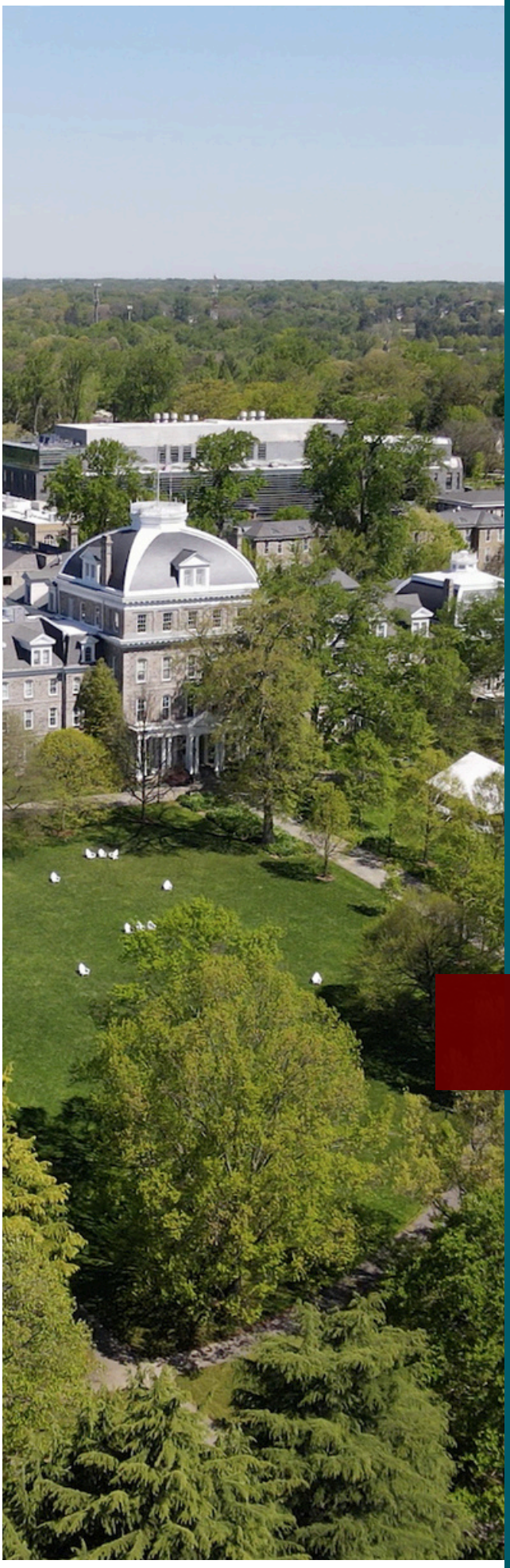


SWARTHMORE

ANNUAL GREENHOUSE GAS INVENTORY

SWARTHMORE COLLEGE

Fiscal Year
2022-2023

OVERVIEW

To support long-term climate and carbon neutrality goals, Swarthmore College conducts an **annual inventory of greenhouse gas emissions (GHGI) associated with campus facilities and operations.** This report reviews the College's emissions data including the major emissions sources. This report also reviews the various factors driving year-to-year changes in emissions levels, including changes in habits, improved data tracking, updated calculation methodology, and other impacts.

Methodology

The Swarthmore College Office of Sustainability collaborates with several campus partners to compile the GHGI for each **fiscal year** (July 1 - June 30). Through the Sustainability Indicator Management & Analysis Platform (**SIMAP**) — a widely-recognized online tool developed by the University of New Hampshire (UNH) — the College calculates and tracks emissions data, as well as **monitors trends** and shares public reports.

As a signatory of the **Presidents' Climate Commitment** (overseen by national organizing body Second Nature), Swarthmore is required to report on a baseline set of emissions categories. While the annual GHG inventory may not completely capture our climate impact, it reflects the major categories of emissions that we are currently able to track accurately with available methodology. Additionally, it follows industry standards to account for several greenhouse gasses (including CO_2 , N_2O and CH_4) in **Metric Tons of Carbon Dioxide equivalent (MTCO$_2$e)**. Each year, we identify ways to improve data tracking and methodology to create the most accurate picture of our emissions as possible.

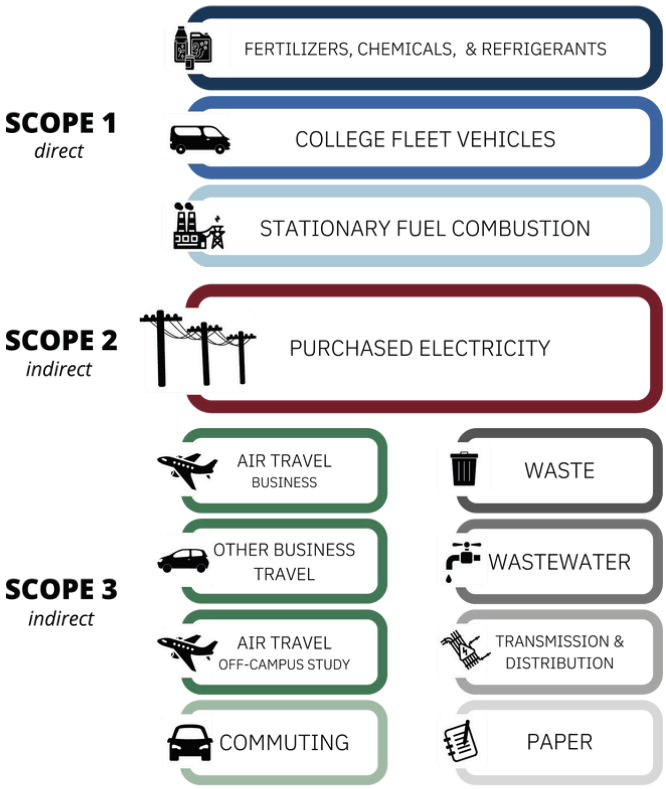
Categories of Emissions

Following international GHG reporting standards, Swarthmore's emissions are categorized into three **"scopes".**

Scope 1: Emissions produced directly on campus - stationary fuels, transportation fuels, fertilizer, refrigerants, and other chemicals. The primary source of Scope 1 emissions is the steam plant, which burns natural gas.

Scope 2: Indirect emissions associated with electricity usage. Purchased electricity is the College's only source of Scope 2 emissions.

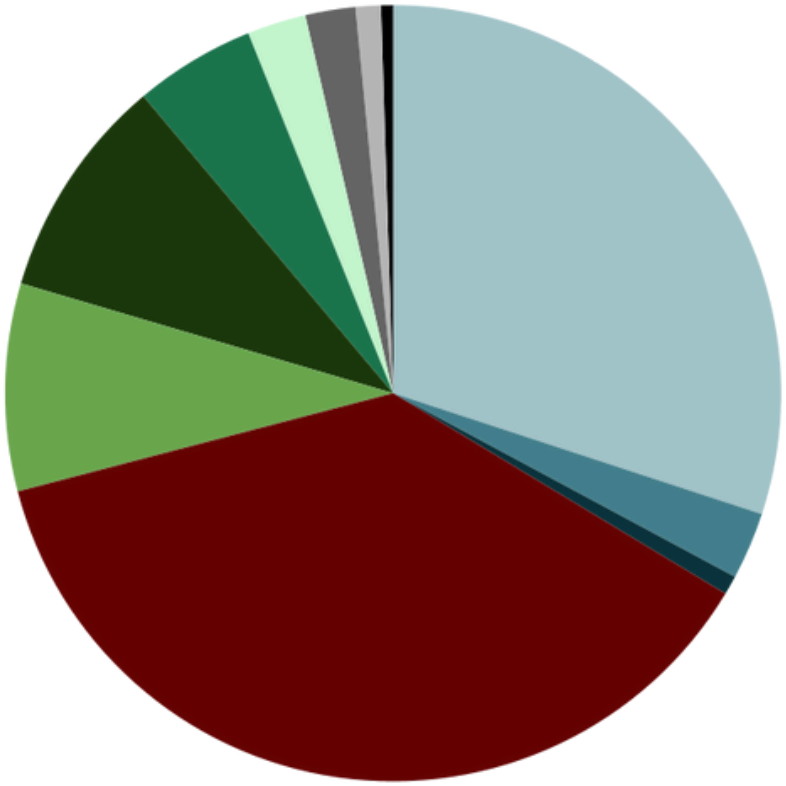
Scope 3: Indirect emissions, including faculty and staff commuting to and from the College, business travel, off-campus study, paper purchasing, waste, and wastewater.



FY23 RESULTS

For **Fiscal Year 2022-2023** (FY23), Swarthmore College emitted a total of **16,011.89 $MTCO_2e$.** The largest categories included **stationary fuel combustion** (i.e. emissions from natural gas burned at the on-campus steam plant) and **purchased electricity**. Within Scope 3, the largest categories included employee commuting and air travel for business (i.e. not for study abroad).

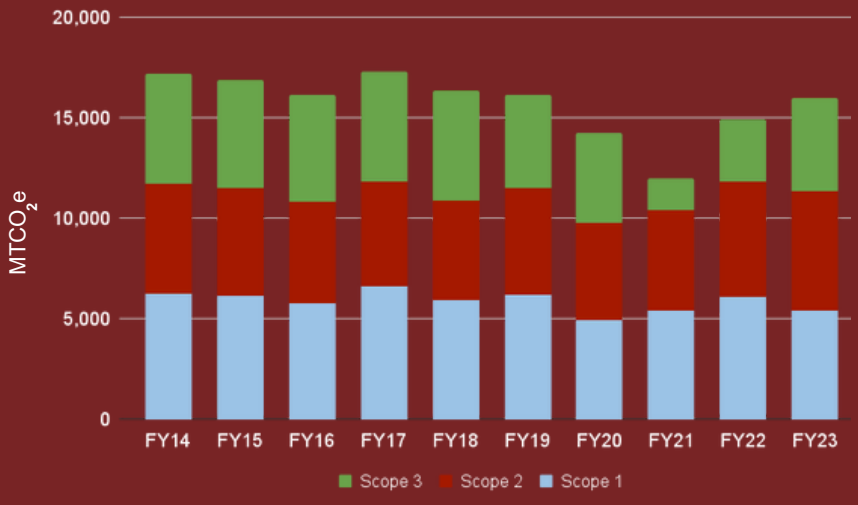
Emissions by Source



EMISSIONS SOURCE	$MTCO_2e$	% of TOTAL
Stationary Fuel Combustion	4,810.25	30.04%
Refrigerants, Chemicals, and Fertilizers	448.73	2.80%
Fleet Vehicles	126.98	0.79%
Purchased Electricity	5,970.24	37.29%
Employee Commuting	1383.91	8.64%
Air Travel - Business	1,489.91	9.31%
Air Travel - Off-Campus Study	806.51	5.04%
Other Travel - Business	392.67	2.45%
T&D losses	334.13	2.09%
Paper	168.56	1.05%
Waste and Wastewater	80	0.50%
Total	**16011.89**	**100.00%**

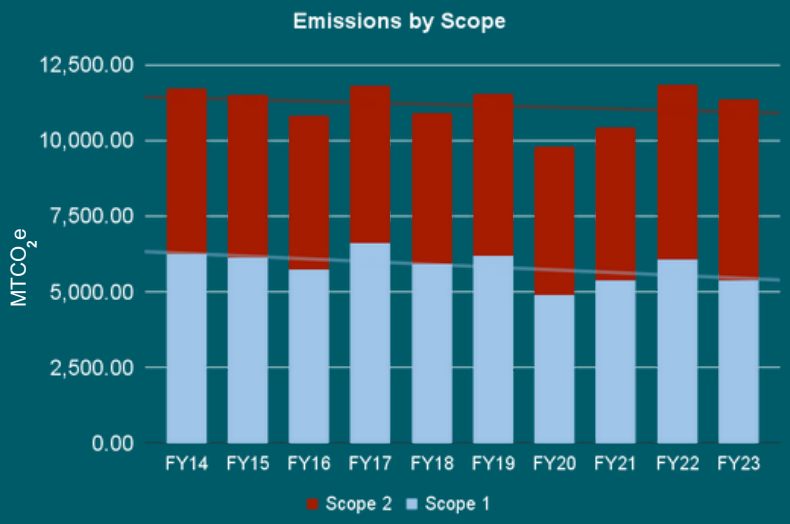
Annual Trends

The College has tracked emissions for several years to analyze trends over time. Notably, total emissions dropped in FY20 and FY21, attributed to changes in campus occupancy due to the COVID-19 pandemic. As campus use and occupancy returned to pre-pandemic levels, FY22 and FY23 demonstrated corresponding rise in total emissions. Other drivers to year-to-year changes in emissions are discussed on the following pages.



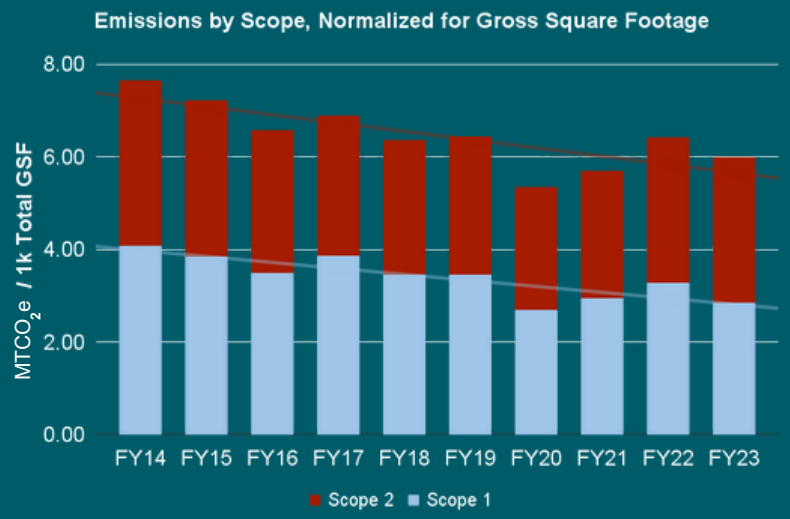
Scope 1 & Scope 2

The College's Scope 1 and Scope 2 emissions have maintained similar levels since FY14, with FY23 showing a minor decrease compared to FY22. This decrease is driven mostly by Scope 1 emissions as result of initiatives such as increasing **hybrid fleet** vehicles and temporarily **shutting down the steam plant** over the summer of 2023. Scope 2 emissions have remained generally consistent with slight increases attributed to added electricity usage from new building spaces.



Scope 1 & Scope 2, per gross square foot

When normalized for gross square footage (GSF), the downward trend of Scope 1 and 2 **emissions intensity** over time is more noticeable. This is likely due to significant investments in energy efficiency through programs such as the **Green Revolving Fund**, even as square footage has grown since 2014 (by ~ 364,149 sq. ft.).



Impact of Geoexchange on Emissions

A key piece of the College's energy plan, **To Zero by Thirty-Five** (20X35), is a multi-phase effort to replace the outdated steam system (which relies on natural gas) with the **geoexchange system**. The College reached several 20X35 milestones in 2023, including completing the first 350 geoexchange wells and beginning construction of the geoexchange plant in the basement of the Dining Center.

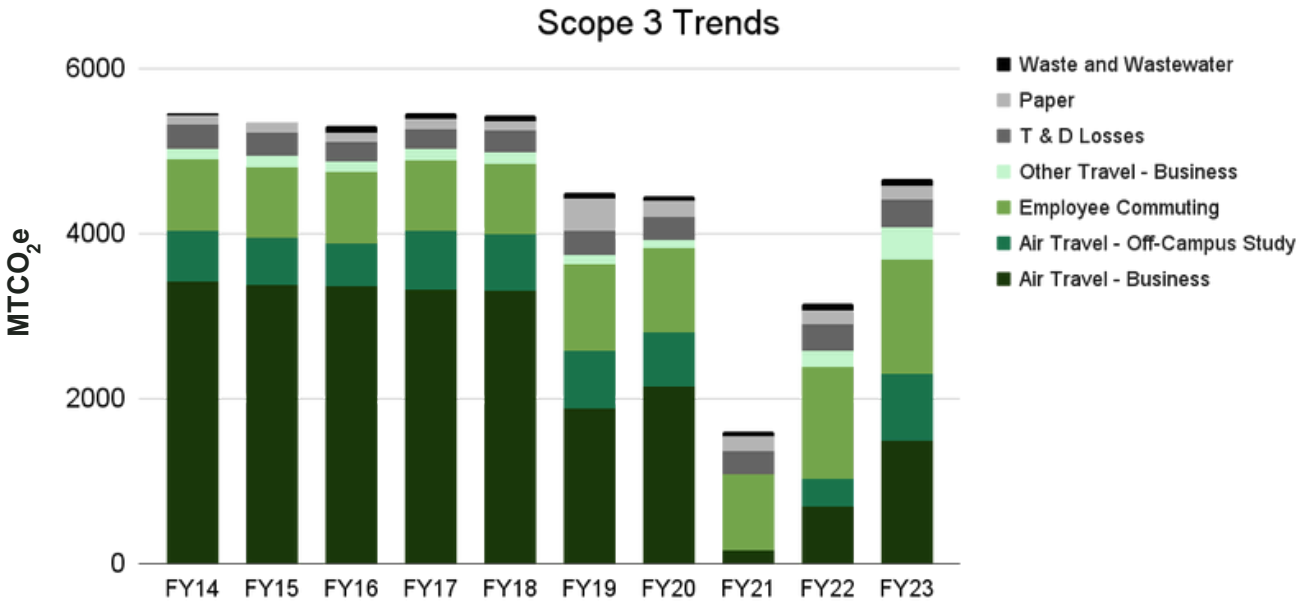
The College expects to operationalize the geoexchange system by the end of **2024** with the first 9 buildings connected. The College will continue to connect buildings in phases until nearly all of campus is connected and the steam plant can be decommissioned. This multi-year process will require that the steam system and geoexchange system operate simultaneously for a period of time, resulting in higher emissions until the geoexchange system is fully implemented by 2035.

The geoexchange system, combined with increased energy efficiency and renewable energy, is expected to **eliminate up to 98%** of emissions related to **stationary fuel combustion** and **purchased electricity.**

Scope 3

During FY22, emissions indicated a trend back to typical travel and commuting patterns after a significant decrease during the height of the COVID-19 pandemic. In FY23, travel and commuting returned to pre-pandemic levels, leading to an increase in Scope 3 emissions. The largest categories of Scope 3 emissions for FY23 were **employee commuting** and **business air travel** (i.e. College-sponsored travel for staff and faculty).

Every year, the College seeks to use the **best data and calculation methods available** to accurately report Scope 3 emissions. Some year-to-year changes, such as the decrease in air travel emissions from FY18 to FY19 are attributed to improved analysis of air travel data. For FY23, opportunities to refine data included more accurate waste numbers and an updated analysis of paper data to account for new paper types. Employee commuting emission calculations for FY23 were based on the campus-wide fall 2023 employee commuting survey that provided a comprehensive look at commuting habits of employees. Any data or calculation methodology changes are noted internally to support improved reporting in future years, as well as comparison of emissions numbers over time.



Offsets for Scope 3 Emissions

In addition to continuing efforts to reduce or avoid emissions as much as possible, the College is working to outline options to offset those emissions that cannot yet be reduced to zero. Through programs like the new **air travel carbon fee**, the College can pursue high-quality verified offsets while encouraging behavior that reduces scope 3 emissions.

Not included in the chart above, the College **offset 50% of emissions related to FY23 business air travel** through **Climate Vault**, a non-profit founded by Swarthmore alumni Michael Greenstone ('91) and Andrew Dailey ('91). Climate Vault uses regulated compliance markets to purchase and "vault" CO2 allowances, thereby preventing major emitters in those markets from utilizing them to emit carbon dioxide into the atmosphere. For Swarthmore College, Climate Vault purchases carbon allowance permits in the **Regional Greenhouse Gas Initiative (RGGI)**, a cooperative effort among twelve states. Proceeds from the RGGI market are often invested by states back into communities, including clean energy programs, energy efficiency, and bill assistance to local businesses and communities.

LOOKING AHEAD

Swarthmore is currently implementing **several strategies** to continue to **drive the downward trend of emissions each year**.

Renewable Energy

In April 2024 Swarthmore College announced a new **renewable energy purchasing agreement** with eight other colleges and universities to bring a 900-acre 150-MW capacity solar farm onto the grid. Once the project is operational in early 2027, the College will receive **renewable energy credits (RECs)** to account for up to 100% of Scope 2 emissions. **Read more here.**

The College currently purchases RECs for 100% of annual electricity load from existing projects (for FY23, from wind power). Compared to the renewable purchasing agreement outlined above, purchasing from existing projects does not significantly reduce emissions and so is not currently applied the College's emissions.

Green Revolving Fund

Swarthmore's **Green Revolving Fund (GRF)** is a self-renewing pool of capital that grants loans to energy efficiency projects on campus. As the energy projects reduce utility expenses, the savings are returned to the fund until the "loan" is paid off, replenishing the fund for future projects. The fund is also supported by the Carbon Charge Fund that is generated through a campus-wide fee on departments for carbon emissions. The GRF has funded a number of projects including LED lighting and automation & control upgrades, as well as made possible initiatives such as shutting down the steam plant over the summer of 2023.

Scope 3 Emissions Strategies

In order to achieve carbon neutrality by 2035, the College will need to reduce Scope 3 emissions as much as possible. The Office of Sustainability and Carbon Charge Working Group are working to outline a comprehensive set of strategies that are tailored to Scope 3 emissions sources. This plan is expected to be shared in 2024.

Swarthmore College
Office of Sustainability
sustainability@swarthmore.edu

ACKNOWLEDGEMENTS

President's Sustainability Research Fellow Ryan Jin '24 | Climate Action Manager Hannah Ulloa | Grounds Facilities Management | Budget Office | Institutional Research | Global Engagement Office Environmental Services | Athletics | Business Office | Purchasing Office