



# SWARTHMORE COLLEGE

*Office of Sustainability*



# GREENHOUSE GAS INVENTORY

*FY 2021*



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# OVERVIEW

To support long-term climate and carbon neutrality goals, Swarthmore conducts an **annual inventory of greenhouse gas emissions (GHG) associated with campus facilities and operations**. This report reviews Swarthmore College's emissions data from FY2021, including the main emissions sources and the various factors driving year-to-year changes in emissions levels.

## Methodology

The Swarthmore Office of Sustainability collaborates with several campus partners to compile the GHG inventory **internally for each fiscal year** (July 1 - June 30). Through the Sustainability Indicator Management & Analysis Platform ([SIMAP](#))—a widely-recognized online tool originally developed by the University of New Hampshire (UNH)—the College is able to calculate and track emissions data, as well as **monitor trends** and compare with other campuses.

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 the College is currently able to track accurately with available methodology. Additionally, it follows industry standards to account for several greenhouse gasses (including CO<sub>2</sub>, N<sub>2</sub>O and CH<sub>4</sub>) in **Metric Tons of Carbon Dioxide Equivalent (MTCO<sub>2</sub>e)**.

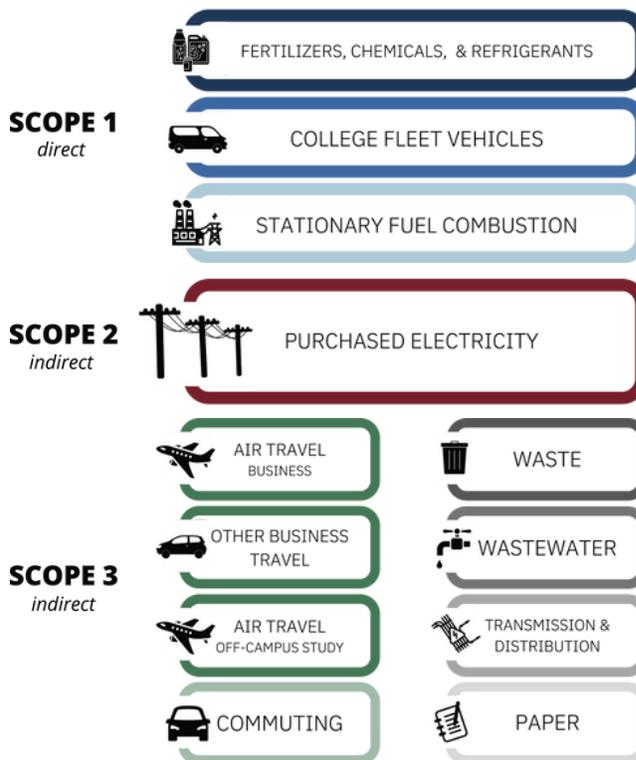
## Emissions by Scope

Following international GHG reporting standards, emissions are categorized into three broad Scopes. Swarthmore's emissions sources are captured in the following 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.

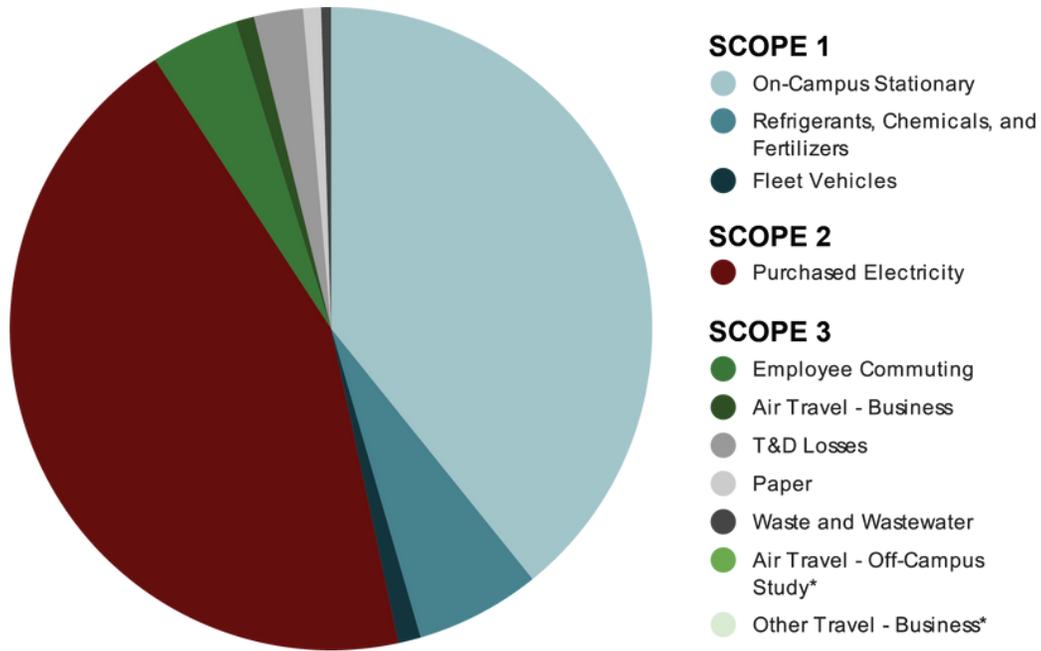
**Scope 2:** Indirect emissions associated with electricity usage. Purchased electricity is the College's only source of Scope 2 emissions.

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



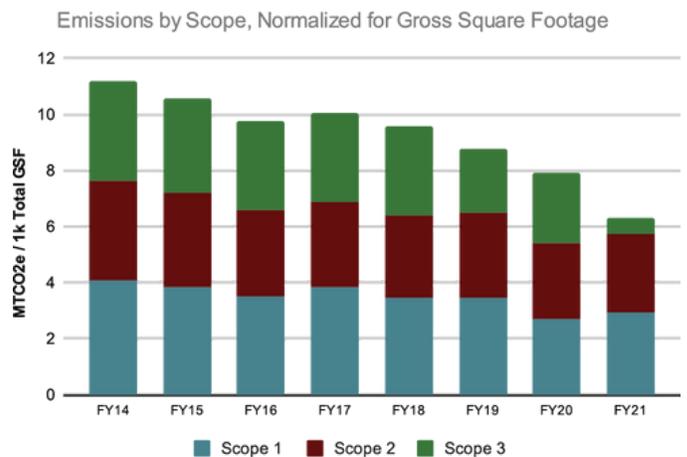
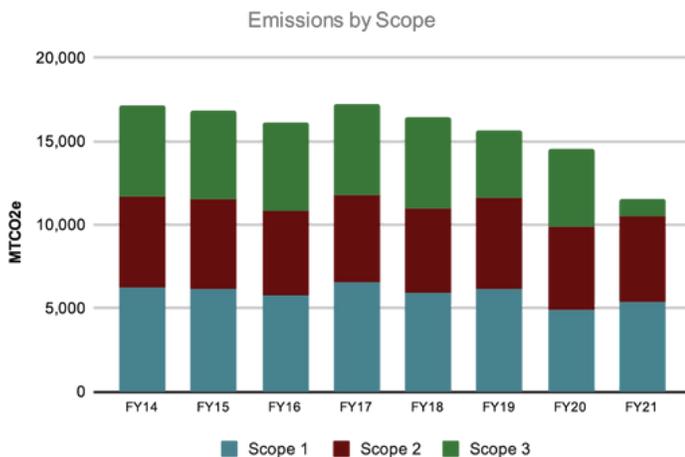
# RESULTS

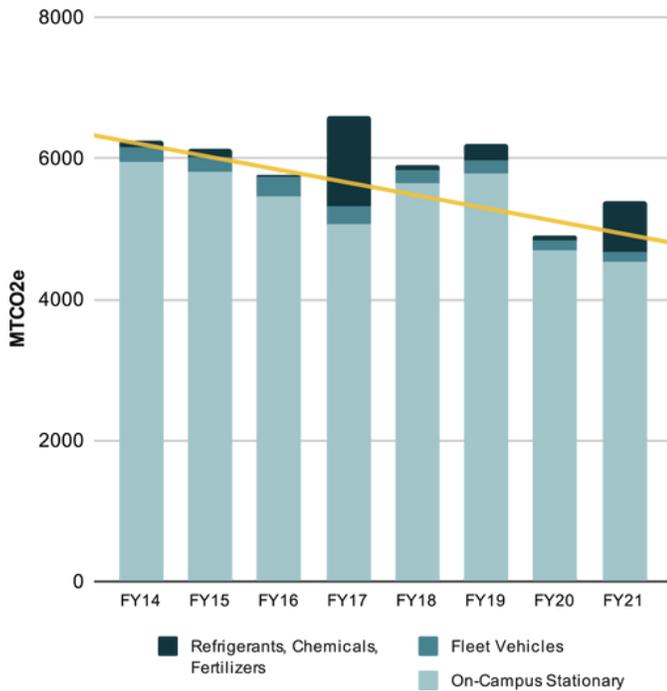
For FY2021, Swarthmore College's emitted a total of **11,554.5 MTCO<sub>2</sub>e**. The College's greenhouse gas emissions continued to follow the trend of decreasing in comparison to the year previous. Due to changes in campus operations, commuting and air travel patterns brought on in response to COVID-19 pandemic, FY2021 included a notable decrease in emissions across several categories.



\* Not represented in chart (<1% of total FY2021 Inventory)

Between FY2014 (1,532,214 sq. ft) and FY2021 (1,830,725 sq. ft), the College's gross square footage (GSF) increased by 298,511 sq. ft. The graphs below shows that given **data normalization for GSF**, the College's emissions (metric ton per 1k total GSF) follow the trend of decreasing in comparison to the year previous.



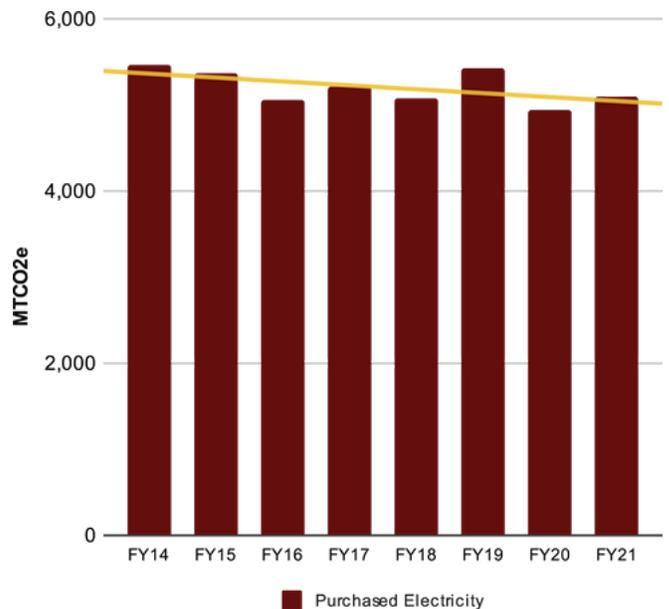


## SCOPE 1

In the figure to the left, the **decreasing trend** in Scope 1 emissions may be primarily attributed to **lower levels of natural gas combustion for building heating** (captured in "On-Campus Stationary") **and fleet vehicle fuel use**. For FY2020 and FY2021, this is likely a result of decreased campus occupancy due to the COVID-19 pandemic. Note, the increase in Refrigerants, Chemicals, & Fertilizers emissions for FY2021 can be attributed to a possible refrigerant leak that has since been resolved.

## SCOPE 2

In the figure to the right, emissions related to purchased electricity are shown to have a slight **downward trend**. During FY2020 and FY2021, the lower occupancy of campus buildings due to the COVID-19 pandemic likely led to **reduced Scope 2 emissions** compared to previous years. Electricity usage is expected to increase some as campus buildings return to full capacity.

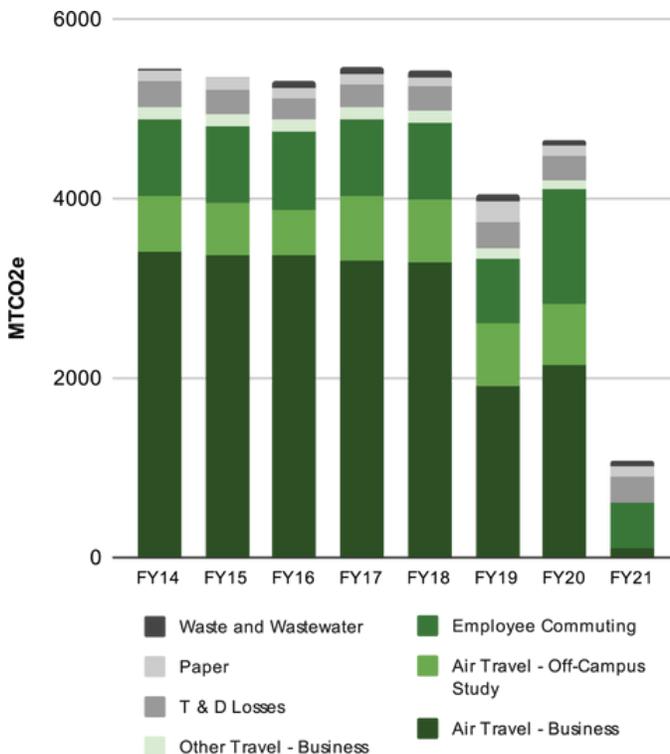


## RENEWABLE ENERGY CREDITS

The College currently purchases **unbundled Renewable Energy Credits (RECs)** for the entirety of the annual electricity load. In this way, the College is indirectly paying for renewable energy (in this case - wind power) and could technically consider these Scope 2 emissions as carbon-neutral. However, unbundled RECs (those not directly tied to the energy being purchased) have not been shown to significantly incentivize new renewable energy in the grid. To champion a **more robust strategy** for eliminating Scope 2 emissions, the college is looking to procure RECs through a **virtual power purchase agreement** that would lead to new renewable energy generation in the regional grid.

## SCOPE 3

Starting in FY2020, the COVID-19 pandemic had a significant impact on the College's Scope 3 emissions. **Changes in the amount of off-campus study trips, business travel needs, and staff/faculty commutes** led to reduced emissions in many of these categories. This trend continued in FY2021 during which limited off-campus study & business travel led to **significantly reduced Scope 3 emissions overall**. These emissions are expected to return to more relatively typical levels as students, staff and faculty return to normal travel and commute patterns.



### CHANGES TO METHODOLOGY

Prior to FY2020, emissions calculations for transportation were based on broad assumptions about the type of transportation (plane, bus, train, etc.). Over FY2020, the College **adjusted methodology** to give a **more accurate picture of air travel**, which was likely under-counted in previous inventories. Methodology was also adjusted to more accurately reflect patterns in **faculty and staff commuting** based on updated survey data.

## FY21 GHG SUMMARY DATA

EMISSIONS SOURCE	GHG MTCDE	% of TOTAL
On-Campus Stationary	4,530.66	39.21%
Refrigerants, Chemicals, and Fertilizers	727.12	6.29%
Fleet Vehicles	130.46	1.13%
Purchased Electricity	5,098.92	44.13%
Employee Commuting	512.97	4.44%
Air Travel - Business	106.74	0.92%
T&D Losses	285.37	2.47%
Paper	104.58	0.91%
Waste and Wastewater	57.28	0.50%
Air Travel - Off-Campus Study	0.00	0.00%
Other Travel - Business	0.41	0.00%
<b>Total</b>	<b>11554.52</b>	<b>100.00%</b>

# LOOKING AHEAD

As the College returns to normal campus use and operations, emissions in many categories, such as those related to energy and electricity needs, are expected to return to relatively typical levels. However, Swarthmore is currently implementing **several strategies** to address various categories and continue to **drive the downward trend of emissions each year**.

## FUTURE OF TRACKING & REPORTING

The scope of the current inventory is limited to those emissions that the College is currently able to accurately track or calculate which includes all Scope 1 and 2 emissions, as well as several Scope 3 emissions sources. As new methodology becomes available, the College expects to **continue to expand the understanding of those Scope 3 emissions** sources not currently tracked, such as food & procurement, and how best to address them.

## CARBON NEUTRALITY BY 2035

Over the next several years, Swarthmore will continue to take bold action to **decarbonize our campus energy systems**. The College's energy plan, the [Roadmap to Zero Carbon](#), outlines several steps that are already underway including campus-wide energy efficiency projects and installation of new geexchange infrastructure for heat. Replacing the outdated steam system (which relies on natural gas combustion) with the **geexchange system** — including the geexchange plant, heat pumps, and heat recovery systems — is a key part of making our campus energy systems efficient and resilient. These initiatives, in addition to the ongoing efforts to increase renewable energy for electricity needs, work together to support Swarthmore's goal to **eliminate 98% of emissions related to on-site energy and purchased-electricity and reach carbon neutrality by 2035**.



## GREEN REVOLVING FUND

Swarthmore's [Green Revolving Fund](#) 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 revolving fund until the "loan" is paid off, which replenishes the fund for further projects. The fund is also supported by allocations from the Carbon Charge Fund, which is generated through a school-wide fee on departments for carbon emissions. Examples of past and current Green Revolving Fund projects include **steam pipe insulation improvements** and **LED lighting upgrades** for the Lamb-Miller Fieldhouse, Tarble Pavilion, and Science Center.

## AIR TRAVEL CARBON FEE

To address **emissions related to air travel** (which made up approximately 17% of the College's total greenhouse gas emissions in FY19) the College adopted a new [Air Travel Carbon Fee](#), in effect for 2023 fiscal year. This new fee builds off of the Carbon Charge Program to **provide funding for Scope 3 emissions reduction efforts**, demonstrate continued leadership on carbon pricing in higher education, and encourage rethinking of travel patterns. Individuals and departments looking for additional ways to reduce the environmental impact of travel are encouraged to review the [Sustainable Travel Guide](#), a new resource on the Office of Sustainability website.



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