

Chapman University Sustainability Solutions

FY21/22 GHG Benchmarking Update

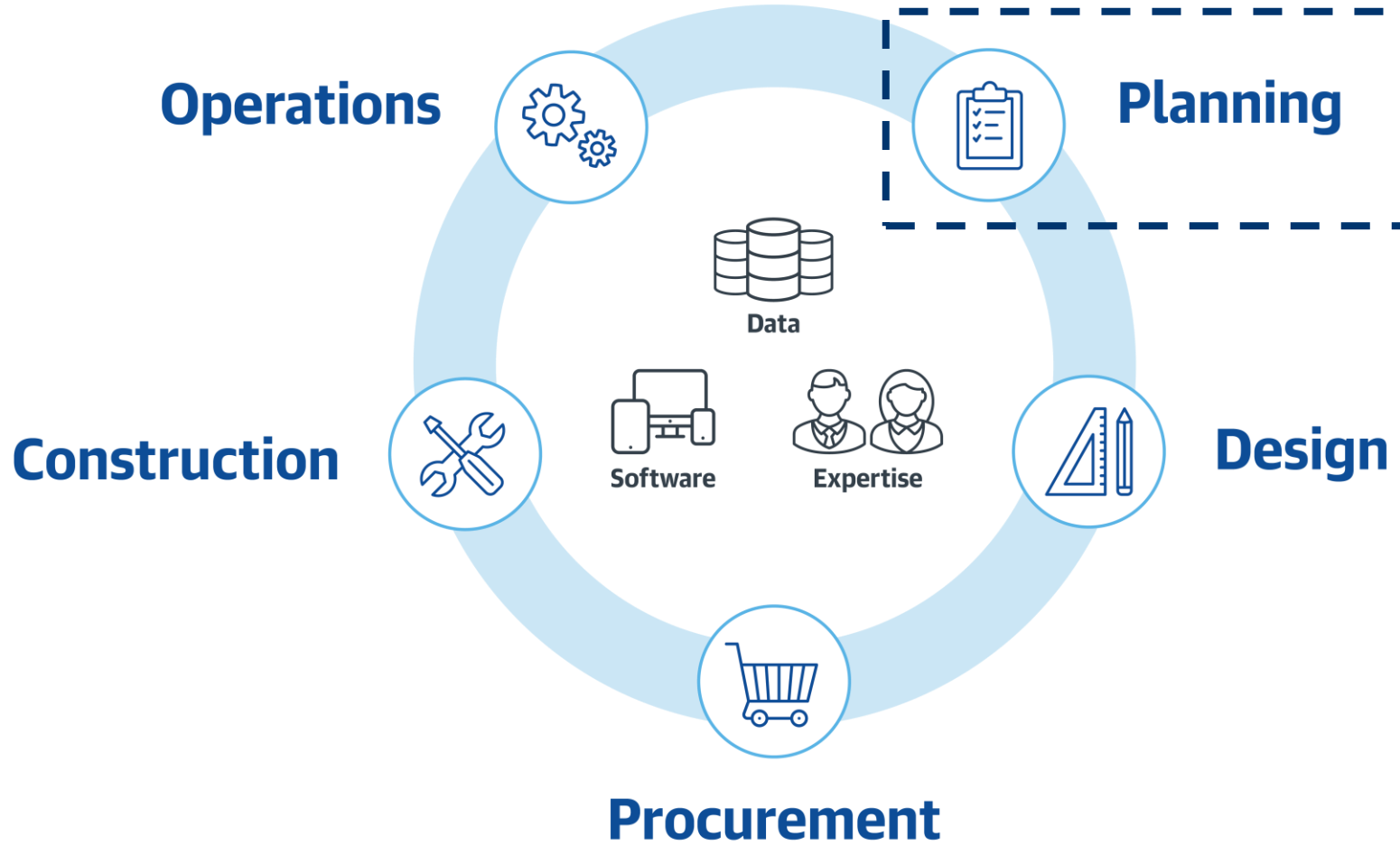
March 2023

Duncan Ketel and Rachel Gonzalez

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



What We Do



Data

Drive Meaningful Action



Software

Improve Workflows



Expertise

Deliver Results



FACILITIES BENCHMARKING & ANALYSIS

Take control of your facilities and make the case for change without the guesswork



FACILITIES ASSESSMENT & PLANNING

Plan and execute capital investment plans that are inclusive, credible, flexible, affordable and sustainable



SPACE UTILIZATION

Ensure your space is working up to its full potential



SUSTAINABILITY SOLUTIONS

Measure, compare and improve environmental stewardship

Sustainability Solutions Agenda



Overview of Sightlines Data Analysis

Summary of Emissions Profile

Utility Specific Analysis

Scope 1 Emissions Overview

Scope 2 Emissions Overview

Scope 3 Emissions Overview

SIMAP Partnership



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**



Components of Emissions Profile



Scope 1: Direct GHGs



- On-Campus Stationary Fuel
- Vehicle Fleet Fuel
- Fertilizer
- Refrigerants

Scope 2: Upstream GHGs



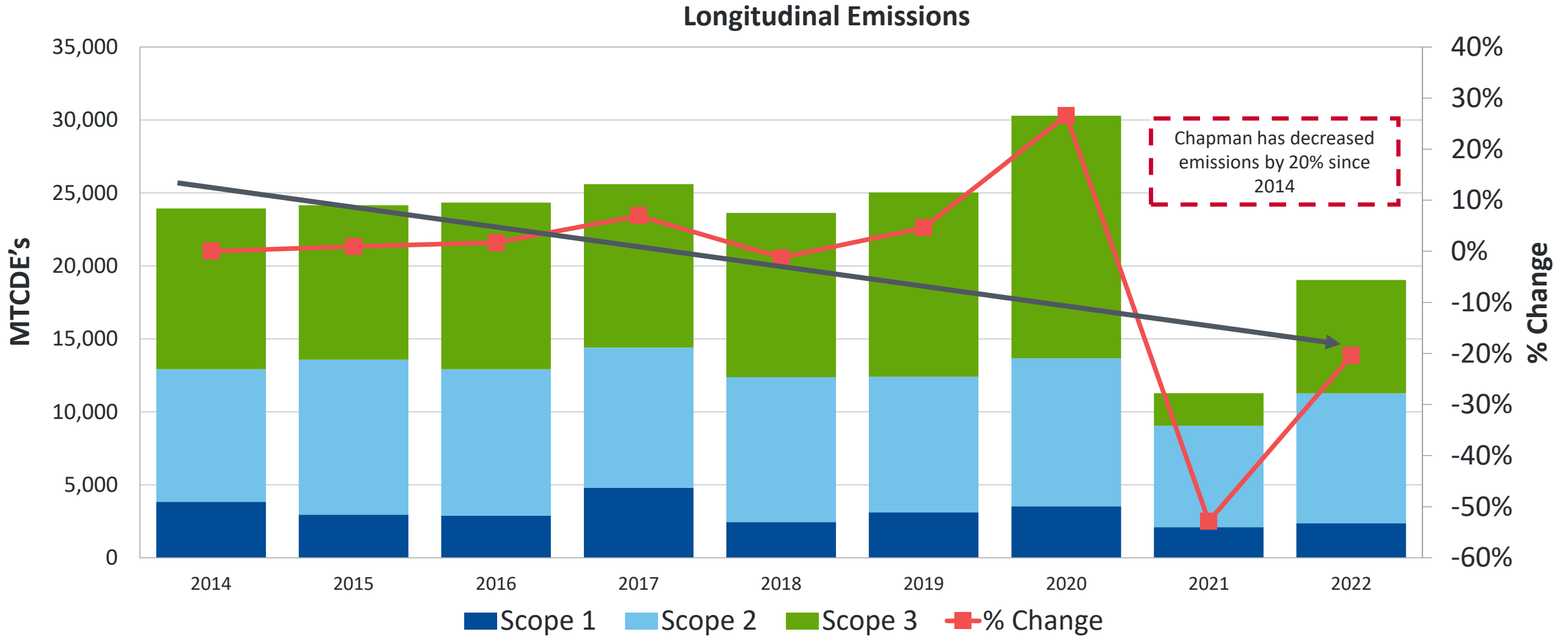
- Purchased Electricity

Scope 3: Indirect GHGs



- Commuting
- Directly Financed Travel
- Solid Waste
- Paper Purchasing
- Transmission & Distribution Losses

Longitudinal Emissions by Scope

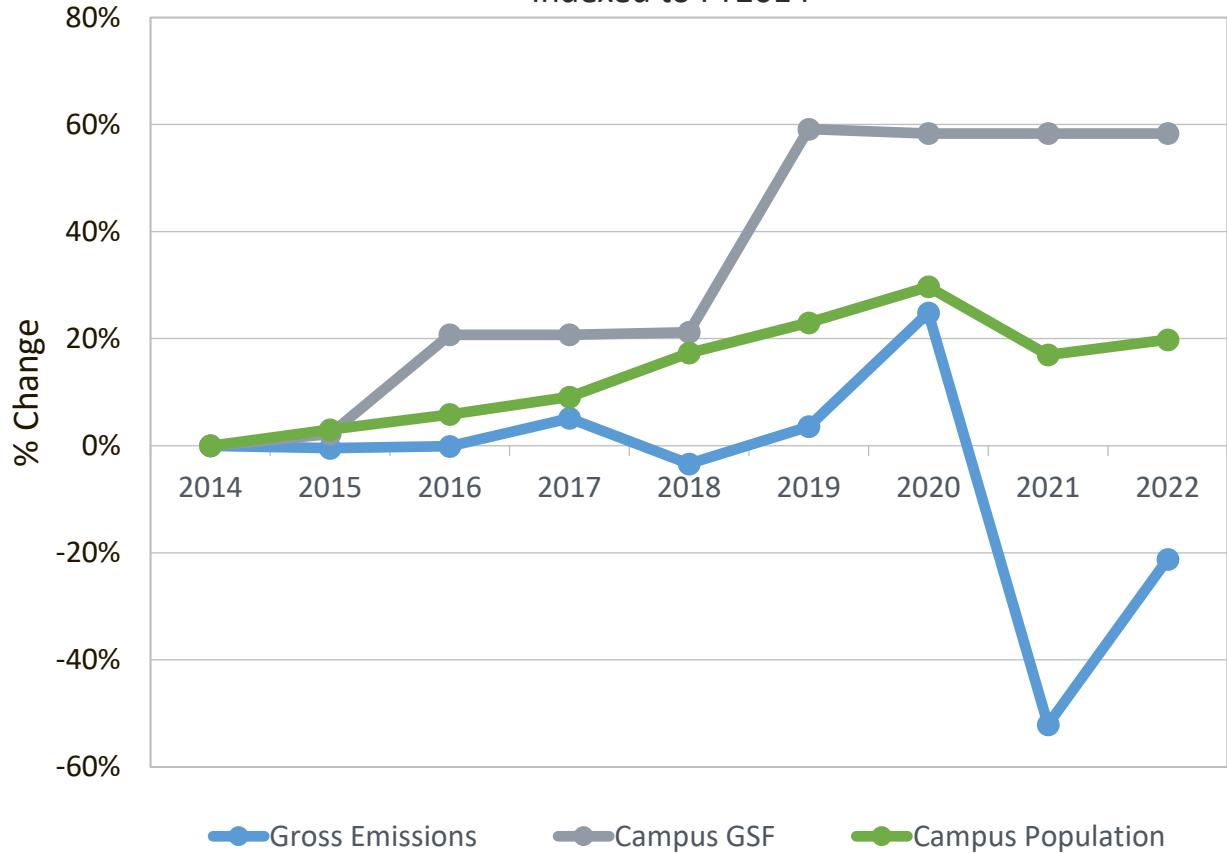


Progress Against 2014 Baseline

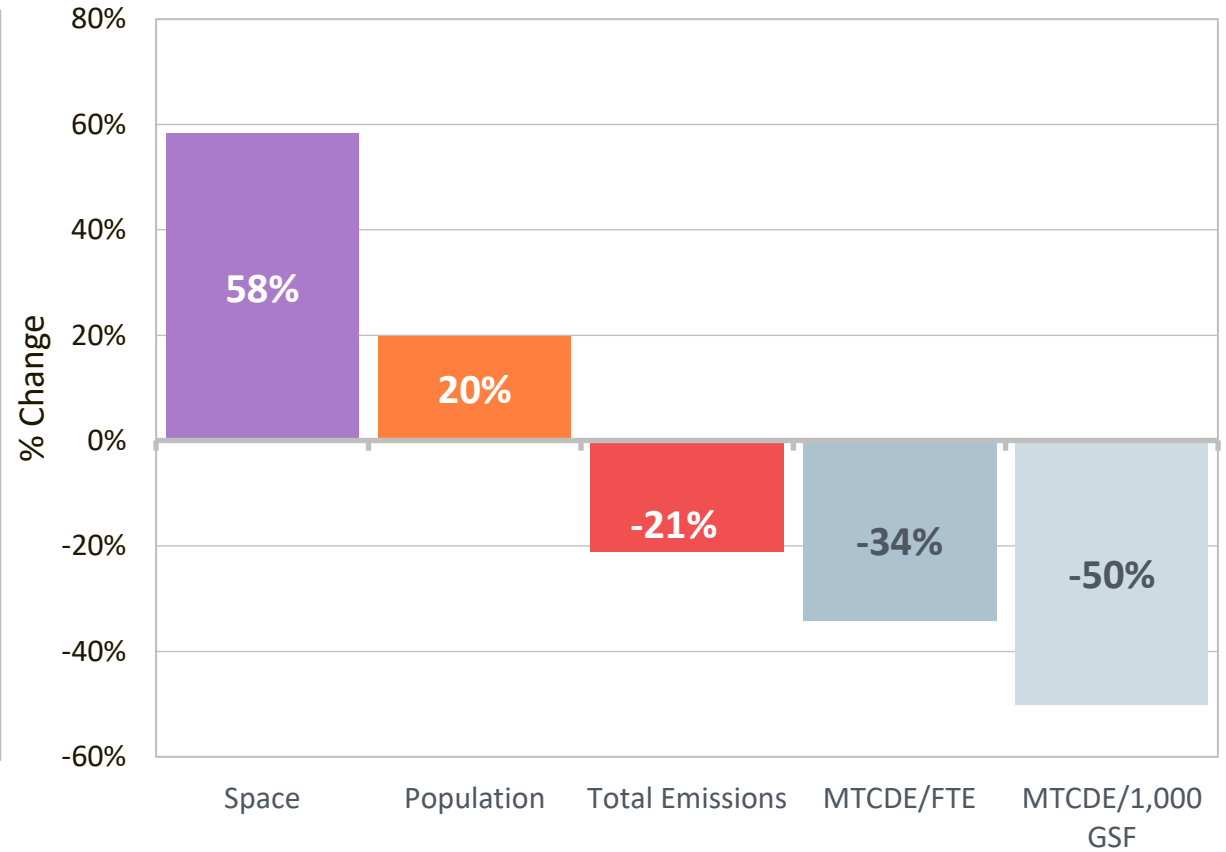


Chapman's emissions substantially decreased when normalizing by population and space

Change in Emissions (MTCDE) vs. Campus Size and Population (FTE) Indexed to FY2014



Change in Space, Population, and Emissions Indexed to FY2014

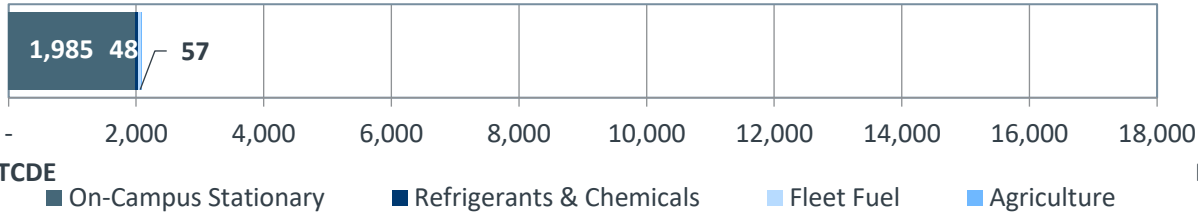


FY21 vs. FY22 Distribution of Emissions

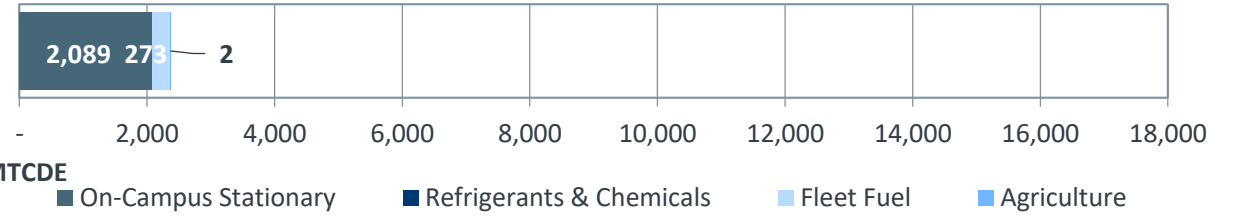


Scope 3 emissions were still impacted due to Covid restrictions, Scope 1&2 increased in FY22

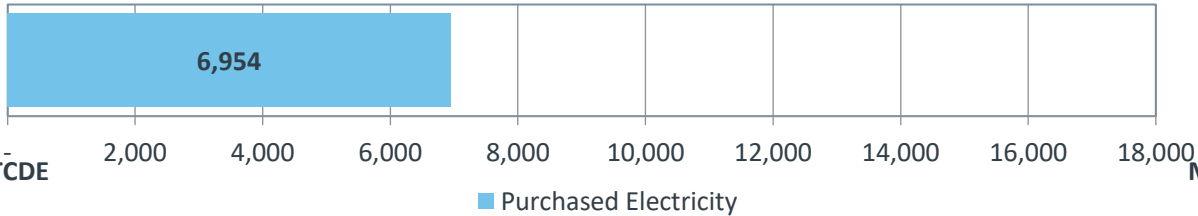
Scope 1 Sources – 19%



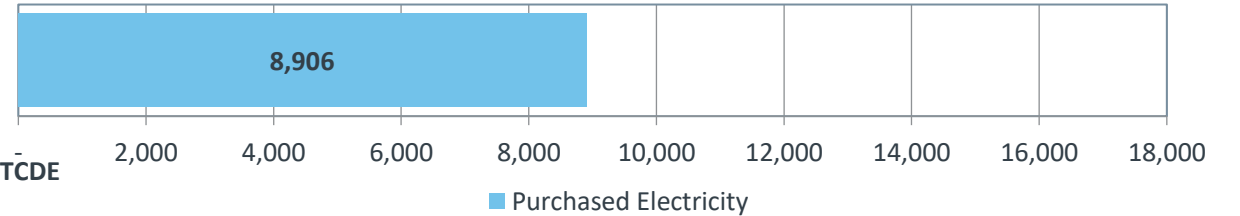
Scope 1 Sources – 12%



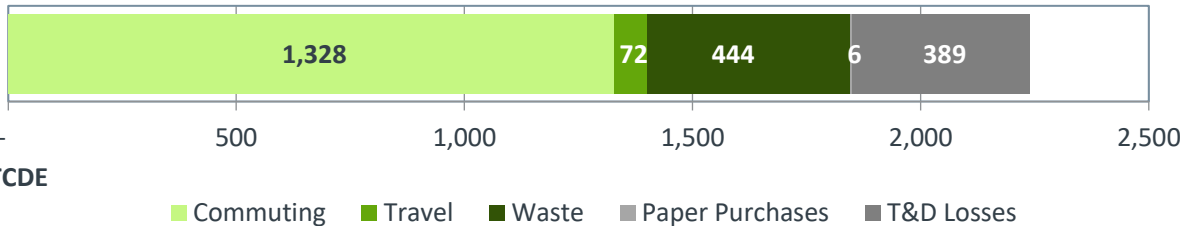
Scope 2 Sources – 62%



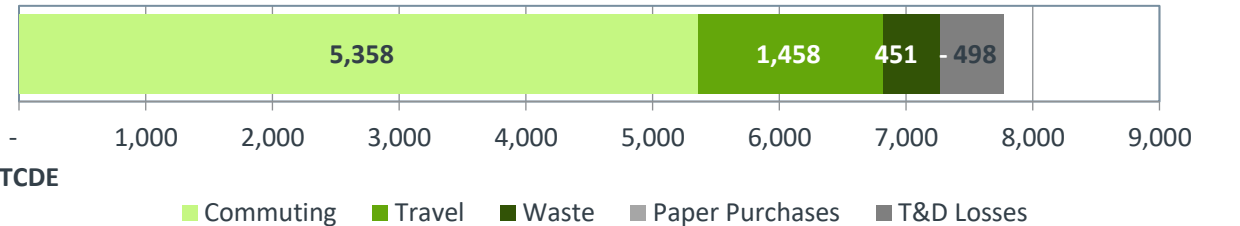
Scope 2 Sources – 47%



Scope 3 Sources – 20%



Scope 3 Sources – 41%

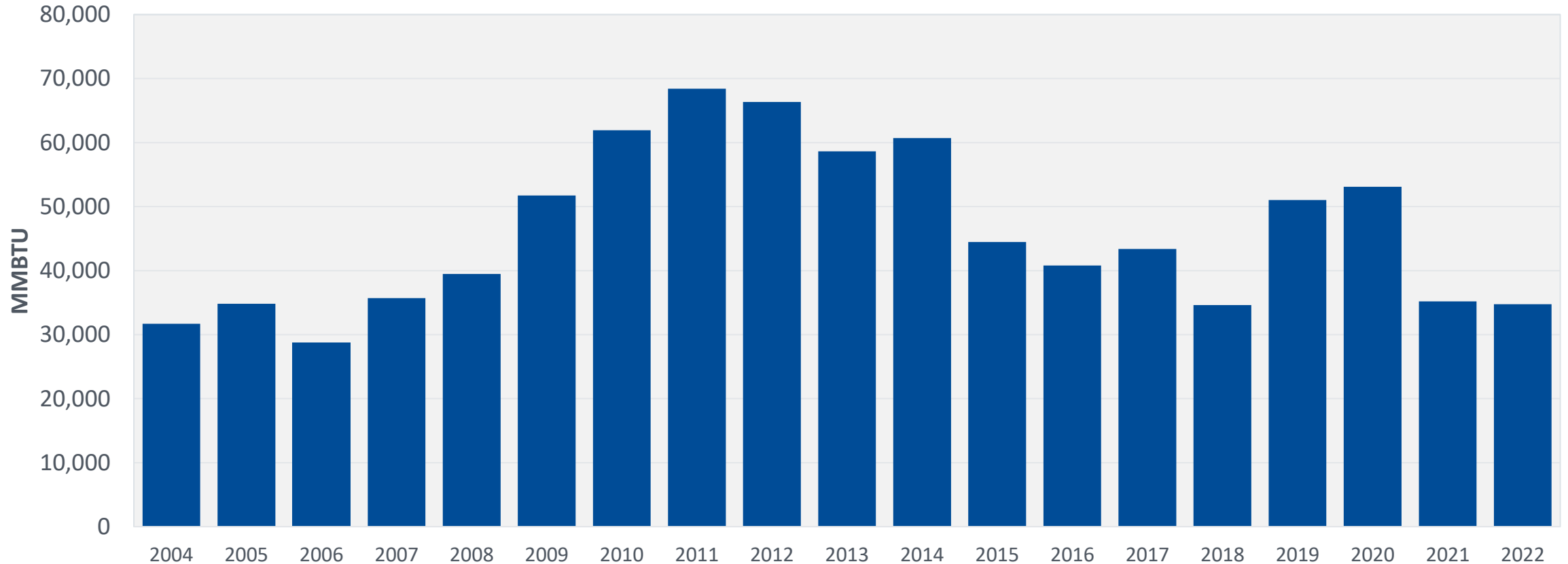


Fossil Consumption by type



Natural Gas usage has fluctuated substantially at Chapman

Total Fossil Consumption

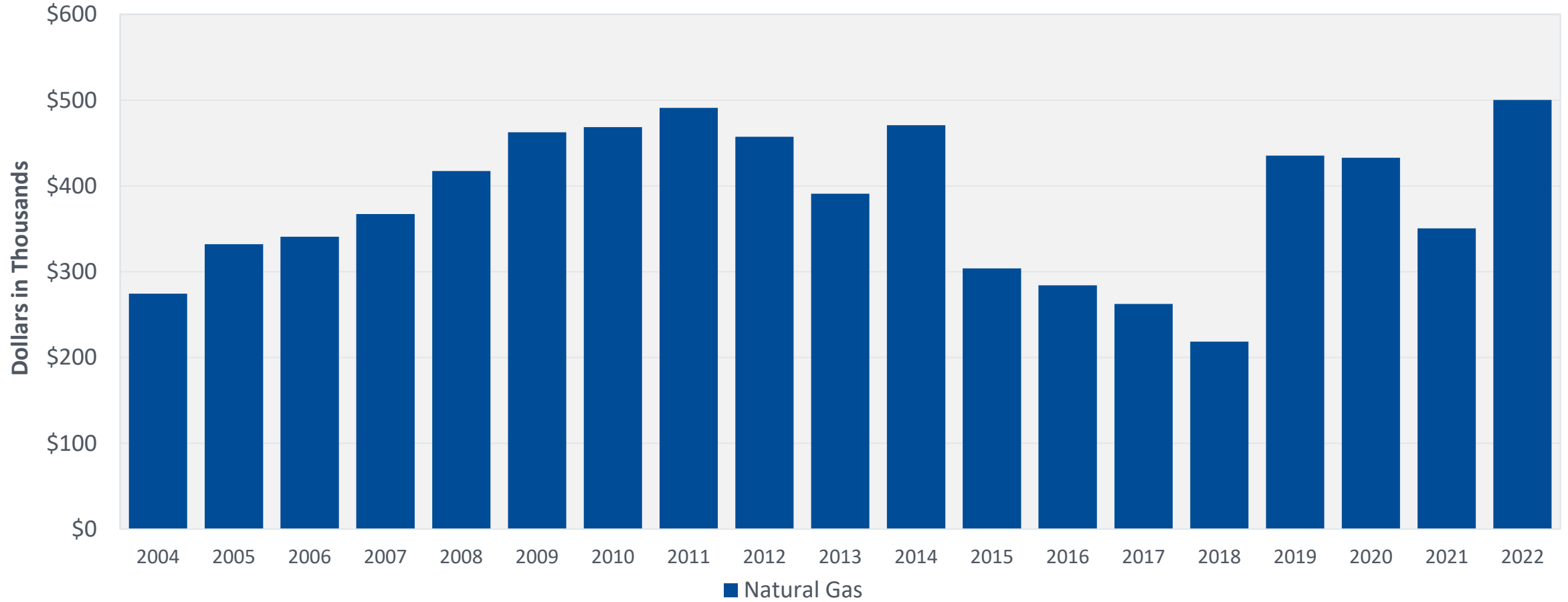


Fossil Fuel Expenditures



Fossil Fuel costs in FY22 outpaced total increases in consumption

Total Fossil Expenditures

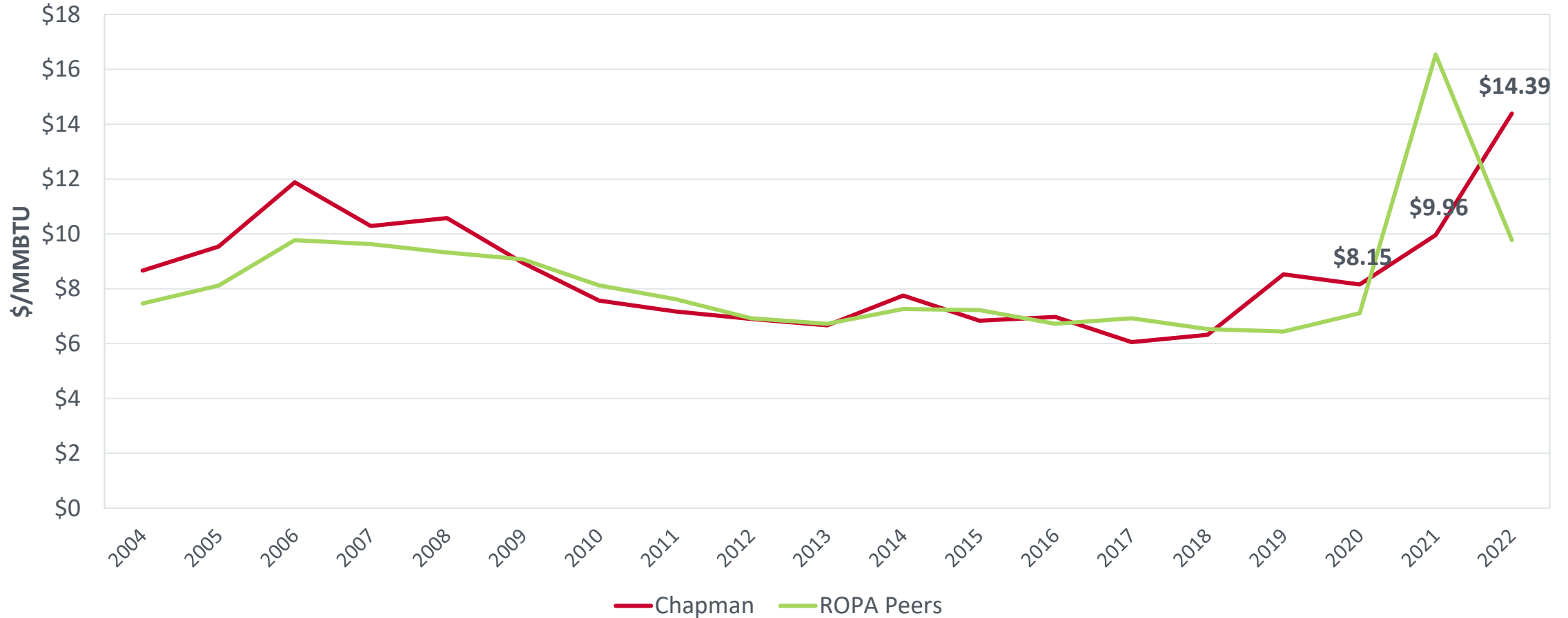


Differences in Unit Costs vs. Peers



Chapman has seen dramatic increases in the commodity costs of Fossil Fuel

Fossil Fuel Unit Cost

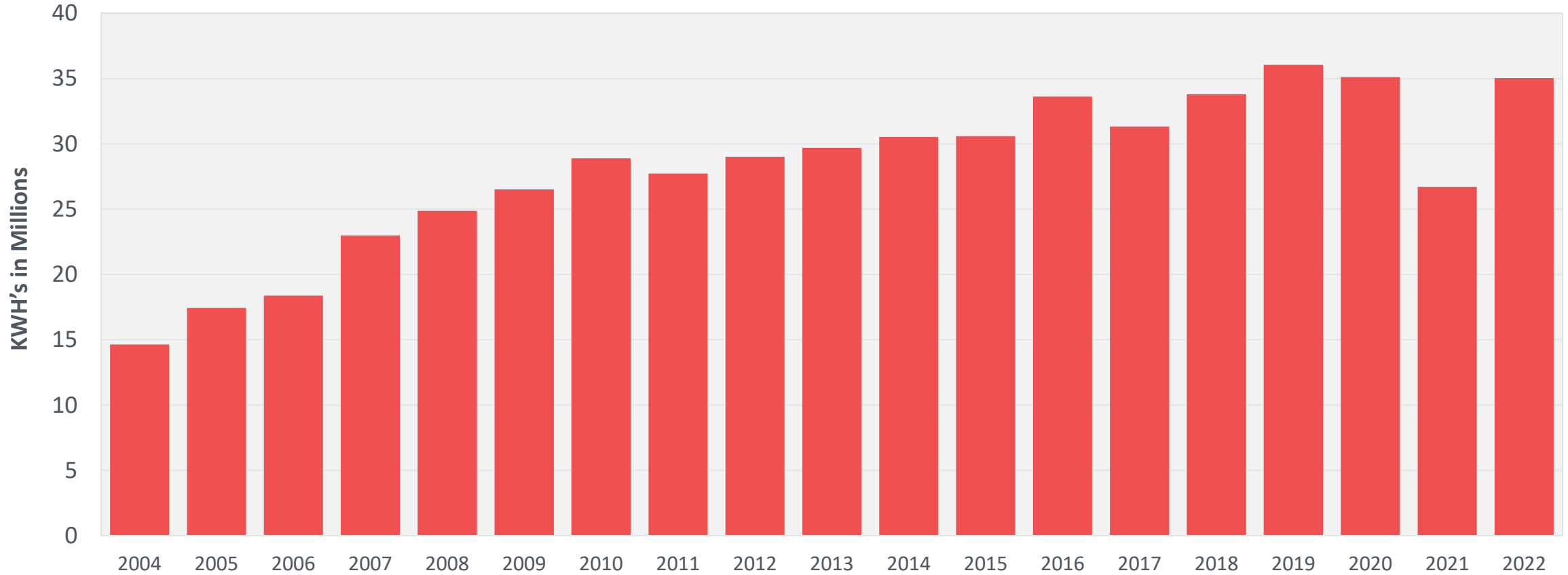


Electricity Consumed by Campus



Aside from FY20/21, as space is added KWH consumption has increased

Total KWHs

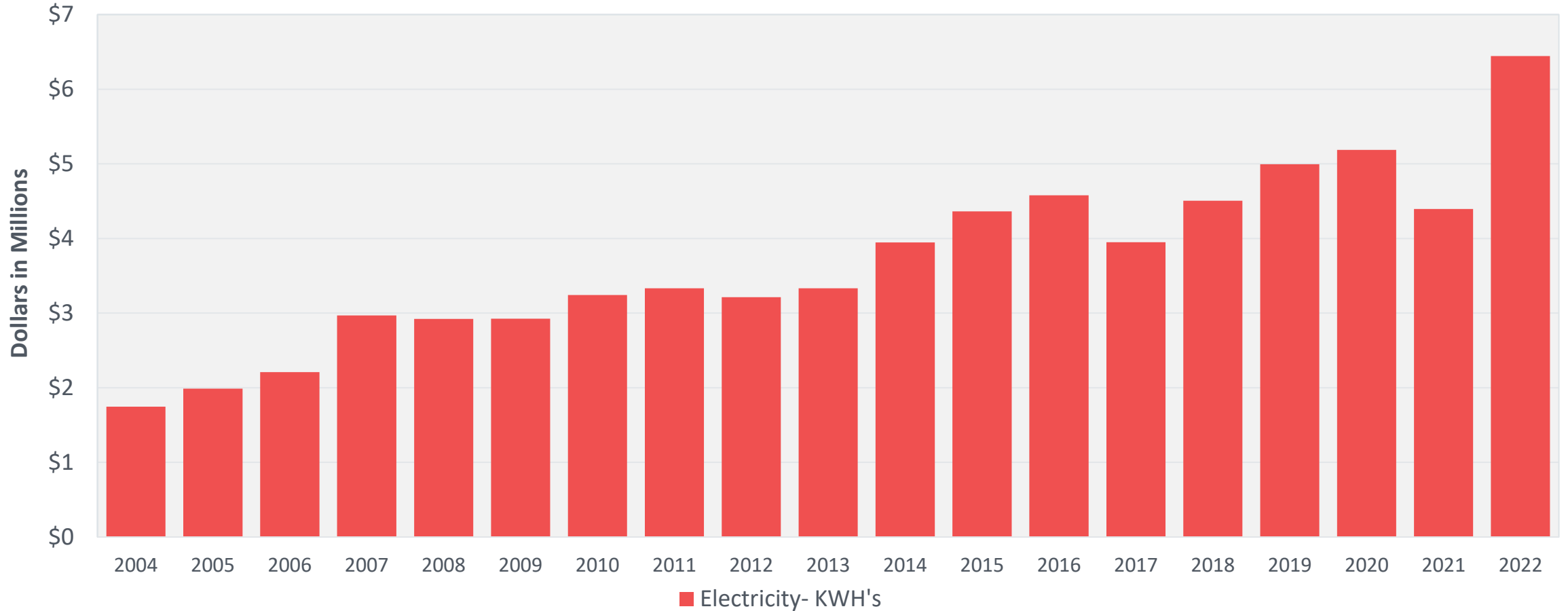


Electricity Expenditures



Similarly, to Fossil Fuel expenditures the cost of electricity outpaced consumption

Total Electricity Expenditures

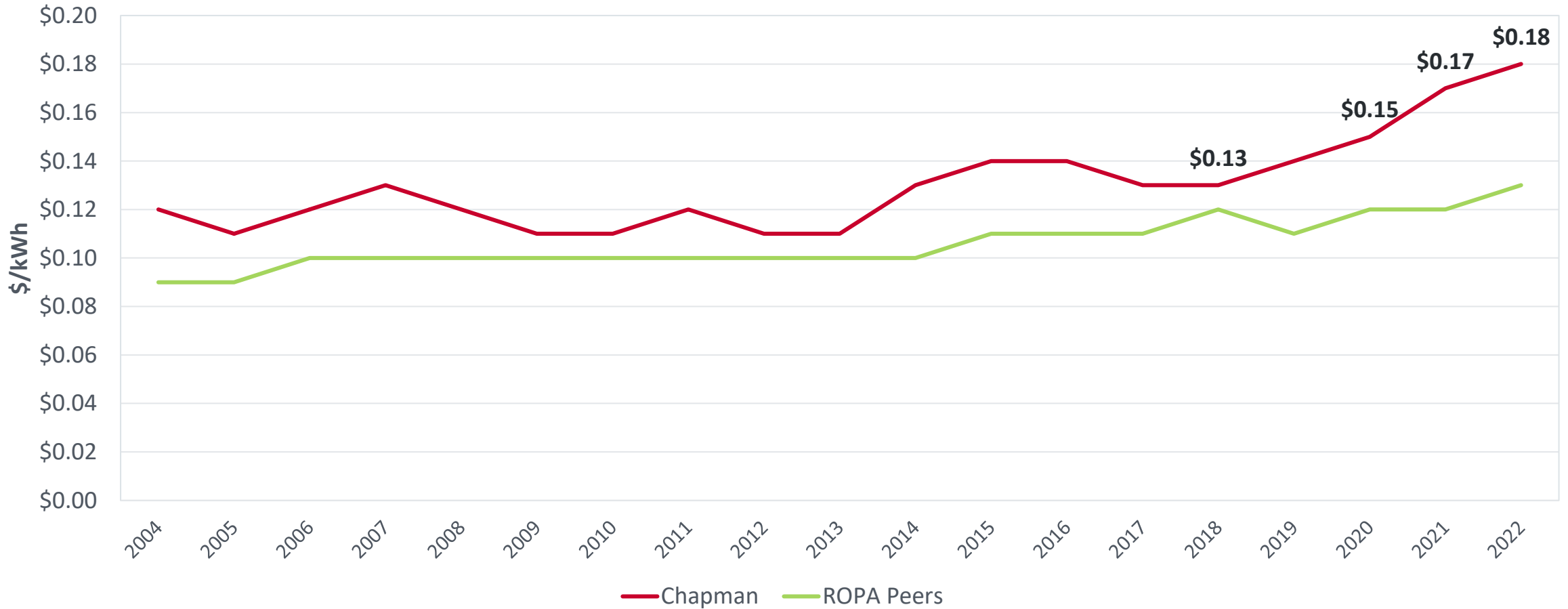


Differences in Unit Costs vs. Peers



While Chapman has consistently paid more than peers, gap has grown since FY19/20

Electric Unit Cost

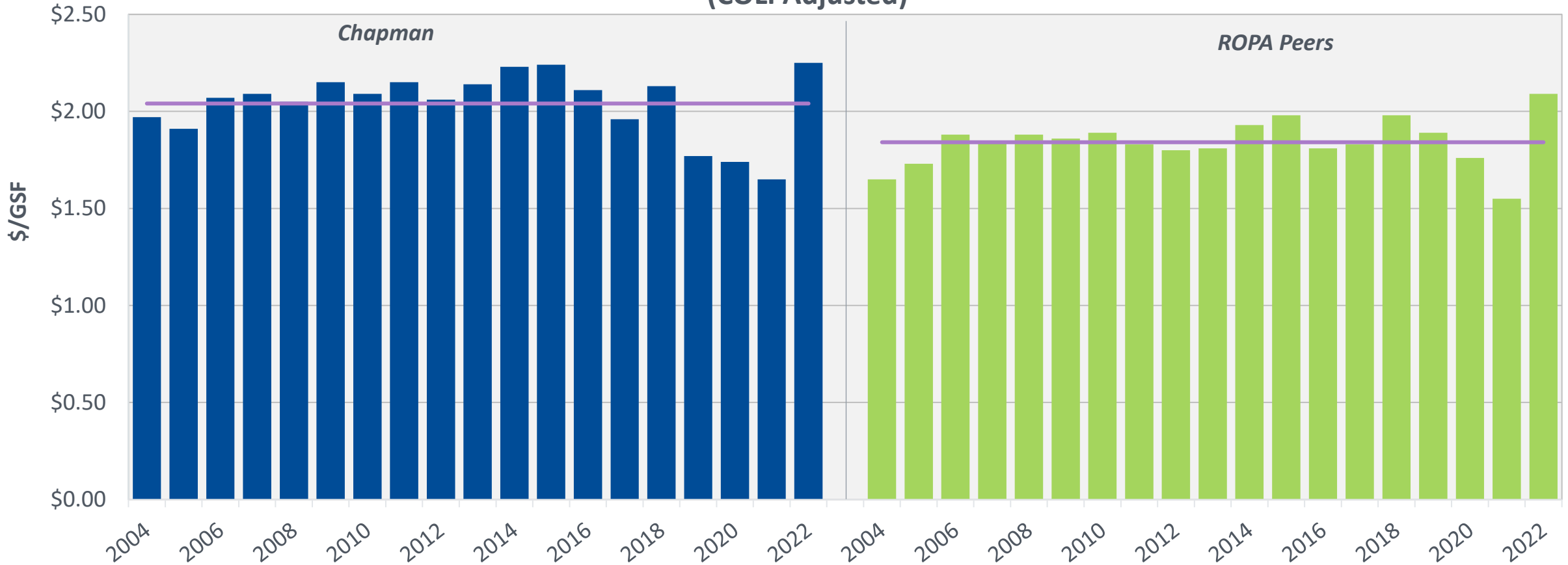


Utility Operating Expenditures Compared to Peers



Utility expenditures are at a record high for Chapman in FY21/22

Chapman versus Peer Utility \$ per GSF
(COLI Adjusted)



Sustainability Peers

Peers determined using location, campus size, and population



Peer Institution	Location
Idyllwild Arts Academy	Idyllwild, California
St. Mary's College of California	Moraga, California
University of San Francisco*	San Francisco, California
University of San Diego*	San Diego, California
University of Denver	Denver, Colorado
University of Texas- Rio Grande Valley	Edinburg, Texas
Stockton University	Galloway Township, New Jersey

Two Ways to Normalize Emissions for Comparison



GHG Emissions per 1,000 GSF EUI Adjusted



Stresses intensity of operations.

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

GHG Emissions per Weighted Campus User



Stresses efficient use of space.

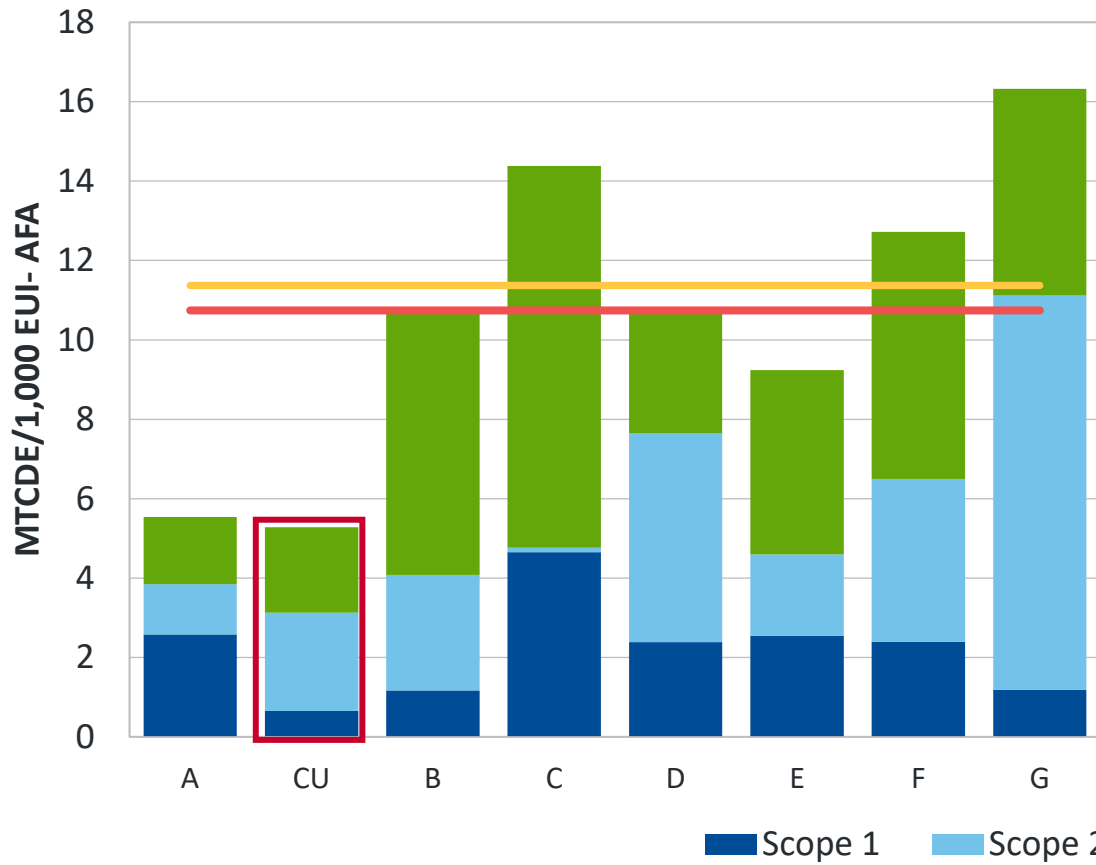
$$\frac{\text{Gross GHG Emissions}}{\text{Weighted Campus User}}$$

Total Gross Emissions per Space and Campus User

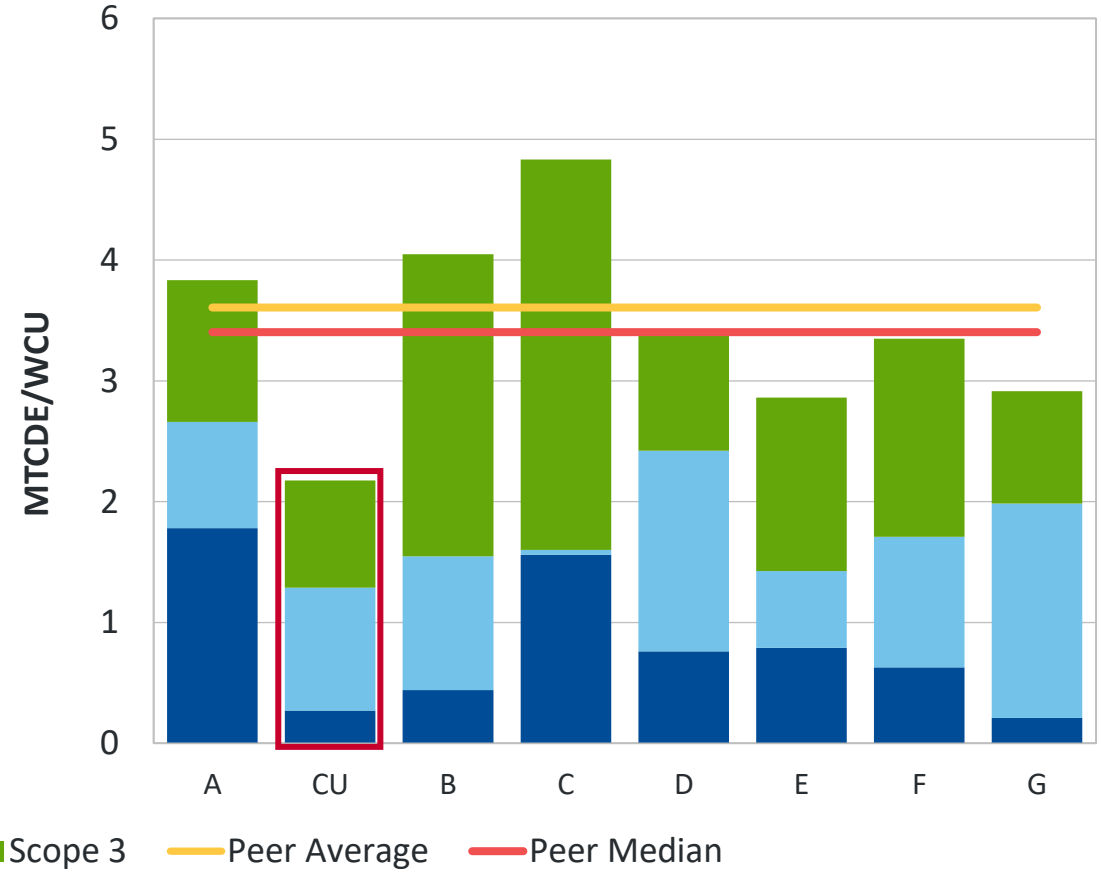


Chapman emits less than peers when normalized by GSF and population

Gross Emissions
MTCDE/1,000 EUI – Adjusted Floor Area



Gross Emissions
MTCDE/Weighted Campus User

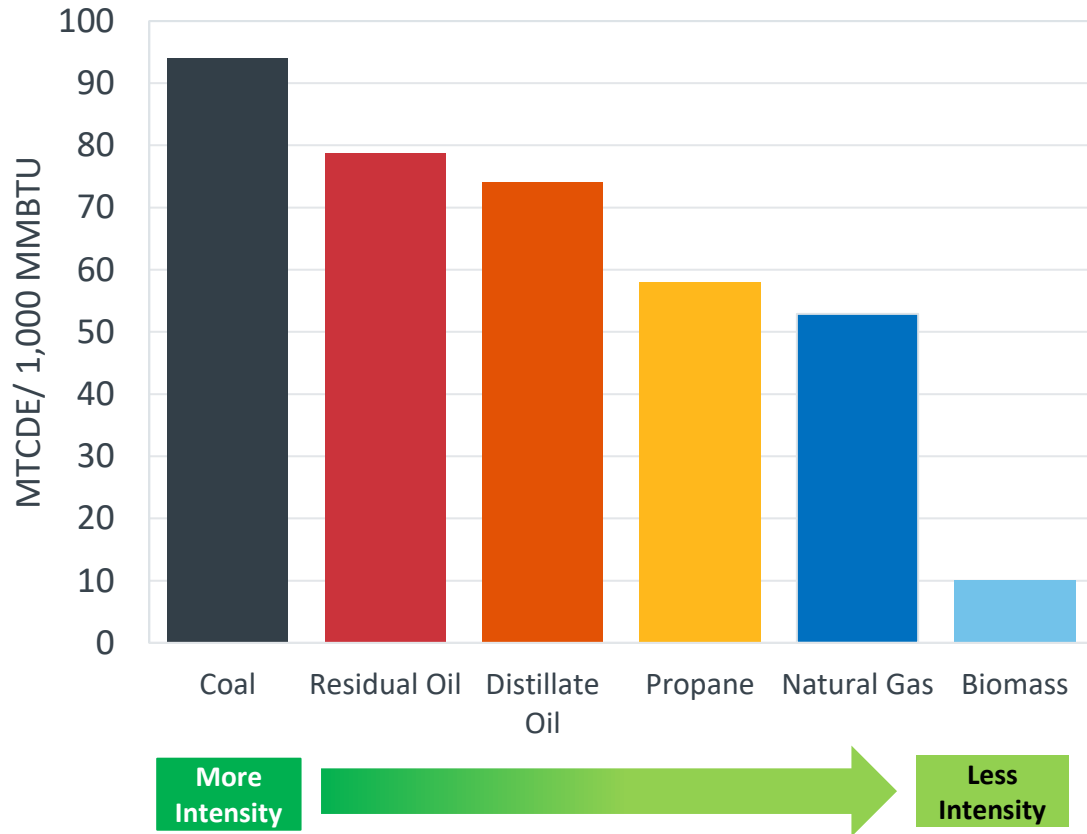


Scope 1: Stationary Fuel Consumption

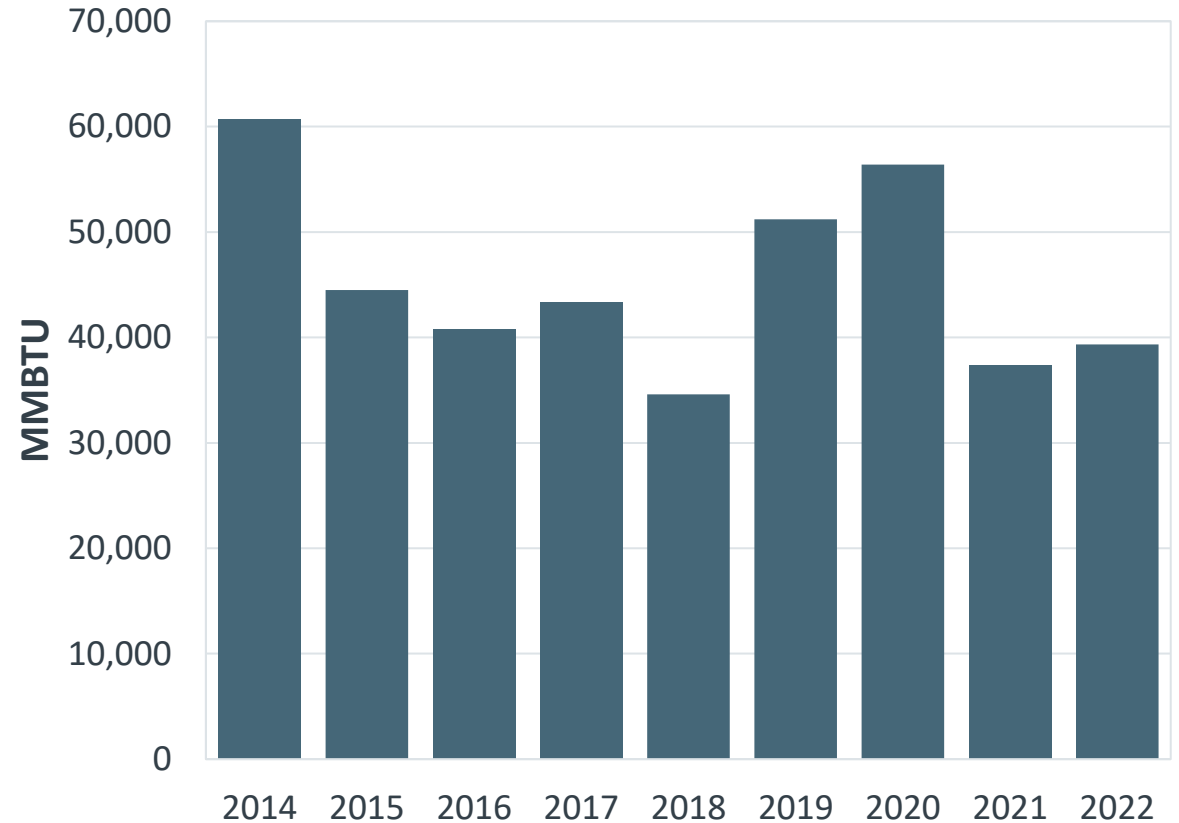


Chapman's FY21/22 Scope 1 emissions caused by an increase in natural gas usage

Carbon Intensity of Commonly Used Fossil Fuels



Stationary Fuel Consumption

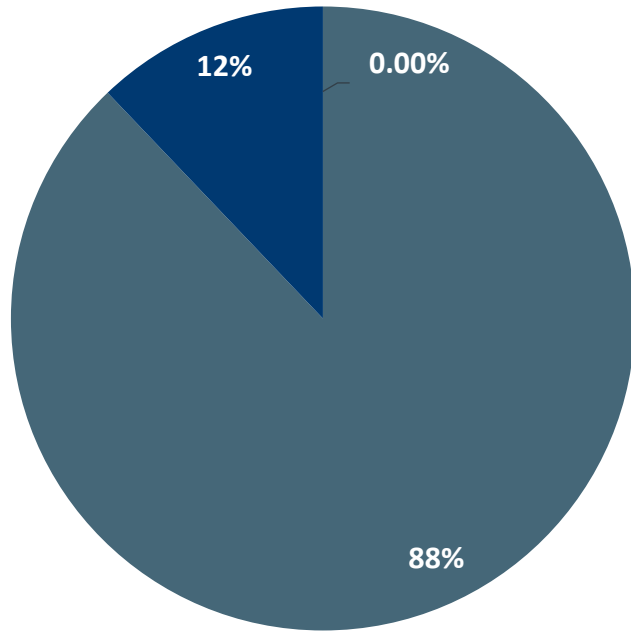


Scope 1: Direct Emissions

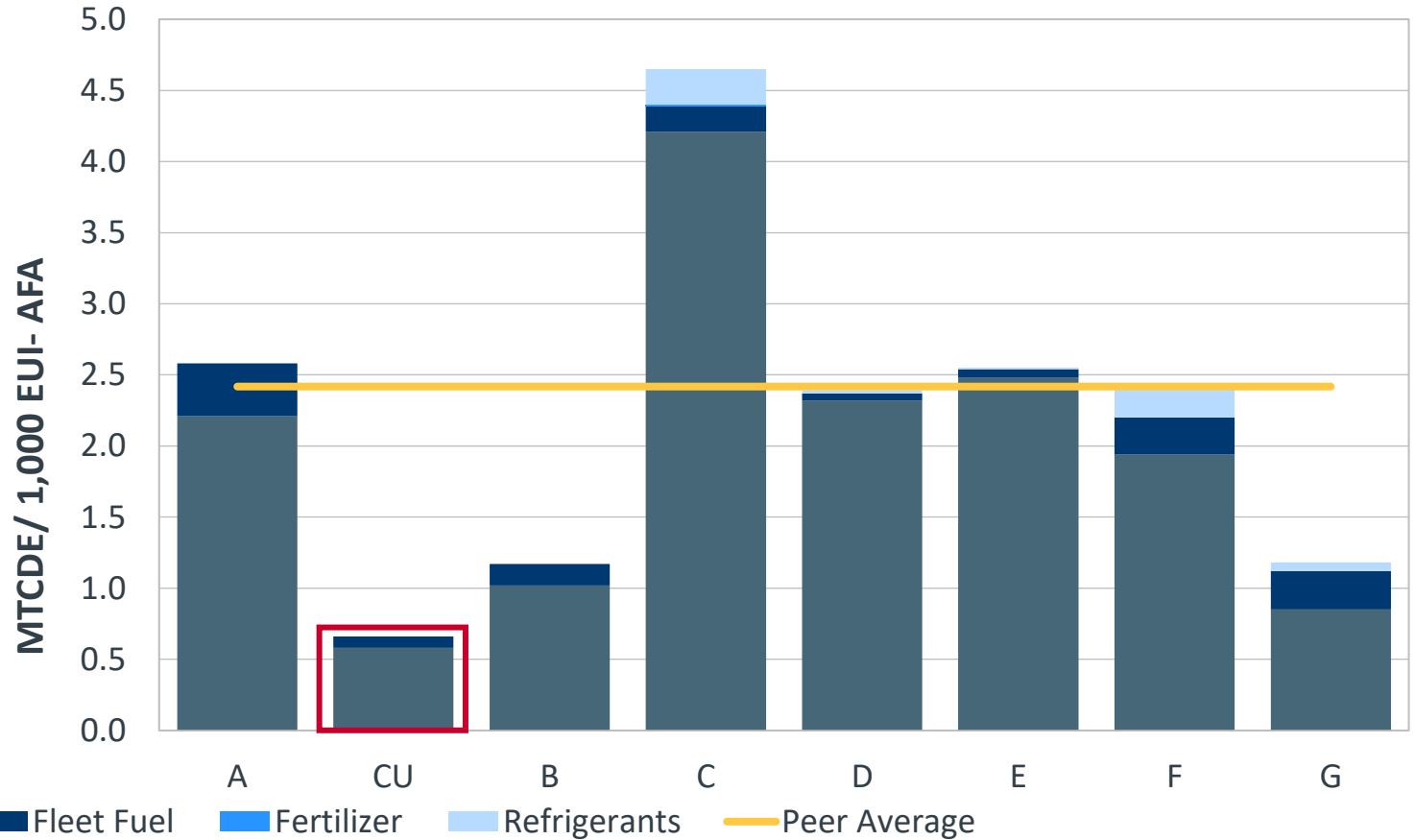


Chapman's scope 1 emissions are significantly below peer average

FY22 Scope 1 Emissions



Scope 1 Emissions vs Peers

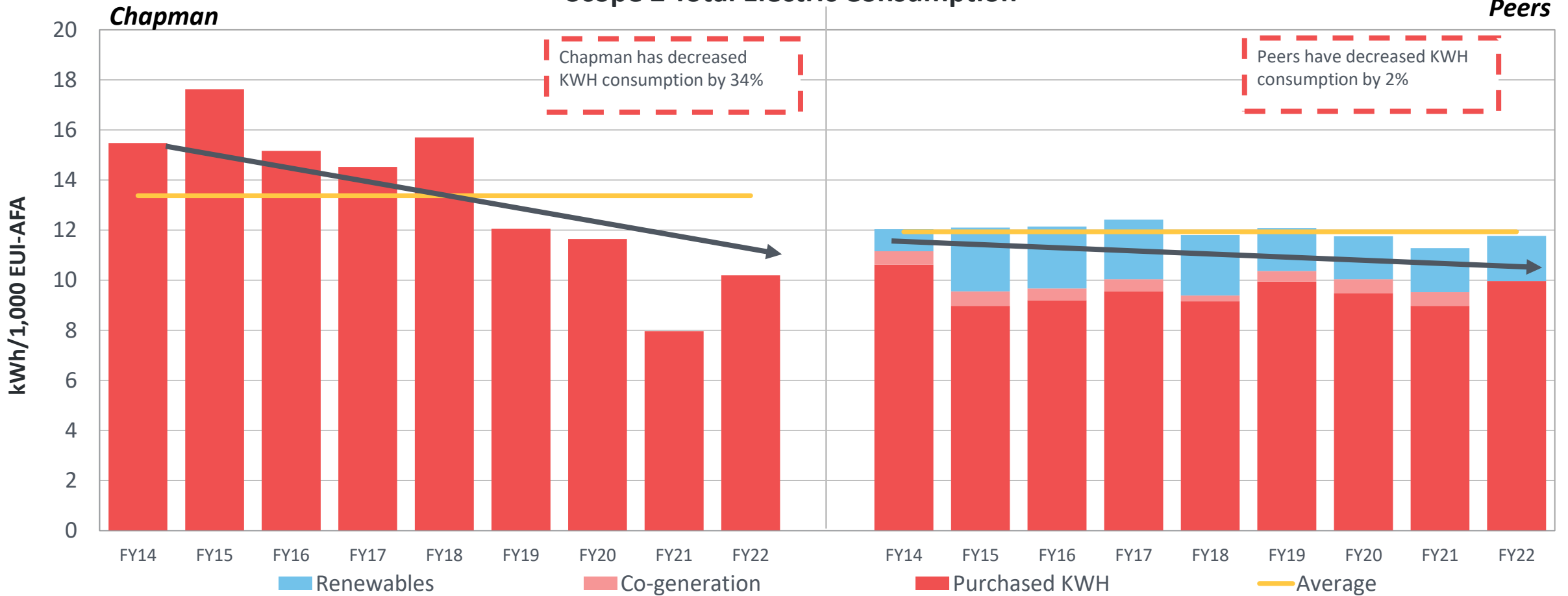


Scope 2: Total Electric Consumption vs. Peers



Since FY19/20 Chapman's electric consumption has been less than peers

Scope 2 Total Electric Consumption

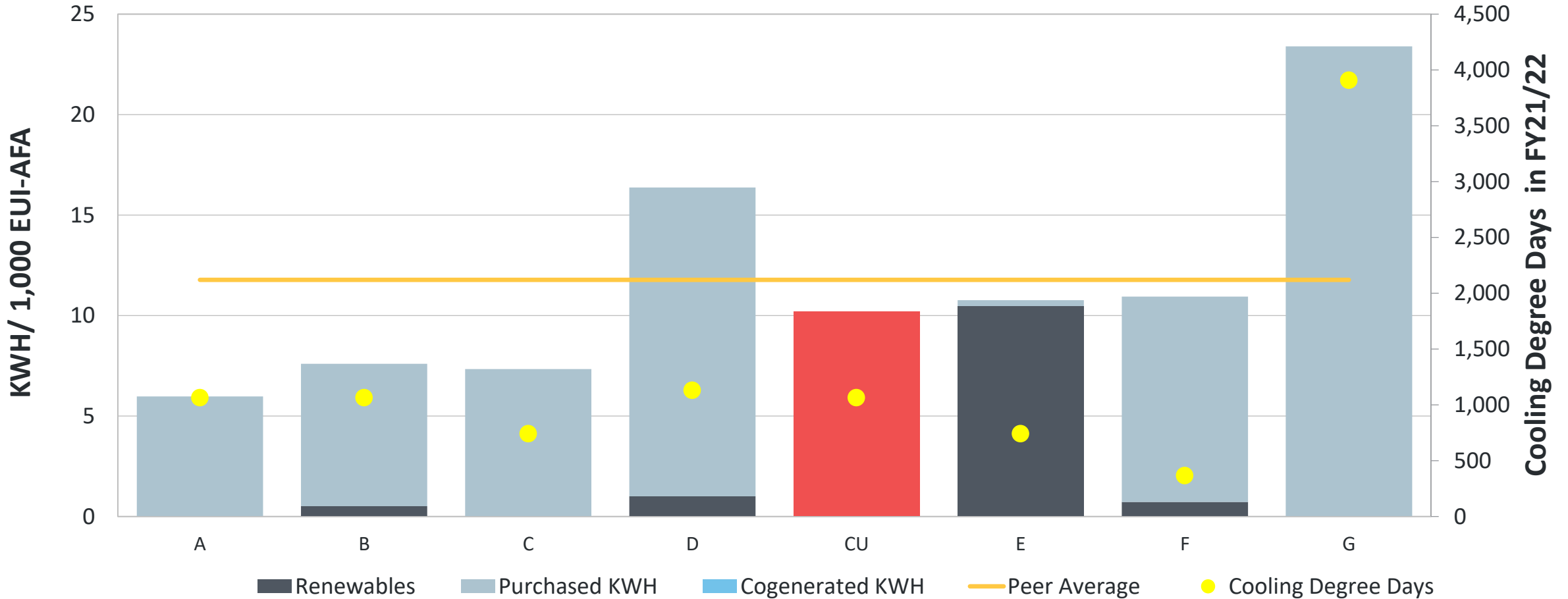


Scope 2: Total Electric Consumption vs. Peers



While total consumption is below peer average, peers diversify their electrical sources

FY22 Electric Consumption vs. Peers



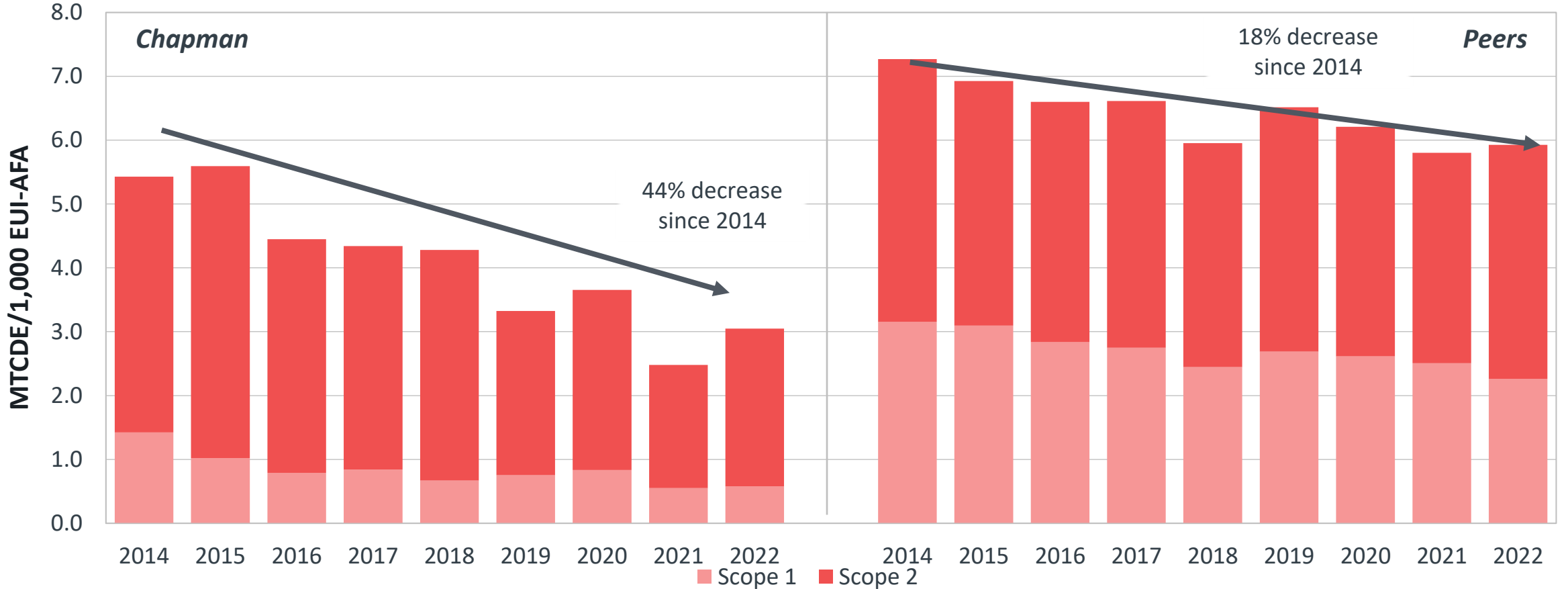
Peers arrayed by technical complexity; The relative mechanical complexity of the campus on a scale of 1-5

Energy Emissions vs. Peers



Chapman's decrease in emissions has been partially due to energy efficiency upgrades

Energy Emissions

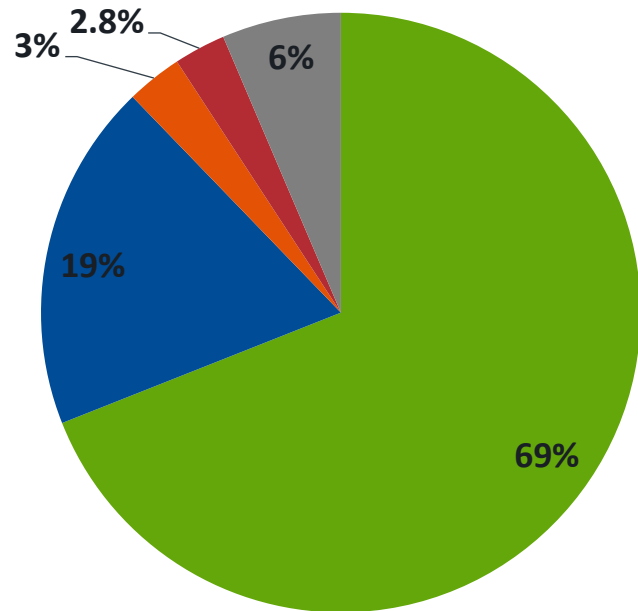


Scope 3: Indirect Emissions Overview



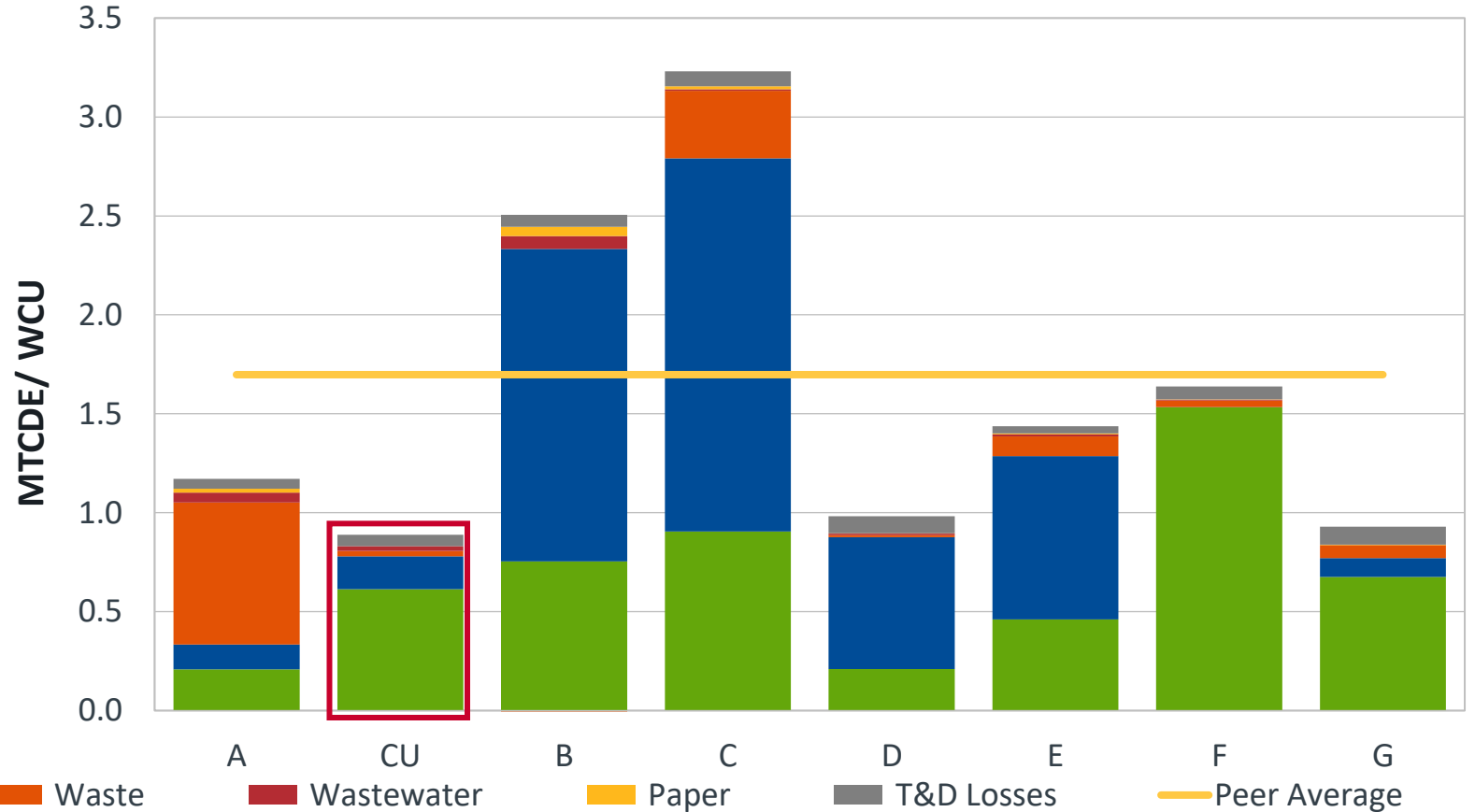
With fewer students occupying dorms total commuting emissions increased

FY22 Scope 3 Emissions



Commuting Travel

Scope 3 Emissions vs Peers

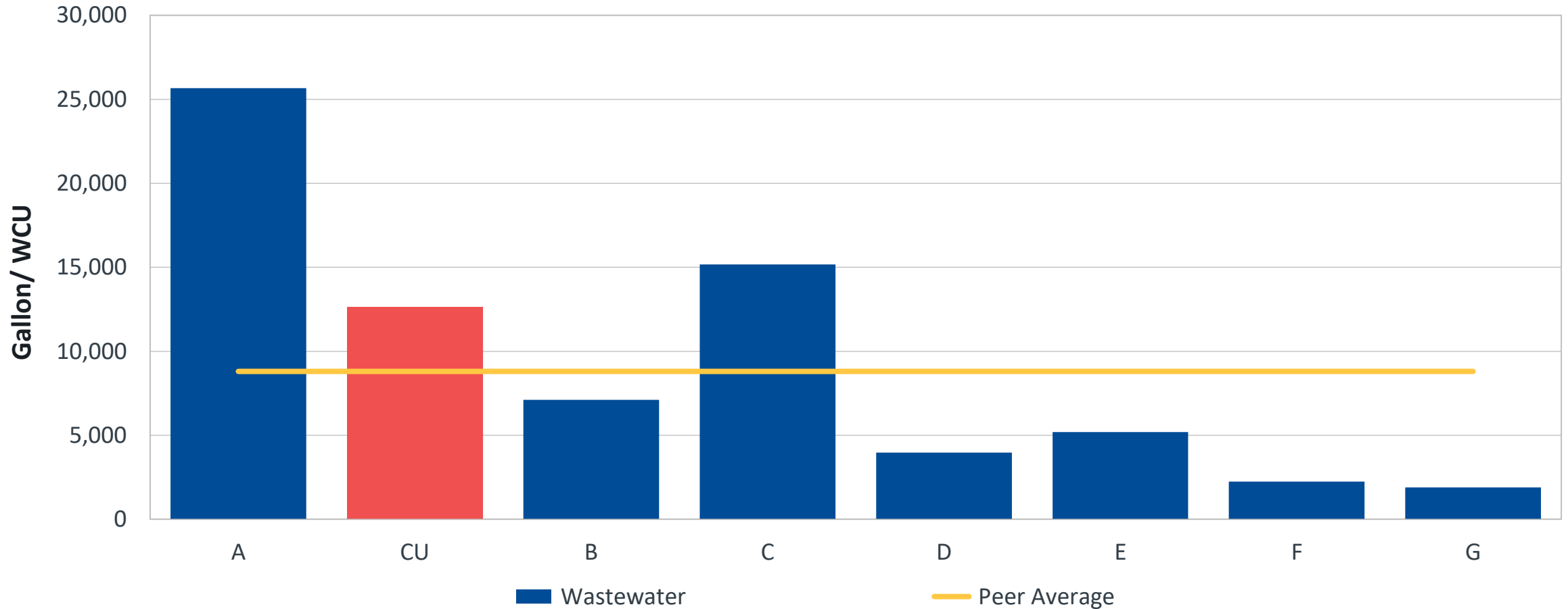


Wastewater Production Similar to Peers



While wastewater is less than 1% of emissions, water reduction should be prioritized

Wastewater Production vs. Peers

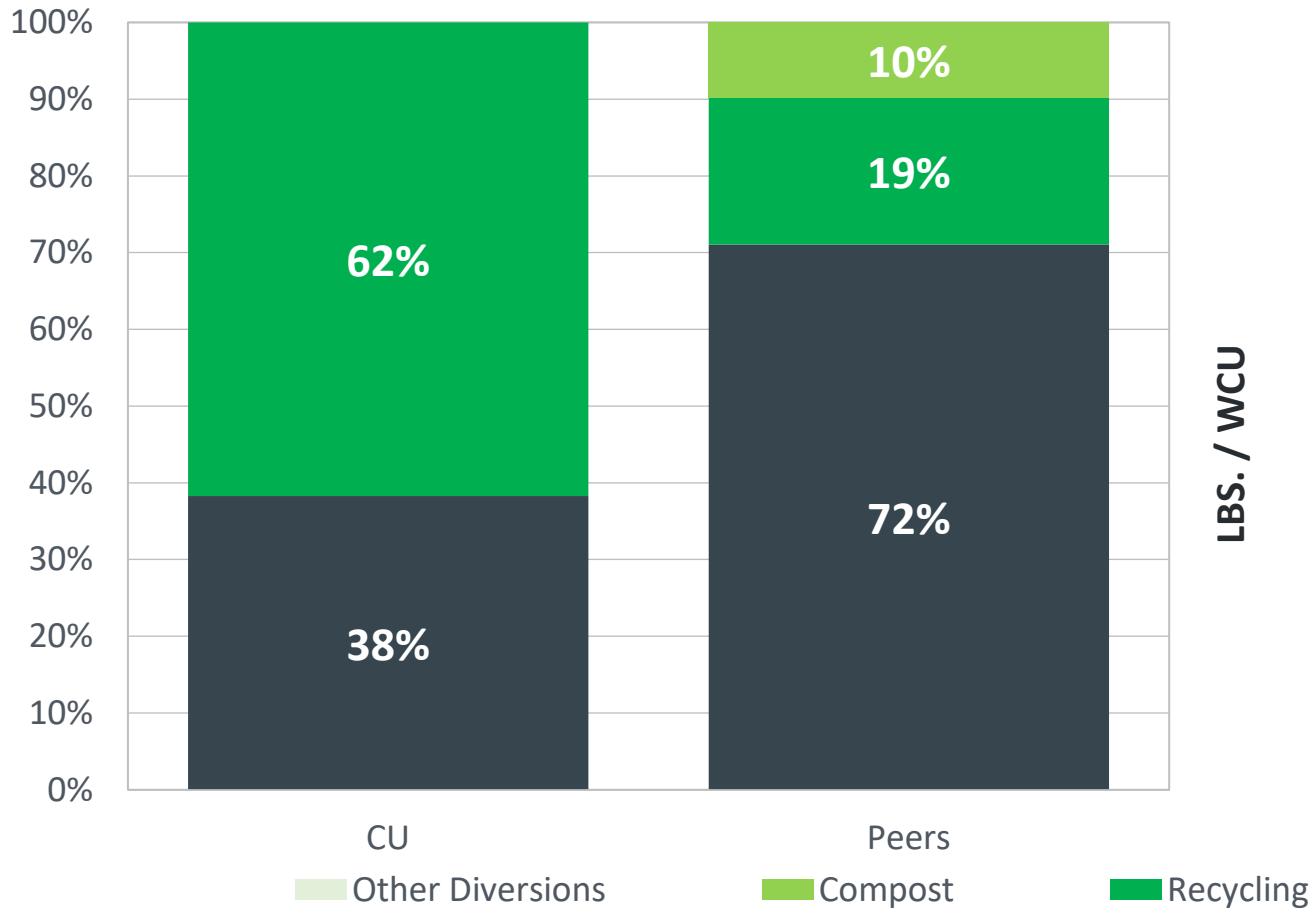


A Closer Look at Waste

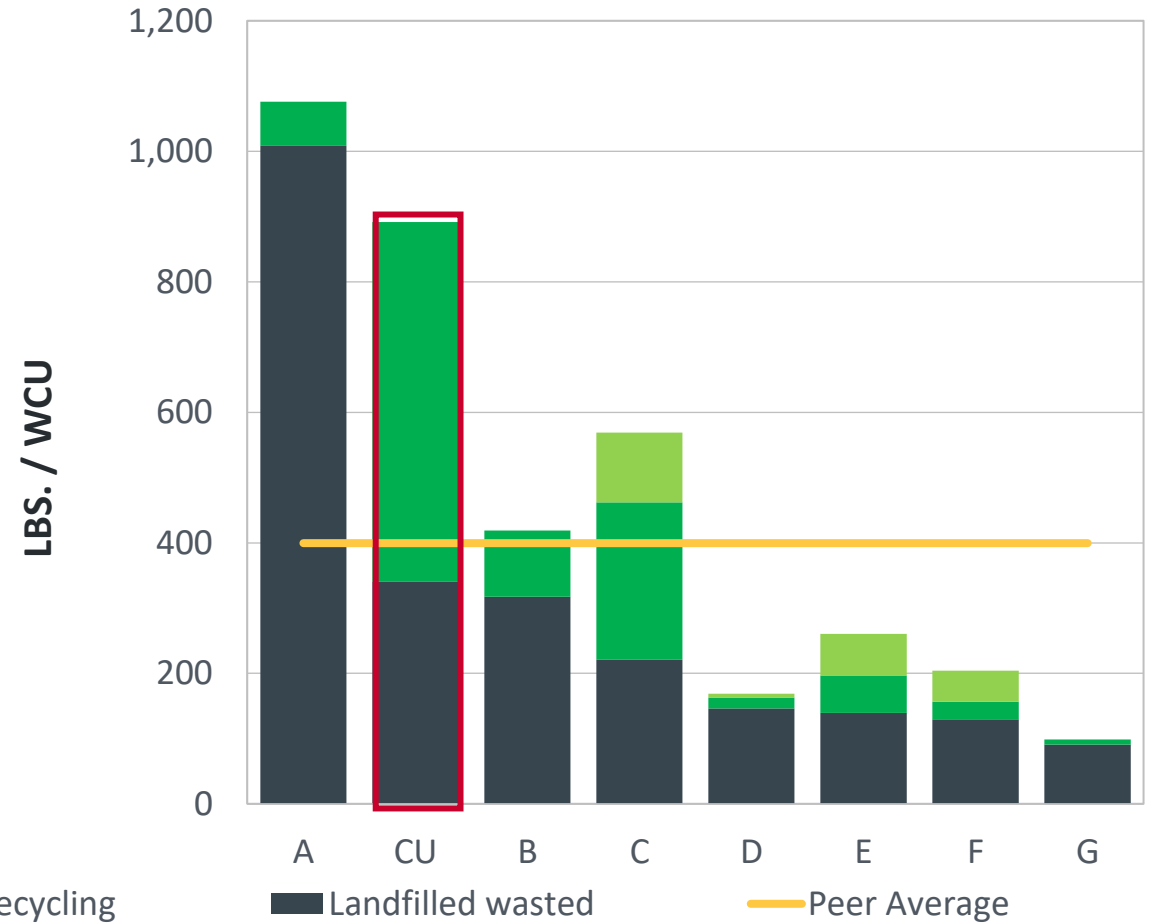


Chapman diverts more waste to recycling than peers, but produces more total waste

FY22 Diversion rate vs Peers



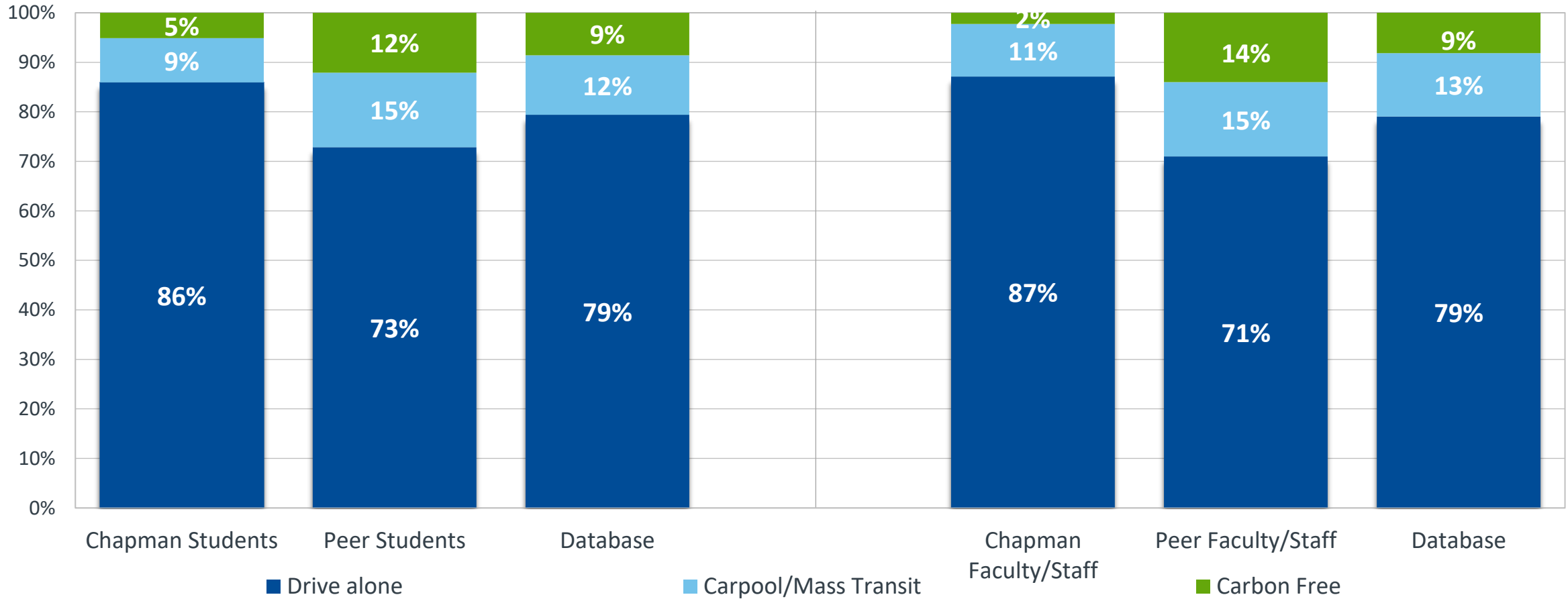
FY22 Waste vs Peers



Commuting Profile by Mode of Transportation

Chapman faculty/staff utilize alternative transportation methods less than peers

Commuting Mode by Demographic

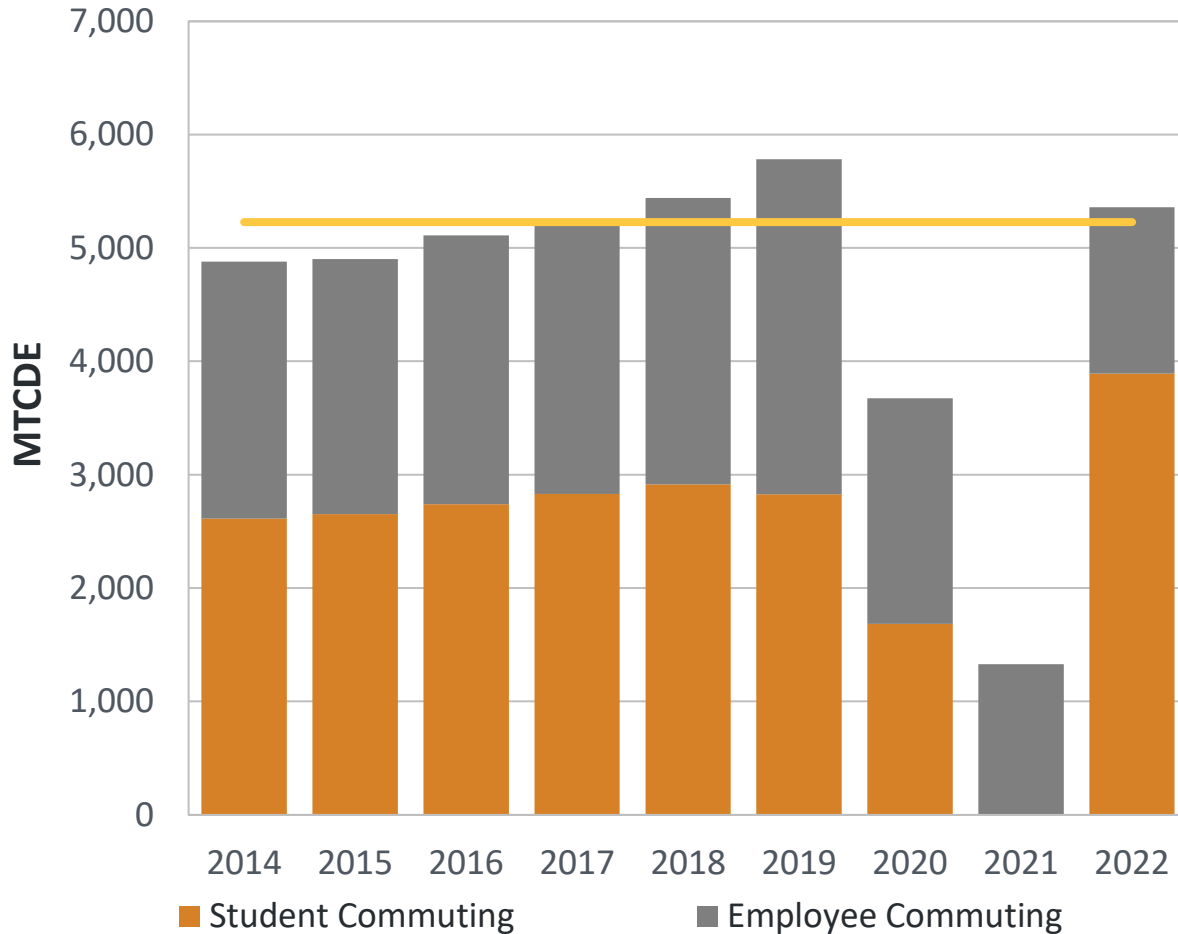


Total Commuting Emissions

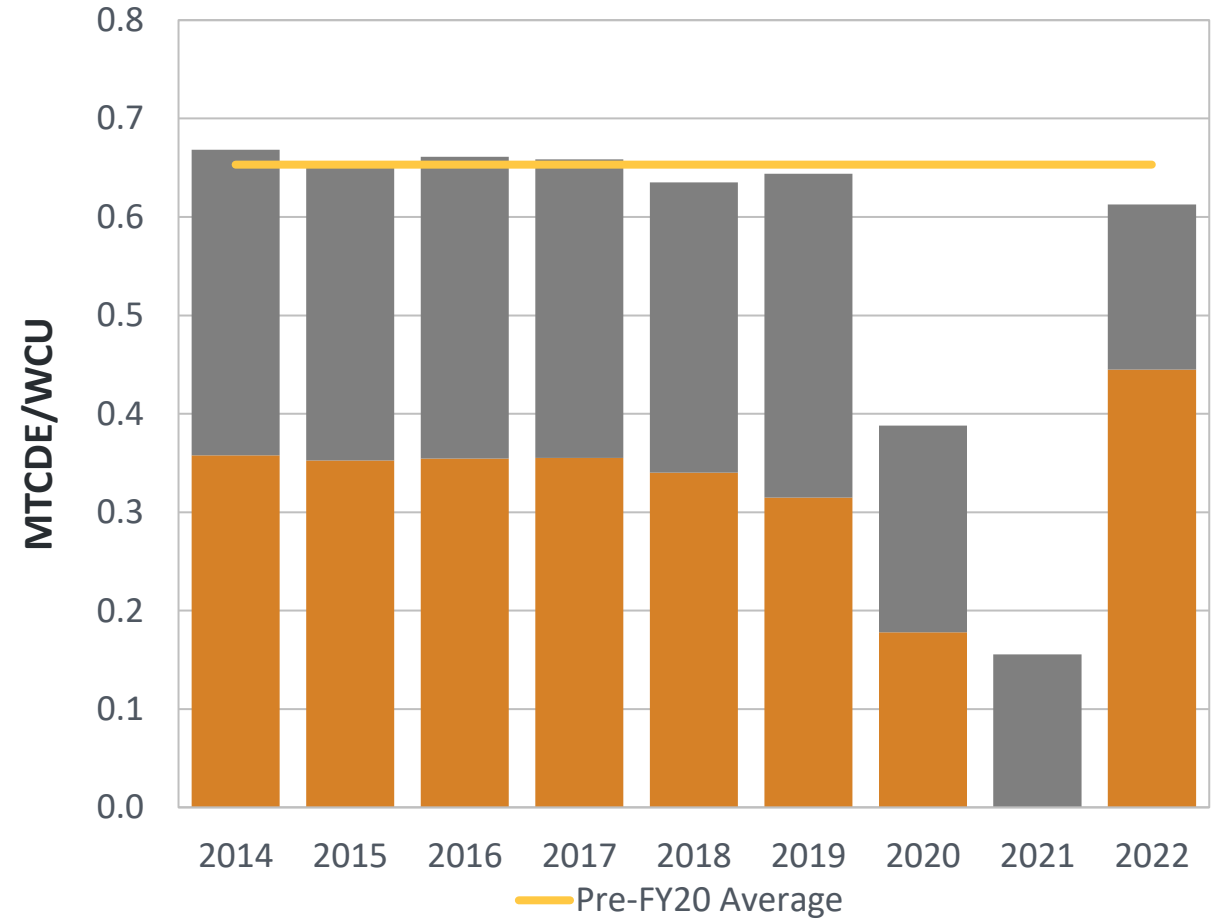


With more students commuting, overall emissions reached pre-Covid average

Commuting Emissions



Normalized Commuting Emissions

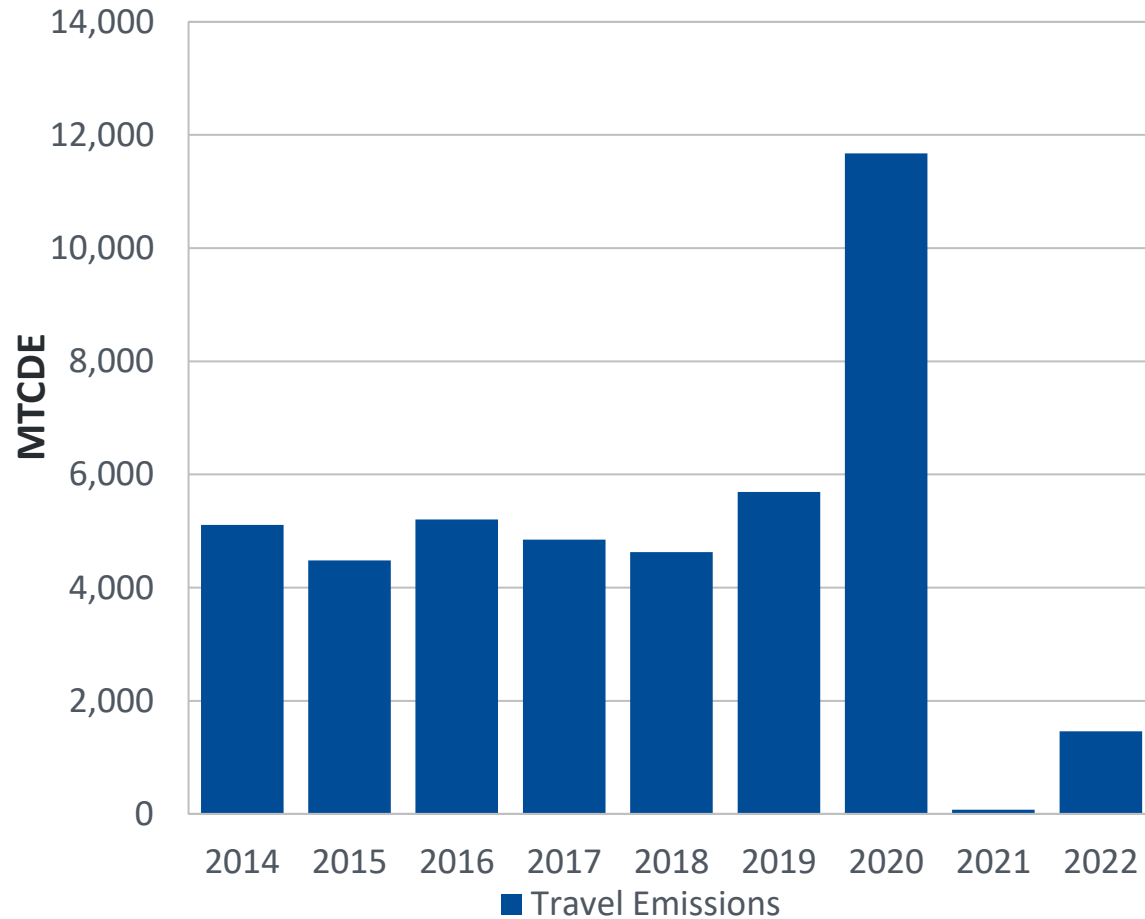


Total Travel Emissions

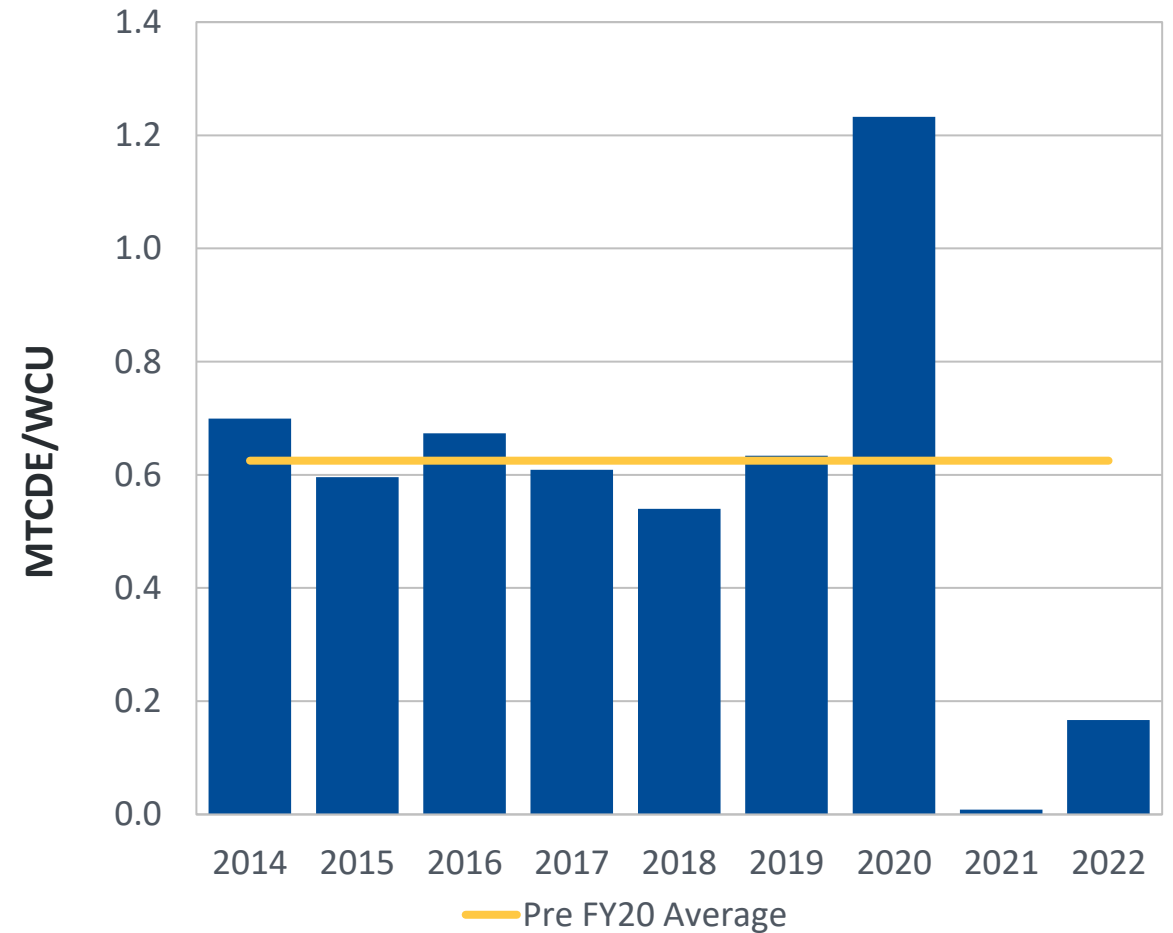


With little travel in FY22, emissions did not reach pre-Covid levels

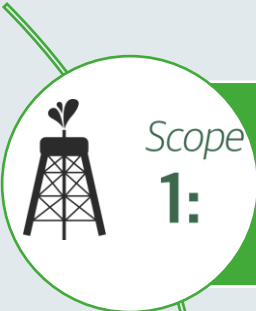
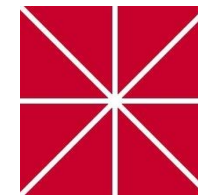
Travel Emissions



Normalized Travel Emissions



Concluding Comments



Scope
1:

Chapman's Scope 1 emissions saw an overall increase due to an increase of natural gas consumption and fleet operations increasing from the prior fiscal year. Going forward, Chapman should electrify the campus fleet and invest in major building remodels to increase overall energy efficiency. If commodity costs continue to increase buildings may need to be electrified.



Scope
2:

Chapman will most likely see electricity consumption increase as larger buildings return to full occupancy and The Keck center continues to be built out. Beyond prioritizing energy efficiency projects, Chapman should consider on campus solar, or purchasing renewal energy credits to negate their emissions.



Scope
3:

Scope 3 saw an increase in commuting emissions as fewer students occupied the dorms. While student commuting should decrease with more students living on campus. However, directly financed travel is most likely to increase. Chapman should begin building out an offset program to mitigate student and staff travel.