

Greenhouse Gas Inventory: 2019-2022

This report describes the results of a comprehensive effort to calculate the greenhouse gas (GHG) emissions of Hillsborough Community College (HCC). Emissions were determined as coming from ten sources, and data was collected in order to estimate the metric tons of carbon dioxide (CO₂) equivalents (MTCO₂e) emitted from each source. The ten sources include: student commute, employee commute, employee automobile travel, employee/student air travel, electricity usage, plumbed natural gas usage, gasoline purchases, diesel purchases, stationary propane, and supply chain.

- Student commute includes automobile travel from the student's home address to their assigned, on-campus class delivered in person.
- Employee commute includes automobile travel from the employee's home address to their assigned work location on their assigned workdays.
- Employee automobile travel includes any reimbursable trips taken for work-related reasons to locations away from an employee's assigned work station.
- Air travel can be taken by either employees or students. (When employees travel by air, it is typically a work-related trip to a conference, meeting, or training. When students travel by air, it is for academic reasons related to coursework in the Honors program.)
- Electricity usage includes any kilowatt hours (KWh) billed from the Tampa Electric Company (TECO).
- Plumbed natural gas usage includes any therms (Thm) of propane billed from TECO.
- Both gasoline and diesel purchases are collected via the billing data from HCC's gas cards, which are typically used to fuel vehicles in the HCC Fleet, or purchases for vehicles used in HCC's academic programs (e.g., Fire Fighting).
- Stationary Propane includes any non-plumbed propane sources that are filled for academic uses (e.g., Chemistry labs).
- Supply chain includes purchased items, maintenance, equipment, water usage, and a host of other sources of GHGs that are not reflected in the nine other sources.

This report will always reflect the estimated MTCO₂e for the past three academic years. Although only the MTCO₂e for the most recently-completed academic year is calculated annually, the report will also show the preceding two years to provide a three-year comparison.

Table 1 displays the total estimated MTCO₂e for the past three academic years, along with the total unduplicated headcount of the HCC Population (all faculty, staff, and students that have a record and some activity entered in the College's system of record, Colleague, during the academic year) and total square footage of owned buildings. Vendors, consultants, contract workers, volunteers, or other individuals for whom the College does not maintain a person record in Colleague would not be counted even though it is possible that these individuals may contribute to College greenhouse gas emissions. Displaying trends in population and building footprint against MTCO₂e is important, as College emissions are often strongly related to how many people and facilities are present, although other forces can impact trends as well.

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Table 1. Total MTCO₂e, HCC Population and Building Square Footage: 2019-20 through 2021-22

2019-20			2020-21			2021-22		
MTCO ₂ e	HCC Population	Total Building SqFt.	MTCO ₂ e	HCC Population	Total Building SqFt.	MTCO ₂ e	HCC Population	Total Building SqFt.
27,326	47,222	1,784,649	19,978	43,978	1,782,689	23,367	44,613	1,782,689

* The EPA website used to estimate carbon emissions from electricity usage changed between the publishing of the 2018-2021 and 2019-2022 reports. Thus, the MTCO₂e from TECO Electricity usage was re-calculated for the last two academic years for the current report and total MTCO₂e for the college will not match the 2018-2021 report.

Table 2 displays a breakdown of each of the ten identified sources of GHG emissions. Each source has a unit of measurement, and that unit will vary depending on what is fueling the source. For example, gasoline is the main fuel combusted in student commute, so the unit shown is gallons of gasoline. The exception is air travel, for which an estimation of the miles traveled is entered into an online calculator, which does not report the gallons of jet fuel. Each source also has the estimated MTCO₂e for that academic year. The Methodology section to follow explains how the calculations were performed for each source.

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Table 2. Estimated Units of Fuel and MTCO₂e by Source of GHGs: 2019-20 through 2021-22

Source	2019-20		2020-21		2021-22	
	Units	MTCO ₂ e	Units	MTCO ₂ e	Units	MTCO ₂ e
Student Commute	1,665,701 gallons	14,157	970,602 gallons	8,249	1,275,539 gallons	10,841
Employee Commute	319,736 gallons	2,717	248,715 gallons	2,114	307,553 gallons	2,614
Employee Automobile Travel	6,603 gallons	56	3,888 gallons	33	9,802 gallons	83
Employee/Student Air Travel	296,901 miles	44	16,358 miles	2	143,291 miles	21
TECO Electricity Usage	23,529,191 KWh	10,179	21,655,547 KWh	9,368	22,256,702 KWh	9,628
TECO Natural Gas Usage	11,366 Thm	60	11,759 Thm	62	10,806 Thm	57
Gasoline Usage - HCC Fleet & Academic Purposes	6,398 gallons	54	9,376 gallons	80	6,624 gallons	59
Diesel Usage – HCC Fleet & Academic Purposes	5,101 gallons	52	5,923 gallons	60	5,532 gallons	56
Stationary Propane for Academic Purposes	480 gallons	3	640 gallons	4	300 gallons	2
Supply Chain	n/a	4	n/a	6	n/a	7
Total		27,326		19,978		23,368

* The EPA website used to estimate carbon emissions from electricity usage changed between the publishing of the 2018-2021 and 2019-2022 reports. Thus, the MTCO₂e from TECO Electricity usage was re-calculated for the last two academic years for the current report and will not match the 2018-2021 report.

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Methodology

The methodology used for calculating the greenhouse gas emissions from each of the ten identified sources at HCC is shown below. GHG emissions are always calculated for the academic year when possible. For items where data is collected by month rather than by term, September through August is used to align with the academic year. For supply chain, the fiscal year had to be used. The grand total of each source of GHG emissions, such as gasoline, diesel, propane, etc., is calculated and then converted to metric tons of CO₂ equivalents (MTCO₂e) using the individual online calculators as detailed below.

Car Travel

There are three types of car travel: student commute, employee commute, and employee car travel. The methodology to arrive at the total miles driven per year is described below. It is assumed that everyone drives themselves to their destination (e.g., no carpooling, biking, or walking) and that everyone drives vehicles that require gasoline (i.e., no electric or diesel). Once that number is obtained, it is divided by 22.5 to arrive at an estimate of the total gallons of gasoline consumed. This number comes from the EPA estimate of the average fuel efficiency of American cars (<https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator>). Finally, the total number of gallons of gasoline is converted to metric tons of CO₂ equivalents using the same EPA calculator.

A. Student Commute

To calculate student commute, the current address for every enrolled student is extracted from Colleague, and the street-level latitude and longitude is determined using the PROC GEOCODE procedure in SAS[®]. This same procedure is used to get the coordinates of every location at HCC, on- or off-campus, where classes are offered. The distance between each student's home coordinates and the class coordinates is used to calculate commute distances. Thus, a direct point-to-point distance is used, not driving distance as one might find on Google Maps.

Next, the entire student class schedule for terms within the academic year is pulled from Colleague. Because Colleague contains a record for every meeting date within a class, we can determine each time a student would have gone to campus. Any distance learning enrollments are excluded, and it is assumed that each student attends every scheduled class meeting. Moreover, it is known the exact location of each class that did not occur on a main campus. The precise location where the student traveled is used. For example, if a dual enrollment student was enrolled in a class at a high school, the coordinates of that high school are used. Then, the distance between the student's home and their class location is calculated and multiplied by the total number of trips they would have taken within the term.

Three adjustments are made: (1) If a student withdrew from the class, only 60% of the trips are used because it is assumed the student would have stopped coming to class after the 60% withdrawal mark in the term. (2) If a student's address as recorded in Colleague is more than 100 miles from their class location, it is assumed this must be an incorrect address. Their commute distance is adjusted down to the average commute, which is 10 miles. (3) If a student has multiple classes at the same location on the same day, it is assumed they only visit that location once.

The calculations of each individual student commute for the term are summed for the grand total of miles commuted for the year.

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B. Employee Commute

Like the student commute, the latitude and longitude of every employee's home address is acquired using the PROC GEOCODE procedure in SAS®. Distance is calculated the same way, as a direct distance between home address and work location. Commute is calculated differently depending whether the employee's primary position number indicates that they are faculty or staff.

For a staff member, Web Time Entry in Colleague is used to determine each day the individual reported to their work site, excluding vacation or sick days. The employee's commuting miles are then multiplied by their total workdays during the term. For a faculty employee, the method used is similar to how commute is calculated for students. The class schedule is pulled to determine when the faculty member would have come to campus. Also, the faculty office hours are pulled in as additional days the individual would have commuted to campus. Like students, we assume the faculty member worked from home if the class was distance learning, and if the faculty's address is more than 100 miles from campus, then the commute is adjusted down to the average employee commute (12 miles). Once total commuting miles are determined at the individual employee level, they are summed to get a grand total for the academic year.

C. Employee Car Travel

Miles commuted for work-related trips (e.g., conferences or meetings) are an additional source of employee car travel; those miles are tracked from the travel reimbursement process. When employees travel for work, they must submit an In-district or Out-of-District travel form that indicates either the total miles traveled or the destination. These data can be queried from Colleague. For In-district travel, the total amount reimbursed is divided by .445 (the mileage reimbursement rate) to determine the total miles traveled. (Most In-district travel is purely mileage, rather than other expenses like parking fees.) For Out-of-District travel, the destination is captured from Colleague. A lookup file was manually prepared for this project using Google Maps to calculate the driving distance between Tampa and all possible destinations, for a computation of the total Out-of-district driving distance.

Like other forms of commuting, once the individual driving distances are calculated using the appropriate method, all trips are summed to get a grand total.

Employee/Student Air Travel

HCC air travel is derived from two sources: employee and student. Employee air travel is also found via the travel-reimbursement process as detailed above. Since it is difficult to conclude from the data entered into Colleague if the employee trip was taken via car or plane, it is assumed that any trip within Florida was traveled via car, and any trip out-of-state was traveled via plane. Once all out-of-state trips are revealed, another manually-created lookup table is used that has the total air travel CO2 emissions from Tampa to all possible destinations. This was created using the CO2 calculator found at: <https://www.icao.int/environmental-protection/Carbonoffset/Pages/default.aspx>.

Student air travel is represented only from the Honors Institute. This department regularly takes the Honors students on enrichment trips to destinations around the world. Each year, the Honors Director is asked where they went and how many students traveled. The same CO2 calculator found above is used to arrive at the total student air travel CO2 emissions.

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TECO Electricity and Natural Gas Usage

The electricity and natural gas used monthly by the College is the only source of GHG where direct measurements were taken rather than estimations. Here, the College Facilities Director provides the bills from TECO, which detail the kilowatt hours (kWh) used for electricity and the therms used for natural gas. These values are summed over the months of September through August to get the grand totals for the academic year.

Gasoline and Diesel Usage for HCC Fleet and Academic Purposes

Certain individuals at the College carry HCC gas cards to charge regular gasoline or diesel purchases. These purchases are either for fuel for the HCC fleet (e.g., the College moving truck) or for academic purposes like the Automotive program. The total gallons purchased can be obtained from the Wex Tax Summary reports managed by the Finance department, detailing the gallons purchased by month. These values also are summed over the months of September through August to get the grand totals for the academic year.

Stationary propane combustion for academic uses

A few academic programs, like the Fire Fighting program and campus Chemistry labs, used stationary propane tanks which are billed individually to those programs/campuses. To obtain these amounts, the Fire Fighting program manager and the Deans of the Brandon, Plant City, and SouthShore campuses must be queried for an estimate of the propane used from their bills for the academic year.

Supply Chain

The greenhouse gas emissions associated with HCC supply chain are estimated based on a methodology first developed by Portland Community College (PCC). First, all expenses are extracted from Colleague for the fiscal year. All expenses are associated with a General Ledger (GL) code, and within that GL code is an object code which describes the type of purchase. Per the PCC methodology, all HCC object codes were first associated with one of 15 different categories: Chemicals, Classroom supplies, Computer software and licensing, Telephone software and licensing, Computers and Electronics, Construction, Food service, Furniture/fixtures/minor equipment, Grounds, Maintenance and repairs, Office supplies, Postage/shipping and receiving, Professional services, Real estate, and Water. Object codes associated with purchases that would have been picked up in other components of the GHG inventory, like travel and propane, were excluded. Then, all expenses were matched to a category using the expense's GL code, and the total expended within each category was summed for the fiscal year. That amount was adjusted for inflation and entered into the EIO-LCA online tool which estimates the total CO₂ emissions for each category based on the amount. The grand total metric tons of CO₂ are then summed across the categories.