Chapman University
Sustainability Solutions

FY21/22 GHG Benchmarking Update

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Sightlines Solutions

**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.
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.
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

Chapman has decreased emissions by 20% since 2014.
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

<table>
<thead>
<tr>
<th>Year</th>
<th>Gross Emissions</th>
<th>Campus GSF</th>
<th>Campus Population</th>
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</thead>
<tbody>
<tr>
<td>2014</td>
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<td>2022</td>
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Change in Space, Population, and Emissions
Indexed to FY2014

- Space: 58%
- Population: 20%
- Total Emissions: -21%
- MTCDE/FTE: -34%
- MTCDE/1,000 GSF: -50%
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%**
- On-Campus Stationary: 1,985
- Refrigerants & Chemicals: 48
- Fleet Fuel: 57

**Scope 1 Sources – 12%**
- On-Campus Stationary: 2,089
- Refrigerants & Chemicals: 27
- Fleet Fuel: 2

**Scope 2 Sources – 62%**
- Purchased Electricity: 6,954

**Scope 2 Sources – 47%**
- Purchased Electricity: 8,906

**Scope 3 Sources – 20%**
- Commuting: 1,328
- Travel: 72
- Waste: 444
- Paper Purchases: 6
- T&D Losses: 389

**Scope 3 Sources – 41%**
- Commuting: 5,358
- Travel: 1,458
- Waste: 451
- Paper Purchases: 498
- T&D Losses: -498
Fossil Consumption by type

Natural Gas usage has fluctuated substantially at Chapman

Total Fossil Consumption

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Fossil Fuel Expenditures

Fossil Fuel costs in FY22 outpaced total increases in consumption

Total Fossil Expenditures

Dollars in Thousands

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<td>$425</td>
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<td>$475</td>
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Differences in Unit Costs vs. Peers

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

Fossil Fuel Unit Cost

Chapman

ROPA Peers

$0

$2

$4

$6

$8

$10

$12

$14

$16

$18


$8.15

$9.96

$14.39

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Electricity Consumed by Campus

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

![Total KWHs chart](chart.png)

KWH's in Millions

- 2004
- 2005
- 2006
- 2007
- 2008
- 2009
- 2010
- 2011
- 2012
- 2013
- 2014
- 2015
- 2016
- 2017
- 2018
- 2019
- 2020
- 2021
- 2022

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Electricity Expenditures

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

Total Electricity Expenditures

<table>
<thead>
<tr>
<th>Year</th>
<th>Dollars in Millions</th>
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<tbody>
<tr>
<td>2004</td>
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<td>2021</td>
<td>$6</td>
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<tr>
<td>2022</td>
<td>$7</td>
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</tbody>
</table>
Differences in Unit Costs vs. Peers

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

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Sustainability Peers

Peers determined using location, campus size, and population

<table>
<thead>
<tr>
<th>Peer Institution</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Idyllwild Arts Academy</td>
<td>Idyllwild, California</td>
</tr>
<tr>
<td>St. Mary’s College of California</td>
<td>Moraga, California</td>
</tr>
<tr>
<td>University of San Francisco*</td>
<td>San Francisco, California</td>
</tr>
<tr>
<td>University of San Diego*</td>
<td>San Diego, California</td>
</tr>
<tr>
<td>University of Denver</td>
<td>Denver, Colorado</td>
</tr>
<tr>
<td>University of Texas- Rio Grande Valley</td>
<td>Edinburg, Texas</td>
</tr>
<tr>
<td>Stockton University</td>
<td>Galloway Township, New Jersey</td>
</tr>
</tbody>
</table>

*Chapman institutional peers
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.
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**

- Coal
- Residual Oil
- Distillate Oil
- Propane
- Natural Gas
- Biomass

**Stationary Fuel Consumption**

- MMBTU

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Scope 1: Direct Emissions

Chapman’s scope 1 emissions are significantly below peer average

FY22 Scope 1 Emissions

<table>
<thead>
<tr>
<th>Component</th>
<th>Emissions %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stationary Fuel</td>
<td>88%</td>
</tr>
<tr>
<td>Fleet Fuel</td>
<td>12%</td>
</tr>
<tr>
<td>Peer Average</td>
<td>0.00%</td>
</tr>
</tbody>
</table>

Scope 1 Emissions vs Peers

- Chapman's emissions are significantly below the peer average.

Chapman's Scope 1 Emissions are as follows:

- Stationary Fuel: 88%
- Fleet Fuel: 12%
- Peer Average: 0.00%

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**Scope 2: Total Electric Consumption vs. Peers**

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

Chapman has decreased KWH consumption by 34%

Peers have decreased KWH consumption by 2%
Scope 2: Total Electric Consumption vs. Peers

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

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

Chapman has experienced a 44% decrease in emissions since 2014, while Peers have seen an 18% decrease since the same period.
Scope 3: Indirect Emissions Overview

With fewer students occupying dorms total commuting emissions increased

FY22 Scope 3 Emissions

Scope 3 Emissions vs Peers

Commuting: 69%
Travel: 3%
Waste: 3%
T&D Losses: 2.8%
Paper: 6%
Wastewater: 19%
Peer Average: 25%

Paper data was extrapolated for all years from FY17
Wastewater Production Similar to Peers

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

<table>
<thead>
<tr>
<th>Mode of Transportation</th>
<th>Chapman Students</th>
<th>Peer Students</th>
<th>Database</th>
<th>Chapman Faculty/Staff</th>
<th>Peer Faculty/Staff</th>
<th>Database</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drive alone</td>
<td>86%</td>
<td>73%</td>
<td>79%</td>
<td>87%</td>
<td>71%</td>
<td>79%</td>
</tr>
<tr>
<td>Carpool/Mass Transit</td>
<td>9%</td>
<td>15%</td>
<td>12%</td>
<td>11%</td>
<td>15%</td>
<td>11%</td>
</tr>
<tr>
<td>Carbon Free</td>
<td>5%</td>
<td>12%</td>
<td>2%</td>
<td>2%</td>
<td>9%</td>
<td>2%</td>
</tr>
</tbody>
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Total Commuting Emissions

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

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

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.

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 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.