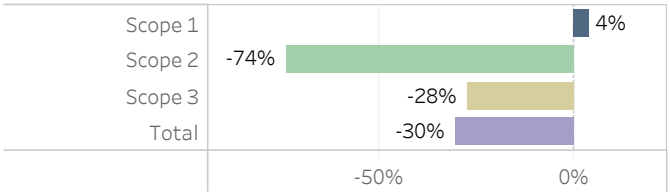
Bowdoin College
FY22 Greenhouse Gas Inventory
## Page 1: Emissions Reporting vs Baseline

This page presents a high-level overview of Bowdoin College's FY22 greenhouse gas emissions relative to emissions from the reporting year baseline (FY08) and the previous reporting year (FY21). The comparison table below also normalizes emissions across variations in the College's sq footage, revenue, and student enrollment. Emissions in FY22 have significantly fallen from the FY08 baseline, which is most apparent for Scope 2 emissions. From FY21 to FY22, emissions overall grew by 39% as the College increased its energy consumption and activities from the previous fiscal year that saw operations impacted by the pandemic. Despite a 30% drop in overall emissions in FY22 from the FY08 baseline, Scope 1 emissions remain largely unchanged from the FY08 baseline.

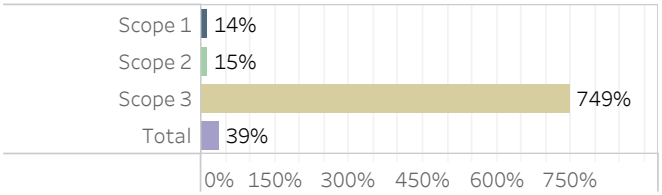
### FY2022 Reported Emissions vs Baseline & Recent Historicals ($MTCO_2e$)

| | 2008 | 2021 | 2022 |
|---|---|---|---|
| Scope 1 | 9,061.9 | 8,265.0 | 9,406.2 |
| Scope 2 | 7,263.8 | 1,651.7 | 1,900.8 |
| Scope 3 | 2,827.7 | -315.3 | 2,047.5 |
| Total Emissions (MTCO2e) | 19,153.4 | 9,601.4 | 13,354.5 |
| Metric Tons CO2e / Million Sq Ft | 9,323.4 | 4,284.7 | 5,942.1 |
| Metric Tons CO2e / Million $ | 162.7 | 52.3 | 67.8 |
| Metric Tons CO2e / Students Enrolled | 11.1 | 5.4 | 6.8 |

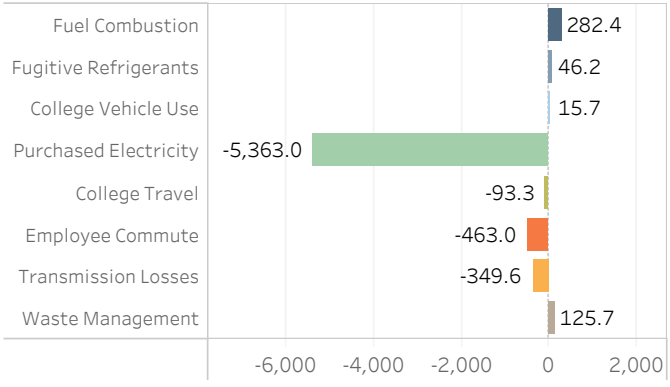
### FY22 % Difference in Emissions vs FY08 (Baseline)



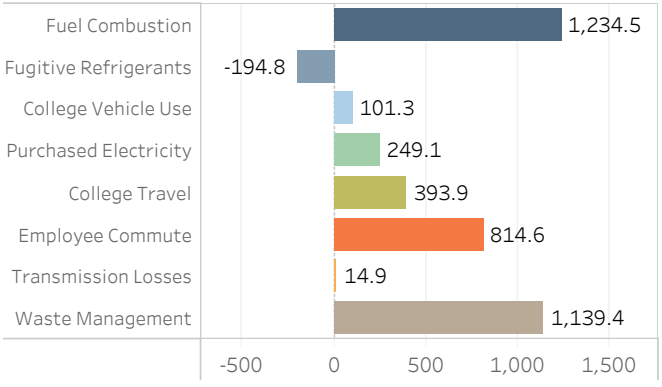

### FY22 % Difference in Emissions vs FY21 (Year-Over-Year)




### FY22 Difference in Emissions vs FY08 (Baseline)




### FY22 Difference in Emissions vs FY21 (Year-Over-Year)

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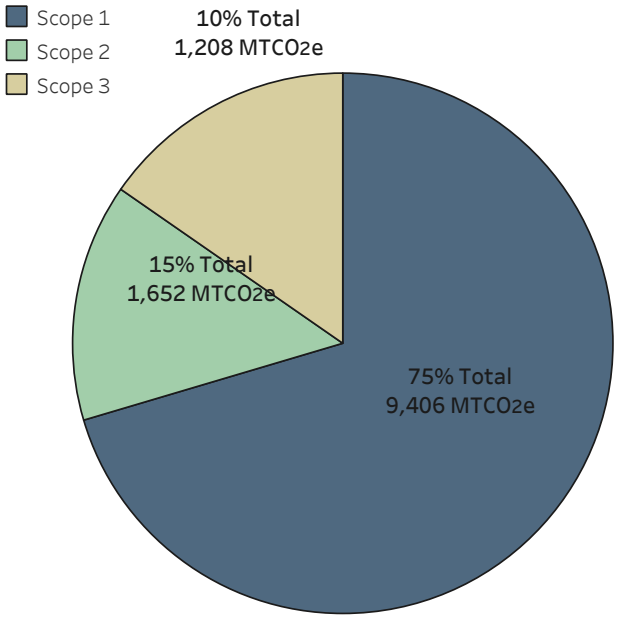
Bowdoin College
FY22 Greenhouse Gas Inventory
Page 2: Total FY22 Annual Emissions Summary

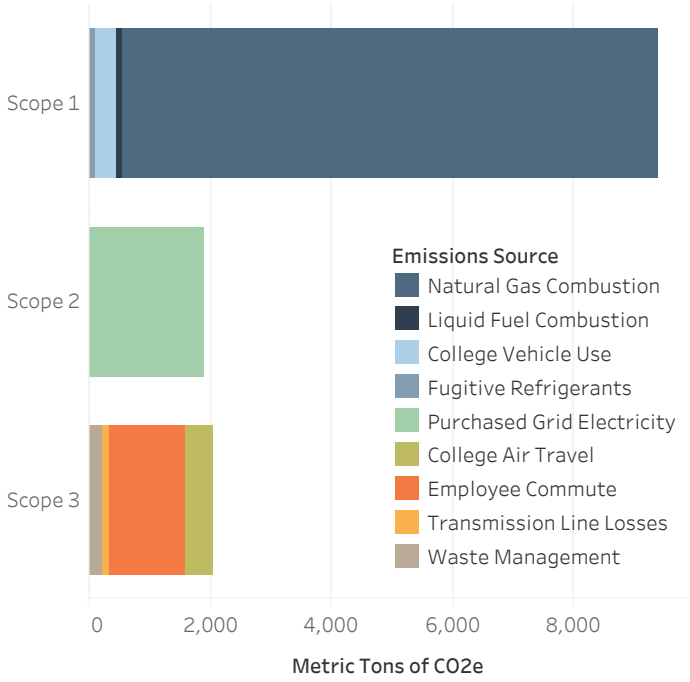
Bowdoin College's FY2022 total greenhouse gas emissions are broken down by scope and activity. The College emitted 13,349 metric tons of carbon dioxide equivalents ($MTCO_2e$) in FY22. Bowdoin tracks annual emissions from onsite fuel combustion, college-owned vehicle use, fugitive emissions, electricity purchases & associated transmission losses, college air travel & employee commuting, and waste management practices. Scope 2 emissions were calculated using location-based greenhouse gas accounting methods. Bowdoin would report 0 $MTCO_2e$ total for Scope 2 emissions under market-based accounting with the College's current renewable energy strategy.

| Scope | Emissions Source | Metric Tons CO2e | Metric Tons CO2 | Metric Tons CH4 | Metric Tons N2O |
|---|---|---|---|---|---|
| Scope 1 | Natural Gas Combustion | 8,840.7 | 8,831.7 | 0.1664 | 0.0166 |
| | Liquid Fuel Combustion | 101.6 | 101.2 | 0.0031 | 0.0012 |
| | College Vehicle Use | 355.9 | 354.2 | 0.0222 | 0.0039 |
| | Fugitive Refrigerants | 101.9 | | | |
| | Scope Total | **9,400.1** | | | |
| Scope 2 | Purchased Grid Electricity | 1,900.8 | 1,829.0 | 1.0671 | 0.1584 |
| | Scope Total | **1,900.8** | | | |
| **FY22 Total Emissions Reported (MTCO2e):** | | **13,348.6** | | | |

## FY22 Emissions Breakdown by Scope



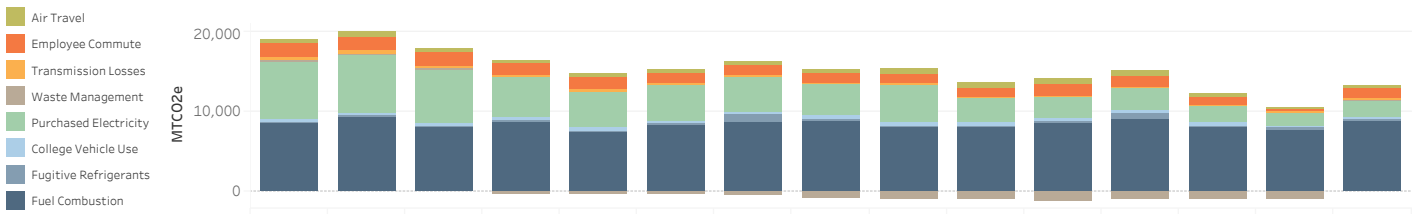

## FY22 Emissions by College Source



Bowdoin College
FY22 GHG Inventory
Page 3: Annual Trends in Greenhouse Gas Emissions

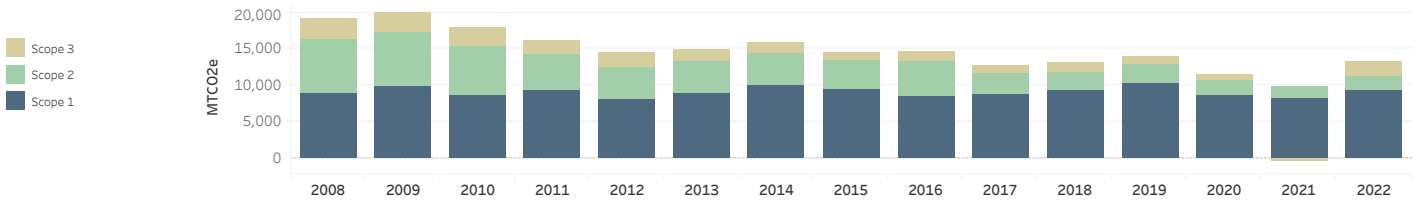
Trends in GHG emissions for Bowdoin College, categorized according to sources of emissions & scope. 100% of emissions were offset using market instruments for FY2018 - FY2022.

## Annual Trends in Emissions by Source




| | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Air Travel | 534 | 534 | 421 | 349 | 469 | 546 | 520 | 630 | 696 | 646 | 724 | 692 | 576 | 47 | 441 |
| Transmission Losses | 464 | 465 | 410 | 298 | 272 | 265 | 253 | 236 | 276 | 173 | 158 | 169 | 123 | 99 | 114 |
| College Vehicle Use | 340 | 392 | 391 | 444 | 431 | 399 | 429 | 435 | 445 | 442 | 455 | 367 | 361 | 255 | 356 |
| Fugitive Refrigerants | 62 | 62 | 130 | 8 | 120 | 148 | 1,032 | 4 | 276 | 205 | 254 | 717 | 201 | 303 | 108 |
| Employee Commute | 1,722 | 1,722 | 1,628 | 1,466 | 1,489 | 1,114 | 1,157 | 1,014 | 1,243 | 1,209 | 1,373 | 1,259 | 973 | 444 | 1,259 |
| Purchased Electricity | 7,264 | 7,287 | 6,837 | 4,968 | 4,534 | 4,411 | 4,213 | 3,929 | 4,600 | 2,881 | 2,630 | 2,815 | 2,047 | 1,652 | 1,901 |
| Fuel Combustion | 8,660 | 9,430 | 8,056 | 8,938 | 7,477 | 8,402 | 8,646 | 9,111 | 7,984 | 8,092 | 8,575 | 9,112 | 8,098 | 7,708 | 8,942 |
| Waste Management | 108 | 108 | 7 | -385 | -325 | -365 | -437 | -883 | -1,058 | -978 | -1,082 | -1,061 | -924 | -906 | 234 |
| Fiscal Year Total MTCO2e: | 19,153 | 20,001 | 17,881 | 16,085 | 14,467 | 14,920 | 15,813 | 14,476 | 14,461 | 12,671 | 13,087 | 14,070 | 11,455 | 9,601 | 13,355 |
| Own-Source MTCO2e: | 16,326 | 17,171 | 15,414 | 14,358 | 12,562 | 13,360 | 14,320 | 13,479 | 13,304 | 11,620 | 11,914 | 13,011 | 10,707 | 9,917 | 11,307 |

## Annual Trends in Emissions by Scope

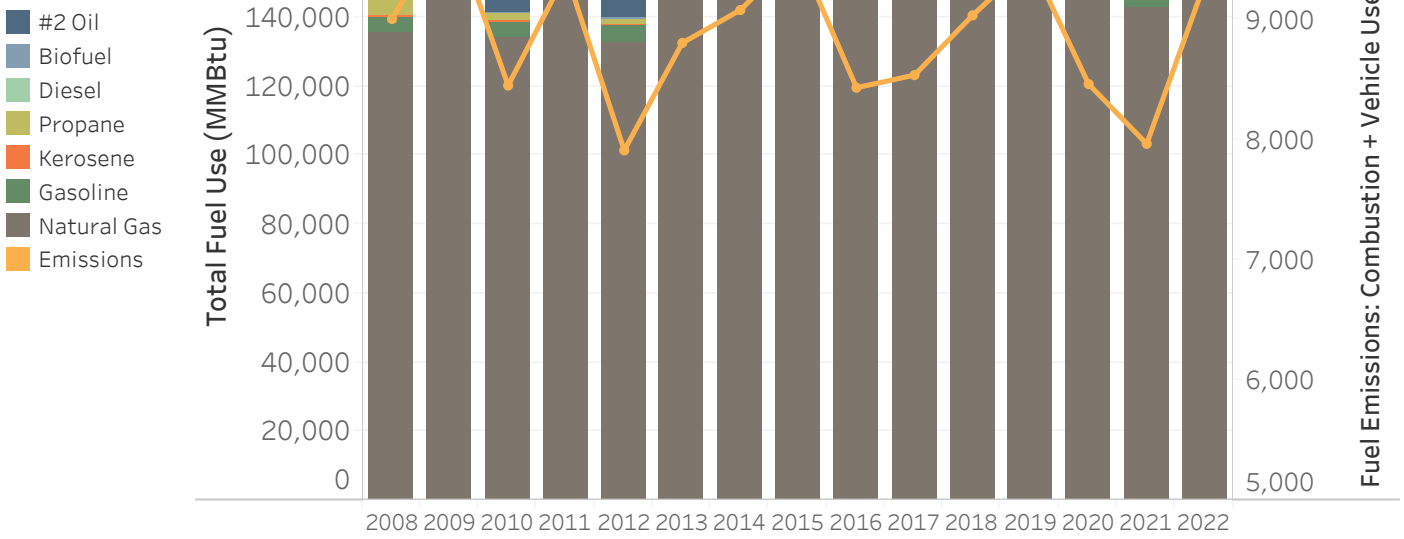



| | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Scope 1 | 9,062 | 9,884 | 8,577 | 9,390 | 8,028 | 8,949 | 10,107 | 9,550 | 8,705 | 8,739 | 9,284 | 10,197 | 8,659 | 8,265 | 9,406 |
| Scope 2 | 7,264 | 7,287 | 6,837 | 4,968 | 4,534 | 4,411 | 4,213 | 3,929 | 4,600 | 2,881 | 2,630 | 2,815 | 2,047 | 1,652 | 1,901 |
| Scope 3 | 2,828 | 2,830 | 2,467 | 1,728 | 1,905 | 1,560 | 1,493 | 997 | 1,157 | 1,051 | 1,173 | 1,059 | 748 | -315 | 2,048 |
| Fiscal Year Total MTCO2e: | 19,153 | 20,001 | 17,881 | 16,085 | 14,467 | 14,920 | 15,813 | 14,476 | 14,461 | 12,671 | 13,087 | 14,070 | 11,455 | 9,601 | 13,355 |
| Own-Source MTCO2e: | 16,326 | 17,171 | 15,414 | 14,358 | 12,562 | 13,360 | 14,320 | 13,479 | 13,304 | 11,620 | 11,914 | 13,011 | 10,707 | 9,917 | 11,307 |

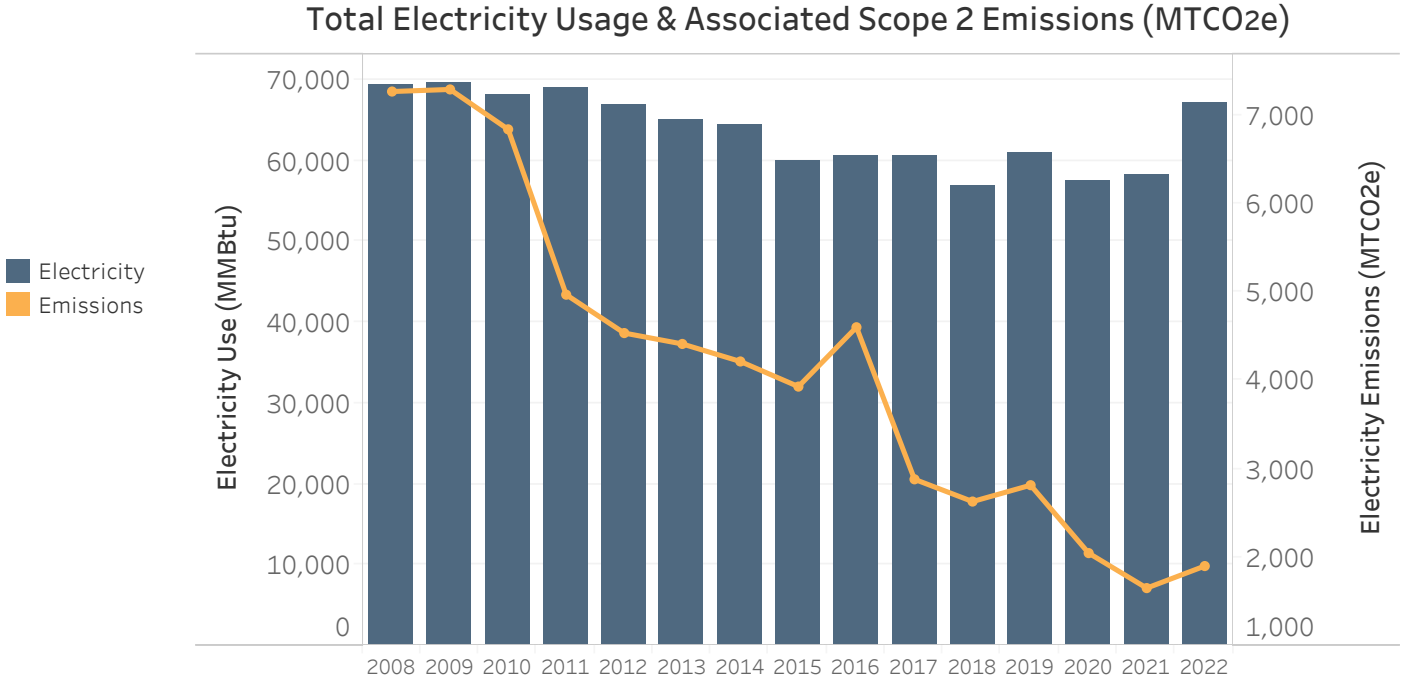
Bowdoin College
FY22 GHG Inventory
Page 4: Trends in Energy Usage & Associated Emissions

Annual trends in energy consumption (purchased electricity & purchased fuels) and associated emissions are shown below. Emissions from fuels (on-site combustion & vehicle use) vary according to fuel mix (e.g. % natural gas vs. liquid fuels) and annual usage. Emissions from electricity vary annually by consumption but continue to drop per MMBtu purchased as the Maine electric grid becomes cleaner.

## Total Fuel Usage & Associated Scope 1 Emissions (MTCO2e)




## Total Electricity Usage & Associated Scope 2 Emissions (MTCO2e)



## Methodology & Reporting Notes

The FY2022 Bowdoin College Greenhouse Gas Inventory presents a comprehensive accounting of Scope 1, Scope 2, & Scope 3 emissions resulting from the College operations during the past fiscal year. Reported sources of emissions were held consistent from previous annual greenhouse gas inventories. Scope 1 emissions extend from activities directly controlled by Bowdoin and result from fuels used for heating, fuels used to operate college-owned vehicles, and fugitive refrigerants. Scope 2 emissions result from Bowdoin's purchased grid electricity and are reported using location-based accounting. As a result, CES did not factor in market-based instruments Bowdoin has used to acquire RECs to offset its Scope 2 emissions in this report (Bowdoin can report 0 $MTCO_2e$ under market-based accounting for Scope 2 emissions in FY22). Scope 3 considers emissions from activities and assets not directly owned or controlled by the College. As in previous years, this category includes emissions from transmission line losses, air travel, employee travel to campus, & waste management. Primary usage data for FY2022 across all scopes came directly from the College. As in previous report versions, flight mileage and employee commute mileage are estimated based on available flight expenses and employee zip code data. Survey results determined the percentage of faculty who worked partially or entirely remote in FY2022.

CES reported Bowdoin's total emissions in metric tons of carbon dioxide equivalents ($MTCO_2e$). Using $MTCO_2e$ allows for comparing different emissions sources by using a single value that accounts for the weighted impact of each ton of various emitted greenhouse gas chemicals ($CO_2$, $N_2O$, & $CH_4$). A metric ton is equal to 1,000 kilograms, or ~2,204.62 pounds. To account for the varying impacts of the different greenhouse gas chemicals, CES used the Global Warming Potential (GWP) international standards for each source of emissions resulting from Bowdoin's operations. GWP measures a substance's ability to absorb energy and thus accounts for each chemical's specific greenhouse gas impact. GWP measures appear in carbon dioxide equivalents ($CO_2e$), with carbon dioxide holding a GWP of 1. The GWP factors used in this assessment incorporate a 100-year time horizon. $CO_2$ has a GWP of 1, $N_20$ has a GWP of 298, & $CH_4$ has a GWP of 25.

Scope 1 emissions factors for on-site fuel combustion, transportation fuel use, & fugitive emissions come from the EPA default emissions factors for greenhouse gas reporting. Scope 2 Emissions for purchased electricity and Scope 3 Emissions for transmission line losses are calculated using the Maine state grid emissions factors from the EPA eGrid 2021 data (published Jan 2022). In FY22, Bowdoin's total emissions per kWh of grid electricity are down year-over-year, with the updated eGrid factor accounting for the continued decarbonization of the power grid. Emissions for Bowdoin'sactivities resulting from Scope 3 sources were also calculated using the EPA's default activity emissions factors.

In FY22, Bowdoin's emissions are up year-over-year from FY21, but down from the FY08 baseline. The significant decline from the FY08 baseline results from the reduced emissions factor used for the College's purchased electricity, with the grid in Maine becoming greener. The largest contributing factor to the year-over-year increase in emissions was an increase in energy consumption and vehicle/air mileage in FY22, with the College returning to a higher energy consumption baseline in the aftermath of the pandemic. Scope 3 emissions in particular rose substantially in FY22. FY22 total emissions equated to 12,515.2 $MTCO_2e$. ~75% of total emissions were Scope 1, ~15% of total emissions were Scope 2, and ~10% of total emissions were Scope 3.