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 AJCUsustain 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).

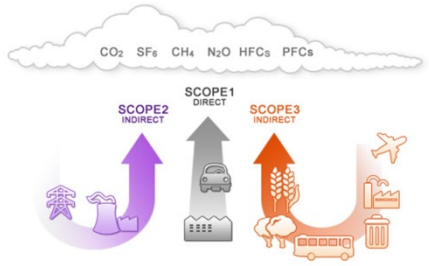
This report should not be used to evaluate individual schools within regions or compare schools across regions. This is to serve as a baseline understanding of AJCU emissions to be used as a tool for setting goals and tracking future progress.

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.

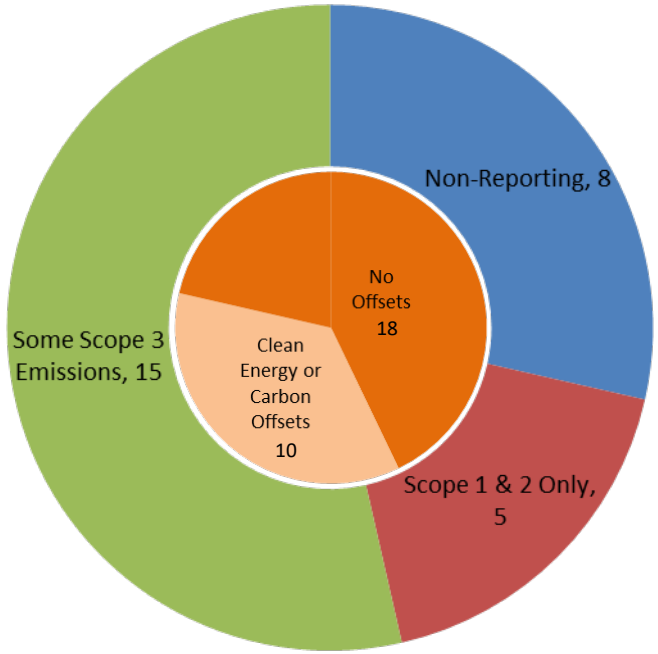
Reporting and Data Collection

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.



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)

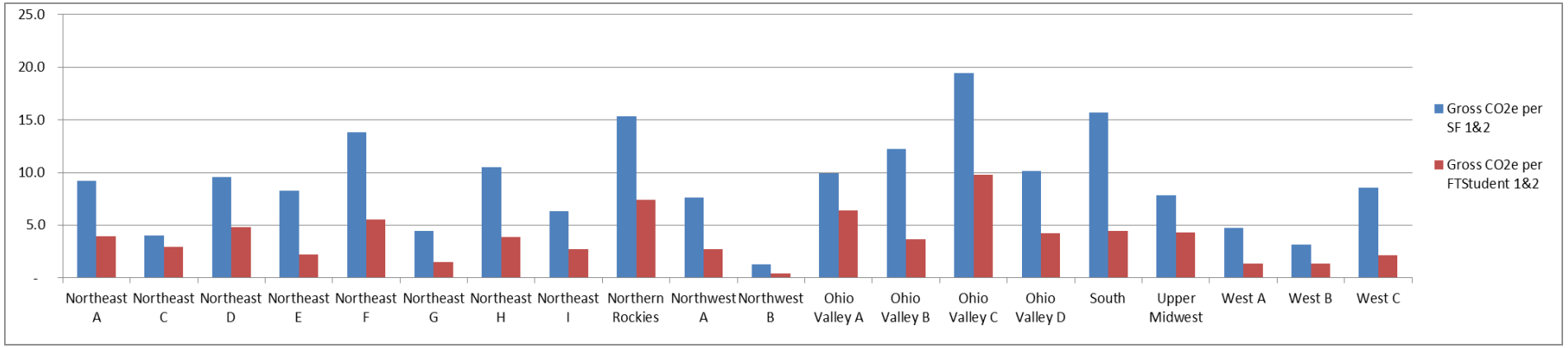


AJCU Schools	28
Non-Reporting	8
Scope 1 & 2 Only	5
Some Scope 3 Emissions	15
Clean Energy or Carbon Offsets	10

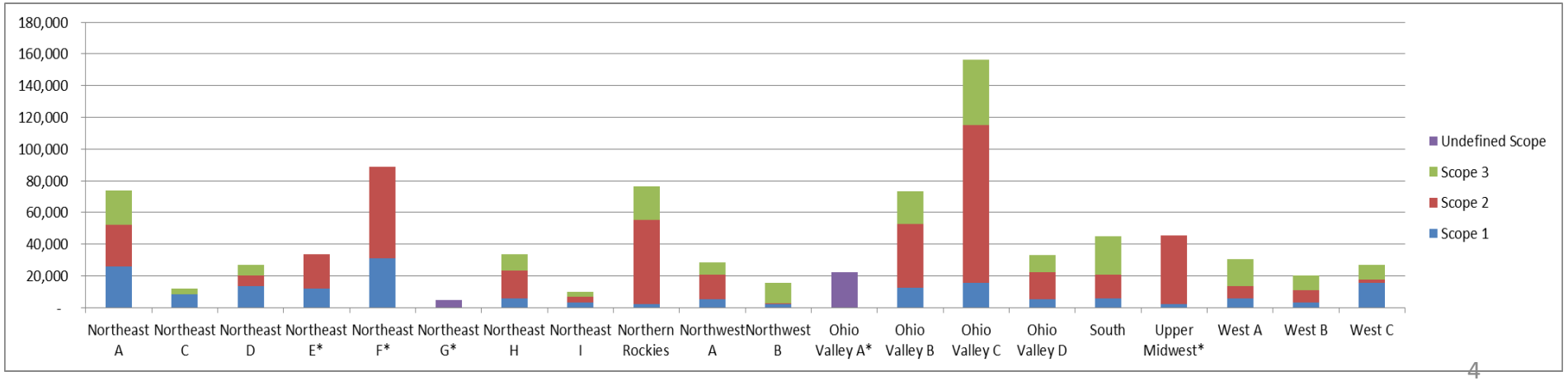
For more information on reporting guidelines and emissions scopes visit: https://www.epa.gov/greeningepa/greenhouse-gases-epa

Results by School (reporting only)

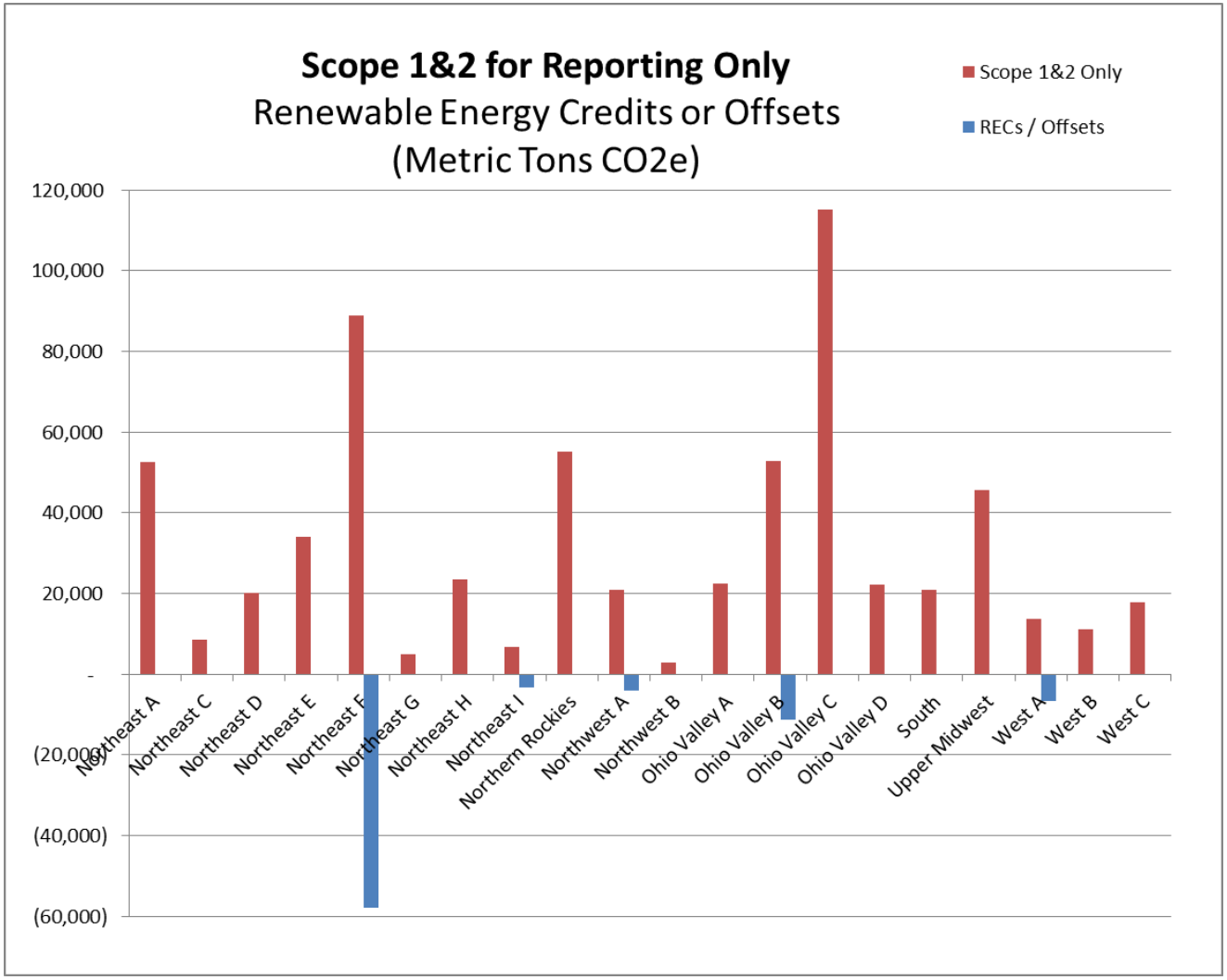
Scope 1&2 emissions by Area and Full Time Student



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.

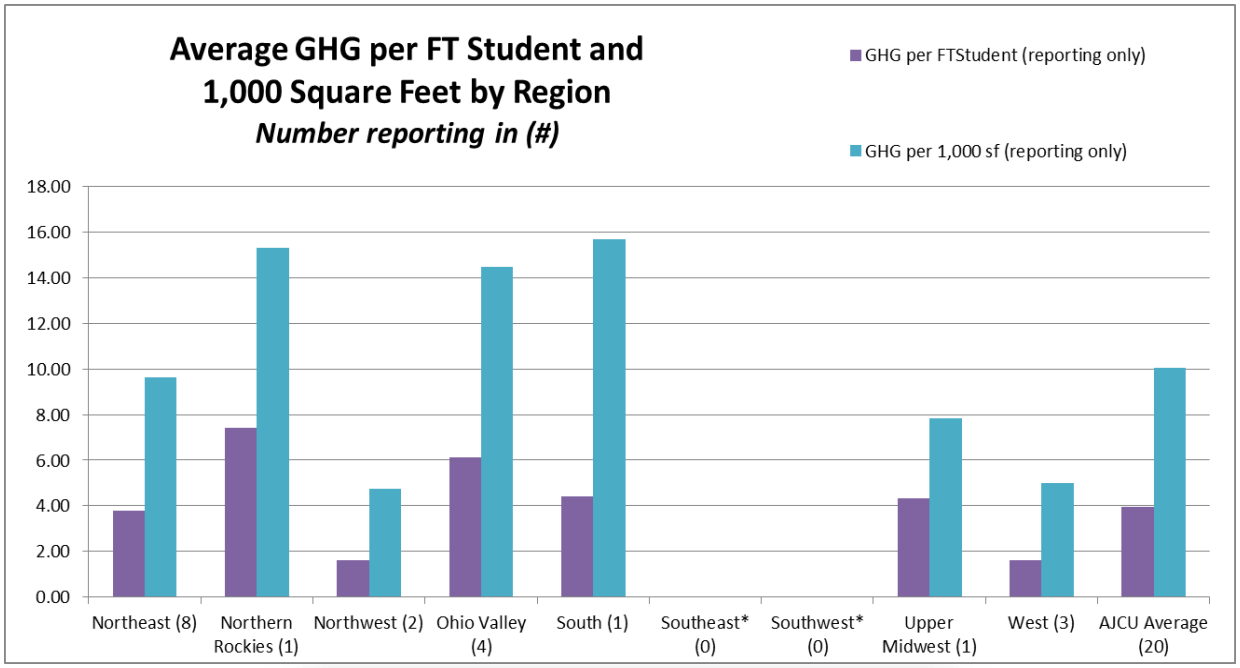
Of note is the significant purchase of Renewable Energy Credits (RECs) by school Northeast F and smaller purchases of RECs by schools Ohio Valley B and West A.

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)

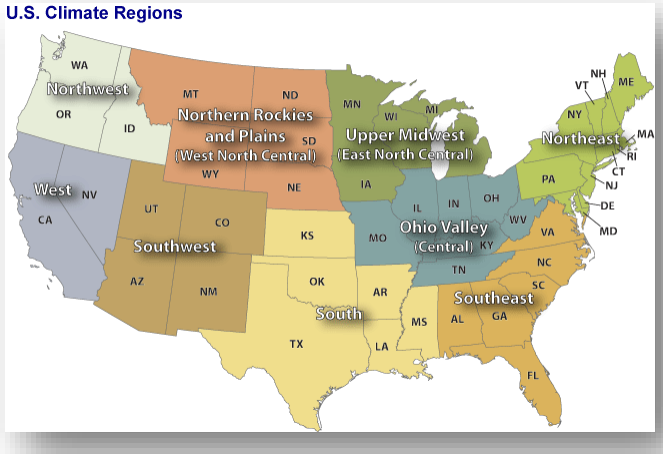


For schools that provided carbon emissions data, this chart shows average emissions in Metric Tons Carbon Dioxide Equivalents per Population (Full Time Student) and Area (1,000 square feet).

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.

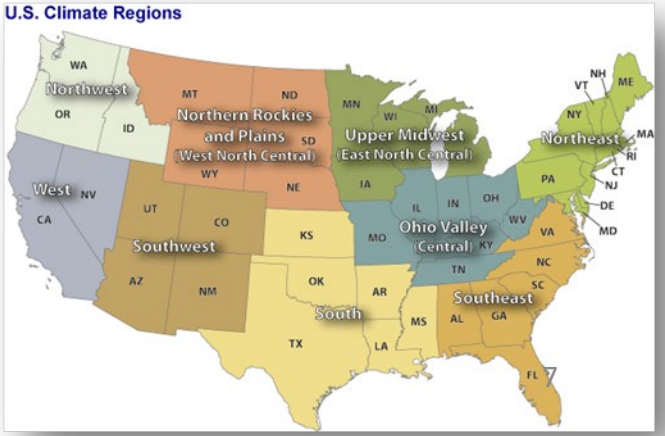
Climate Region Source: https://www.ncdc.noaa.gov/monitoring-references/maps/us-climate-regions.php



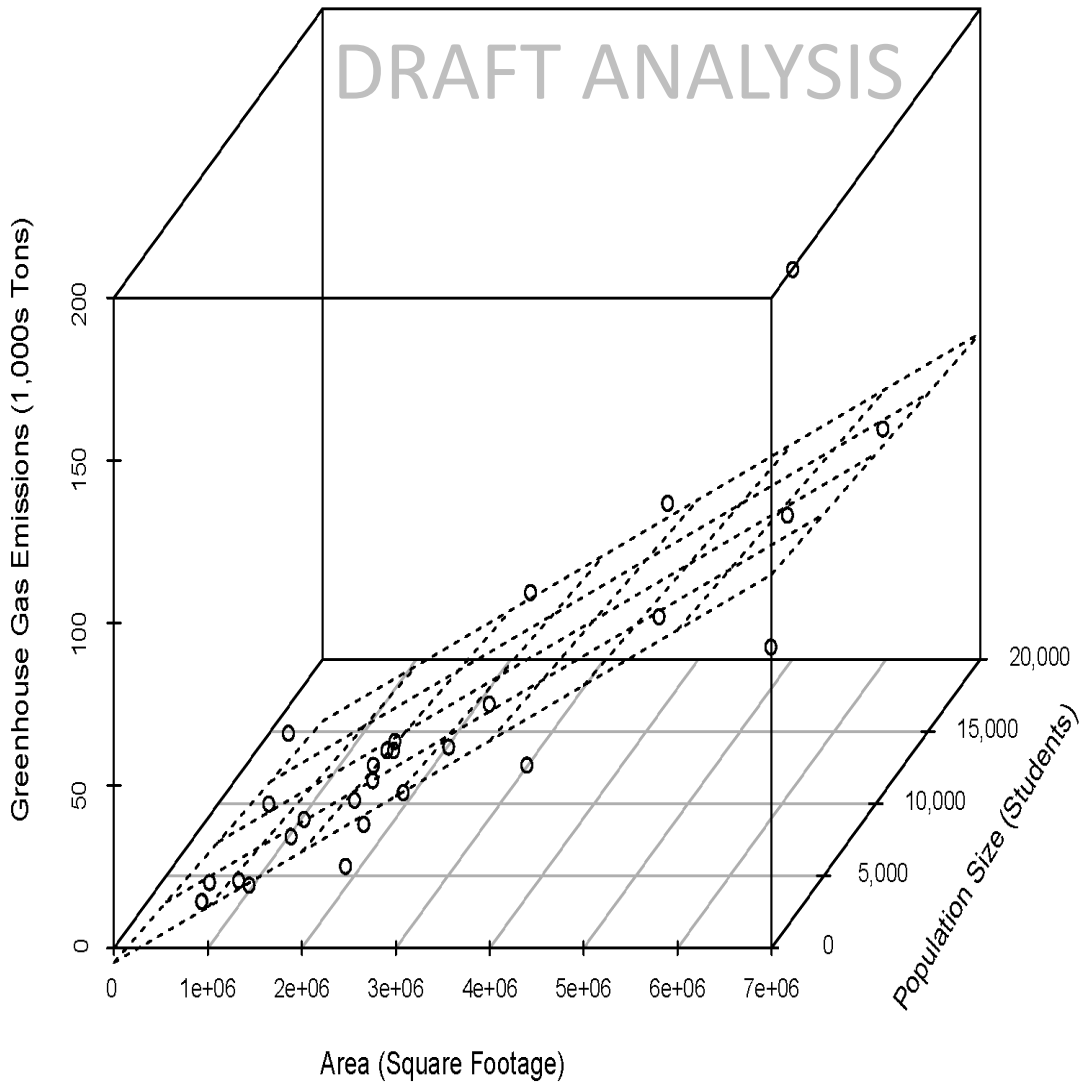
Estimated total carbon footprint by climate region (detail)

			REPORTING ONLY					ESTIMATED FOOTPRINT				
ESTIMATIONS BY CLIMATE REGION	**# Schools**	**# Reporting**	**Emissions Subtotal (reporting only)**	**FTStudents (reporting only)**	**GHG per FTStudent (reporting only)**	**Area (reporting only)**	**GHG per 1,000 sf (reporting only)**	**FT Students (ALL)**	**Estimated MT CO2e using average per FT Student**	**Area (ALL)**	**Estimated MT CO2e using average per 1,000 s.f.**	**Estimated MT CO2e using statistical average of 571 schools**
UNIT	*Institution*	*Institution*	*Metric Tons CO2e*	*Full-time student equivalent*	*Metric Tons CO2e*	*Square Foot*	*Metric Tons CO2e*	*Full-time student equivalent*	*Metric Tons CO2e*	*Square Foot*	*Metric Tons CO2e*	*Metric Tons CO2e*
Northeast (11)	11	8	*238,731*	*63,269*	*3.77*	*24,821,306*	*9.62*	77,940	294,088	30,805,067	296,282	320,144
Northern Rockies (1)	1	1	*55,247*	*7,455*	*7.41*	*3,606,004*	*15.32*	7,455	55,247	3,606,004	55,247	55,247
Northwest (2)	2	2	*23,701*	*14,817*	*1.60*	*4,993,520*	*4.75*	14,817	23,701	4,993,520	23,701	23,701
Ohio Valley (6)	6	4	*212,411*	*34,789*	*6.11*	*14,671,482*	*14.48*	38,154	232,957	16,246,482	235,214	239,361
South (1)	1	1	*20,883*	*4,713*	*4.43*	*1,332,852*	*15.67*	4,713	20,883	1,332,852	20,883	20,883
Southeast* (1)	1	0						1,192	4,706	802,500	8,050	9,067
Southwest* (1)	1	0						6,234	24,610	955,000	9,580	16,642
Upper Midwest (2)	2	1	*45,644*	*10,567*	*4.32*	*5,818,018*	*7.85*	14,643	63,250	7,387,657	57,958	67,126
West (3)	3	3	*42,433*	*26,271*	*1.62*	*8,460,445*	*5.02*	26,271	42,433	8,460,445	42,433	42,433
AJCU TOTAL	28	20	*639,050*	*161,881*	*29.25*	*63,703,627*	*72.69*	191,419	761,874	74,589,527	749,349	794,604
AJCU AVERAGES		71.4%	*31,952*	*8,094*	*3.95*	*3,185,181*	*10.03*	6,836	3.98	2,663,912	10.05	
*Uses AJCU average and not regional average					per FT Student		per 1,000 sf		per FT Student		per 1,000 sf	

- 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.



GHG Emissions for AJCU Schools



Statistics:

Model: **$p < 0.001$**

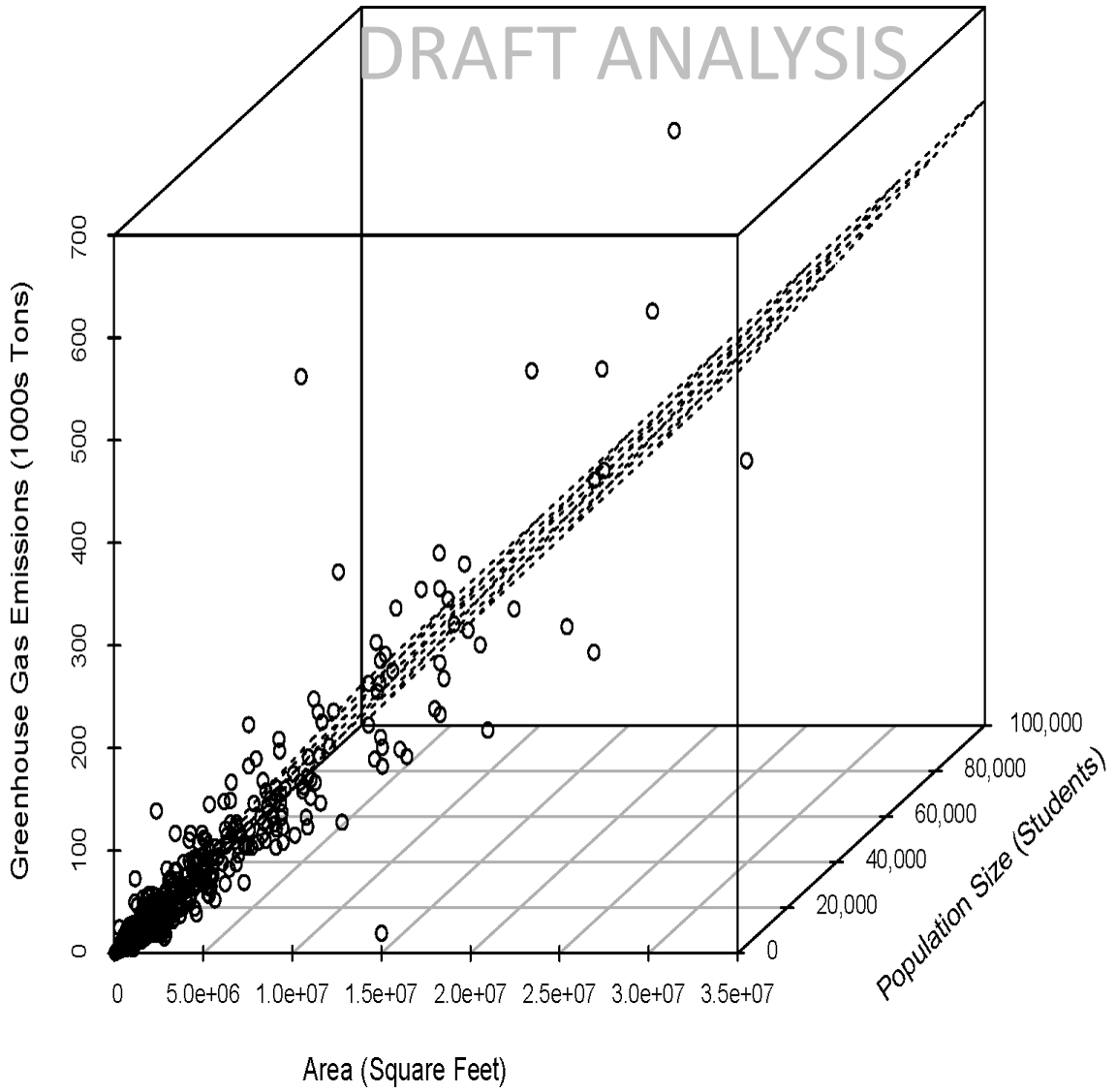
Adj. R^2 : 0.679

Variables (Log Transformed):

Area: **$p = 0.010$**

Population: $p = 0.289$

GHG Emissions for All Schools



Statistics:

Model: $p < 0.001$

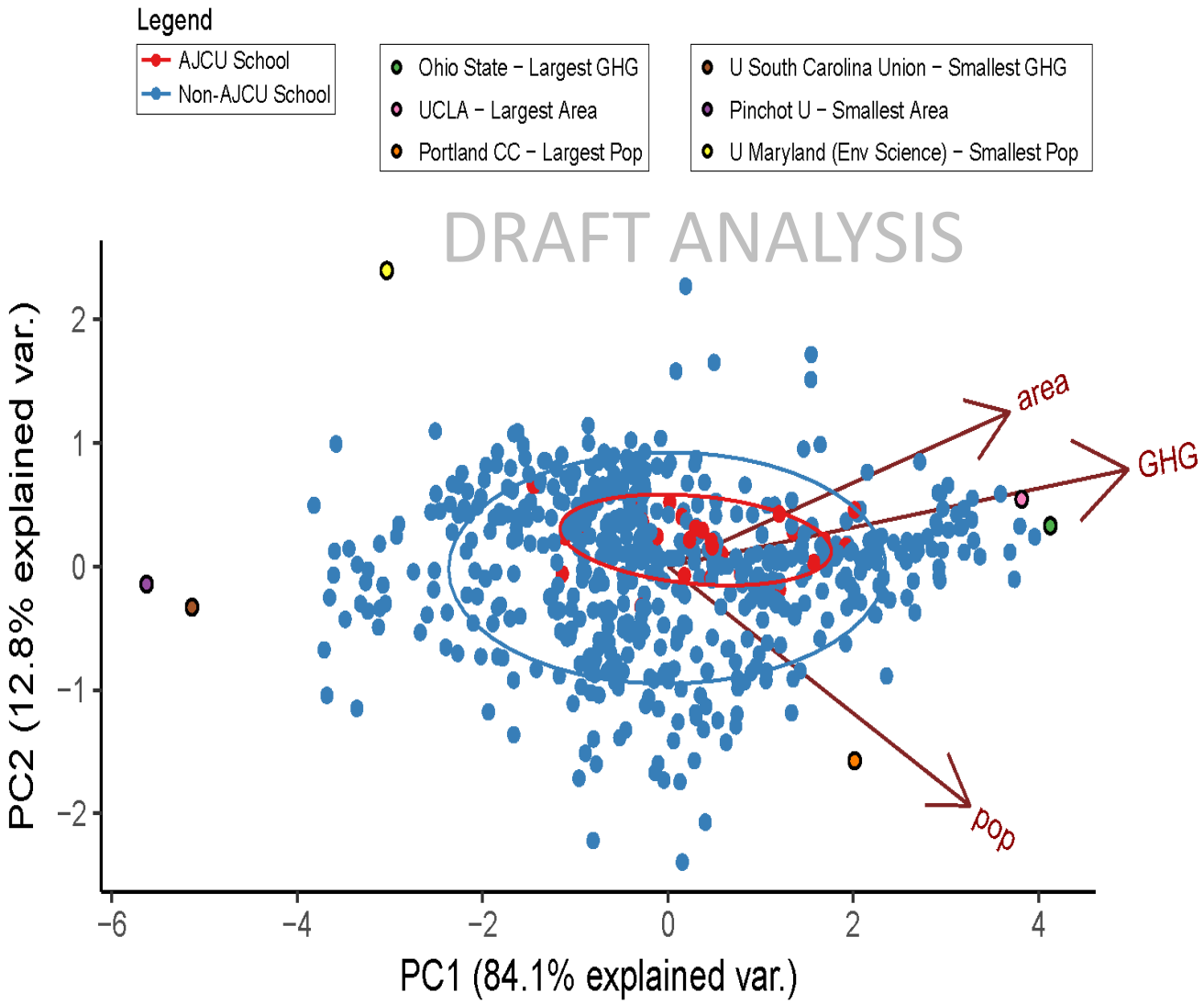
Adj. R^2 : 0.842

Variables (Log Transformed):

Area: $p < 0.001$

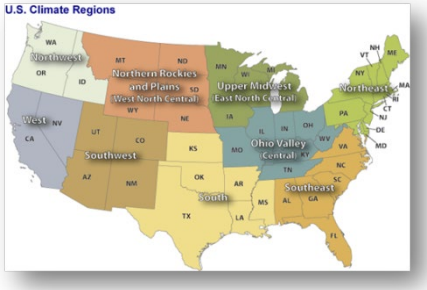
Population: $p < 0.001$

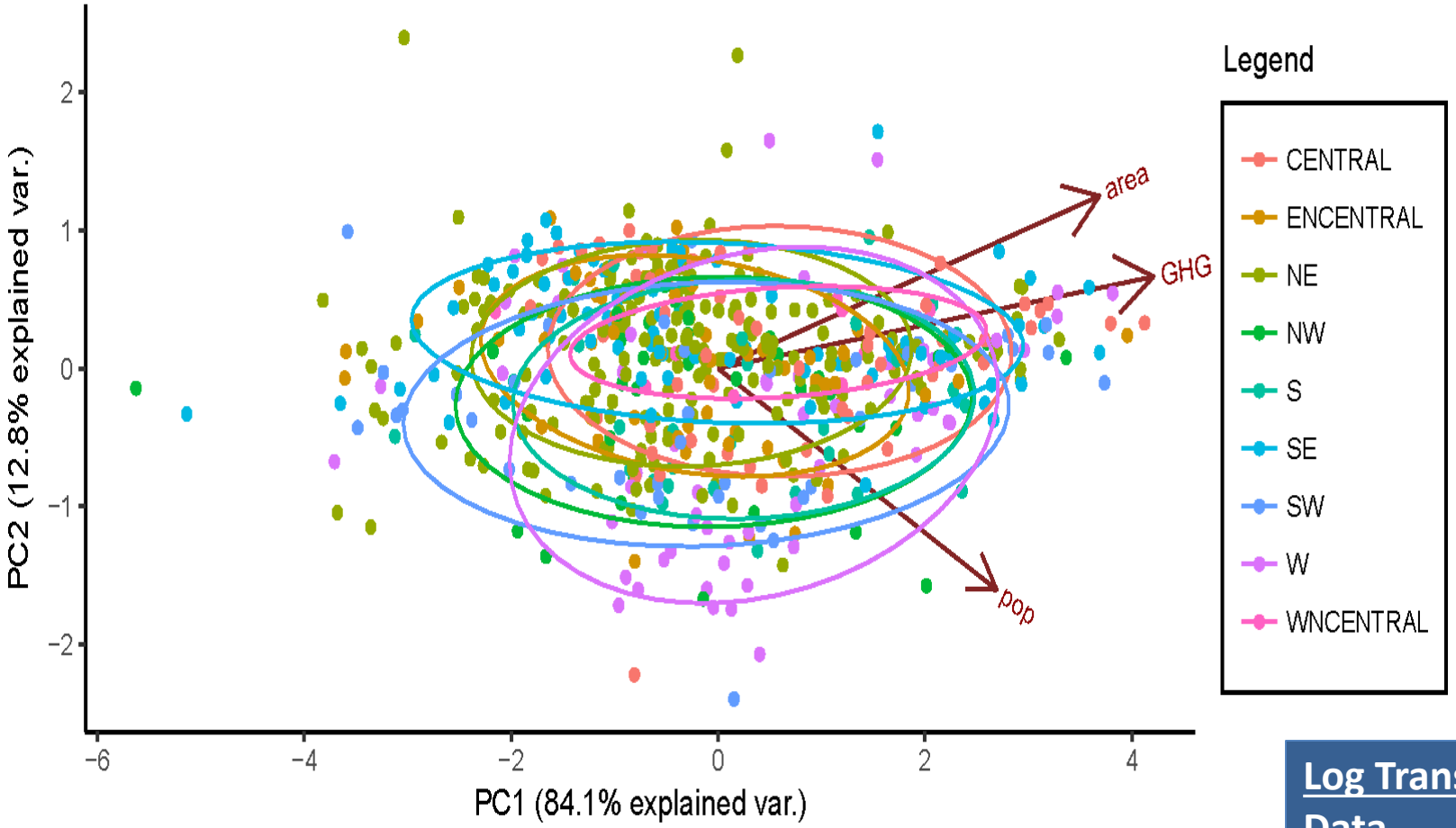
Principle Component Analysis: AJCU / Non-AJCU



Log Transformed Data
Ellipse: 68% of data

Principle Component Analysis: Region





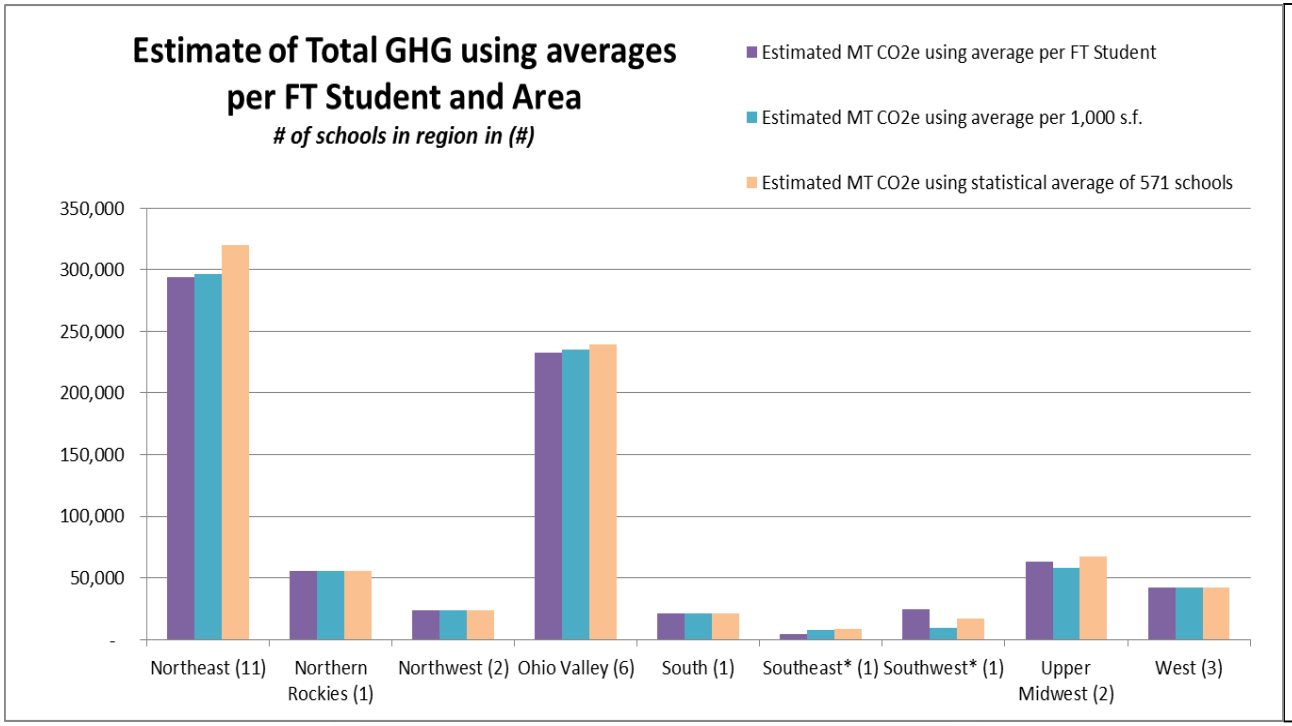
DRAFT ANALYSIS

Log Transformed Data
Ellipse: 68% of data

Estimated total carbon footprint

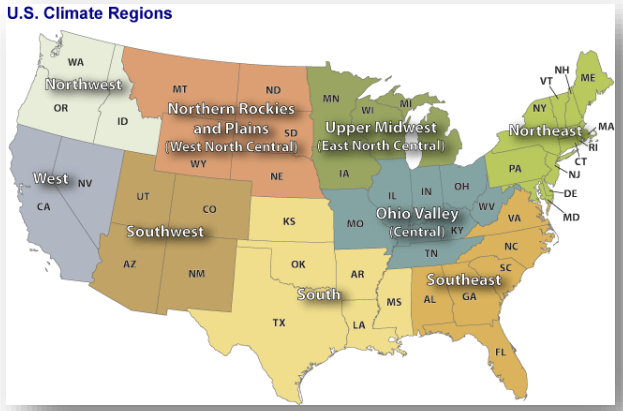
Greenhouse Gas Emissions	Reporting Schools (20)	Reporting and Estimated Schools (28)
Scope 1 & 2 Only (Total)	**639,050 MT CO2e**	***749,349 – 794,604 MT CO2e***
Per FT Student (Scope 1 & 2 Total only)	**3.95 MT CO2e**	*3.98 MT CO2e*
Per 1,000 Square Feet (Scope 1 & 2 Total only)	**10.03 MT CO2e**	*10.05 MT CO2e*

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"

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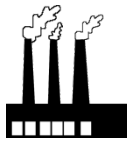
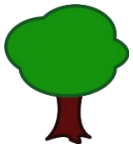
794,604 Metric Tons Carbon Dioxide Equivalents





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)

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AJCU

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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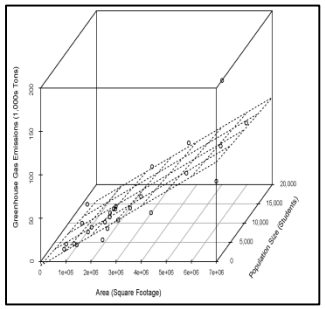
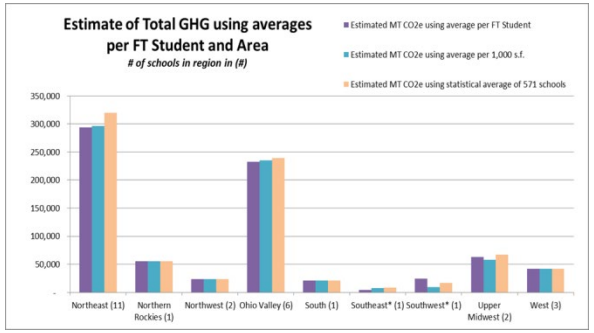


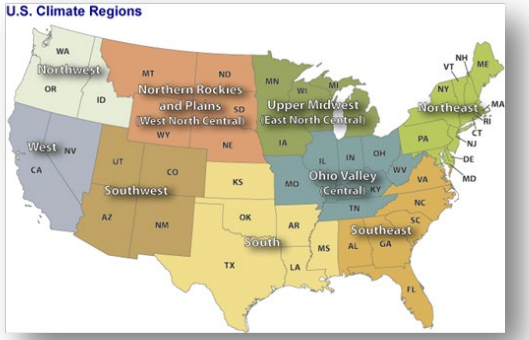
Plot of 20 AJCU Schools by size variables.

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 = ***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

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

Region

CENTRAL	66
ENCENTRAL	58
NE	210
NW	36
S	34
SE	75
SW	42
W	58
WNCENTRAL	10

State

CA	54
NY	48
MA	38
PA	29
MD	24
MN	21
TX	20
WA	19

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.