

Bentley University FY22 Sustainability Presentation


March 24th, 2023


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 is Included in a Greenhouse Gas Inventory?

Scope 1:
From sources owned or controlled by Bentley


On-Campus Stationary 

 Vehicle Fleet

Refrigerants 


 Fertilizer


Scope 2:
From the generation of electricity purchased by Bentley




Purchased Electricity

Scope 3:
From sources not directly controlled by Bentley

Directly Financed and Study Abroad Travel 

 Waste and Wastewater

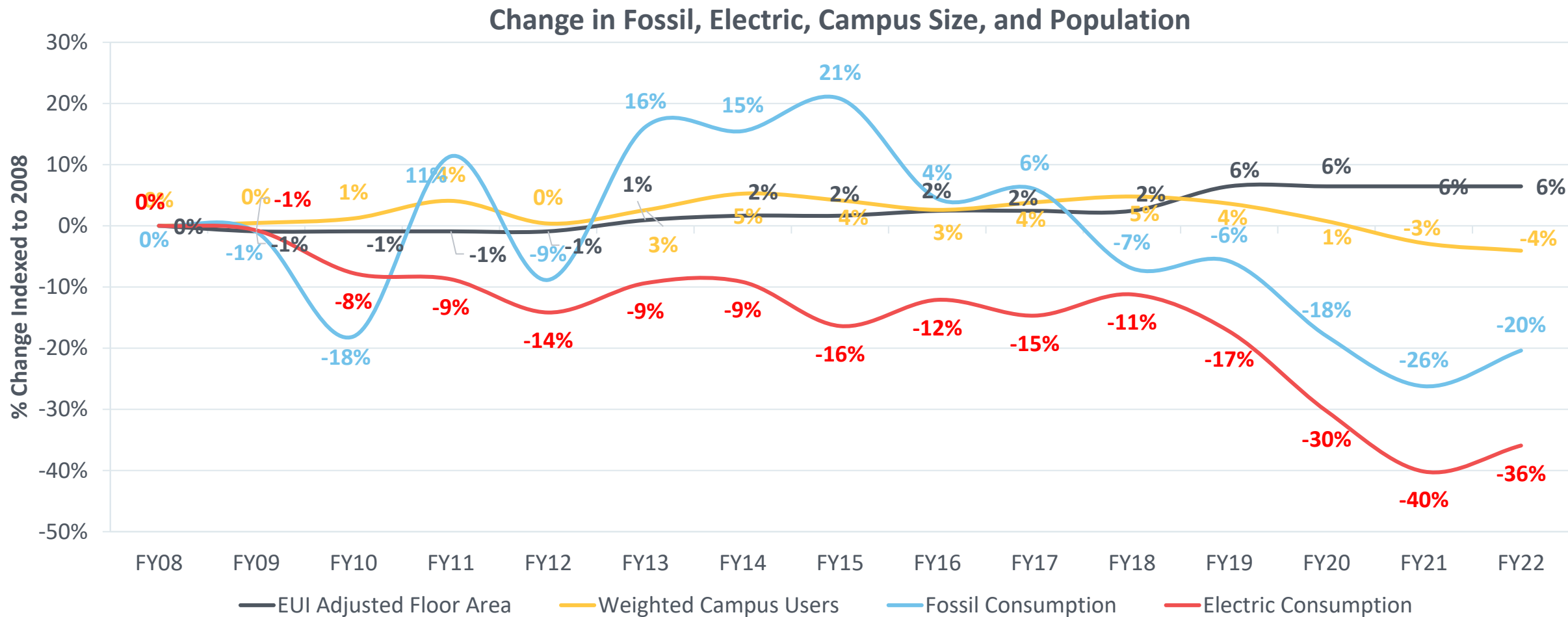
Student, Faculty, and Staff Commuting 

Paper Purchasing
Transmission and Distribution Losses

Increasingly Difficult to Track, Control and/or Mitigate

Steady Population and GSF; Decrease in Utility Consumption

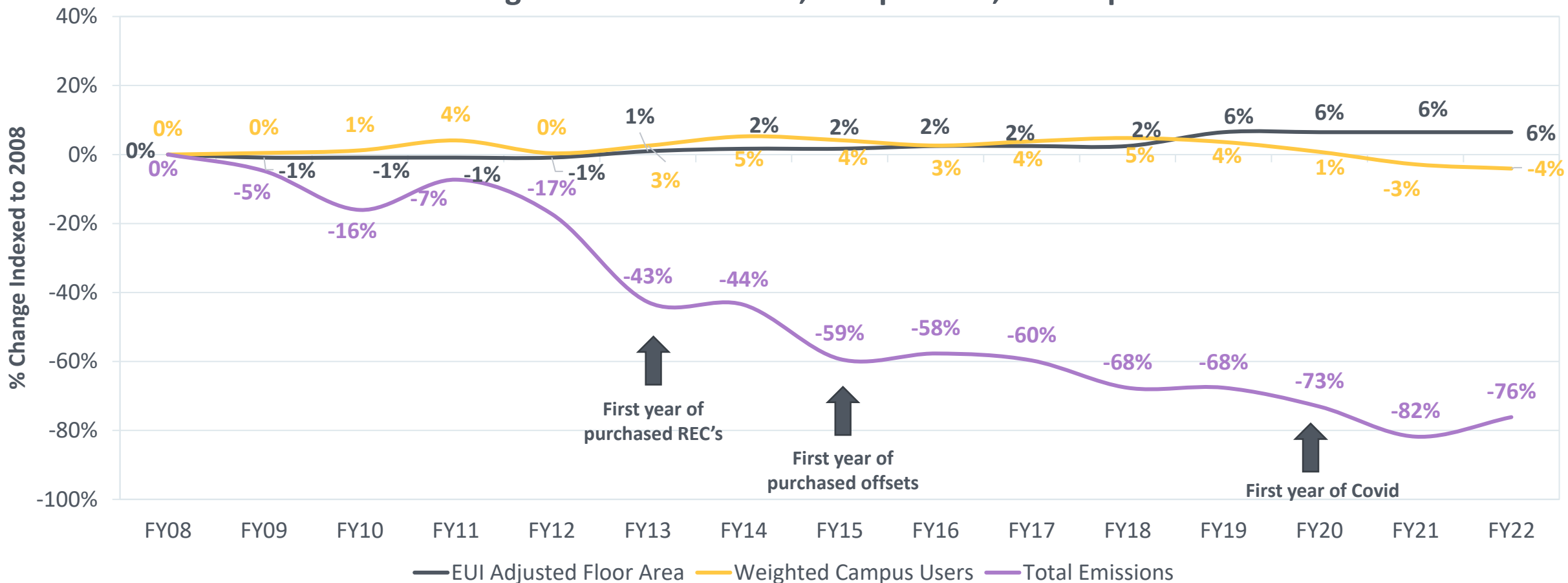
Through strategic energy management and Covid implications, consumption continues to decrease



Emissions Have Decreased 76% From FY08 to FY22

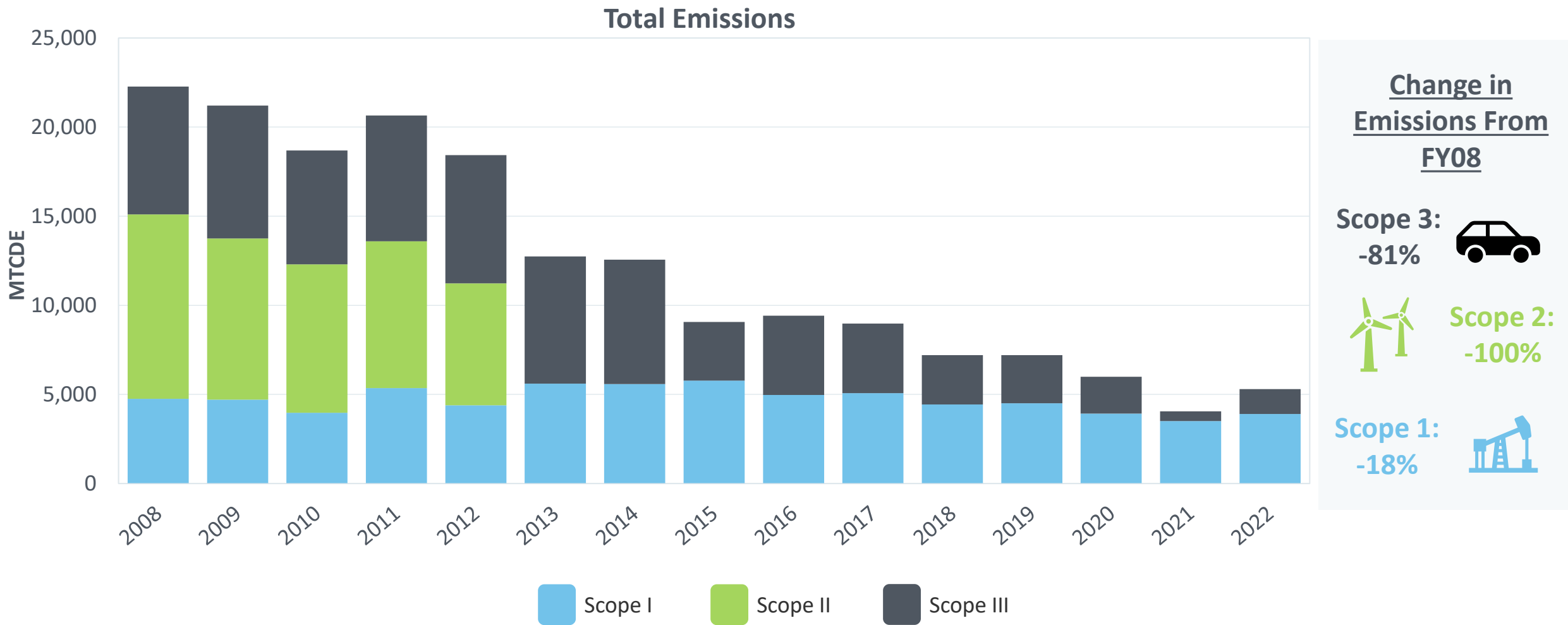
Bentley reduced emissions through energy management, use of market mechanisms, and impact of Covid

Change in Total Emissions, Campus Size, and Population



Emissions Have Decreased 76% From FY08 to FY22

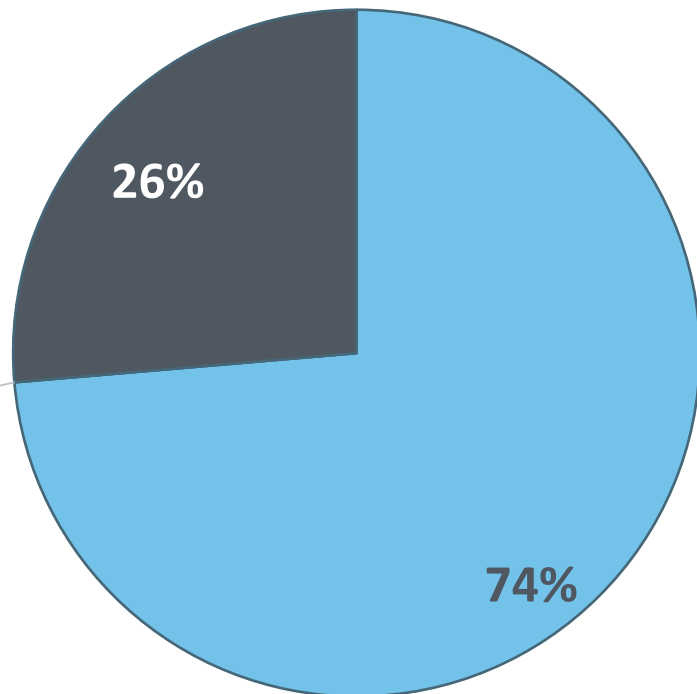
Emissions reductions driven by increased building efficiency, purchasing of market mechanisms, and COVID-19



FY22 Total Emissions Profile at Bentley

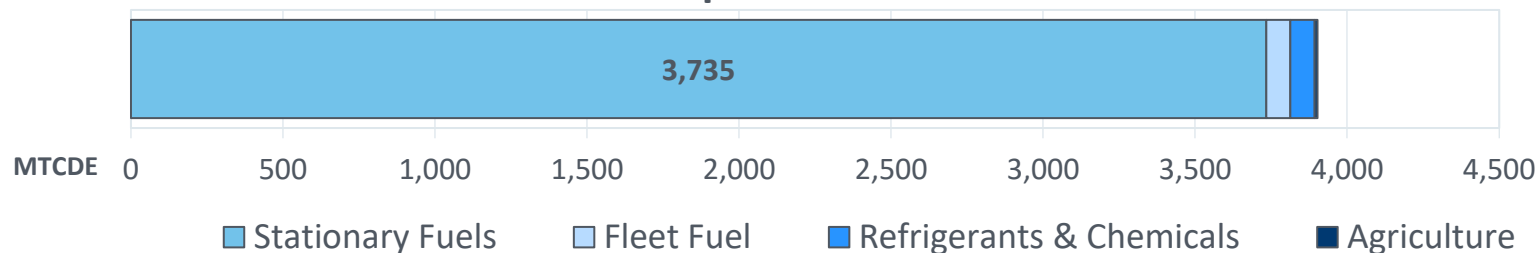
With the purchase of RECs and Offsets Bentley's FY22 emissions total 5,299 MTCDE

Emissions by Scope

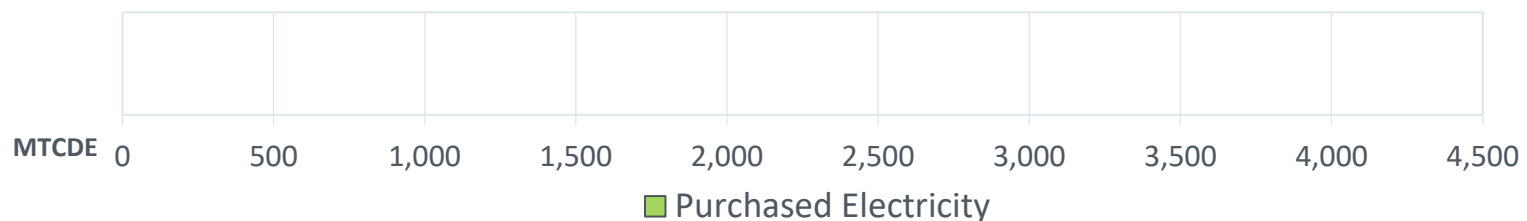


Scope 1 Scope 2 Scope 3

Scope 1 Sources



Scope 2 Sources



Scope 3 Sources



Sustainability Benchmarking



Peer Institutions Used For Benchmarking

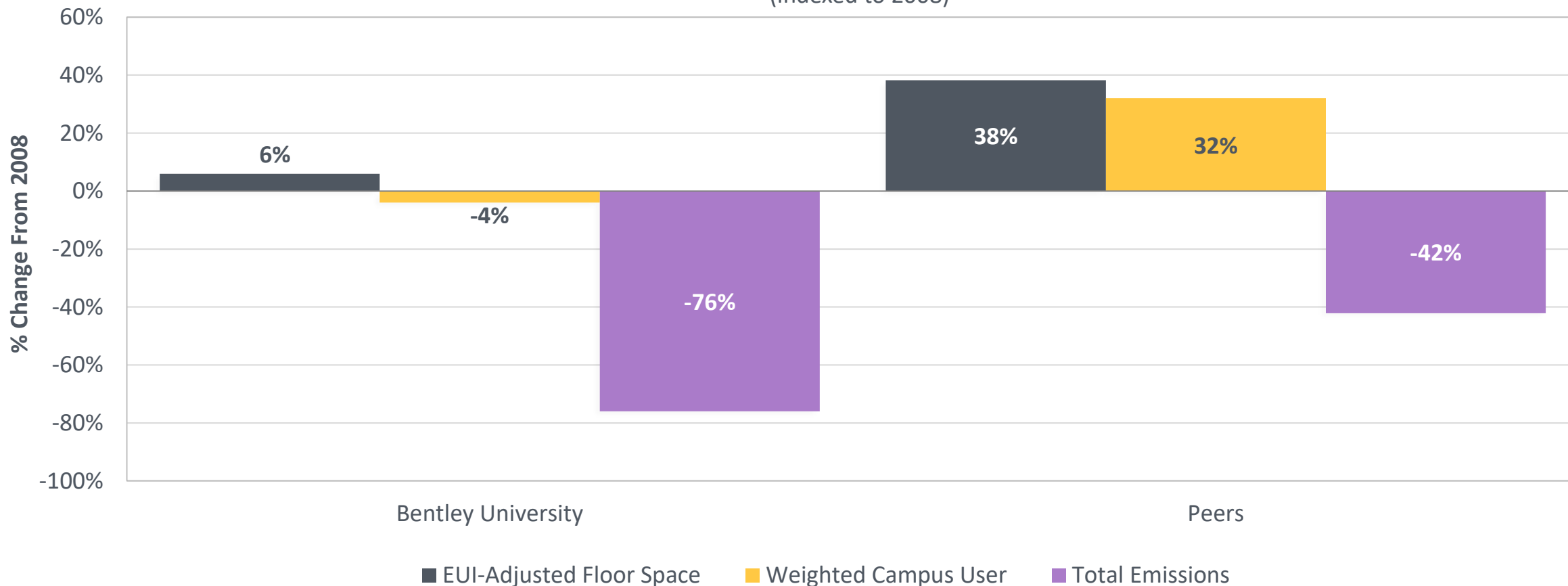
Institution Name	Location:	Carbon Neutral Date	GSF Range	Enrollment Range
Bentley University	Waltham, MA	2030	1 – 2.5M	5,000 – 10,000
American University	Washington, D.C.	2020	2.5M – 5M	10,000 – 15,000
Boston College	Boston, MA		Over 5M	10,000 – 15,000
Carleton College	Northfield, MN	2050	1 – 2.5M	5,000 – 10,000
Chapman University	Orange, CA		2.5M – 5M	5,000 – 10,000
Fitchburg State University	Fitchburg, MA		1 – 2.5M	5,000 – 10,000
Rider University	Lawrence Township, NJ	2050	1 – 2.5M	Under 2,000
Worcester State University	Worcester, MA	2050	Less Than 1M	5,000 – 10,000

Bentley Has Experienced Less Growth Compared to Peers

Limited increase in footprint and decrease in population helps Bentley reduce total Emissions

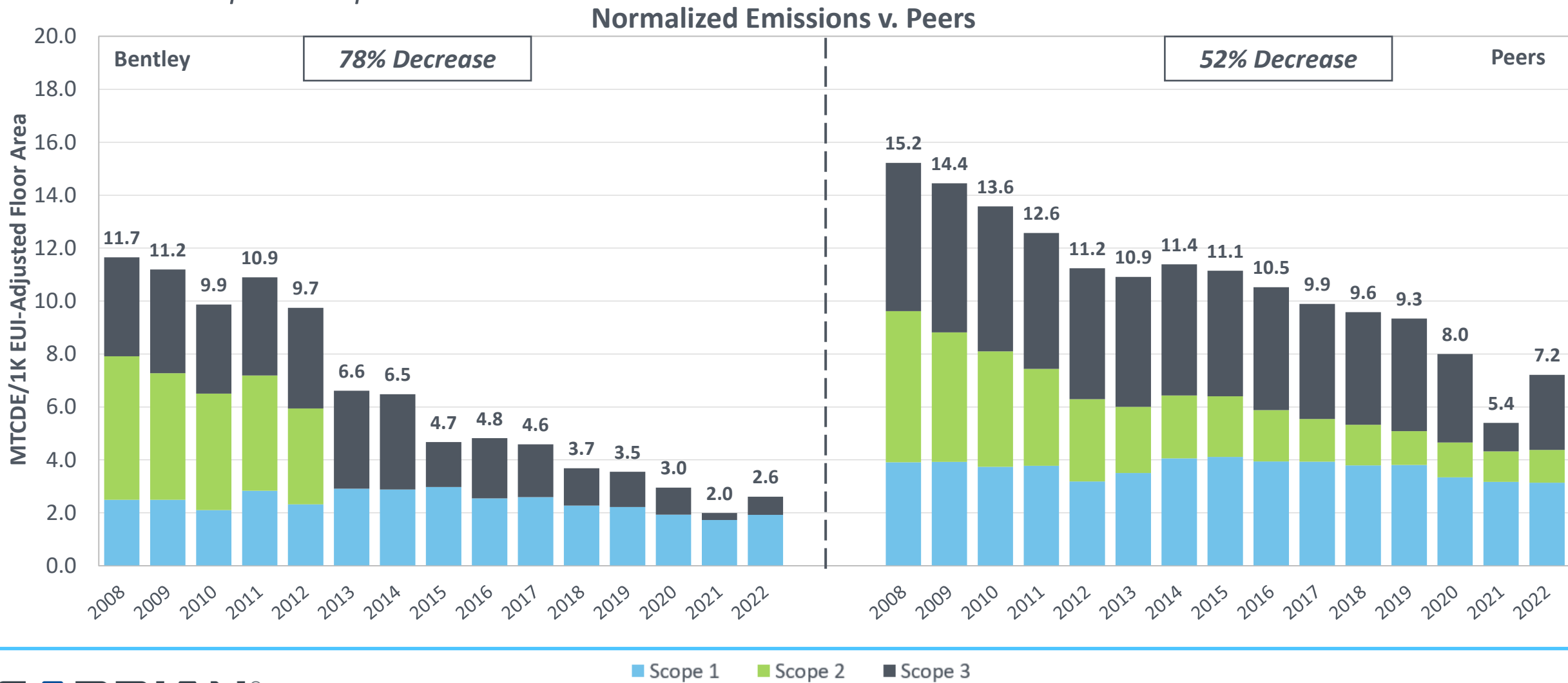
Campus Footprint, Users, and Emissions Trending v. Peers

(Indexed to 2008)



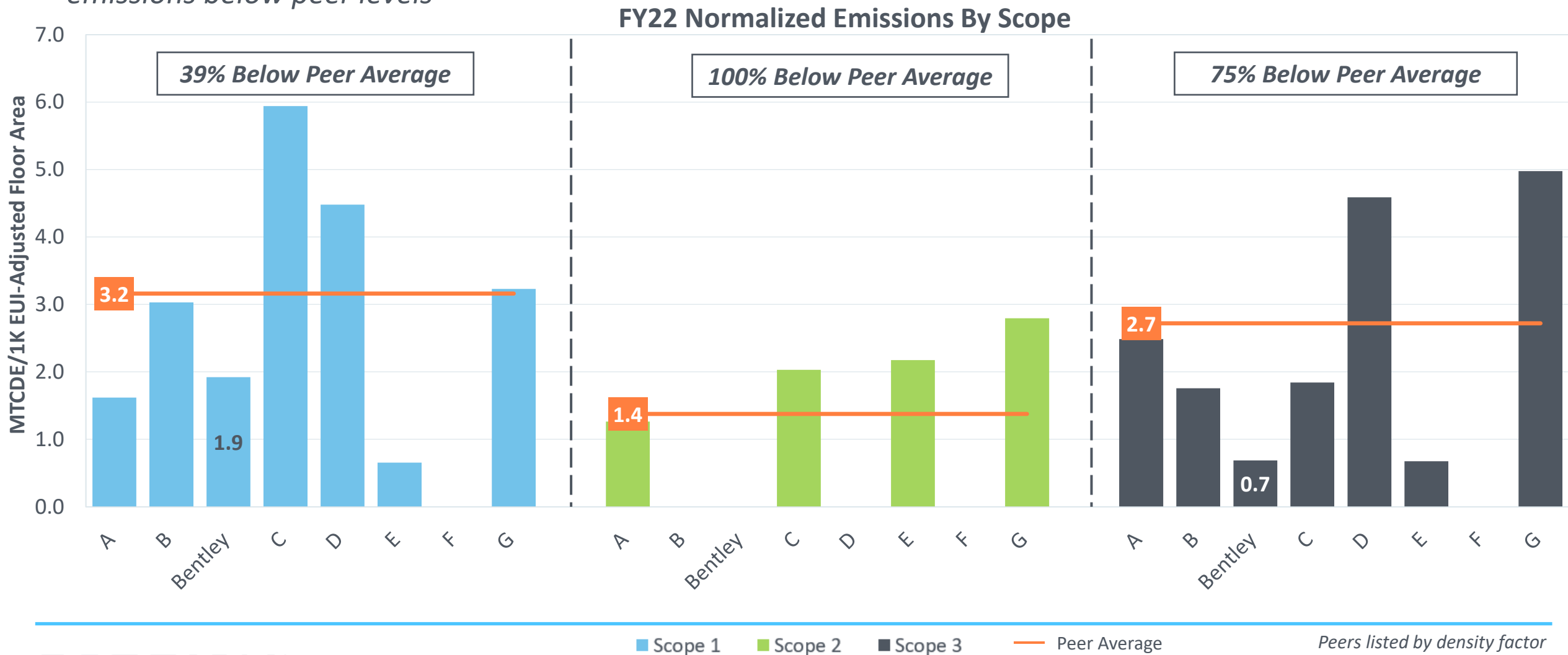
Bentley Has Reduced Emissions Faster Than Peers

Bentley's strategic energy management and use of market mechanisms result in larger decrease in total emissions compared to peers



FY22 Emissions at Bentley Below Peer Levels

Strategic energy management, market mechanisms and limited commuting emissions aid in keeping total emissions below peer levels

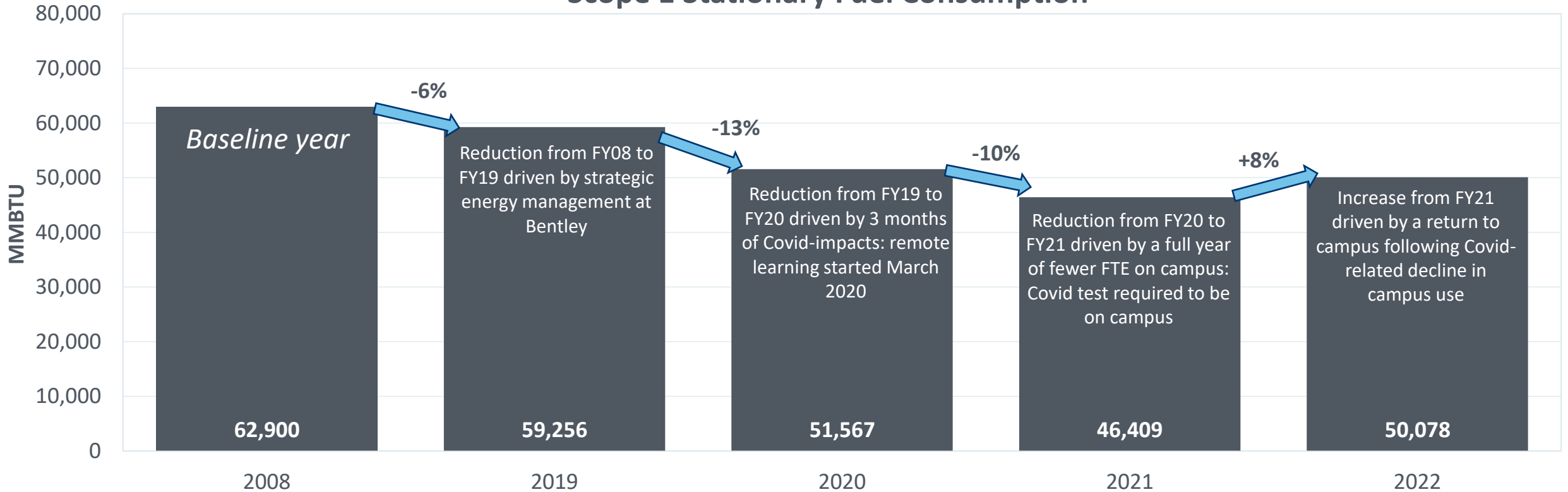


Scope 1 Emissions Profile



Natural Gas Consumption Has Decreased 20% From FY08

Scope 1 Stationary Fuel Consumption

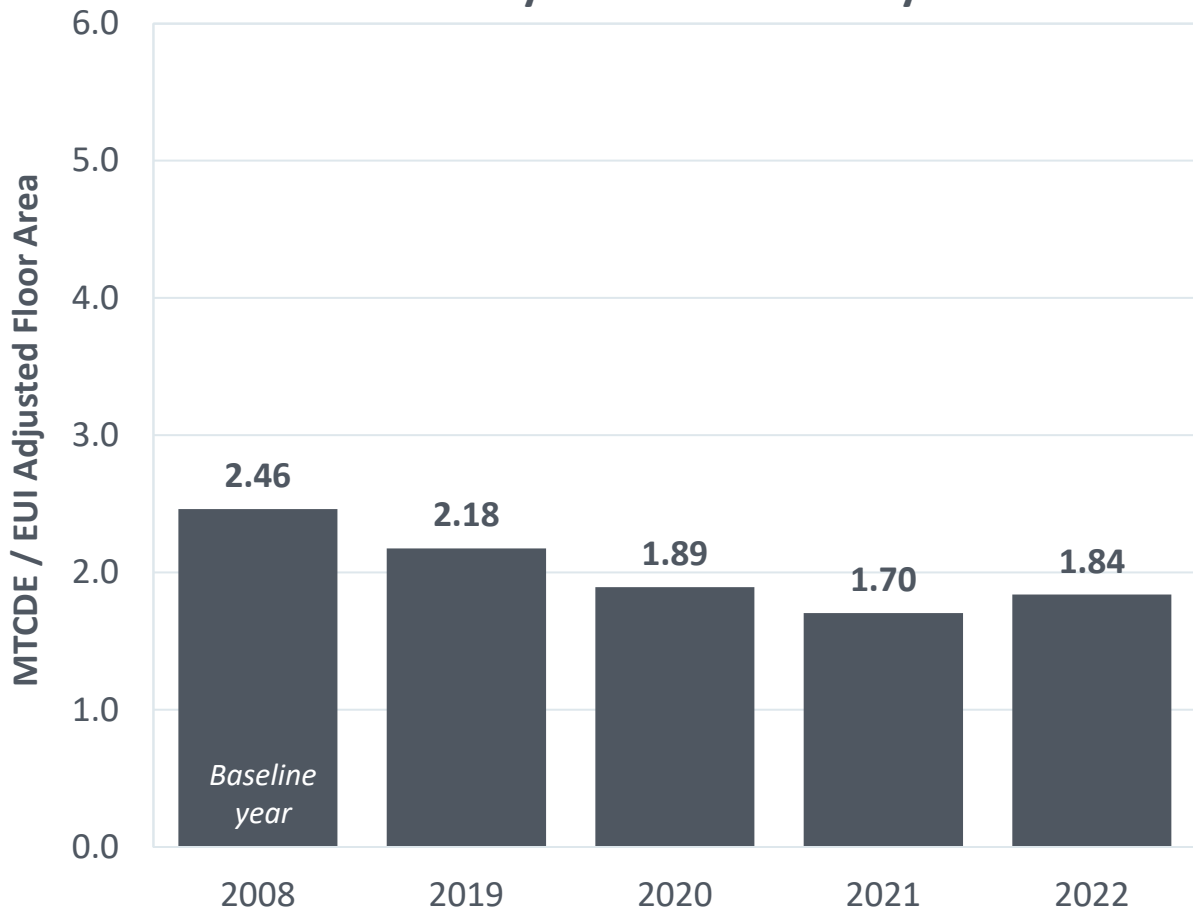


Bentley to Reduce Stationary Fuels Even Further (from Sustainability and Climate Action Plan)

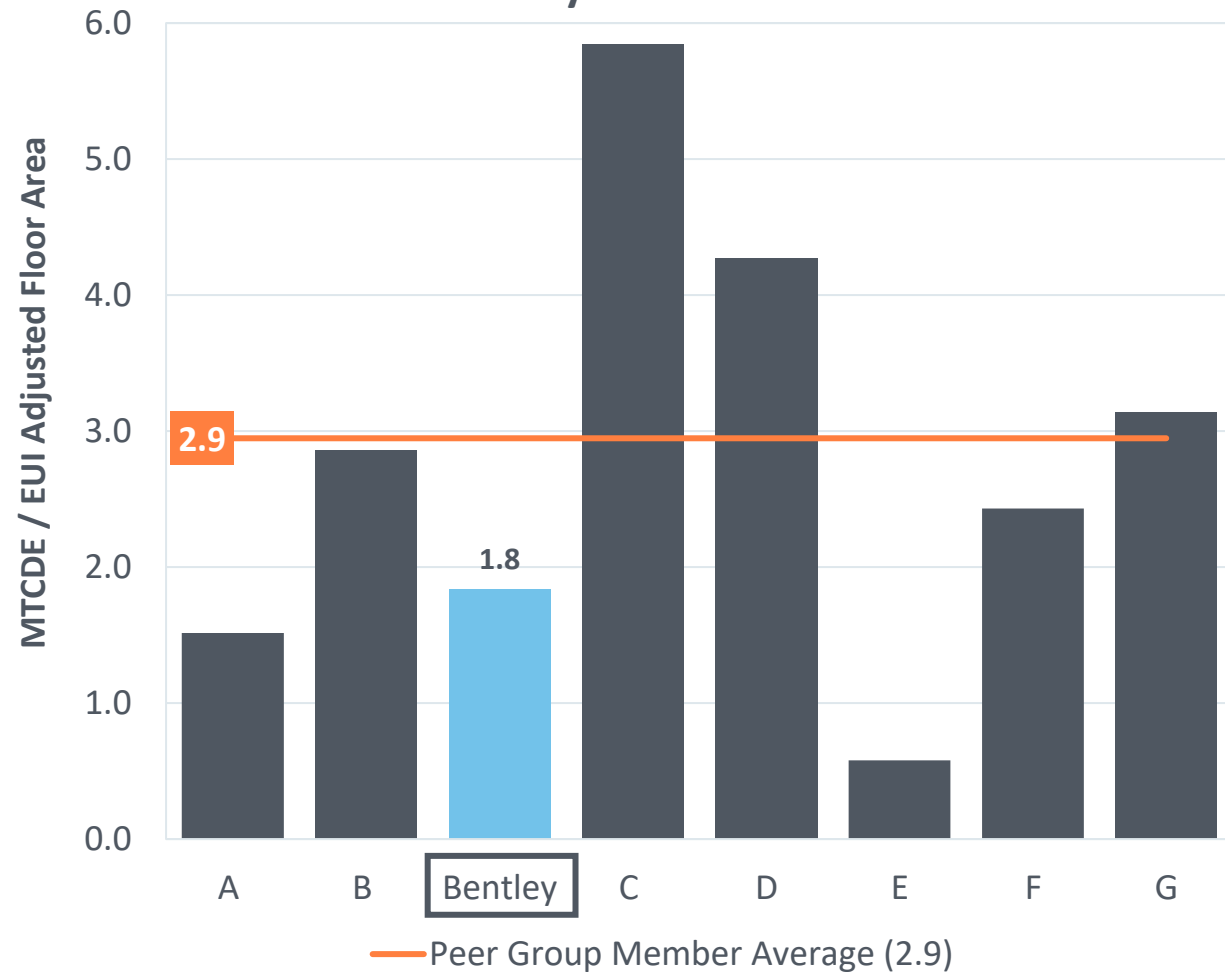
- Goal 1 - Decarbonize:** By 2026, Bentley has reduced its dependence on fossil fuels using the following strategies:
 - Strategy 1 - Plan:** Develop a utility energy and resiliency plan, including assessment of renewable energy production and electrification of campus energy systems
 - Strategy 2 - Pilot:** Convert a system(s) within a building from fossil fuel to electricity as a standalone project or in supplementation to a Capital building major renovation
 - Strategy 3 - Install:** Advocate for the installation of renewable power generation infrastructure on campus

Lower Stationary Emissions at Bentley Compared to Peers

Total Bentley Historic Stationary Emissions



FY22 Stationary Emissions vs. Peers

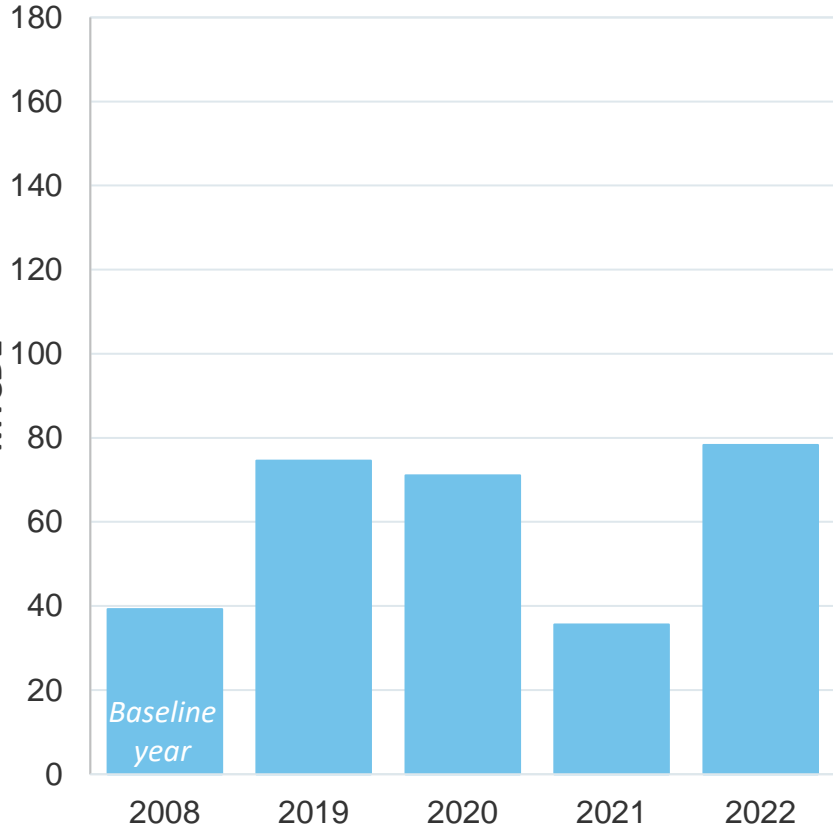


Peers listed by density factor

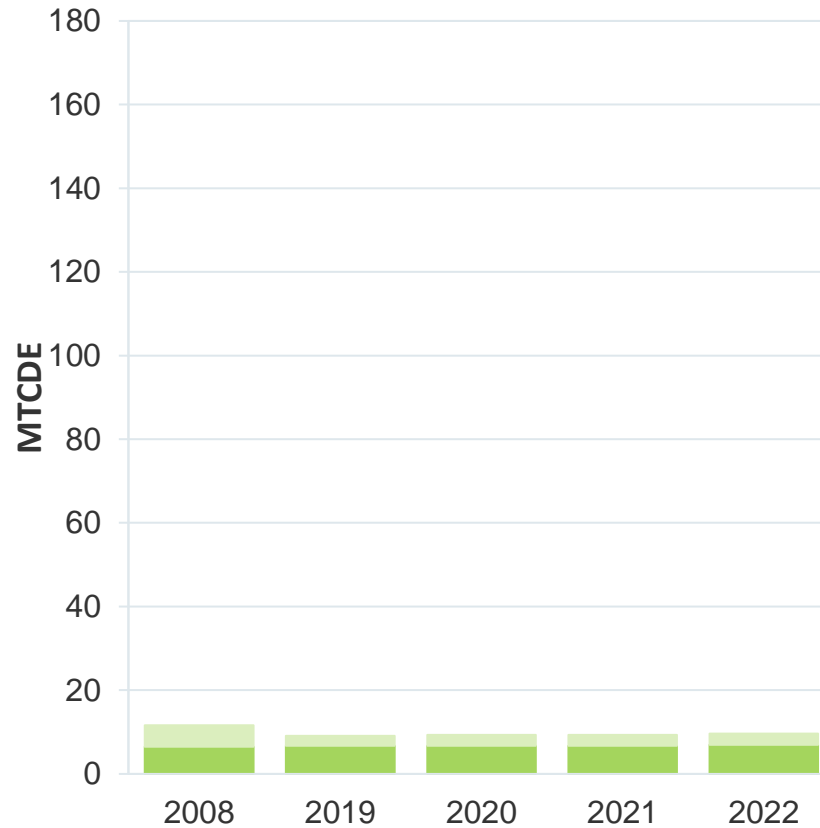
De Minimis Scope 1 Emissions Increase From FY21 to FY22

Refrigerant emissions reported in 2013, 2014, and 2022

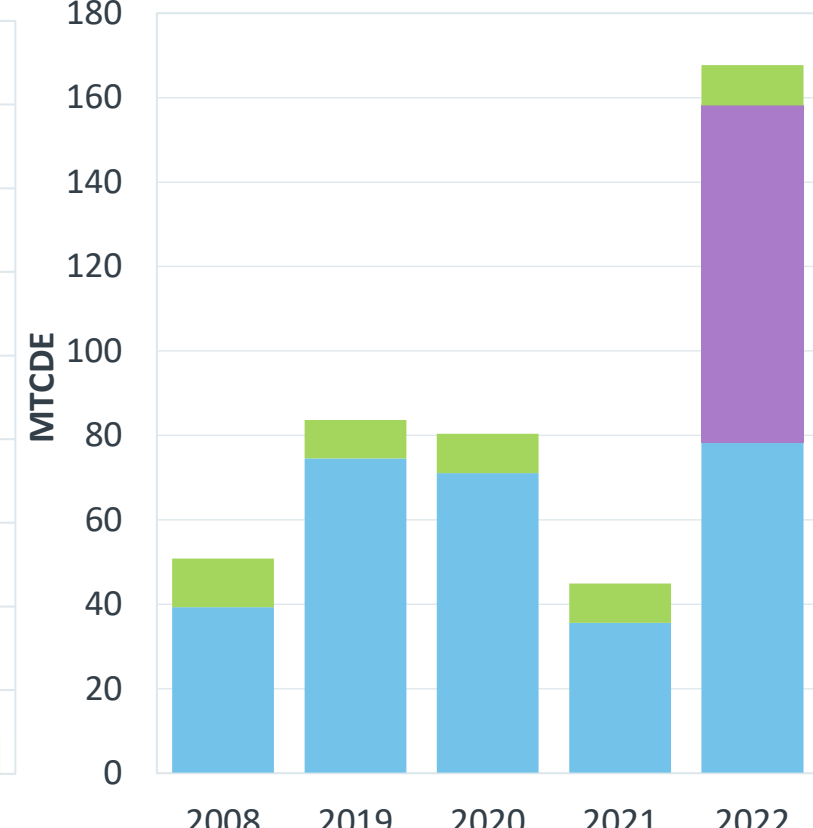
Fleet Fuel Emissions



Fertilizer Emissions



De Minimis Scope 1 Emissions



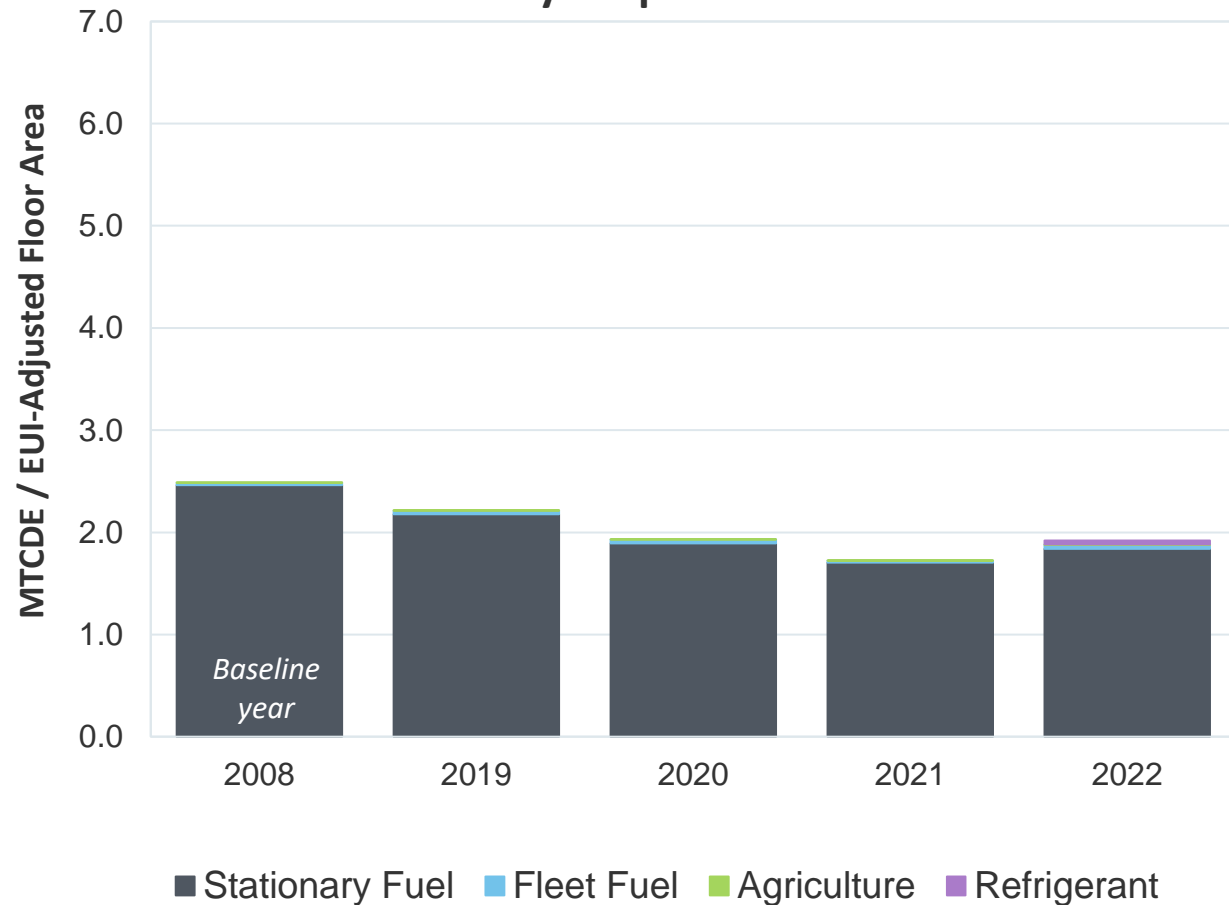
■ Synthetic Emissions ■ Organic Emissions

■ Fleet Fuel ■ Refrigerants ■ Fertilizer

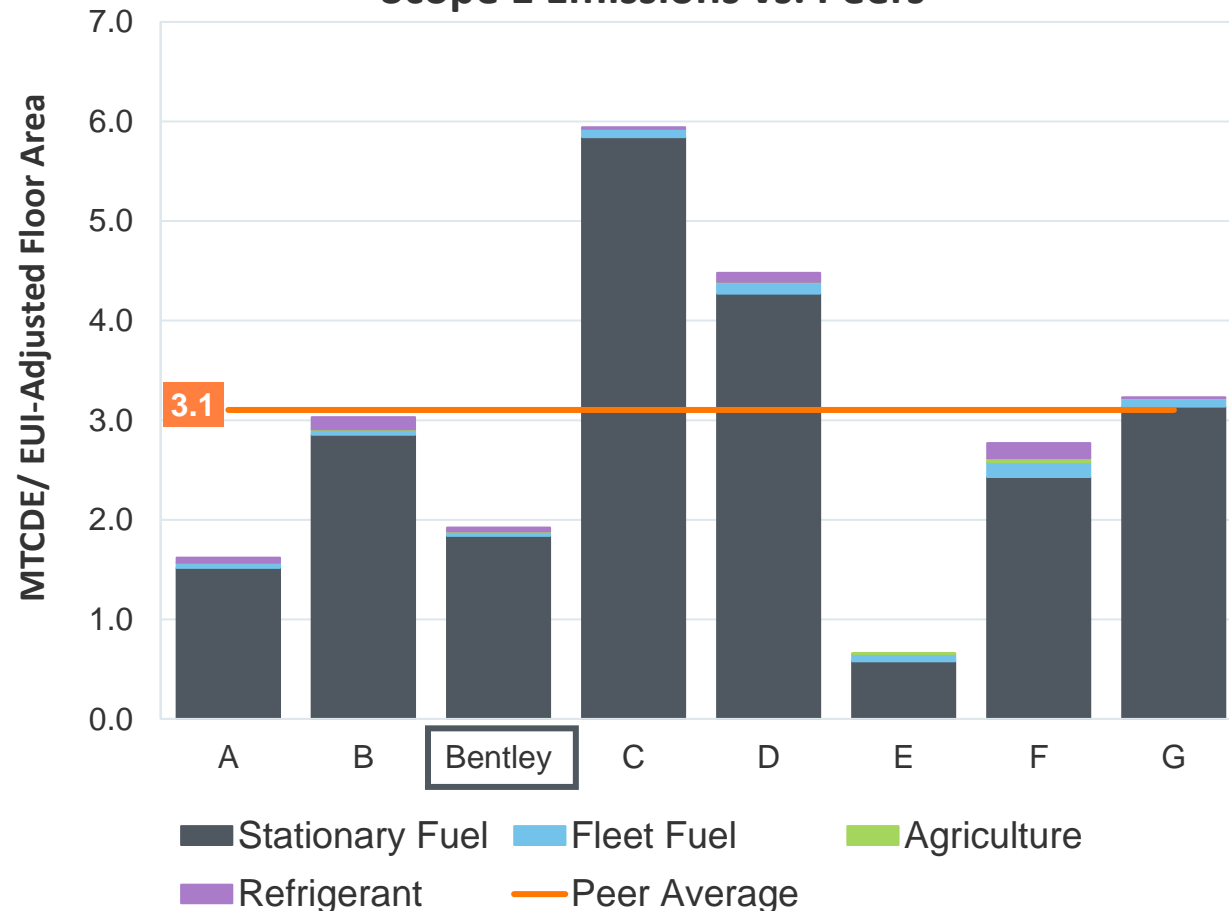
Scope 1 Summary: Slight Increase in FY22; Still Below Peers

Prioritization of envelope/mechanical investments and strong energy management drive Bentley emissions below peers

Bentley Scope 1 Emissions



Scope 1 Emissions vs. Peers



Peers listed by density factor

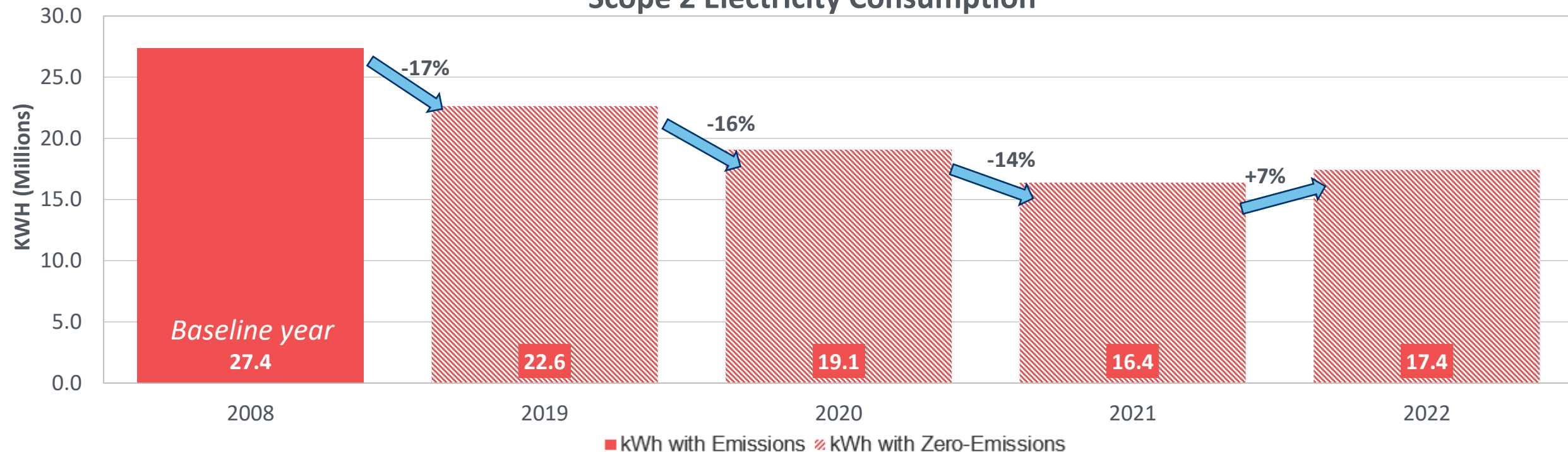
Scope 2 Emissions Profile



Electric Consumption Continues Overall Decrease

Although usage increases post-pandemic, Bentley decreases consumption 36% since 2008

Scope 2 Electricity Consumption



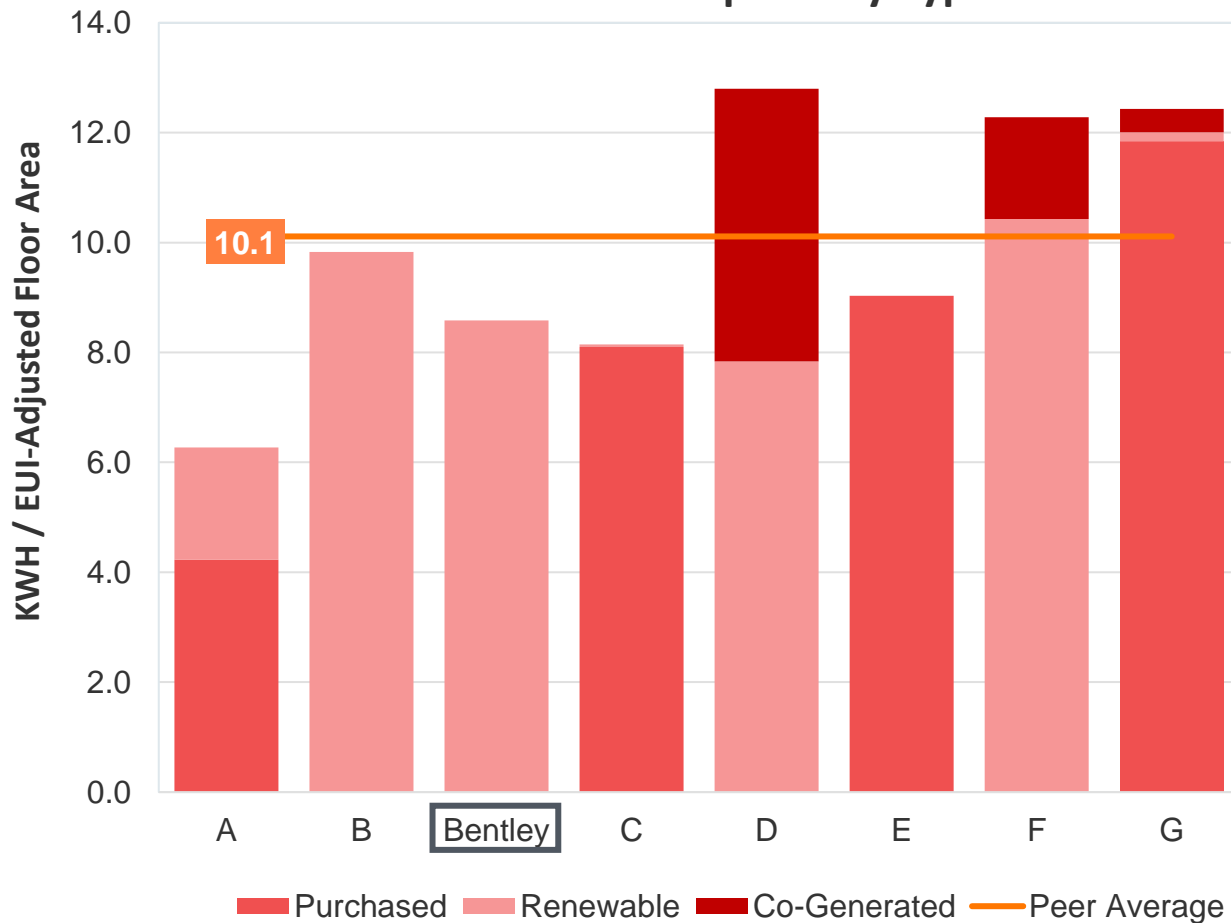
Bentley to Reduce Electricity Even Further (from Sustainability and Climate Action Plan)

- Goal 2 – Energy Use:** By 2026, Bentley has decreased its energy use per square foot (EUI) across campus spaces using the following strategies:
 - Strategy 1 - Standardize:** Create construction standards for new buildings and large renovation projects with consideration and funding for improved efficiency and methodology standards to have targeted EUI goals and enhance resilience
 - Strategy 2 – Reduce:** Implement targeted energy efficiency projects on campus with the goal of reducing usage that can be funded as a standalone project or act as supplementation to the deferred maintenance plan

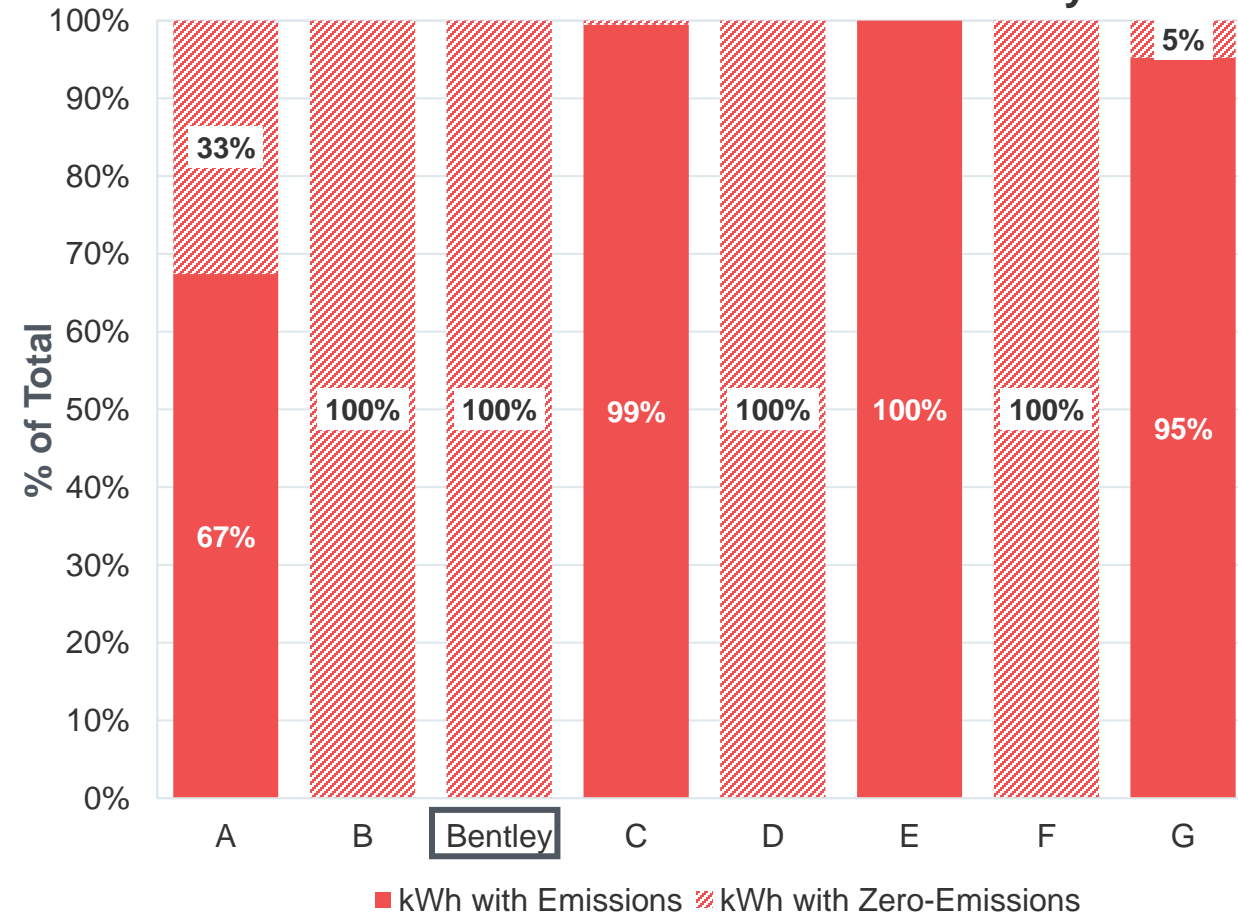
Bentley's Campus is More Energy Efficient than Peers

Peers have a mix of purchased electricity, co-generated electricity and renewable electricity

Electric Consumption by Type



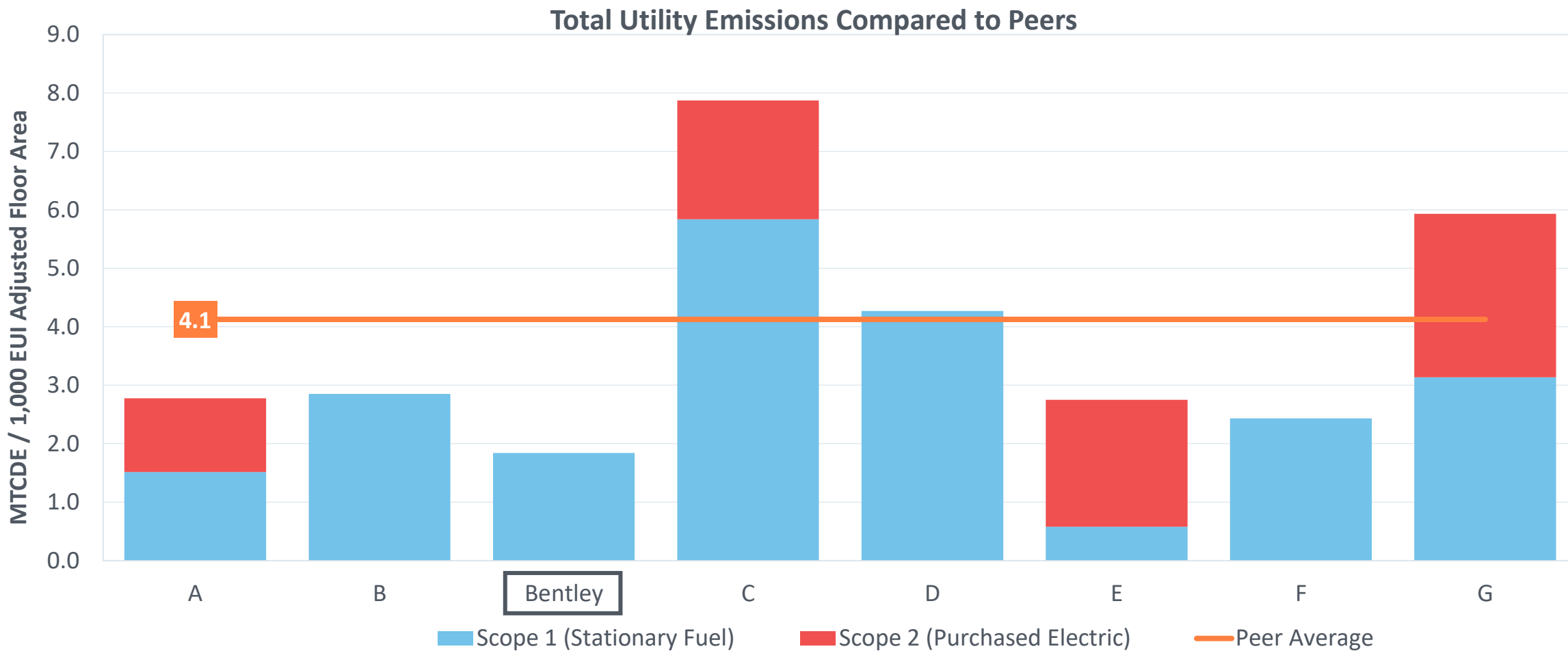
Percent of Zero-Emissions Electricity



Peers listed by density factor

Utility Emissions at Bentley Below Peer Average

Bentley's combined efficient consumption and use of market mechanisms equate to low utility emissions



Peers listed by density factor

Aligning Bentley Utility Consumption With State Regulations



Bentley Currently On Track with Massachusetts Executive Order

Even with increased consumption from FY21, Bentley continues to exceed total emission reduction needed by 2025

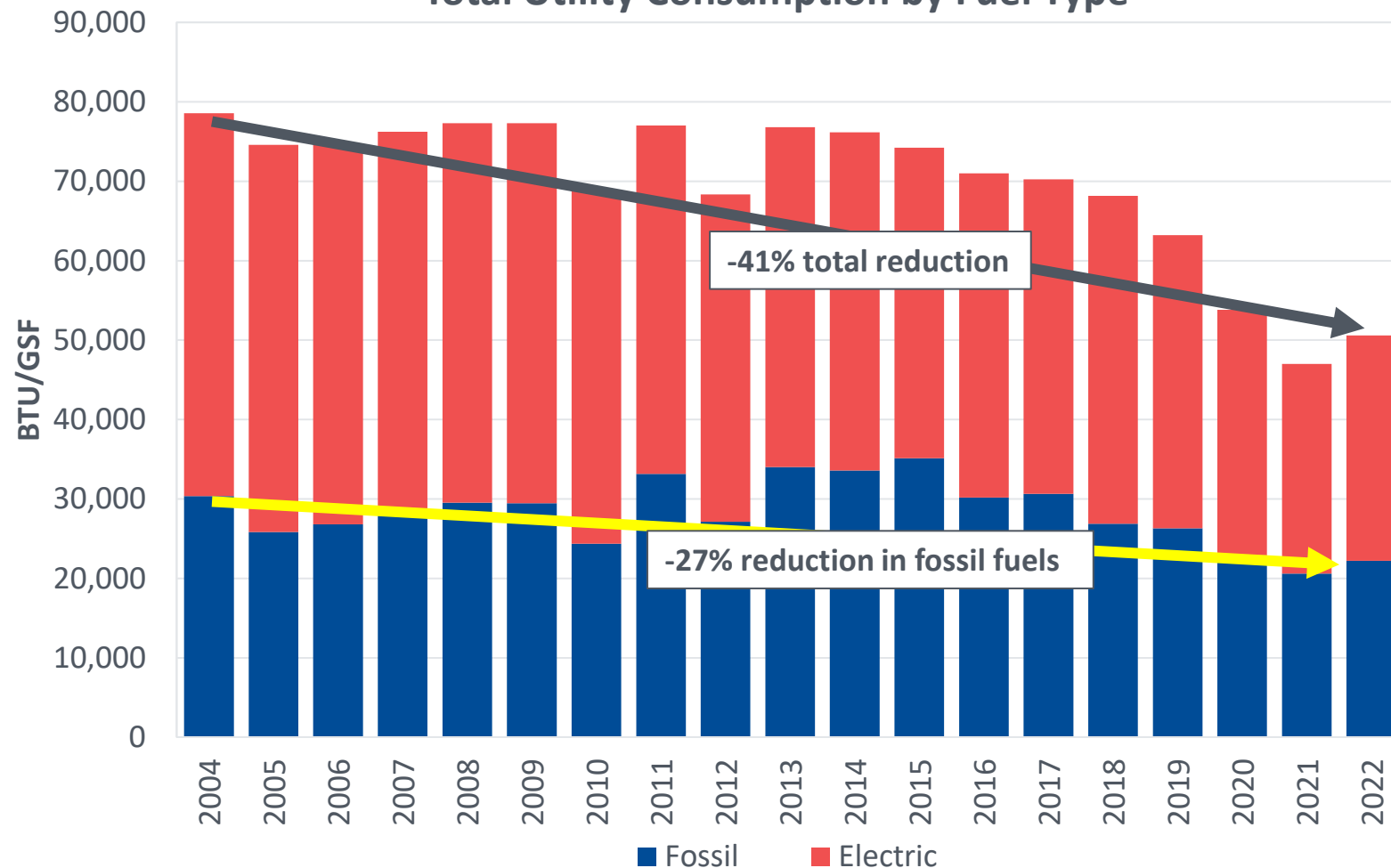
Massachusetts Executive Order No. 594 *Leading By Example: Decarbonizing and Minimizing Environmental Impacts of State Government*

Agencies as a whole, and to the greatest extent feasible, individually, shall meet or exceed the following fiscal year targets where applicable:

1. Reduce emissions from a 2004 baseline associated with the burning of onsite fossil fuels at buildings and in vehicles:

1. 20% in 2025
2. 35% in 2030
3. 60% in 2040
4. 95% in 2050

Total Utility Consumption by Fuel Type



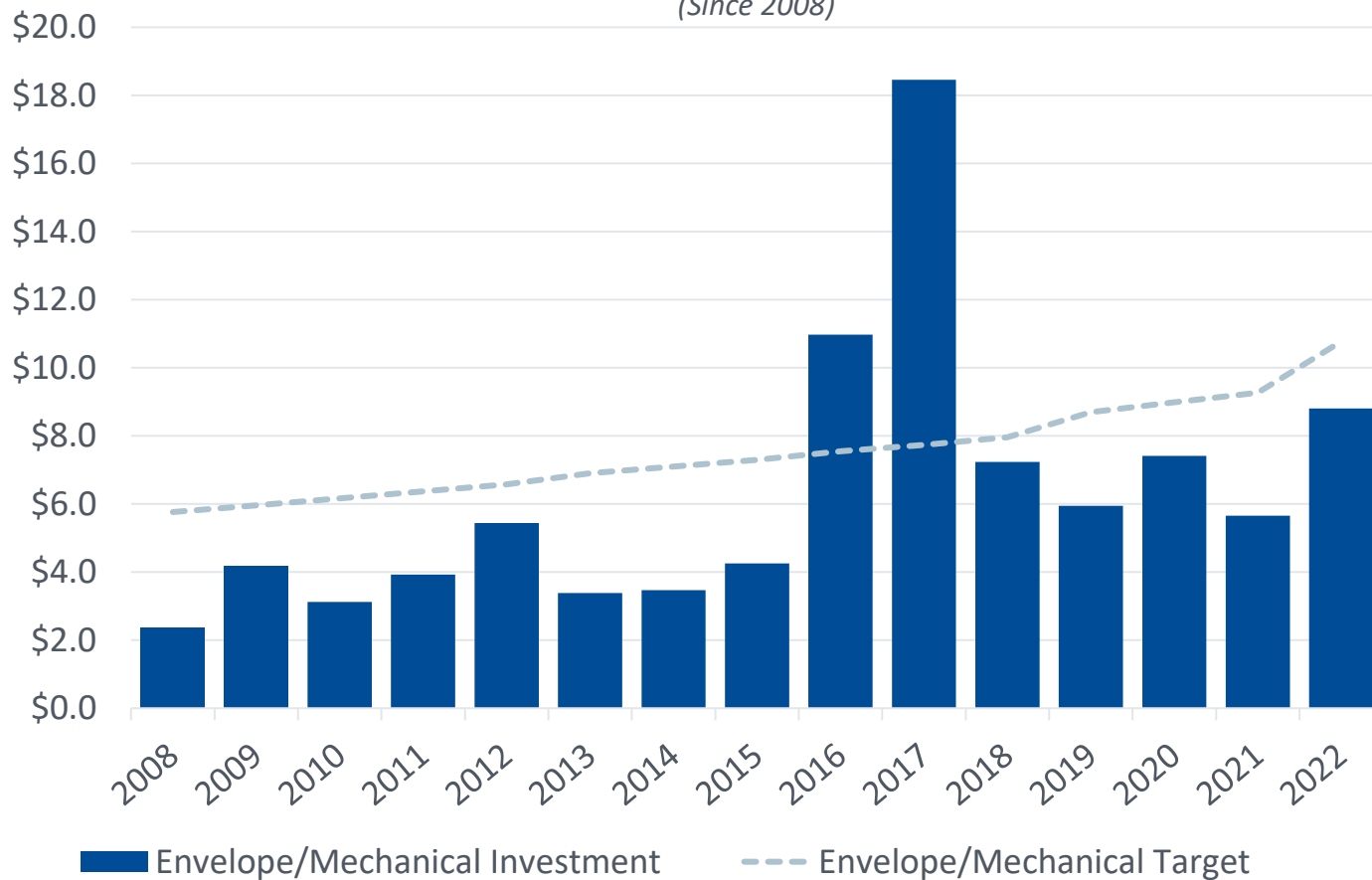
Reduction in energy in FY21 was driven by Covid-19 along with Bentley's strategic utility management

Investments Should Target Envelope/Mechanical Systems

Heating and cooling fuels are responsible for 72% of total emissions at Bentley in FY22

Envelope & Mechanical Target Funded

(Since 2008)



Examples of Envelope & Mechanical Decarbonization Capital Strategies:

- *Envelope:*
 - *Air seal exterior penetrations*
 - *Add insulation to walls and roofs*
 - *Window replacement and storm windows*
- *Electrification of Energy End-Uses and Supply:*
 - *Heating electrification: boiler or furnace to heat pump*
 - *Cooling electrification: absorption chiller to electric chiller*
 - *Water heating electrification: natural gas to heat pumps*
 - *Cooking electrification: ovens, griddles, fryers*
- *Heating, Ventilation, Air Conditioning and Refrigeration:*
 - *Enhanced energy recovery ventilation*
 - *Convert constant air volume to variable air volume*
 - *Demand controlled ventilation*
 - *Refrigeration retrofits and controls*
- *Water heating:*
 - *Water conservation retrofits*

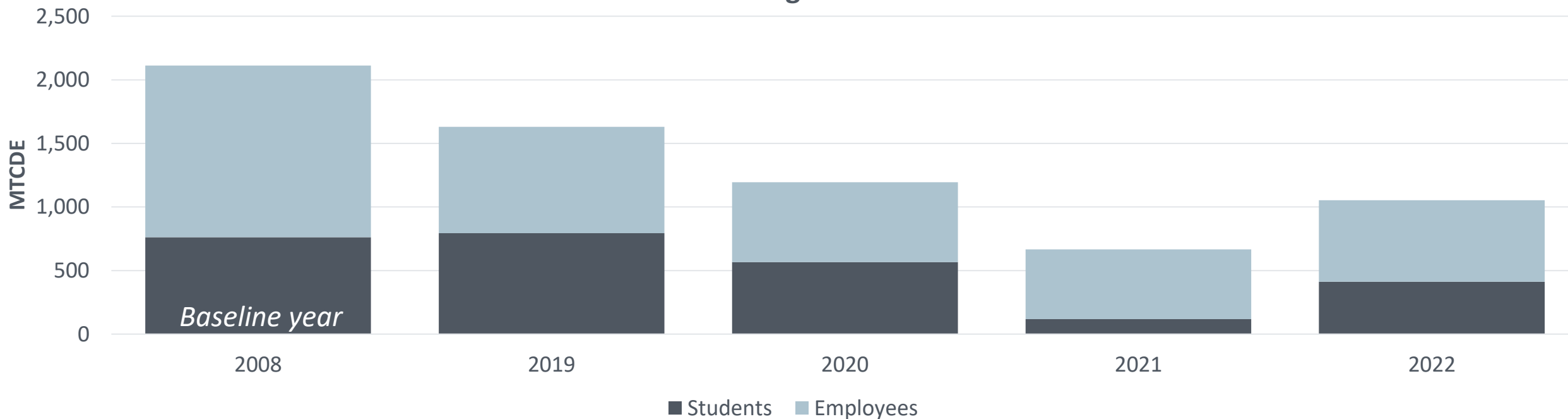
Scope 3 Emissions Profile



Commuting Emissions Increase From FY21

Consistently incorporating telecommuting survey question will aid in improving data accuracy post-pandemic and create a form of measurement for flexibility strategy

Commuting Emissions



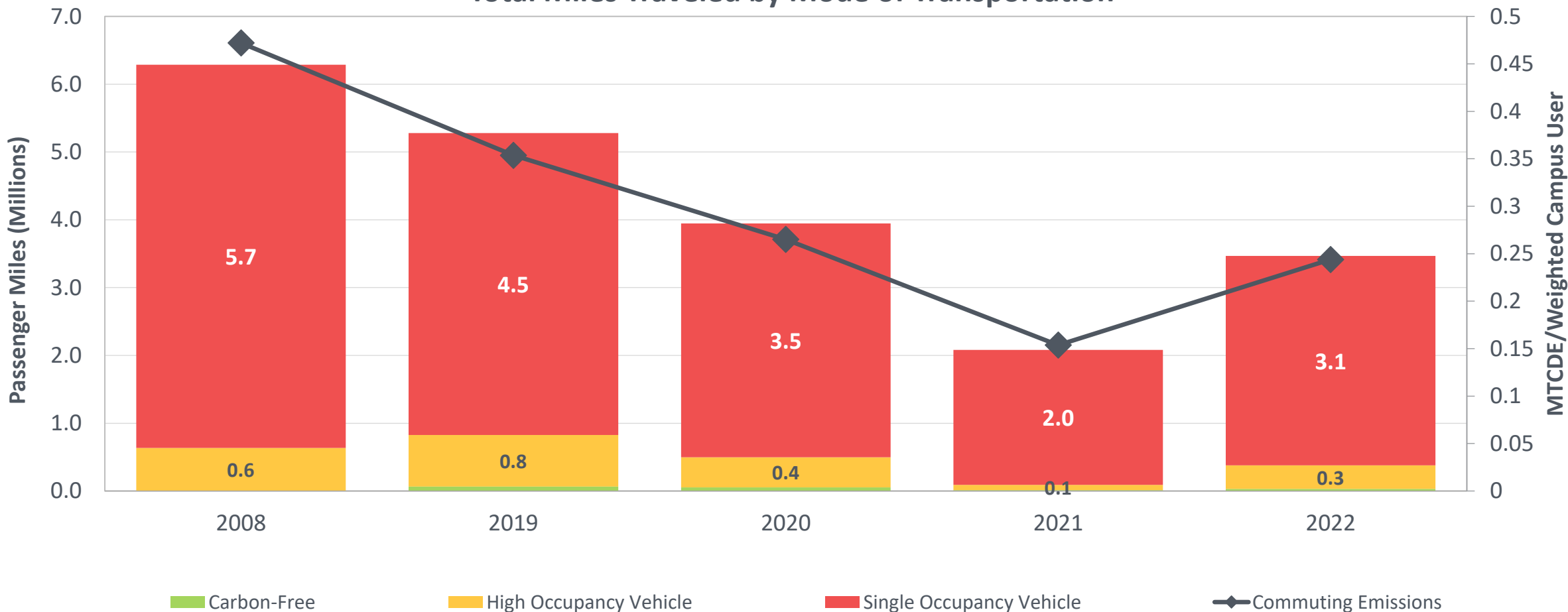
Bentley Initiatives to Reduce Commuting even Further (from Sustainability and Climate Action Plan)

- **Goal 2- Commuting:** By 2026, Bentley has reduced commuting emissions and increased sustainable modes of commuting* to and from campus using the following strategies:
 - **Strategy 1 - Incentivize:** Provide incentives and programs for students, faculty and staff to choose sustainable commuting modes
 - **Strategy 2 - Connect:** Identify and increase sustainable commuting access to key locations in the Waltham area (ex: Commuter Rail, Moody Street)
 - **Strategy 3 - Be Flexible:** Increase workplace flexibility and opportunities to work remotely as defined in the university’s Flexible Work Arrangements policy
 - **Strategy 4 - Engage:** Increase communications about sustainable commuting options to grow awareness and engagement in sustainable commuting programs

“Return to Normal” Results in Increased Commuting Miles

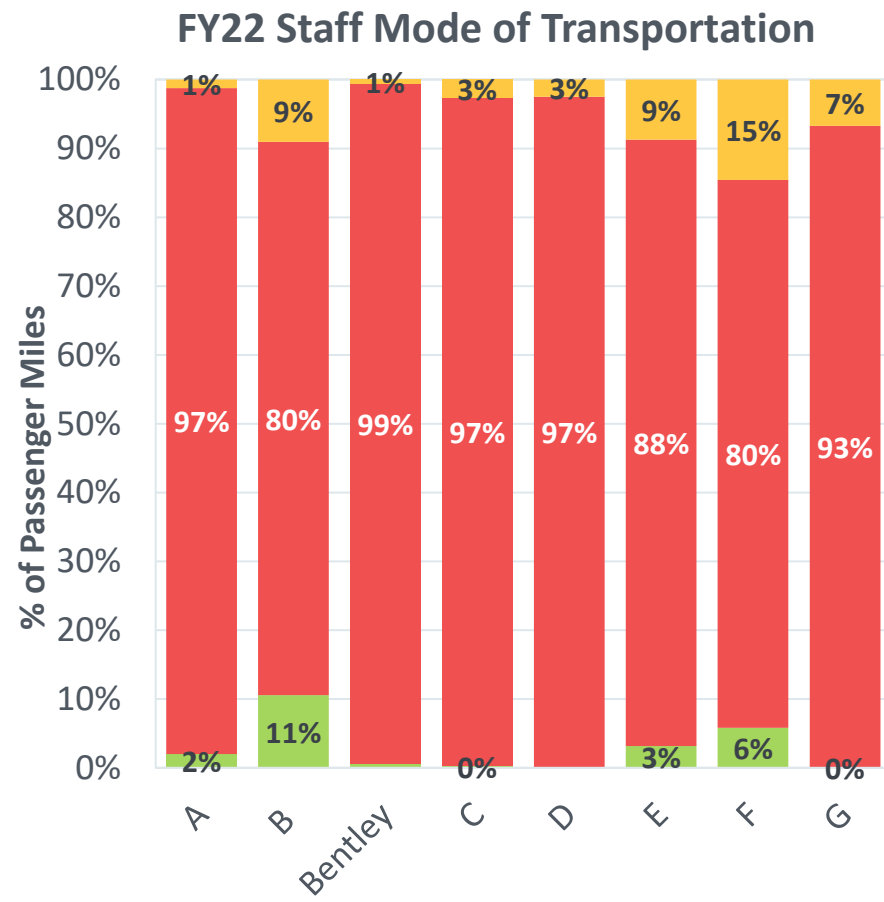
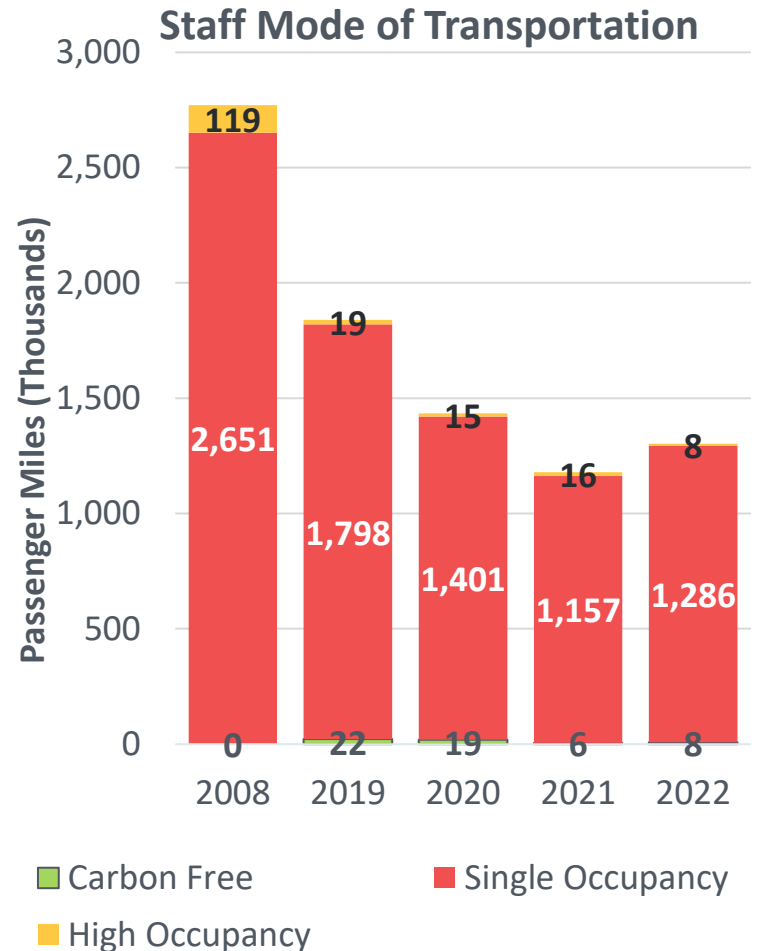
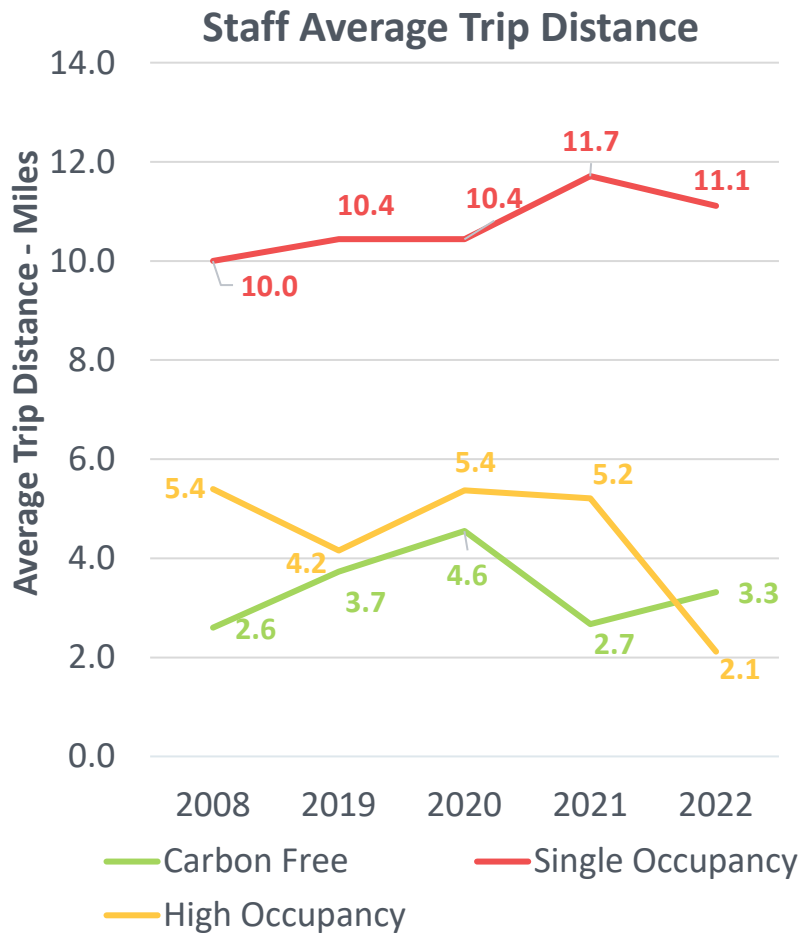
Students, Faculty, & Staff at Bentley are choosing single occupancy vehicles as the primary mode of transportation

Total Miles Traveled by Mode of Transportation



Bentley's Staff Traveling Fewer Miles via Public Transportation in FY22

Identify and increase sustainable commuting access to key locations in the Waltham area (ex: Commuter Rail, Moody Street)



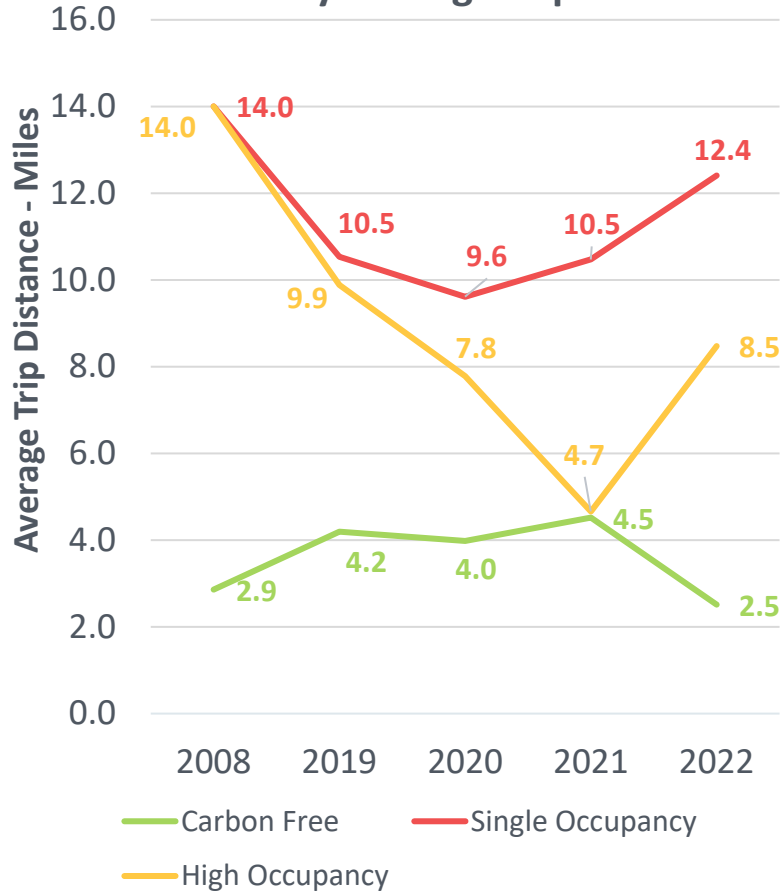
*Bentley does not ask about telecommuters in commuting survey

Peers listed by density factor

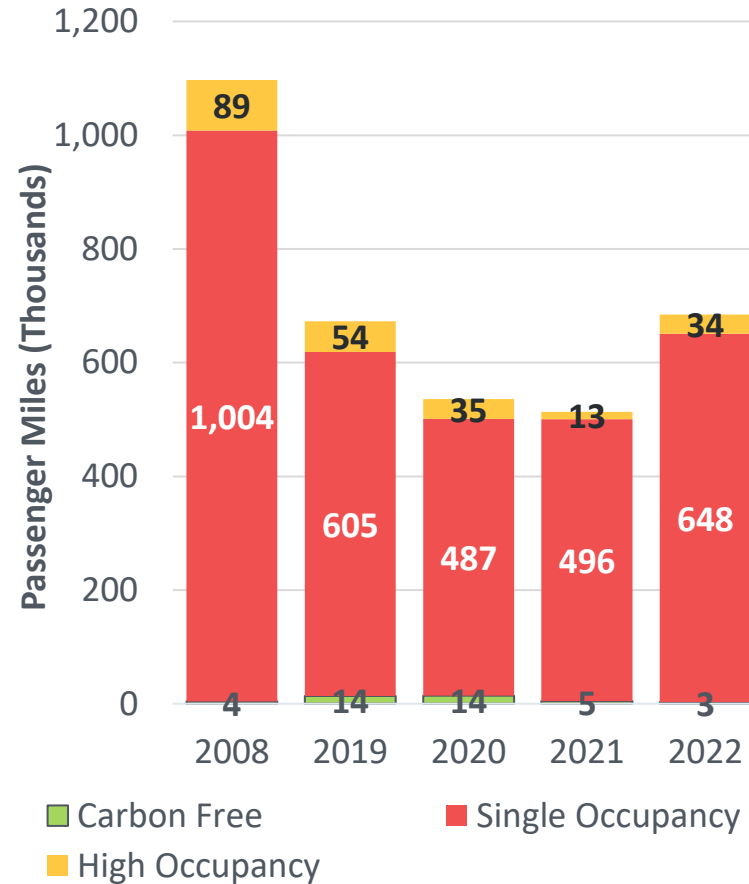
Bentley's Faculty Largely Reliant on Single Occupancy Vehicles

Faculty driving single occupancy vehicles are commuting further distances in FY22

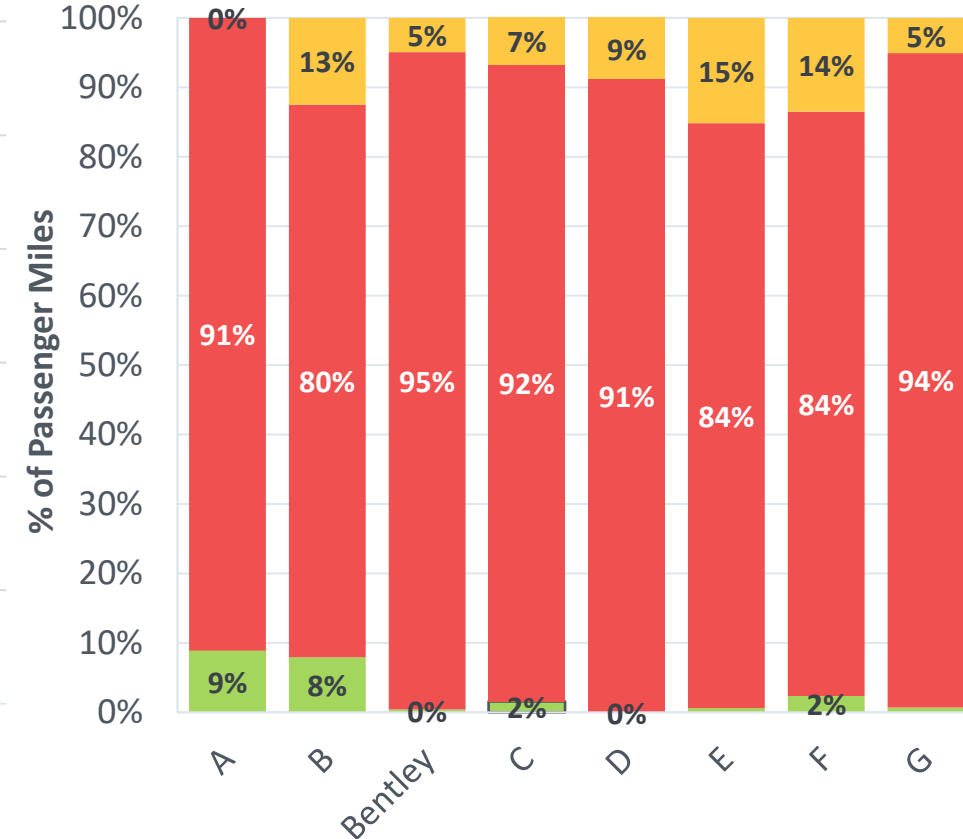
Faculty Average Trip Distance



Faculty Mode of Transportation



FY22 Faculty Commute Modal Split – Peers

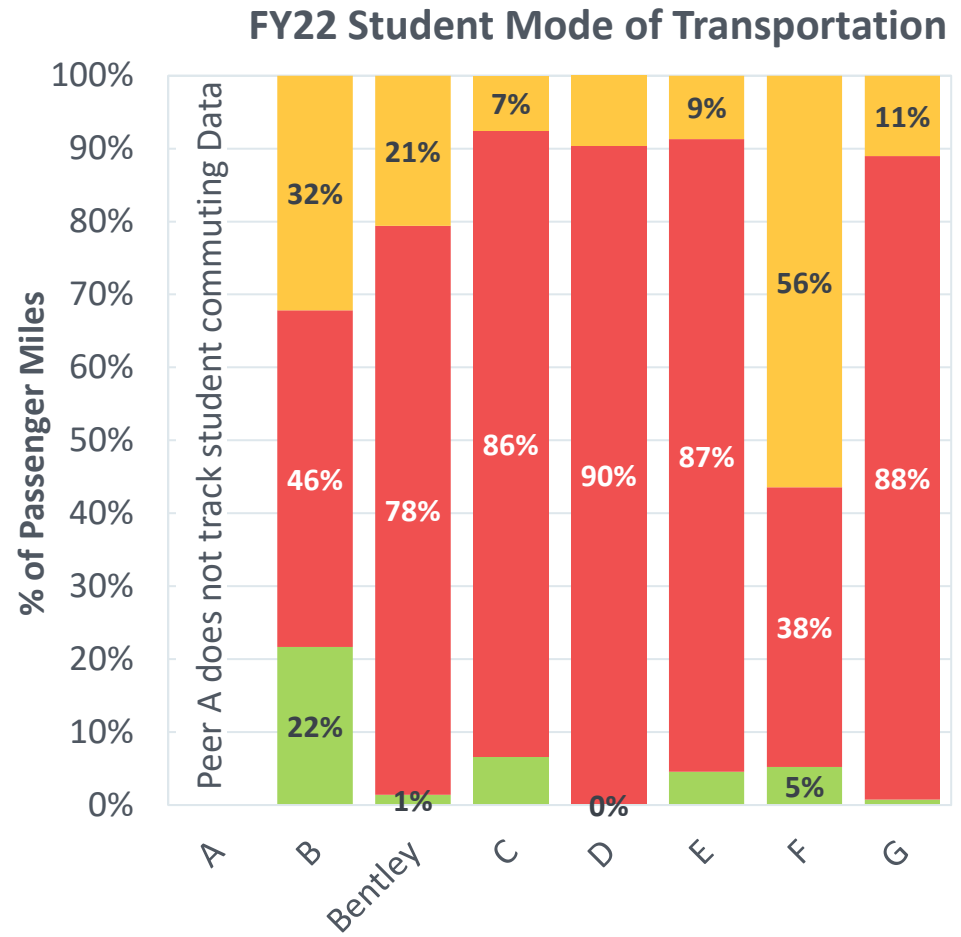
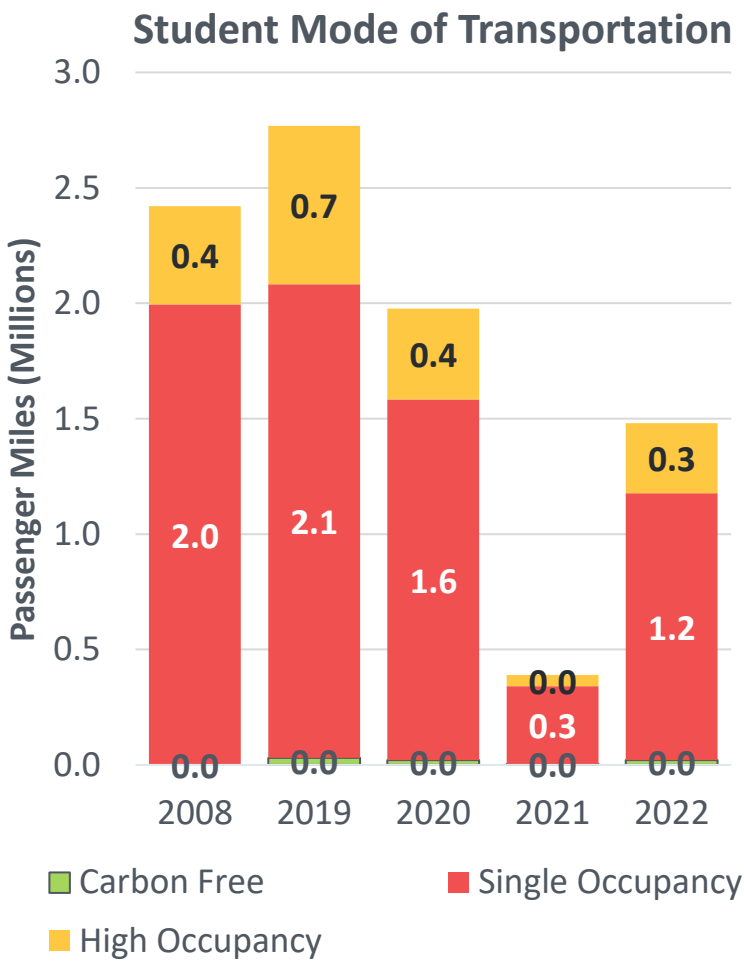
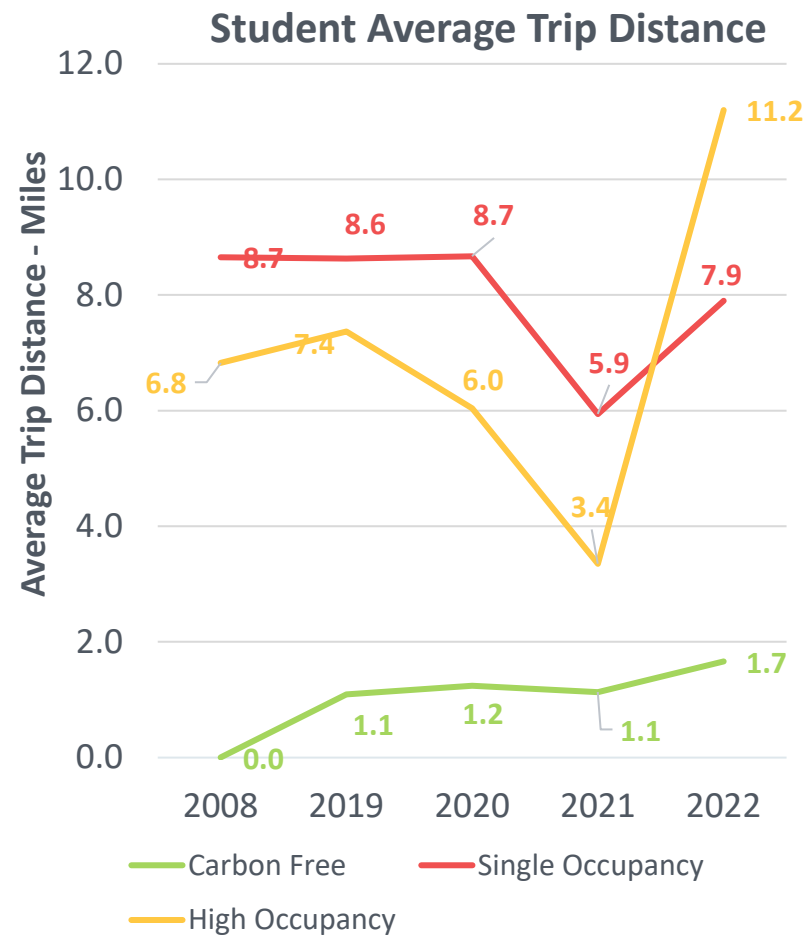


*Bentley does not ask about telecommuters in commuting survey

Peers listed by density factor

Campus Return to Normal Impacts Miles Traveled

Increase communications about sustainable commuting options to grow awareness across commuting population



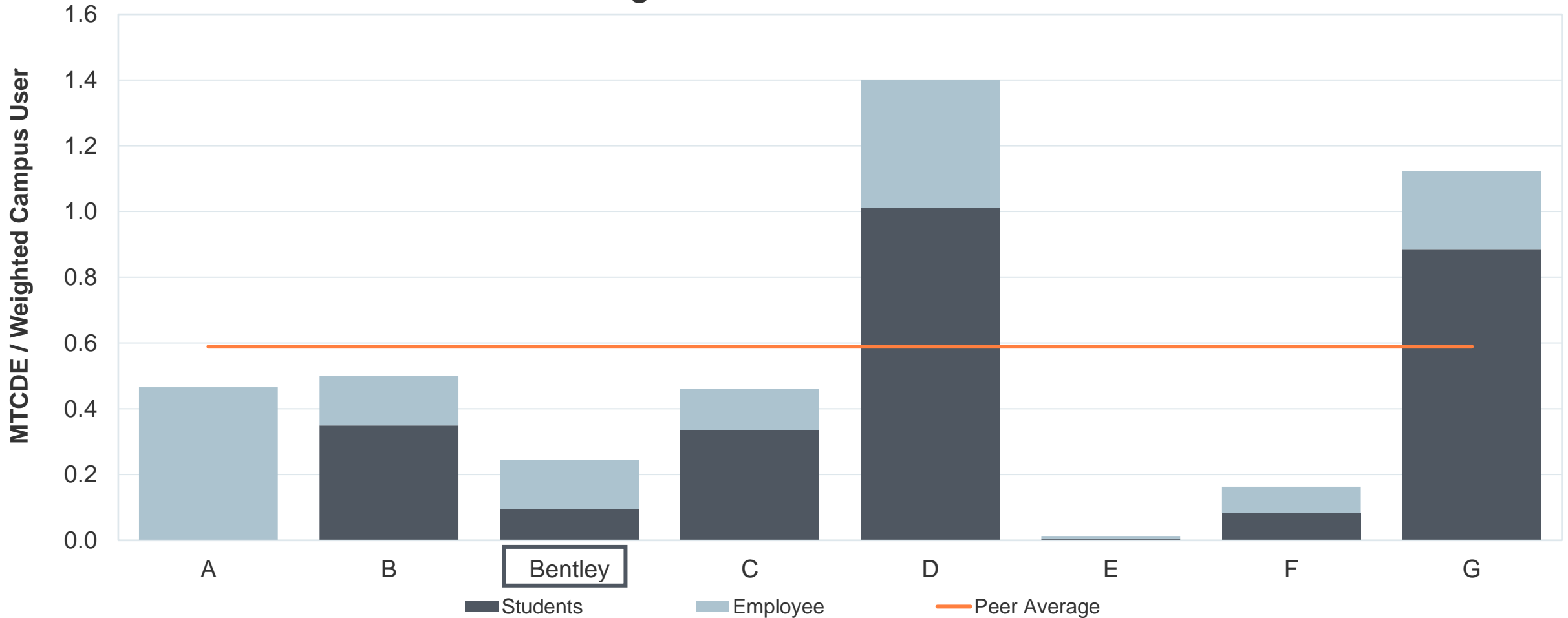
*Bentley does not ask about telecommuters in commuting survey

Peers listed by density factor

Low Commuting Emissions at Bentley Compared to Peers

Bentley's high residential campus combined with urban location allows for shorter and less frequent trips per commuter

Commuting Emissions vs. Peers

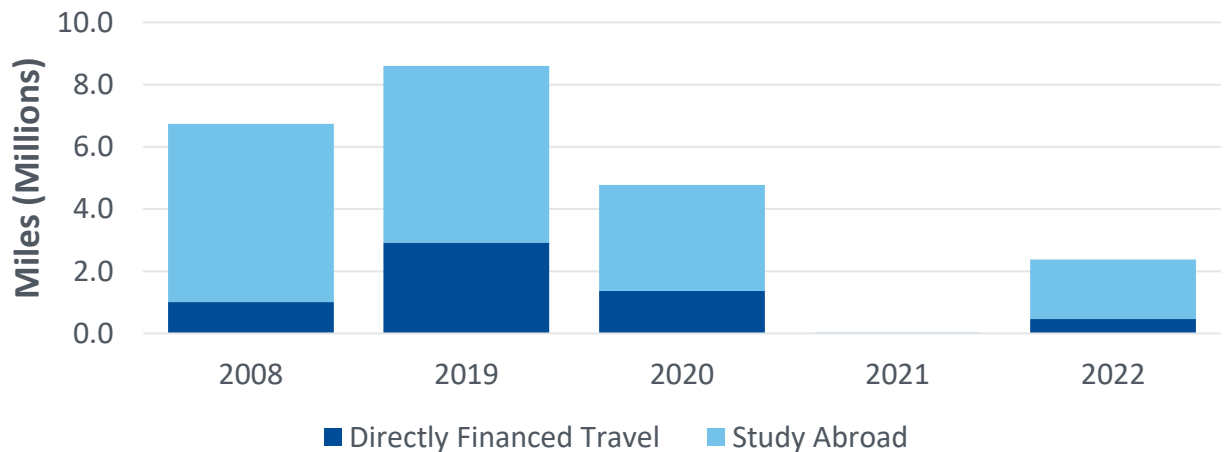


Peers listed by density factor

Travel Increases Post-COVID, Remains Below Historic Average

*Bentley purchases Carbon Offsets to mitigate 100% of travel emissions; showing emissions excluding offsets for benchmarking purposes

Air Travel Miles by Type

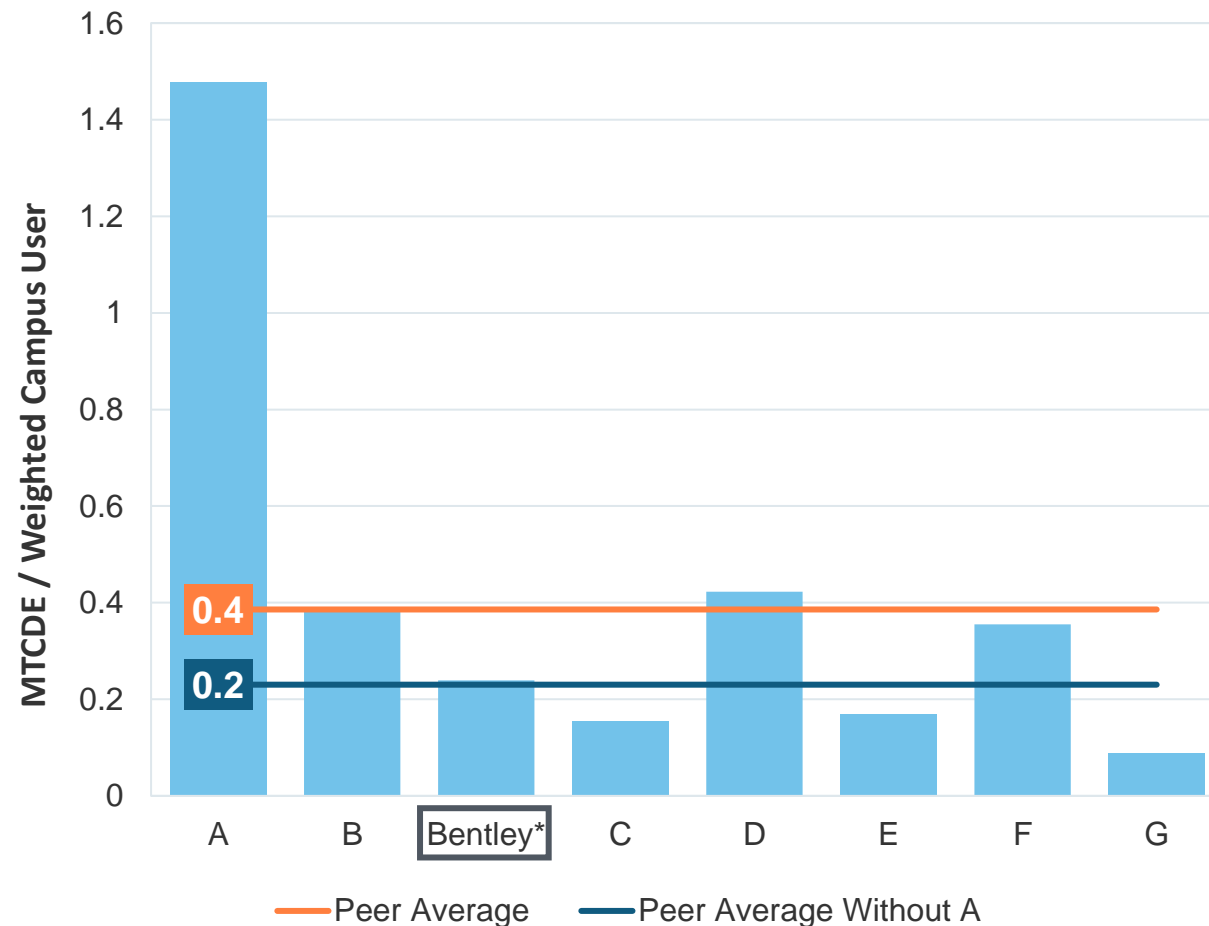


*No travel in 2021 due to COVID restrictions

Bentley Initiatives to Reduce Travel even Further (from Sustainability and Climate Action Plan)

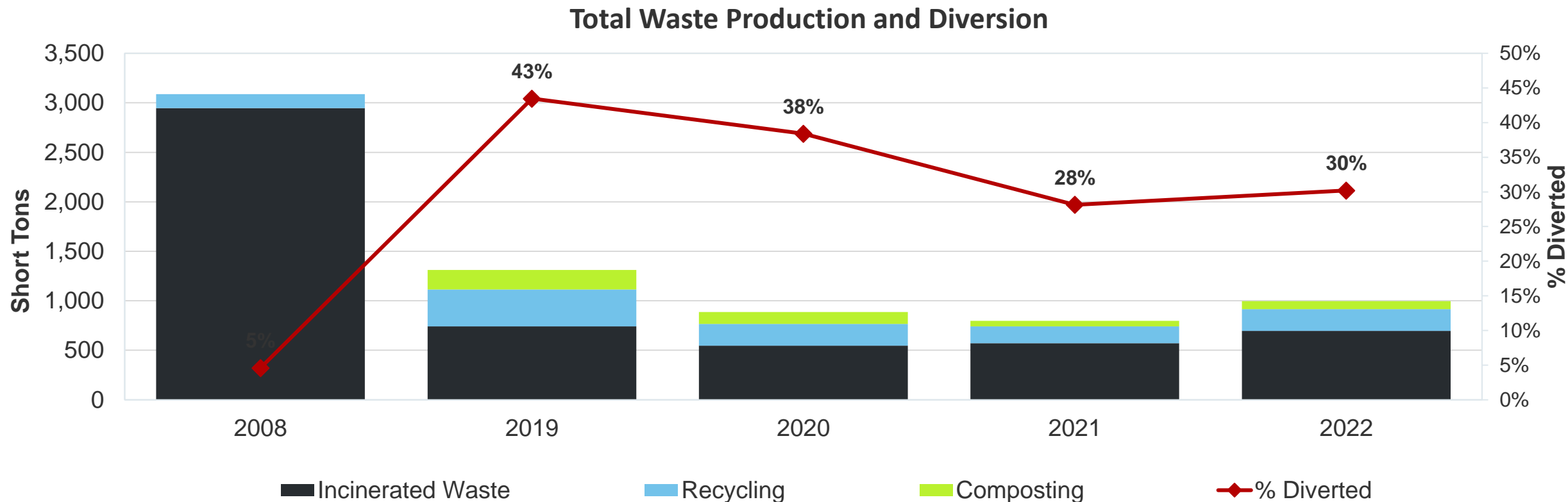
- **Goal 1 - Travel:** By 2026, Bentley has reduced emissions from business and academic air travel using the following strategies:
 - **Strategy 1 - Guide:** Create a low-emissions guide for business travel, including information on how Bentley offsets travel emissions and how to effectively self-manage efficient travel
 - **Strategy 2 - Track:** Track and report out on travel emissions and offsets with users across campus to increase awareness
 - **Strategy 3 - Support:** Assess and support low-emissions engagement, including virtual meetings and events

Air Travel Emissions vs. Peers



Peers listed by density factor

More Waste On Campus in FY22; 30% Diverted



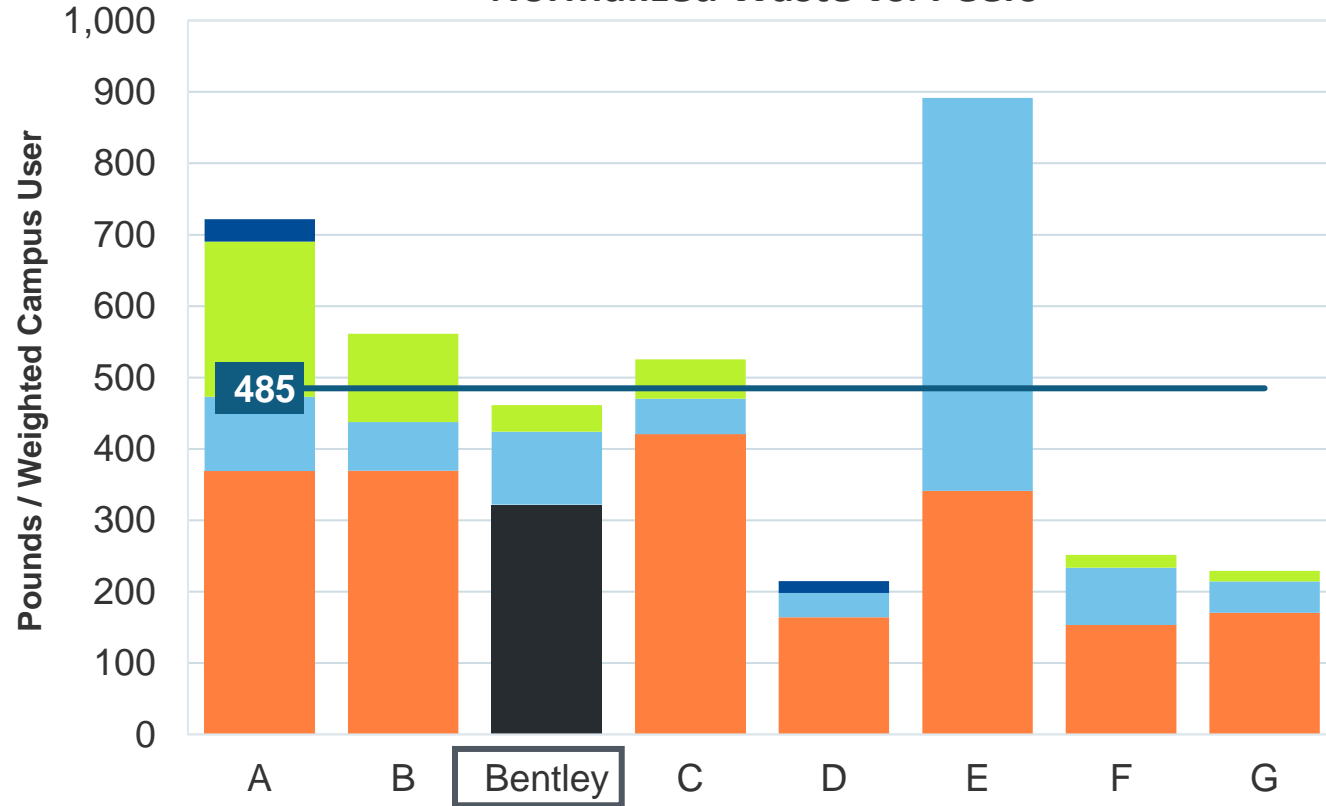
Bentley Initiatives to Reduce Waste Production and Increase Diversion even Further (from Sustainability and Climate Action Plan)

- **Goal 1 - Material Disposal:** By 2026, Bentley has reduced the volume of materials disposed of across campus operations using the following strategies:
 - **Strategy 1 - Enhance:** Create a waste reduction plan for dining service programs
 - **Strategy 2 - Strive:** Commit to following material management practices in accordance with the **Zero Waste Alliance's Zero-Waste Hierarchy**
 - **Strategy 3 - Reuse:** Provide reuse and diversion programs across campus operations – education outreach

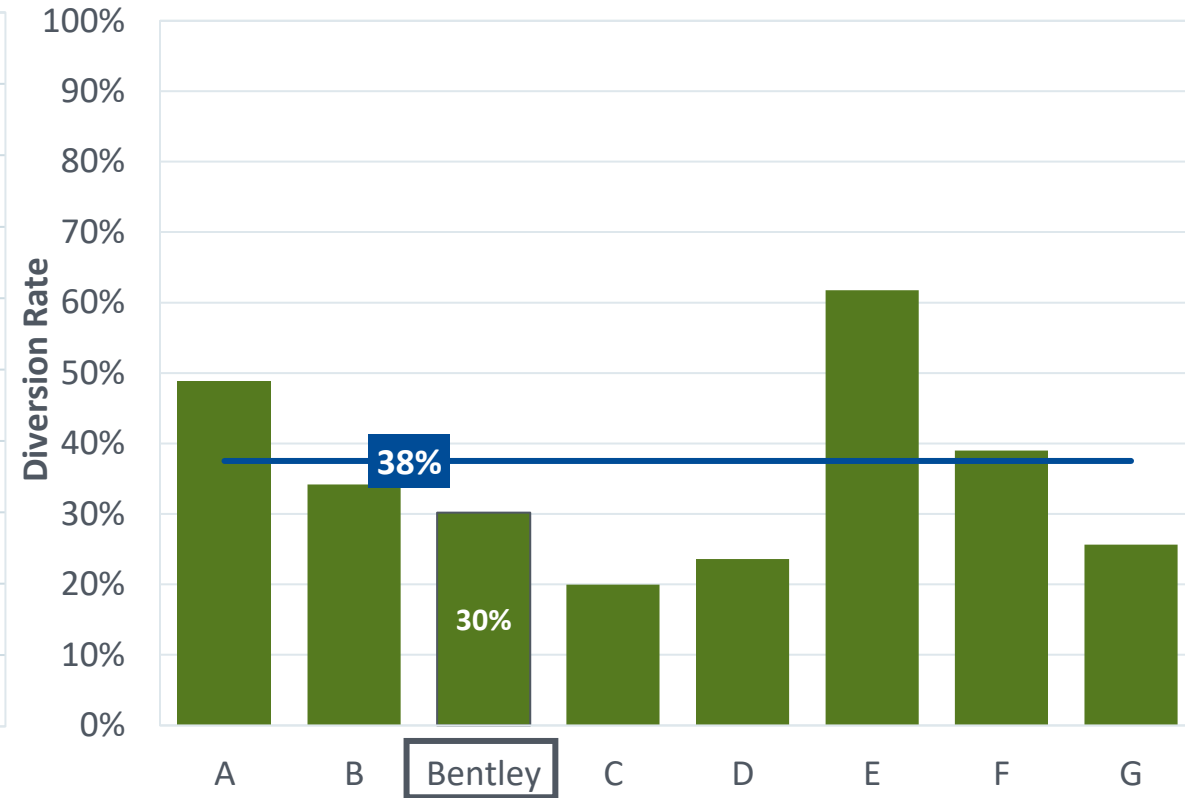
Normalized Waste Production Above Peer Levels in FY22

Bentley has a lower diversion rate compared to peers

Normalized Waste vs. Peers



FY22 Diversion Rate

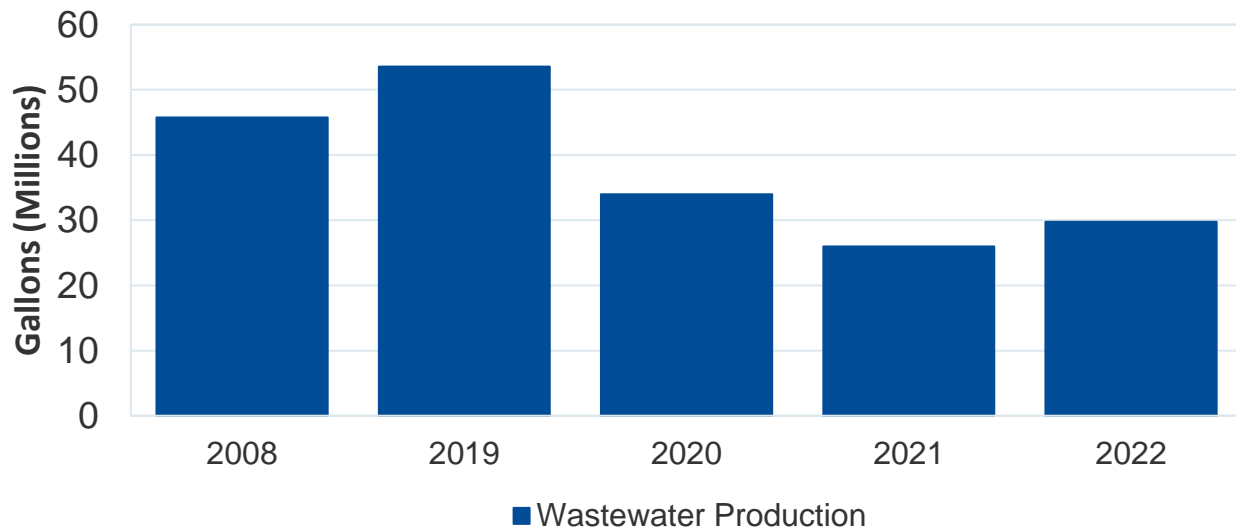


- Landfill Waste
- Incinerated Waste
- Recycling
- Composting
- Other
- Peer Average

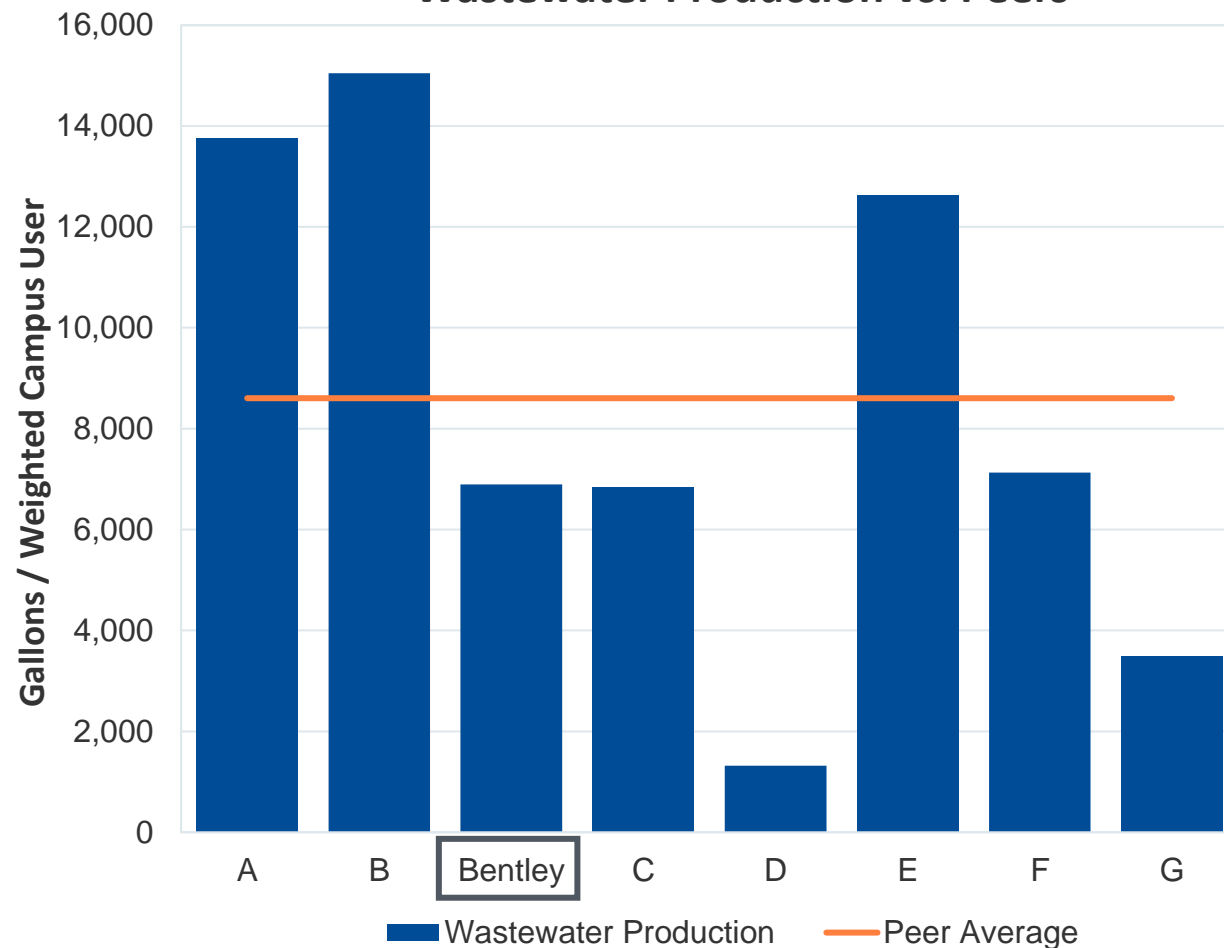
Wastewater Has Decreased 44% Since FY19

Continue prioritizing water conservation retrofits to ensure wastewater production continues to decrease

Wastewater Production



Wastewater Production vs. Peers



Bentley Initiatives to Improve Water Usage even Further (from Sustainability and Climate Action Plan)

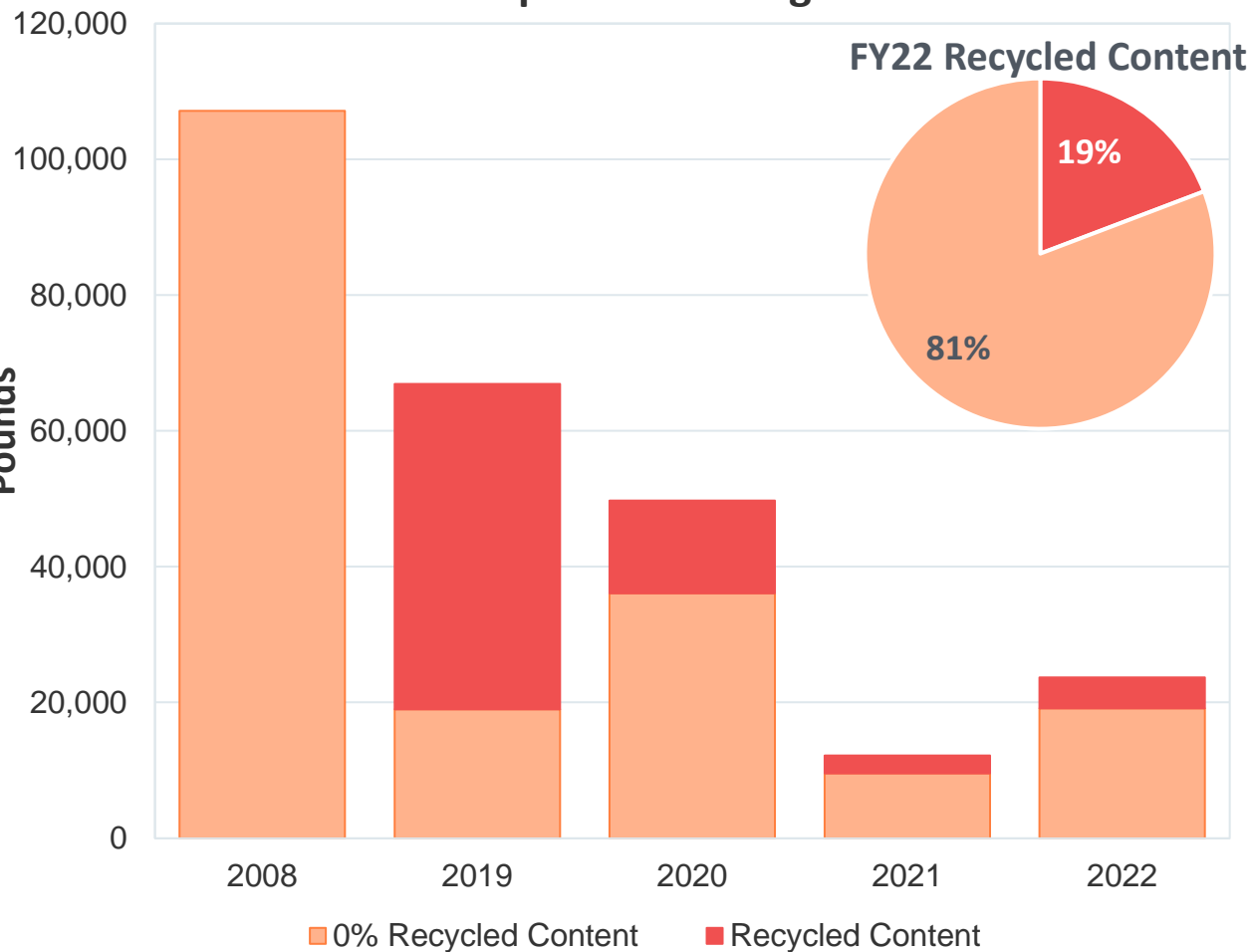
- **Goal 3 - Water Use:** By 2026, Bentley has improved water efficiency across its natural and built environments using the following strategies:
 - **Strategy 1 - Plan:** Create a 5-year indoor and outdoor water management and use reduction plan with a focus on resiliency and efficiency
 - **Strategy 2 - Update:** Directly replace water fixtures to match current low-flow standards

Peers listed by density factor

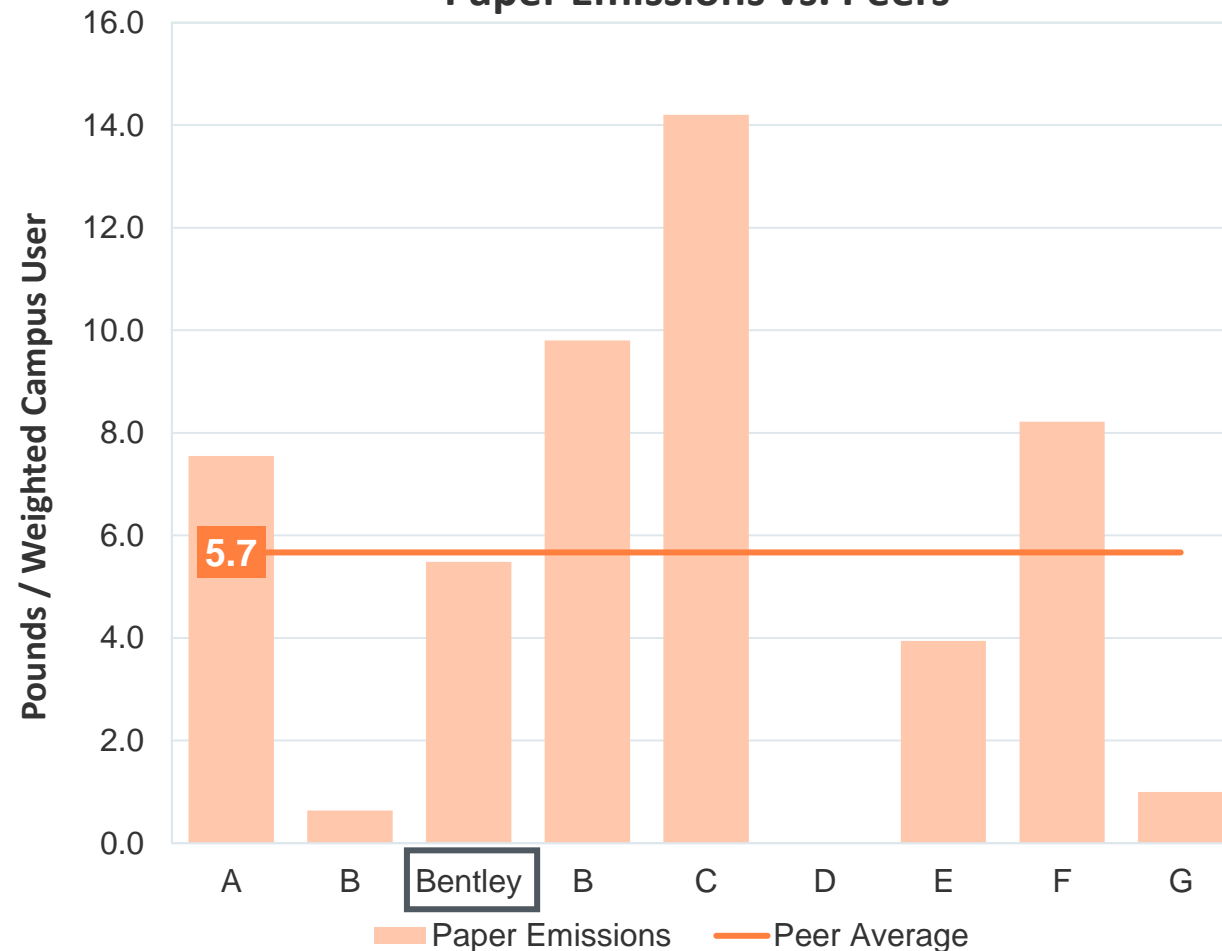
Bentley is Purchasing Less Recycled Content Paper

Purchasing increased from FY21, Bentley below peer's average paper emissions

Paper Purchasing



Paper Emissions vs. Peers

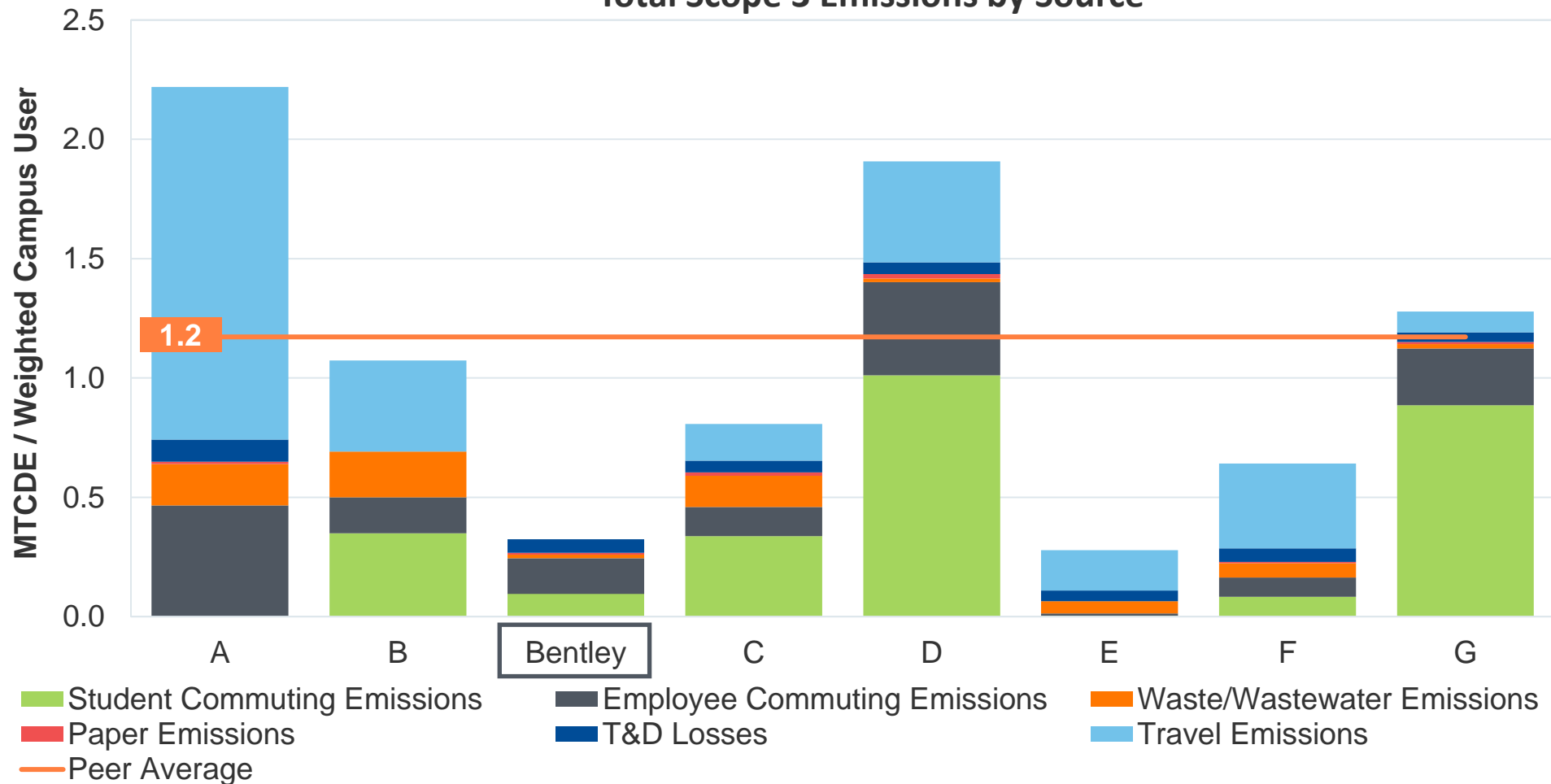


Peers listed by density factor

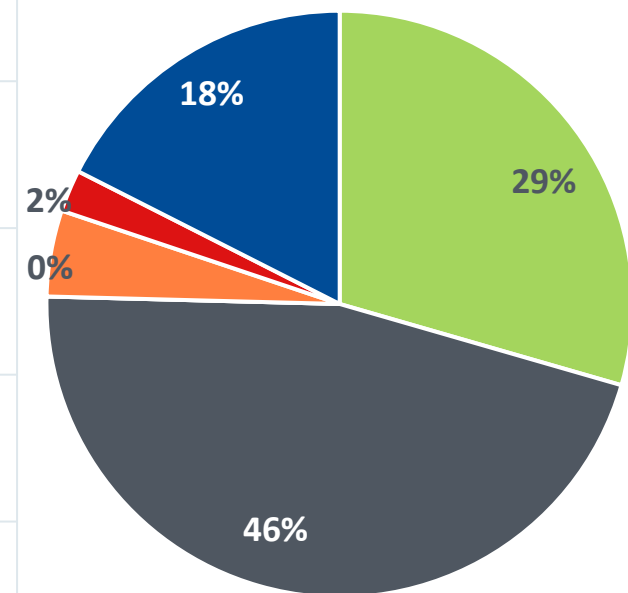
Scope 3 Summary: Total Emissions Lower at Bentley

Below average commuting levels, and the purchase of Carbon Offsets to mitigate travel emissions result in lower Scope 3 emissions compared to peers

Total Scope 3 Emissions by Source



Bentley FY22 Total Scope 3 Emissions

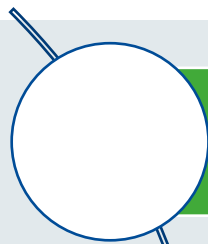


Peers listed by density factor

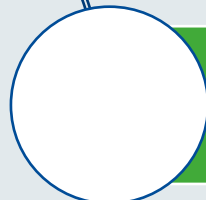
Concluding Comments



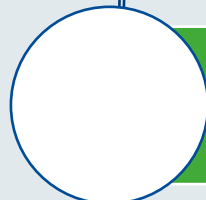
Concluding Comments



Since 2008, Bentley's campus footprint has grown 6% while population has decreased -4%. Bentley has managed to reduce total emissions by 76% from the baseline year. Strategic energy management, the use of market mechanisms and campus occupancy/limited travel due to Covid aid in this effort.



Bentley's younger age profile, historically strong capital funding levels and strategic planning has reduced overall utility consumption across campus. Fossil consumption has decreased 20% and electric consumption 36% between FY08 and FY22.



Heating and cooling campus buildings comprise 72% of Bentley's greenhouse gas emissions profile in FY22. Continue targeting capital investments into energy intensive building systems to buy down on deferred maintenance and overall utility consumption on campus.



Covid-19 has impacted where we learn and work, resulting in an increased need to distribute a detailed commuting survey annually that measures the frequency of telecommuting. This coincides with Bentley's strategy to increase workplace flexibility and opportunities to work remotely as defined in the university's Flexible Work Arrangements policy.



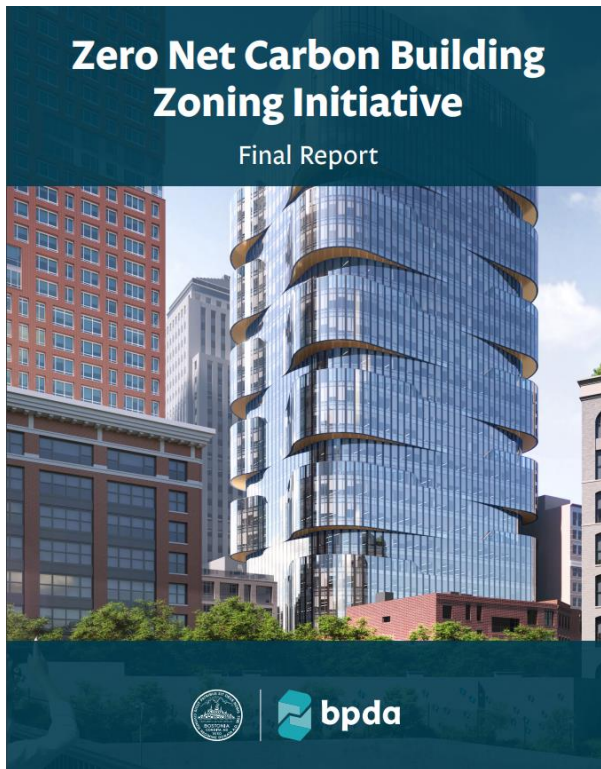
Questions & Discussion

Appendix





Proposed Upcoming Local Sustainability Laws



<https://www.bostonplans.org/getattachment/6b305862-b53a-4901-ae8a-56fdf1e56c6e>

Zero Net Carbon Building Zoning Initiative

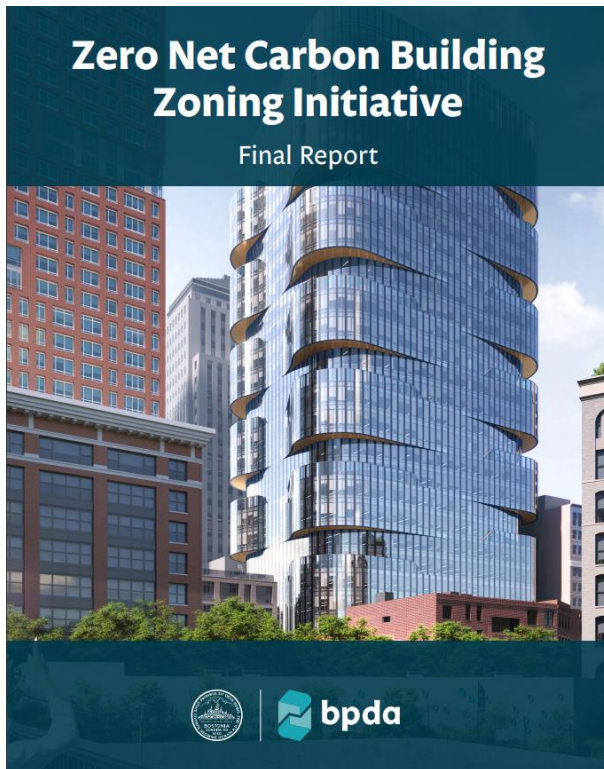
- Would apply to all newly constructed buildings over 20,000 square feet.
 - Major renovations may be subject to “specific performance targets” for emission reductions and minimum LEED code and utility incentives, can be done at no added cost.”

These recommendations include three key updates to the current zoning:

- Lower the applicability threshold to buildings 20,000 square feet and larger;
 - Raise the minimum LEED score to Gold or better; and
 - Add a zero net carbon building standard that prioritizes low carbon building construction and generation and use of clean renewable energy.
- Recommends: “switching to efficient electric HVAC systems, adding energy recovery ventilation, and improving building enclosures”



Proposed Upcoming Local Sustainability Laws



<https://www.bostonplans.org/getattachment/6b305862-b53a-4901-ae8a-56fdf1e56c6e>

Zero Net Carbon Building Zoning Initiative

The first strategy to reduce embodied carbon is through the reuse and recycling of building decommissioning, demolition, and construction waste. This can be broken down into several steps:

- Identify barriers to building component and material reuse
- Evaluate opportunities to support local businesses that focus on material salvaging;
- Support workforce development in retrofitting existing buildings and salvaging/reinstalling components;
- Include the embodied carbon of building demolition in carbon emission targets and account for avoided carbon emissions from reuse and recycling as a credit
- Participate in the City of Boston's Deconstruction Pilot; and
- Support implementation of a Boston zero waste policy



Proposed Upcoming Local Sustainability Laws

Municipal Fossil Fuel Free Building Demonstration Program

- Signed August 2022
- Ten towns including Brookline & Newton have signed up to participate in a pilot program to study the effect of phasing out building fossil fuel consumption in new and renovated buildings
- Future action by towns (and city of Boston) still to be determined as of March 2023

An Act Driving Clean Energy And Offshore Wind, Section 82

(b) The department of energy resources shall establish a demonstration project in which cities and towns may, notwithstanding chapter 40A of the General Laws, section 13 of chapter 142 of the General Laws and chapter 164 of the General Laws or any other general or special law to the contrary, adopt and amend general or zoning ordinances or by-laws that require new building construction or major renovation projects to be fossil fuel-free, and enforce restrictions and prohibitions on new building construction and major renovation projects that are not fossil fuel-free, including through the withholding or conditioning of building permits; provided, that said restrictions and prohibitions shall not apply to research laboratories for scientific or medical research, or to hospitals or medical offices regulated by the department of public health as a health care facility.