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University of New Haven

FY18 Sustainability Presentation

February 2019

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

Why Sustainability?

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Sustainability: An ecosystem, a lifestyle, or a community that supports itself and its surroundings

Globally

We cannot maintain our quality of life as human beings, the diversity of life on Earth, or Earth's ecosystems unless we embrace Sustainability.

Internationally

Sustainability focuses on balancing the fine line between competing needs – our need to more forward technologically and economically, and the need to protect the environment in which we live in.

Regionally

Sustainable CT strives to create a more sustainable life by respecting the finite capacity of the natural environment, and equitably promoting the health and well-being of its residents.

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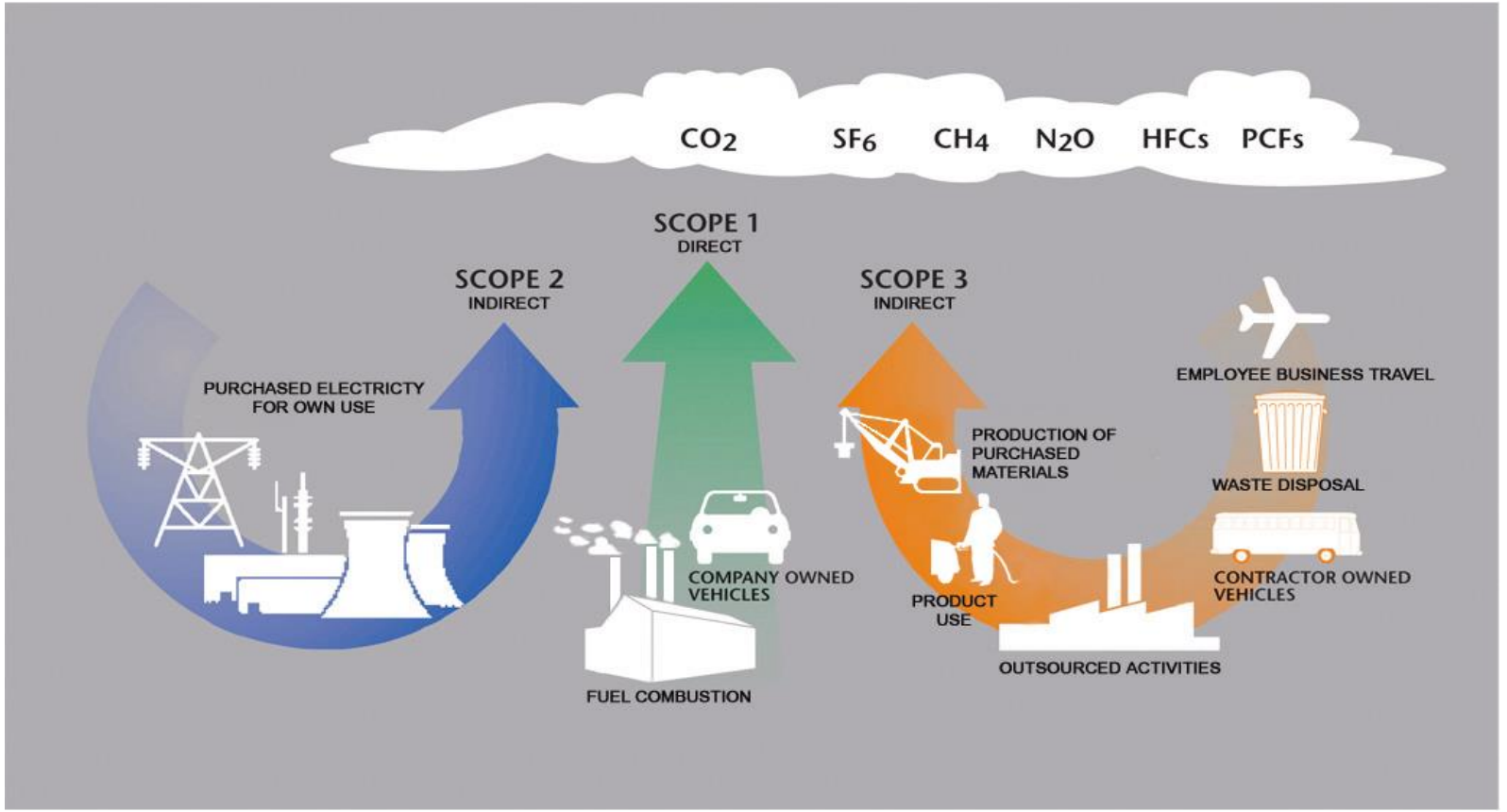
seeks to design and implement campus enhancements that nurture a culture of environmental and social responsibility.

Typical GHG Emissions by Scope

University of New Haven

Slide courtesy of CA-CP (Clean Air Cool Planet)



Scope 2: Emissions from utility production not at the institution

Scope 1: Emissions from the direct activities of the campus

Scope 3: Indirect emissions including transportation, waste disposal, etc.

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Peer Institutions Used for Benchmarking

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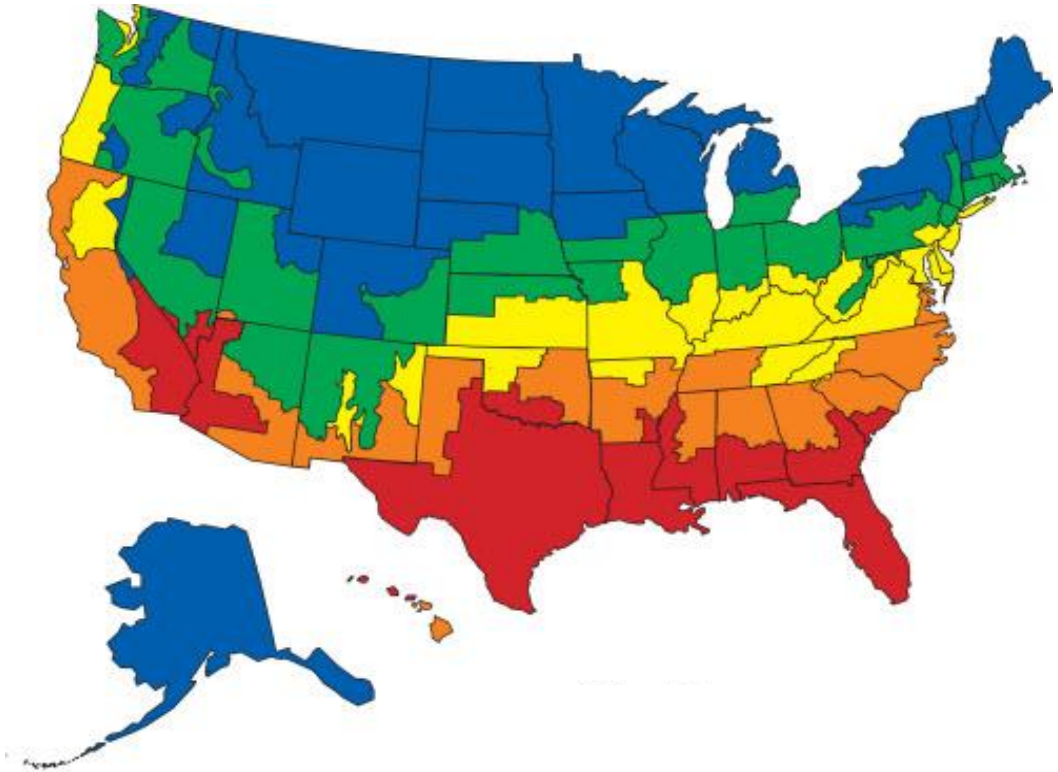
University of New Haven is located in climate zone 2



Institution Name	Location
Babson College	*Wellesley, MA*
Bentley University	*Waltham, MA*
Emerson College	*Boston, MA*
Fitchburg State University	*Fitchburg, MA*
Hamilton College	*Clinton, NY*
Union College	*Schenectady, NY*
Worcester State University	*Worcester, MA*

Sustainability Solutions Measurement and Analysis Members

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

Peer Group Based On

Size

Technical Complexity

Climate Zone

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University of New Haven Sustainability Overview

FY18 Emissions Profile at University of New Haven

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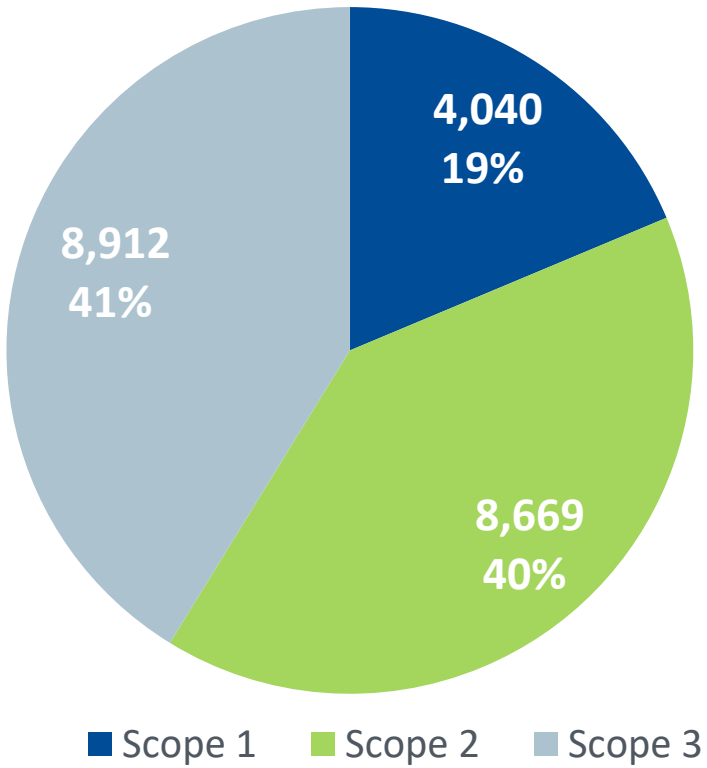
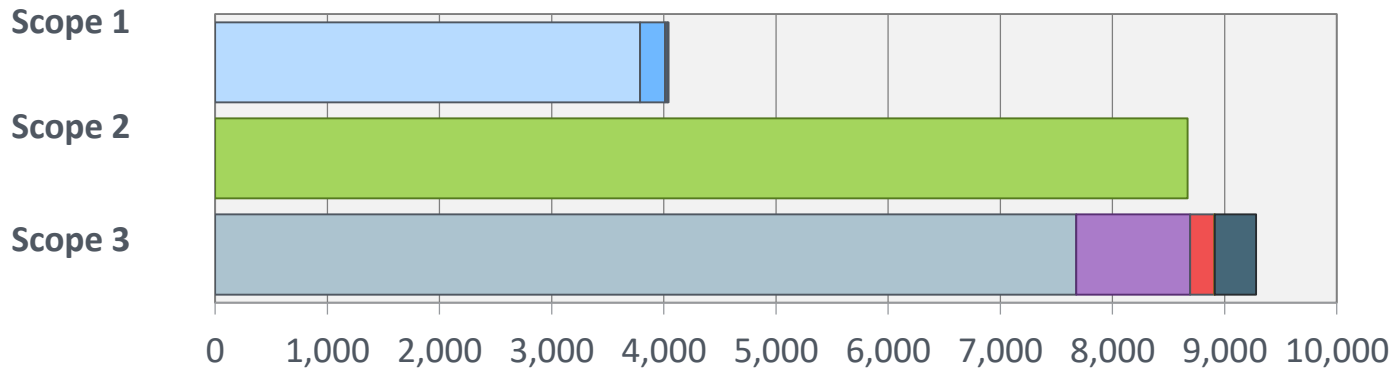
Emissions by Scope

(FY18)



MTCDE by Source

(FY18)



MTCDE	Scope 3	Scope 2	Scope 1
On-Campus Stationary			3,789
Direct Transportation			222
Refrigerants & Chemicals			19
Fertilizer			10
Purchased Electricity		8,669	
Commuting	7,677		
Travel	1,014		
Waste/Wastewater	217		
Paper Purchases	4		
T&D Losses	367		

Historical Emissions Profile – 39% Increase Since FY14

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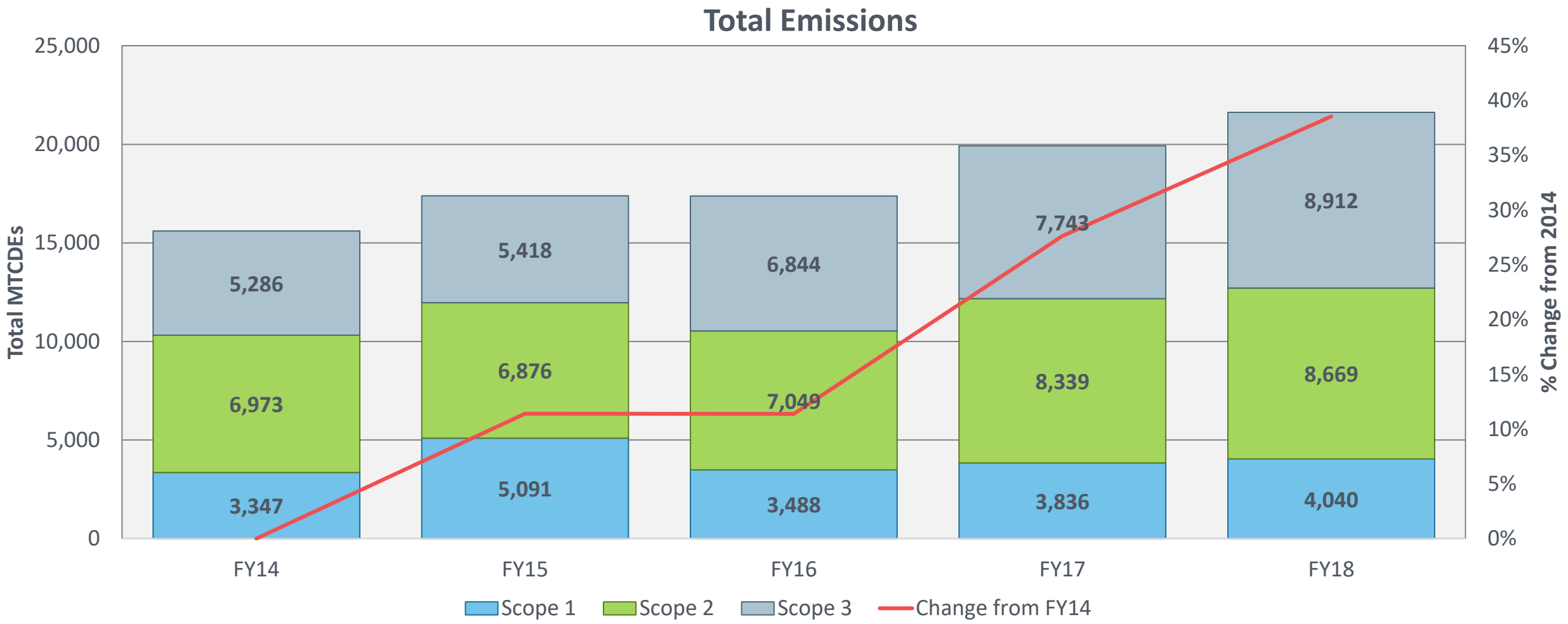

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Benchmarked FTE's and GSF at University of New Haven

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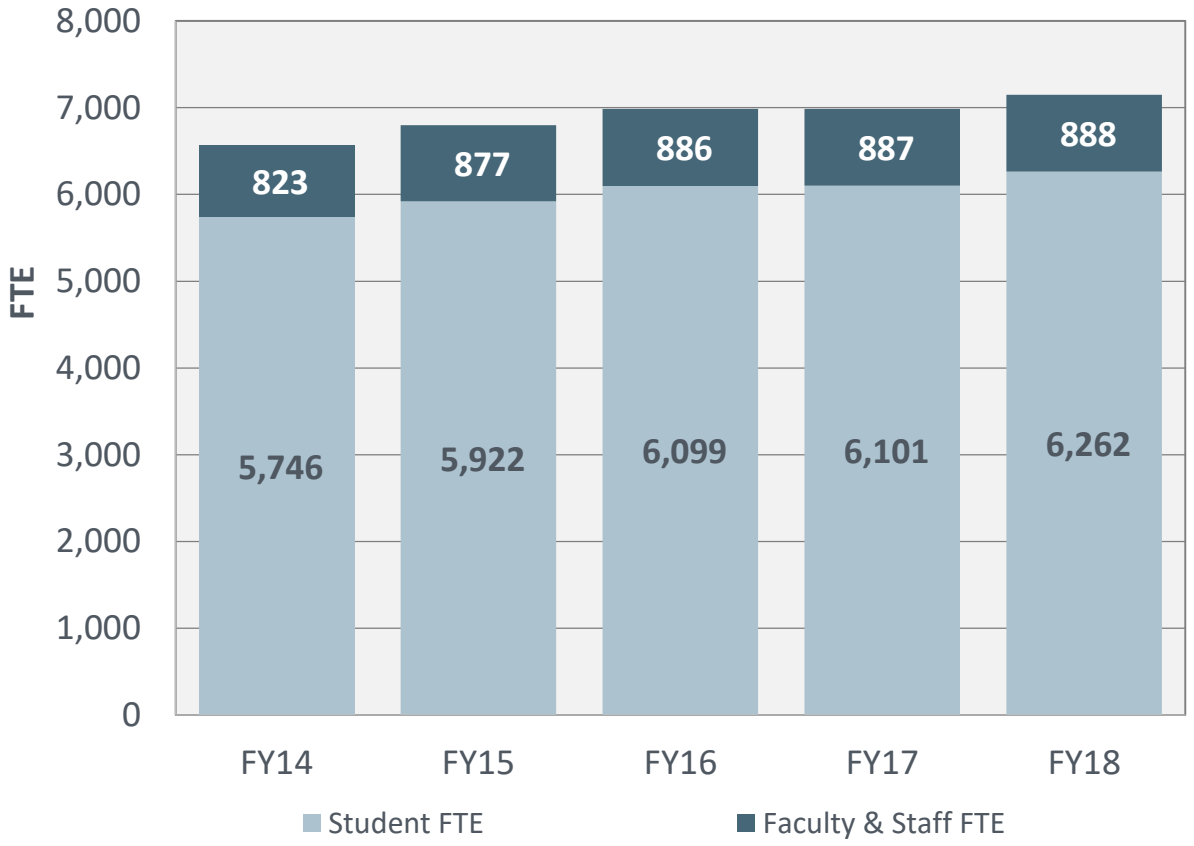
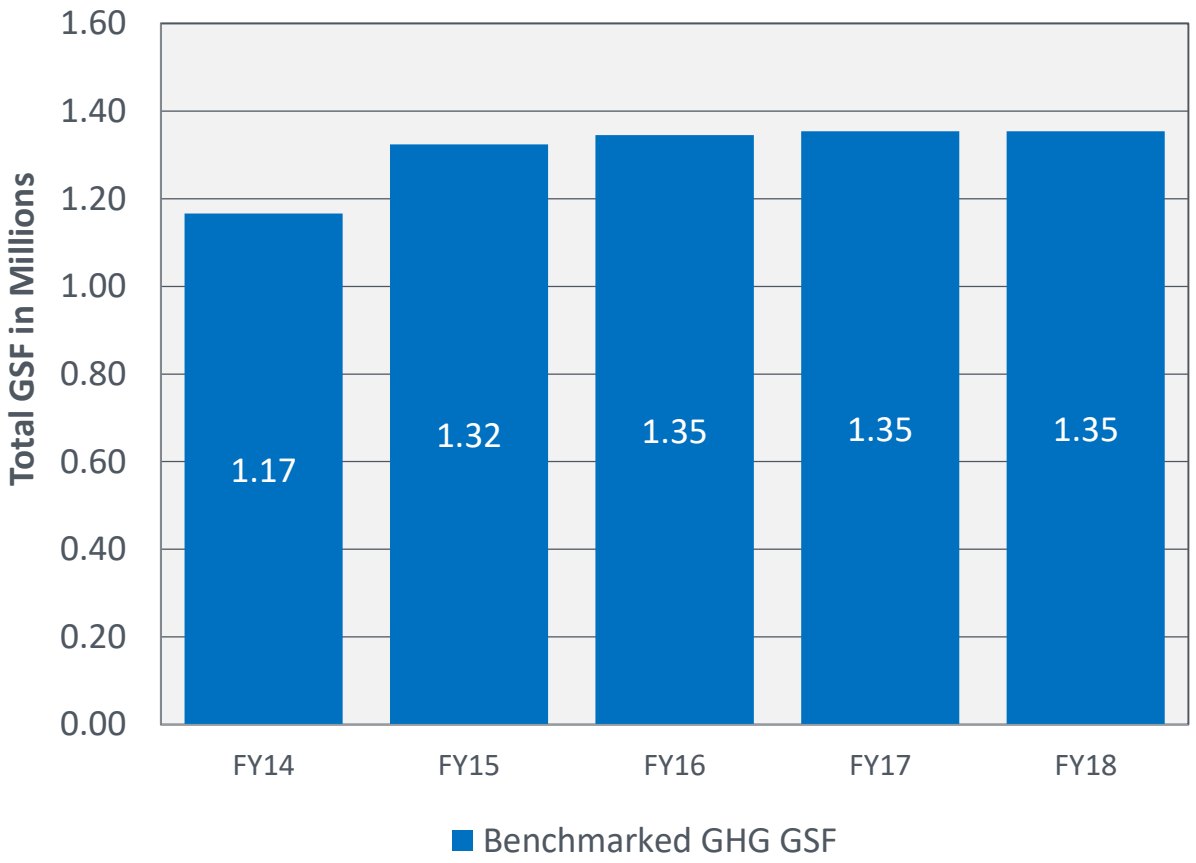
Both FTE's and space have grown since FY14

Campus Users Over Time



GSF Over Time



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Comparing Changes in Emissions to Changes on Campus

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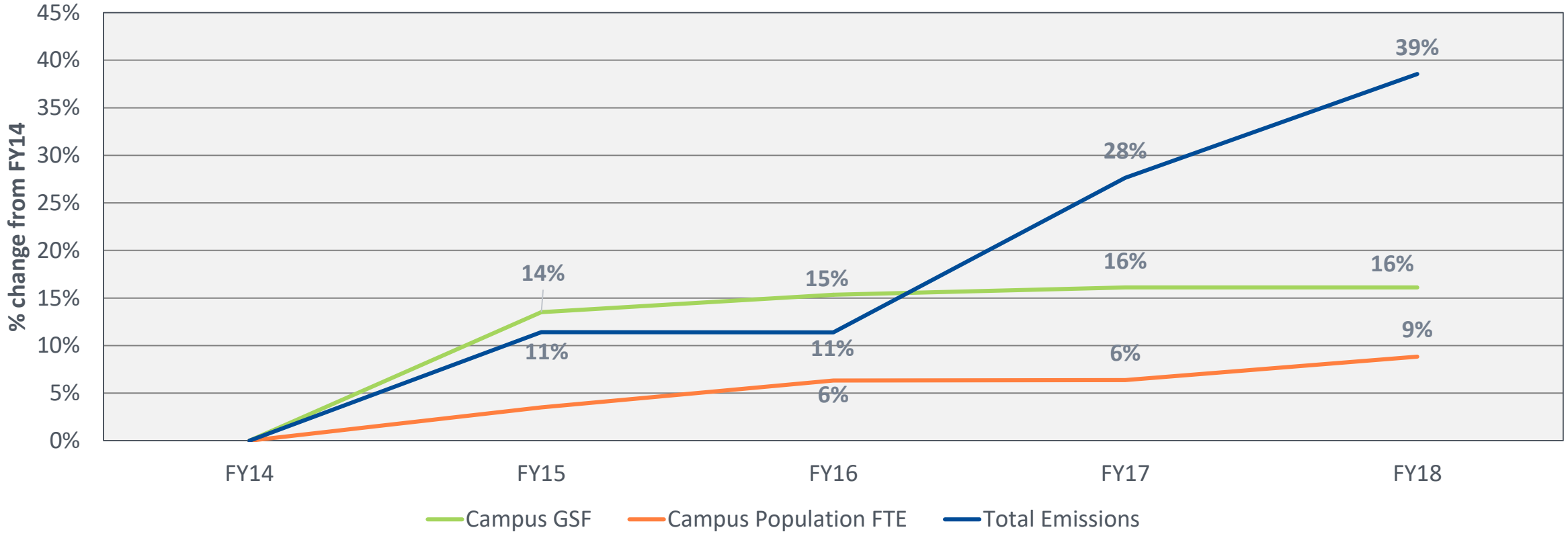
Change in Emissions vs. Change in Campus Size and Population

Baseline in FY14



Two Different Ways to Benchmark GHG Emissions

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GHG Emissions per Student

Stresses efficient use of space.

$$\frac{\text{Gross GHG Emissions}}{\text{Total Student FTE}}$$

GHG Emissions per 1,000 EUI Adjusted Floor Area

Stresses intensity of operations and behaviors.

$$\frac{\text{Gross GHG Emissions}}{\text{Total GSF in Footprint}} \times 1{,}000$$

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GHG Emission Peer Benchmarks

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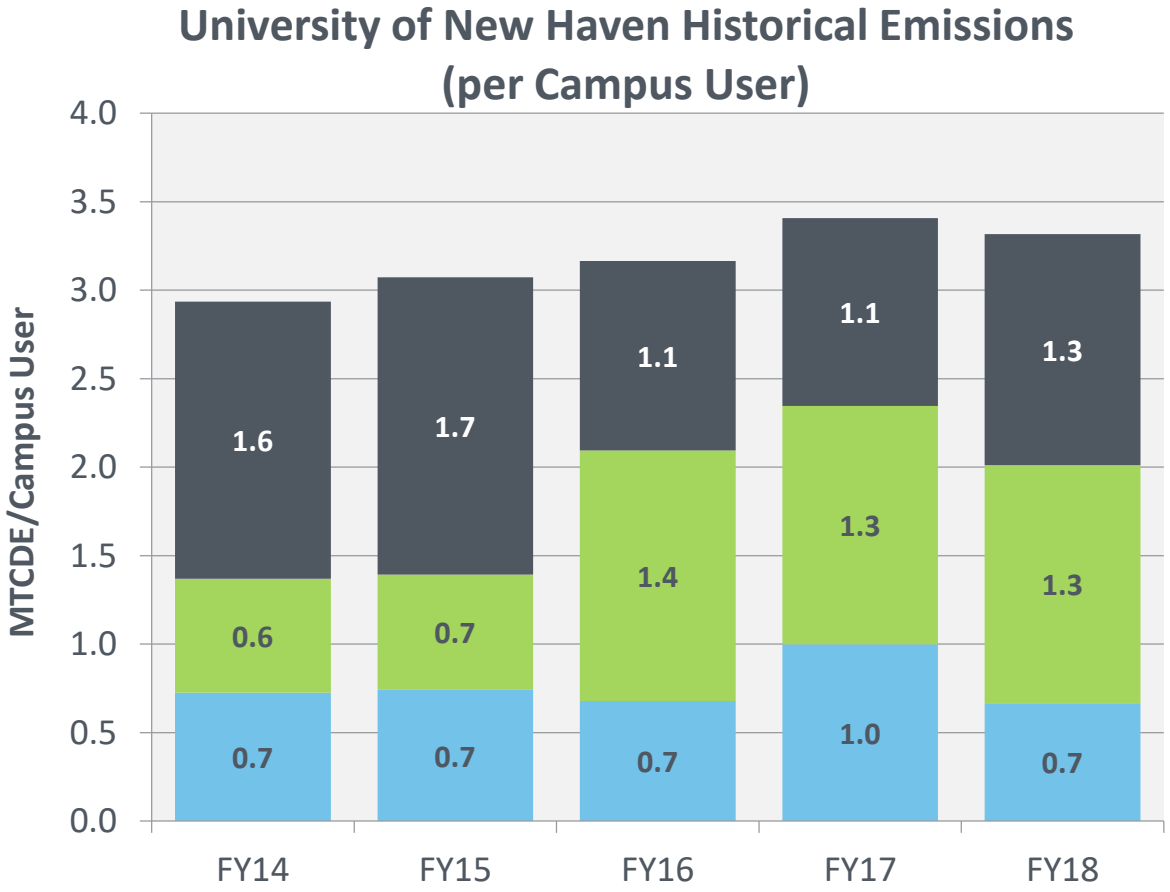
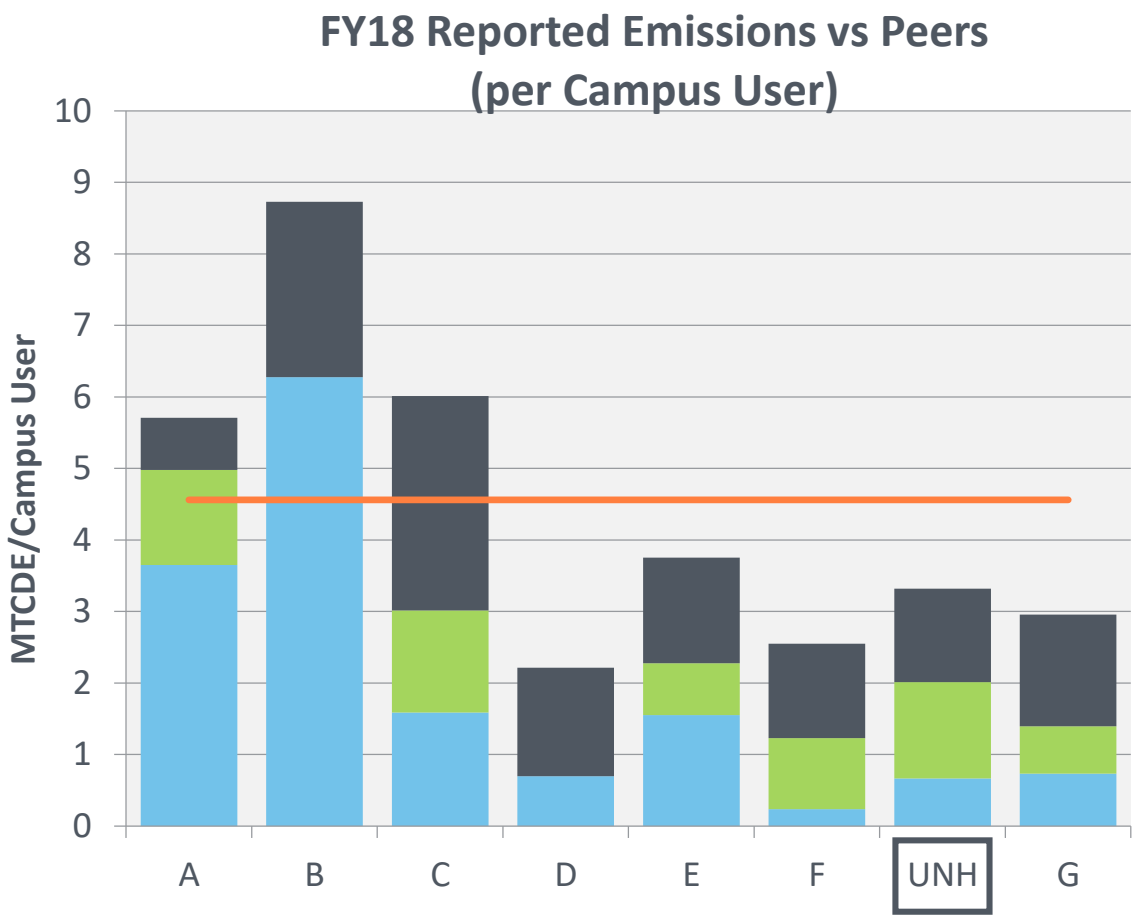
Campus User includes all Staff, Student, and Faculty Full-Time Equivalents (FTE)





Peers listed by density factor

***Campus User** = all Staff, Student & Faculty Full Time Equivalent (FTE)*

Scope I Scope II Scope III

Peers listed by density factor

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GHG Emission Peer Benchmarks

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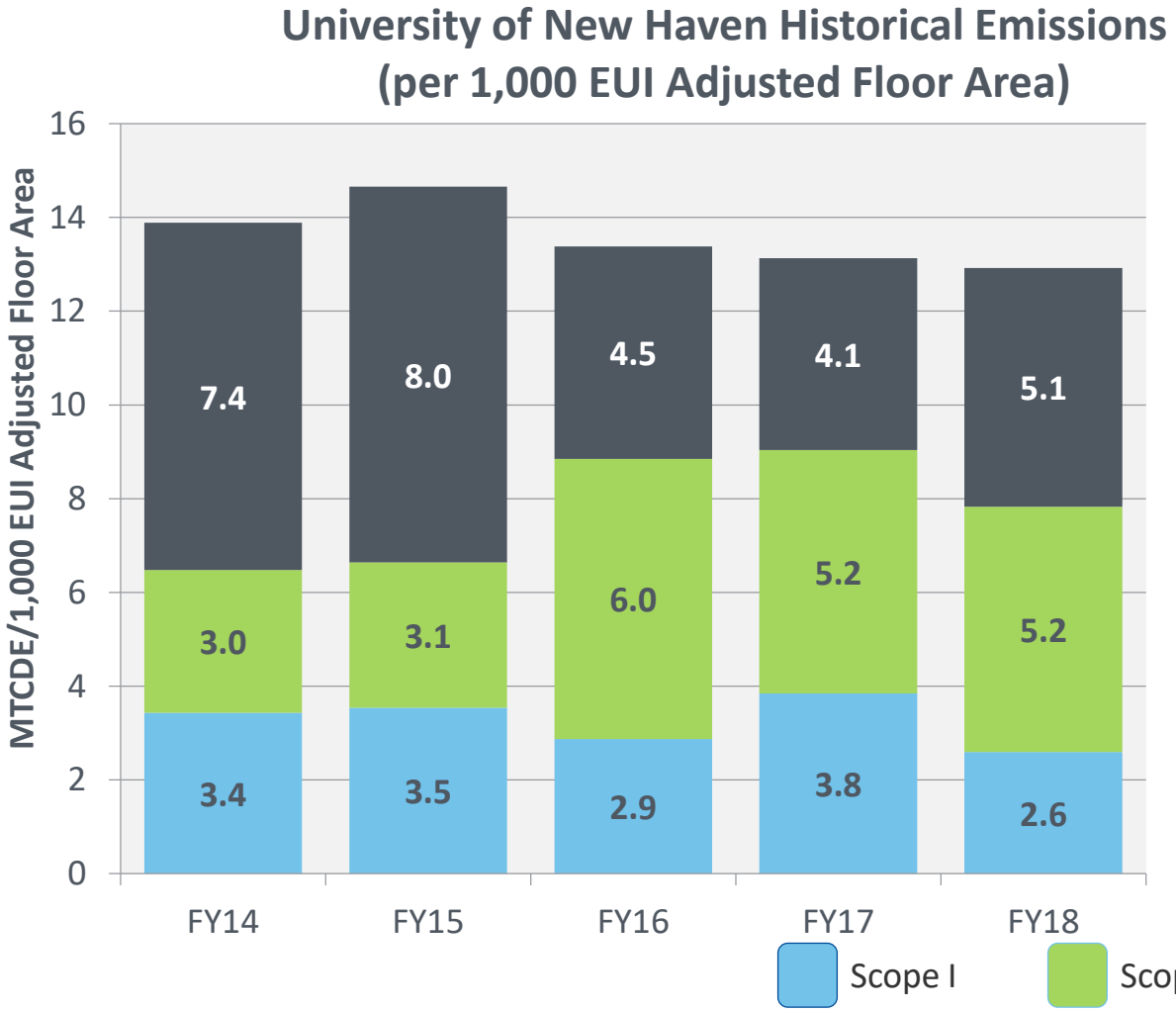
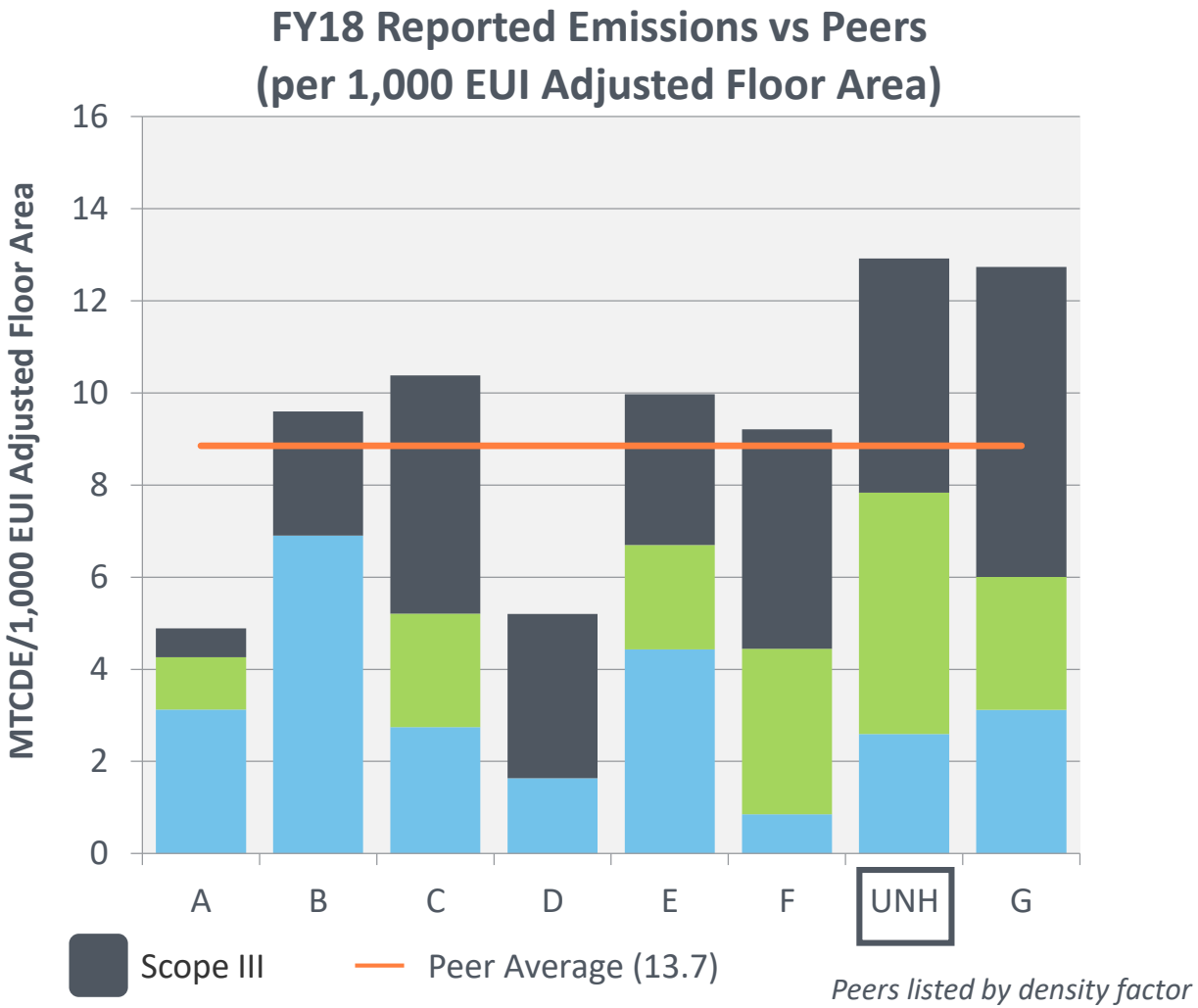
GSF calculated using new GHG Protocol on SIMAP slide





Peers listed by density factor

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Scope 1

Stationary fuel consumption

Scope 1 Stationary: Fuel Mix

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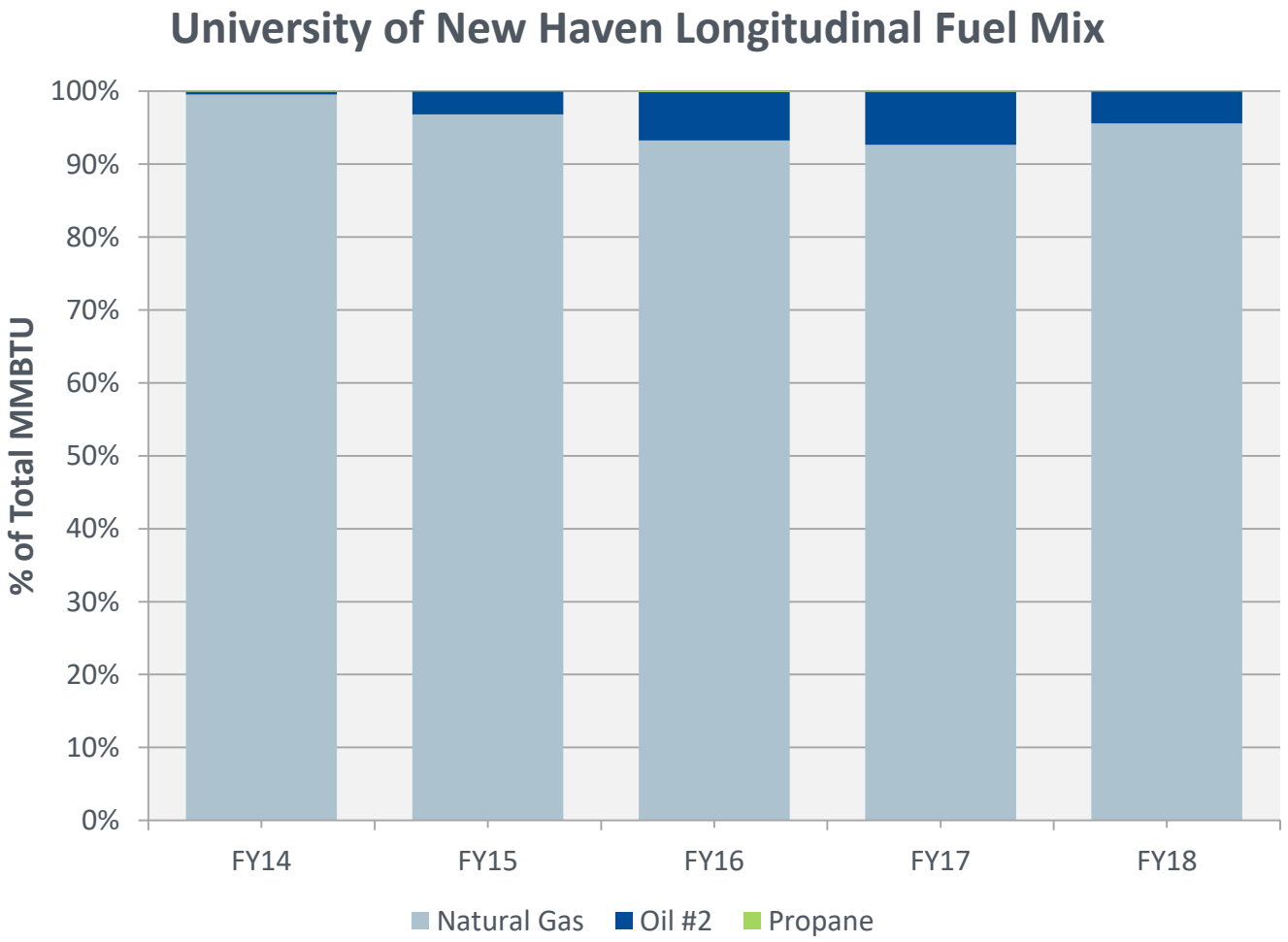
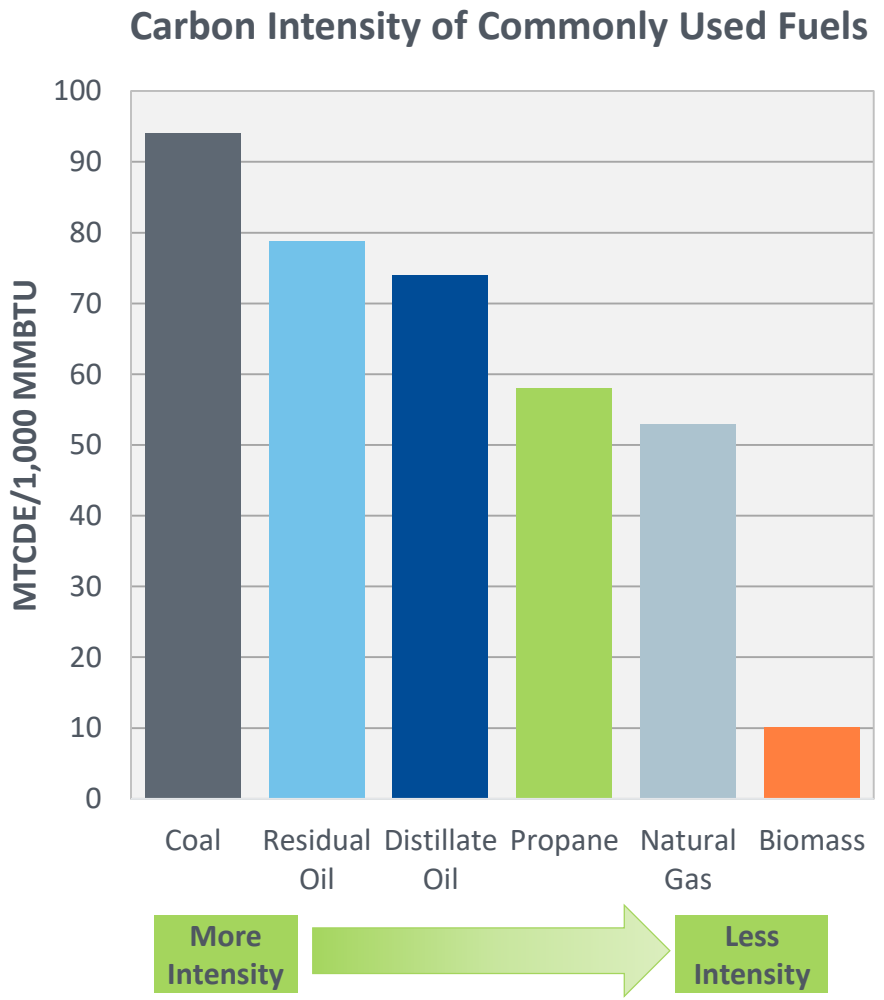
New Haven benefits from consuming mainly a low carbon intensity fuel, natural gas





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Impact of Weather on Energy Consumption

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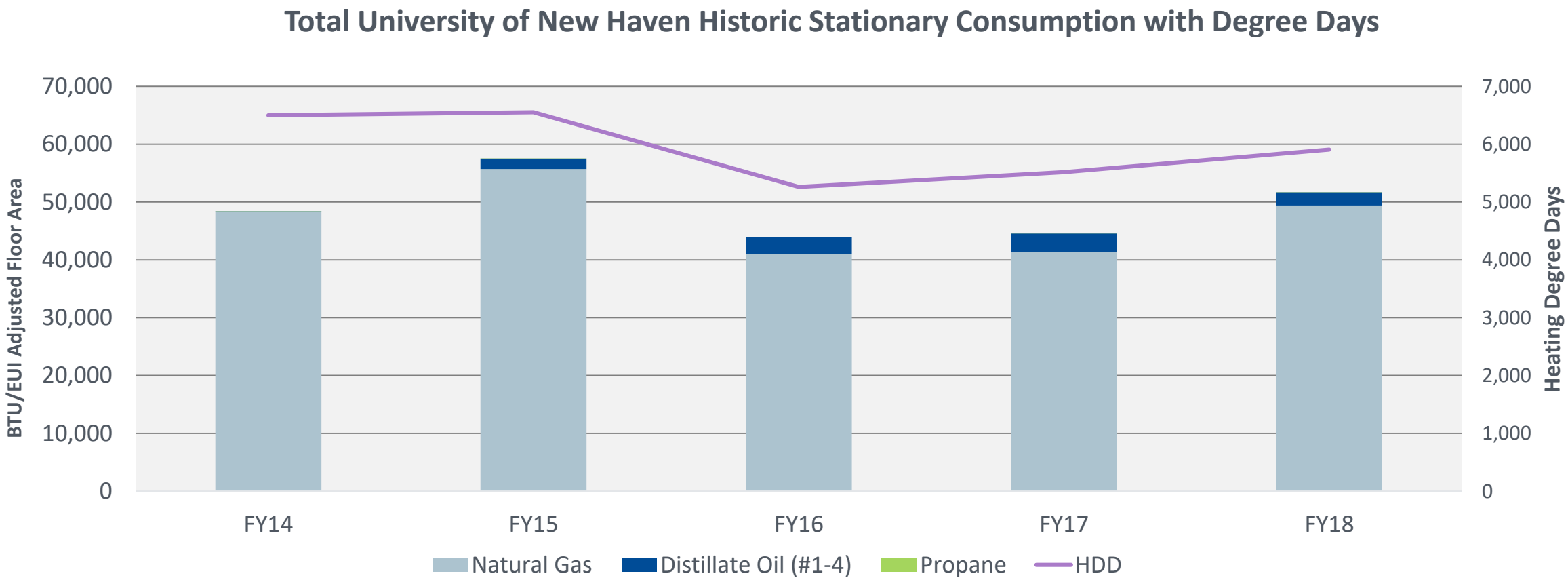
Heating degree days can influence Natural Gas consumption



***Heating Degree Day (HDD)**: The number of degrees that a day's average temperature is below 65º Fahrenheit (18º Celsius), which is the temperature below which buildings need to be heated.*

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Stationary Emissions Driven by Consumption Levels

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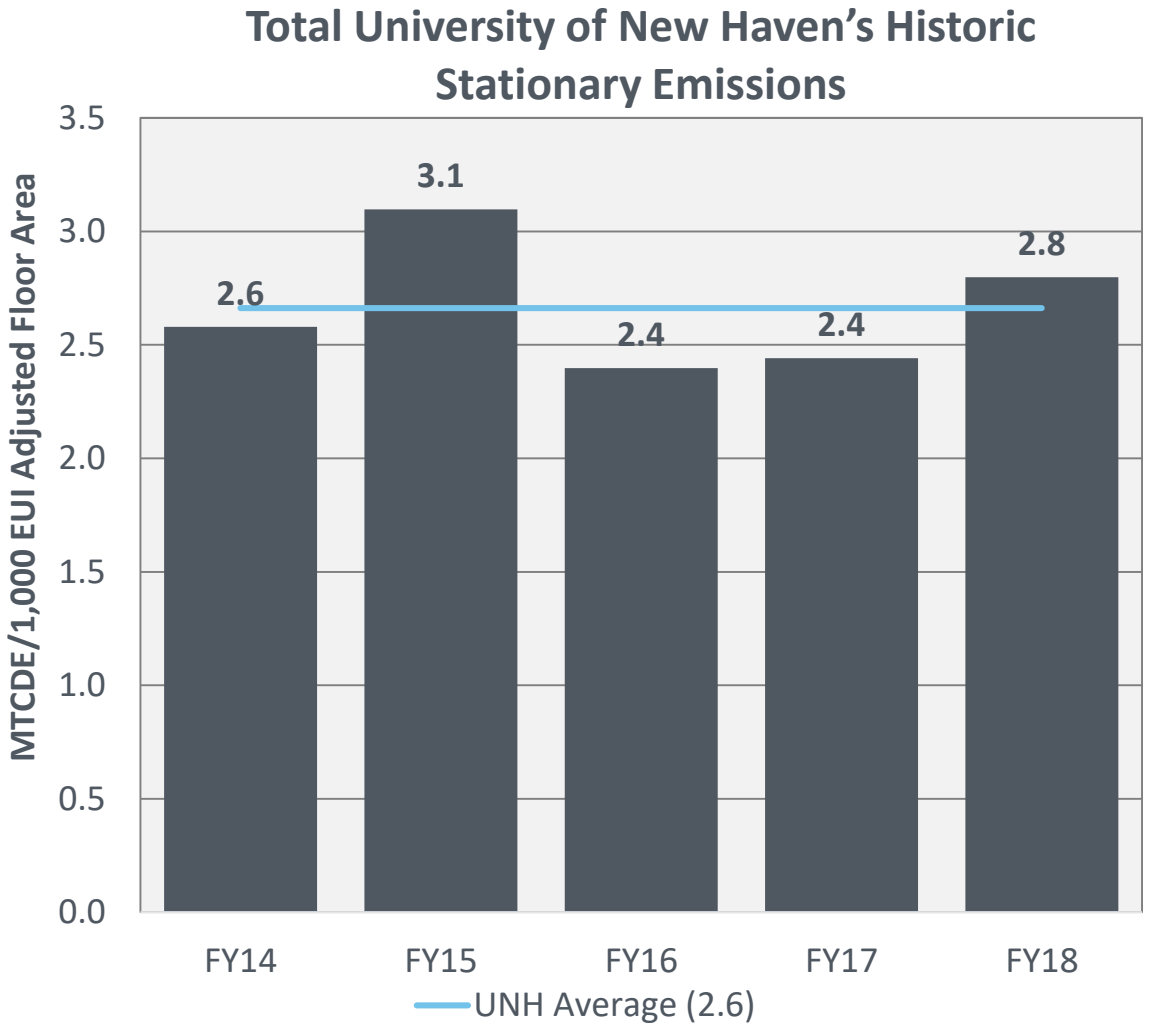
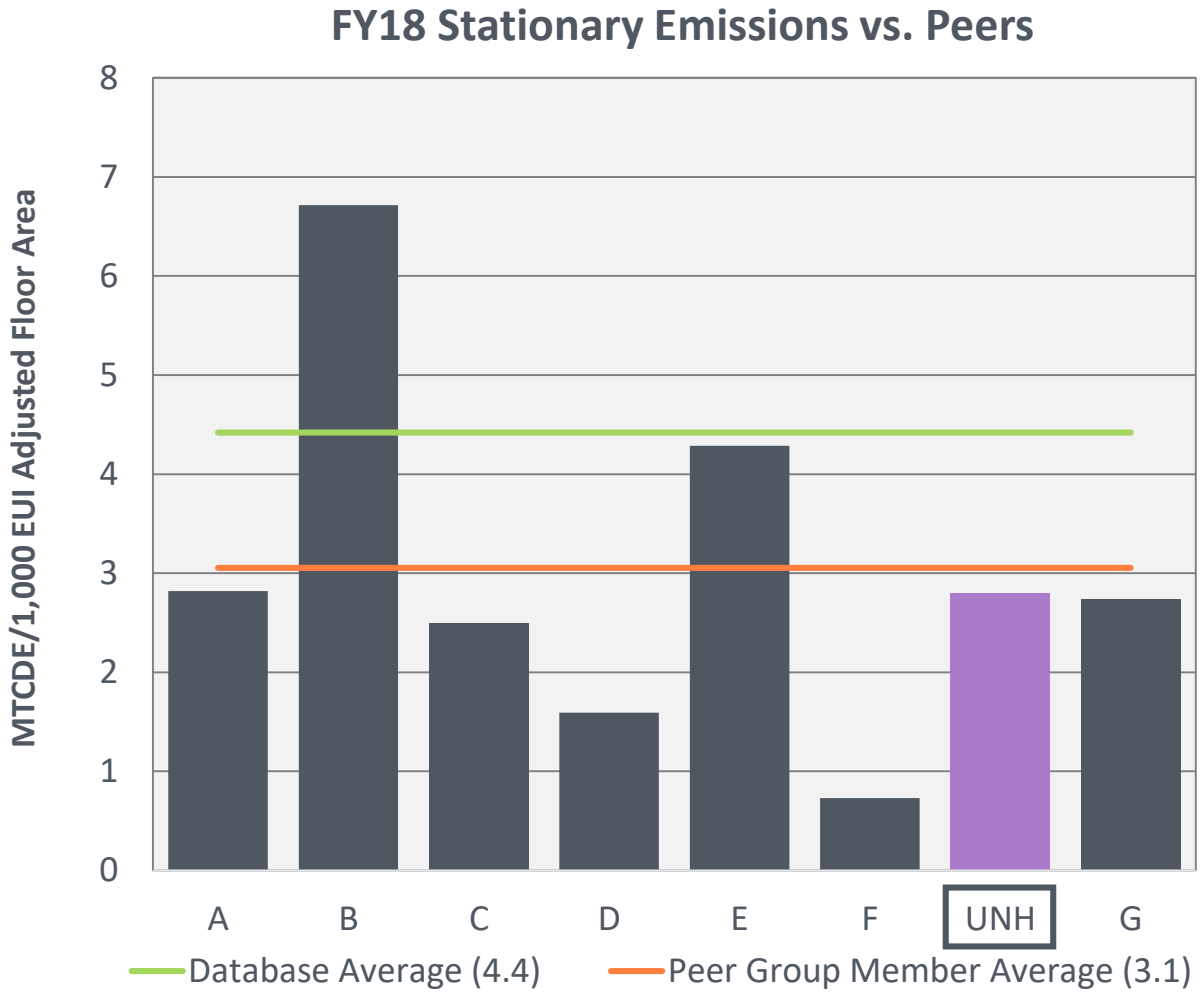
Increased fossil fuel efficiency leads to improved stationary fuel performance





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*Database includes all Sightlines Sustainability Members; Public & private institutions from across the country

Peers listed by density factor

Fertilizer Consumption Compared to Peers

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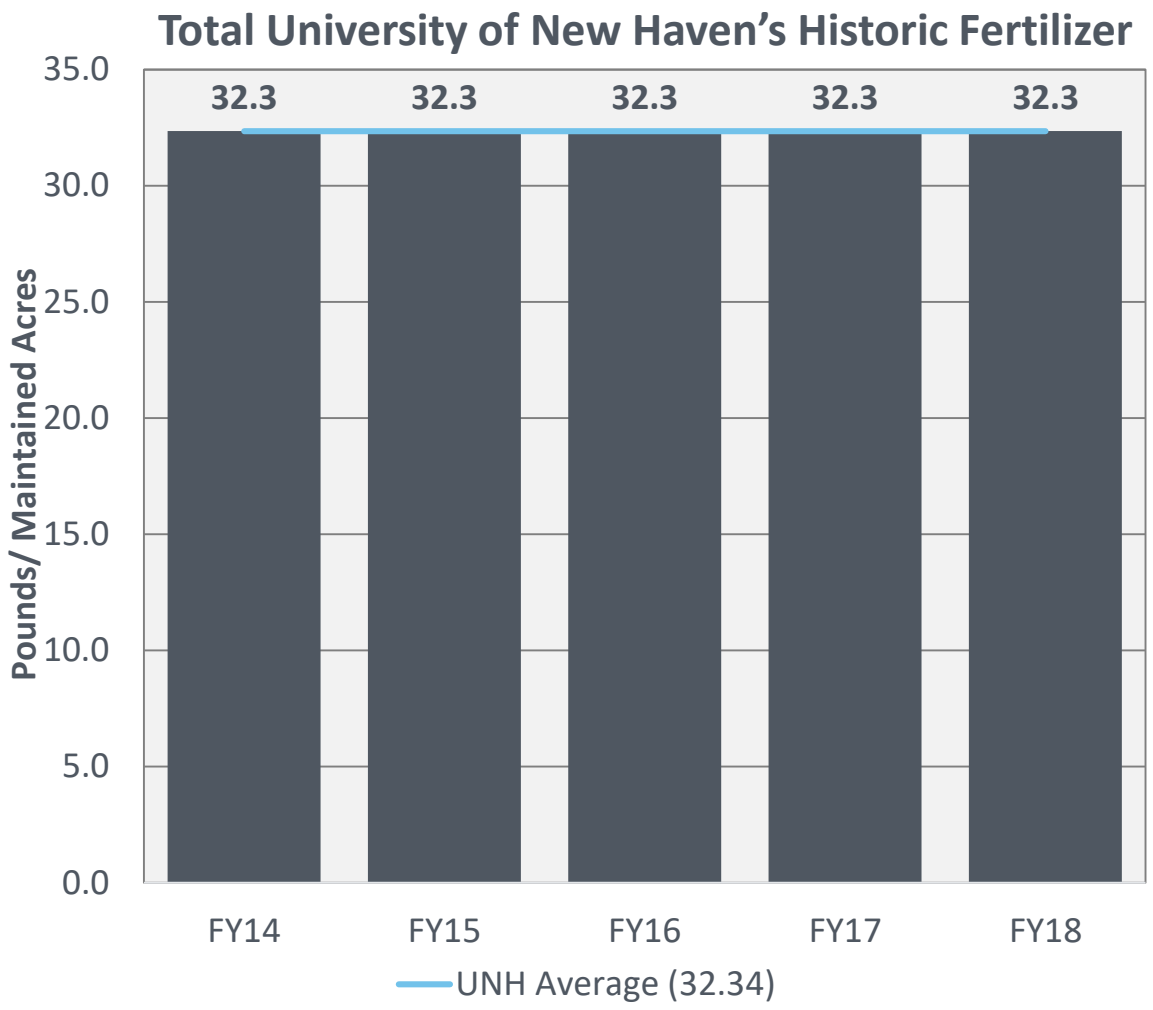

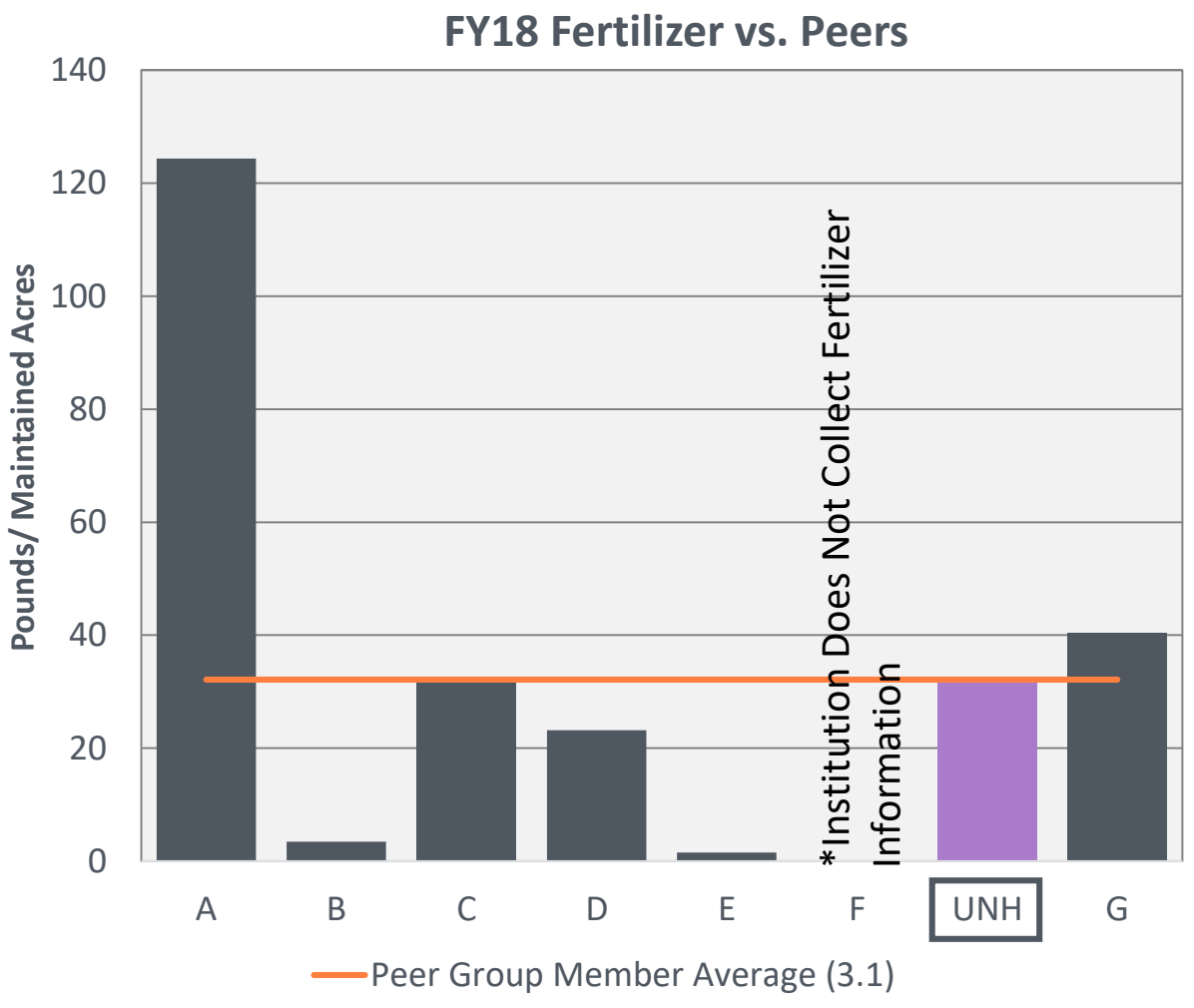

Peers listed by density factor

Fleet Vehicle Fuel Compared to Peers

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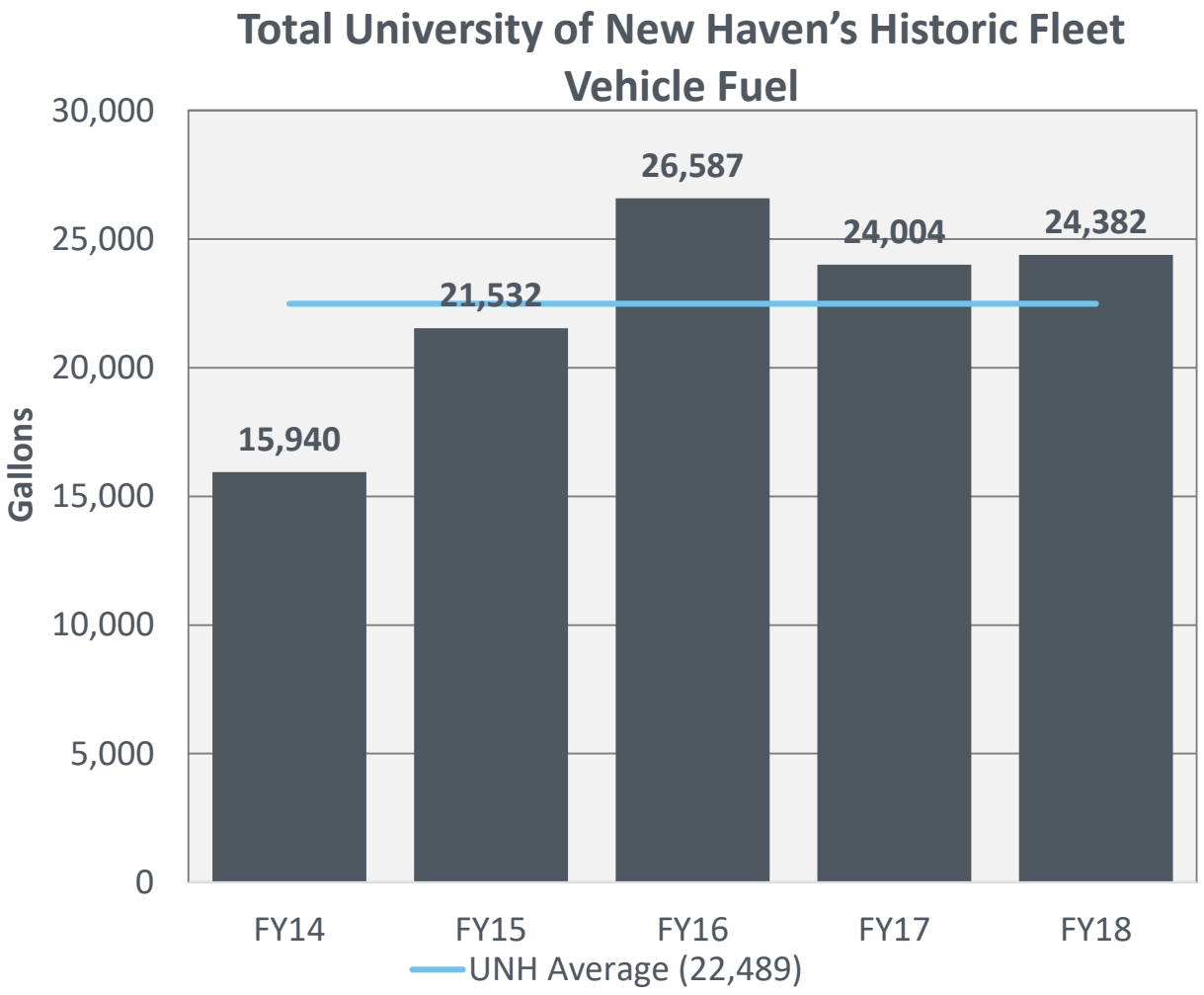

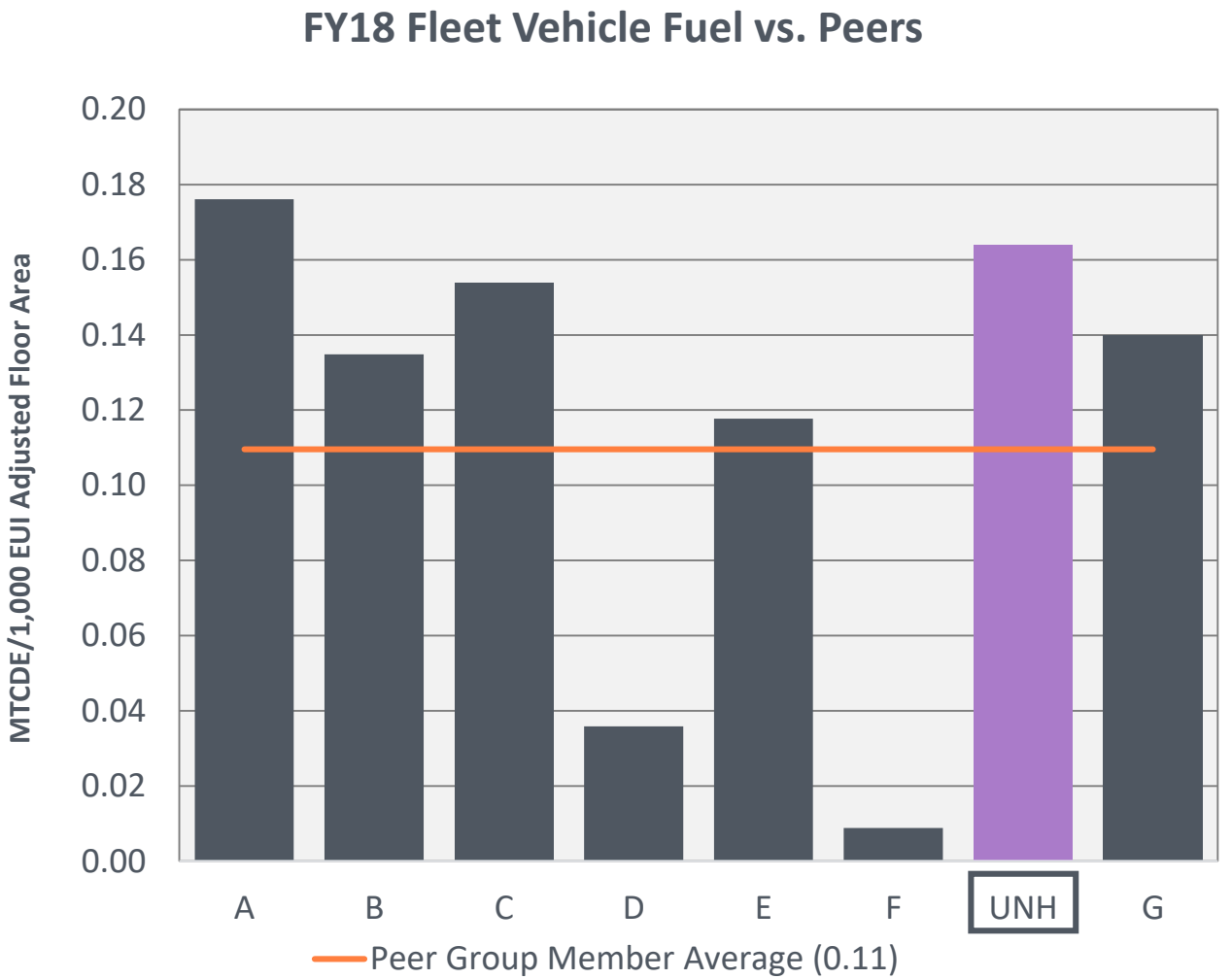

Peers listed by density factor

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Scope 2 Profile:

Purchased electricity (Location Based vs. Peers)

Purchased electricity (Market Based Reporting)

Scope 2 Purchased Electric: Fuel Mix

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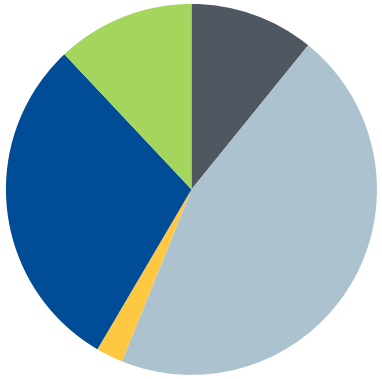
University of New Haven is located in a less carbon intense region

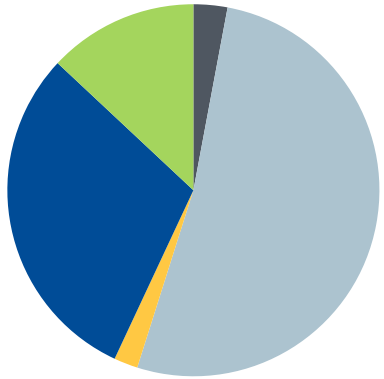
More Activity

Less Activity

NEWE Grid Fuel Mix (2010)

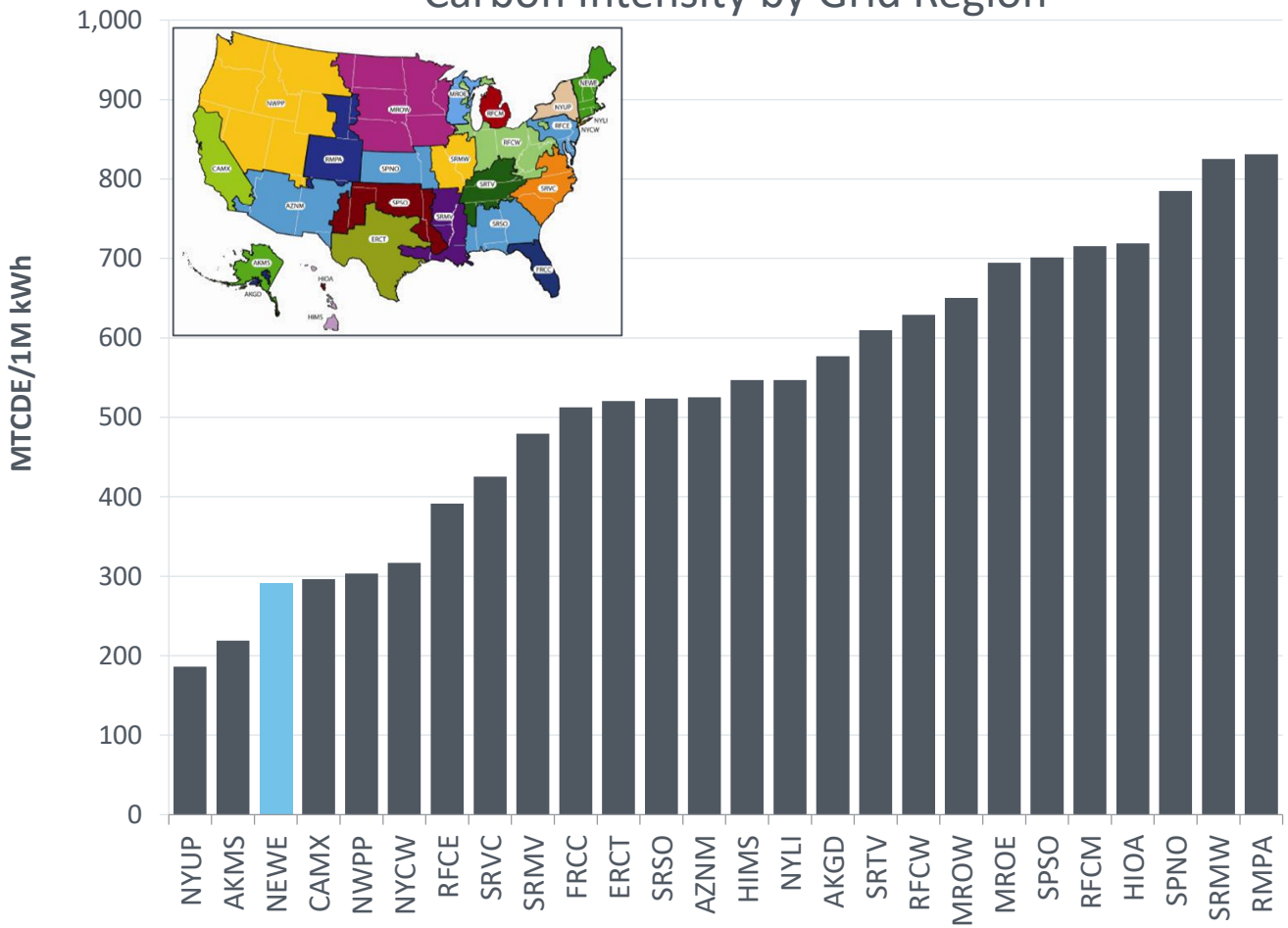


NEWE Grid Fuel Mix (2012)



Coal Natural Gas Other Fossil Nuclear Renewable

Carbon Intensity by Grid Region



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Scope 2 Consumption & Emissions Over Time

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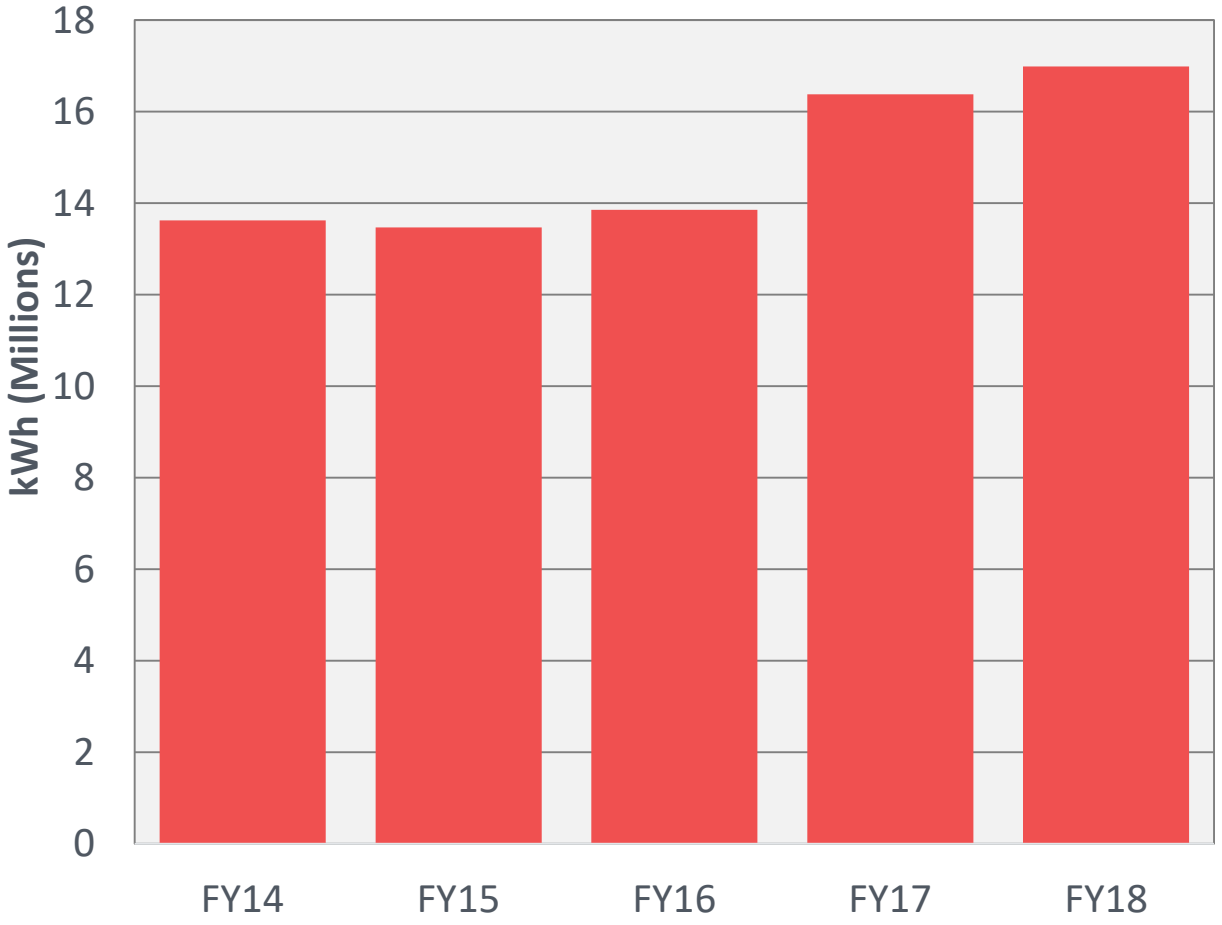
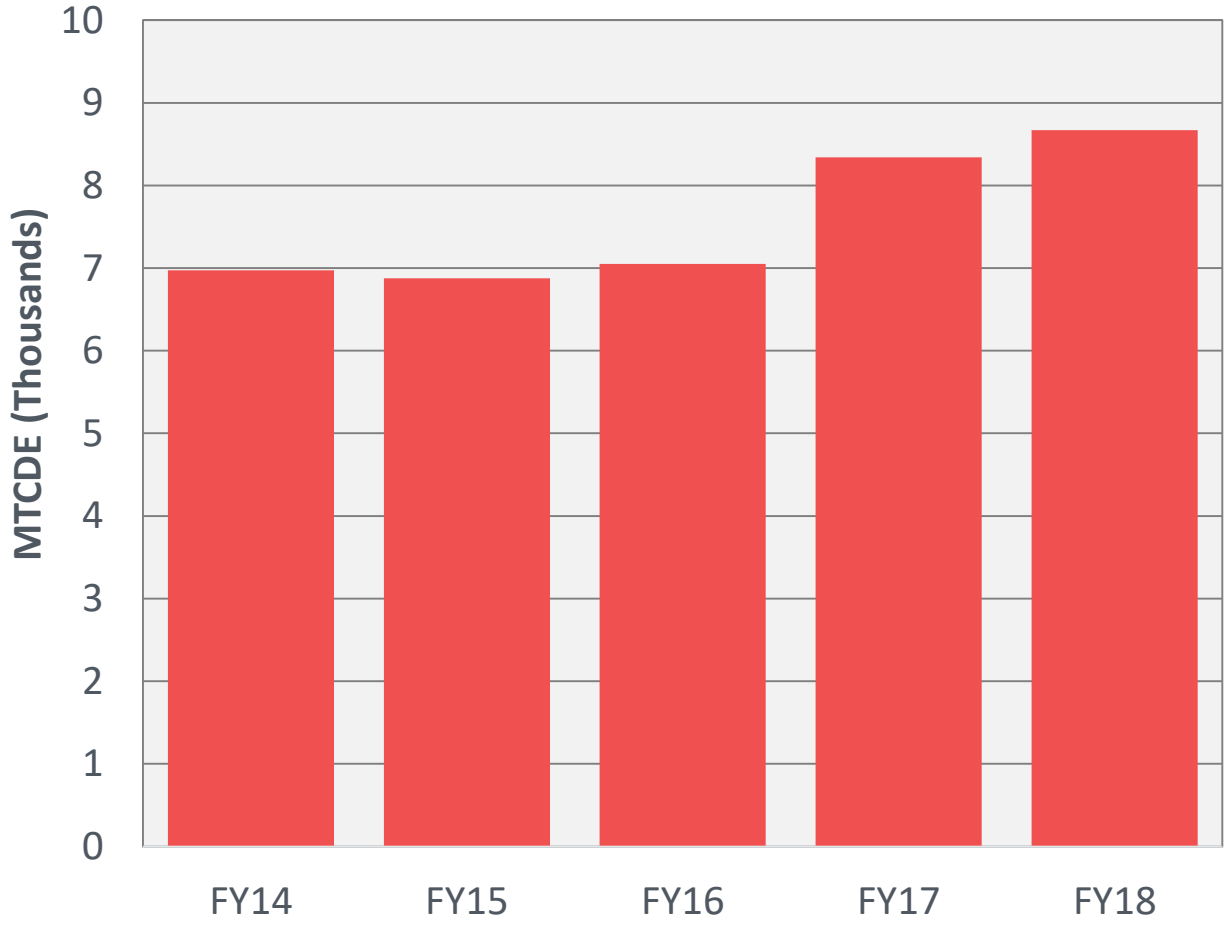
Electric Consumption Over Time



Total Scope 2 Emissions Over Time



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Impact of Weather on Electric Consumption

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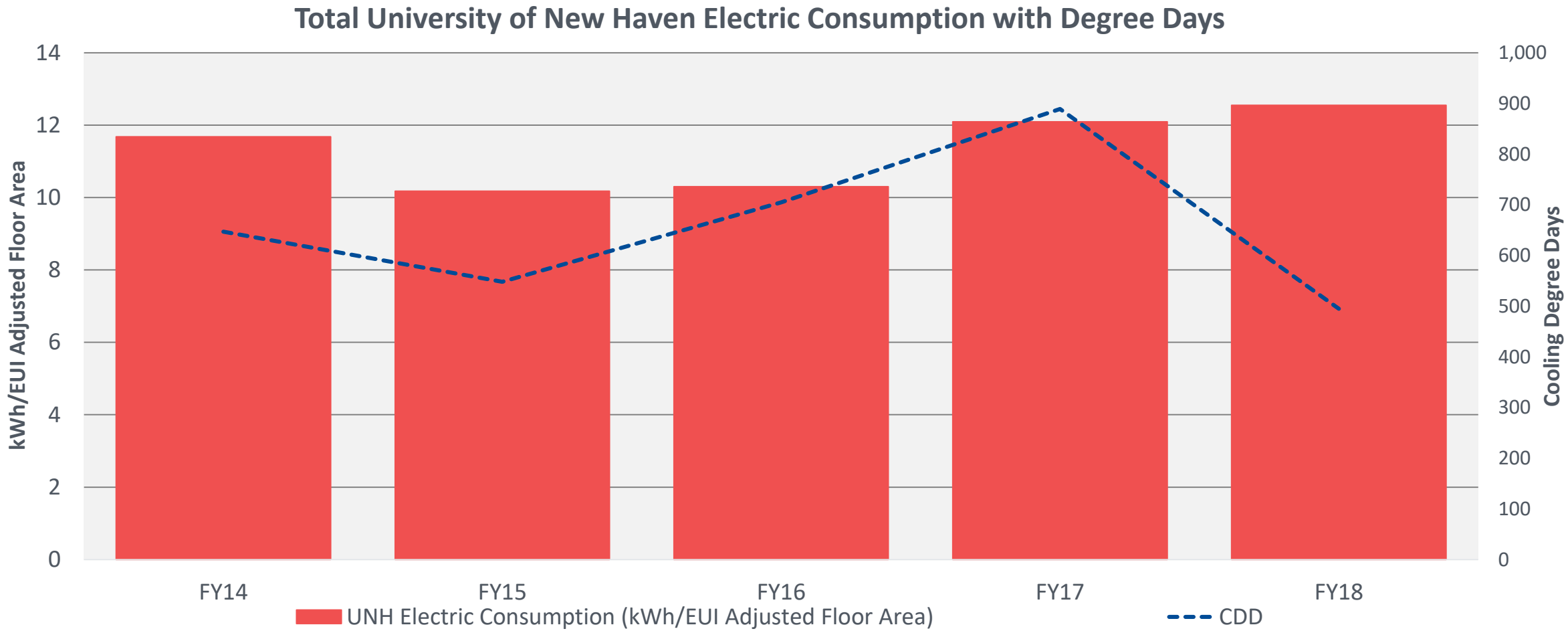
University of New Haven's electric consumption has increased since FY16 despite having fewer CDD in FY18



Cooling Degree Days (CDD) *measure how hot the temperature was on a given day or over a period of days. A day with a mean temperature of 80°F has 15 CDD. If the next day has a mean temperature of 83°F, it has 18 CDD. The total CDD for the two days is 33 CDD.*

Purchased Electricity & Carbon Intensity

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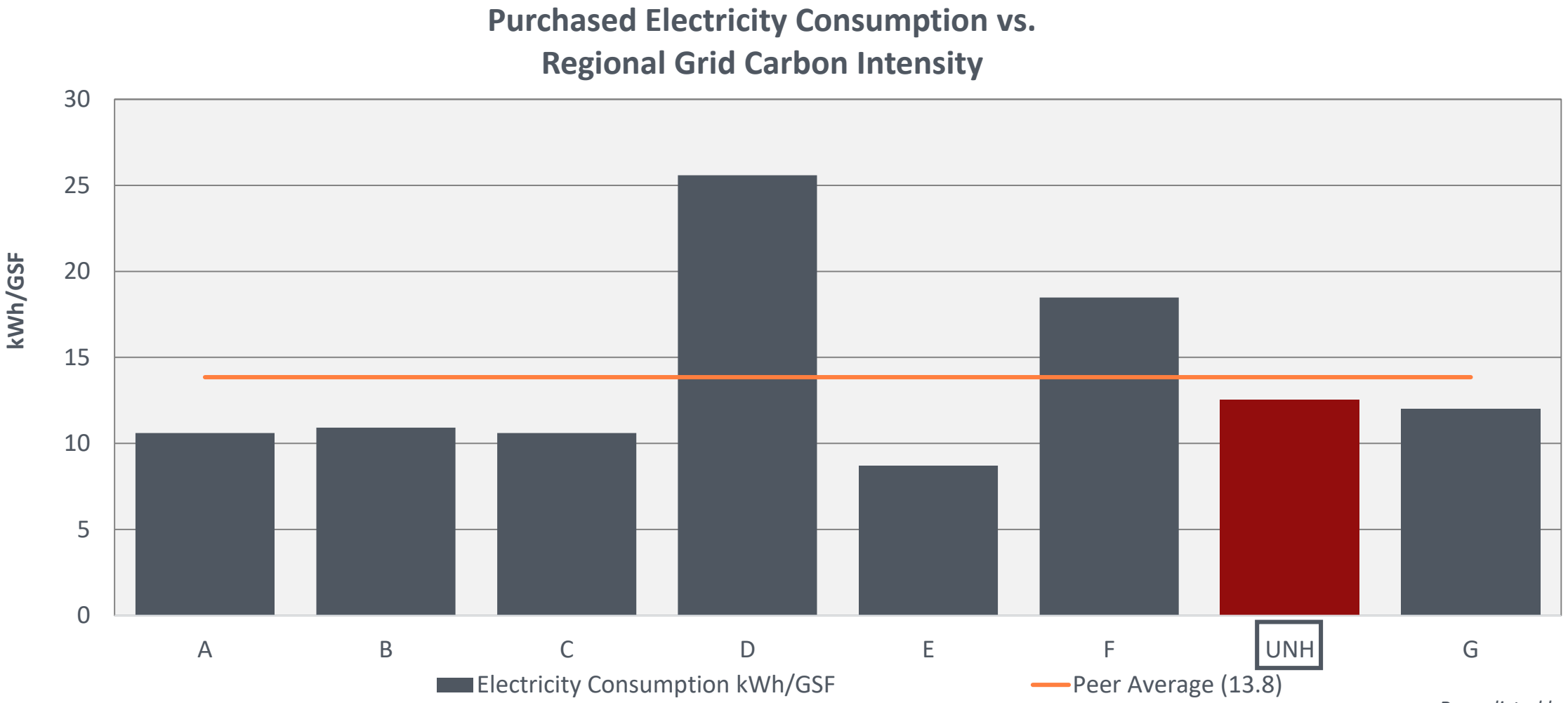

Peers listed by density factor

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Market Based Reporting Electric Consumption

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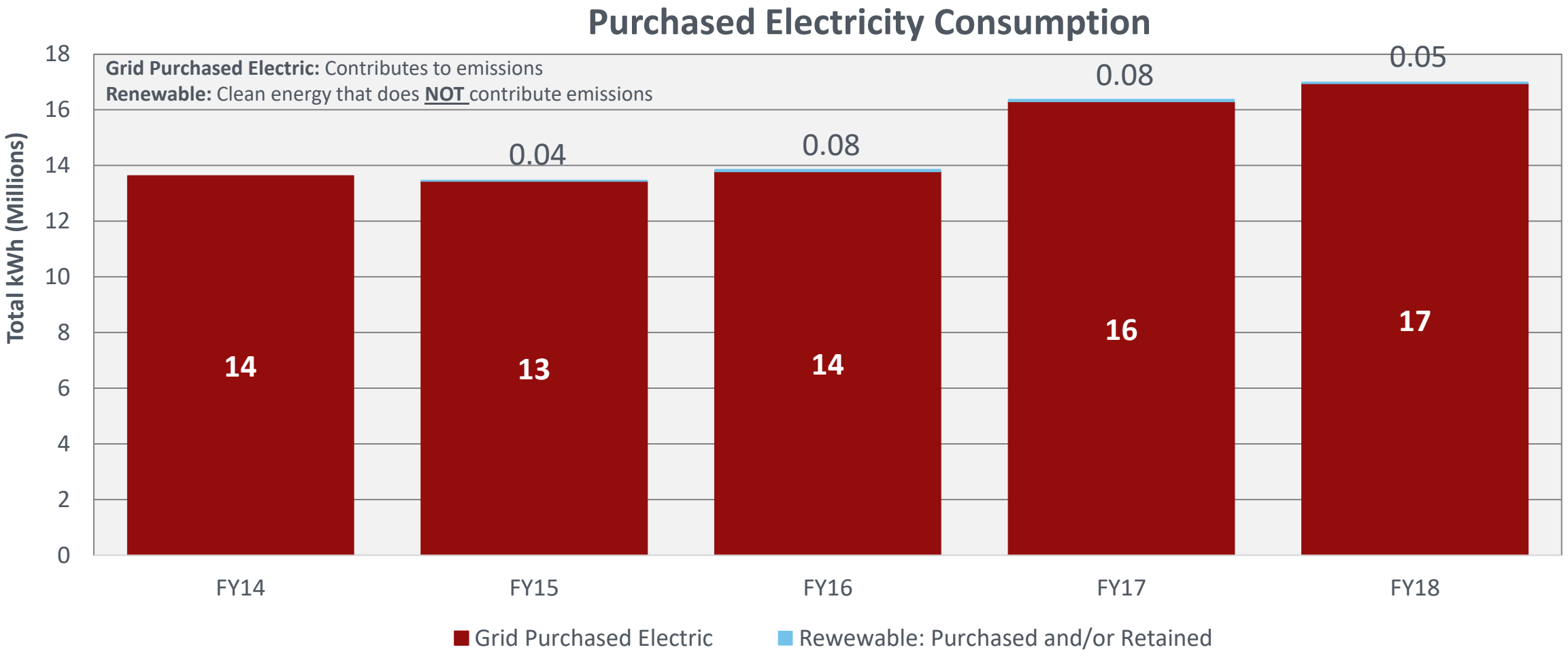
Comparing grid purchased kWh with renewable kWh



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Market Based Reporting vs Peers

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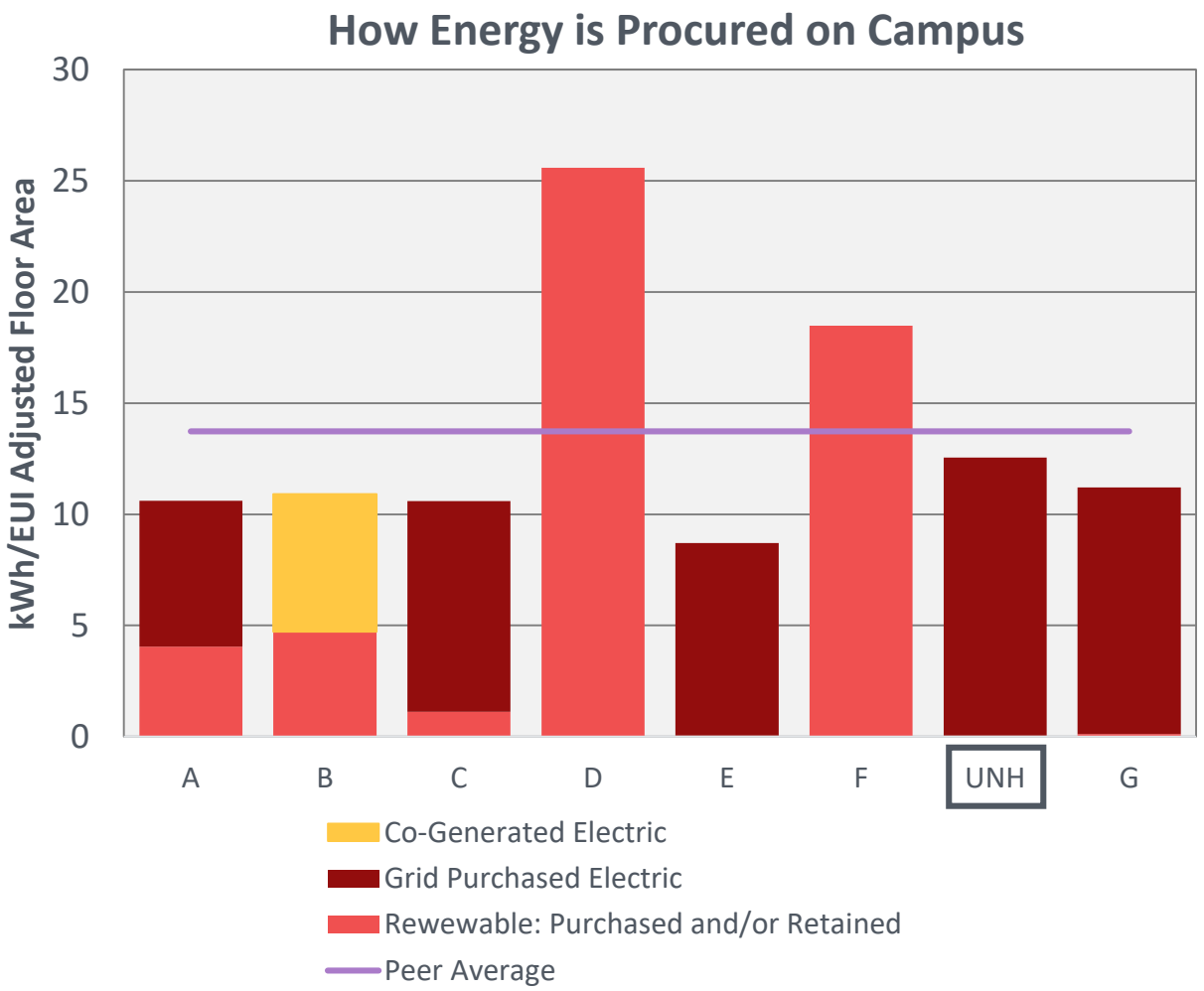

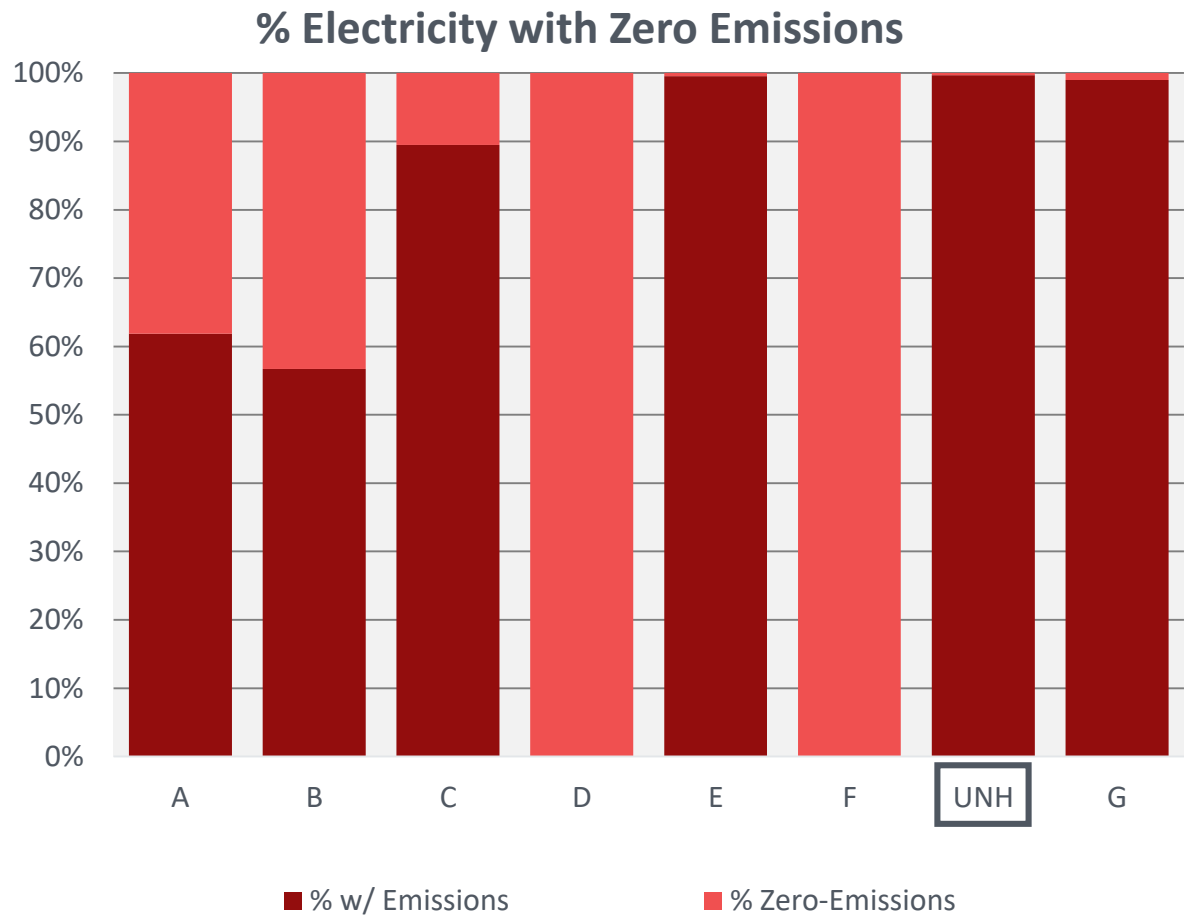

Peers listed by density factor

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Scope 2 Emissions Market Based Reporting

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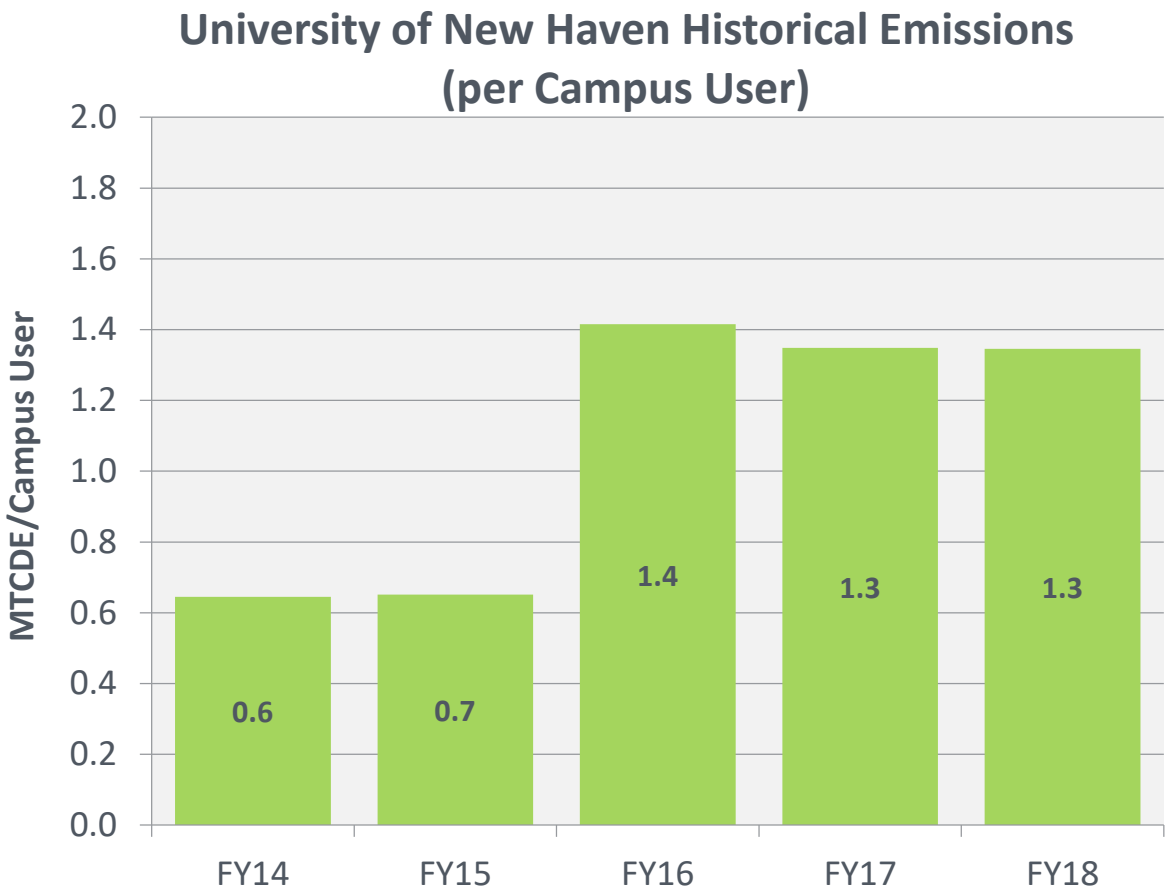

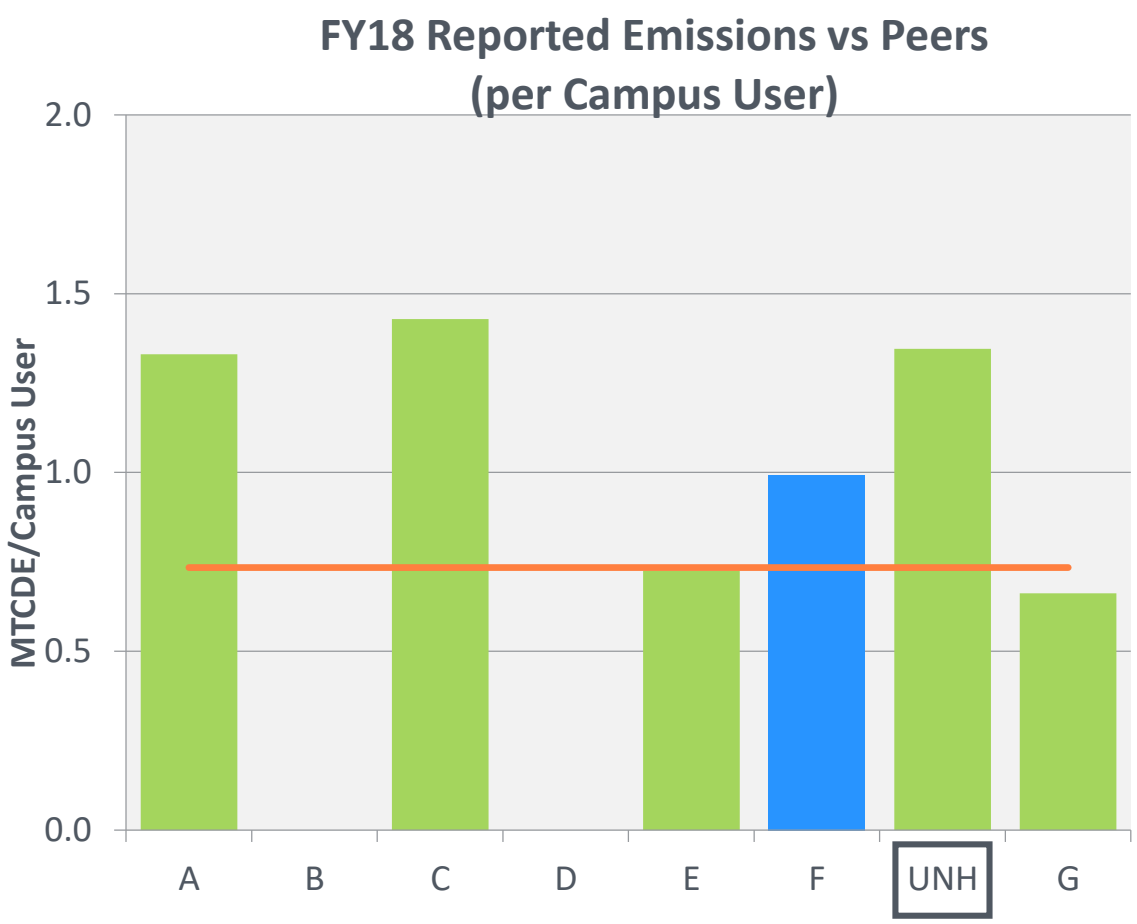

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Scope 2 Emissions Market Based Reporting

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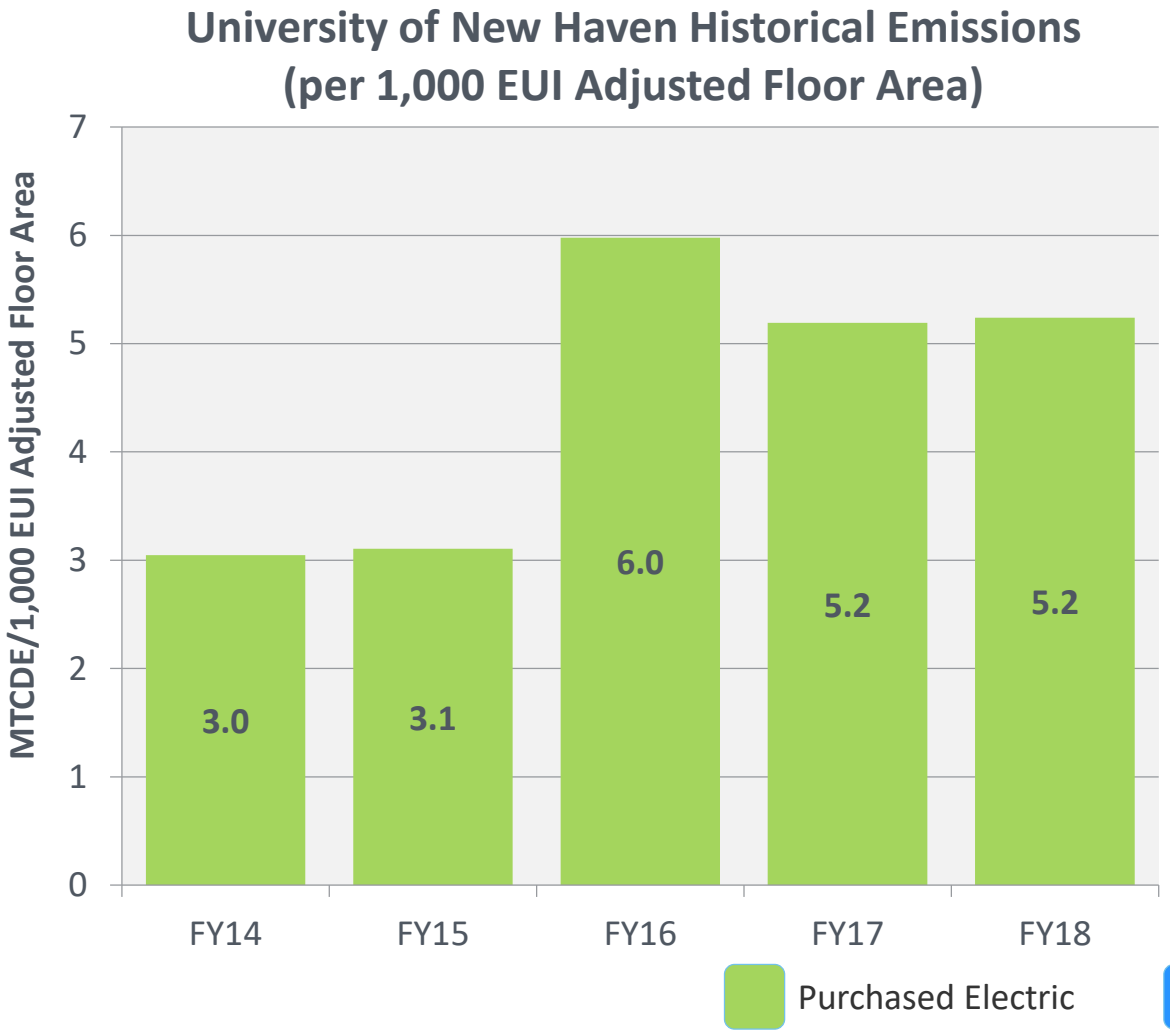

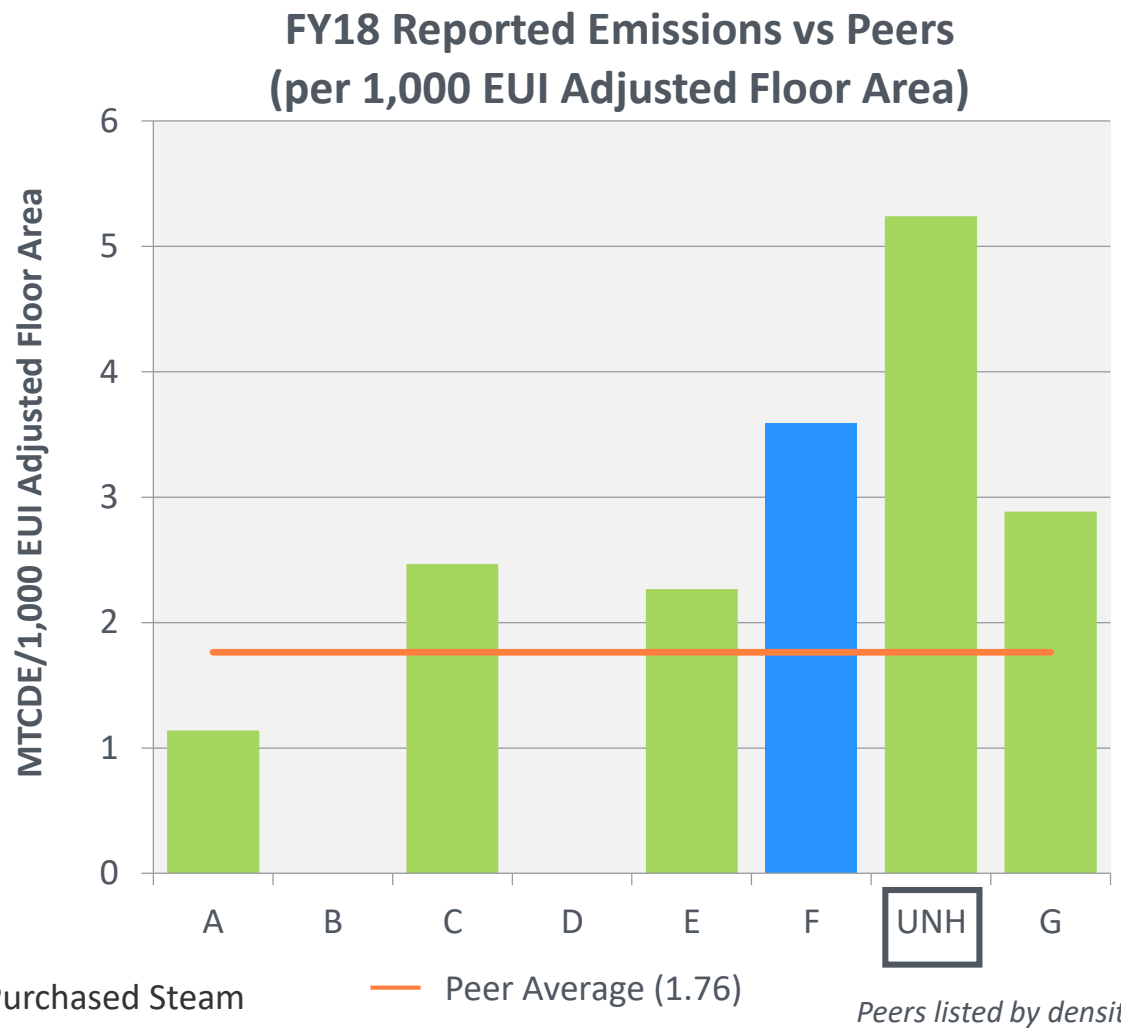

Peers listed by density factor

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Scope 3 Emissions Profile

Scope 3 Trending Over Time

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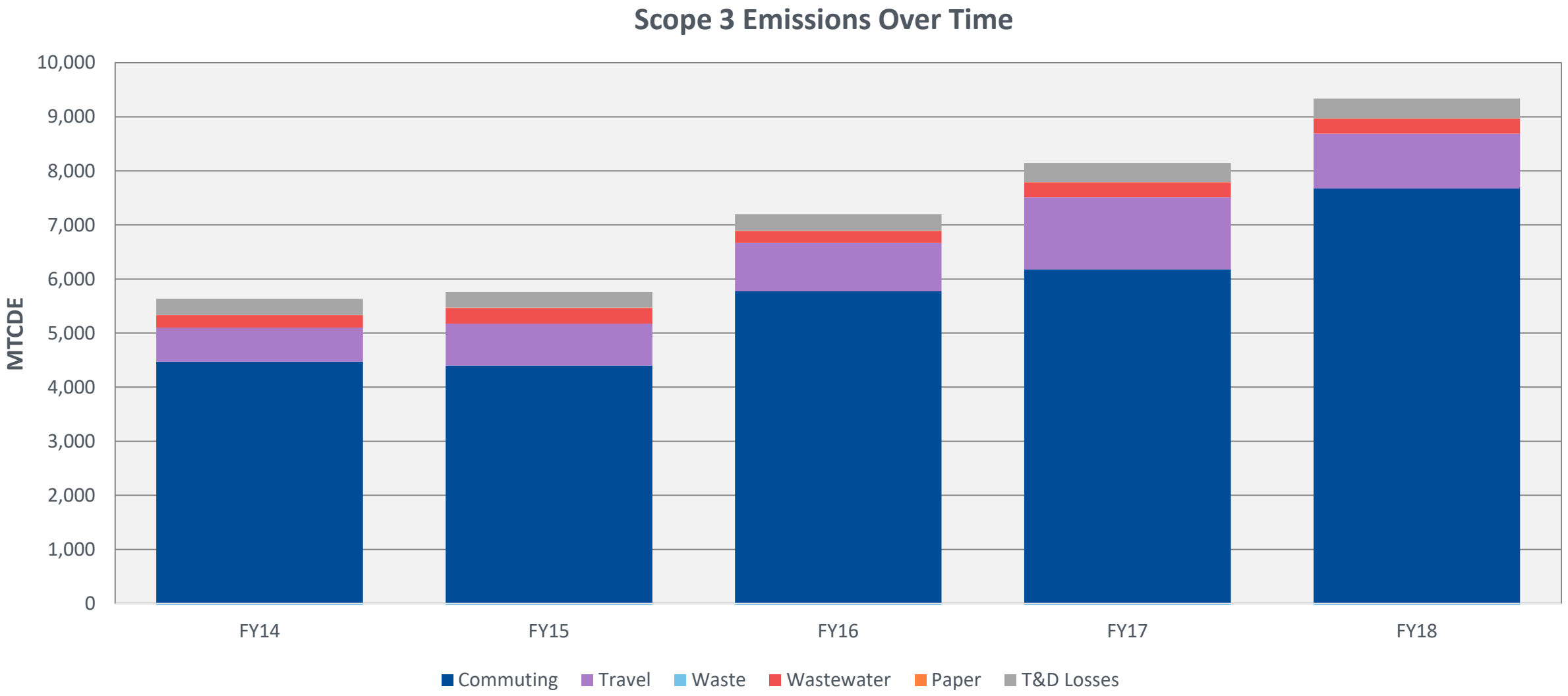
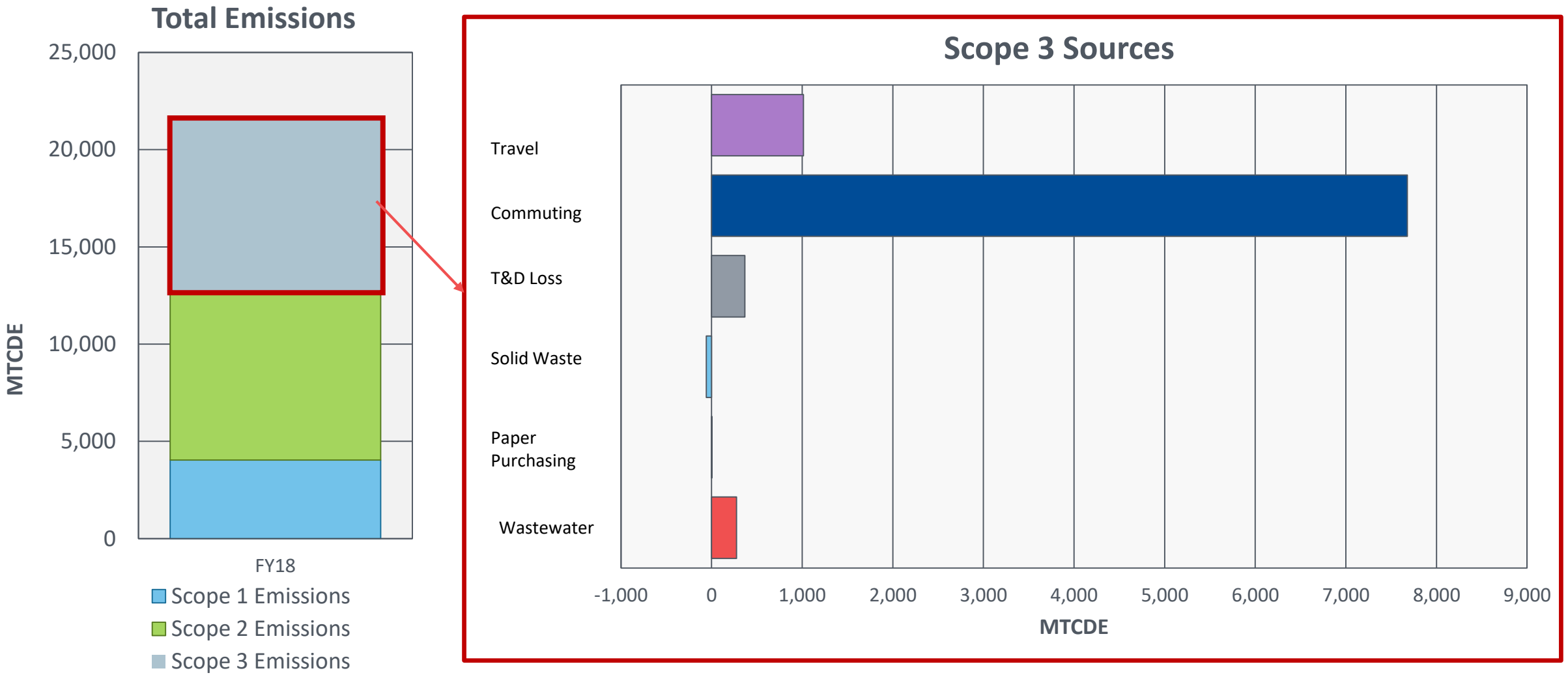


Scope 3 Distribution



Scope 3: Travel

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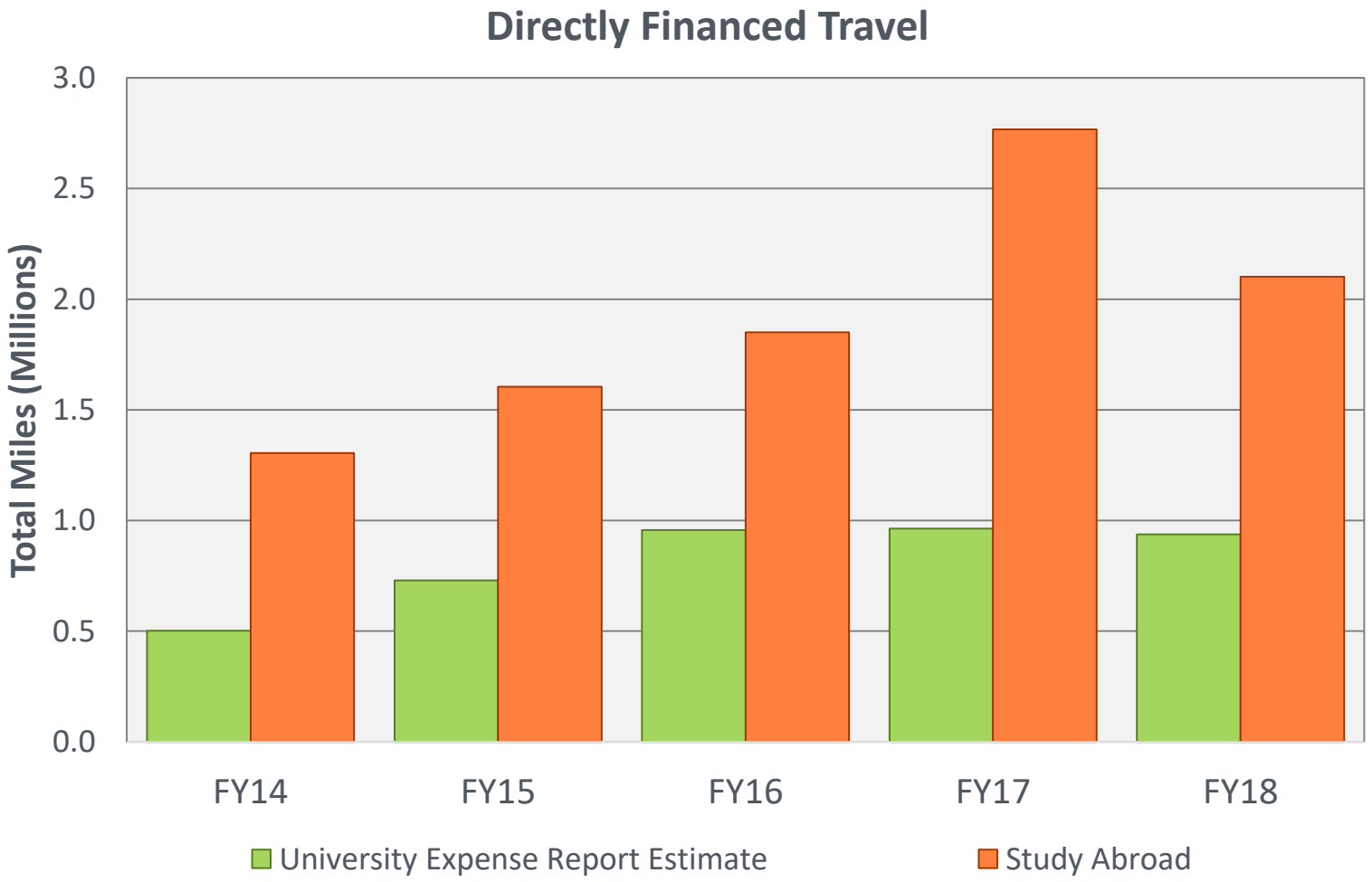
What is Included in Directly Financed Travel

- **Study Abroad**
  - Study Abroad Locations & Participants
- **University of New Haven Estimate**
  - University of New Haven Travel Expense Reports



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Study Abroad Travel Profile

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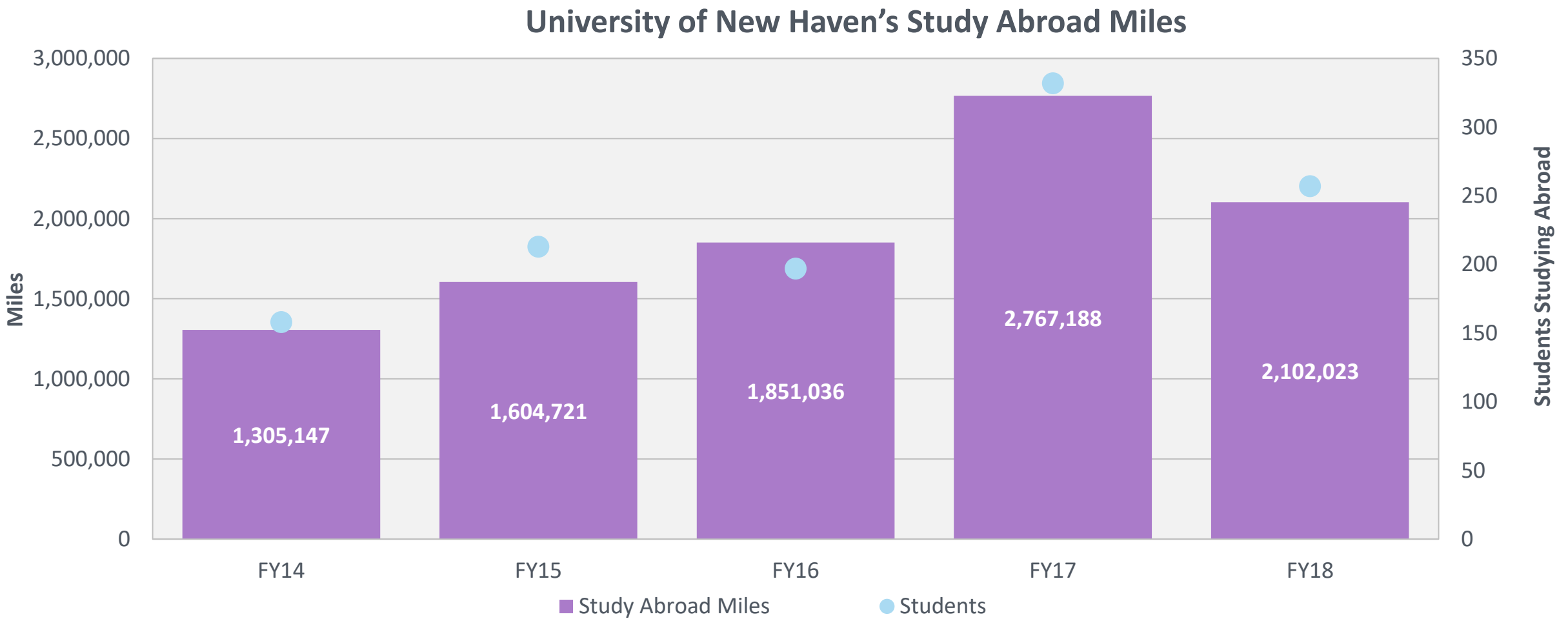
Study abroad travel fluctuates over time along with student population



Air Travel vs. Peers

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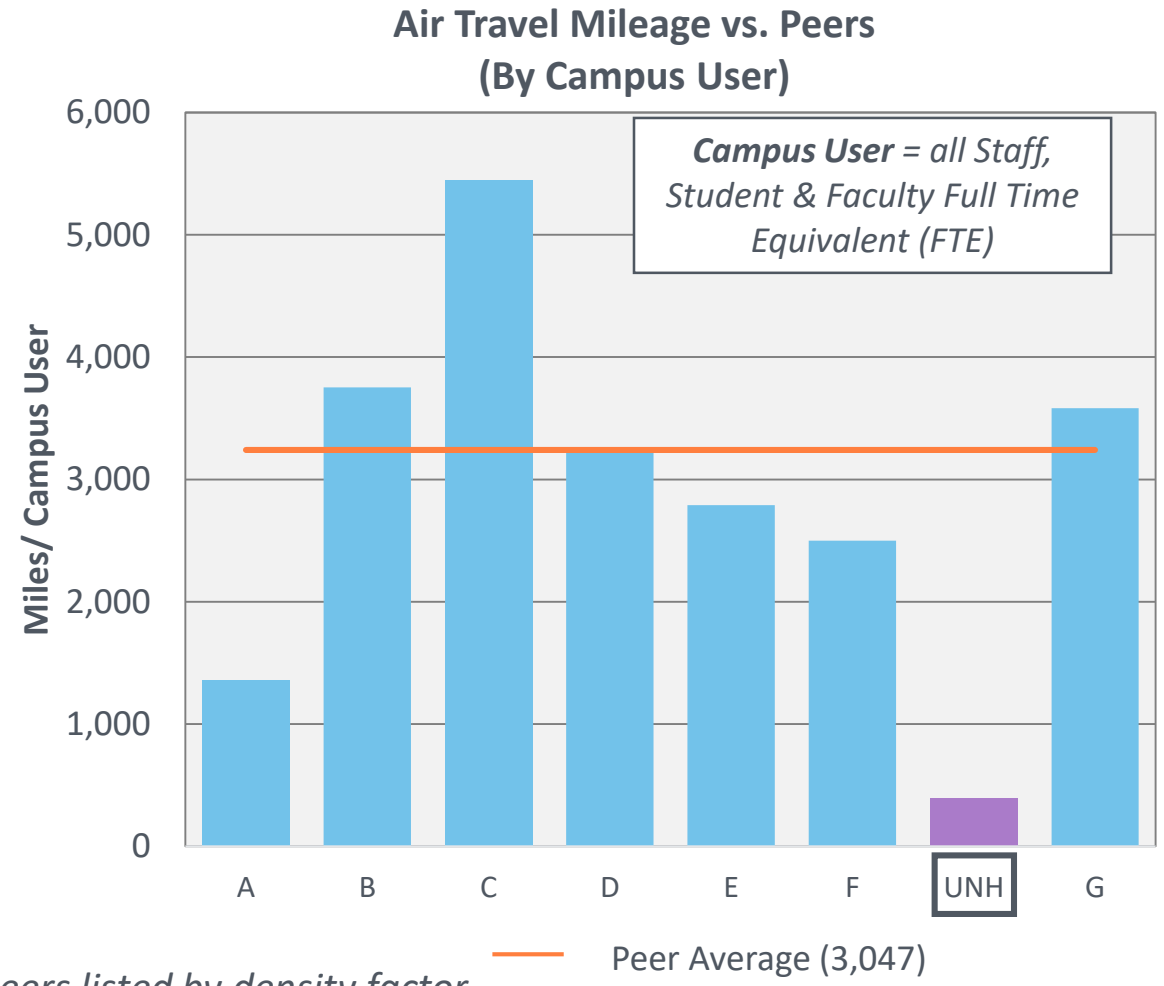
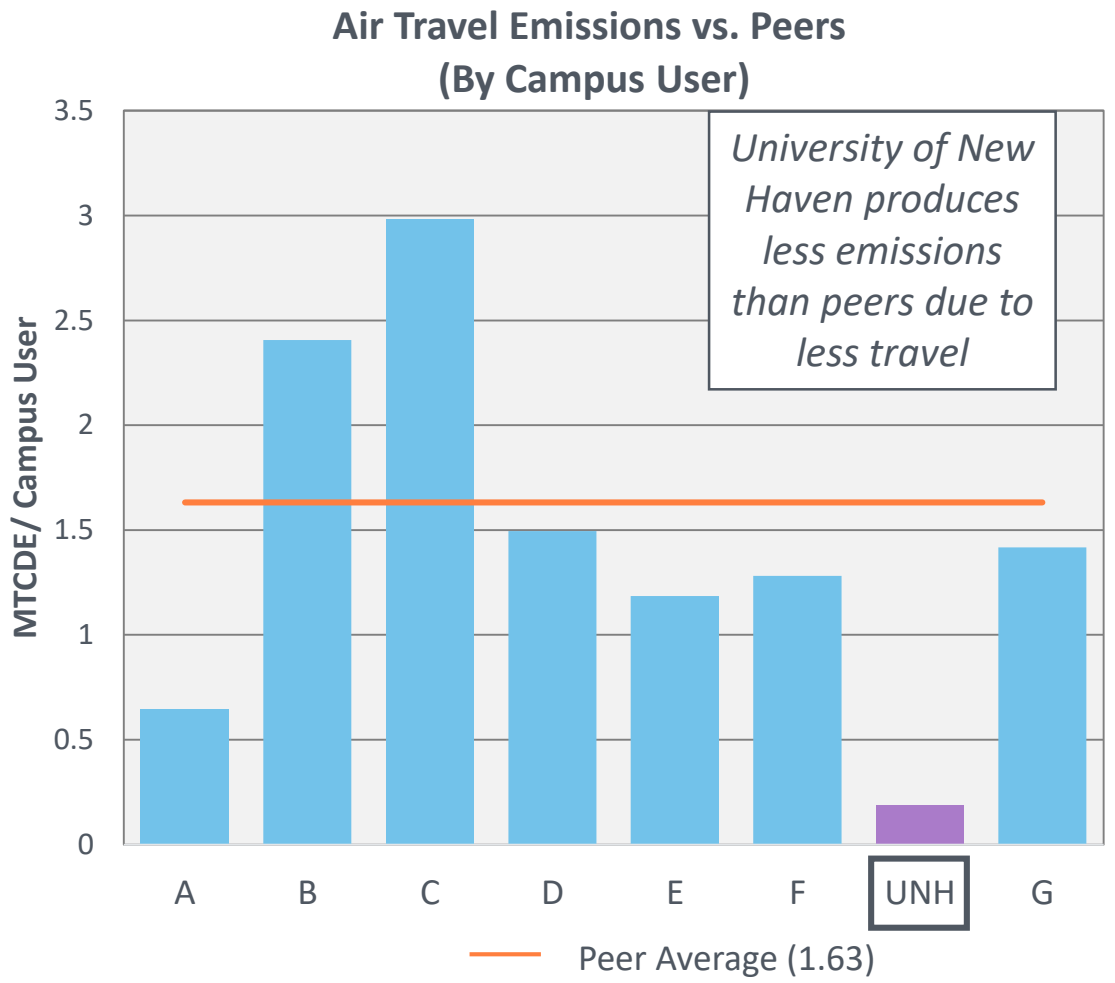
Number of miles impacts total emissions; More users traveling & longer trips produce more emissions





Peers listed by density factor

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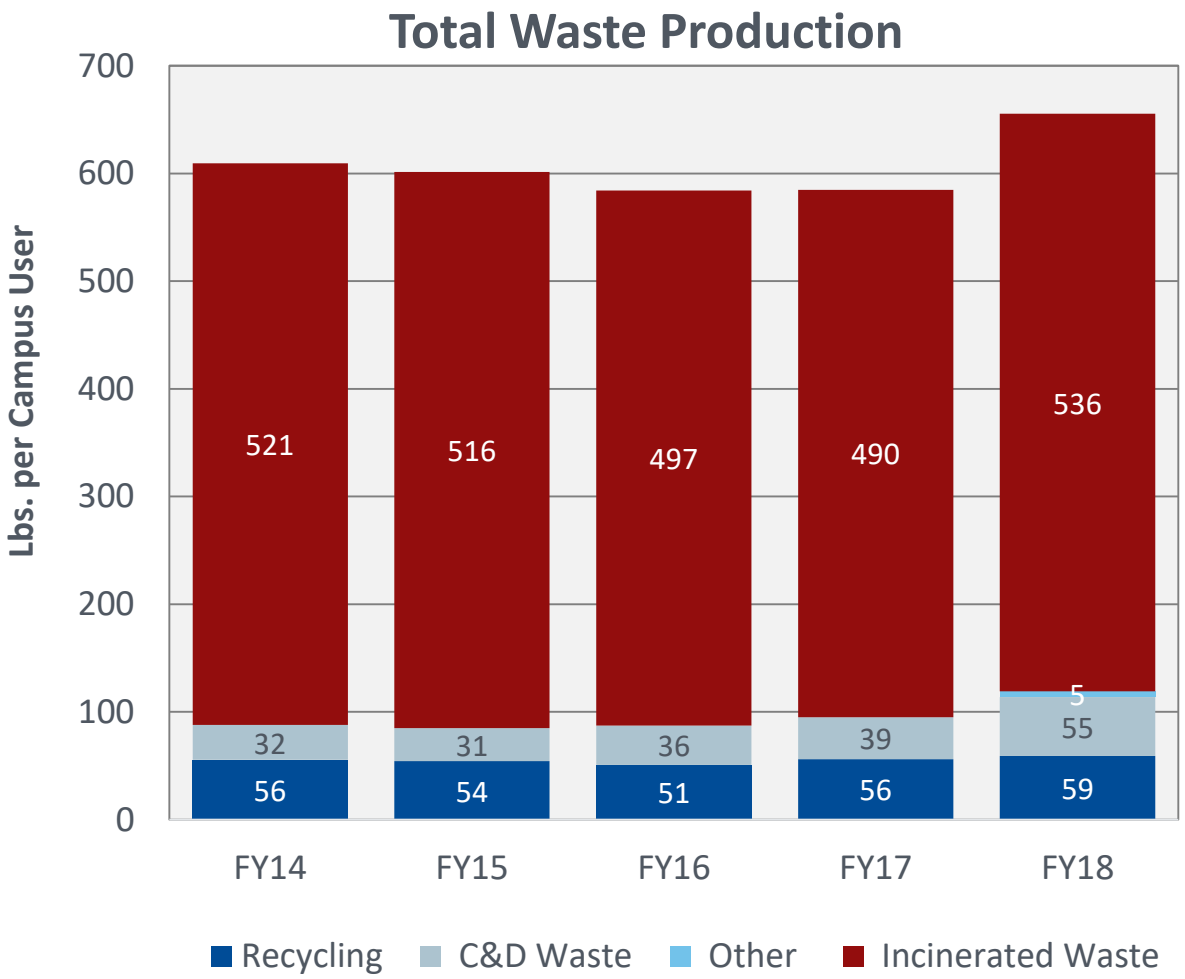
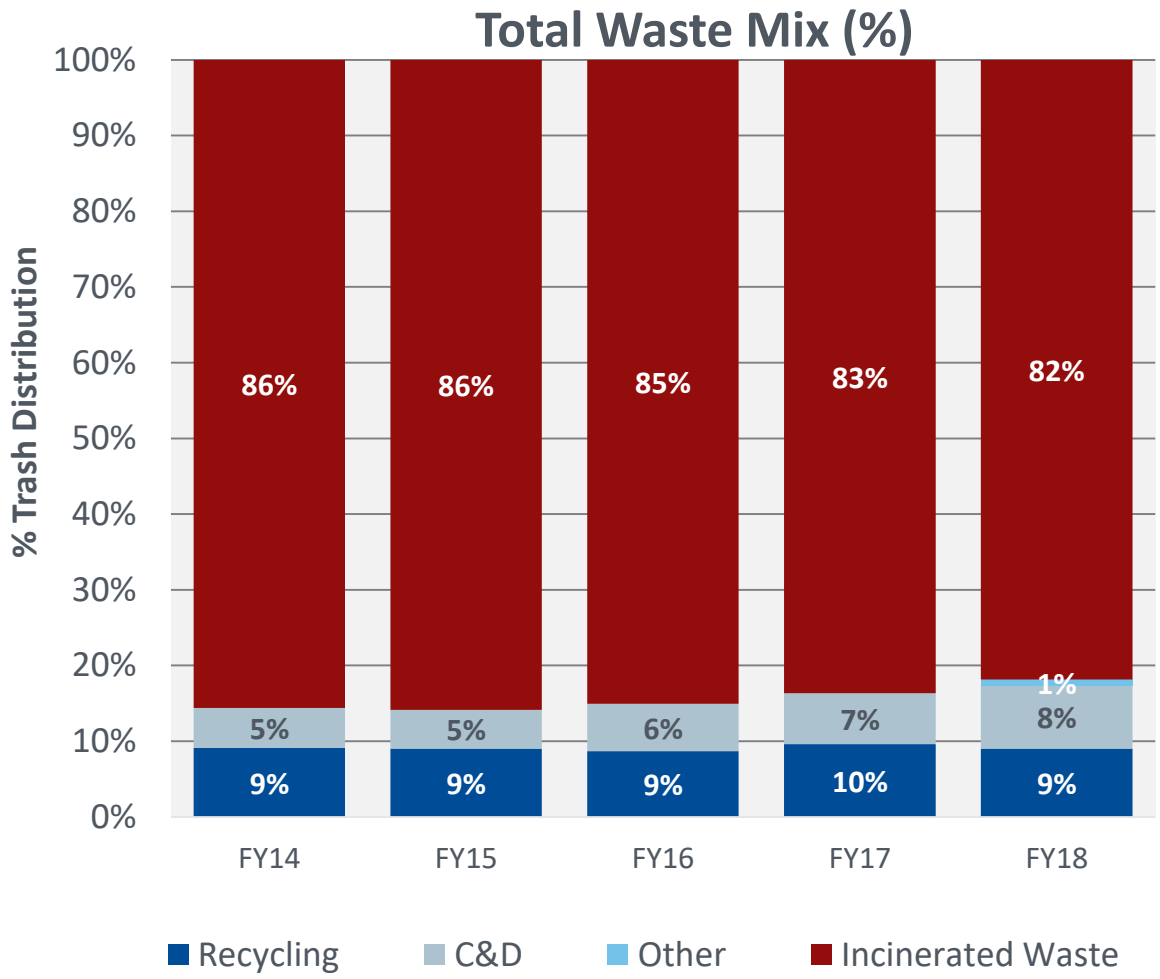
University of New Haven Solid Waste Profile

University of New Haven





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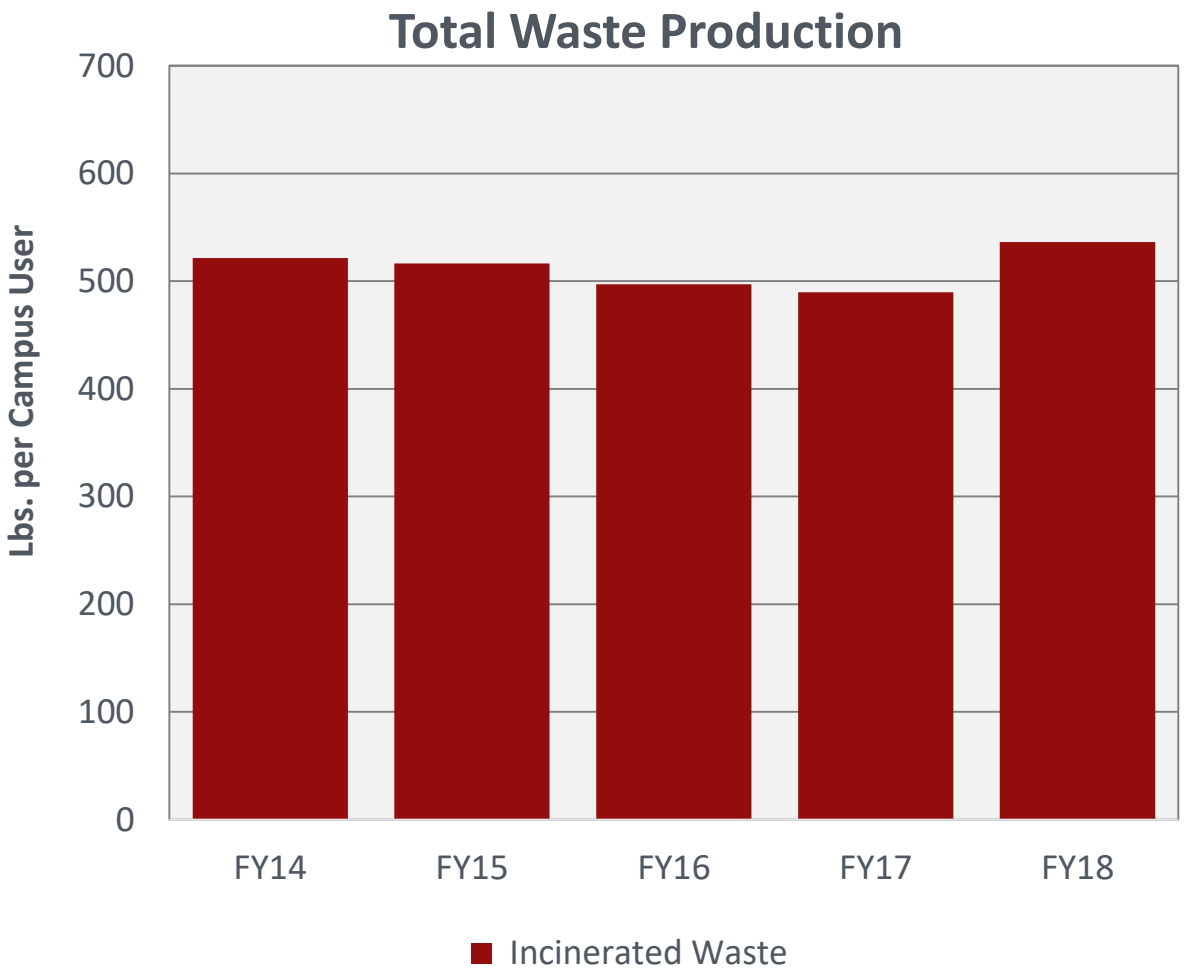
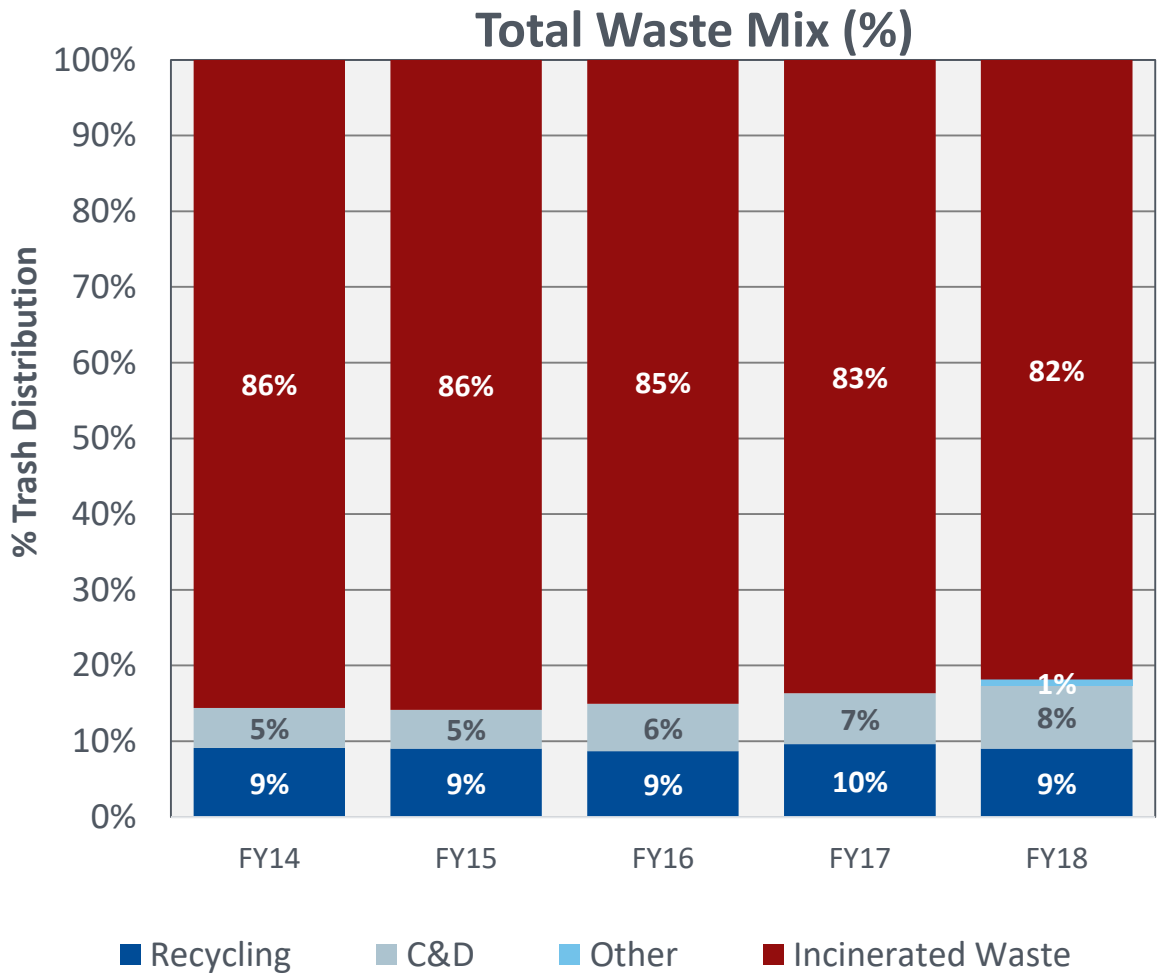
University of New Haven Solid Waste Profile

University of New Haven





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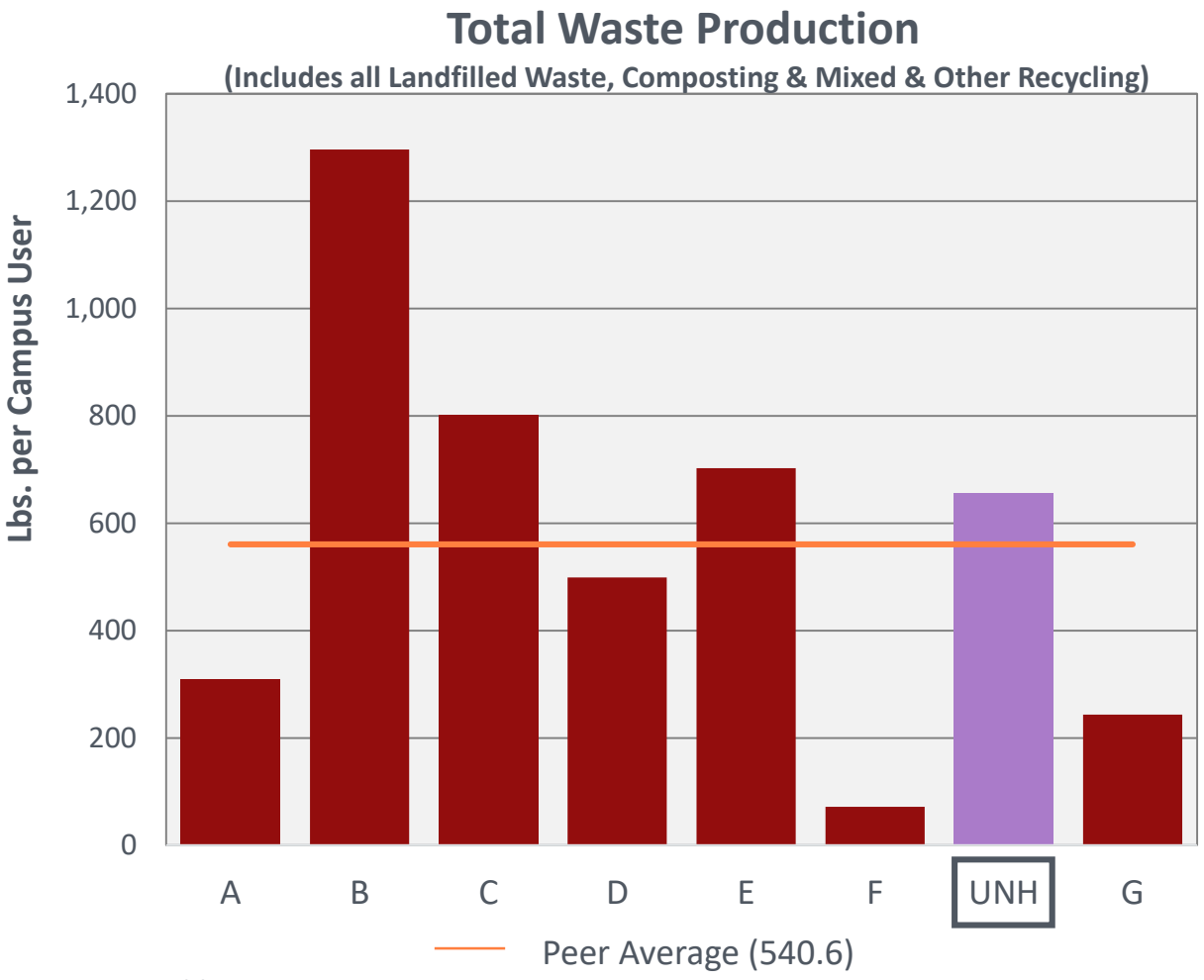
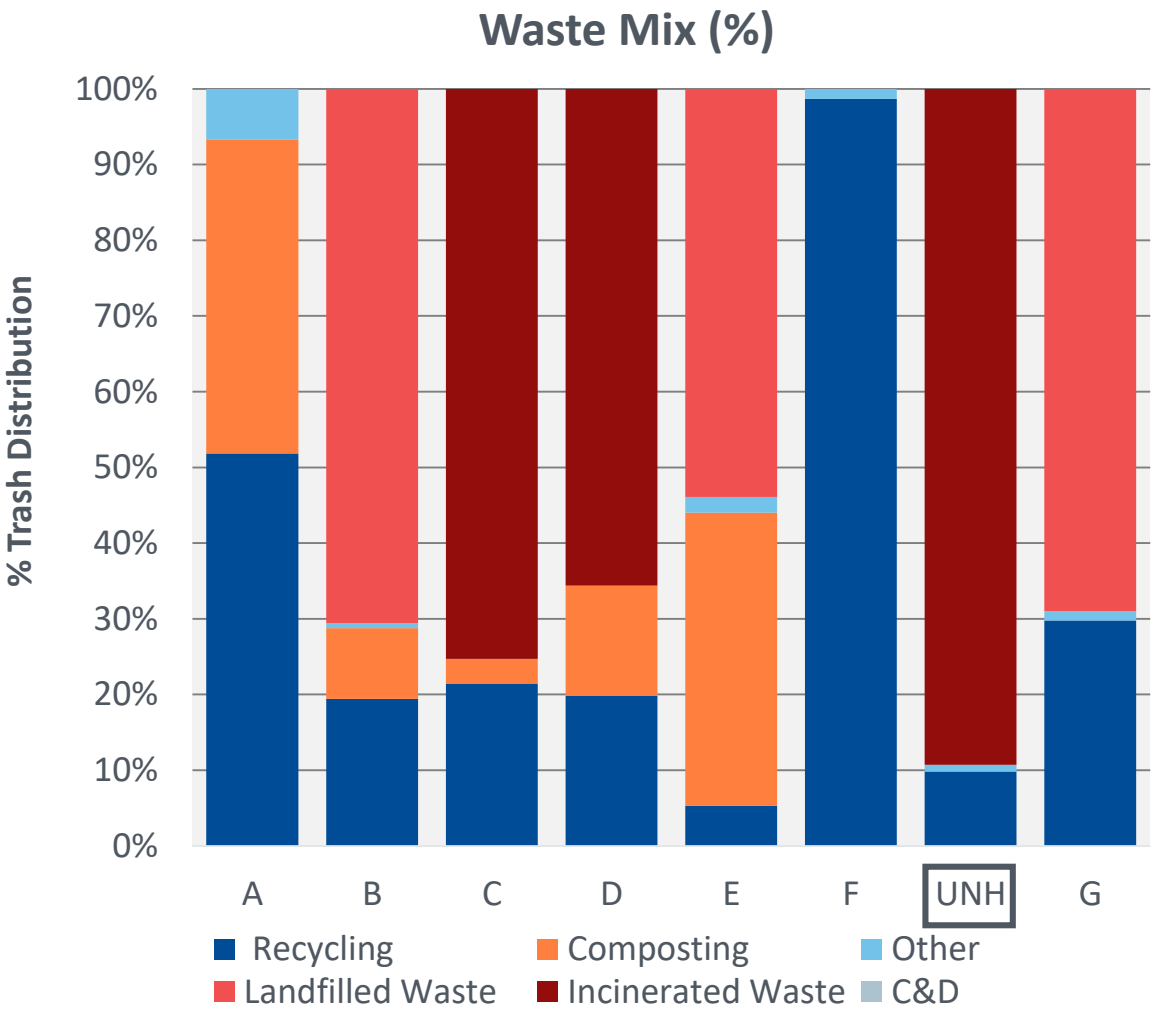
Campus Waste Distribution Profile

University of New Haven





*Peers arrayed by Density Factor

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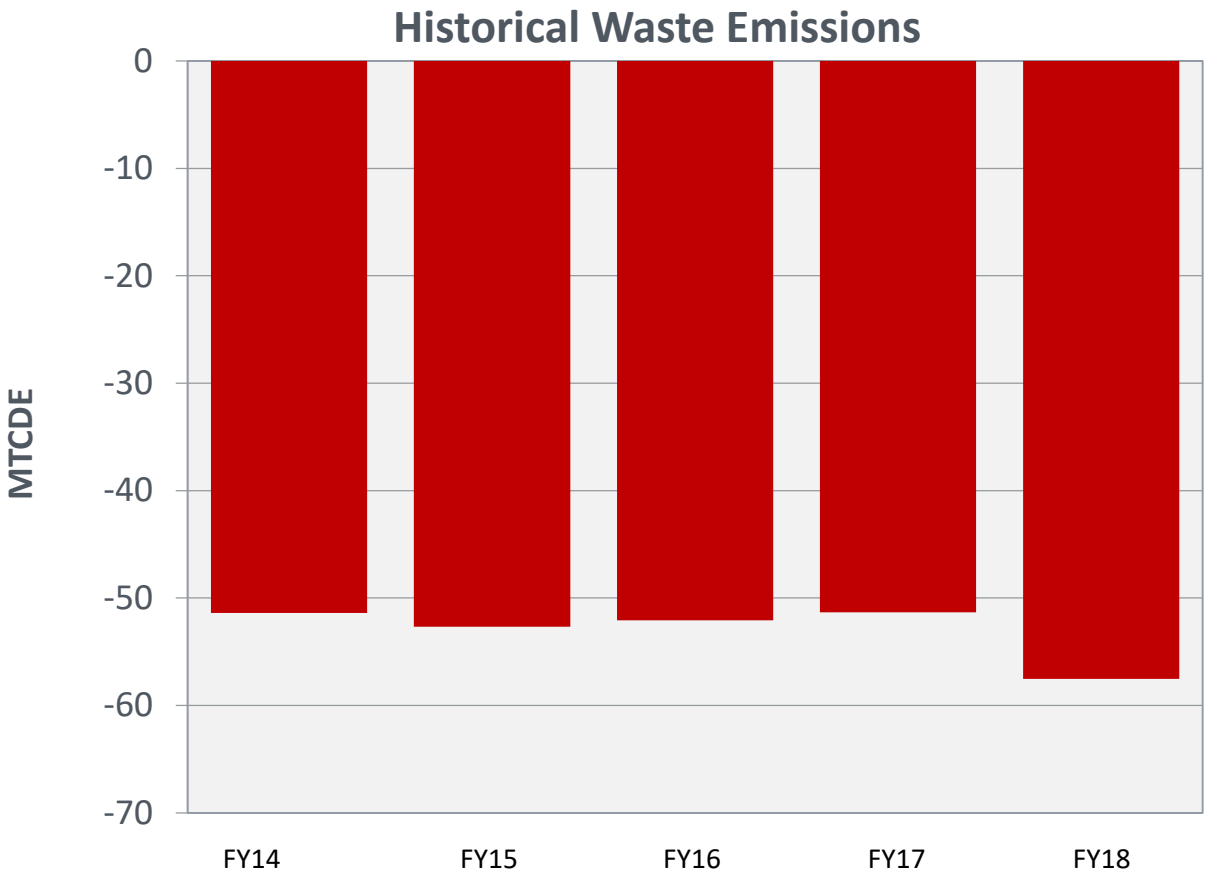
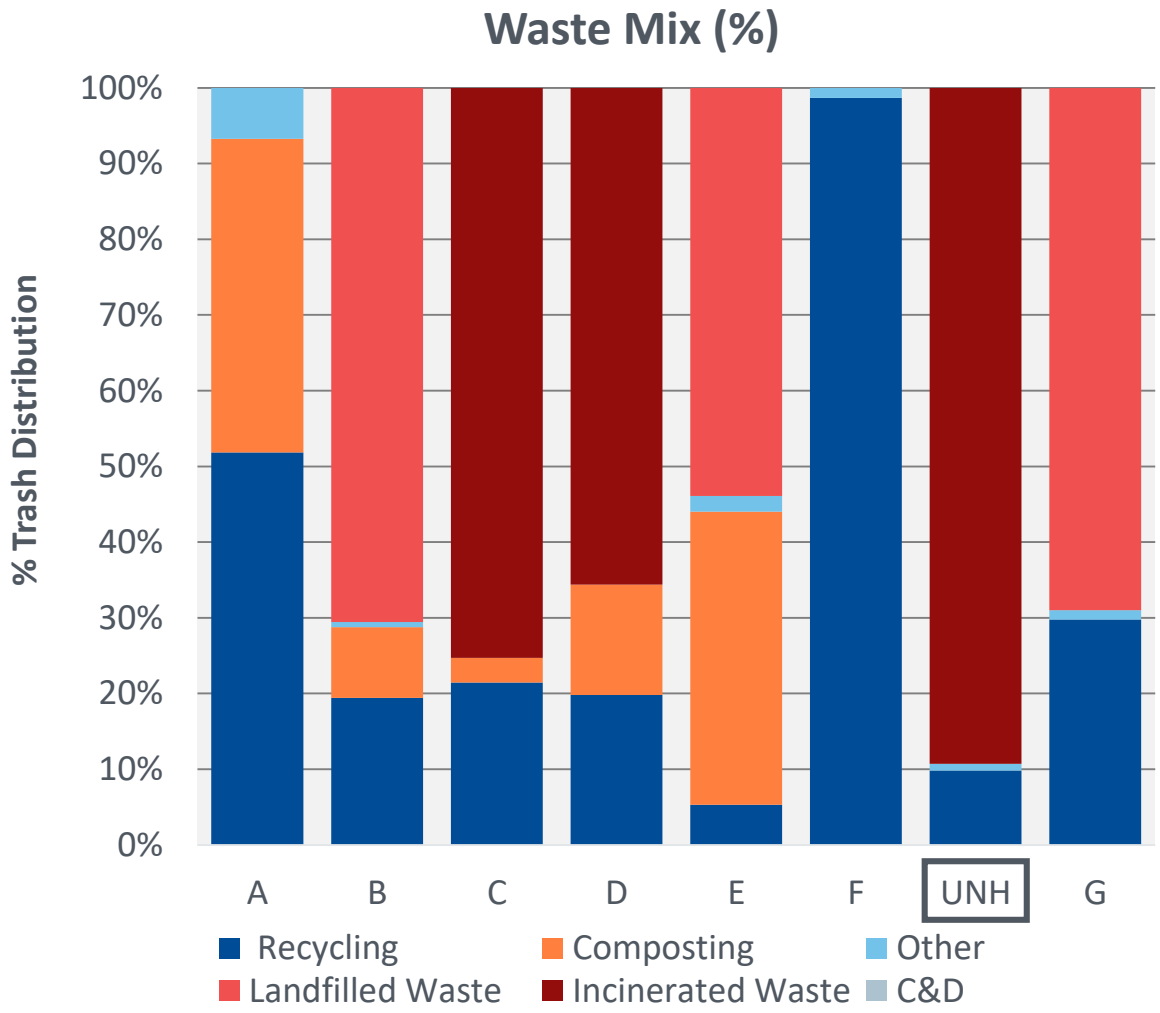
Waste Emissions

University of New Haven

Waste emissions decreased in FY18; continues to produce less emissions than peers





Ordered by: Density Factor

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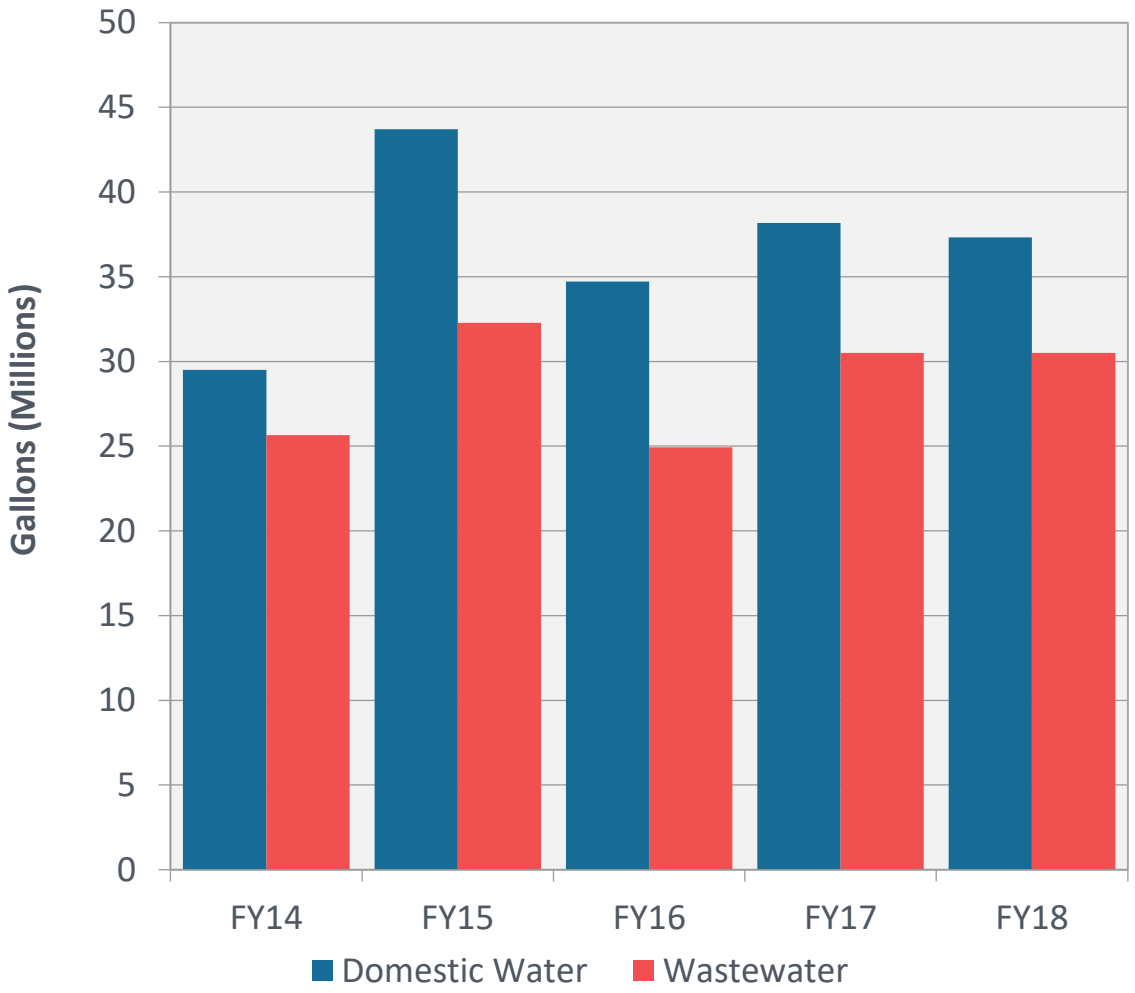
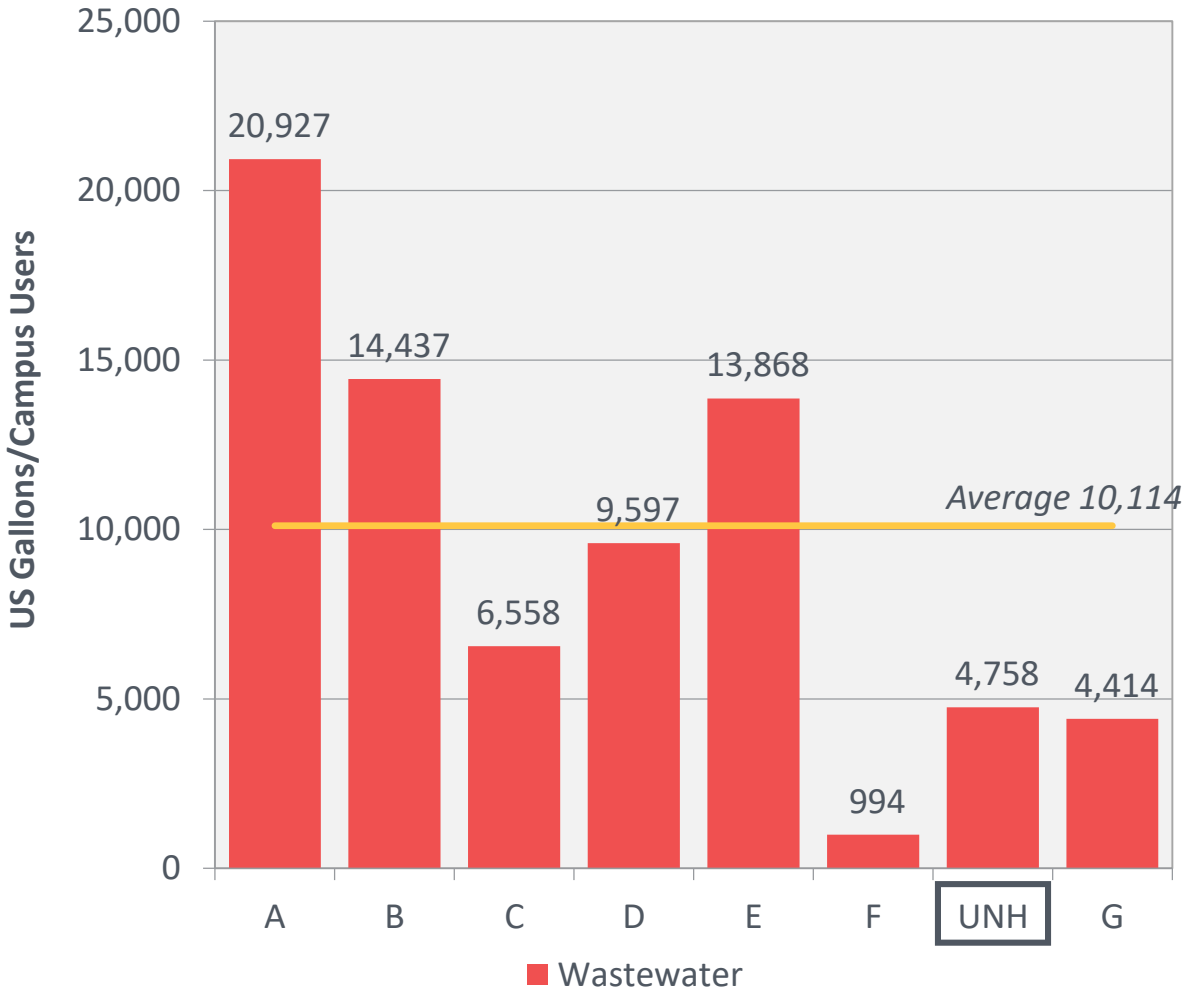
Scope 3 – Water

University of New Haven

Total Water Consumption Over Time



Normalized Wastewater Consumption vs. Peers



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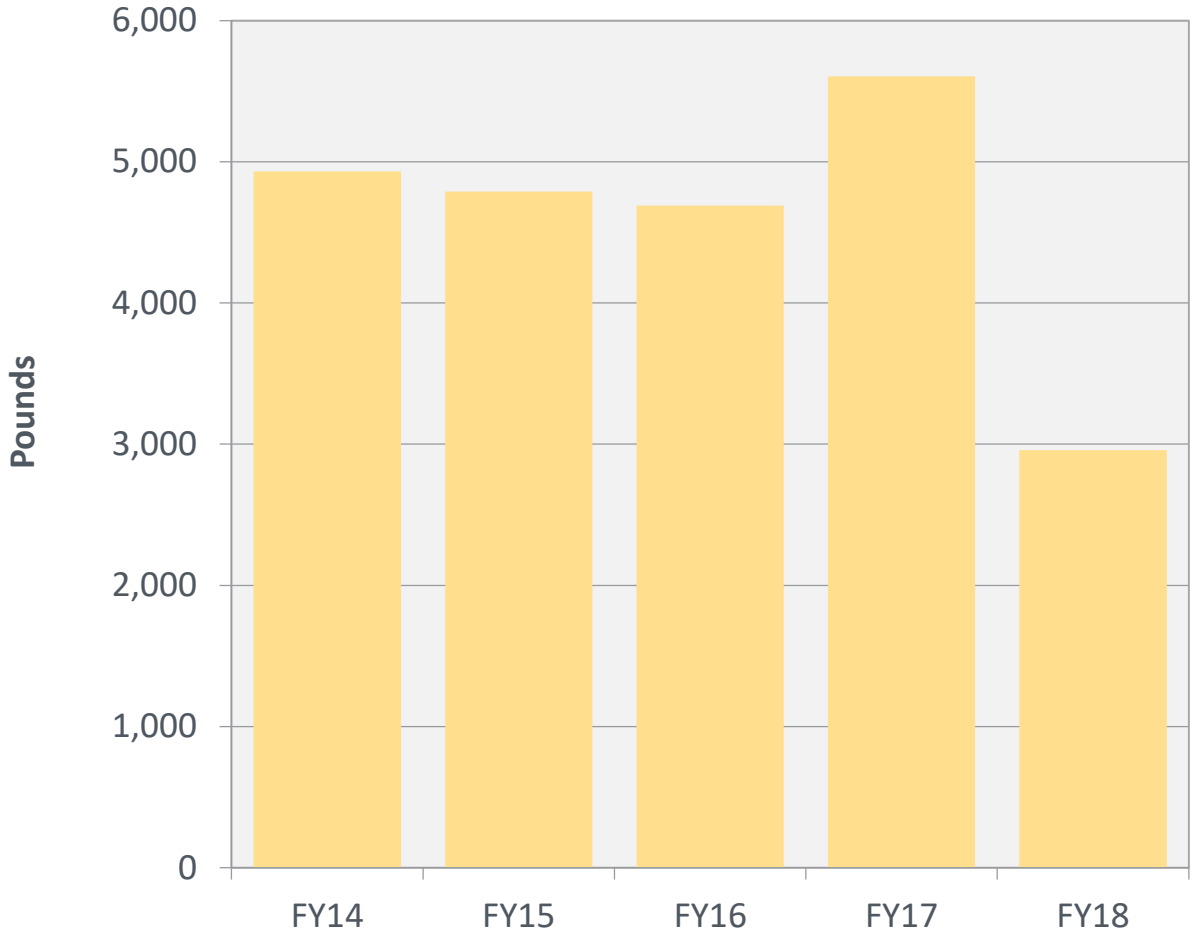
Typical ratios of domestic water to waste water are close to 1:1. The difference for the University of New Haven is the lack of comprehensive waste water documentation. Opportunity exists to better understand and track where the missing waste water data lies.

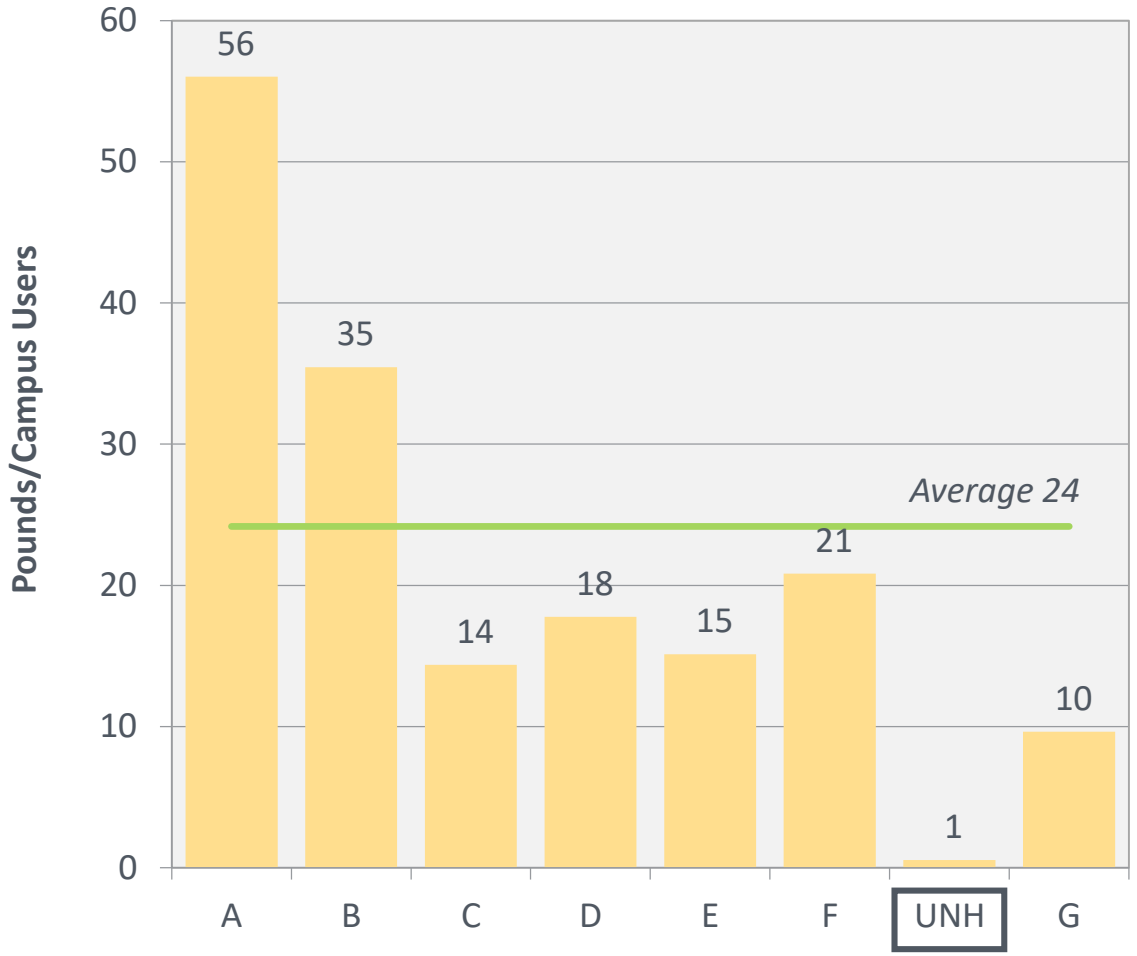
Scope 3 – Paper Consumption

University of New Haven

Total Paper Consumption Over Time



Normalized Paper Consumption vs. Peers



Peers listed by density factor

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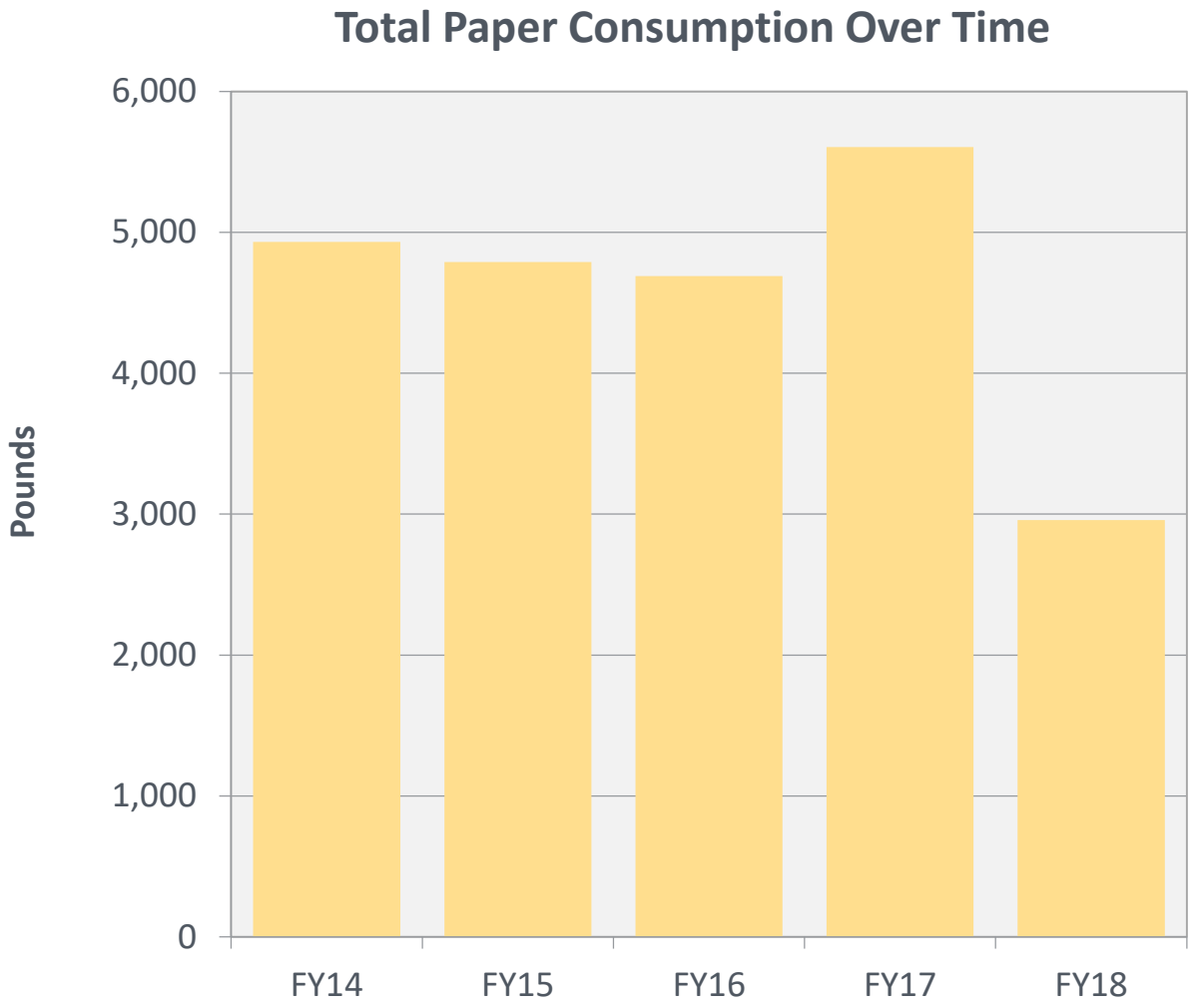
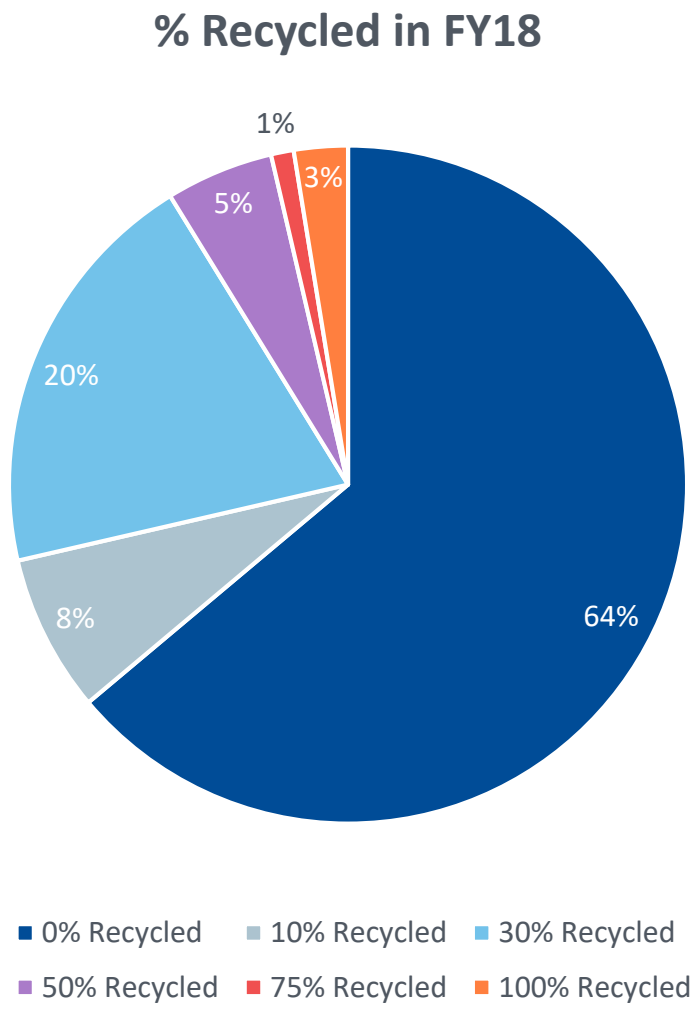
Majority of Paper Purchased Has 0% Recycled Content

University of New Haven





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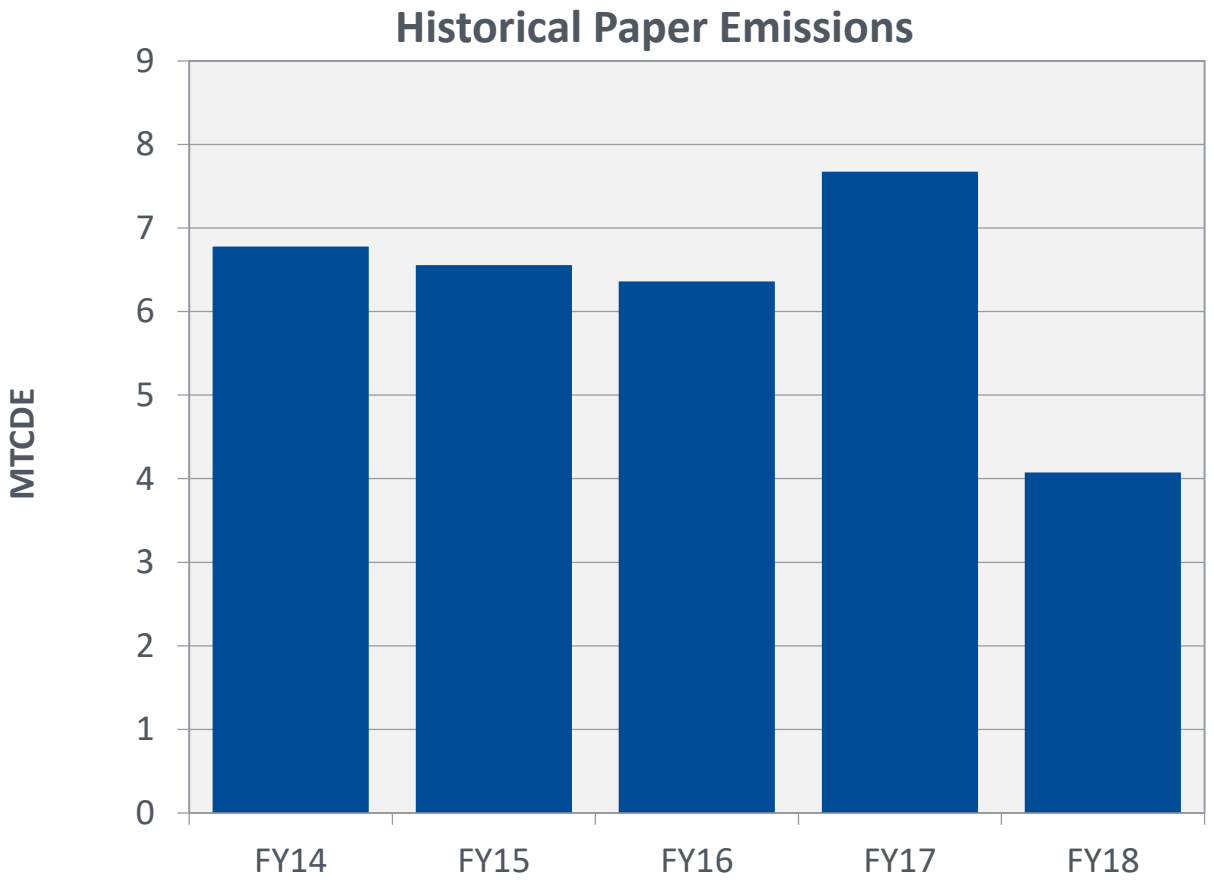
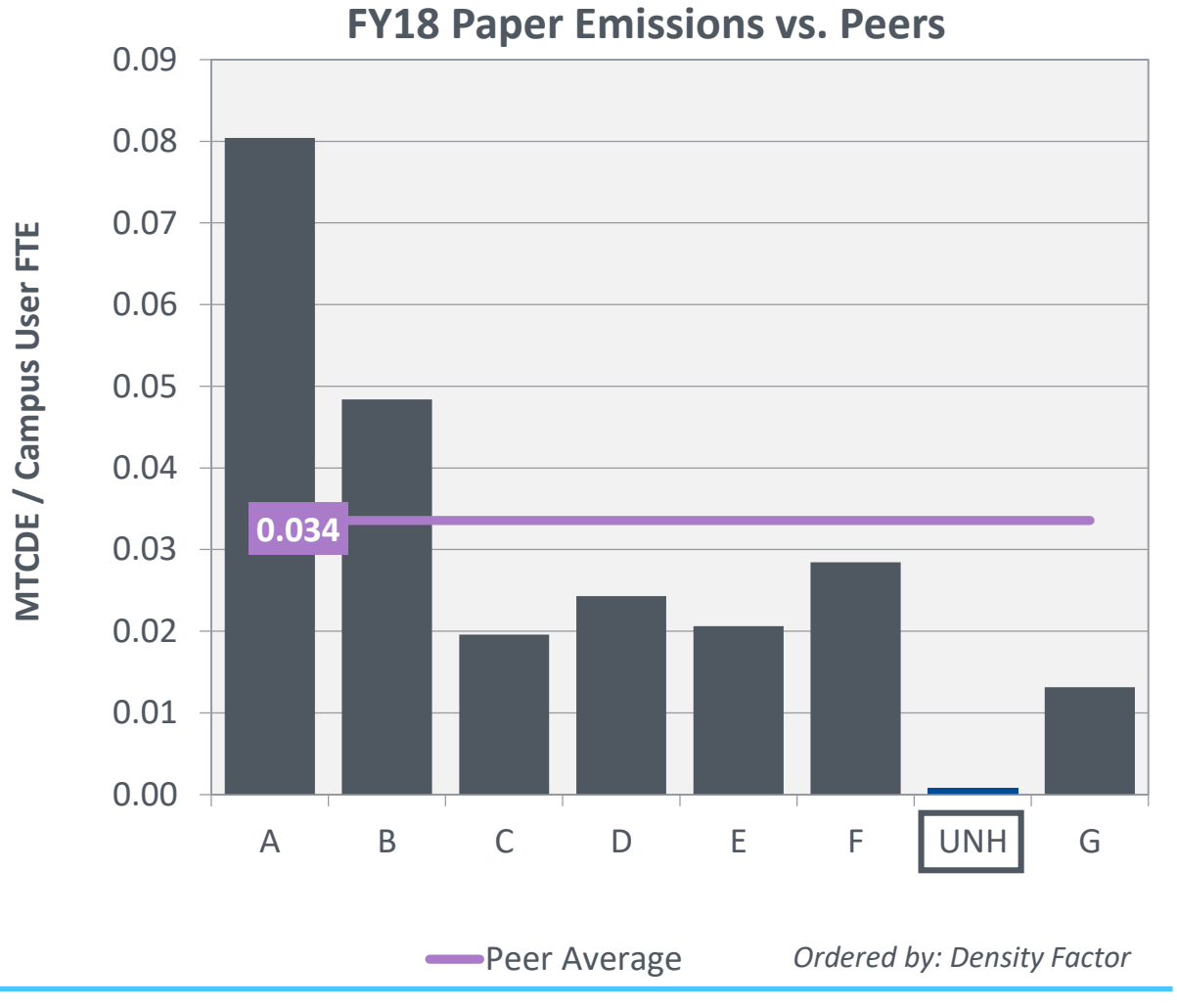
Purchased Paper Emissions

University of New Haven

Paper emissions decreased in FY18; continues to produce less emissions than peers





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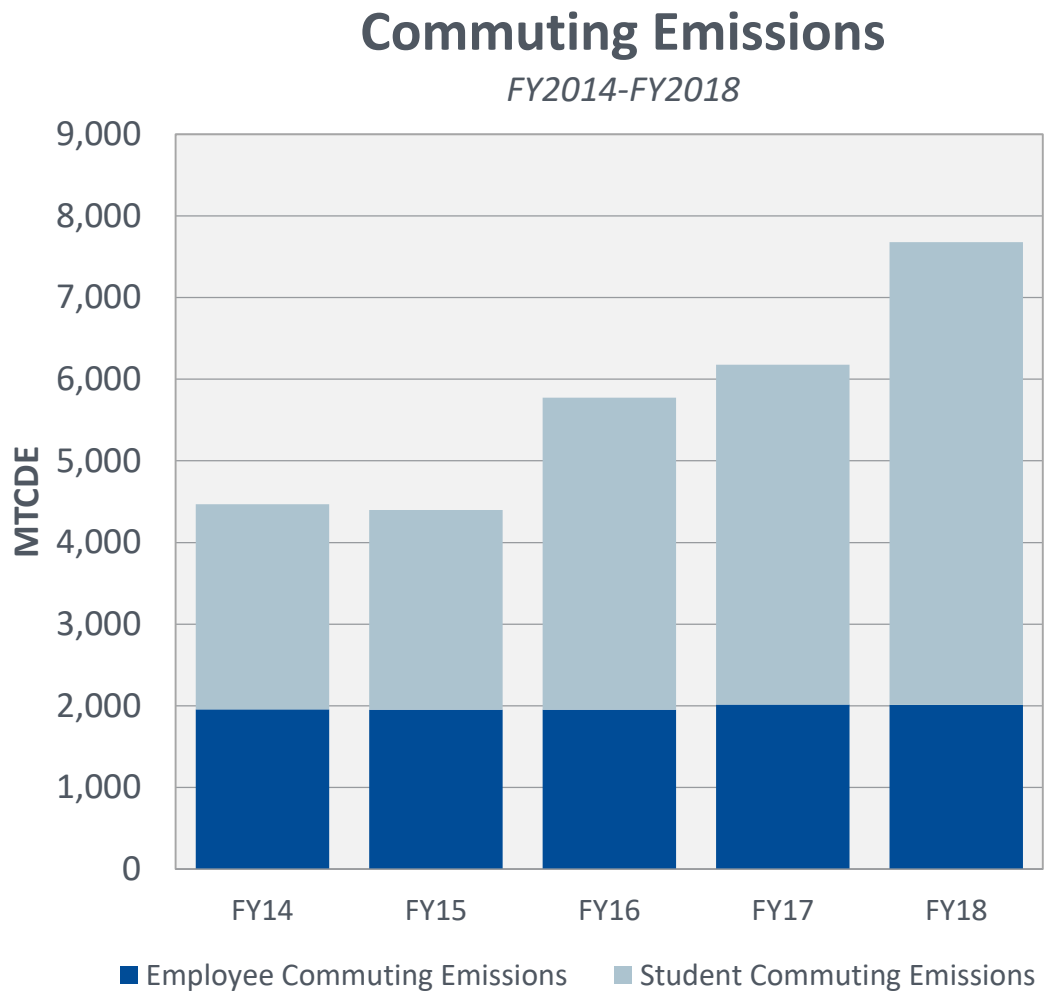
Commuting Survey Results

Commuter Survey Results

University of New Haven

Survey Facts:

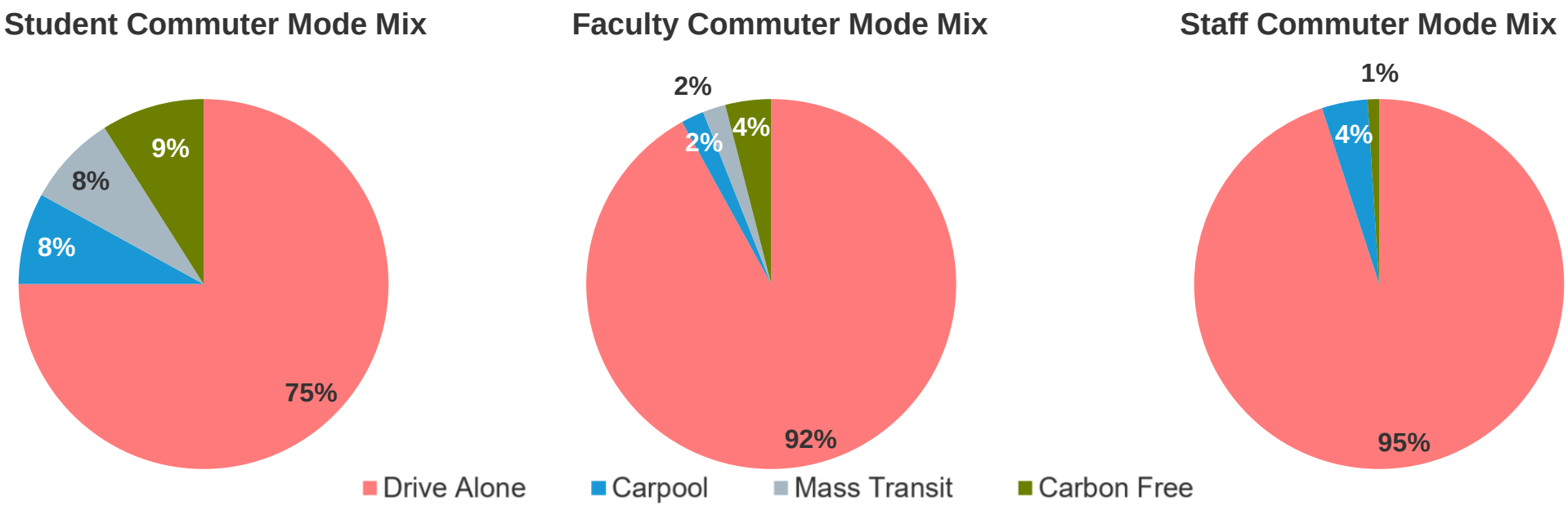
- Who it was sent to?
  - Commuting Survey was sent out to the University of New Haven campus
- How many people responded?
  - Total # of responses: 346
- By role at UNH?
  - Faculty: 123
  - Staff: 168
  - Student: 55
- How long it was open for?
  - November 27th – December 19th



Distribution of Commuting Modes

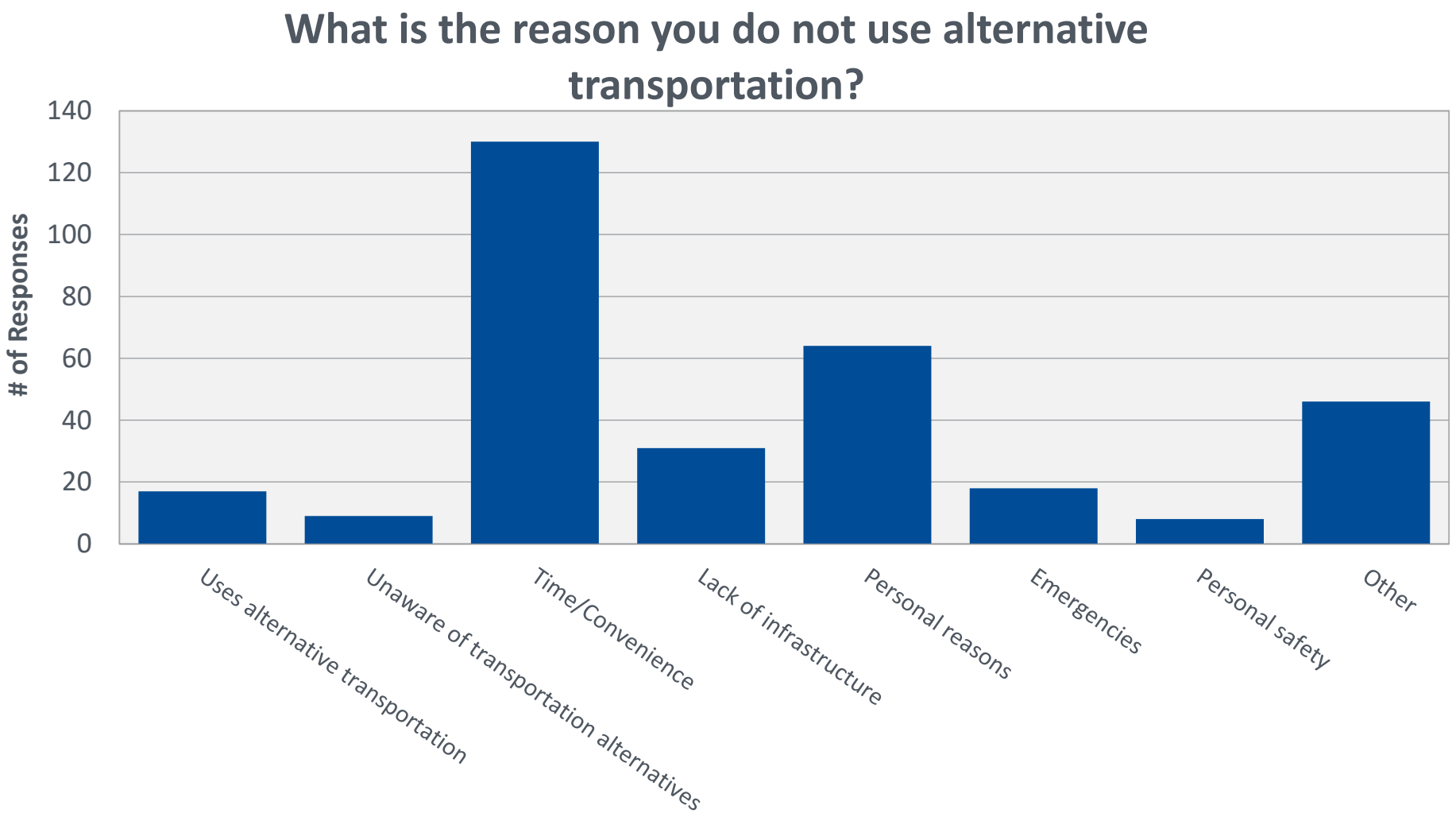
University of New Haven

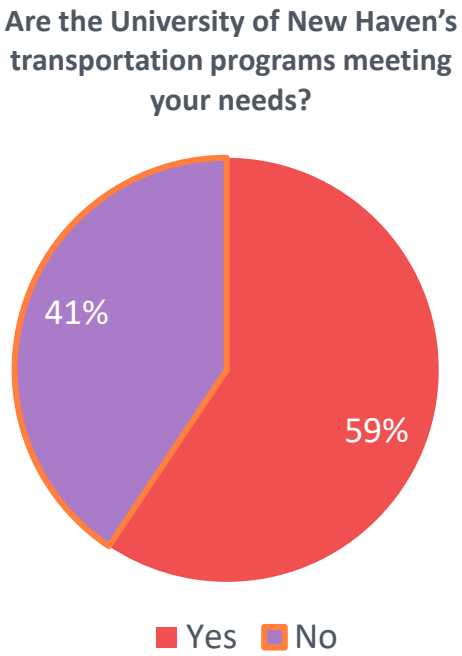
Rideshare Survey Responses	Student	Faculty	Staff
% Drive Alone	75%	92%	95%
Avg. Trip Distance (Drive Alone)	14.30 mi	16.67 mi	15.63 mi
% Carbon-Free	9%	4%	1%
Avg. Trip Distance (Carbon-Free)	1.0 mi	5 mi	3.71 mi



New Haven's Transportation Opportunities

University of New Haven





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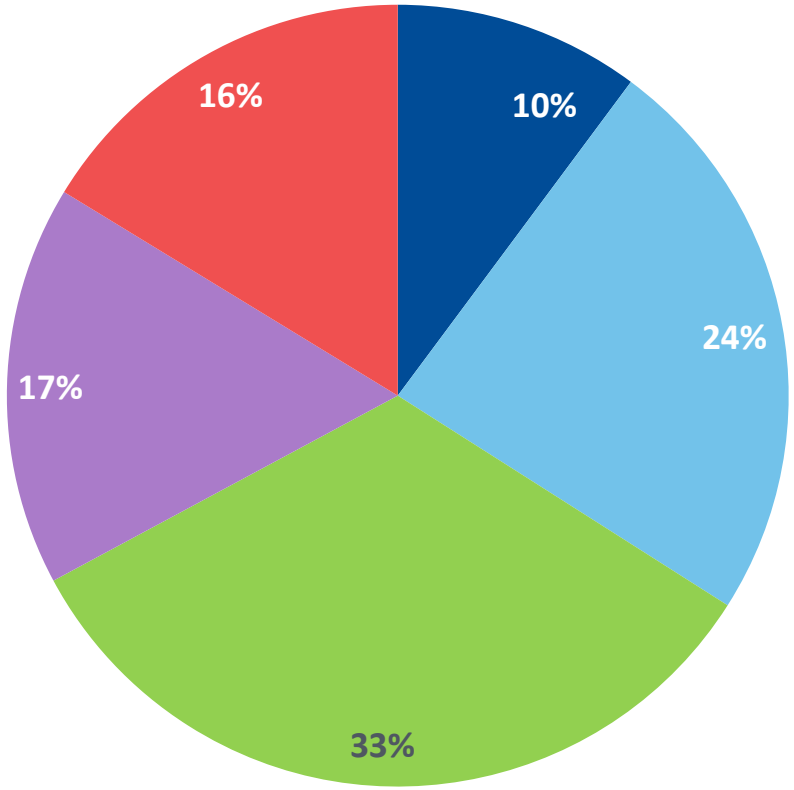
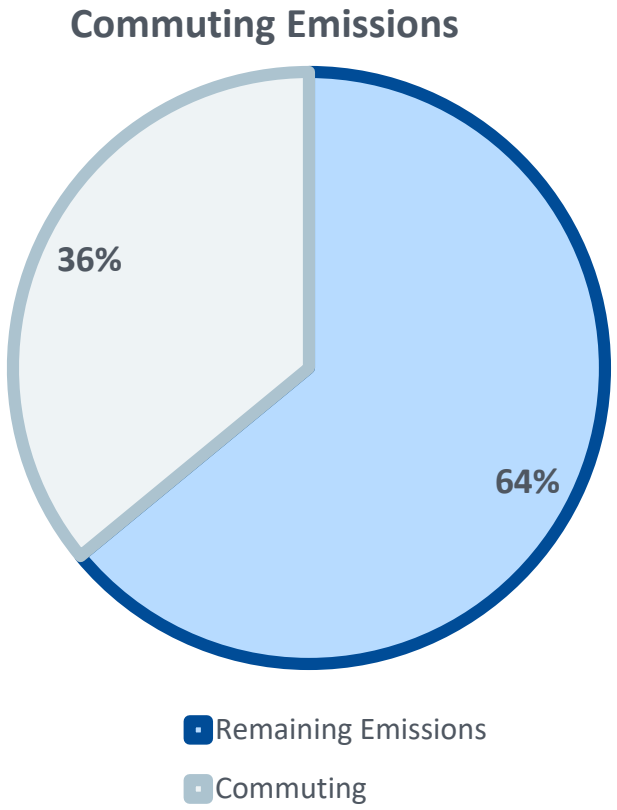
The Impact of Commuting Emissions

University of New Haven

How much impact, if any, do you think your commuting habits have on UNH's carbon footprint?





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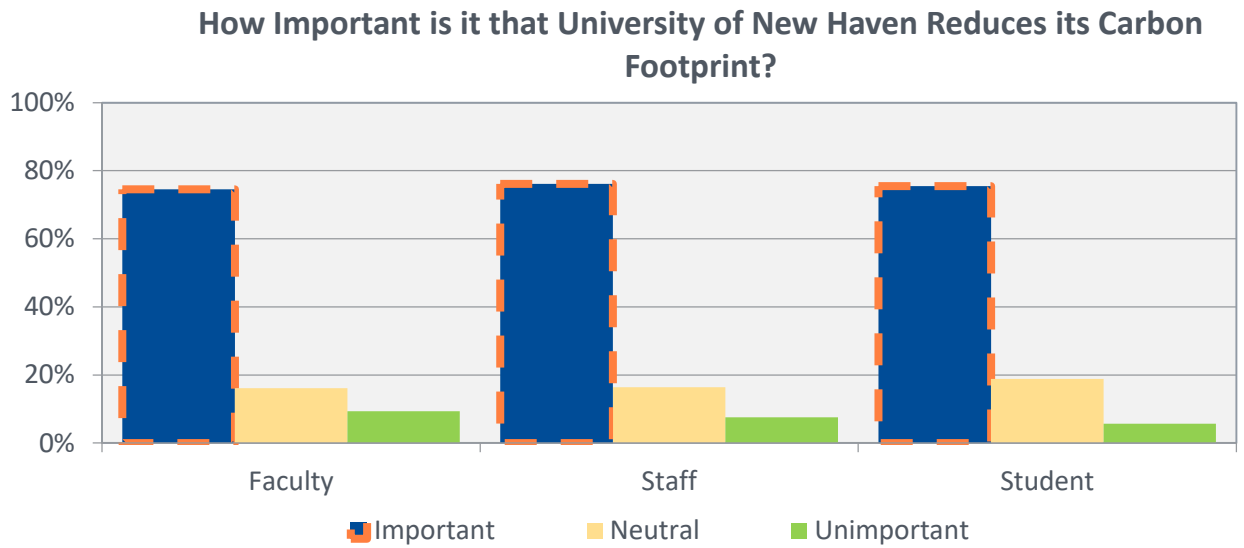
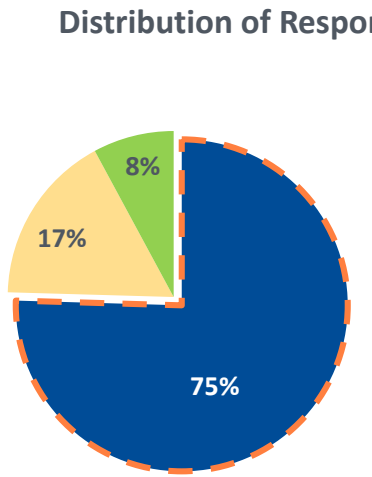
Engaging the New Haven Community

University of New Haven





Ways to include the campus community in sustainability initiatives:

Encourage energy saving competitions

Support alternative transportation methods

Improve recycling capacity and visibility

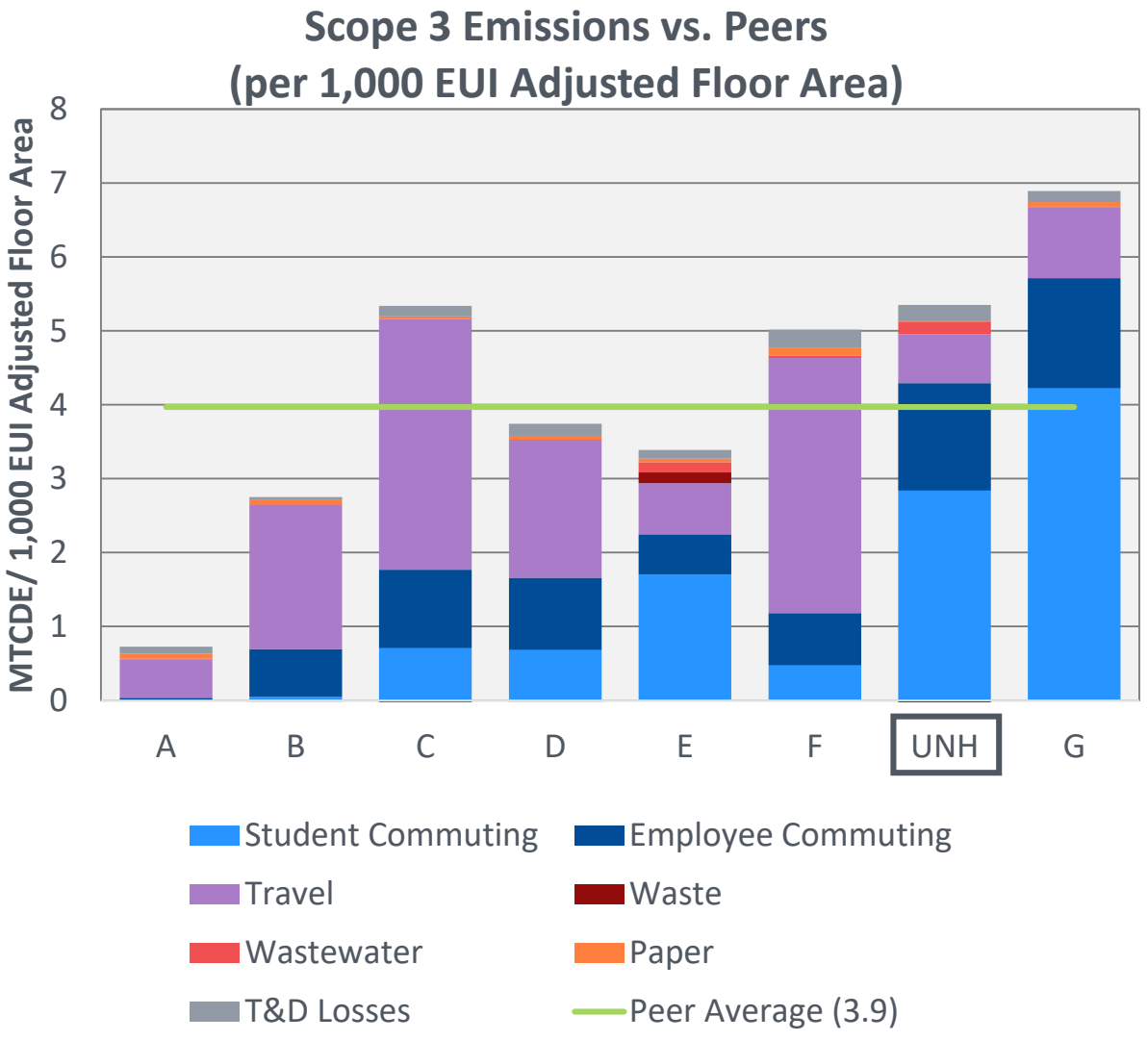
Suggestions for Reducing the Commuter Footprint

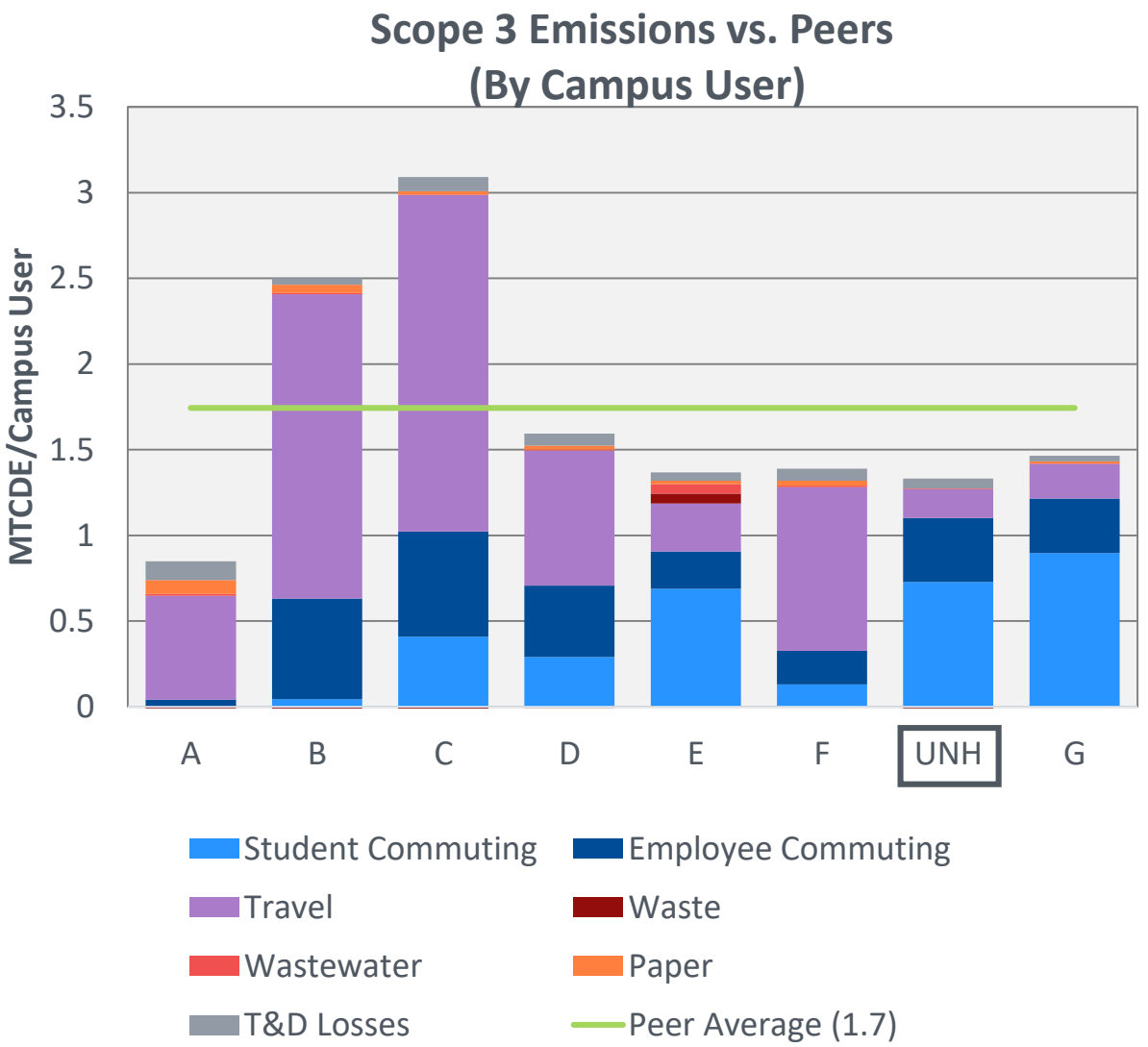
University of New Haven

- Increase parking costs
- Add opt-out or opt-in sustainability student fee to fund campus conservation projects
- Town – add bike lanes, sidewalks where possible
- On-campus daycare
- Compile list of employees/students willing to carpool, provide them means to contact each other
- Bike/bus stop shelters
- Increase monitoring of commuter-designated parking spaces
- Discounts for campus users to use existing mass transit
- Guaranteed ride home
- Purchase offsets

Scope 3 Summary

University of New Haven





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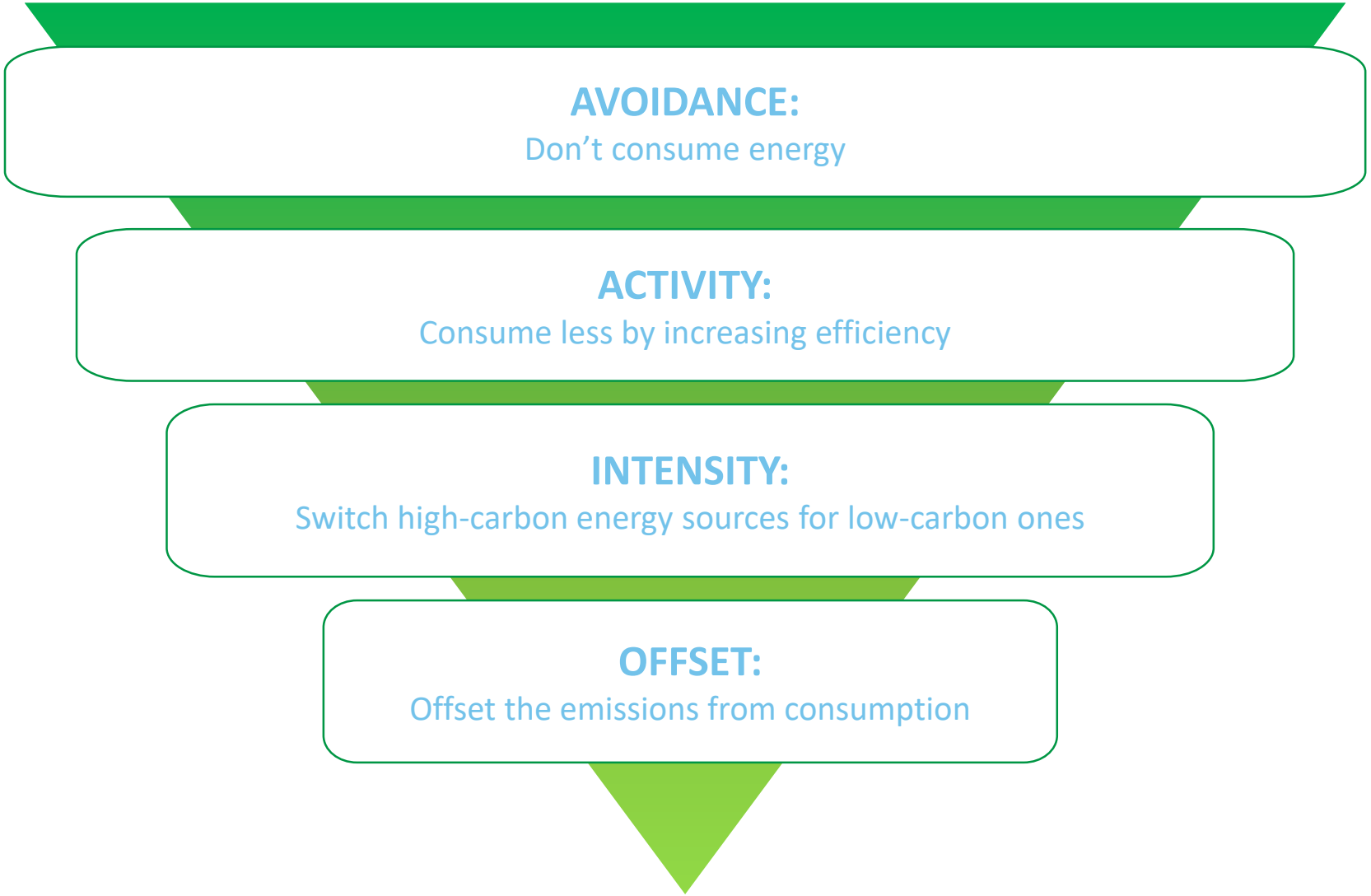
Conclusions

Carbon Mitigation Structure

University of New Haven



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Concluding Comments

University of New Haven

Scope 1

- Continued increase in fossil fuel consumption and resulting emissions
- When the Lyme campus comes offline in FY2020 New Haven will be only using natural gas as main source of fuel, and thus benefit from consuming a lower carbon intense fuel

Scope 2

- 40% of total emissions comes from Scope 2 or purchased electricity consumption
- Renewable electricity (solar panels) helped reduce scope 2 emissions

Scope 3

- Scope 3 emissions are driven by the commuting aspect of the University of New Haven's population
- The commuting survey indicates a desire of campus users for increased public transit accommodations

Prospects to impact Activity/Intensity of Emissions

- Energy-efficient practices—investment into efficient envelopes, green retrofits, mechanical systems and appliances and equipment—enable campuses to meet the needs of campus users and fulfill the institutional mission even while cutting GHG emissions.

- Assess current building automation and controls policies to further increase efficiency of existing systems on campus.

Opportunities to begin to Offset Emissions

- Expand existing recycling and composting program to help offset emissions and educate campus community.

- Use the purchase of offsets as an educational opportunity. Try to procure local offsets, when possible, and give vendors the opportunity to educate campus through demonstrations on campus.

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Questions and Comments

Glossary of Terms

University of New Haven

- **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). 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
- **Transmission and Distribution loss (T&D Losses) -** The difference in the generated and distributed units of energy is known as Transmission and Distribution loss.