

SWARTHMORE COLLEGE



GREENHOUSE GAS INVENTORY

FY 2020

Alana Ballagh '22, Office of Sustainability Intern

OVERVIEW

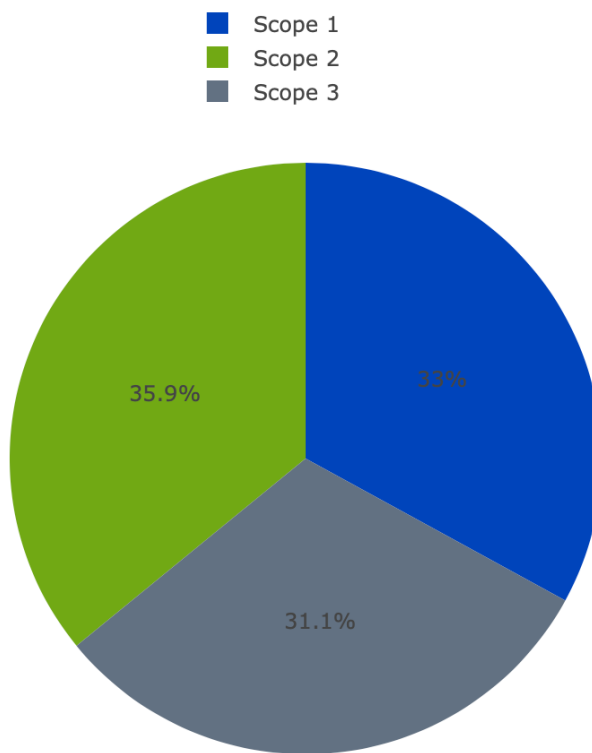
This report summarizes Swarthmore College's greenhouse gas emissions data from FY2020 by considering (1) the main emissions sources for FY2020 and (2) changes in measurement methods that affected the emissions that were reported between FY2019 and FY2020. The College conducted the FY2020 inventory internally using the online tool SIMAP to calculate emissions from collected source data. The College plans to continue to conduct the inventory internally. The College's fiscal year starts on July 1 and ends on June 30. Limitations to data analysis include a significant change in methodology for Scope 3 emissions between fiscal years.

This report breaks down Swarthmore College's emissions data into three Scopes:

Scope 1 includes 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 includes emissions associated with electricity usage. Purchased electricity is the College's only source of Scope 2 emissions.

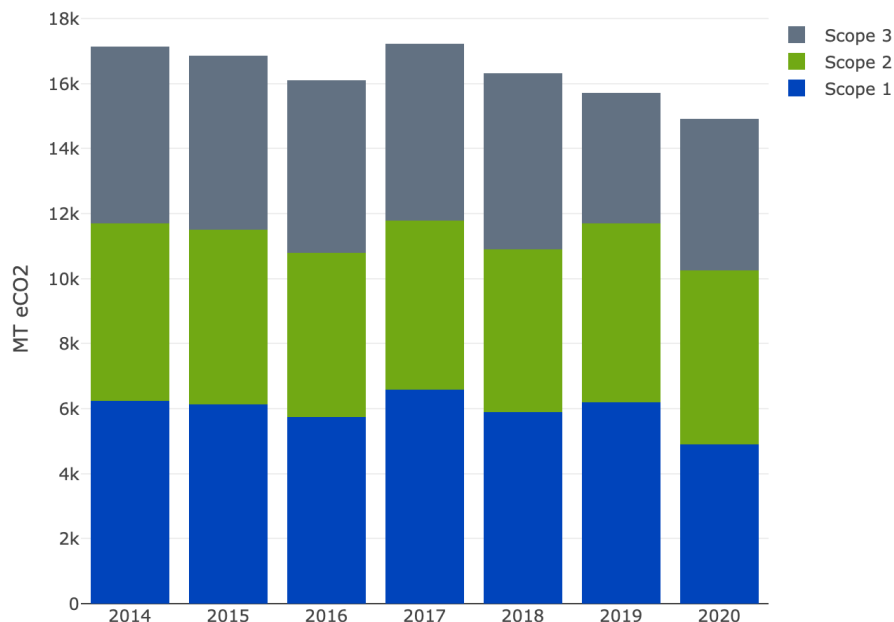
Scope 3 consists of indirect emissions, which include emissions associated with faculty and staff commuting to and from the College, business travel, off-campus study, paper purchasing, transmission and distribution losses, and waste and wastewater.



FY2020 Emissions by Scope

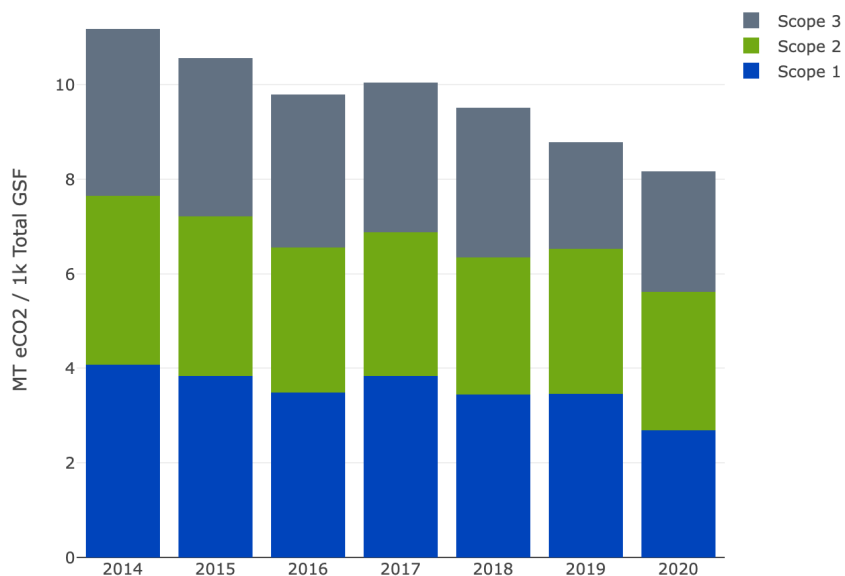
RESULTS

Swarthmore College's gross emissions have decreased each of the last two years. The total emissions for FY2020 were 14,906.9 MTCO₂e.



Trend of Swarthmore College's MTCO₂e (FY2014-FY2020)

Between FY2014 (1,532,214 sq. ft) and FY2020 (1,827,664 sq. ft), the College's gross square footage (GSF) increased by 295,450 sq. ft. The table below shows emissions data normalized by GSF (metric ton of CO₂ equivalent by Gross Square Foot). We see even more clearly the decreasing trend of campus emissions.



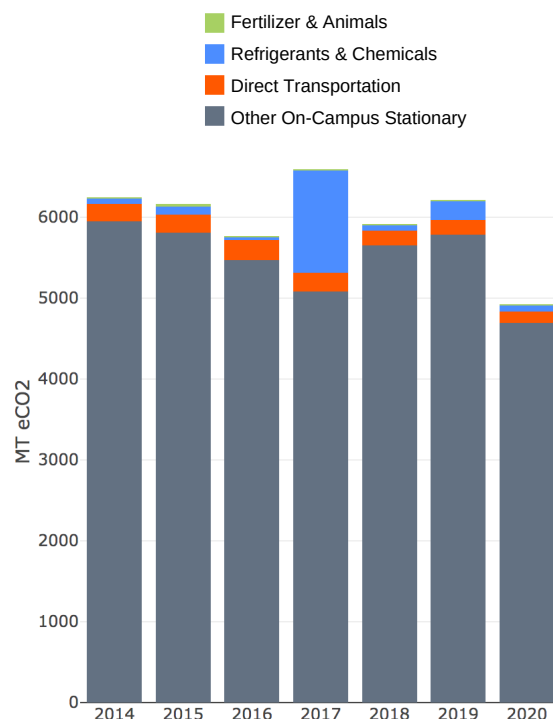
Trend of Swarthmore College's MTCO₂e Normalized by Gross Square Footage (FY2014-FY2020)

SCOPE 1

The decrease in Scope 1 emissions can be primarily attributed to lower natural gas and fuel oil use.

Burning natural gas in the central steam plant is the primary source of Scope 1 emissions. In the figure to the right, emissions from the steam plant are included within “On-Campus Stationary” emissions. Given that FY2020 included relatively mild weather and lower campus building usage during some heating months as a result of the COVID-19 pandemic, the campus required lower levels of natural gas usage.

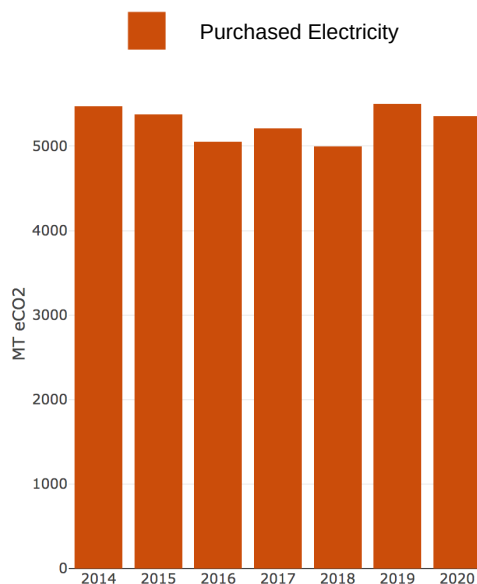
Lowered diesel use also drove the downward trend in Scope 1 emissions. Over FY2020, there was lowered use of diesel within on-campus backup generators and transportation on campus, which includes transportation related to grounds equipment.



Trend of Swarthmore College's MTCO2e for Scope 1 emissions

SCOPE 2

Purchased electricity is the College's only source of Scope 2 emissions. Scope 2 emissions have remained consistent year over year. In FY2020, it is likely that electricity use from new construction (i.e. Singer Hall) counteracted the decreased use of buildings due to COVID-19 and ongoing improvements in energy efficiency. Given this, electricity usage will rise when buildings return to full capacity, and will likely increase due to increased ventilation demands as a result of COVID-19.

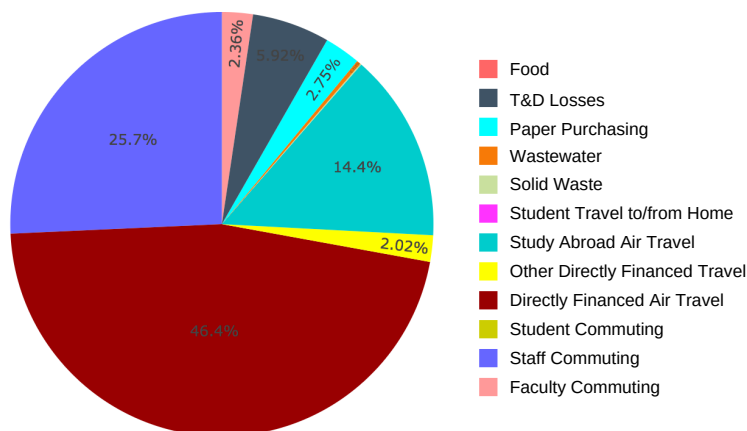


Trend of Swarthmore College's MTCO2e for Scope 2 emissions (FY2014-FY2020)

Currently, the College purchases unbundled Renewable Energy Credits (RECs) in the form of wind power. By purchasing unbundled RECs, the College is paying for the environmental attributes associated with renewable electricity generated from wind farms while also continuing to buy electricity from a local supplier. Because the College purchases enough RECs to cover the entire annual electricity load, the College could technically claim carbon neutrality with regard to Scope 2 emissions. However, the College recognizes that there is limited proof that buying unbundled RECs is actually driving the creation of new renewable energy on the grid, so the College does not claim Scope 2 carbon neutrality. Currently, the College is working to procure RECs through a virtual power purchase agreement that would result in the construction of a new renewable energy generation facility in the PJM grid, a more robust strategy for eliminating Scope 2 emissions.

SCOPE 3

The College changed its methodology for measuring Scope 3 emissions ahead of FY2020. This makes comparison to previous years somewhat misleading.



Breakdown of Swarthmore College's MTCO2e for Scope 3 emissions by category (FY2020)

Prior to FY2020, emissions calculations for transportation were based on broad assumptions about the type of transportation (plane, bus, train, etc.) and, as a result, were not sufficiently accurate. For FY2020 data, emissions by mode were tracked with more detail and accuracy. This change in methodology drove resulted in an apparent increase in air travel emissions which counteracted the lower number of flights due to COVID-19.

The other driver of Scope 3 emissions was a change in methodology around tracking faculty and staff commuting. Previously, the College tracked commuting data by assuming that faculty and staff came to campus 32 weeks out of the year. For FY2020, the College calculated emissions for faculty and staff commuting to campus 52 weeks.

DISCUSSION

The COVID-19 pandemic drove lower campus emissions overall by (1) decreasing operational Scope 1 emissions and (2) stabilizing Scope 2 emissions associated with electricity-generation despite an increase in campus square footage. It is expected that both Scope 1 emissions and Scope 2 emissions will increase with a return to normal campus activity.

As of FY2020, Scope 3 emissions data should be reviewed as stand alone data due to the large methodological changes driving changes in emissions levels. In future years, the College's commuting survey should give the College a better understanding of commuting data in order to calculate the most accurate emissions data for faculty and staff commuting. For now, the College will continue to conduct calculations under the assumption that faculty and staff commute 52 weeks out of the year to avoid under-calculating emissions levels. It can be expected that air travel emissions (Scope 3) will increase given the combination of (1) more accurate methodology for calculating emissions and (2) a return to normal levels of off-campus study and gradual return to some level of business and academic travel.

Swarthmore College's Energy Plan: Roadmap to Zero Carbon commits the College to reaching carbon neutral energy systems on-campus by 2035. Ultimately, campus heating and cooling will be supplied from a central heat recovery chiller plant coupled with a geo-exchange field and renewable electricity, which will eliminate emissions from the legacy steam plant. As of FY2020, the main driver of Scope 1 emissions was on-campus stationary emissions (steam plant emissions); moving away from steam heating will almost entirely eliminate Scope 1 emissions. The transition towards renewable electricity, both through on-campus solar and off-site renewable energy, will eliminate reliance on electricity generated through combustion of fossil fuels, thereby eliminating Scope 2 emissions completely. However, the Energy Plan does not address Scope 3 emissions, accounting for 31.1% of total emissions for FY2020.

Moving forward, the College will consider the best approach to minimizing and offsetting Scope 3 emissions. The College should examine pathways for offsetting air travel emissions (62.82% of Scope 3 emissions) as well as commuting emissions (28.06% of Scope 3 emissions). Current commuting data is from the College's last transportation survey completed in early 2020. The College will learn more about current commuting habits with a new transportation survey in the coming years.