Shippensburg University of PA
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Decreasing Energy Consumption Creates Savings

Ship spends 28% less on utilities than peers

Energy Consumption Since FY13

Utility Actuals Compared to Peers

*Peers arrayed by tech rating
Ship Now Second Lowest Consumer in PASSHE

FY16 Energy Consumption vs. Peers

Institutions ordered by decreasing consumption

31% below peer average
### Peer Institutions

<table>
<thead>
<tr>
<th>Institution</th>
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<tbody>
<tr>
<td>Babson College*</td>
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<tr>
<td>Bentley University*</td>
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<tr>
<td>Boston College</td>
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<tr>
<td>Emerson College</td>
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<tr>
<td>Fitchburg State University</td>
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<tr>
<td>Hamilton College*</td>
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<tr>
<td>Loyola University Maryland*</td>
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<tr>
<td>Millersville University*</td>
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<tr>
<td>Rensselaer Polytechnic Institute</td>
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<tr>
<td>Stockton University</td>
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<tr>
<td>The Catholic University of America</td>
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*Institutions previously benchmarked in Shippensburg’s GHG analysis

#### Key Concepts:
- Major Reductions in Scope 1 Emissions due to Infrastructure Overhaul
- Opportunities to Reduce Scope 2 and 3
Carbon Management for Energy

AVOIDANCE:
Don’t consume energy

ACTIVITY:
Consume less by increasing efficiency

INTENSITY:
Switch high-carbon energy sources for low-carbon ones

OFFSET:
Offset the emissions from consumption
Distribution of Emissions by Level of Control

Scope 1 makes up the smallest portion of Ship’s emissions footprint

Scope 1 – Direct GHGs
- Natural Gas, Coal
- Vehicle Fleet
- Refrigerants
- Fertilizer

Scope 2 – Upstream GHGs
- Purchased Electricity

Scope 3 – Indirect GHGs
- Faculty/Staff/Student Commuting
- Directly Financed Travel
- Study Abroad Travel
- Solid Waste
- Wastewater
- Paper Purchasing
- Transmission & Distribution Losses

Emissions by Scope

- Scope 1: 24%
- Scope 2: 37%
- Scope 3: 39%
Distribution of Emissions by Level of Control

Purchased electric and commuting/travel generate the most emissions

Emissions by Scope

- Scope 1 Sources
  - Other On-Campus Stationary: 5,010 MTCDE
  - Direct Transportation
  - Refrigerants
  - Agriculture

- Scope 2 Sources
  - Purchased Electricity: 9,059 MTCDE

- Scope 3 Sources
  - Commuting: 6,421 MTCDE
  - Wastewater: 979 MTCDE
  - Paper Purchasing: 915 MTCDE
  - Scope 2 T&D Losses

Sightlines
Infrastructure Project Led to a Strong Emissions Profile

Gross emissions decreased 32% since 2013, driven by scope 1.

Gross Emissions from FY13 to FY16

- Scope 1
- Scope 2
- Scope 3
Two Ways to Compare Emissions to Peers

Benchmarking by GSF is useful for emissions that are affected by space characteristics, such as age, technical complexity, and systems efficiency.

Benchmarking by Student FTE is useful for emissions that are affected by individual habits, such as commuting and waste production/recycling.
Infrastructure upgrades have kept campus efficient

Emissions Dropping Despite Increasing Space

Change in Emissions vs. Change in Campus Size and Population
Indexed to FY2013

Change in Space, Population, and Emissions
Indexed to FY2013

Nation-wide emissions dropped 3% since 2013
Drastic Drop in Scope 1 Emissions Due to Coal Avoidance

Fuel carbon intensity affects scope 1 emissions

**Emissions from Stationary Sources**

- 2013: 14,000 MTCDE
- 2014: 14,000 MTCDE
- 2015: 6,000 MTCDE
- 2016: 6,000 MTCDE

68% decrease

**Shippensburg’s Stationary Fuel Mix**

- 2013: 90% Coal, 10% Natural Gas
- 2014: 90% Coal, 10% Natural Gas
- 2015: 100% Natural Gas
- 2016: 100% Natural Gas

**Carbon Intensity of Commonly Used Fossil Fuels**

- Coal: 80 MTCDE/1,000 MMBTU
- Residual Oil: 70 MTCDE/1,000 MMBTU
- Distillate Oil: 60 MTCDE/1,000 MMBTU
- Propane: 50 MTCDE/1,000 MMBTU
- Natural Gas: 30 MTCDE/1,000 MMBTU
- Biomass: 10 MTCDE/1,000 MMBTU
Success in Reducing Refrigerants Emissions

Though these sources are a smaller portion of scope 1, they provide additional successes and opportunities.
Ship Emissions Below Peer Average

Fleet and refrigerants make up a greater portion of Scope 1 emissions for some peers

2016 Scope 1 Emissions/1,000 GSF

- 27% below peer average

Stationary
Fleet
Agriculture
Refrigerants
Peer Average
No Change in Scope 2 Emissions

Scope 2 includes electric consumption

Scope 2 Consumption

Scope 2 Emissions

RFCE Grid Fuel Mix (2007)

RFCE Grid Fuel Mix (2012)
Scope 2 Emissions Below Peer Average

Ship outperforming peers in both Scope 1 and Scope 2 emissions levels

2016 Scope 2 Emissions/1,000 GSF

36% below peer average
No Change in Scope 3 Emissions

Total Scope 3 Emissions

<table>
<thead>
<tr>
<th>Year</th>
<th>MTCDE</th>
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<tbody>
<tr>
<td>2013</td>
<td>8,000</td>
</tr>
<tr>
<td>2014</td>
<td>8,000</td>
</tr>
<tr>
<td>2015</td>
<td>8,000</td>
</tr>
<tr>
<td>2016</td>
<td>8,000</td>
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</tbody>
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FY16 Scope 3 Breakdown

- Commuting: 75%
- Paper: 1%
- Wastewater: 2.0%
- Study Abroad: 6%
- Directly Financed Travel: 5%
- T&D Losses: 11%
Scope 3 Emissions Closer to Peer Average

FTEs (rather than GSF) has greater impact on Scope 3 emissions

2016 Scope 3 Emissions/student FTE

19% below peer average
Ship Commuting Emissions are Among Highest in Peer Group

*Carpool and mass transit incentives could reduce Scope 3 footprint*

### Total Commuting Emissions Compared to Peers

![Graph showing total commuting emissions compared to peers](image)

### Shippensburg Commuter Mode Mix

<table>
<thead>
<tr>
<th>Mode</th>
<th>% Commuters</th>
</tr>
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<tbody>
<tr>
<td>Drive Alone</td>
<td>72.3%</td>
</tr>
<tr>
<td>Mass Transit</td>
<td>2%</td>
</tr>
<tr>
<td>Carpool</td>
<td>6%</td>
</tr>
<tr>
<td>Carbon Free</td>
<td>20%</td>
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*Shippensburg Commuter Mode Mix*
Peers Do More Recycling and Composting

Total waste in FY16 was about 290 lbs/campus user

Waste Stream Compared to Peers

Waste Mix Compared to Peers
Scope 1 Accounts for Almost All Emissions Reductions

Scope 2 and 3 should be prioritized for gradual decreases moving forward

Emissions Change by Scope

Baseline Year

-31%

-0.03%

-0.29%

FY13 - FY16
Peers reduced emissions by 6%

Ship Emissions Decrease 32%
Concluding Comments

Scope 1
- The infrastructure project has produced a drastic drop in Scope 1 emissions – focus must now turn to smaller and consistent reductions over time.
- Continue reducing emissions by switching to less intense refrigerants and improving fleet fuel efficiency.
- Consider implementing anti-idling policies and combining work order requests to reduce travel.

Scope 2
- Identify a plan for electric reductions and implement efficiency measures.
- Focus on implementing LED lighting across campus.

Scope 3
- Educate commuters about less carbon intense commuting options.
- Review options to condense class scheduling to increase more carpooling opportunities.
- Continue to improve recycling program, and consider composting as an additional option to divert waste.
- Electric reductions will also decrease emissions from T&D losses.