2010 and 33.58% increase from 2021

For Emory to achieve its 45% reduction goal by 2030, its total emissions must be less than or equal to 190,438 MT CO_2e, meaning emissions must be reduced by 20,304 MT CO_2e by the end of the decade. The IPCC issued new guidance in 2023 about mitigation pathways to achieve the 1.5 °C target and calls for rapid decarbonization this decade. While it calls for the same

[1] This document was prepared for the Office of Sustainability, Resilience, and Economic Inclusion at Emory University by E Rowe Consulting, LLC for internal and external purposes.

emission reduction targets Emory has in place now, these projections use 2019 emissions as a baseline, as opposed to 2010. In order to remain in alignment with global scientific recommendations, Emory leadership are considering using 2019 emissions as a baseline in future inventories. By doing so, Emory would need to limit its total carbon emissions to 135,832 $MTCO_2e$ – a reduction of ~75,000 MT CO_2e by 2030.

With these considerations in mind, Emory's Office of Sustainability, Resilience, and Economic Inclusion will be reviewing its 2019 GHG inventory as a new baseline, delineating Healthcare emissions to better understand how emissions are being driven on campus and completing its 2023 GHG inventory to further understand its emissions following the COVID-19 pandemic.

Introduction

Emory University regularly evaluates its greenhouse gas (GHG) emissions, or carbon footprint, in order to monitor its efforts to reduce emissions to net-zero by 2050 through strategies that entail energy efficiency, behavior change, clean and renewable energy sources, and new innovations. Emory began measuring and reporting its GHG emissions in 2010, with 2005 as the original baseline year, and subsequent inventories have been conducted in 2013, 2014, 2016, 2019, 2019, 2021, and 2022. The goal of these GHG inventories is to assist Emory in making short- and long-term mitigation decisions, increase on-campus awareness of mitigation efforts, and provide accountability to these goals.

On October 13, 2021, Emory University joined Second Nature's Presidents' Climate Commitment, which includes 450 higher education institutions committed to achieving net-zero carbon emissions and building resilience to the impacts of climate change. A key component of this commitment is to publicly report an institution's annual GHG emissions and report on climate action planning efforts. Prior to joining Second Nature, Emory University already publicly reported its GHG emissions on the Office of Sustainability, Resilience, and Economic Inclusion's (OSI) website and through its Sustainability, Tracking, Assessment, and Rating System (STARS) report. In advance of Emory's one year anniversary of joining Second Nature, Emory shared its historic GHG inventories and 2021 inventory – the first to be completed since joining the commitment. This 2022 inventory is the second to be shared under the Second Nature commitment.

In 2019, Emory updated its greenhouse gas reduction goals to mirror the latest scientific evidence and recommendations of the United Nations Intergovernmental Panel on Climate Change (IPCC). At that time, scientific evidence showed that in order to stabilize global mean surface temperature to a 1.5-degree Celsius (°C) target or lower, net anthropogenic emissions of greenhouse gases must decrease by 45% by 2030 (from 2010 levels), the worldwide economy must achieve decarbonization (or reach net-zero) by 2050.[2] In light of this evidence, Emory leadership approved updating its baseline inventory year to 2010 and matching its GHG emissions reductions goals to these global targets [45% reduction by 2030 and 100% reduction by 2050]. In support of these overarching goals, Emory's 2025 Sustainability Vision and Strategic Plan set contributing goals to:

- Invest in a portfolio of innovative greenhouse gas sequestration projects that provide resilience, research, teaching, and national leadership benefits to Emory;
- Achieve carbon neutral construction for all new construction;
- Reduce campus energy use per square foot (EUI) by 50% and total energy use by 25%;

[2] Special Report: Global Warming of 1.5°C (IPCC - 2018)

- Develop a local carbon offset program with social justice benefits to allow students, faculty, and staff to offset Emory-sponsored travel and study abroad.

In March 2023, the IPCC released a report on the status of climate change to date, including projected mitigation pathways to stabilize global warming to 1.5°C - 2 °C. This report calls for a ~45% reduction in GHG emissions by 2030 and net zero emissions by 2050 in order to stabilize global warming to 1.5 degrees.[3] While these are the same reduction percentages the IPCC published in 2018, these updated goals use 2019 emissions levels as a baseline for calculation (as opposed to 2010 in 2018 report). The modeled pathways to limit warming to 1.5°C - 2 °C show global GHG emissions peaking between 2020 and 2025. While the reduction percentages are the same, the baseline emissions are larger, meaning global decarbonization will have to occur faster within the next decade than previously expected. In light of these updated recommendations from the IPCC, Emory is evaluating updating its GHG baseline year to 2019 to reflect the latest scientific evidence. A further update on this decision will be provided in future inventory reports.

Methodology

GHG inventories quantify GHG emissions and are used by a range of stakeholders to identify baseline emissions, track reductions, and inform future mitigation planning. All base figures for calculations, graphs, charts, and tables in this report were generated through SIMAP (Sustainability Indicator Management Analysis Platform), and all figures were generated in Excel. SIMAP was chosen for this report because it is an emissions calculator specifically designed for higher education and the GHG reporting platform used by Second Nature for the Presidents' Climate Commitments reporting requirements. SIMAP utilizes an activity-based approach which calculates GHG emissions by multiplying the driver of a GHG producing activity, such as gallons of fuel used, by a conversion or emissions factor to calculate the corresponding GHG emissions.[4]

SIMAP updates its emissions factors and Global Warming Potential (GWP) factors annually, utilizing data from the IPCC, Climate Registry, and Greenhouse Gas Registry. Emory University uses the emissions factors provided by SIMAP, and for 2022, updated factors to match SIMAP's latest recommendations, including:[5]

- Emissions Factors Version 2022 – emissions factors vary by input type.

[3] Climate Change 2023 Synthesis Report: Summary for Policymakers (IPCC - 2023)
[4] Greenhouse Gas Emissions Information for Decision Making: A Framework Going Forward (National Academies - 2022)
[5] More information on specific emissions factors is publicly provided on SIMAP's website.

- Global Warming Potential Version AR5 100-year – the effect greenhouse gases will have in the atmosphere over a 100-year time period. This GWP version does not account for the climate-carbon feedback.
- Radiative Forcing Factor of 2.7 – emissions from air travel are multiplied by a radiative forcing factor (2.7) to account for the higher GWP from emissions released at higher altitudes.
- Scope 2 Market-Based – Emory updated its calculations for Scope 2 emissions from Location-Based to Market-Based in 2021 to reflect the reporting requirements for Second Nature. Both approaches account for regional fuel mixes, meaning that regions with less renewable energy in the grid mix, will have higher GHG emissions for Scope 2. The market-based approach allows an institution to account for any renewable energy purchased or sold by an institution. Since Emory does not purchase or sell renewable energy, switching from the location-based to market-based scenario has not altered the calculations of Scope 2 emissions.

This inventory was completed by a third-party consultant with internal support from Emory's OSI staff. All data inputs, outputs, and assumptions were reviewed and approved by the Office of Institutional Research and Decision Support in July 2023.

Emissions Sources and Scopes

Emory's emissions are largely from carbon dioxide (CO_2). Methane (CH_4), nitrous oxide (N_20), and hydrofluorocarbons (HFC) emissions represent only a small percentage of Emory's total inventory. These GHGs currently account for 82% of present-day, worldwide warming.[6] Below is a list of Emory's sources for each of these emission types.

CO_2 (carbon dioxide): On-Campus Stationary Sources, Transportation Fuel, Purchased Electricity, Commuting, and Air Travel (including Study Abroad)
CH_4 (methane): On-Campus Stationary Sources, Transportation Fuel, Purchased Electricity, Commuting, Air Travel (including Study Abroad), Solid Waste, and Wastewater
N_2O (nitrous oxide): On-Campus Stationary Sources, Transportation Fuels, Fertilizers, Purchased Electricity, Commuting, and Air Travel (including Study Abroad)
HFC (hydrofluorocarbon): Refrigerants

[6] Greenhouse Gas Emissions Information for Decision Making: A Framework Going Forward (National Academies - 2022)

GHG calculations are delineated as either direct emissions sources (which are owned or operated by Emory) or indirect emissions sources (which are not owned or operated by Emory). Emissions sources are further categorized by means of three different scopes:

1. Scope 1 includes all direct GHG emissions from sources owned or maintained by Emory. For example, emissions from burning fuels in Emory's boilers and fleet vehicles are considered Scope 1 emissions.
2. Scope 2 includes indirect GHG emissions from purchased energy by the institution. Scope 2 emissions physically occur at the facility where electricity is generated, such as Georgia' Power's production plants, but are attributable to Emory as the end user of the product.
3. Scope 3 includes all other indirect emissions. Scope 3 emissions are directly attributable to Emory's operations but are from sources outside the definitions of Scopes 1 and 2. At present, Emory reports Scope 3 emissions for Emory-funded travel; study abroad; student, faculty, and staff commuting to Emory; wastewater, and landfilled waste generated by Emory. SIMAP also automatically calculates the emissions for transmission and distribution (T&D) losses and fuel- and energy-related activities (FERA). More information about these two emissions sources is provided below.

Under its Second Nature commitment, Emory is only required to report Scope 3 emissions for Emory-funded travel and commuting. When comparing Emory's progress to peer institutions in the Second Nature reporting platform, please note Emory is voluntarily reporting additional emissions sources which impact its total emissions and Scope 3 emissions.

Inventory Boundary and Timeframe

GHG emissions for this inventory are collected for the main campus of Emory University and Emory Healthcare located in the Druid Hills neighborhood of Atlanta, Georgia. This inventory includes in its scope all University buildings located on and around Clifton Road, the Briarcliff campus, the Clairmont campus, and Emory National Primate Research Center. Healthcare facilities included are Emory University Hospital and its adjacent buildings, Clinics A, B, and C, the 1525 Clinic, and the Emory Rehabilitation Hospital. Wesley Woods hospital campus and other Emory Healthcare hospitals and campuses are not included within the campus boundary at this time. A university and a healthcare system have very different building requirements and energy demands, and it is rare for a university to include its healthcare system within its GHG inventory, as Emory does. OSI is exploring the possibility of differentiating University and Healthcare emissions to better understand how these two parties are driving Emory's total GHG emissions. More information about this will be provided in a future inventory report.

All data reported are for FY22, which ran from September 1, 2021, to August 31, 2022.

Utilities

Roughly 70% of the emissions in this inventory come from Stationary Fuels and Purchased Electricity, which together provide the energy necessary to operate Emory's buildings.[7] Emory's campus receives utilities from external sources through several electric, natural gas, and domestic water systems. As of this 2022 inventory, 4,195,644 kWh of solar power was produced on campus – an 853% increase from 2019 and a 130% increase from 2021. In 2020, Emory began installation of 15,000 solar panels which have the capacity to generate 10% of Emory's peak electricity demand and reduce emissions by 4,300 metric tons (MT) annually.[8]

Emory operates a 500,000 pound/hour steam plant and three central chilled water plants to provide cooling, heating, and plug and process load energy to over 100 buildings.[9] Five large natural gas fired boilers in the central steam plant distribute steam throughout steam mains to buildings. The steam produces hot water and hot air for water heating and building comfort. The boilers recover energy from the exhaust steam and control the amount of unburned oxygen to maximize energy conservation efficiency. In 2016, a steam-turbine generator, which is part of a cogeneration/combined heat power (CHP) system utilizing the existing mechanical heat from the natural gas boiler, became operational. The heat is captured, generating a higher-pressure steam that turns a turbine that improves the efficiency of Emory's energy use. This system has the capacity to provide an additional 1 mega-watt (MW) of electricity for the same level of natural gas usage. This electrification of energy systems is a critical pathway to carbon neutrality, since electricity can be produced from carbon-free sources, whereas there are no carbon-free alternatives for natural gas and other heating oils. At the time of this inventory, there was not sufficient tracking and reporting information on the system efficiencies (figures required for SIMAP reporting) to include data on the cogeneration facility.

In 2019, a system of 400-foot-deep geothermal wells were dug in nearby McDonough Field to provide some 700 tons of heating and cooling capacity to the LEED Platinum-certified Student Center. This system is not directly reported in the GHG inventory since geothermal does not generate power. Instead, this system is indirectly reported through reductions in stationary fuel usage.

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[7] For the purpose of this inventory, water usage is not included in the calculation because SIMAP only accounts for purchased chilled water, and Emory creates its own chilled water via electric water chillers.

[8] Transformative solar power agreement will help Emory reduce greenhouse gas emissions (Emory University - 2020)

[9] Plug and process loads are energy loads that are not related to general lighting, heating, ventilation, cooling, and water heating, and that typically do not provide comfort to the occupants.

Three chilled water plants use electrical centrifugal water chillers to produce 42 °F chilled water. The chilled water is distributed to buildings through buried chilled water mains where it is used to dehumidify and cool the air. Some cooling is required year-round to dehumidify outside air before it is circulated to the interior area of buildings, which is then re-heated for occupant comfort. Heat absorbed from buildings is dissipated using evaporative water-cooling towers located outside the chiller plants.

Steam and chilled water loads have decreased as a result of a temperature control policy changes and weekend, evening, and holiday building shutdowns. A LEED (Leadership in Energy and Environmental Design) Silver minimum requirement for all new construction and complementary Emory Sustainable Performance Program are major drivers of EUI reductions for Emory and result in energy efficiency and optimization.

Results

Overall Emissions

Historically, Emory has seen annual GHG reductions despite significant growth. In the 2021 inventory, Emory achieved artificially high reductions in GHG emissions, particularly for Scope 3, because Emory suspended almost all funded travel and study abroad, and switched to telecommuting for most faculty, staff, and students. It was therefore expected that as Emory resumed pre-pandemic operations, GHG emissions would increase in 2022 compared to 2021 levels.

Since 2010, Emory has reduced its GHG emissions by 39.14%. Emory emitted a net quantity of 210, 742.76 metric tons of carbon dioxide equivalent (MT CO_2e) in 2022 (see Appendix A for a breakdown of GHG emissions results). While emissions were expected to increase from 2021 to 2022, Emory only had an increase of 1.14% in GHG emissions. In addition, there was a 14.67% reduction in emissions compared to 2019, the most recent inventory completed before the COVID-19 pandemic.

Figure 1. This stacked chart shows GHG emissions by scope from 2010-2022, and the trend line represents total GHG emissions. Emissions are shown in MT CO_2e.

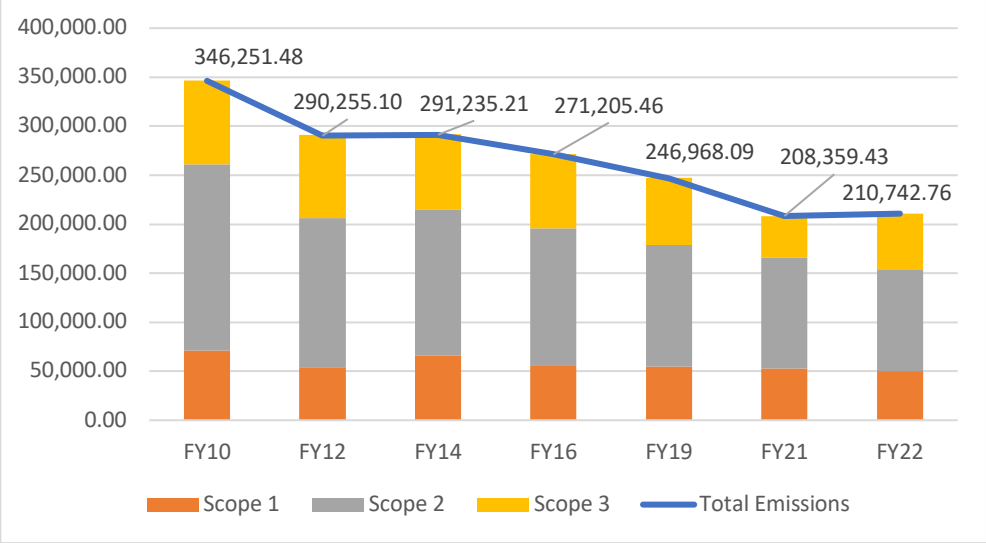


Figure 2. This chart shows the breakdown of Emory's GHG emissions by input, with Purchased Electricity (Scope 2) and On-Campus Stationary Fuels (Scope 1) making up the largest share of emissions. The Pie sections labeled as 0% indicate emissions sources that represent less than 1% of Emory's total emissions, which have been rounded down to 0% in this chart.

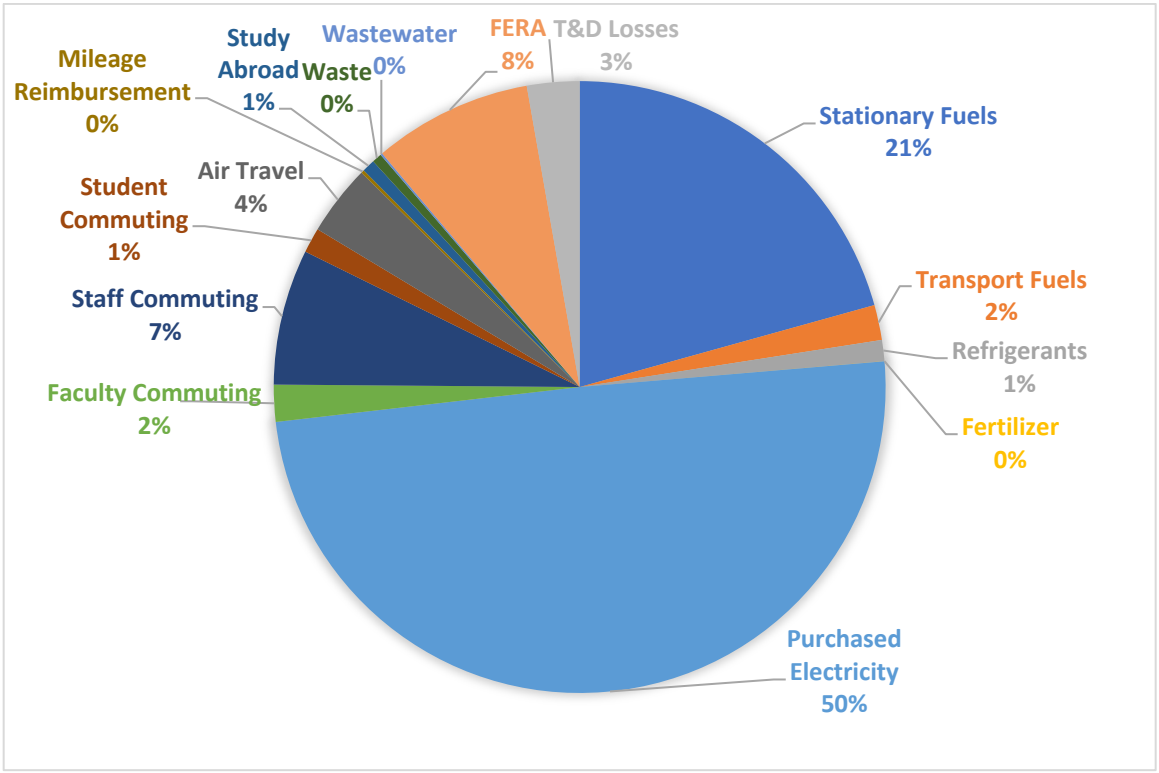
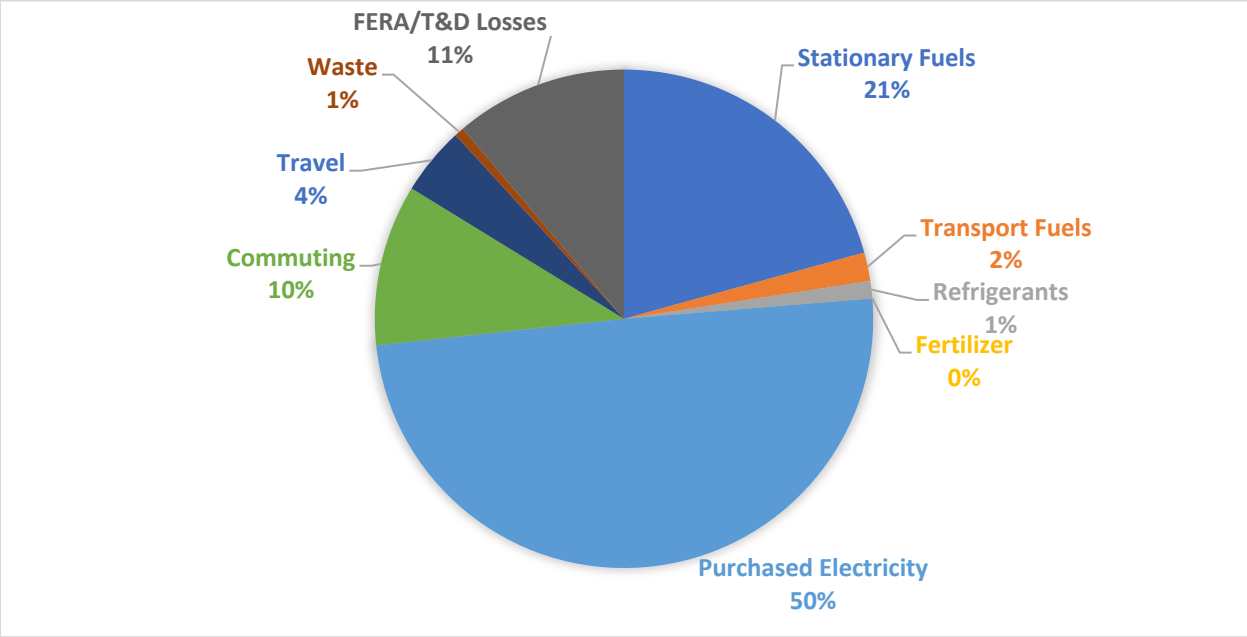


Figure 3. This chart shows the breakdown of Emory's GHG emissions with consolidated inputs to visualize how each of the overall emissions sources are driving emissions. In this chart the following sources have been combined:

- **FERA/T&D Losses**
- **Waste: Wastewater and Landfill Waste**
- **Travel: Mileage Reimbursement, Study Abroad, and Emory-funded Air Travel**
- **Commuting: Student, Staff, and Faculty Commuting**



T&D Losses and FERA Emissions

SIMAP has automatically calculated the emissions for T&D Losses for each of Emory's inventories, and Emory has always reported these emissions within Scope 3. T&D losses represent electricity that is lost in the transport of electricity along power lines. While the University only pays for the electricity it consumes, the emissions from these electricity losses are still attributable to Emory as a Scope 3 emissions source.

In early 2023, SIMAP issued a comprehensive update with expanded Scope 3 reporting categories, which includes the automatic inclusion of fuel- and energy-related activities (FERA) emissions. These emissions occur upstream for purchased fuels and electricity from the extraction, production, and transportation of fuels. This includes, but is not limited to, the emissions associated with the refining of gasoline, the mining of coal, and the production of solar panels. At present, SIMAP is reporting FERA emissions for solar, fuel oil, wind, coal and natural gas. In 2022, Emory's FERA emissions were 17,706.74 MT CO_2e and made up 8.4% of Emory's carbon footprint.

These emissions were automatically calculated in Emory's SIMAP report, resulting in a higher total quantity of GHG emissions. All historic GHG inventories were re-calculated to include FERA emissions to enable direct comparisons between this report and future reports. In addition, these emissions have always been attributable to Emory's operations, but it was not until this year there were sufficient datasets to support their calculations in SIMAP. All total emissions and Scope 3 emissions figures for all historic inventories will be higher than in previous reports as a result of inclusion of FERA emissions. To reduce its FERA emissions, Emory should decrease its Scope 1 and Scope 2 emissions.

Scope 1

Scope 1 emissions are GHG emissions from sources that are controlled and owned by Emory University and Emory Healthcare, which include stationary fuels, transportation fuels, fertilizer, and refrigerants. In FY22, they represented 24% of Emory's GHG emissions, which is the same for 2019 (Figures 4 & 5). Scope 1 emissions were 49,858.55 MT CO_2e in 2022 and have decreased by 29.93% from Emory's 2010 baseline and by 5.99% from 2021.

Changes in Scope 1 Emissions

- Stationary fuel emissions decreased by 26.56% compared to the 2010 baseline and by 9.94% compared to 2021. Campus Services continued to report utility data from utility bills instead of utility meters providing a more accurate report of energy usage. Despite reductions in building occupancy in 2021, emissions for Stationary Fuels continued to decrease in 2022.
- Transportation fuel emissions increased by 11.57% compared to 2021. In 2021, Emory used 405,256 gallons of transportation fuels to operate Emory's fleet, compared with 439,624 gallons in 2022. This increase in transportation fuels is consistent with a return to normal campus operations in 2022, and therefore an increase in transportation demand for Emory. Compared with the 2010 baseline, transportation fuel emissions have increased by over 108%. While the increase in emissions from 2021 to 2022 was expected, this increase is part of a larger trend for this emissions source.
- Since 2010, emissions associated with refrigerant use have decreased by 76.30%; however, compared with 2021, there was a 111% increase. In 2022, Emory expanded its refrigerant reporting to include all refrigerants used within Emory's central plant. These data have not been previously reported in GHG inventories. However, refrigerant emissions have significantly decreased from the 2010 baseline as a result of international and federal regulations to phase out hydrofluorocarbons.
- Emissions from fertilizer use decreased by 27.87% from the 2010 baseline and by 21.10% compared to 2021.

Scope 2

Scope 2 emissions are GHG emissions from purchased electricity, steam, and chilled water. Scope 2 emissions physically occur at the facility where electricity is generated but are attributed to Emory as the end user of the energy. In 2022, they represented 49.5% of Emory's GHG emissions, as compared to 50% in 2019 (Figures 4 & 5). In 2022, Scope 2 emissions were 104,358.86 MT CO_2e compared with 113,010.59 MT CO_2e in 2021. Since 2010, Scope 2 emissions have decreased by 45.03% and 7.66% compared to 2021.

Changes in Scope 2 Emissions

Between 2021 and 2022, Scope 2 emissions from purchased electricity have decreased by 8,651.73 MT CO_2e. While Emory significantly increased its solar capacity through its 20-year Solar Energy Procurement Agreement (SEPA) with Cherry Street Energy during this time, this is not the only driver of this emissions reduction. From 2021 to 2022, Emory consumed an additional 9,953,167 kWh of purchased electricity. Despite this increase in electricity use, emissions decreased as a result of changes to Georgia Power's energy mix. In 2022, 24% of Georgia Power's energy mix was produced by nuclear energy and 13% by renewables.[10] Georgia Power has been investing in expanding its nuclear portfolio as its primary means of reducing GHG emissions from its energy mix. As of July 31, 2023, Georgia Power's Plant Vogtle Unit 3 nuclear facility was operational.[11] Emory's Scope 2 emissions will continue to decrease with this system online, but the primary driver of this decline is from nuclear, not renewable energy expansion.

Scope 3

Scope 3 emissions are directly attributable to Emory's operations, but do not occur on Emory's campus, meaning they are indirect emissions sources. This includes Emory-sponsored air travel, mileage reimbursement for ground travel, study aboard air travel, commuting, landfilled waste, FERA, T&D losses, and wastewater. In 2022, these sources represented about 27% of Emory's GHG emissions, compared with 28% in 2019 (Figures 4 & 5). Scope 3 emission were greatly reduced in 2021 as a result of Emory's COVID-19 policies, so a direct comparison of these results is difficult. Between 2019 and 2021, Scope 3 emissions decreased by 51%. Between 2021 and 2022, Scope 3 emissions increased by 33.58%. Since 2010, Scope 3 emissions have reduced by 33.86% and since 2019 have reduced by 17.50%. While Scope 3 emissions were significantly impacted by COVID-19 policies in 2021, there are lingering impacts of these policies into 2022 with Scope 3 emissions totaling 56,525.35 MT CO_2e.

Changes in Scope 3 Emissions

[10] 2022 Facts & Figures (Georgia Power – 2022)
[11] Vogtle Unit 3 goes into operation (Georgia Power – 2023)

- All emissions sources for travel were significantly reduced in 2021. All travel emissions increased in 2022, however air travel, mileage reimbursement, and study abroad miles all are reduced by about 50% from pre-pandemic levels. Emissions from commuting are not as straightforward. There was an increase in telecommuting for all campus populations, which is documented in the results of Emory's Transportation Survey; however, the increase is not significant enough to have noticeable impacts on GHG emissions at this point. Future inventories will provide more clarity on shifting commuting patterns, and will reveal if these lower travel mileage figures will hold.
    - In 2021, Emory Healthcare staff within the scope of the inventory were included within Staff Commuting for the first time, and were included within this inventory as well. Subsequently, staff commuting emissions have increased since ~6,000 staff members have been added to the inventory.
- Emissions associated with the methane produced from landfilled waste increased by 331.14% compared to 2021 and 181.15% compared to 2019. In 2022, Emory changed waste haulers, resulting in waste being hauled to landfills that practice methane flaring, as opposed to methane capture and electricity generation as was practiced at the landfill used by Emory's previous waste hauler. Emissions associated with the methane and nitrous oxide produced from wastewater treatment decreased by 15.78% compared to 2021. Given incomplete data inputs, reduction comparisons cannot be provided from these two emissions sources compared to the 2010 baseline.

Figure 4. This chart shows the percentage of emissions by Scope for 2022.

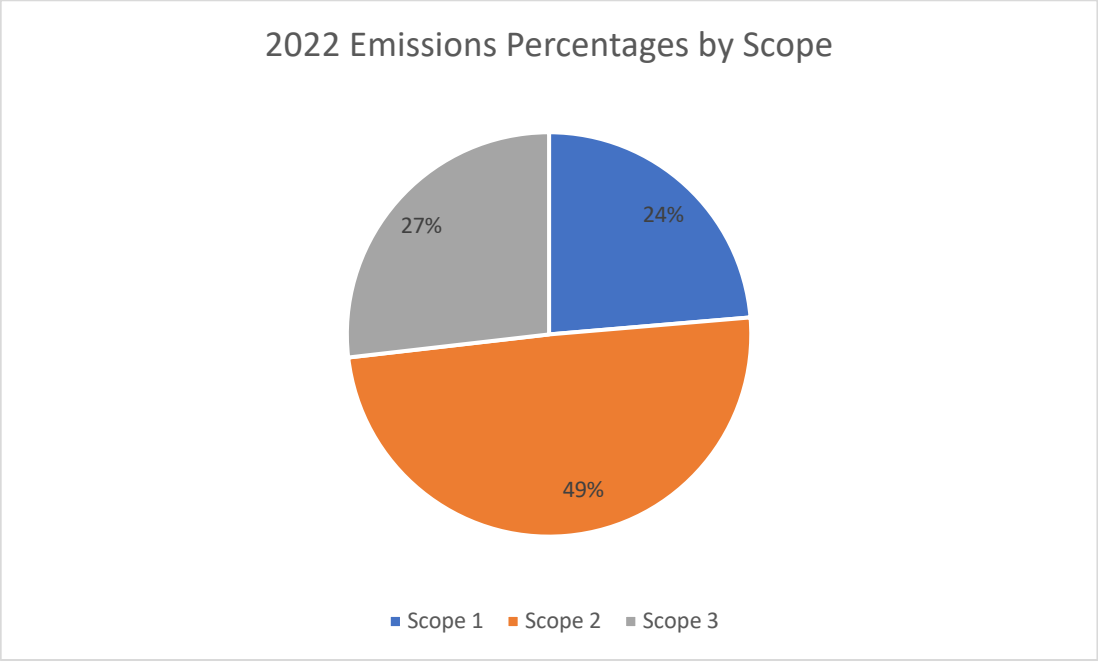
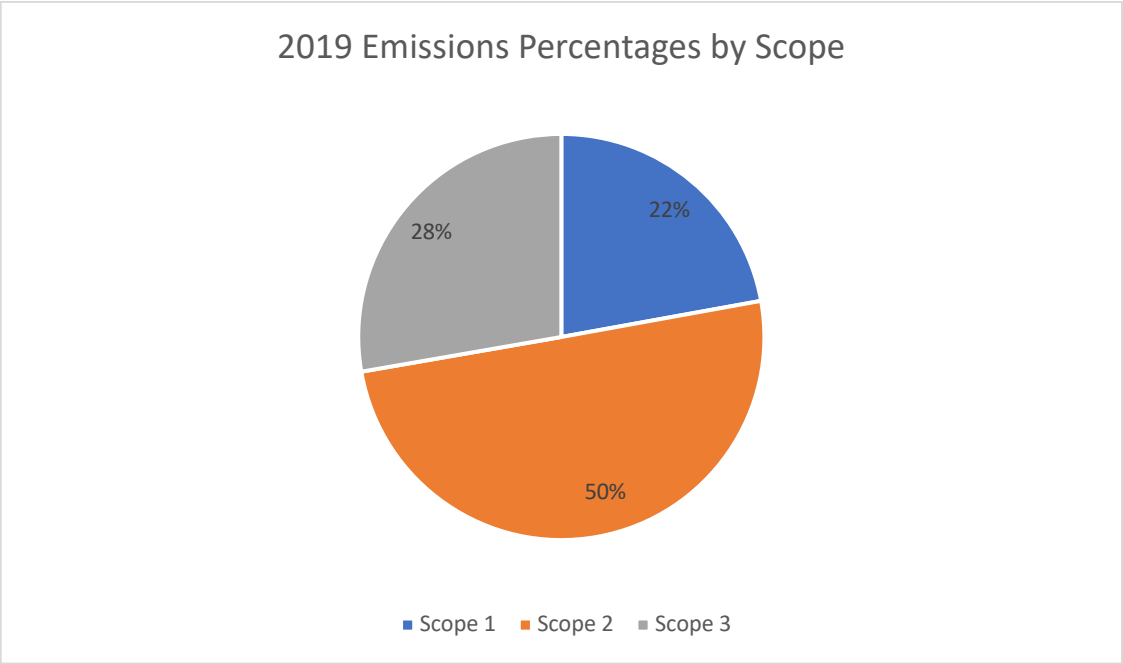


Figure 5. This chart shows the percentage of emissions by scope for 2019.



Data Corrections for Previous Inventories

While completing the 2022 inventory, there were several data corrections discovered in the 2021 inventory for Air Travel, Commuting, and Wastewater. OSI made the decision to correct these minor errors to provide the most up to date emissions figures. These errors highlight why this is an iterative process, and inventories and methodologies should be evaluated annually.

Total Emissions Update

	Total Emissions (MT CO_2e)
FY21 – Original	191,019.72
FY 21 – Updated	189,595.83

Air Travel Update

- The dataset provided for Emory-funded air travel included trips that were purchased in 2021 but were taken within fiscal year 2022. Those roughly million miles of air travel are accounted for in the 2022 results.

	Number of Miles	**Emissions (MT CO_2e)**
FY21 – Original	2,956,567	1,298.99
FY21 – Updated	1,981,765	870.7

Commuting Update

- Commuting via Emory Transportation such as its shuttle buses should not be included within commuting since these transportation fuels are accounted for in Scope 1 Transport Fuels. This means that the commuters who use Emory transportation should also be excluded from the commuting data reported in Scope 3.

Faculty	**Number of Commuters**	**Emissions (MT CO_2e)**
FY21 – Original	567	816.48
FY21 – Updated	555	761.93

Staff	**Number of Commuters**	**Emissions (MT CO_2e)**
FY21 – Original	6,606	14,254.17
FY21 – Updated	6,238	13,554.87

Students	**Number of Commuters**	**Emissions (MT CO_2e)**
FY21 – Original	1,174	545.55
FY21 – Updated	927	430.4

Wastewater Update

- Previous inventories estimated the quantity of water processed by Emory's WaterHub, and excluded that recycled water from wastewater emissions calculations. We have updated the inventory to reflect the actual metered data from the WaterHub.

	Number of Gallons	**Emissions (MT CO_2e)**
FY21 – Original	50,086,000	99.92
FY21 – Updated	132,622,018	264.57
FY19 – Original	65,722,049	131.11
FY19 – Updated	109,818,316	219.08

Conclusion

Completing annual greenhouse gas inventories is an iterative process, and each GHG inventory represents just a snapshot in time. In a given year, there can be a number of limitations in collecting data and discovering new data sources. This inventory, and each previous inventory, represents the best estimate of Emory's GHG emissions within its defined scope. During each inventory, the team learns news lessons and best practices to be implemented during the subsequent year's data collection process. As the urgency of the climate crisis continues to strengthen, there is a growing recognition for all sectors to continue to expand their reporting

to include more emission types, particularly for Scope 3. OSI continues to evaluate the feasibility of expanding its Scope 3 reporting and expanding its campus boundary to include more Emory healthcare facilities in the inventory. Emory University is committed to annually benchmarking its GHG emissions and updating its reporting methodology to follow industry best practices.

APPENDIX A – 2022 GHG Emissions

This table shows the GHG emissions for each emissions type for FY22. All figures are reported in MT CO_2e.

Emission Type	Emissions (MT CO_2e)
Total	210,742.76
Scope 1	49,858.55
Scope 2	104,358.86
Scope 3	56,525.35
Stationary Fuels	43,591.35
Transport Fuels	3,907.01
Refrigerants	2,346.31
Fertilizers	13.87
Purchased Electricity	104,358.86
Faculty Commuting	4,108.98
Staff Commuting	15,106.78
Student Commuting	2,793.26
Air Travel	7,874.07
Mileage	353.62
Study Abroad	1,432.73
Waste	1,085.79
Wastewater	222.82
T&D Losses	5,840.57
FERA	17,706.74

APPENDIX B – Emissions Reduction Comparisons

This table shows a breakdown of emissions reductions over time. Each positive figure is the percent emissions reduction. Each negative figure is a percent increase in emissions. Emory originally calculated GHG emissions using the Campus Carbon Calculator, which was updated and relaunched as SIMAP. During this transition, some original data inputs were not valid for SIMAP, in this case Wastewater and Waste, making comparisons to the FY10 baseline skewed for analysis.

The purpose of this table is to show the following emissions reductions:

- FY22-FY10: compares FY22 to FY10 to show total reduction of emissions, and reflects progress made toward Emory's carbon neutrality goals
- FY22-FY21: compares FY22 to FY21 to show the percent reductions achieved between the two most recent inventories
- FY22-FY19: compares FY22 to FY19 to show percent reductions compared to a pre-COVID operating year (FY19)

Emissions Type	FY22-FY10 (%)	FY22-FY21 (%)	FY22-FY19 (%)
Total	39.14	-1.14	14.67
Scope 1	29.93	5.99	8.88
Scope 2	45.03	7.66	15.70
Scope 3	33.86	-33.58	17.50
Stationary Fuels	26.56	9.94	13.25
Transport Fuels	-108.27	-11.57	-5.46
Refrigerants	76.30	-111.00	-208.01
Fertilizer	27.87	21.10	-227.12
Purchased Electricity	45.03	7.66	15.70
Faculty Commuting	-23.75	-439.29	-24.14
Staff Commuting	46.54	-11.45	-26.18
Student Commuting	6.37	-548.99	34.44
Air Travel	31.62	-804.34	56.35
Mileage	21.61	-38.71	48.68
Study Abroad	59.93	-8,082.35	46.14
Waste	Historic Errors	-331.14	-181.15
Wastewater	Historic Errors	15.78	-1.71
T&D Losses	50.22	7.66	12.21
FERA	25.63	10.60	12.89