University of North Carolina Greensboro Greenhouse Gas Inventory Report 2009-2022

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INTRODUCTION

This report tracks the anthropogenic greenhouse gas emissions, or carbon footprint, for the University of North Carolina Greensboro (UNCG) campus for the fiscal years (FY = July 1 to June 30) from 2009 to 2022. It provides details concerning the trends of UNCG's greenhouse gas emissions dating back to 2009, the year UNCG first conducted an inventory and the year the University considers to be its baseline by which the University measures its progress in becoming climate neutral by 2050 – a goal stated in the University of North Carolina System's Sustainability Policy[1].

To measure our greenhouse gas inventory, UNCG uses the Sustainability Indicator Management and Analysis Platform (SIMAP),[2] which was developed and is managed by the Sustainability Institute at the University of New Hampshire. For the purposes of this report, UNCG used the Market Based calculation method which allows for the input of renewable energy generated on-site and for any renewable energy credits purchased by electricity users. The Market Based method also allows for the input of supplier-specific emissions factors (UNCG's utility provider is Duke Energy), whereas the Location Based method uses factors from the Emissions & Generation Resource Integrated Database (eGRID), which are based on a mix of utility providers from a broader region that expands outside of North Carolina.

To learn more about the differences in calculation methods and the intricacies of SIMAP's methodologies please read our Greenhouse Gas Inventory Report from 2018[3] or visit the SIMAP website.

As stated in the SIMAP User Guide, "…the carbon footprint is a measure of the greenhouse gases emitted from a campus' activities. It includes all six greenhouse gases specified by the Kyoto Protocol: carbon dioxide (CO2), methane (CH4), nitrous oxide (N2O), hydrofluorocarbons (HFC), and perfluorocarbons (PFC), and sulfur hexafluoride (SF6)." These gases are produced via different means of energy generation or chemical reactions in the environment and fall into the following categories: purchased electricity, on-campus stationary sources (propane, natural gas, and distillate oil), air and ground transportation, commuting, refrigerants and chemicals, fertilizers, solid waste, paper purchasing, T&D losses (inefficiencies in the power grid), and wastewater.

We report our carbon footprint in metric tons of carbon dioxide equivalent or MTeCO2. CO2 equivalents are a metric measure used to compare the emissions from various greenhouse gases based upon their global warming potential relevant to one ton of carbon. To learn more, visit the Environmental Protection Agency's website on greenhouse gas emissions.[4]

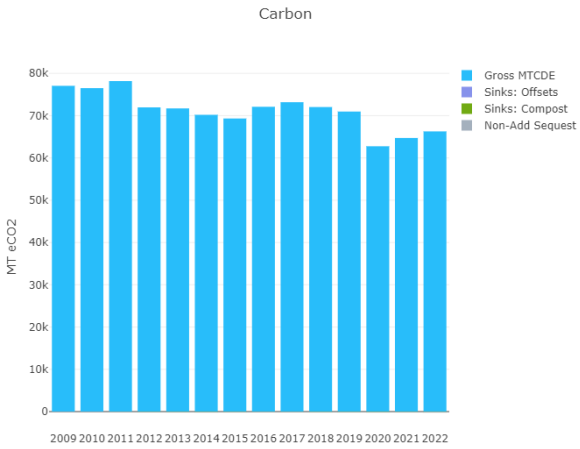
As you read through this report and compare the results to those of our previous reports, keep in mind SIMAP updates its methodology every year to reflect the most up-to-date scientific understandings, which is why the totals of MTeCO2 for previous fiscal years will not always be an exact match in our reports from year-to-year.

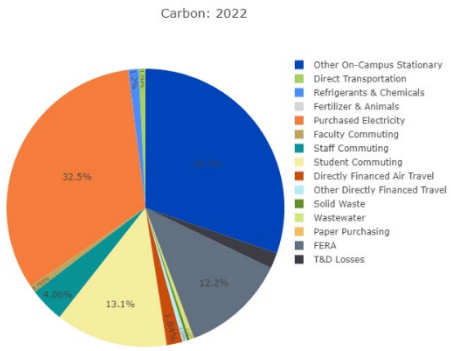
[1] https://www.northcarolina.edu/apps/policy/doc.php?id=776
[2] https://sustainableunh.unh.edu/calculator
[3] https://sustainability.uncg.edu/wp-content/uploads/2019/11/UNCG-Greenhouse-Gas-Inventory-FY09-18-Final-Report.pdf
[4] https://www.epa.gov/ghgemissions/understanding-global-warming-potentials

RESULTS

For FY22, UNCG's carbon footprint was **66,203 MTeCO2** which is a 14% reduction from our baseline FY09 footprint of 77,046 MTeCO2. However, this represents a 2.5% increase from our FY21 footprint, which mirrors regional and global trends as industries and countries continue to rebound to pre-pandemic levels of production and activity. The United States' greenhouse gas emissions increased by 1.3% during the 2022 calendar year compared to 2021, with extreme weather events putting stress on the utility grid as people consumed more energy in their homes and buildings – the sector that saw the largest increase.[5]

At UNCG, the major contributors to the University's rebound in emissions were increases in spending on directly financed air and ground travel (restrictions by the State were lifted in early FY21, but at that time people were still hesitant to travel and conferences remained mostly virtual); the need to replace refrigerants due to a leak at UNCG's chiller plant; and students reported traveling a longer average distance for their commute to campus in combination with an increase in residential students and a return to in-person learning. Compared to FY21, emissions from student commuting increased by 3,110 MTeCO2, air travel increased by 860 MTeCO2, and refrigerants were responsible for 662 more tons. Despite the rebound, UNCG's CO2 emissions are still on a downward trend compared to pre-pandemic levels, achieving a 7% decrease since 2019.





In FY20, UNCG reported a 25% decrease in total emissions from our 2009 baseline, so it should be noted that is a 11% difference compared to this year's trajectory. The 6% increase from FY20 to FY22 thus leaves a gap of 5%. This remaining difference is attributed to changes in SIMAP's calculation methods. Specifically, there have been two changes that have significantly altered previous calculations.

SIMAP now measures fuel and energy related activities (FERA) in Scope 3 emissions[6], which includes, but is not limited to emissions produced by the extraction and transportation of raw and refined fuels. While such emission sources are certainly not a new development, it is the first time SIMAP has been able to incorporate them into the calculator. The new FERA category added 7,178 MTeCO2 to our 2009 baseline and 8,075 MTeCO2 to our FY22 footprint, a 12% increase.

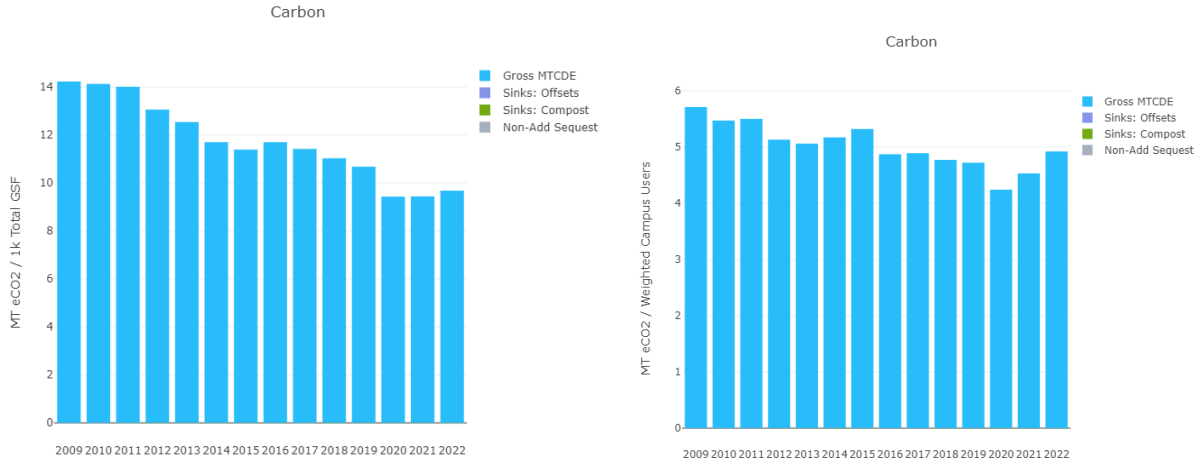
[5] https://www.nytimes.com/2023/01/10/climate/us-carbon-emissions-2022.html

[6] https://unhsimap.org/cmap/data-entry/scope3/3

SIMAP also changed the calculations for commuter emissions from 2009 to 2018, shifting away from the EPA's GREET Model[7] to data sets from the Bureau of Transportation Statistics (BTS), which resulted in a 15% reduction of 2,713 MTeCO2 for all three commuting categories in our 2009 baseline emissions. However, calculations for commuter emissions from 2019-2022 were already using the BTS data and remained unchanged; had the calculation method remained the same the university would have achieved a reduction in commuter emissions. Overall, while also accounting for minute changes to calculations of other categories, the new methods and new FERA category ultimately added 3,994 MTeCO2 to UNCG's 2009 baseline, a 5% increase compared to previous 2009 measurements.

Mirroring the overall rebound in total emissions, the university also saw a 3% increase in emissions per 1000 GSF and an 8% increase per weighted campus user from FY21 to FY22. While UNCG's FTE student population declined by approximately 800 students and the university employed approximately 100 fewer employees, the number of student residents increased by 720 and there were 3,116 fewer students solely enrolled in online learning compared to FY21, both trends reflecting a return to campus post-pandemic, which lead to the total amount of electricity purchased from Duke Energy increasing by 764,000 kwh or 1% compared to the previous year.

Despite those rebounds, the university has achieved a 32% MTeCO2 reduction per 1000 gross square feet, a 14% MTeCO2 reduction per weighted campus compared to our 2009 baseline. UNCG also achieved a 24% reduction in total energy consumption per square foot, which is a 3% improvement compared to FY21.



More key statistics, data, and infographics are provided in the appendices. More information regarding recent resource conservation projects on campus can be found in the 2022 Energy and Water Plan Annual Report.[8] More information regarding the future integration of sustainability initiatives on campus can be found in the 2020 Campus Plan.[9]

[7] https://greet.es.anl.gov/
[8] https://sustainability.uncg.edu/action-areas/energy/
[9] https://facdc.uncg.edu/wp-content/uploads/2020/12/20201030_UNCG-The-2020-Campus-Plan_External-Report_Spreads.pdf

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APPENDICES

SIMAP SCOPE DEFINITIONS

Scope 1 – Direct emissions from sources that are owned and/or controlled by your institution. This includes combustion of fossil fuels in college-owned facilities or vehicles, fugitive emissions from refrigeration, and emissions from on-campus agriculture or livestock husbandry. Your institution has complete control over these emissions, and they are no-one else's responsibility. Examples of these generally include the following:

• On-Campus Stationary Sources
Emissions from all on-campus fuel combustion, excluding vehicle fuels

• Direct Transportation Sources
Emissions from all fuel used in the institution's fleet (the vehicles it owns)

• Agriculture
N2O emissions from fertilizer use and CH4 emissions from animals (cattle, horses, etc.)

• Refrigeration and other Chemicals
Fugitive emissions from refrigerants and other sources

Scope 2 – Indirect emissions from sources that are neither owned nor operated by your institution but whose products are directly linked to on campus energy consumption. This includes purchased energy: electricity, steam, and chilled water. Although your institution is not directly responsible for these emissions, it is strongly implicated. These emissions come from converting energy sources that release greenhouse gas emissions when used (fossil fuels) to energy sources that do not (electricity, steam, or chilled water). Although your institution did not burn the coal to make the electricity you use, someone had to, and although the electricity producer emitted the gasses, they did not use any of the energy produced.

• Purchased Electricity
Emissions from the production of any electricity the institution purchases off-campus

• Purchased Steam
Emissions from the production of steam purchased from off-campus

• Purchased Chilled Water
Emissions from the production of chilled water purchased from off-campus

• Renewable Energy Certificates

Scope 3 – Other emissions attributed to your institution, deemed "optional" emissions by corporate inventories. This includes emissions from sources that are neither owned nor operated by your institution but are either directly financed (i.e., commercial air travel paid for by the institution) or are otherwise linked to the campus via influence or encouragement (i.e. air travel for study abroad programs, regular faculty, staff, and student commuting). Many Scope 3 emissions are considered "upstream" like the emissions associated with making and transporting plastic silverware. To prevent institutions from accounting for too many upstream emissions, most campuses define distinct financial or control boundaries to distinguish which Scope 3 emissions they are indeed responsible for.

• Commuting
Emissions from regular commuting by faculty, staff, or students (does NOT include student travel to and from home over breaks) (note – student commuting is generally considered to be under more institutional control than staff/faculty commuting)

• Directly Financed Outsourced Transportation
Emissions from travel that is paid for by the institution, but does not occur in fleet vehicles (business trips in commercial aircraft, staff travel in personal vehicles where mileage is reimbursed, etc.)

• Study Abroad Air Travel
Emissions from students flying to their study abroad location

• Transportation and Distribution Losses from Purchased Energy
Energy lost while transporting purchased electricity, steam, or chilled water to campus

• Food
Emissions from producing, transporting, preparing, consuming, and composting food

• Upstream Emissions from Directly Financed Purchases
Emissions associated with paper production, food production, fuel extraction, etc.

• Solid Waste and Wastewater
Emissions from managing the institution's waste (incineration, landfilling, etc.)

• Fuel- and energy-related activities (FERA)
The FERA category generally includes all emissions that occur upstream from the scope 1 direct combustion of a fuel or generation of energy.