

University of Alabama FY22 Sustainability Solutions

Presented by Morgan Smith and Kevan Will

University of the Sciences in Philadelphia
University of Toledo
University of Vermont
University of Washington
University of West Florida
University of Wisconsin - Madison
Vanderbilt University
Virginia Commonwealth University
Wake Forest University
Washburn University
Washington State University
Washington State University - Tri-Cities Campus
Washington State University - Vancouver
Washington University in St. Louis
Wayne State University
Wellesley College
Wesleyan University
West Chester University
West Virginia Health Science Center
West Virginia University
Western Oregon University
Westfield State University
Widener University
Williams College
Worcester Polytechnic Institute
Worcester State University



Gordian Partners With SIMAP

At the end of 2017, Gordian entered into a partnership with the Sustainability Institute at the University of New Hampshire, ensuring our Sustainability Solutions are always based on the most up-to-date science and methods.

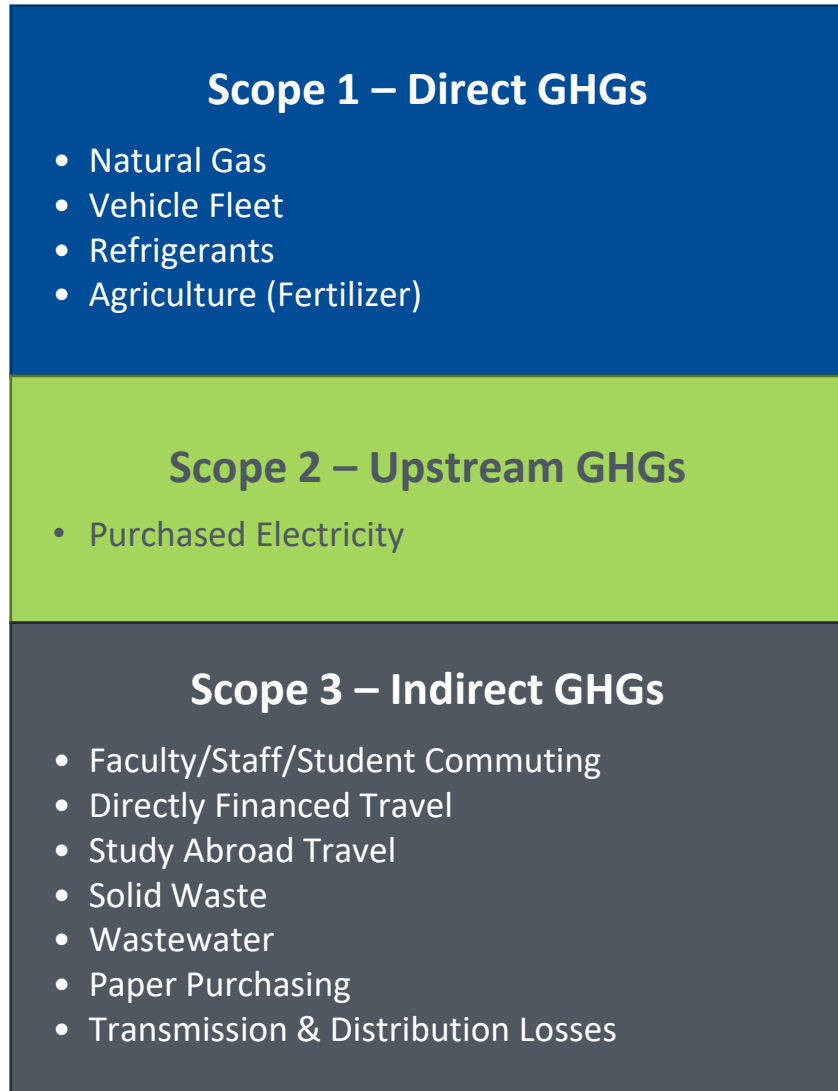
They host *Sustainability Indicator Management & Analysis Platform (SIMAP)*. This is a carbon and nitrogen-accounting platform that tracks and analyzes campus-wide sustainability based on nearly two decades of work supporting campus inventories.



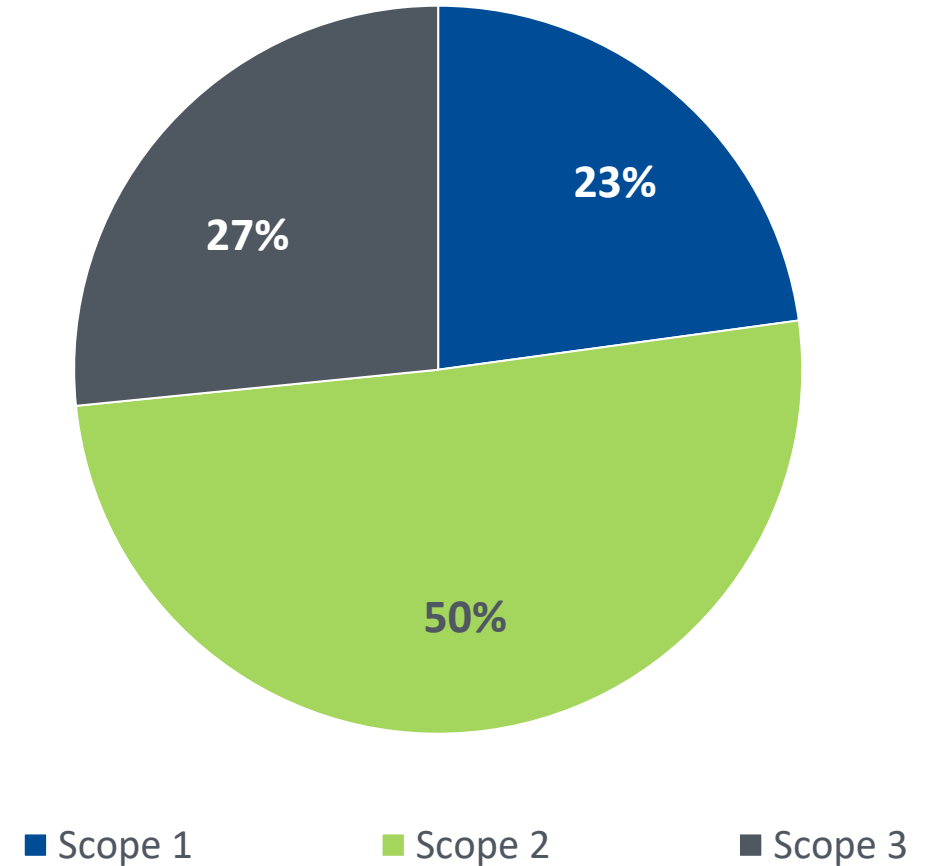
**University of
New Hampshire**



Distribution of Emissions by Level of Control



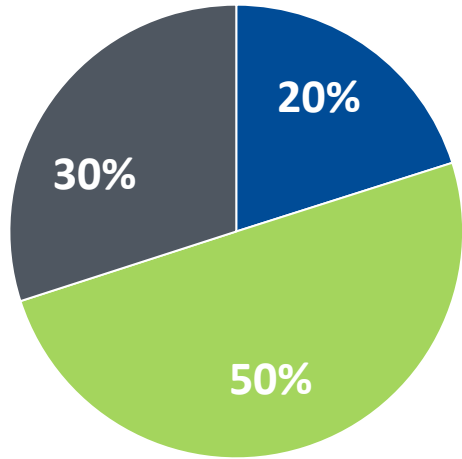
FY22 Emissions by Scope



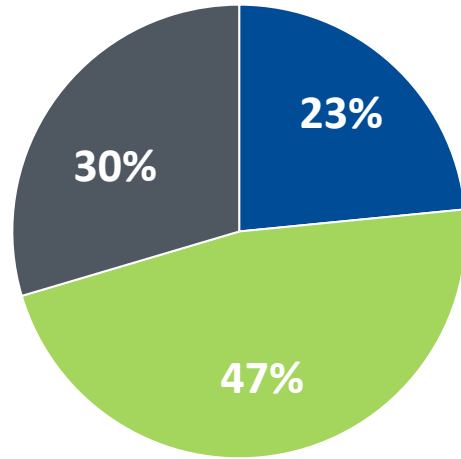
Consistent Distribution of Emissions Over Time

Emissions breakout changed slightly as COVID interrupted normal operations

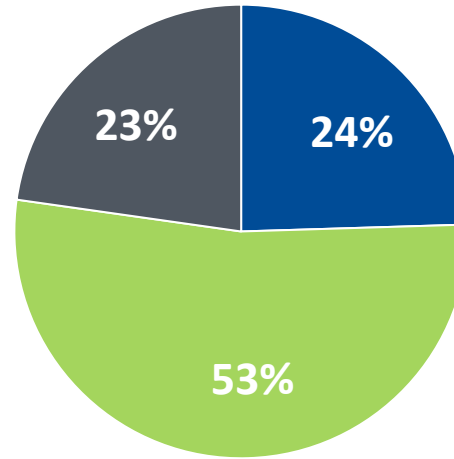
FY19 Emissions by Scope



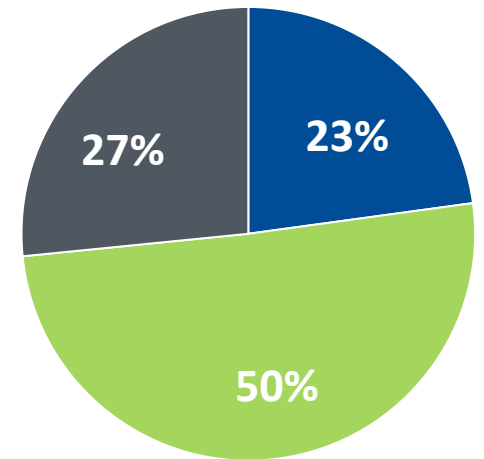
FY20 Emissions by Scope



FY21 Emissions by Scope



FY22 Emissions by Scope

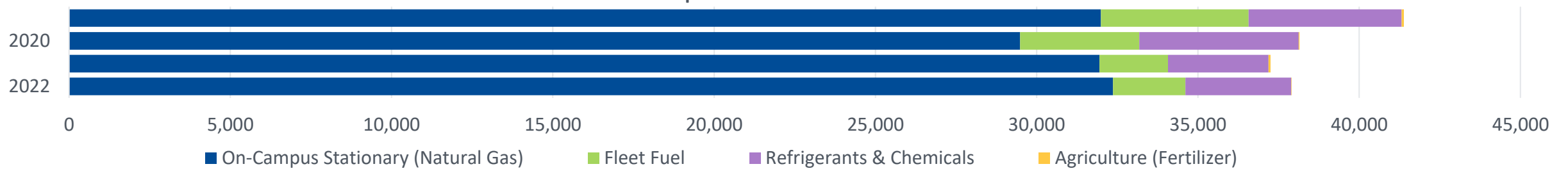


■ Scope 1 ■ Scope 2 ■ Scope 3 ■ Scope 1 ■ Scope 2 ■ Scope 3 ■ Scope 1 ■ Scope 2 ■ Scope 3 ■ Scope 1 ■ Scope 2 ■ Scope 3

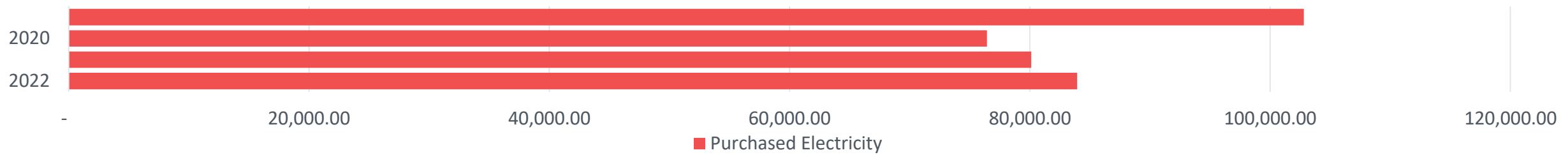
Segmenting Emissions by Scope

Energy use is the most impactful contributor to emissions profile

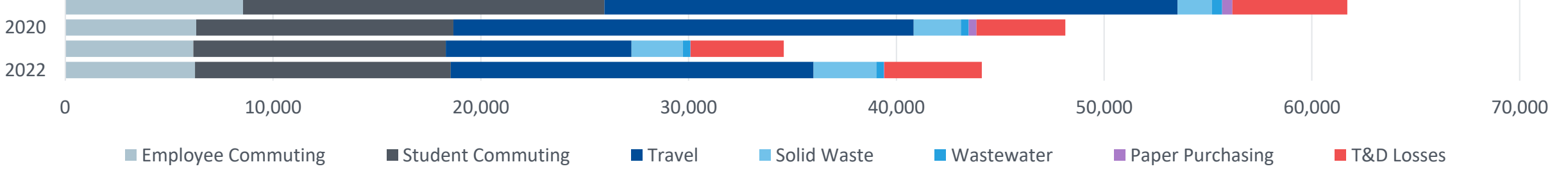
Scope 1 Sources



Scope 2 Sources



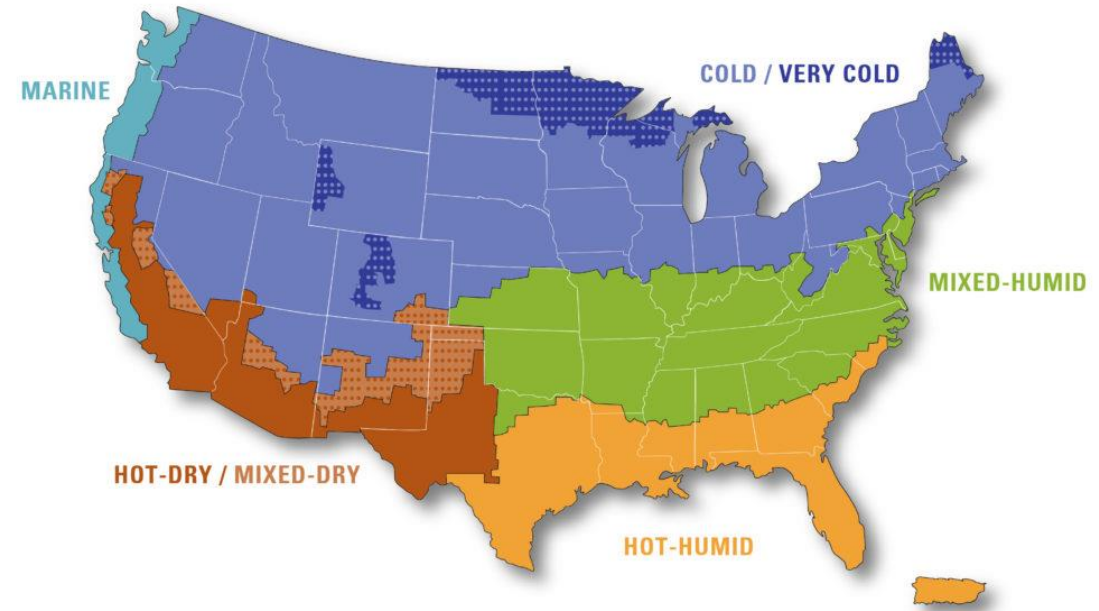
Scope 3 Sources



*Sources measured in MTCDE

Comparative Peers

Peer Institutions	Location
Arizona State University	Tempe, AZ
Clemson University	Clemson, SC
Florida State University	Tallahassee, FL
Texas A&M University	College Station, TX
Towson University	Towson, MD
University of Arkansas	Fayetteville, AR
University of Tennessee	Knoxville, TN
University of Texas – Rio Grande Valley	Edinburg, TX
Virginia Commonwealth University	Richmond, VA



Sustainability Solutions Measurement and Analysis Members

- Sightlines has over 50 Sustainability Solutions Members
- Approximately two-thirds are private
- Approximately two-thirds have signed the ACUPCC
- Approximately forty percent are Charter Signatories

Benchmarking GHG Emissions

Two ways to normalize: by Campus User & by GSF



GHG Emissions per 1,000 EUI Adjusted GSF

$$\frac{\text{Gross GHG Emissions}}{\text{Total EUI Adjusted GSF}} \times 1,000$$

Stresses efficient use of space.

*EUI Adjusted GSF weighs Science Research and Medical Space more heavily

GHG Emissions per Weighted User

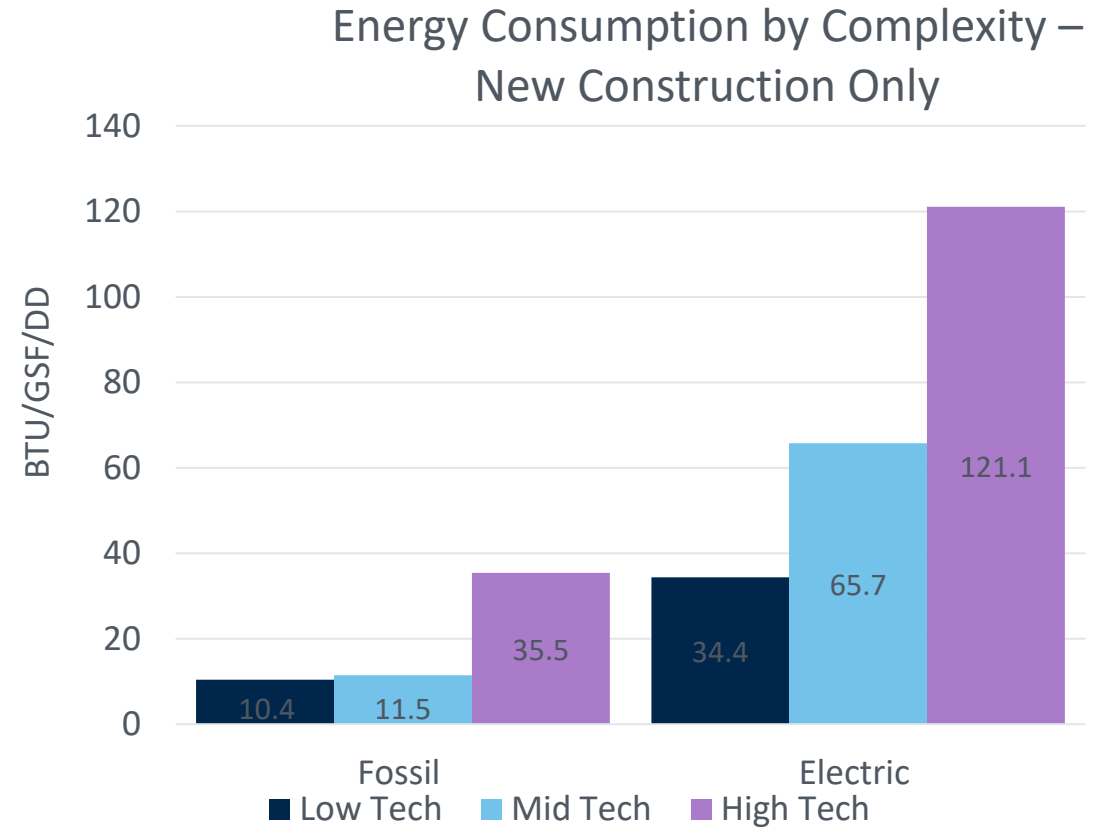
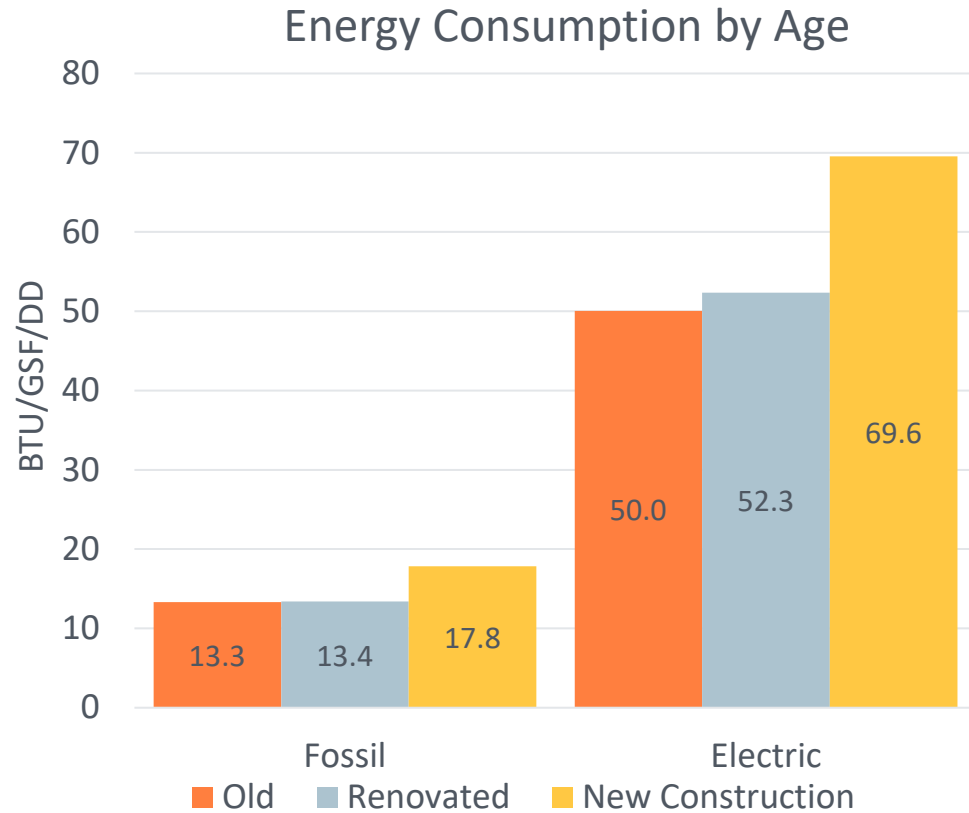
$$\frac{\text{Gross GHG Emissions}}{\text{Weighted User}}$$

Stresses intensity of operations and commuting.

*Weighted User weighs full-time residential students more heavily

Campus Space Profile Impacts Sustainability Effort

Age and technical complexity of buildings on campus impact energy consumption and efficiency



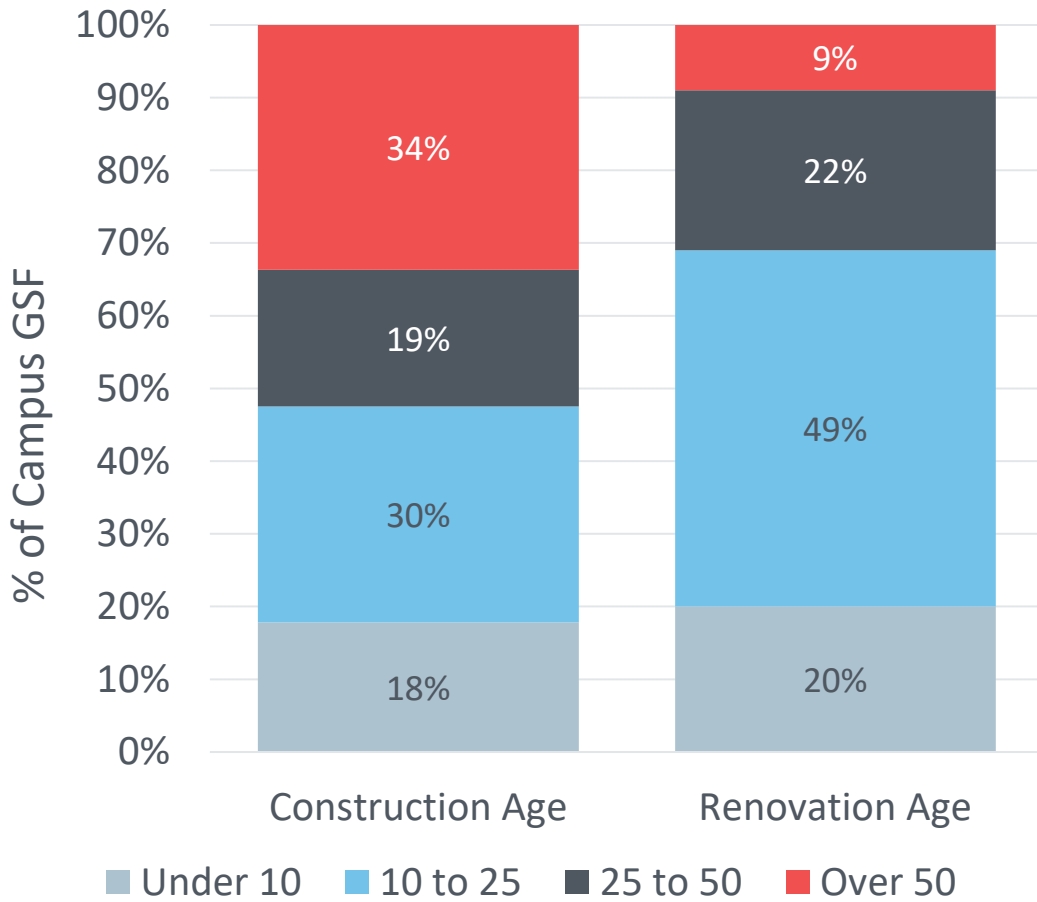
New construction systems can be more efficient, but high tech complexity increases energy consumption

Technically complex (high tech) systems tend to consume more energy

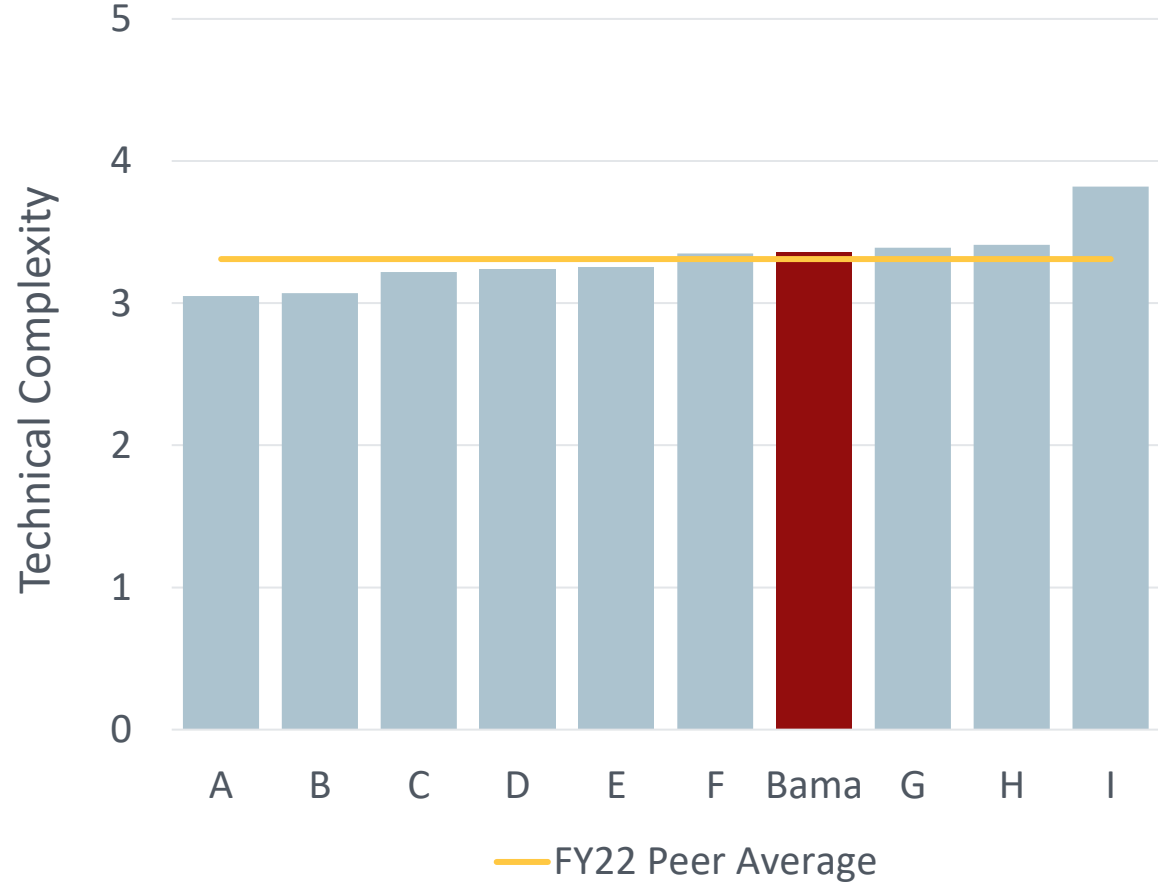
Age Profile Impacts Energy Consumption

Reducing campus age through new construction creates potential for higher consumption

Campus Age by Category



Campus Technical Complexity

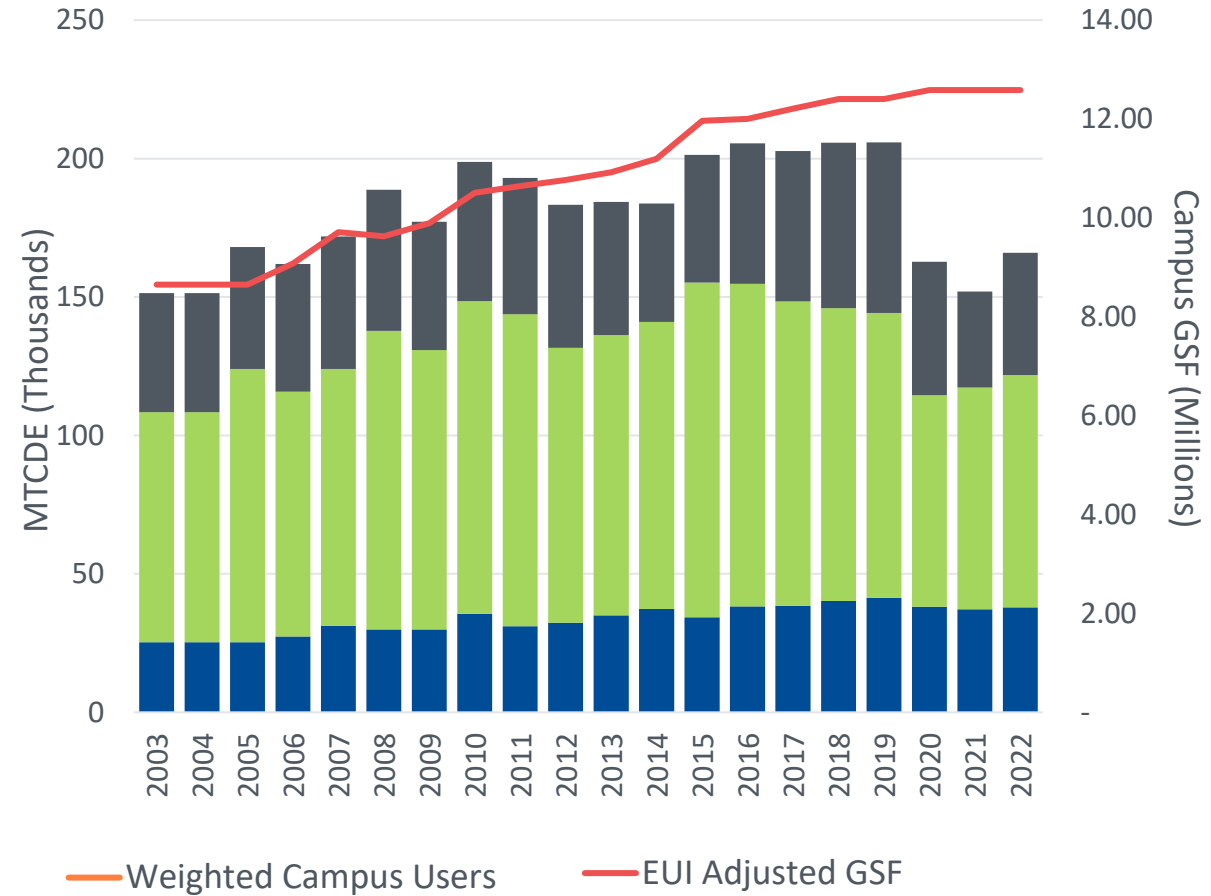
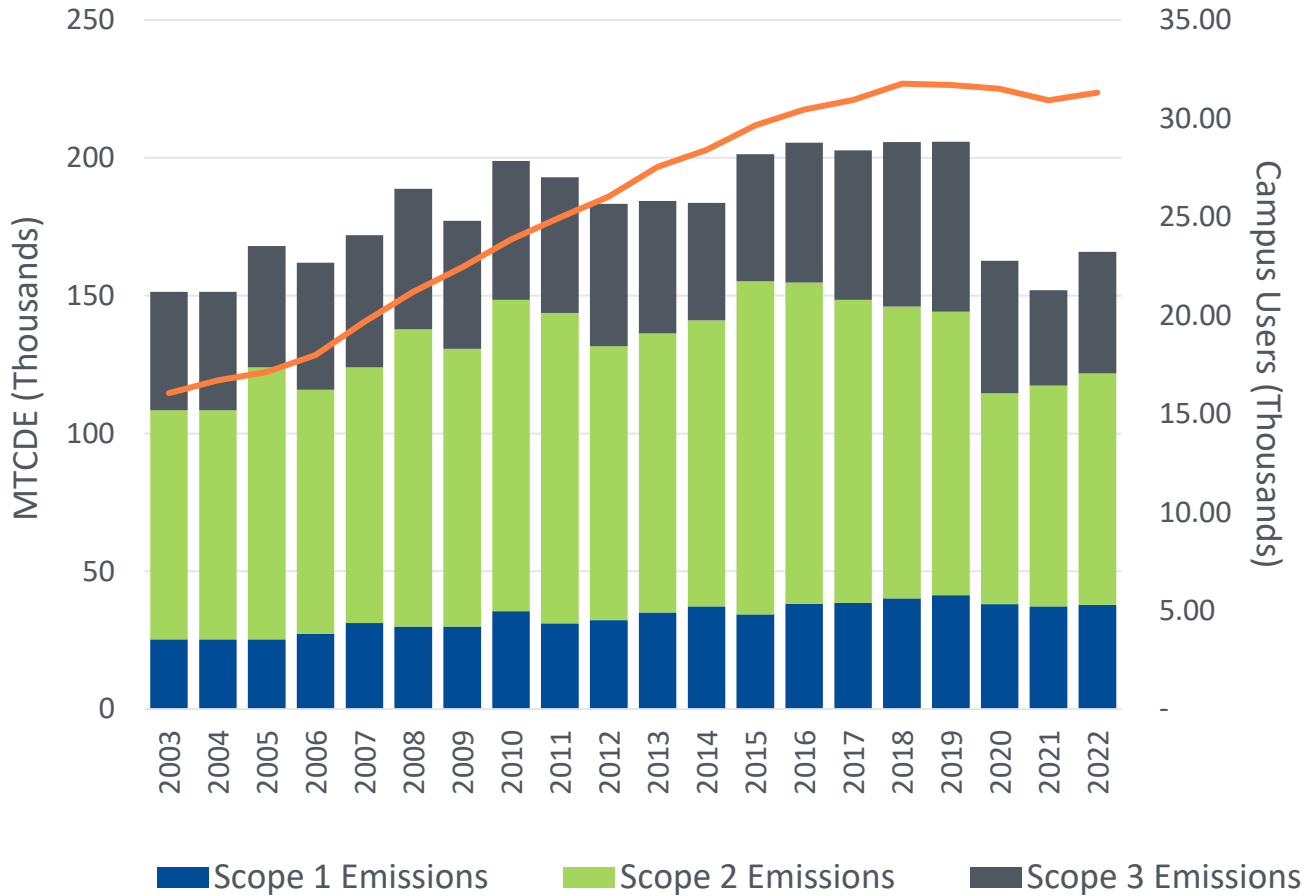


Longitudinal Tracking of Emissions by Scope

Because emissions are based on campus behavior, seeing emissions increase as space and users increase is not surprising

Emissions by Scope Compared to Campus User Growth

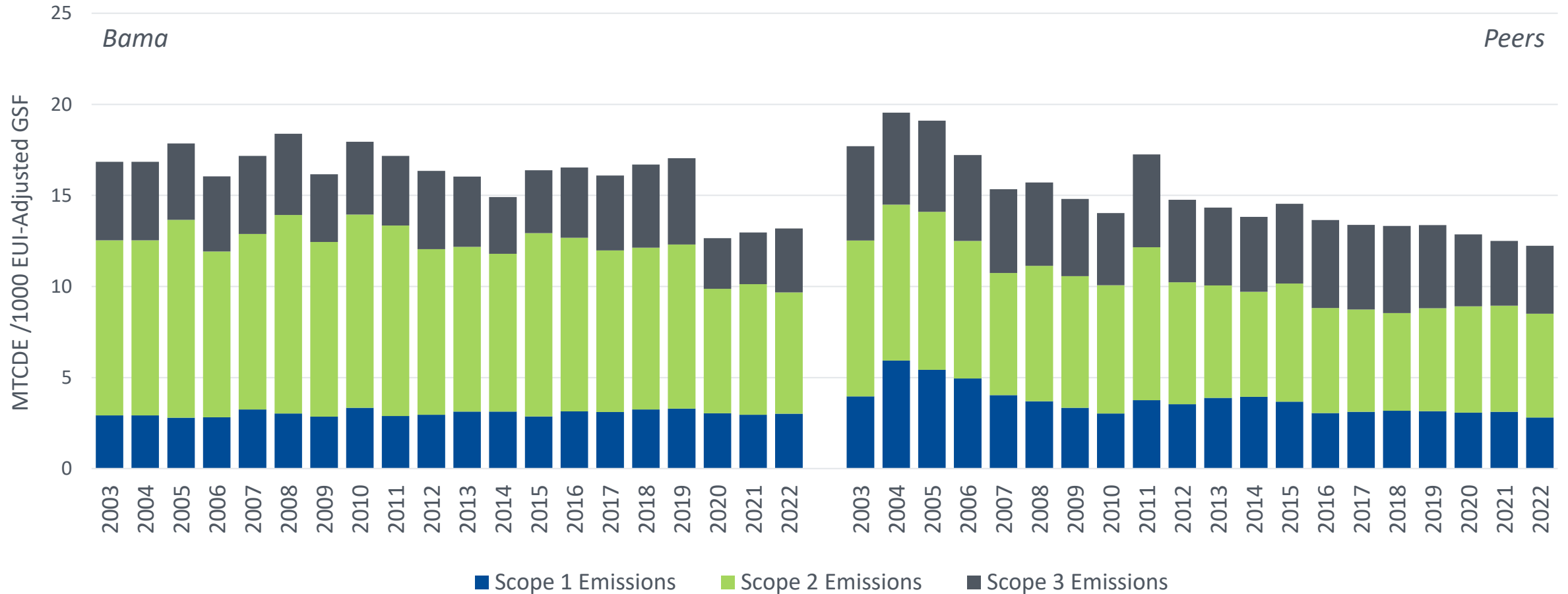
Emissions by Scope Compared to Space Growth



Longitudinal Look Vs Peers

COVID impacted emissions at peer institutions as well as across the Gordian database

Emissions Trending by Scope vs Peers

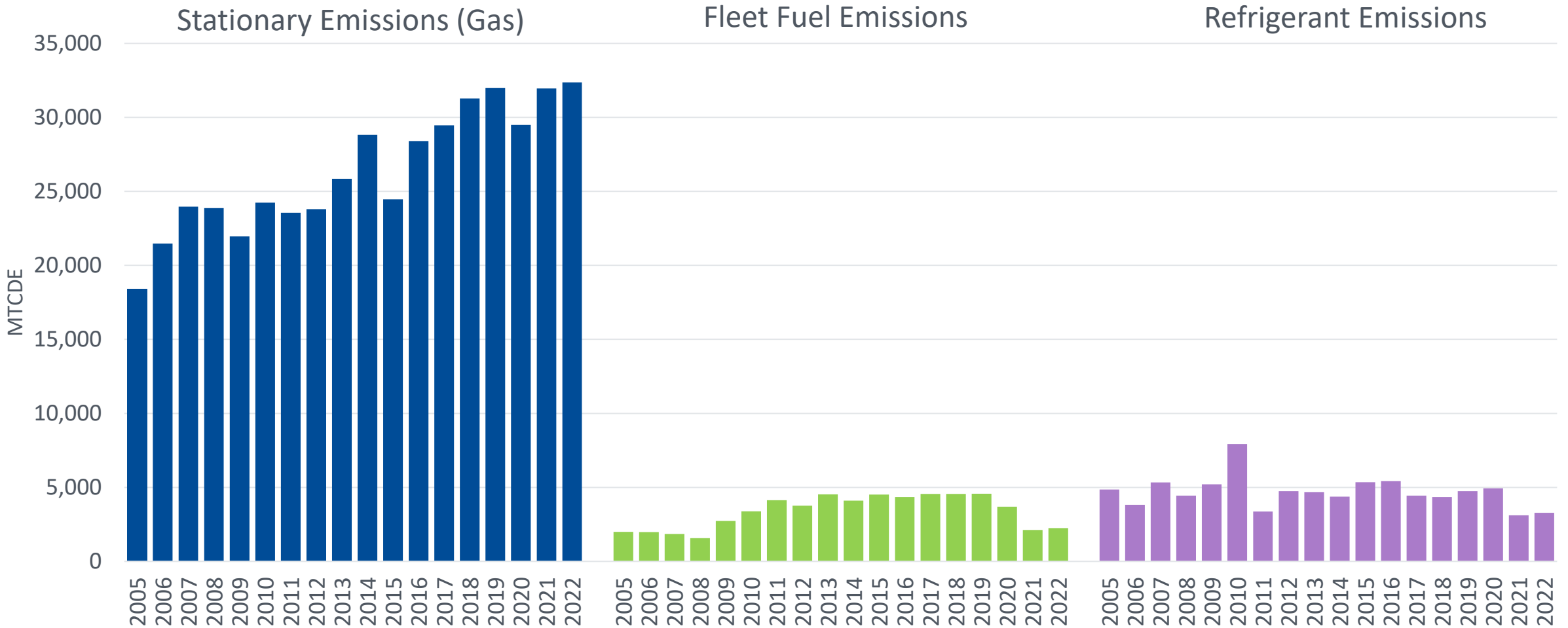


Scope 1 Emissions: Natural Gas



Scope 1 Emissions By Source

Majority of Scope 1 emissions from Natural Gas consumption

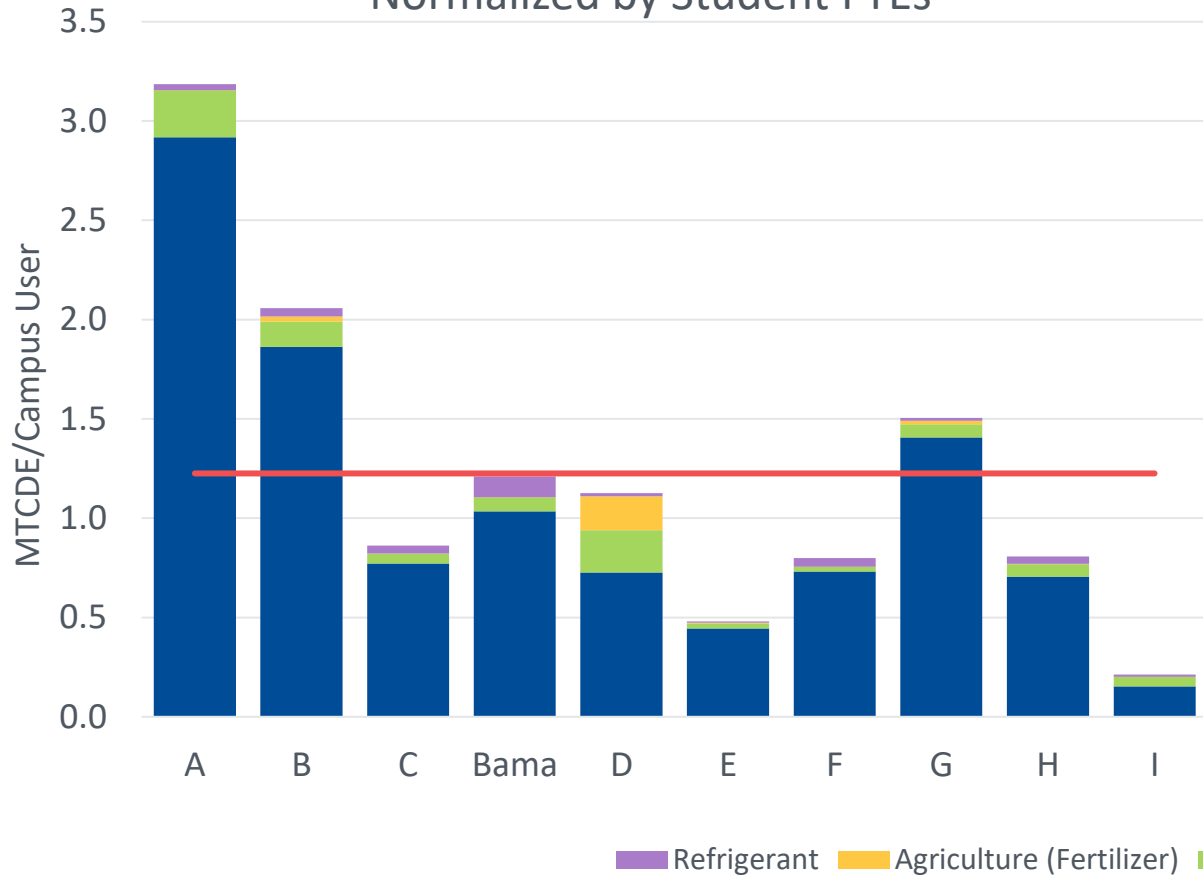


**fertilizer left out: insignificant factor for emissions*

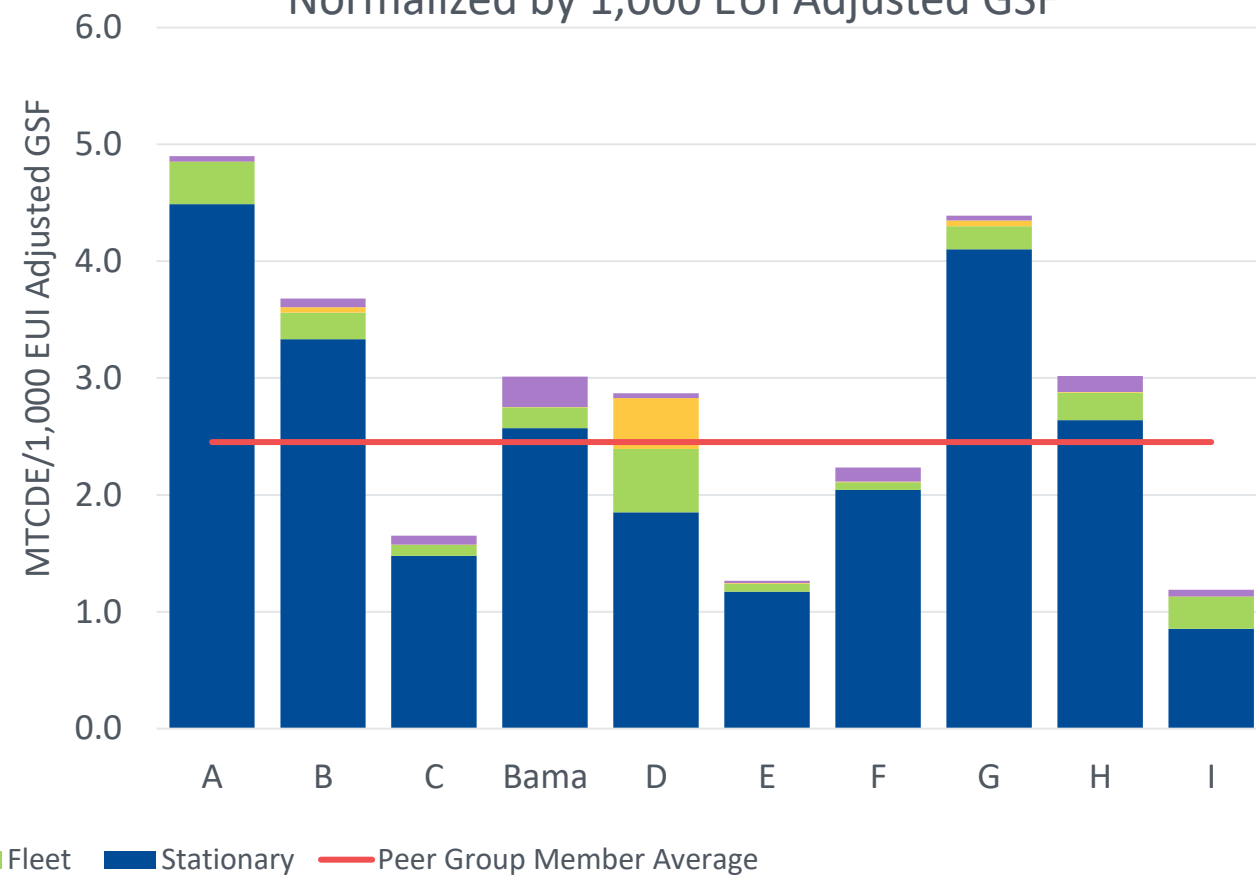
Scope 1 Emissions by Source, Normalized

Alabama operating at and above peer average

Alabama's Scope 1 Emissions Vs. Peers
Normalized by Student FTEs

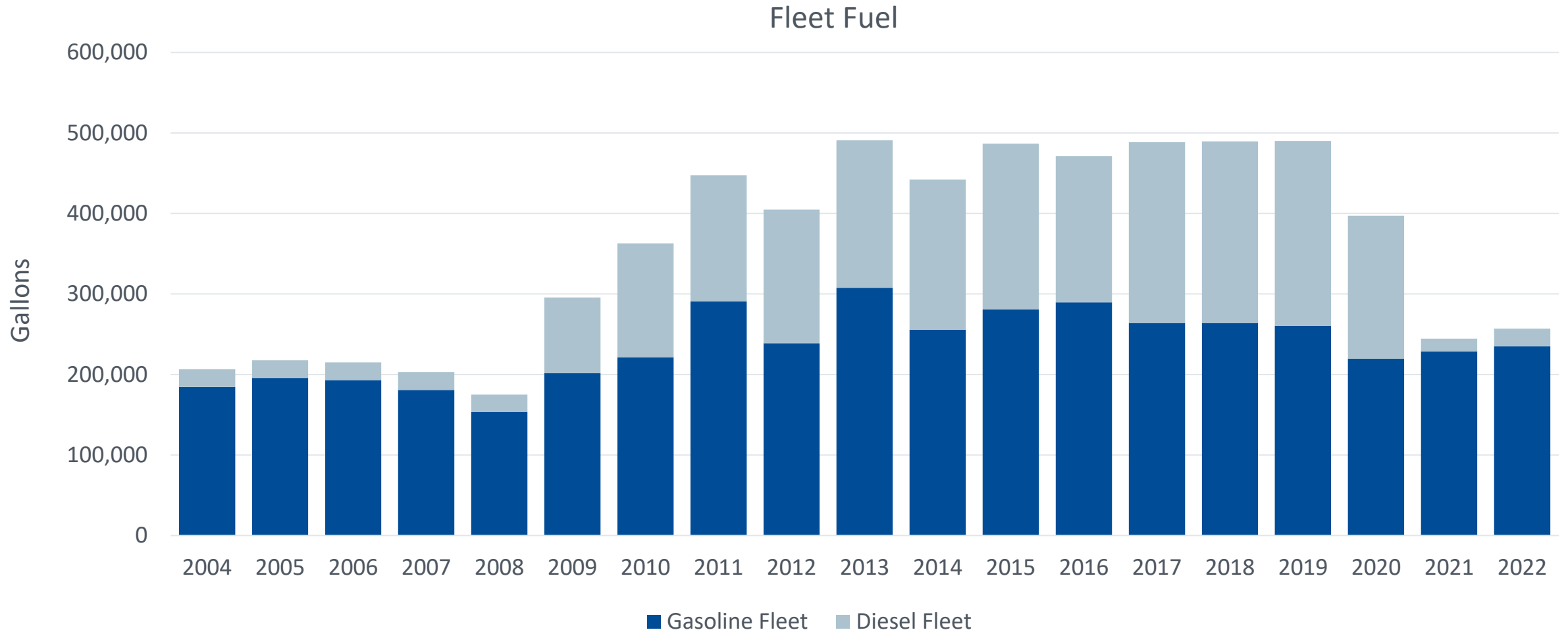


Alabama's Scope 1 Emissions Vs. Peers
Normalized by 1,000 EUI Adjusted GSF



Fleet Fuel – Additional Scope 1 Sources

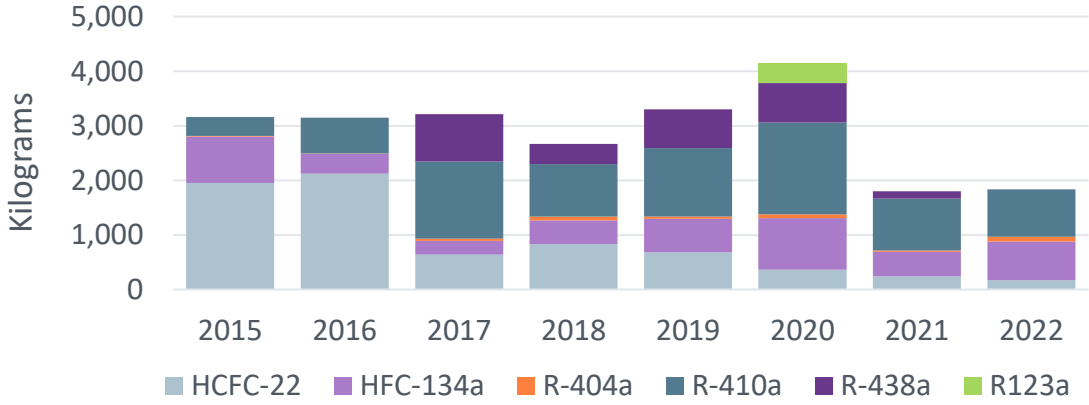
Diesel usage increased 41% in FY22



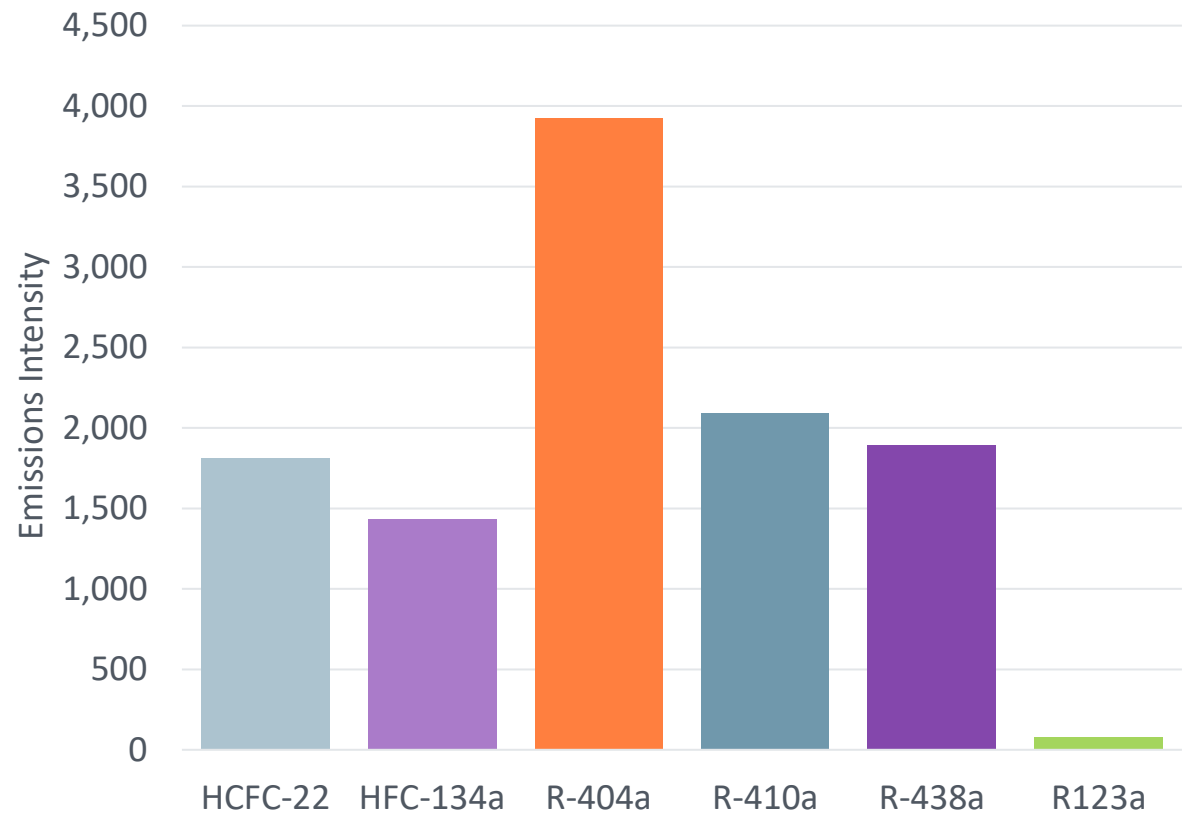
Refrigerant & Their Emissions Factors

Refrigerant R123a has the lowest GWP of all used refrigerants

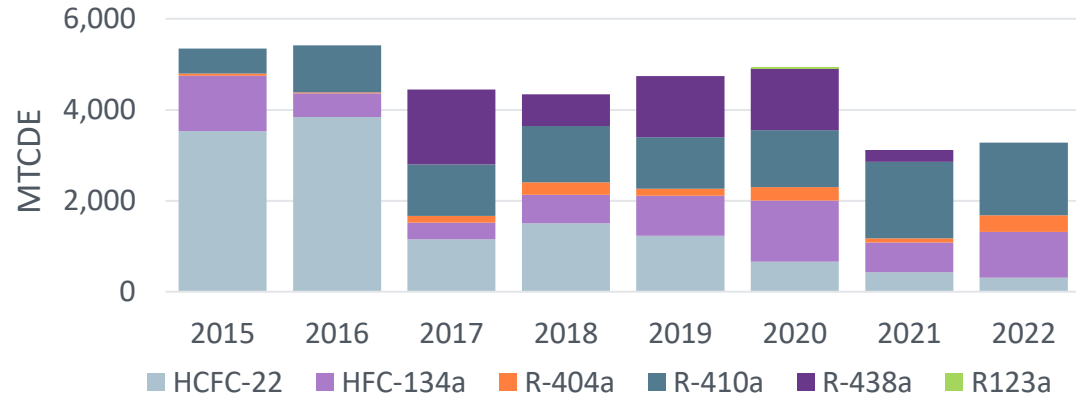
Refrigerants & Chemicals (Purchased)



Emissions Intensity of Each Refrigerant Type



Refrigerants & Chemicals (Emissions)



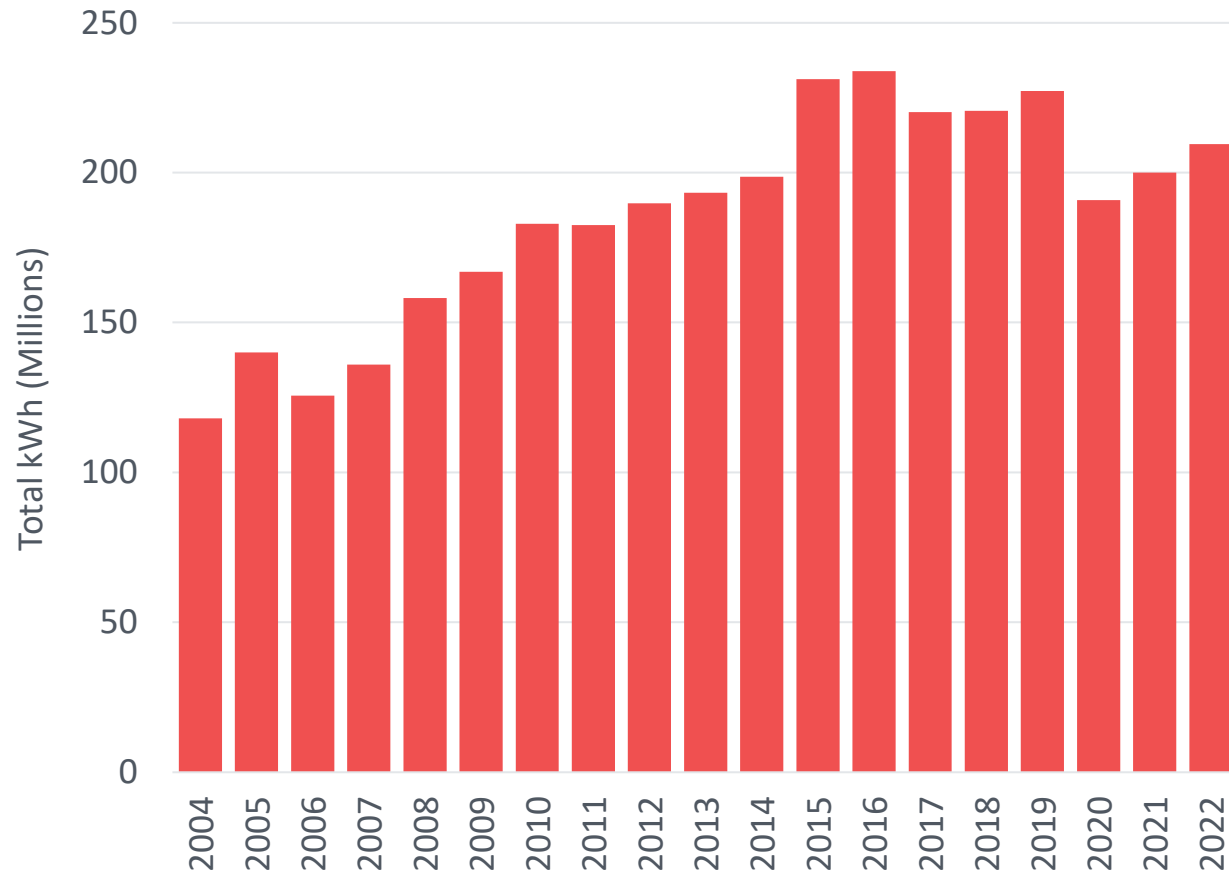
Scope 2 Emissions: Purchased Electricity



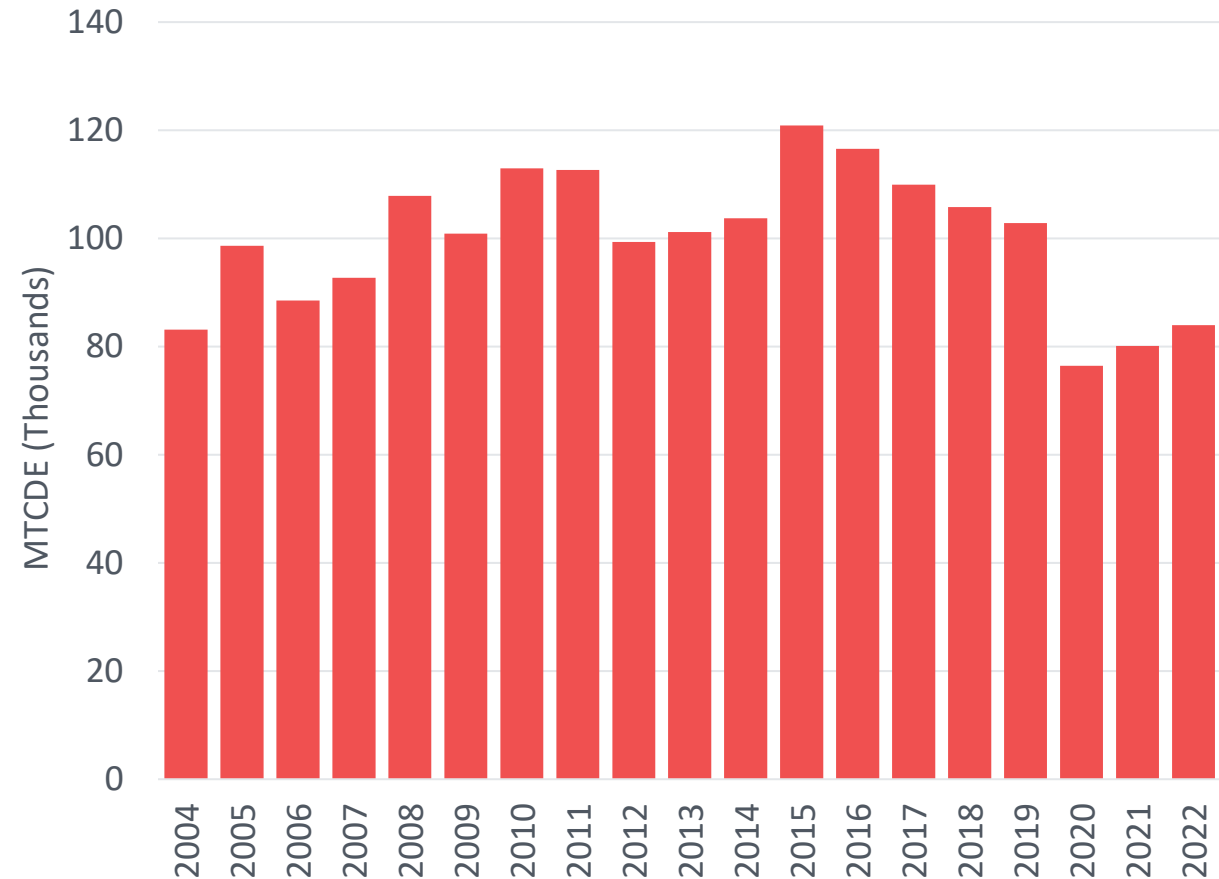
Scope 2: Bama Electricity Consumption vs Emissions

Electricity consumption saw an increase in FY22 from FY21

Historical Energy Consumption



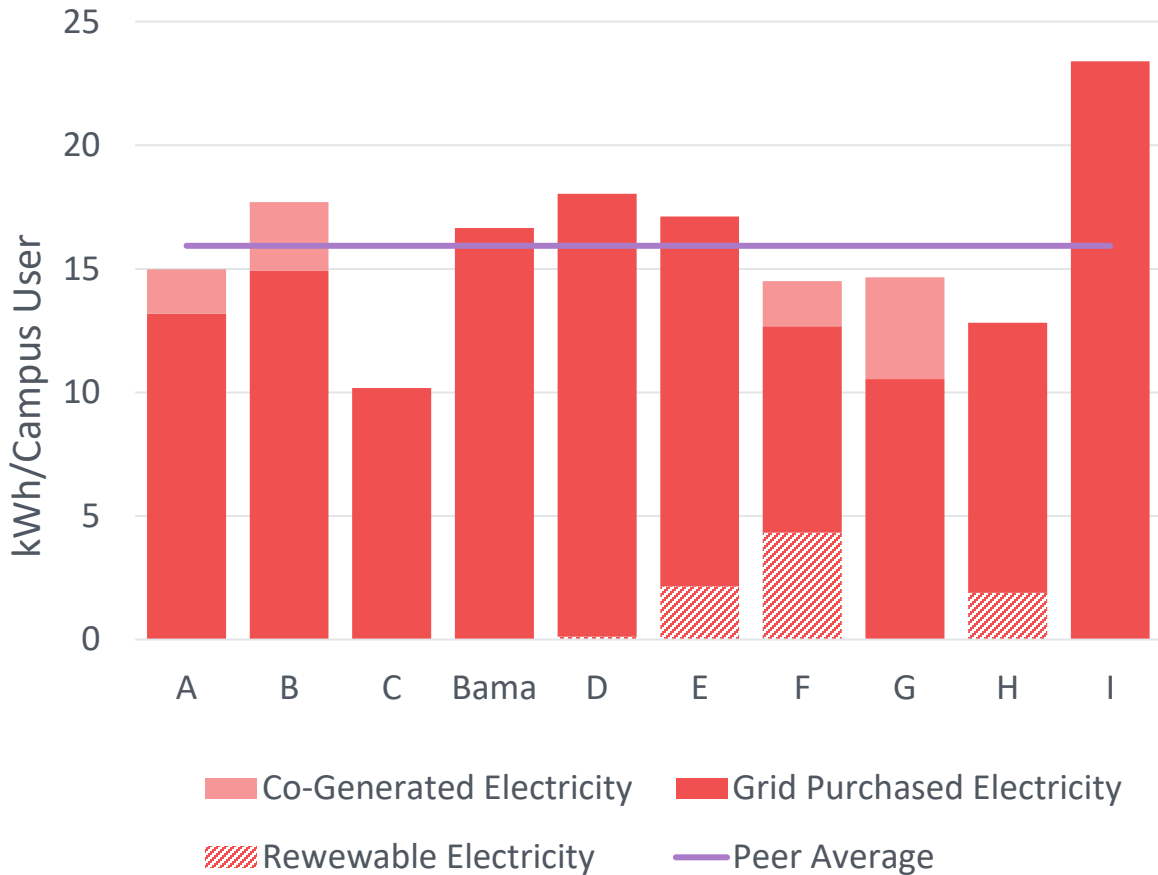
Historical Energy Emissions



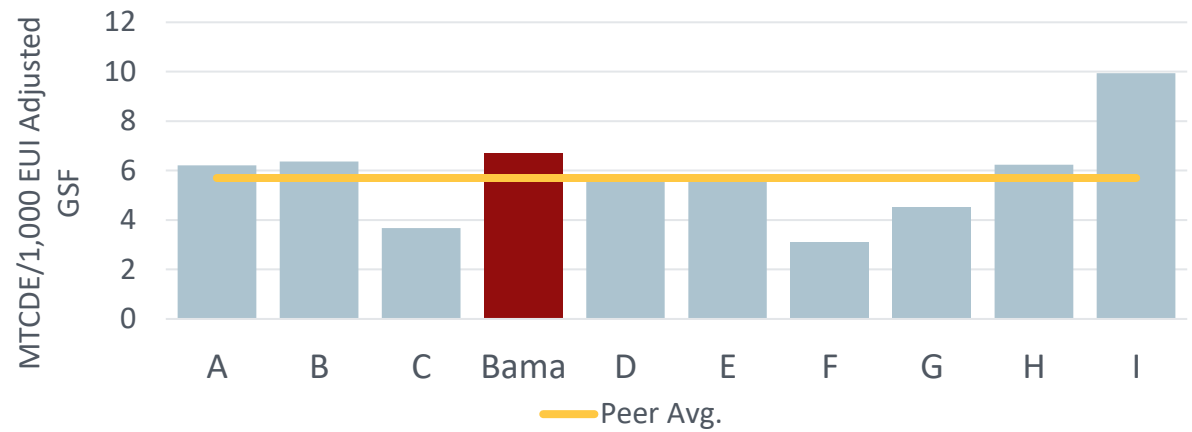
Comparing Emissions from Electricity

Type of electricity consumed impacts emissions

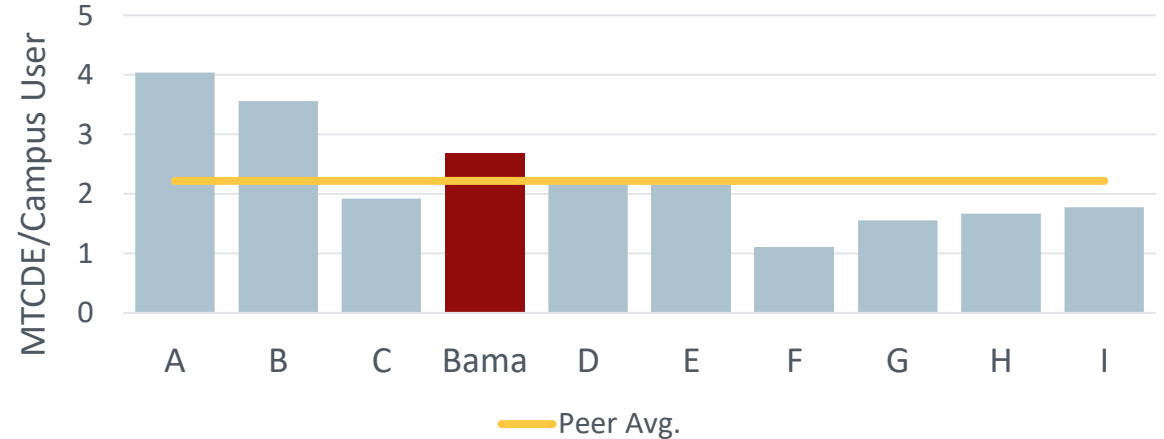
Purchased Electricity Consumption



Purchased Electricity Emissions (per GSF)



Purchased Electricity Emissions (per User)



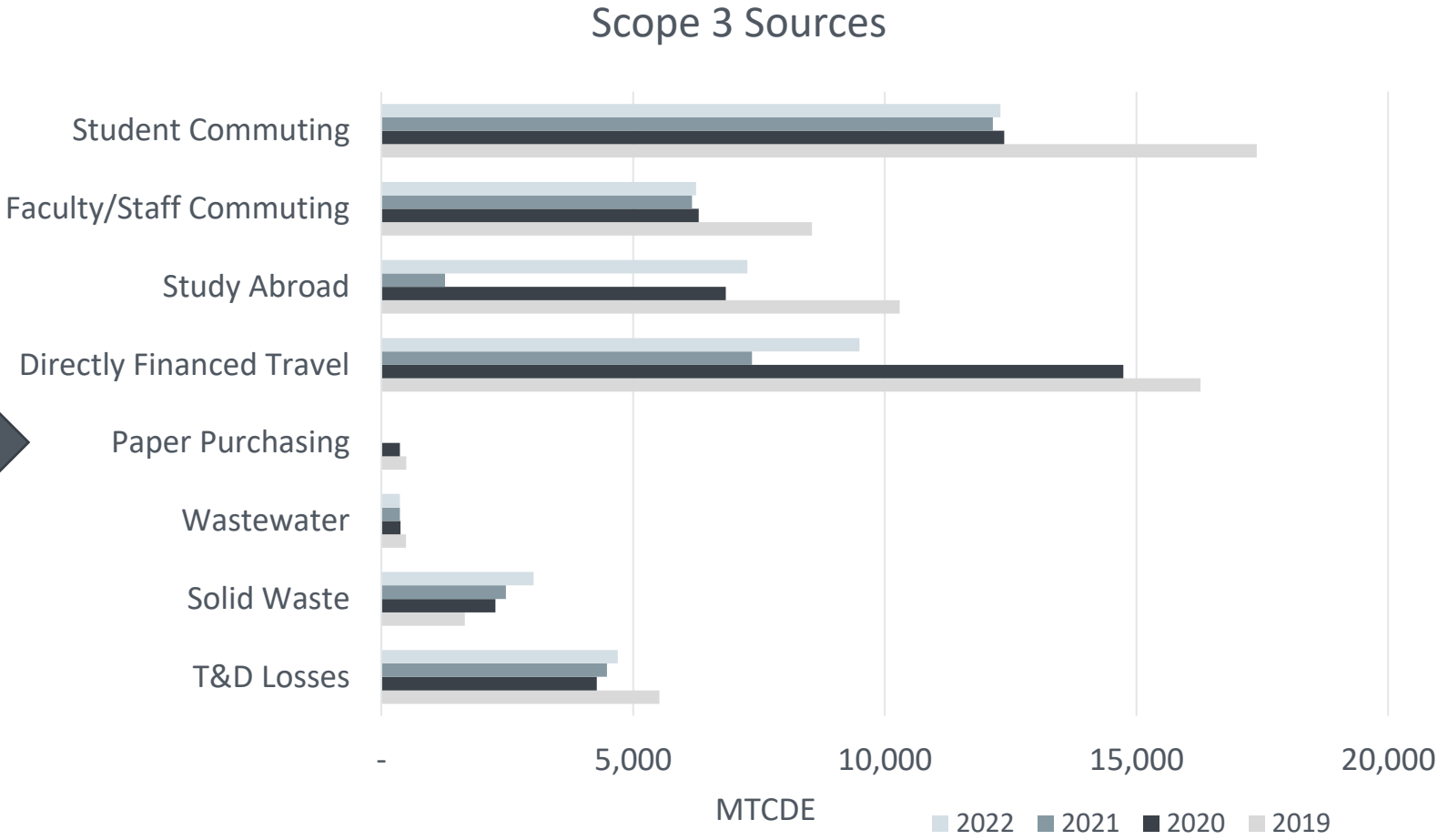
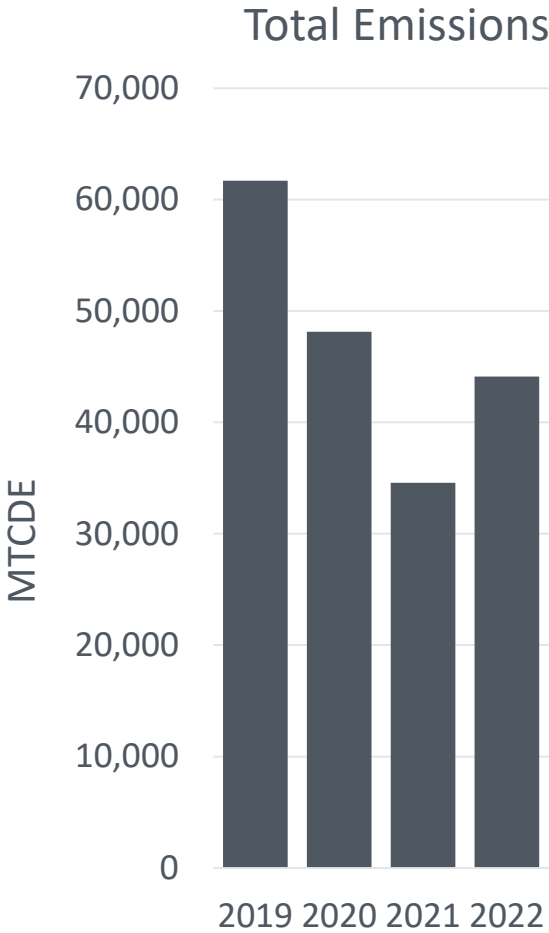
* Co-Generated Electricity and Renewable Energy do not contribute to emissions

Scope 3 Emissions



Scope 3 Distribution by Source

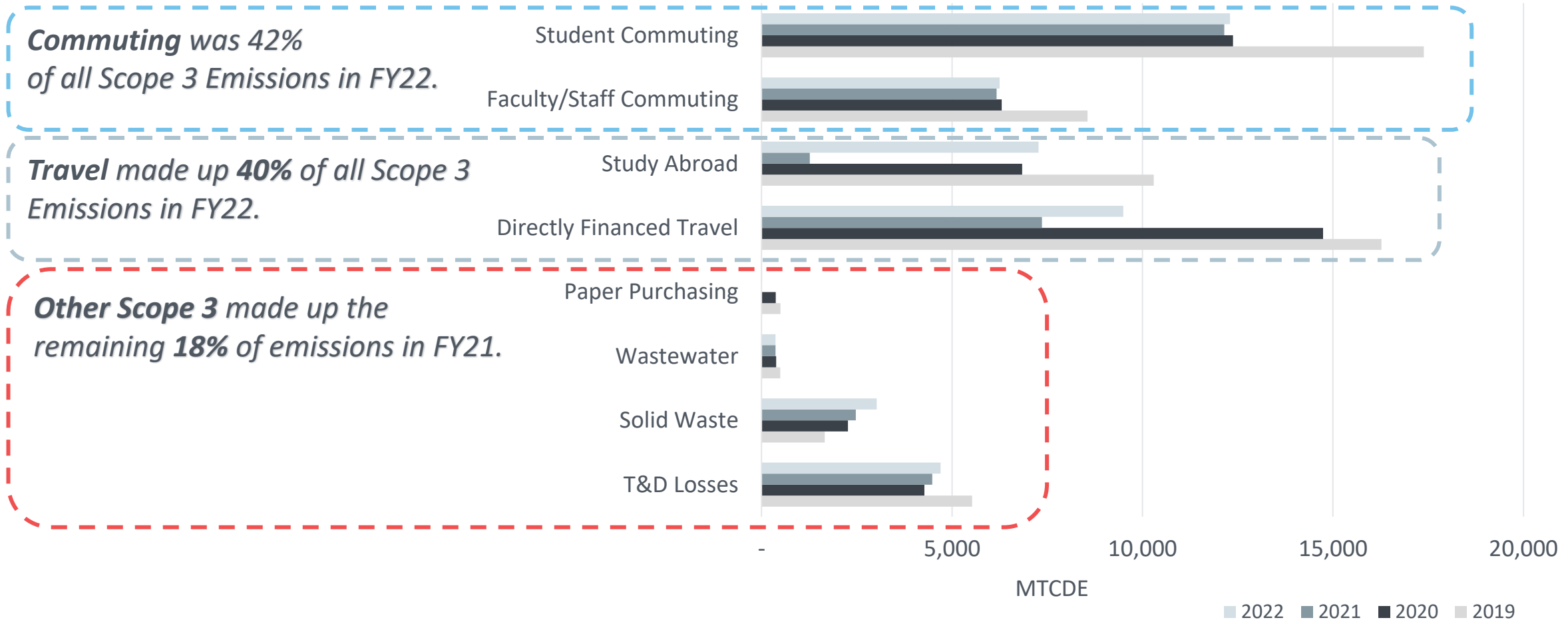
Study Abroad saw biggest increase in FY22



Scope 3 Emissions Increasing Over Time

Travel and Commuting Emissions are the largest contributors to Scope 3

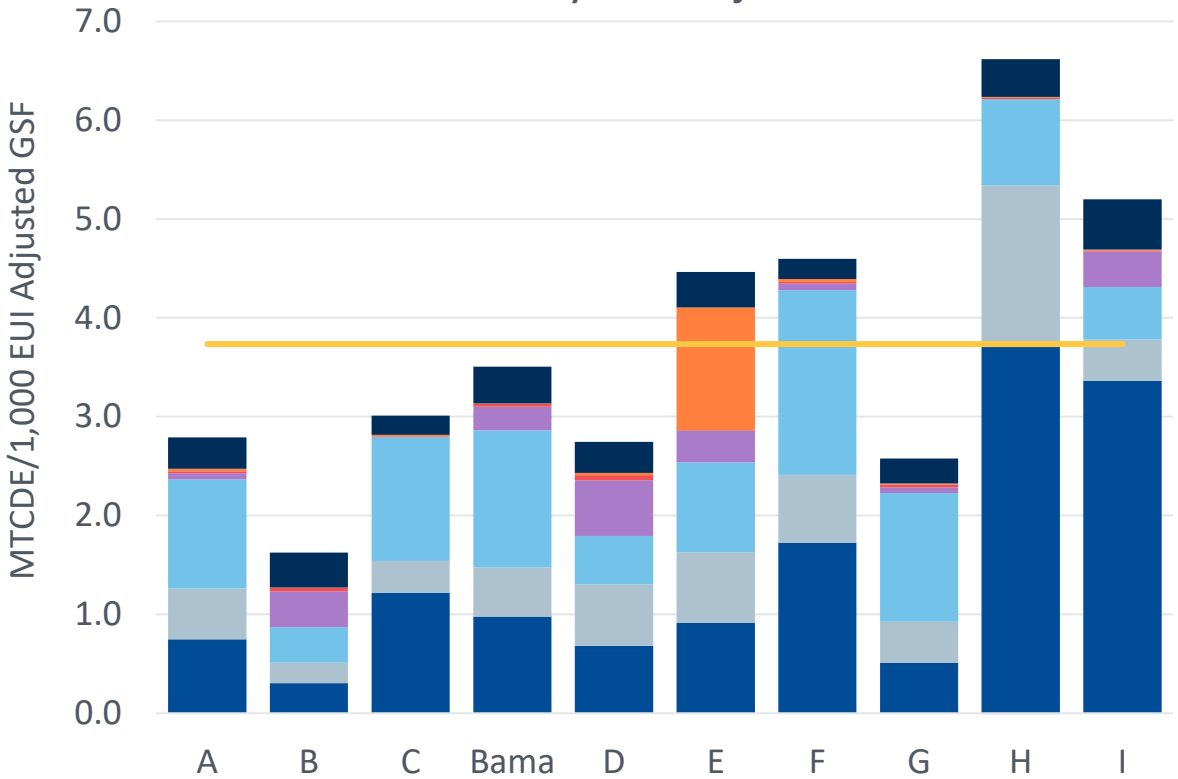
Scope 3 Sources



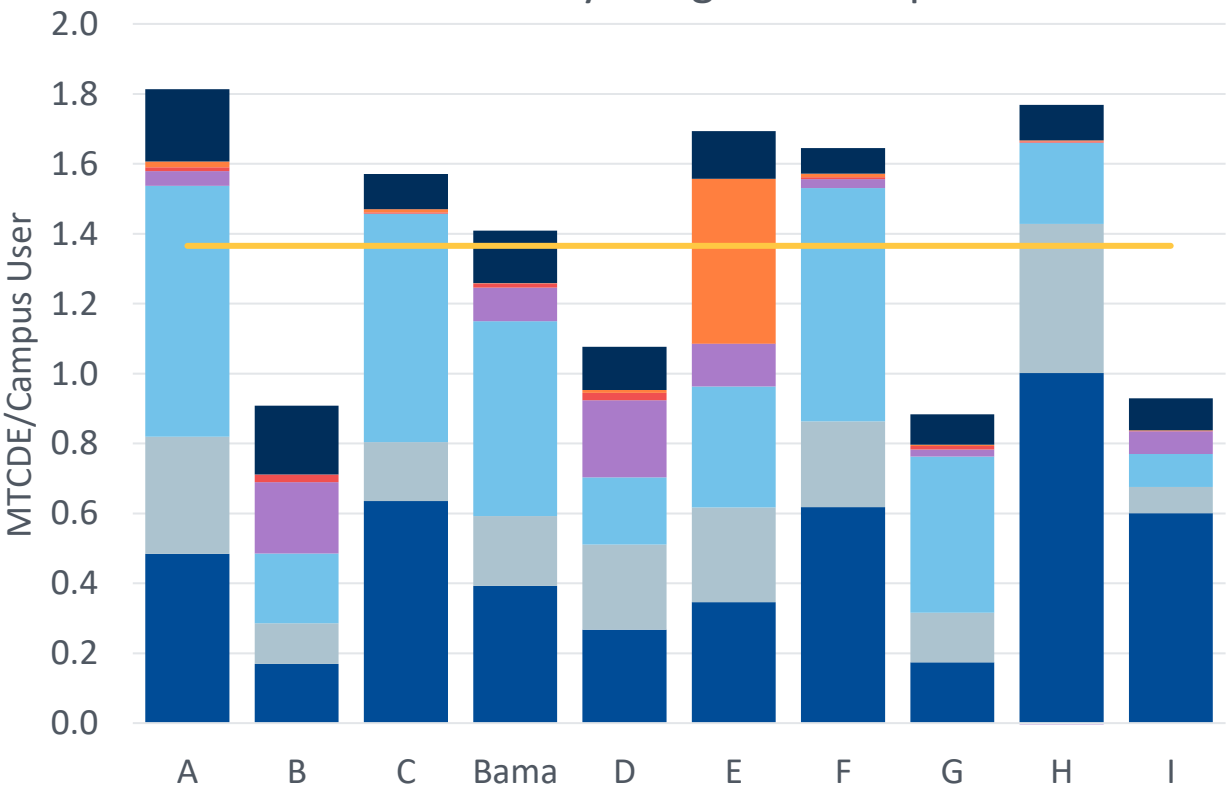
Scope 3 – Emissions by Source

Scope 3 at Alabama driven by other travel emissions

Scope 3 Emissions Vs. Peers
Normalized by EUI Adjusted GSF



Scope 3 Emissions Vs. Peers
Normalized by Weighted Campus User



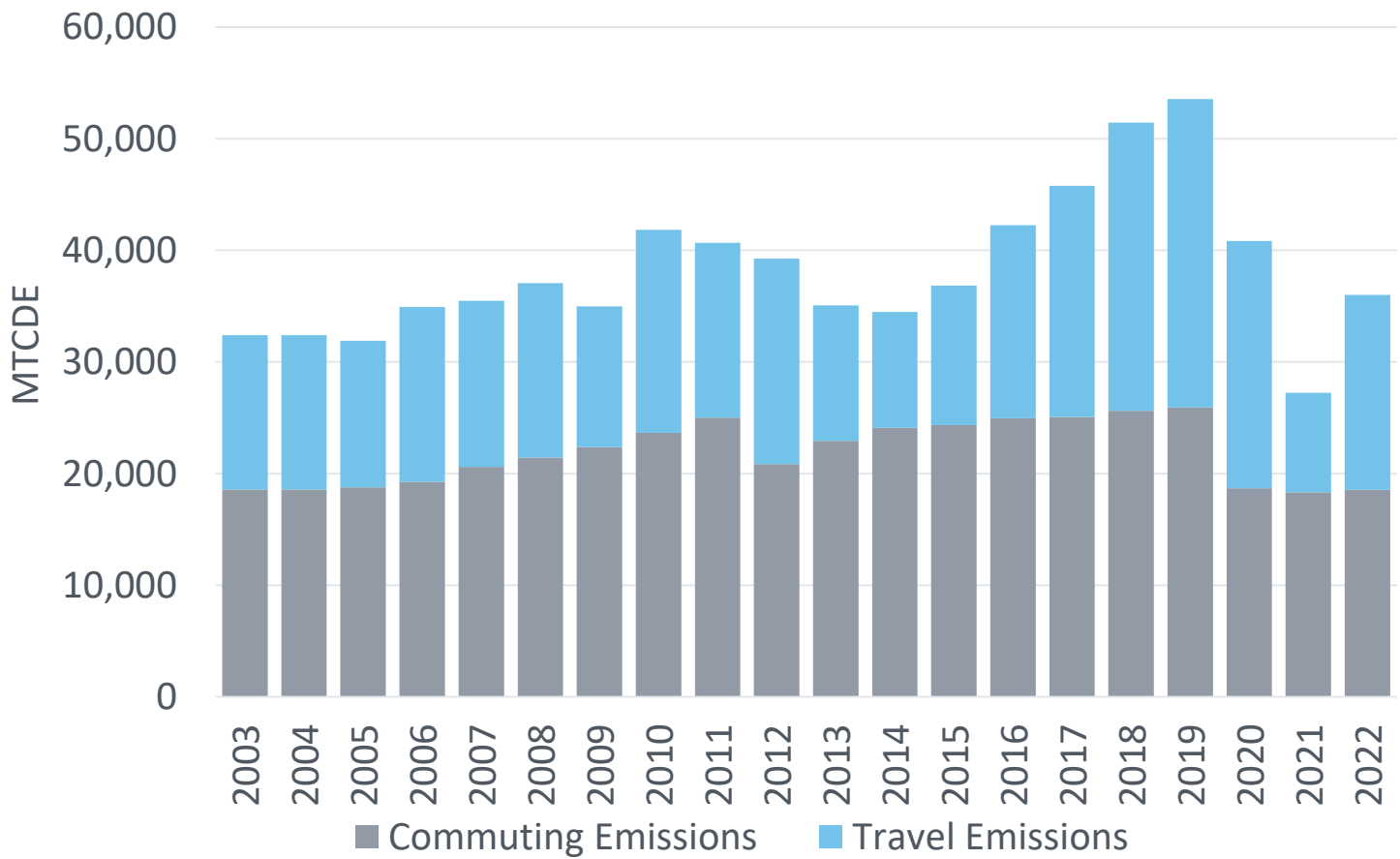
■ T&D Losses
 ■ Paper Emissions
 ■ Wastewater Emissions
 ■ Waste Emissions
 ■ Other Travel Emissions
 ■ Employee Commuting
 ■ Student Commuting
 — Peer Average



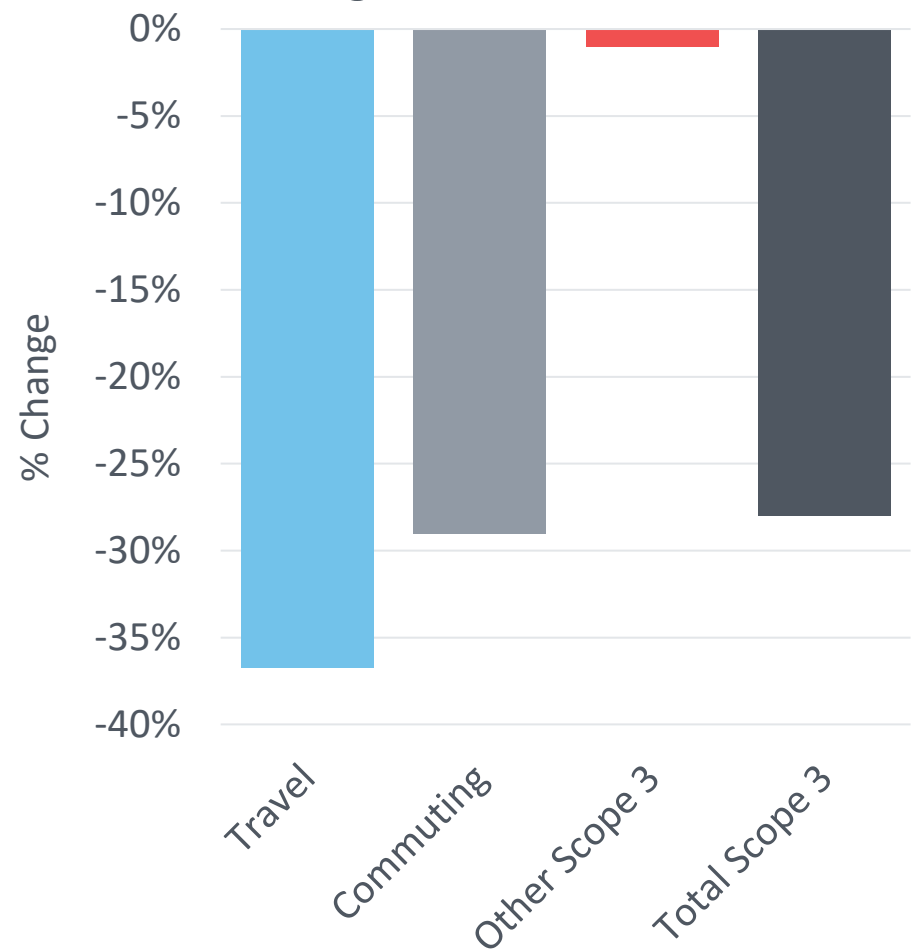
Scope 3 Emissions Increasing Over Time

Total travel emissions dropped by 33% in FY22, compared to FY19

Commuting and Travel Emissions Trending



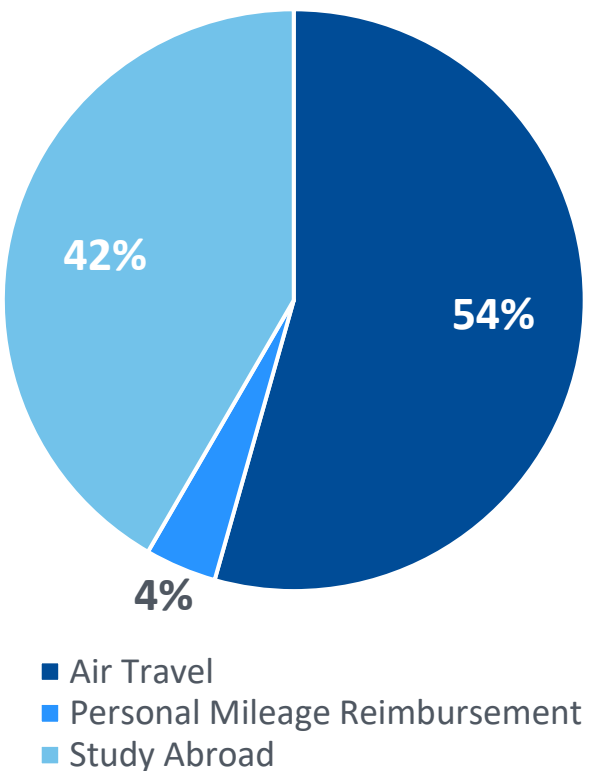
% Change in Emissions Since 2019



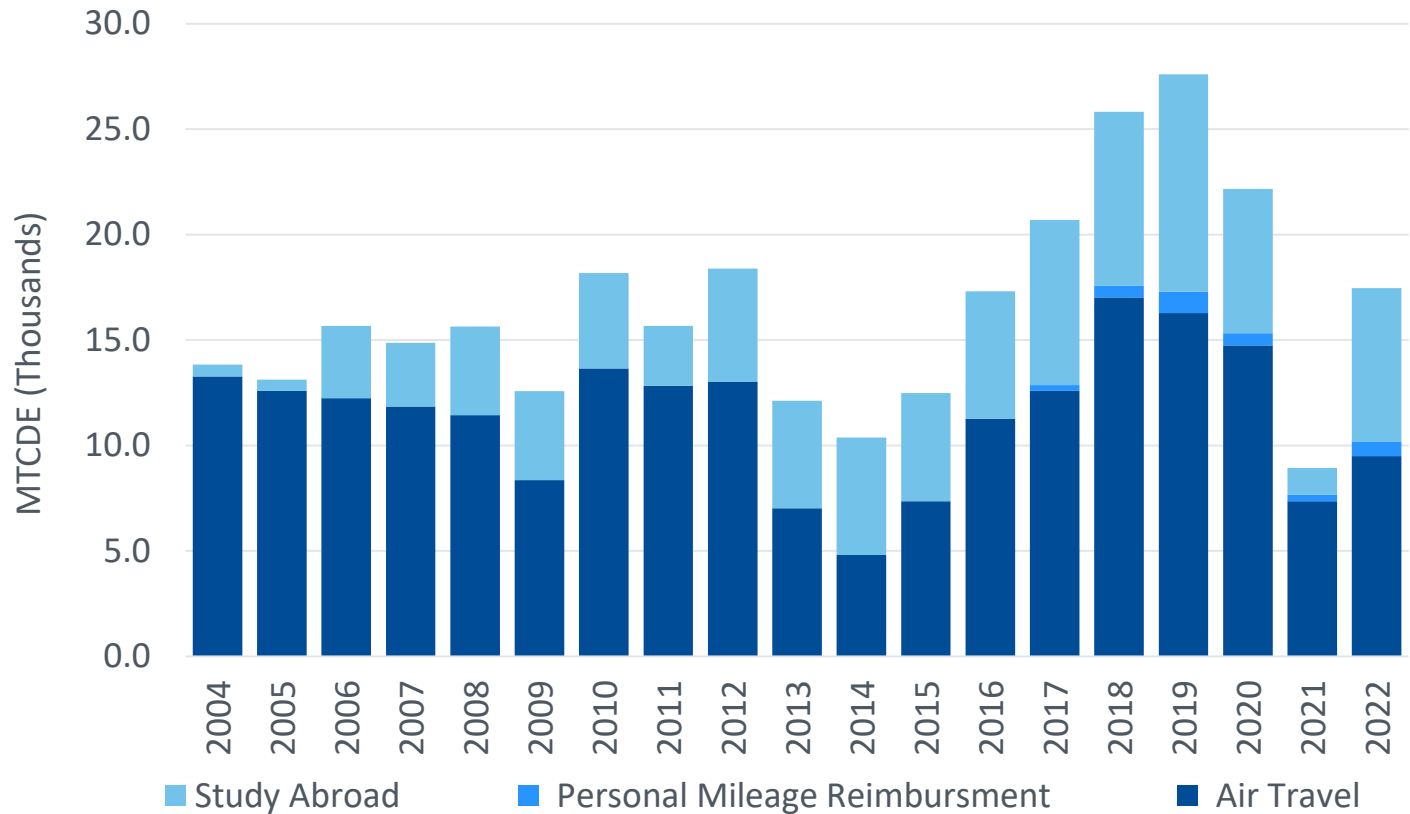
Emissions Increasing Over Time

Travel emissions on the rise once again in FY22

FY22 Travel Emissions

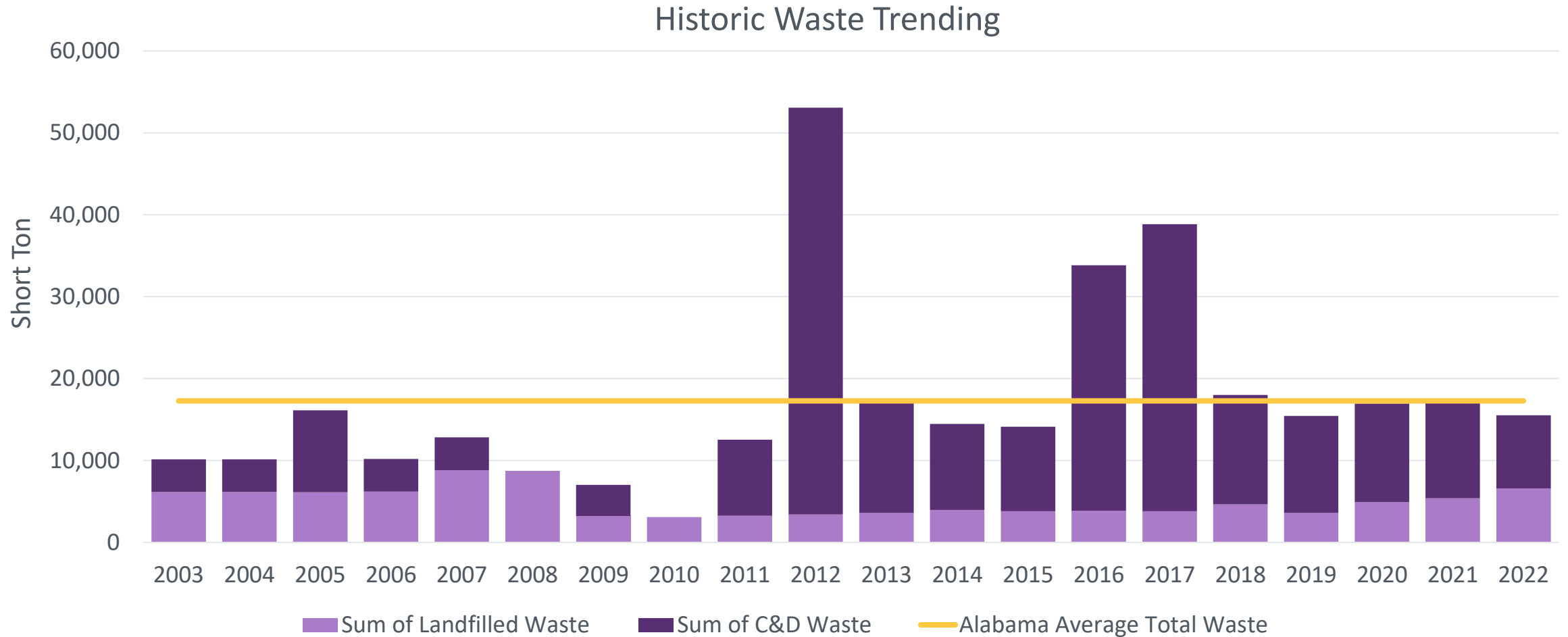


Travel Trending



Measuring Campus Waste

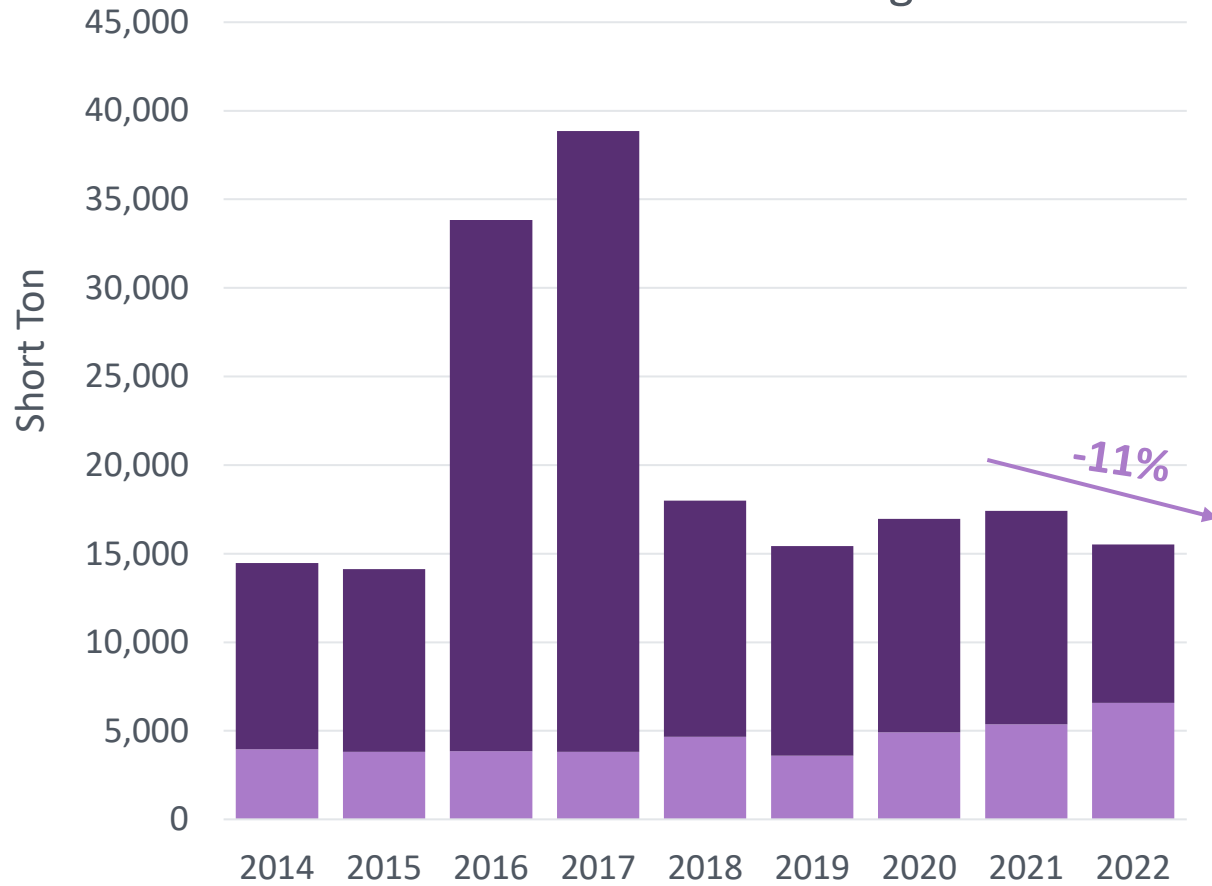
Landfilled waste decreased in FY22



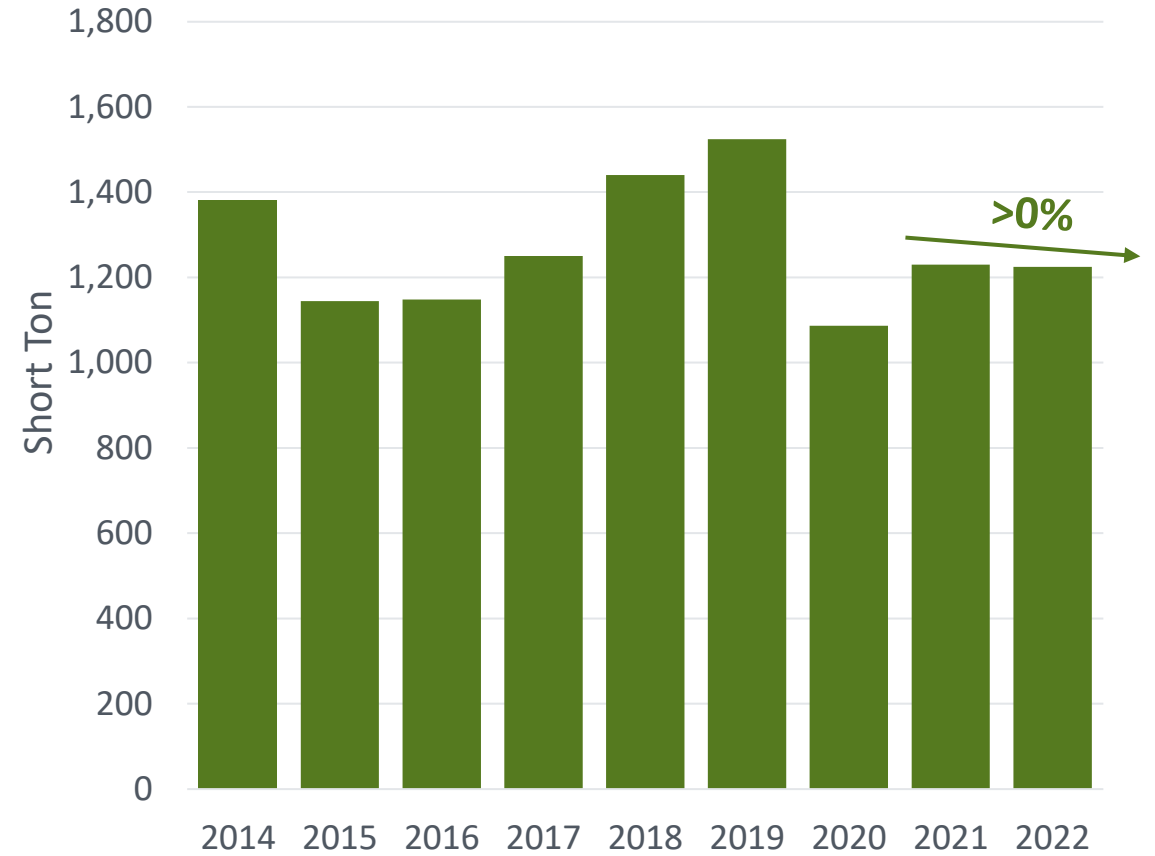
Continuing Emphasis on Recycling Initiatives on Campus

FY22 brought about an 11% decrease from FY21 in waste trending

Historic Waste Trending



Alabama Recycling

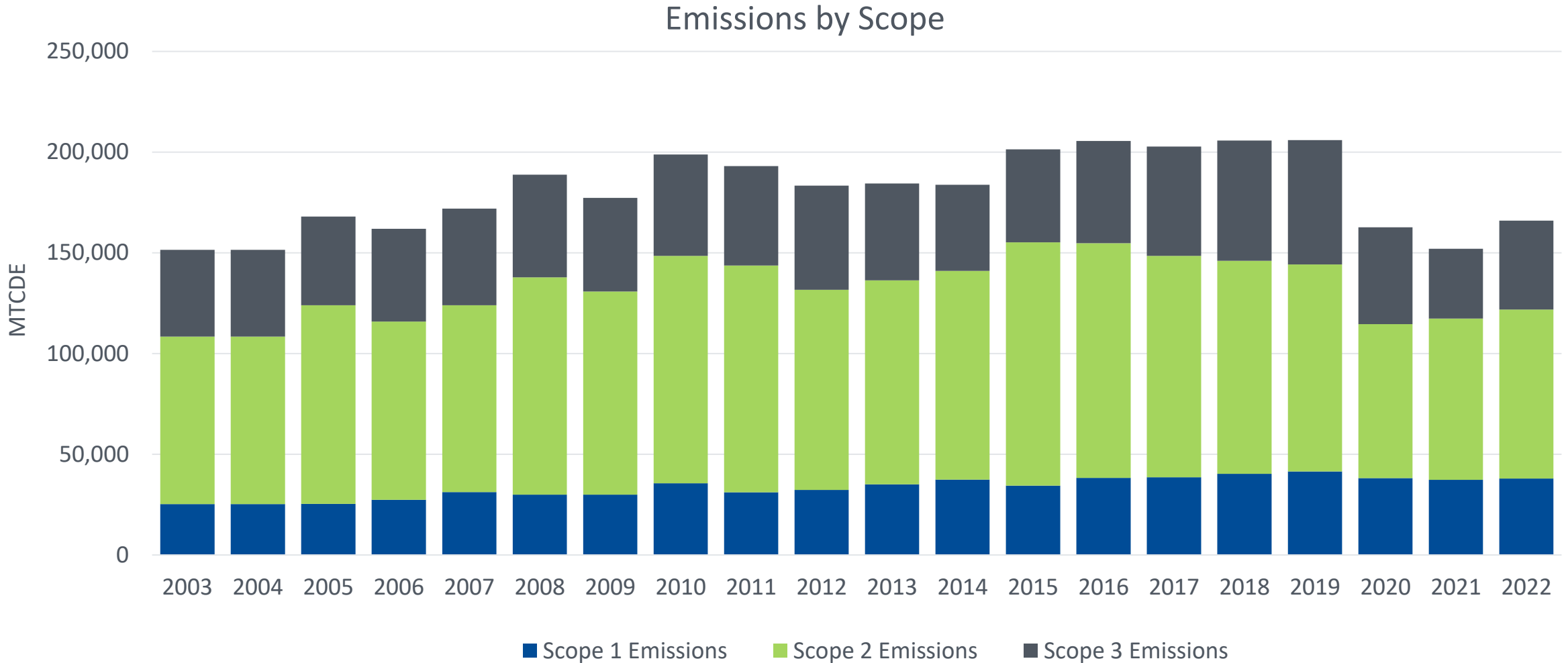


Total Emissions Profile



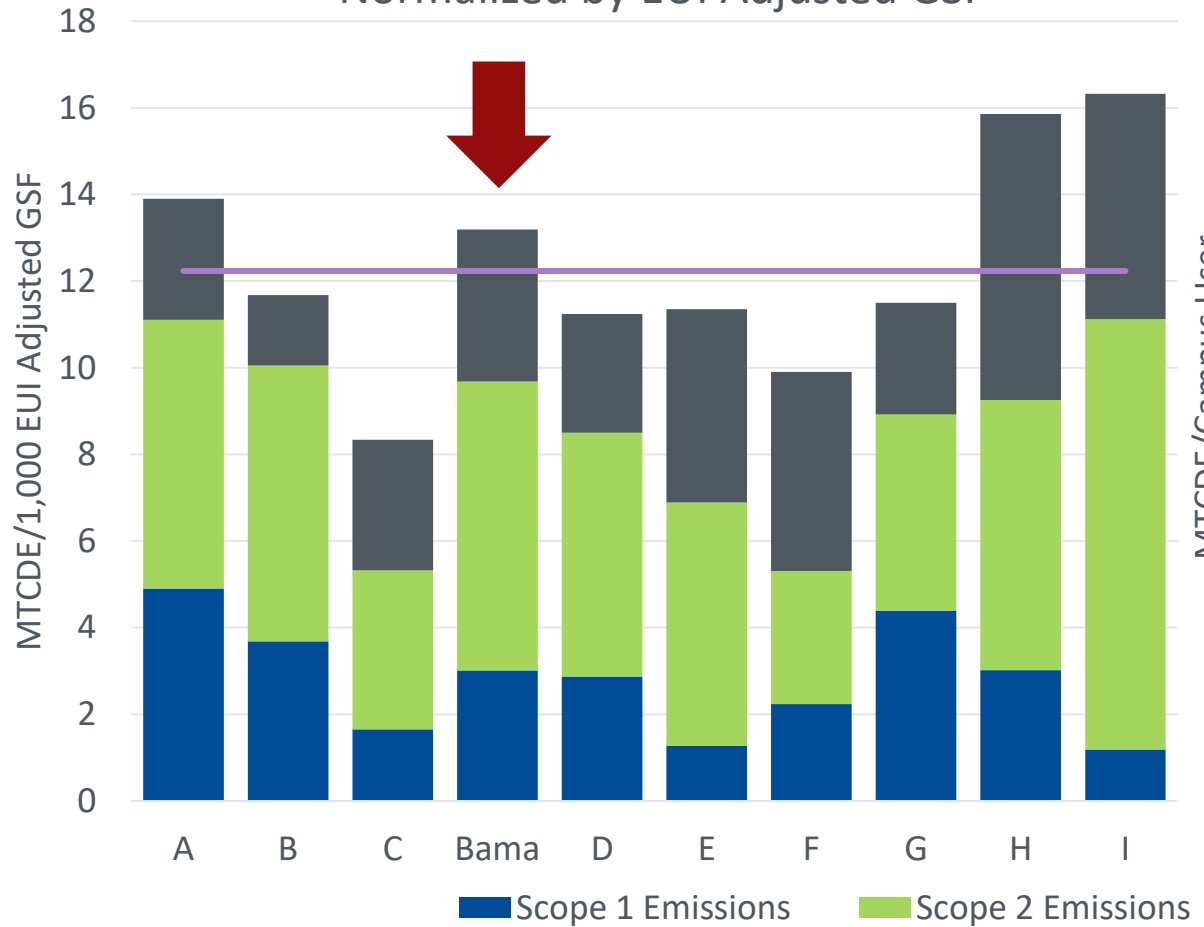
Longitudinal Tracking of Emissions by Scope

With campus being fully operational again in FY22, we start to see emissions trend back towards pre-covid levels

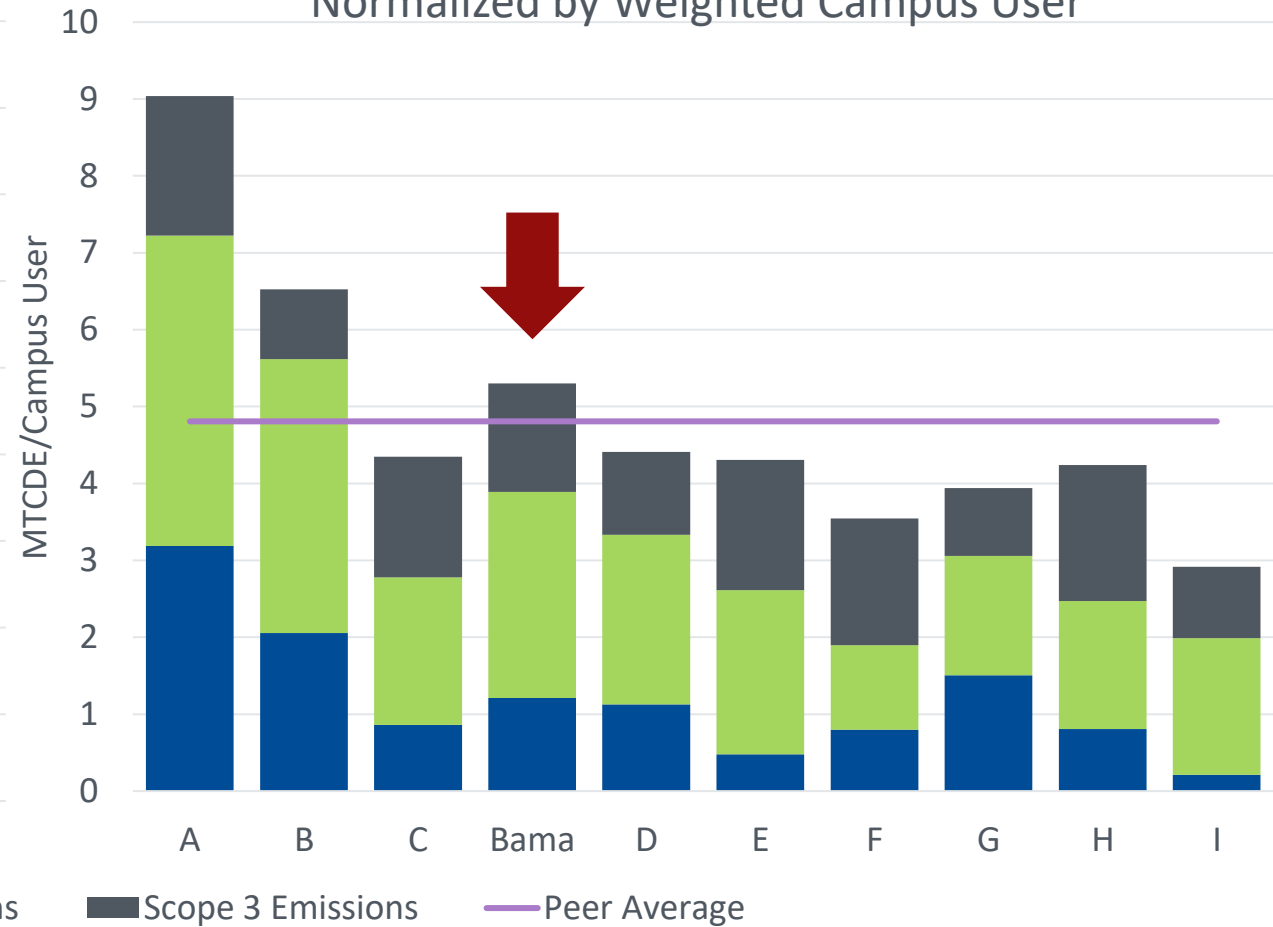


Tracking Alabama's Total Carbon Footprint

Total Emissions vs. Sustainability Peers
Normalized by EUI Adjusted GSF



Total Emissions vs. Sustainability Peers
Normalized by Weighted Campus User



What's Next for Alabama Sustainability- Revisited

“To create a more sustainable tomorrow through research, teaching and promoting green initiatives and services within the University and surrounding communities.”



Strategy at Alabama:

- *New Construction Design Standards*
- *Energy management strategies*

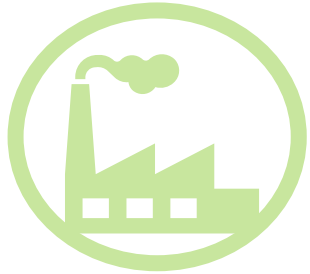
What are Alabama's short- and long-term sustainability goals?

Who does Alabama report those goals and progress to?

Tying Mission to Metrics- Revisited

Mission

The Office of Sustainability will create a more sustainable tomorrow through research, teaching and promoting green initiatives and services within the University and surrounding communities. We will focus on the importance of recycling, reducing consumption, educating others on the importance of sustainability and providing sustainable solutions while being more aware of our environment in our local community as well as regionally, nationally and globally.



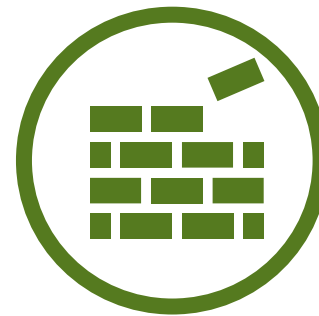
Reducing consumption = evaluating our steam management policies, seeing fossil consumption/gsf reduce



Focusing on the importance of recycling = ratio of recycled to landfilled waste



Reducing consumption = evaluating our energy policy, seeing electricity consumption/gsf reduce

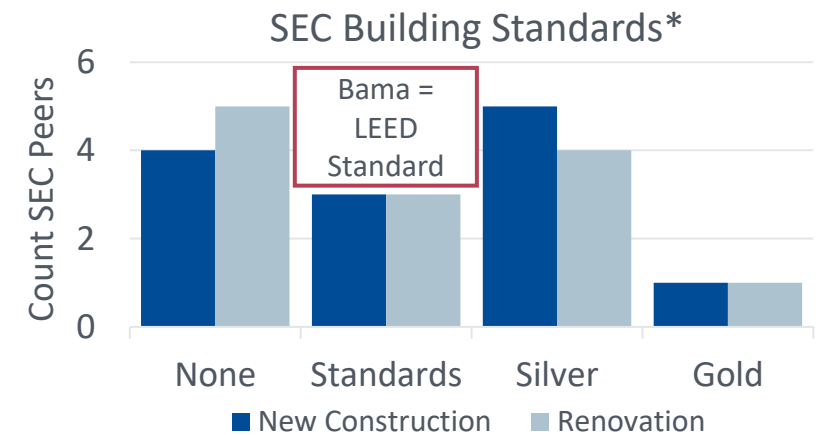
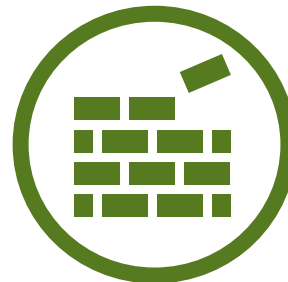
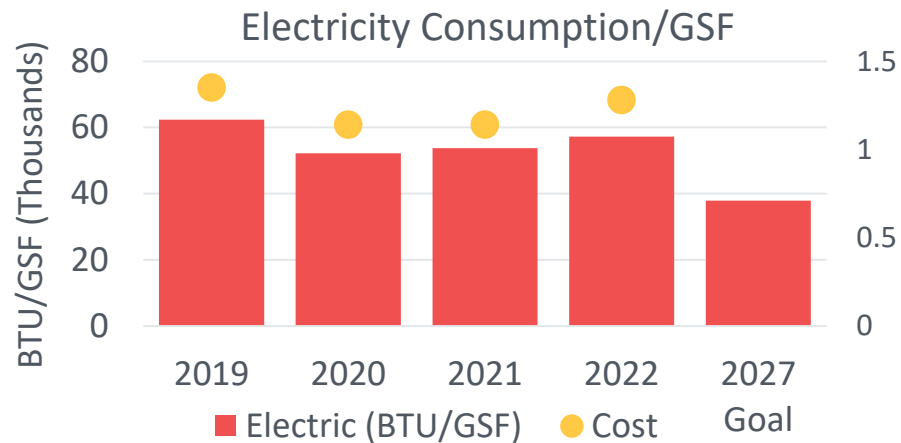
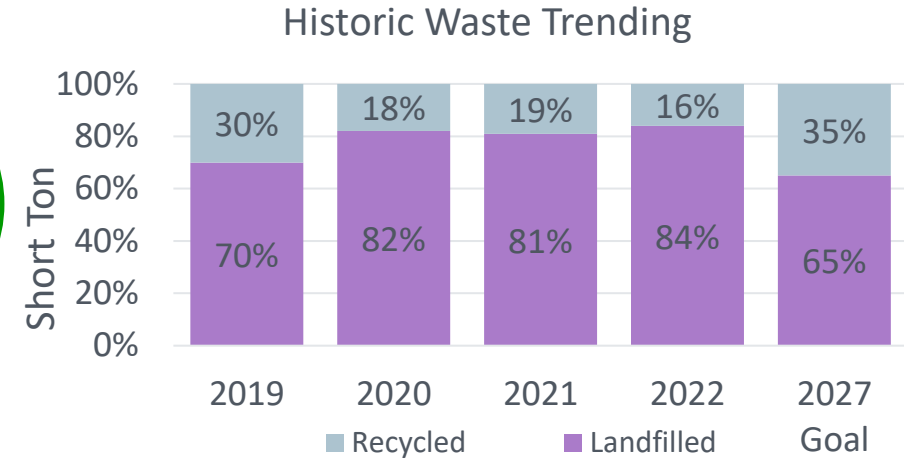
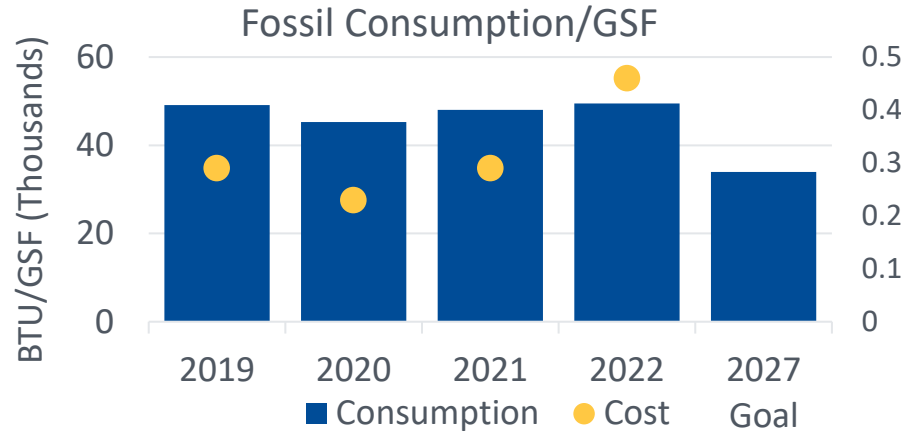


Ensuring progress = learn from building-level data in the past in order to inform future energy efficiency strategies.



Alabama FY22 Performance Against Metrics- Revisited

2027 goals are based on peers' goals – how can we tailor them more to Bama SS?





Questions & Discussion

Appendix I: Glossary of Terms



Glossary of Terms

- **Scope 1 (direct)** – Emissions from the power sources owned or controlled by the institution, including on-campus stationary fossil fuel sources; mobile sources, such as the vehicle fleet; and fugitive sources, such as refrigerants and fertilizer
- **Scope 2 (indirect)** – 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.
- **Scope 3 (indirect)** – Any other indirect emissions, including commuting by faculty, staff and students, air travel by faculty, paper, solid waste, wastewater, research animals and scope two transmission and distribution losses
- **Global Warming Potential (GWP)**- a relative measure of how much heat a greenhouse gas traps in the atmosphere. It compares the amount of heat trapped by a certain mass of the gas in question to the amount of heat trapped by a similar mass of carbon dioxide.
- **MTCDEs (Metric Tons of Carbon Dioxide Equivalent)**- The carbon footprint is reported in metric tons of carbon dioxide equivalents (CO₂e)⁵. This measure includes all six greenhouse gases, which are converted to CO₂e based on their 100-year global warming potential
- **Density Factor**- A measure of the amount use the campus buildings receive on a daily basis/The number of campus users per 100,000 GSF
- **Technical Complexity**- the relative mechanical complexity of the campus on a scale of 1-5

