The Climate on Campus

Association of Jesuit Colleges and Universities
Carbon Pollution Summary

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Project Summary

The intention of this project was to estimate the carbon footprint for the 28 Jesuit schools in the United States consistent with *Laudato si’,* Pope Francis’ Encyclical on Ecology. This effort builds off of previous summaries of sustainability efforts on AJCU campuses including AJCU sustain listserv, commitment matrix and sustainability accounting training. The process was:

- Reviewed records in Second Nature’s Greenhouse Gas (GHG) and Climate Plan Reporting Tool.
- Conducted online research with search terms including School’s Name, “Climate Plan”, “Greenhouse Gas Inventory”, “Sustainability”.
- Contacted all schools to:
  - Confirm the most recent GHG tracking,
  - Seek out information if missing data.
- Created a summary of this information (slides 3-6) and created estimates for non-reporting schools based on climate region or AJCU average (slides 7-14).

This report should not be used to evaluate individual schools within regions or compare schools across regions. This is to serve as a baseline understanding of AJCU emissions to be used as a tool for setting goals and tracking future progress.

Any questions regarding methodology or data accuracy should be directed to Aaron Durnbaugh, Director of Sustainability, Loyola University of Chicago at adurnbaugh@luc.edu or 773 508 7558.
Reporting and Data Collection

Observations;
- Many schools report under the ‘Climate Commitment’ framework administered by Second Nature
- Other schools provide data tabulated by ‘Sightlines’ facility reports
- A few schools must report because of local or state requirements
- All other schools track and report this information voluntarily
- 20 of 28 schools have some level of GHG reporting
  - 5 of 20 only track Scope 1 and 2 emissions (and only utilities, not vehicle fuel, fertilizers, refrigerants, etc.)
  - 15 of 20 track some Scope 3 emissions
  - 10 of 20 reported some Renewable Energy Credits or Carbon Offsets to reduce or address emissions
    - Only one school sources all of its electricity from non-carbon sources although one other was very close and another one was nearly non-carbon through it’s utility.

AJCU Schools

<table>
<thead>
<tr>
<th>Category</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-Reporting</td>
<td>8</td>
</tr>
<tr>
<td>Scope 1 &amp; 2 Only</td>
<td>5</td>
</tr>
<tr>
<td>Some Scope 3 Emissions</td>
<td>15</td>
</tr>
<tr>
<td>Clean Energy or Carbon Offsets</td>
<td>10</td>
</tr>
</tbody>
</table>

Scope 1 – Direct, on-campus emissions (e.g. vehicles, boilers)
Scope 2 – Off-campus but directly linked to our actions (e.g. purchased electricity)
Scope 3 – Indirect emissions that may be supported but not directly controlled by the university (e.g. commuting, air travel, landfill management)

For more information on reporting guidelines and emissions scopes visit: https://www.epa.gov/greeningepa/greenhouse-gases-epa
Results by School (reporting only)

Scope 1&2 emissions by Area and Full Time Student

Gross Emissions: All reported scopes (scope 3 varies by university)
Results by School including RECs or Offsets (reporting only)

For schools that provided carbon emissions data, this chart shows total Scope 1 & 2 emissions in the red bar (in Metric Tons Carbon Dioxide Equivalents) and efforts to reduce emissions by procuring clean energy or carbon offsets (in Metric Tons Carbon Dioxide Equivalents) in the blue bar. 10 schools had some offsetting activity reported.

Of note is the significant purchase of Renewable Energy Credits (RECs) by school Northeast F and smaller purchases of RECs by schools Ohio Valley B and West A.

No schools make significant purchases of Carbon Credits.

For more information on Renewable Energy Credits visit: https://www.epa.gov/greenpower/renewable-energy-certificates-recs

For more information on Carbon Credits visit: https://www.green-e.org/programs/climate
Results by Climate Region
(20 reporting schools only)

For schools that provided carbon emissions data, this chart shows average emissions in Metric Tons Carbon Dioxide Equivalents per Population (Full Time Student) and Area (1,000 square feet).

Highest emissions are found in Northern Rockies, Ohio Valley and South regions. Lowest emissions are found in Northwest and West regions.

*No data from Southeast and Southwest regions.

Climate Region Source: https://www.ncdc.noaa.gov/monitoring-references/maps/us-climate-regions.php
Estimated total carbon footprint by climate region (detail)

- 20 of 28 schools reporting (71.4%) representing 161,881 Full Time Students (84.5%) and 63,703,627 square feet (85.4%).
- Six schools used regional averages to provide GHG estimates. Two schools used Reporting School nation-wide averages.
- Estimates of emissions for all 28 schools range from 749,349 to 794,604 MT CO2e depending on the estimation method.

<table>
<thead>
<tr>
<th>UNIT Region</th>
<th># Schools</th>
<th># Reporting</th>
<th>Emissions Subtotal (reporting only)</th>
<th>FT Students (reporting only)</th>
<th>GHG per FT Student (reporting only)</th>
<th>Area (reporting only)</th>
<th>GHG per 1,000 sf (reporting only)</th>
<th>FT Students (ALL)</th>
<th>Estimated MT CO2e using average per FT Student</th>
<th>Area (ALL)</th>
<th>Estimated MT CO2e using average per 1,000 sf per FT Student</th>
<th>Estimated MT CO2e using statistical average of 571 schools</th>
</tr>
</thead>
<tbody>
<tr>
<td>Northern Rockies (1)</td>
<td>1</td>
<td>1</td>
<td>55,247</td>
<td>7,455</td>
<td>7.41</td>
<td>3,606,004</td>
<td>15.32</td>
<td>7,455</td>
<td>55,247</td>
<td>3,606,004</td>
<td>55,247</td>
<td>55,247</td>
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<tr>
<td>Northwest (2)</td>
<td>2</td>
<td>2</td>
<td>23,701</td>
<td>14,817</td>
<td>1.60</td>
<td>4,993,520</td>
<td>4.75</td>
<td>14,817</td>
<td>23,701</td>
<td>4,993,520</td>
<td>23,701</td>
<td>23,701</td>
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<tr>
<td>Ohio Valley (6)</td>
<td>0</td>
<td>4</td>
<td>212,411</td>
<td>34,789</td>
<td>6.11</td>
<td>14,671,482</td>
<td>14.48</td>
<td>38,154</td>
<td>232,957</td>
<td>16,246,482</td>
<td>235,214</td>
<td>239,361</td>
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<tr>
<td>South (1)</td>
<td>1</td>
<td>1</td>
<td>20,883</td>
<td>4,713</td>
<td>4.43</td>
<td>1,332,852</td>
<td>15.67</td>
<td>4,713</td>
<td>20,883</td>
<td>1,332,852</td>
<td>20,883</td>
<td>20,883</td>
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<tr>
<td>Southeast* (1)</td>
<td>1</td>
<td>0</td>
<td>1,192</td>
<td>4,706</td>
<td>2.47</td>
<td>802,500</td>
<td>8,050</td>
<td>8,050</td>
<td>9,067</td>
<td>9,067</td>
<td>16,642</td>
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<tr>
<td>Southwest* (1)</td>
<td>1</td>
<td>0</td>
<td>6,234</td>
<td>24,610</td>
<td>955,000</td>
<td>9,580</td>
<td>9,580</td>
<td>11,924</td>
<td>16,642</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Upper Midwest (2)</td>
<td>2</td>
<td>1</td>
<td>45,644</td>
<td>10,567</td>
<td>4.32</td>
<td>5,819,018</td>
<td>7.85</td>
<td>14,643</td>
<td>63,290</td>
<td>7,387,657</td>
<td>57,958</td>
<td>67,126</td>
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<tr>
<td>West (3)</td>
<td>3</td>
<td>3</td>
<td>42,433</td>
<td>26,271</td>
<td>1.62</td>
<td>8,840,445</td>
<td>5.02</td>
<td>26,271</td>
<td>42,433</td>
<td>8,840,445</td>
<td>42,433</td>
<td>42,433</td>
</tr>
<tr>
<td>AJCU TOTAL</td>
<td>28</td>
<td>20</td>
<td>639,050</td>
<td>161,881</td>
<td>29.25</td>
<td>63,703,627</td>
<td>72.69</td>
<td>191,419</td>
<td>761,874</td>
<td>74,589,527</td>
<td>749,349</td>
<td>794,604</td>
</tr>
<tr>
<td>AJCU AVERAGES</td>
<td>71.4%</td>
<td>31,952</td>
<td>8,094</td>
<td>3.95</td>
<td>3,185,181</td>
<td>10.03</td>
<td>6,836</td>
<td>3.98</td>
<td>2,663,912</td>
<td>10.05</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Uses AJCU average and not regional average per FT Student per 1,000 sf
GHG Emissions for AJCU Schools

Statistics:
Model: $p < 0.001$
Adj. $R^2$: 0.679

Variables (Log Transformed):
Area: $p = 0.010$
Population: $p = 0.289$
GHG Emissions for All Schools

Statistics:
Model: $p < 0.001$
Adj. $R^2$: 0.842

Variables (Log Transformed):
Area: $p < 0.001$
Population: $p < 0.001$
Principle Component Analysis:
AJCU / Non-AJCU

Log Transformed Data
Ellipse: 68% of data

Legend
- AJCU School
- Non-AJCU School
- Ohio State – Largest GHG
- UCLA – Largest Area
- Pinchot U – Smallest Area
- Portland CC – Largest Pop
- U Maryland (Env Science) – Smallest Pop

PC1 (84.1% explained var.)
PC2 (12.8% explained var.)

Log Transformed Data
Ellipse: 68% of data
Principle Component Analysis: Region

Log Transformed Data

Ellipse: 68% of data

Legend

- CENTRAL
- ENCENTERAL
- NE
- NW
- S
- SE
- SW
- W
- WNCENTRAL

Log Transformed Data
Ellipse: 68% of data
## Estimated total carbon footprint

<table>
<thead>
<tr>
<th>Greenhouse Gas Emissions</th>
<th>Reporting Schools (20)</th>
<th>Reporting and Estimated Schools (28)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scope 1 &amp; 2 Only (Total)</td>
<td>639,050 MT CO2e</td>
<td>749,349 – 794,604 MT CO2e</td>
</tr>
<tr>
<td>Per FT Student (Scope 1 &amp; 2 Total only)</td>
<td>3.95 MT CO2e</td>
<td>3.98 MT CO2e</td>
</tr>
<tr>
<td>Per 1,000 Square Feet (Scope 1 &amp; 2 Total only)</td>
<td>10.03 MT CO2e</td>
<td>10.05 MT CO2e</td>
</tr>
</tbody>
</table>
Estimated total carbon footprint by region

This chart shows the reported and estimated emissions from all 28 AJCU schools. It is an aggregate of the emissions per region so areas with more schools will have a larger footprint.

For non-reporting schools, the regional average CO2e per Full Time Student and per 1,000 square feet were multiplied by the known Population and Area. For non-reporting schools in regions without other reporting schools (Southeast and Southwest), the national average CO2e per Population and Area was multiplied for the known variables.
AJCU “carbon footprint”

794,604 Metric Tons Carbon Dioxide Equivalents

Equivalent to:

– 167,847 passenger vehicles driven for one year
– 1,904,392,135 miles driven by the average passenger vehicle
– 89,411,950 gallons of gasoline consumed
– 847,918,033 pounds of coal burned
  • 4,232 railcars’ worth of coal
  • 23.1% of a coal-fired power plants’ yearly emissions
– 83,907 homes’ energy use for one year

OR

– 201 wind turbines installed
– 20,593,072 tree seedlings growing for 10 years
– 752,176 acres of U.S. forest for one year

Source: US EPA Greenhouse Gas Equivalencies Calculator
https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator
Opportunities for collaboration

- Benchmarking against regional peers
- Recognition in climate leadership on specific strategies (energy efficiency, clean energy procurement, research and teaching)
- Procurement of clean energy (Renewable Energy Certificates, Power Purchase Agreements)
- Shared commitment among AJCU institutions to address carbon pollution

However;
- Should account for regional and institutional difference
- Should be led by AJCU
- Should rely on existing frameworks (Second Nature, AASHE, Catholic Climate Covenant)
Recognition and Thanks

• Brandon Verhoff, Saint Louis University
• Dr. Brian Ohsowski, Loyola University Chicago
• Deanna Howes, AJCU
• Many contacts at other AJCU institutions for sharing data and context.

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This effort to inventory and estimate the greenhouse gas emissions of the 28 member institutions of the AJCU produced the following results:

- 20 of 28 universities had some greenhouse gas tracking
- The emissions of the 20 reporting universities = 639,050 MT CO2e (most recent reporting year)

Using regional and national averages, applied to the size (both full time students and area) estimates a total emissions across all 28 universities = \textbf{749,349 – 794,604 MT CO2e}

This information can be used to identify regional and national benchmarks, recognize high-performing campuses and set shared goals for reductions and climate action.
### Summary Data

<table>
<thead>
<tr>
<th>AJCU Schools</th>
<th>GHG Emissions</th>
<th>Area (Square Feet)</th>
<th>Population</th>
</tr>
</thead>
<tbody>
<tr>
<td>AJCU</td>
<td>28</td>
<td>Min. : 326</td>
<td>Min. : 25000</td>
</tr>
<tr>
<td>N</td>
<td>561</td>
<td>1st Qu.: 10464</td>
<td>1st Qu.: 668731</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Median : 19952</td>
<td>Median : 1357013</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mean : 47284</td>
<td>Mean : 2849398</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3rd Qu.: 47341</td>
<td>3rd Qu.: 3132339</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Max. : 689721</td>
<td>Max. : 30414130</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Region</th>
<th>State</th>
<th>Population</th>
</tr>
</thead>
<tbody>
<tr>
<td>CENTRAL</td>
<td>CA</td>
<td>54</td>
</tr>
<tr>
<td>ENCENTRAL</td>
<td>NY</td>
<td>48</td>
</tr>
<tr>
<td>NE</td>
<td>MA</td>
<td>38</td>
</tr>
<tr>
<td>NW</td>
<td>PA</td>
<td>29</td>
</tr>
<tr>
<td>S</td>
<td>MD</td>
<td>24</td>
</tr>
<tr>
<td>SE</td>
<td>MN</td>
<td>21</td>
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<td>20</td>
</tr>
<tr>
<td>W</td>
<td>WA</td>
<td>19</td>
</tr>
<tr>
<td>WNCENTRAL</td>
<td></td>
<td>10</td>
</tr>
</tbody>
</table>

### Description
- **AJCU Schools:**
  - AJCU: 28
  - N: 561

- **GHG Emissions:**
  - Min.: 326
  - 1st Qu.: 10464
  - Median: 19952
  - Mean: 47284
  - 3rd Qu.: 47341
  - Max.: 689721

- **Area (Square Feet):**
  - Min.: 25000
  - 1st Qu.: 668731
  - Median: 1357013
  - Mean: 2849398
  - 3rd Qu.: 3132339
  - Max.: 30414130

- **Population:**
  - Min.: 70
  - 1st Qu.: 2200
  - Median: 5971
  - Mean: 9917
  - 3rd Qu.: 14310
  - Max.: 89000
Schools by Climate Region

- **Northeast**
  - Boston College*
  - Canisius College
  - College of Holy Cross*
  - Fairfield University*
  - Fordham University*
  - Georgetown University*
  - Le Moyne College*
  - Loyola University Maryland*
  - Saint Joseph’s University
  - Saint Peter’s University*
  - University of Scranton

- **Northern Rockies**
  - Creighton University*

- **Northwest**
  - Gonzaga University*
  - Seattle University*

- **Ohio Valley**
  - John Carroll University*
  - Loyola University Chicago*
  - Rockhurst University
  - Saint Louis University*
  - Wheeling Jesuit University
  - Xavier University*

- **South**
  - Loyola University New Orleans*

- **Southeast**
  - Spring Hill College

- **Southwest**
  - Regis University

- **Upper Midwest**
  - Marquette University*
  - University of Detroit Mercy*

- **West**
  - Loyola Marymount University*
  - Santa Clara University*
  - University of San Francisco*

*indicates that school provided some carbon accounting.