Greenhouse Gas Emissions Report for Fiscal Year 2021

Williams College

prepared by

The Zilkha Center for Environmental Initiatives
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Williams College Greenhouse Gas Emissions Reduction Goals

In 2007, Williams College set its first greenhouse gas[1](GHG) emissions goals to reduce emissions to 10% below 1990 levels by 2020, and to establish sustainability as an institutional priority. In 2015, the College revised those goals to 35% below fiscal year 1991 levels by the end of fiscal year 2020. Starting in fiscal year 2020, the College also began purchasing verified carbon offsets to neutralize its remaining, assessed scope 1-3 emissions. This step was guided by two years of work and research conducted by the Campus Environmental Advisory Committee (CEAC) and followed a trial purchase in 2019.[2] In 2019 the College began work on a new strategic planning process, which culminated in the 2021 Strategic Plan.[3] Sustainability, together with Diversity, Equity and Inclusion, was identified as cross-cutting themes. Within the sustainability domain, the College laid out the following set of new climate action goals:

- Sharply reducing emissions from campus combustion through energy conservation measures and shifting to renewable energy sources;
- Reducing travel emissions through reduced vehicle and air miles and improved vehicle fleet efficiency;
- Maintaining carbon neutrality with a view toward achieving net-zero emissions[4] through investment in high-quality, verified carbon offsets and carbon removal;
- Incorporating a carbon damage charge in decisions about travel and a carbon shadow price in decisions about energy use and buildings;
- Securing 100% renewable purchased electricity and continuing to increase on-campus solar generation;
- Pursuing opportunities to reduce the amounts of embodied carbon in building materials, packaging, water and food;
- Partnering with local communities and investing in emissions-reduction projects off campus; and
- Continuing to invest the endowment in impact investments that promote measurable reductions in global carbon emissions.

Among these goals, a critical priority is the reduction of on-campus combustion of fossil fuels. The College is developing an Energy and Carbon Master Plan (ECMP) for transitioning from a natural gas powered co-generation plant to low and zero-carbon

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[1] The main greenhouse gases targeted by climate action are carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), and fluorinated gases, such as HFCs, PFCs, and SF_6.

[2] More information about the College's work on carbon offsets can be found here: https://sustainability.williams.edu/energy/carbon-offsets/

[3] The complete Strategic Plan, including its cross-cutting sustainability goals is available here: https://www.williams.edu/strategic-planning/strategic-plan-2021/

[4] Carbon neutrality means neutralizing an organization's GHG emissions through the purchase of carbon offset credits for projects that avoid or sequester carbon emissions elsewhere (outside of the organization's boundaries). Net-zero emissions also requires an organization to zero-out its emissions but puts more emphasis on doing so within its own boundaries by (i) avoiding emissions to occur in the first place through energy efficiency, behavior and process changes, (ii) replacing fossil-based energy sources with renewable energy and (iii) only offsetting the remaining GHG balance.

technologies, including building electrification and heat pumps, in conjunction with aggressive energy efficiency and conservation measures. The operational goal is to reduce direct campus emissions (scope 1) by at least 80% by 2035 compared to fiscal year 1991 levels.

Greenhouse Gas Emissions Categories and Accounting Principles

Organizational GHG inventories are typically categorized into three separate scopes. Scope 1 covers direct emissions from sources that are controlled or owned by the organization, e.g., emissions associated with fuel combustion in boilers, furnaces, and vehicles. Scope 2 emissions are indirect emissions associated with the purchase of electricity, steam, heat, and cooling. Although the associated emissions occur at the generating facilities such as power plants, they count towards the organization's emissions because they are the result of the organization's activities. Lastly, scope 3 emissions are all remaining indirect emissions that are not part of scope 2 and are outside of the organization's direct control. This includes employee business travel and commuting, purchase and disposal of equipment, food, and other products and services. A minimum inventory of an organization's GHG emissions covers scopes 1 and 2 since scope 3 emissions represent somebody else's scope 1 and 2 emissions and would hence be covered under their emission inventories. However, it is considered good practice to attempt to tabulate scope 3 emissions to the extent feasible.

In addition to tracking GHG emissions for scopes 1 and 2 as well as a subset of scope 3 categories, Williams College follows the rules and guidelines developed by the World Resources Institute (WRI) and the World Business Council for Sustainable Development (WBCSD) over the past two decades.[5] In particular, Williams College uses the *operational control approach* to determine which emissions to include in the inventory. The GHG Protocol defines operational control as follows:

> "A company has operational control over an operation if the former or one of its subsidiaries has the full authority to introduce and implement its operating policies at the operation. This criterion is consistent with the current accounting and reporting practice of many companies that report on emissions from facilities, which they operate (i.e., for which they hold the operating license). It is expected that except in very rare circumstances, if the company or one of its subsidiaries is the operator of a facility, it will have the full authority to introduce and implement its operating policies and thus has operational control. Under the operational control approach, a company accounts for 100% of emissions from operations over which it or one of its subsidiaries has operational control."[6]

[5] More information about the GHG Protocol developed by WRI and WBCSD can be found here: https://ghgprotocol.org/

[6] Greenhouse Gas Protocol. A Corporate Accounting and Reporting Standard. Revised Edition. https://ghgprotocol.org/sites/default/files/standards/ghg-protocol-revised.pdf. p.18

In short, for this GHG inventory, we have defined the inventory boundaries to include all processes, facilities, and operations over which the College has direct control. This includes buildings for which the College controls utilities, building systems and operations, such as the Log and the three Oxford-Exeter buildings, but excludes buildings for which that is not the case, such as faculty and staff residential buildings and the Williams Inn.[7] We will continue to review the organizational boundaries and, in particular, undertake efforts to gather more GHG relevant information from buildings/assets owned but not operationally controlled by the College.

The temporal boundary for this GHG inventory is—as in prior years—the fiscal year cycle, i.e., July 1, 2020 through June 30, 2021.

Greenhouse Gas Emissions Reporting

We record our GHG inventory in SIMAP—the Sustainability Indicator Management and Analysis Platform—a platform managed by the University of New Hampshire's Sustainability Institute. SIMAP was originally developed in 2001 as the Campus Carbon Calculator in collaboration between the former non-profit Clean Air-Cool Planet and UNH. It is now used by over 1500 schools, colleges, universities, and other organizations across North America and the world to track and manage campus carbon and nitrogen footprints. SIMAP complies with the GHG Protocol standards for greenhouse gas emission accounting and reporting.

Changes in the calculation or estimation of certain emission categories, the addition of new categories for scopes 1 and 2, evolution in the specification of the organizational boundaries, and changes in the quality and completeness of input data (e.g., air travel data) impact the comparability of the College's GHG inventories over time.

Global Warming Potentials

To assess the combined amount of greenhouse gases emitted by Williams College, conversion factors—Global Warming Potentials (GWP)—are used to establish equivalencies between carbon dioxide, methane, nitrous oxide, HFCs, PFCs, and SF6. The GWPs used for our FY21 calculations adhere to the IPCC's 5th assessment (AR5) 100-years horizon, with the exception of waste emissions, which use a consolidated calculated MTCDE factor generated by the EPA based on AR4.[8]

[7] For a detailed description of the facilities within and outside of the organizational boundaries for the FY21 GHG inventory and the main organizational control approaches, refer to this document: https://docs.google.com/document/d/1YcwB8GhqLKUatxzgrppUVL6tTlnSikVs71uz_LV6_js/edit

[8] The IPCC releases periodic assessments on climate change science, called Assessment Reports and are numbered by release. AR4 was released in 2007 and AR5 was released in 2014. The most recent assessment, AR6, was released in 2021. All assessment reports can be accessed at https://www.ipcc.ch/

Greenhouse Gas Emissions in Fiscal Year 2021

Williams College totaled emissions of 12,539 metric tons of carbon dioxide equivalent (MTCDE) in fiscal year 2021. This represents a decrease of nearly 41% compared with FY20 and almost 47% compared with FY19, the most recent pre-pandemic year. Compared to our baseline reference year, FY91, emissions were 48.5% lower and compared with the peak emissions year of FY03, our emissions decreased by just under 65%.

Emissions [MTCDE]	FY21	FY20	FY19 (pre-pandemic)	FY03 (peak emissions year since FY91)	FY91 (baseline year for emission reduction goals)
Scope 1	11,418	12,135	12,972	18,605	13,475
Scope 2	14	4,709	5,544	10,865	6,438
Scope 3	1,107	4,332	5,044	6,223	4,449
TOTAL	12,539	21,176	23,561	35,693	24,361

Table 1: Summary of GHG emissions for selected fiscal years by scope. Note: scopes might not sum exactly to the total due to rounding.

To put 12,539 MTCDE into perspective, they are equivalent to the annual emissions of 2,725 average US passenger vehicles according to the EPA[9]. Based on carbon flux estimates in a 2020 study in the Proceedings of the National Academy of Sciences, it would take the annual carbon sequestration productivity of roughly 2.5 million trees to absorb our emissions from last year.[10]

[9] Source: https://www.epa.gov/greenvehicles/greenhouse-gas-emissions-typical-passenger-vehicle

[10] Domke, Grant M., et al. "Tree planting has the potential to increase carbon sequestration capacity of forests in the United States." Proceedings of the National Academy of Sciences 117.40 (2020): 24649-24651. The calculation was based on Figure 1: Annual carbon dioxide flux for trees with at least 12.7 cm dbh (diameter at breast height) is 457.5 MMT CO2 for 90.4 billion trees in the U.S. This translates to an annual sequestration rate of 0.00506 MT CO2 per tree, yielding 2,477,651.6 trees to sequester Williams College's FY21 emissions of 12,539 MTCDE.

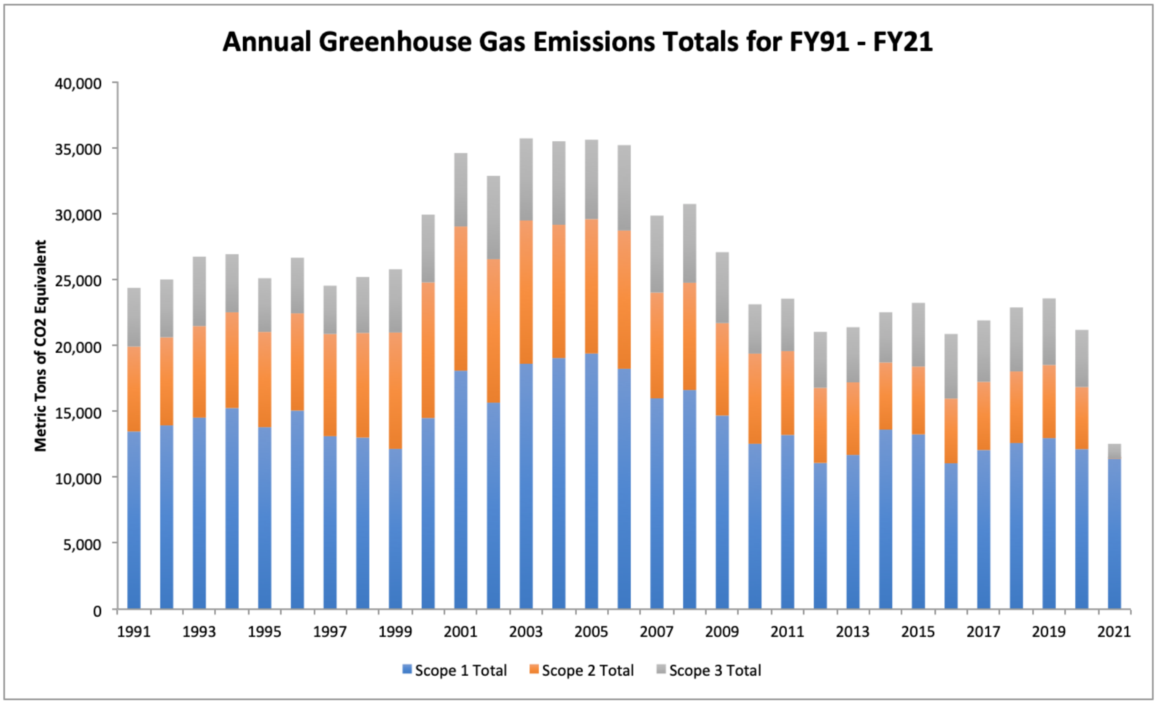

Figure 1: Williams College annual greenhouse gas emissions by scope for fiscal years 1991-2020. Note: emissions for scope 1 refer to on-campus fuel combustion at the cogeneration plant, fertilizer application, college-owned fleet operation, refrigerants, and energy use at college-owned separate buildings (e.g., Oxford). Scope 2 refers to emissions from purchased electricity and scope 3 emissions cover: college travel, transmission & distribution losses, and waste management.

The reductions in emissions achieved in FY21 are due primarily to (i) pandemic-induced changes in campus operations, notably a 83% decline in travel-related emissions and (ii) the elimination of emissions from purchased electricity (scope 2) through the acquisition of renewable energy credits (RECs) and a greener grid in Massachusetts. The remaining 14 MTCDE for scope 2 are due to purchased power for the College's three buildings in Oxford, UK. Carbon accounting rules require the purchase of RECs in the same geographic market as where the emissions arise (North America is considered a single market for this purpose, but the UK is outside of it). For this reason, the College allocated 14 carbon offsets to neutralize the Oxford scope 2 emissions. The following sections take a closer look at each scope of emissions.

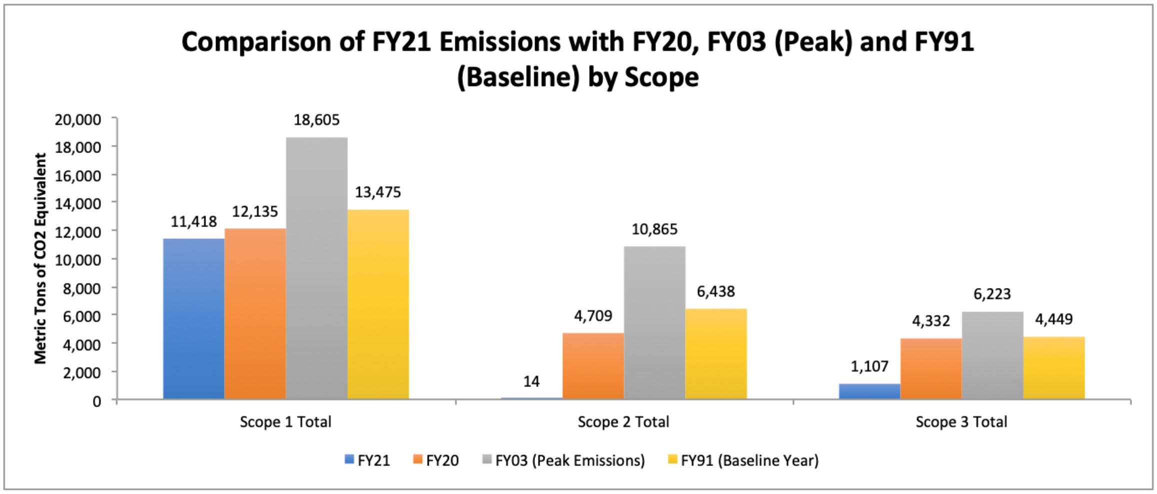

Figure 2: Comparison of GHG emissions by scope between fiscal years 2021, 2020, 2003 (peak emissions year) and 1991 (baseline year). Note: The 14 MTCDE for scope 2 in FY21 are attributable to purchased power for the Oxford-Exeter buildings and are neutralized through carbon offsets.

Scope 1 Emissions

Ninety percent of our scope 1 emissions (11,418 MTCDE) originate from natural gas combustion at the CHP plant.[11] Gasoline and diesel fuel use by College-owned vehicles contributes another 7.5%. Refrigerants and the Oxford properties are new additions to the inventory for FY21. However, neither represents substantial increases in emissions for the College. The addition of campus equipment fuel increased emissions for "fleet" use, notably diesel eightfold beyond the vehicle fuel total, though the overall emission total is in line with non-COVID historical values. Gasoline use and emissions are decreased, likely due to pandemic-induced operational changes.

[11] CHP is an energy efficient technology that generates electricity and captures the heat that would otherwise be wasted to provide useful thermal energy—such as steam or hot water—that can be used for space heating, cooling, domestic hot water and industrial processes. CHP can be located at an individual facility or building, or be a district energy or utility resource. CHP is typically located at facilities where there is a need for both electricity and thermal energy. (Source: https://www.epa.gov/chp/what-chp)

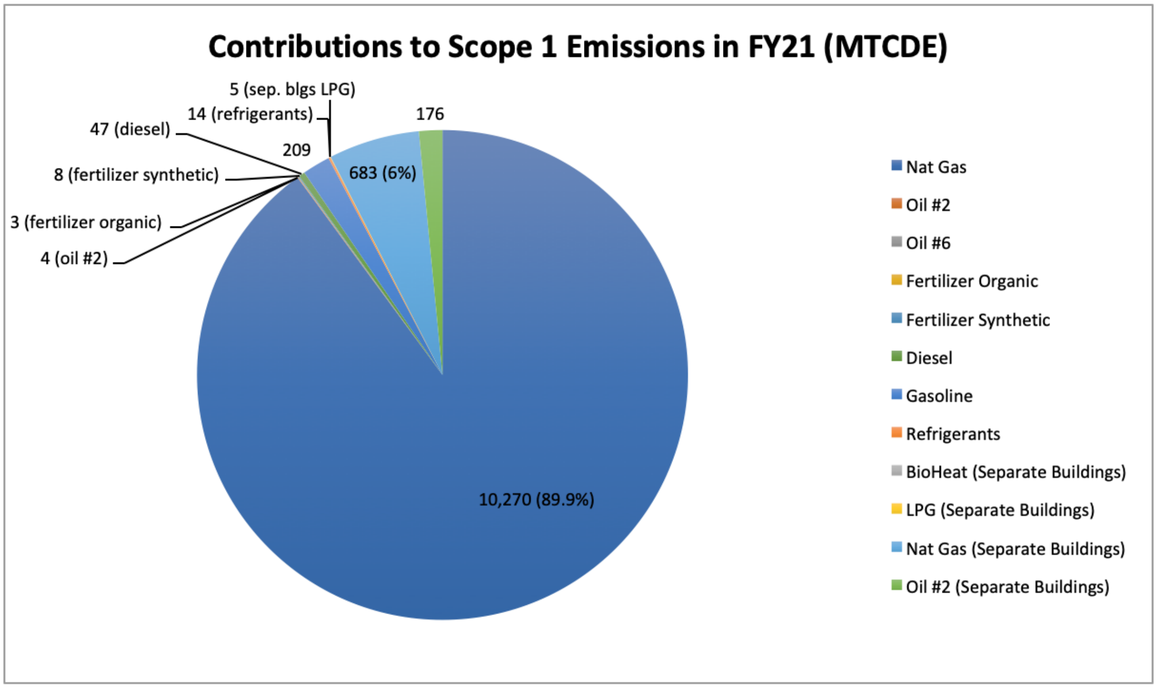

Figure 3: The sources contributing to scope 1 emissions for FY21.

Scope 2 Emissions

A key strategy for achieving the 2020 goal to reduce College GHG emissions by 35% below FY91 by 2020 was a large-scale (76 MW) renewable energy project with partner colleges Amherst, Bowdoin, Hampshire, and Smith, which became the Farmington Solar Project[12]. The contract with the developer NextEra established the commercial operation date for September 2020. Due to the pandemic, the project experienced several construction delays, which pushed the commercial operation date back to late October 2021.

The College used delay damage payments from the developer to purchase RECs with environmental attributes similar to those that will be generated by the Farmington Solar Project, thus eliminating most scope 2 emissions from purchased electricity for FY21. Farmington became operational on October 27, 2021 and we will purchase approximately 18,000 MWh annually from the project (about 80-90% of our purchased electricity), leading to a reduction in our Scope 2 emissions of about 4,700 MTCDE, the remainder will still be greened through additional RECs purchases.

Scope 3 Emissions

For scope 3, we evaluated emissions from air and ground travel, waste and compost management as well as transmission and distribution (T&D) losses. Total emissions were 1,107 MTCDE (see Figure 4). Air travel, despite its substantial reduction due to the

[12] You can find more information about the Farmington project here: https://farmingtonsolarproject.weebly.com/

pandemic, contributed approximately 63% of scope 3 emissions, while waste and T&D losses contributed 26% and 10%, respectively. Reducing travel-related emissions through incentivizing travel-smart choices and supporting clean travel options will contribute to our goal to become net zero in line with science-based targets to keep global warming below 1.5 degrees Celsius.[13]

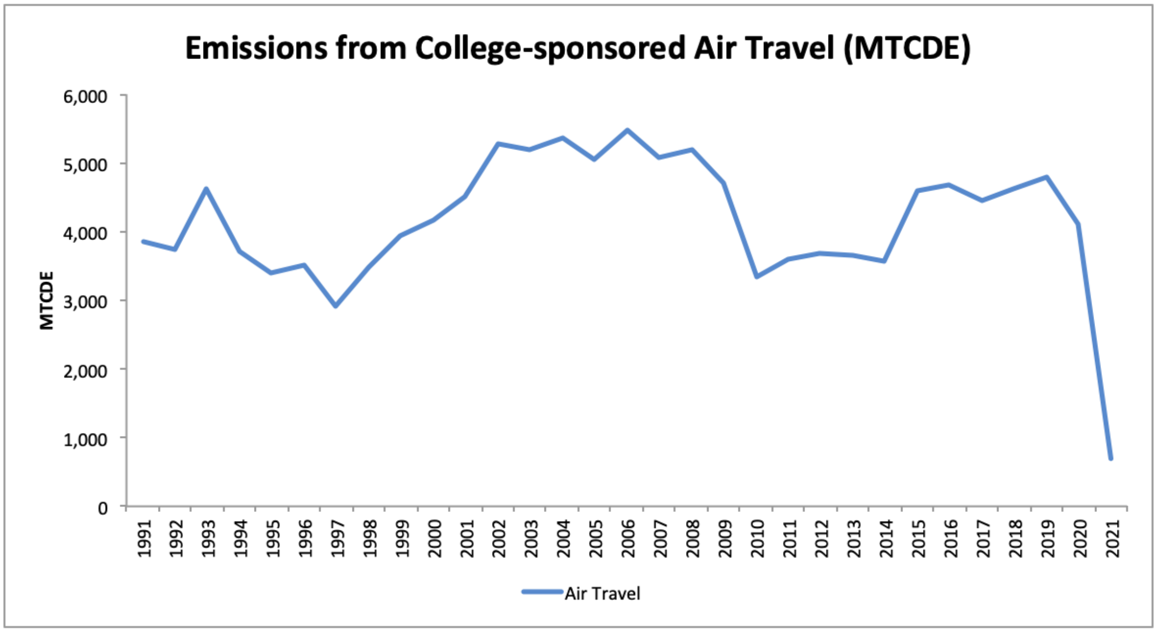

Figure 4: Development of GHG emissions from college-sponsored travel between FY91 and FY21 based on available data.

Noteworthy with respect to waste and composting emissions (see Figure 5) is that the EPA's most recent waste emissions factors now include the estimated emissions associated with transporting waste to disposal facilities. This changes our waste and composting management from a net carbon sink to a net carbon emissions source, something we will consider in our Zero Waste Action Plan.

The T&D losses were calculated using actual loss factors for National Grid utility customers, which are lower than the average numbers used by SIMAP, and thus more accurate for Williams College.

[13] To learn more about the Science-based Target Initiative, visit https://sciencebasedtargets.org/

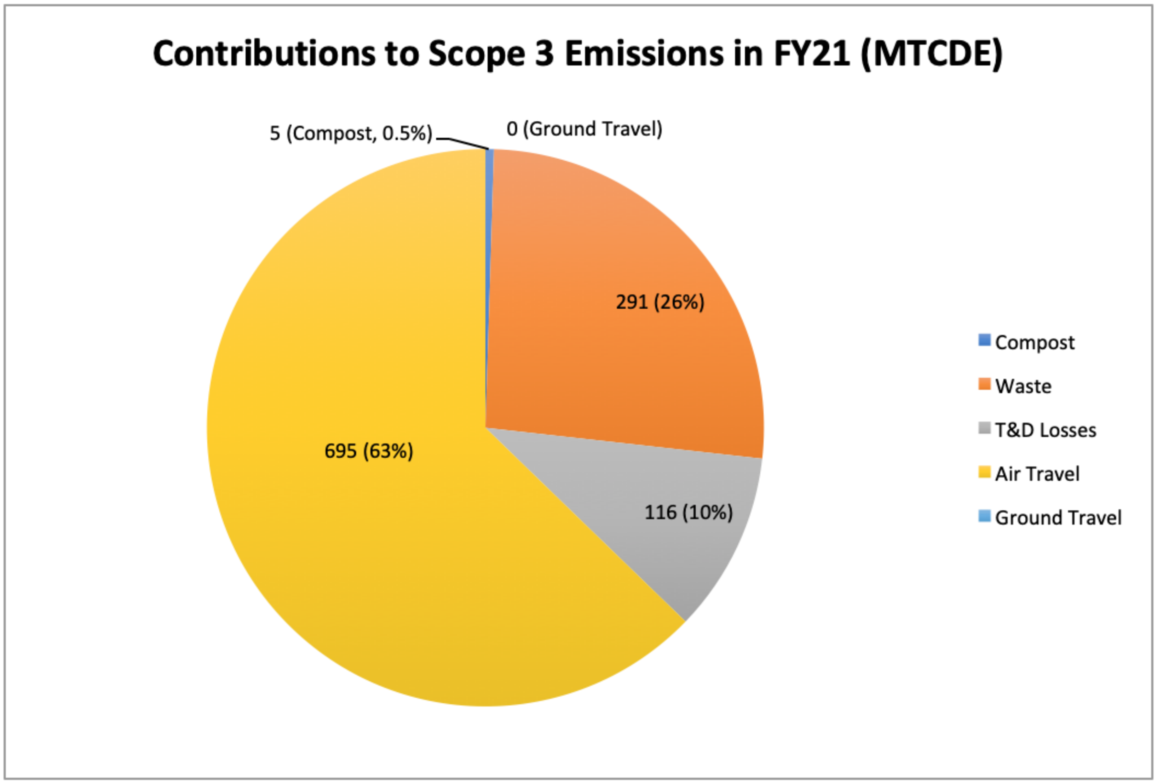

Figure 5: The sources contributing to scope 3 emissions for FY21. Note: T&D Losses refers to electricity losses in transmission and distribution lines.

Carbon Offset Purchases

The 2015 climate change goals announced by President Adam Falk and the Board of Trustees were two-fold: 1) reduce the College's emissions to 35% below 1990 levels and, after doing that, 2) purchase sufficient carbon offsets to achieve carbon neutrality. The Campus Environmental Advisory Committee (CEAC) developed guidelines for the College's approach to carbon offset purchases. It explains that "[c]arbon offsets are arrangements that will allow us to compensate for our own greenhouse gas emissions by investing in a greenhouse gas reduction or sequestration project somewhere else. These arrangements can take many forms, from forest conservation to renewable energy development to landfill methane capture."[14] We recognize that carbon offsets are controversial for several reasons[15] and should not be the main strategy for reducing our net carbon footprint. Carbon offsets markets can, however, also be beneficial by providing capital to projects that are difficult to secure financing for or that are otherwise not financially viable. They can also generate co-benefits such as jobs, environmental

[14] From the CEAC report on carbon offsets, which can be accessed here: https://sites.williams.edu/ceac/files/2019/05/Carbon-Offsets-at-Williams-College.pdf

[15] Carbon offset projects have to be additional, i.e., the project would not have happened without the effects of the voluntary or compliance-based carbon market, to serve as true carbon reduction efforts. This is not always easy to verify. In addition, carbon offsets need to be permanent, verifiable/measurable, and should not lead to 'carbon leakage' elsewhere (e.g., protecting a forested area should not lead to additional logging elsewhere).

health improvements, and local conservation benefits. For the time being, Williams College will purchase carbon offsets in line with the recommendations developed by CEAC to neutralize operating emissions. Our partner for carbon offset purchases is Cool Effect, which helps us identify and vet potential projects. Table 2 shows the offsets purchased for FY21.

Project	Description	Carbon offsets purchased
Biogas Digesters and Clean Cookstoves in China's Sichuan province	This project builds biogas digesters that convert organic waste into clean renewable energy to fuel clean cookstoves.	7,553 MTCDE at $5.02 per offset
Mirador Clean Cookstoves Project in Honduras	This project works side-by side with local families across rural Honduras to build improved cookstoves that use just half the amount of wood of a traditional one. When wood use is cut by half, so are CO_2 emissions.	5,000 MTCDE at $8.50 per offset
TOTAL	24,883 MTCDE purchased, of which ● 12,539 MTCDE are used to offset FY21 net emissions, this includes 14 MTCDE to neutralize scope 2 emissions from purchased power for the Williams-Exeter Program at Oxford ● The remaining 12,344 MTCDE are banked for future fiscal years.	

Table 2: Summary of Williams College's FY21 carbon offset purchases.

Embodied versus Operational Carbon

Tracking and reporting on GHG emissions according to the GHG Protocol's three scopes is helpful for identifying emission sources that are under different levels of control by the organization and hence its ability to reduce them. Another broad distinction of GHG emissions in the context of an organization's physical building infrastructure is based on *embodied* and *operational* carbon.

Embodied carbon refers to the greenhouse gas emissions arising from the manufacturing, transportation, installation, maintenance, and disposal of building materials.[16] Operational carbon in contrast are greenhouse gas emissions released during the ongoing operation of buildings, including lighting, power, heating and cooling, ventilation, and other infrastructure such as lifts and automatic doors.

Embodied carbon makes up a sizeable portion of a building's lifetime GHG emissions—the exact share depends on factors such as building type, design and energy sources used to build and operate it, climate zone, and occupancy/use patterns. As buildings become more energy efficient and use more renewable energy for operations, the total lifetime GHG emissions decline but the share of embodied carbon emissions actually increases (see Figure 6).

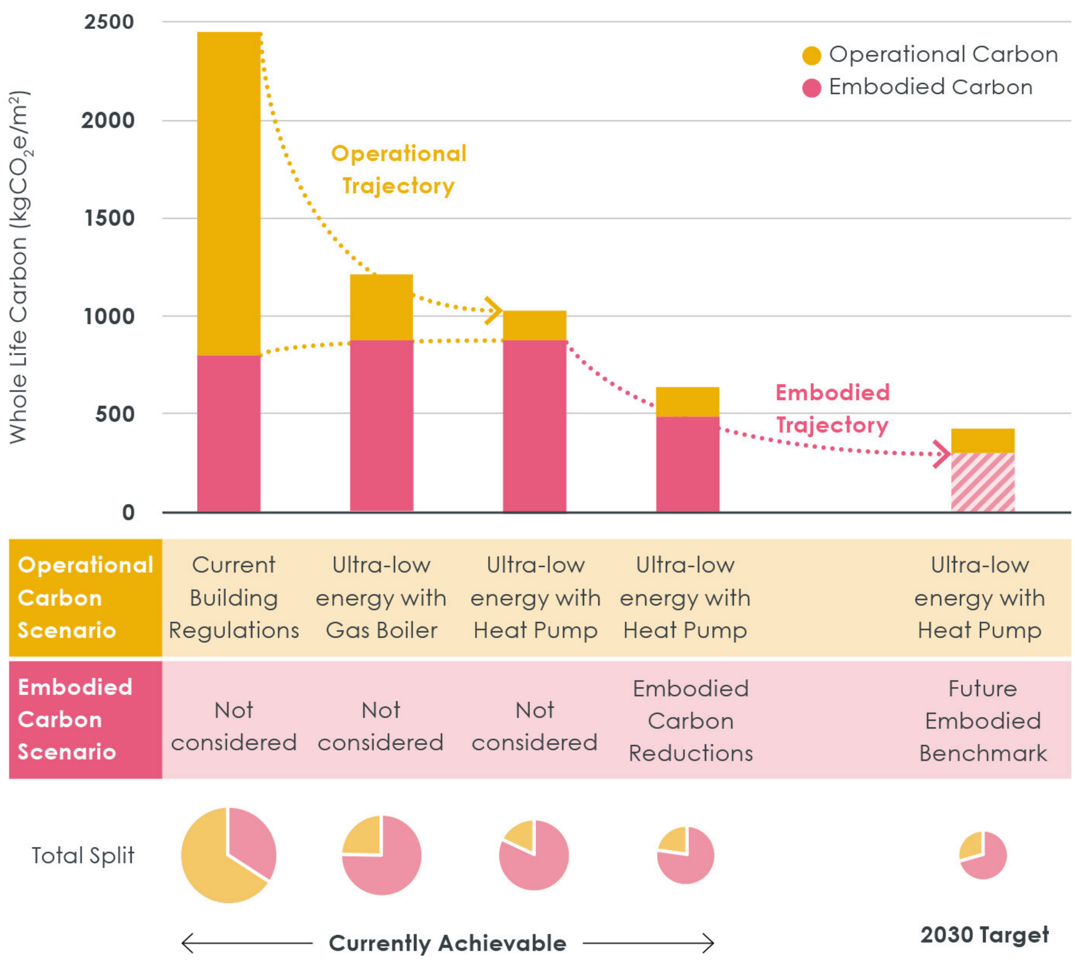

Figure 6: A schematic depiction of the lifetime GHG emissions per square meter of buildings in the UK and the relative contributions of embodied and operational carbon. Source: LETI's Embodied Carbon Primer, https://www.leti.london/ecp (accessed 01-12-2022).

[16] See the Carbon Leadership Forum's primer on embodied carbon for more information at https://carbonleadershipforum.org/embodied-carbon-101/ (accessed 01-12-2022).

It is important to actively assess embodied carbon and manage it as part of a holistic climate action plan and net-zero emissions goal. Common strategies at present to address embodied carbon are to carefully consider building materials (local, renewable and salvaged materials) and considering reuse and repurposing of existing structures when possible as well as to purchase offsets to 'neutralize' the building's embodied carbon burden. In recent years, Williams College has begun pursuing these actions as part of its green building policy. Going forward, we anticipate developing a more comprehensive accounting of the embodied carbon in our building stock.

Cumulative versus Annual Greenhouse Gas Emissions

GHG emissions inventories track annual net releases of greenhouse gases into the atmosphere. Climate change, however, is a problem of stocks and less so of flows. The concentration of carbon dioxide and other greenhouse gases in the atmosphere is what drives the greenhouse gas effect and thus global warming with its resulting impacts on extreme weather events, wildfires, sea level rise, ocean acidification, disease vector distribution, etc.

The Paris Accord's goal to keep global average temperature rise to 1.5 degrees Celsius[17] to avoid dangerous anthropogenic interference with the climate system is based on atmospheric concentrations of greenhouse gases and the corresponding remaining amount of gases countries can emit into the atmosphere. Following a science-based pathway to this goal requires the world to become net-zero emissions by 2050.

[17] Global temperature rise has not been uniform. The poles, for example, are warming at a much faster rate than the rest of the planet with increased impacts already occurring. There is also a growing risk of reaching climatic tipping points that trigger irreversible changes such as the disintegration of the Antarctic ice shelf, permanent thawing of permafrost, and the slowing of the Atlantic meridional overturning circulation (AMOC).

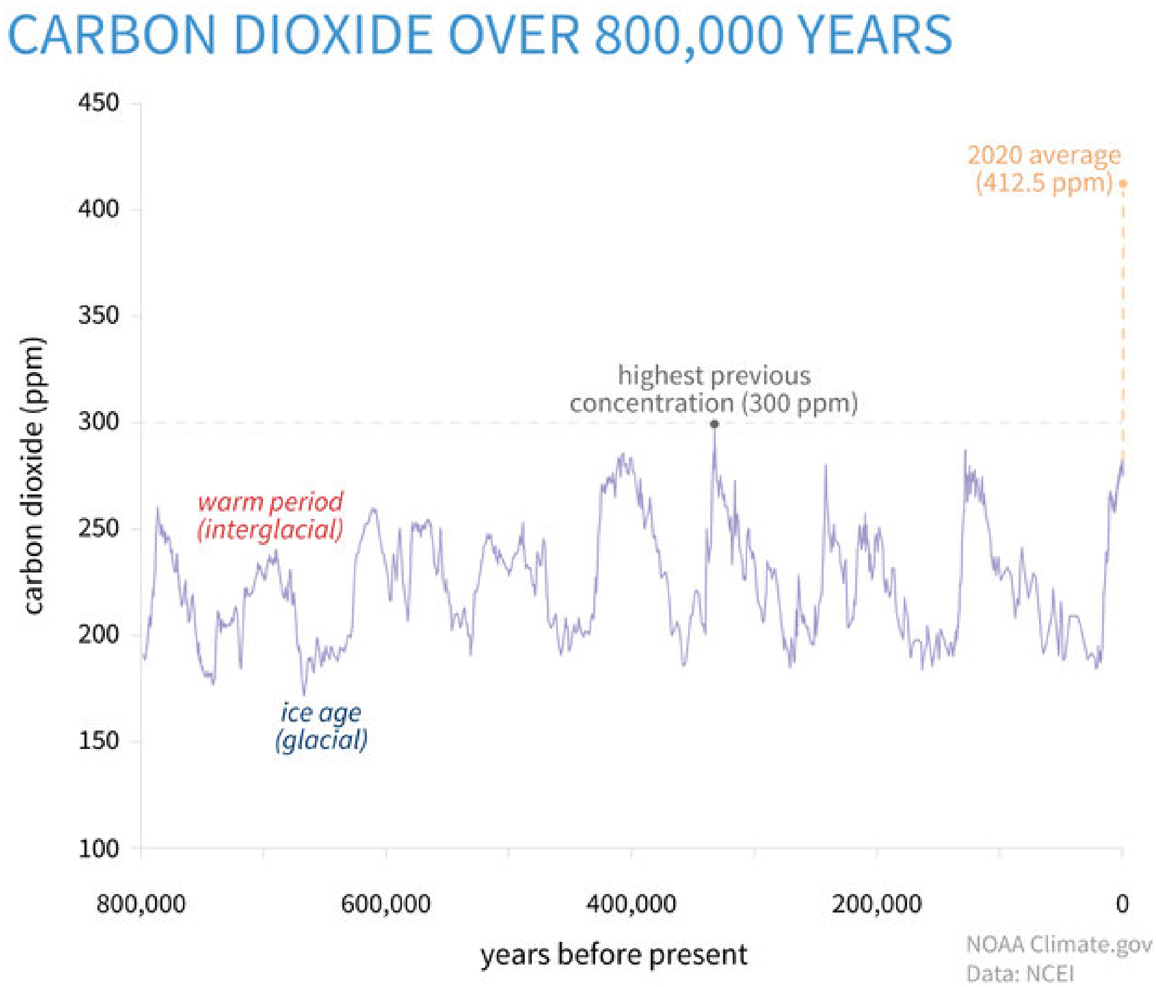

Figure 7: Reconstruction of atmospheric CO_2 concentrations over the past 800,000 years. Source: NOAA, Climate.gov website. https://www.climate.gov/news-features/understanding-climate/climate-change-atmospheric-carbon-dioxide

Considering, however, that we have already increased atmospheric CO_2 concentrations from 280 parts per million (ppm) to more than 410 ppm (see Figure 7), putting us into uncharted territory and resulting in increasingly widespread and severe climate change impacts, safeguarding the climate system requires both decarbonizing our economy and deploying technologies that actively remove greenhouse gases from the atmosphere such as direct air carbon capture and storage (DACCS). From an organizational perspective, this means looking beyond net-zero to becoming carbon negative or to eliminate the organization's lifetime net-carbon footprint.[18] Based on our annual GHG emission

[18] Several companies have made the pledge to become lifetime carbon-neutral, including Google and Microsoft. For more information on Microsoft's strategy, visit https://blogs.microsoft.com/blog/2020/01/16/microsoft-will-be-carbon-negative-by-2030/. Additionally: some organizations, such as Google, are working to become net-zero carbon on a 24/7 basis rather than on an annual basis and for organizations with large scope 3 carbon footprints compared with their scope 1 and 2 emissions, it is particularly important to reduce emissions along their entire value chain.

inventories for FY91-FY21 (see Figure 8), the College would need to remove 781,127 MTCDE to neutralize its historical emissions.

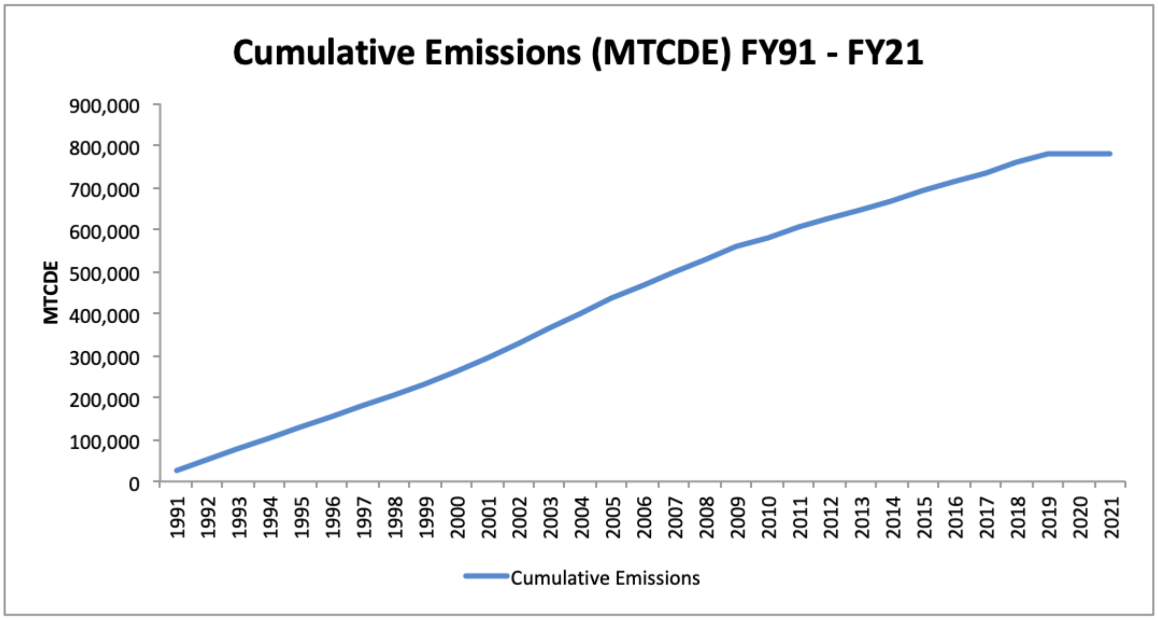

Figure 8: Cumulative greenhouse gas emissions for fiscal year 1991 through fiscal year 2021. Since fiscal year 2020 the College has purchased carbon offsets to be carbon neutral.

Frequently Asked Questions

Why was there a big increase in emissions in the early to mid 2000s?
The increase in emissions from 1991 to 2005 was due to added buildings and increased energy use in existing buildings.

To what can we attribute the reduction in the late 2000s to early 2010s?
The campus community petitioned the President at the time to address climate change and increase the College's focus on sustainability, which led to the College's first emissions reduction goals. The primary driver of the initial decrease in emissions was the switch to burning cleaner fossil fuels in the co-generation plant. From 2007 to 2010, the College substantially decreased its #6 residual fuel oil consumption and increased natural gas consumption. By FY14, 91% of heating fuel used was natural gas, compared to 43% in FY07. The College may burn a small amount of secondary fuel oil in the co-generation plant during colder months. As mentioned in the FY14 emissions report, that remaining fuel oil was switched in FY14 from #6 residual oil to a #2 distillate oil, which has slightly lower emissions per unit of energy than residual oil, but the switch made a negligible difference.

Why didn't emissions decrease more in the past ten years?

Despite ongoing energy efficiency projects that conserve thermal and electrical energy as well as setting challenging energy targets for new construction and major renovations, prior to the pandemic, scope 1 emissions were relatively flat since the early 2010s and scope 2 emissions have been relatively flat since 2014. This is because these initiatives have been largely offset by construction and new square footage. Additionally, the past emissions reduction strategies did not address travel, and therefore, few gains have been made in scope 3.

Where are the current gaps regarding measuring and tracking emissions?
In recent years, advances have been made in terms of tracking emissions savings from energy efficiency projects, though there is still room for improvement. Similarly, over the course of the past few years, the College has been able to improve the data collection for air and train travel, refrigerants, campus vehicle/equipment fuel use, and adding the Oxford-Exeter properties to our inventory. Areas that can still be improved include measuring emissions from food, procurement, commuting, waste generation from construction projects and increasing the granularity of building energy metering in order to improve energy consumption problem-solving and, relatedly, the associated emissions. GHG Protocol categories for scope 3 emissions are shown below. Not all are relevant for Williams College. Categories currently included are marked with an *, those that are partially included are marked with ** and categories we are in the process of developing are marked with ^.

- Purchased goods & services^
- Capital goods^
- Fuel- and energy- related activities (T&D losses)*
- Upstream transport & distribution (food)^
- Waste generated in operations**
- Business travel (incl. study away travel)*
- Employee commuting (student, faculty, staff)^
- Upstream leased assets (not relevant)
- Downstream transport & distribution (not relevant)
- Processing of sold products (not relevant)
- Use of sold products (not relevant)
- End of life treatment of sold products (not relevant)
- Downstream leased assets (not relevant)
- Franchises (not relevant)
- Investments

The Strategic Plan Climate Goals
The new climate action goals laid out in the 2021 Strategic Plan provide the goalposts for our new Climate Action Plan.[19] A key initiative is the transition away from campus fossil fuel combustion for which the Energy and Carbon Master Plan, currently in development, will provide the blueprint. The required infrastructure and technological changes will

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[19] The CAP is a living document that is periodically updated with new information, actions, and results. It can be accessed here:
https://docs.google.com/document/d/1rbF3knDxPEw-2yPk4AetG3urH1HSvTh8HBPmXtgTJYQ/edit

represent the College's largest-ever campus transformation and are expected to take 10-15 years to complete. In addition, we are targeting travel related emissions, the 2nd largest source of emissions, after campus combustion, fleet electrification, as well as food and waste system emission reductions.