Archival Emissions: Calculating the environmental impact of collections storage

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Introduction

Society of American Archivists' Core Values

Statement on Sustainability:

Caring for collections and serving communities—along with developing acquisition, processing, storage, and service models—must necessarily involve an ongoing awareness of the impact of archival work on the environment.
Background

Greenhouse Gas Emissions Emissions
(1990-2050)

2005-2012
- RECs
- Energy Program
- Additional Combined Heat & Power

2013-2020
- Energy Program
- Coal/Gas Conversion
- Steam Turbine replacement
- Energy Program
- Solar PPA
- Additional Combined Heat and Power

Other includes waste, refrigerants and animal management. Hershey Medical & Pennsylvania College of Technology not included.

"Our Footprint," Penn State Sustainability Institute: https://sustainability.psu.edu/campus-efforts/climate-action/our-footprint/
Results

<table>
<thead>
<tr>
<th>Source</th>
<th>Emissions (MtCO2e)</th>
<th>Percentage of Total Emissions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Utilities</td>
<td>10,673</td>
<td>95.6%</td>
</tr>
<tr>
<td>Commuter</td>
<td>360</td>
<td>3.2%</td>
</tr>
<tr>
<td>Air Travel</td>
<td>107</td>
<td>1.0%</td>
</tr>
<tr>
<td>Leased Vehicles</td>
<td>12</td>
<td>0.11%</td>
</tr>
<tr>
<td>Data Center</td>
<td>8</td>
<td>0.07%</td>
</tr>
<tr>
<td>Fleet Vehicles</td>
<td>5</td>
<td>0.05%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>11,165</strong></td>
<td><strong>100.0%</strong></td>
</tr>
</tbody>
</table>

**Complete data and calculations for this inventory are available in an Excel spreadsheet.**
Emissions per square foot

**The second column is a known calculation error, described more fully in the report.**
Science Park Library Annex

- Opened in 2018
- 7200 sq ft storage
- 35,000 lf capacity
- 65% filled (~23,000 lf)
- Building also contains separate human-occupied space
Energy Usage at the Science Park Library Annex

The Science Park Library Annex at Penn State University

- Monthly Natural Gas Usage (mcf)
- Monthly Electricity Usage (mcf)

Source: Penn State University, Office of Physical Plant, EnergyCAP application.
Average Monthly Temperature in Comparison to Energy Usage

The Science Park Library Annex at Penn State University

Sources: Penn State University, Office of Physical Plant, EnergyCAP application; PA State Climatologist.
Source: Penn State University Libraries, eClimateNotebook data.
Results

- $140,867 / 23,000 lf = $6.12 per lf
- 512 mtco2e = 1,024,000 pounds
- 1,024,000 / 23,000 lf = 44.5 pounds CO2e per lf over study period
This is equivalent to greenhouse gas emissions from:

- 110 gasoline-powered passenger vehicles driven for one year

This is equivalent to CO₂ emissions from:

- 57,612 gallons of gasoline consumed
- 566,482 pounds of coal burned
- 64.5 homes' energy use for one year
IPI Sustainable Storage recommendations

- System shutdowns
- Seasonal setpoints
- System setbacks
- Adjusting fan speed
- Outside air reduction
The Effect of System Shutdowns on Energy Cost

The Science Park Library Annex at Pennsylvania State University

- Total Monthly Energy Cost - Normal Operations
- Total Monthly Energy Cost - System Shut Downs
Thanks for listening!

• PSU Libraries GHG Inventory full report and data available here: https://bit.ly/3LxAxsr

• Science Park Library Annex analysis still in development