



ENERGY STAR® Higher Education Benchmarking Initiative (HEBI)

ROUND 2 - FEBRUARY 2023



ABOUT HEBI

The ENERGY STAR Higher Education Benchmarking Initiative (HEBI) provides institutions with information on how their campus energy and water performance compares to peer institutions. This initiative moves beyond sector challenges such as incomplete building level metering, perceived incomparability, and partial coverage of 1-100 ENERGY STAR Scores to deliver actionable insights for participants.

In 2022, 51 institutions, representing 89 campuses across the US and Canada, participated in the second round of HEBI. This document summarizes campus data on site and source energy and water use intensity. The summary scorecard also provides information on the impacts of COVID-19 on campus operations. Institutions that did not participate in this survey can use this resource to estimate their relative performance, while industry associations and other stakeholders can use it to understand broader performance trends.



ENERGY STAR DEFINITIONS

SOURCE ENERGY USE INTENSITY (EUI):

The total raw fuel required per year to operate the property, including losses that take place during energy generation, transmission, and distribution, divided by the square feet of the property.

In this scorecard, source EUI is displayed in the units of kBtu/ft², or thousands of Btu per square foot.

Source EUI is the most appropriate metric for equitably comparing institutions with different fuel sources.

SITE ENERGY USE INTENSITY (EUI):

The total amount of energy consumed on-site per year, regardless of the source, divided by the square feet of the property.

In this scorecard, site EUI is displayed in the units of kBtu/ft², or thousands of Btu per square foot.

Site EUI is the most appropriate metric for measuring improvement over time for an individual campus or institution.

WATER USE INTENSITY (WUI):

The total amount of water used from all water sources per year divided by the square feet of the property (not including parking or irrigated area).

In this scorecard, WUI is displayed in the units of gallons of water per square foot of the property (or campus). WUI shows water performance used by the property over a year.

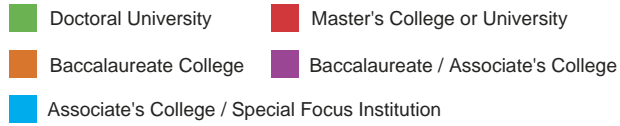
METHODOLOGY AND LIMITATIONS

Participants self-reported campus-wide energy and (optionally) water consumption data for calendar year 2021 via ENERGY STAR® Portfolio Manager®. Participants also completed a separate questionnaire to provide additional campus characteristics for analysis. Participant data was analyzed to create peer groups based on institution/campus characteristics considered across the sector to be key factors influencing energy performance.

To avoid substantially skewed results, campuses with source EUI values above 794.6kBtu/ft² were classified as outliers and excluded from the analysis. Campuses with WUI values above 133.8 gal/ft² were classified as outliers and excluded. Outliers were also excluded when determining median values for peer groups.

Participant Overview*

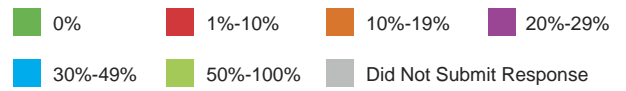
Carnegie Classification¹



88 reporting campuses

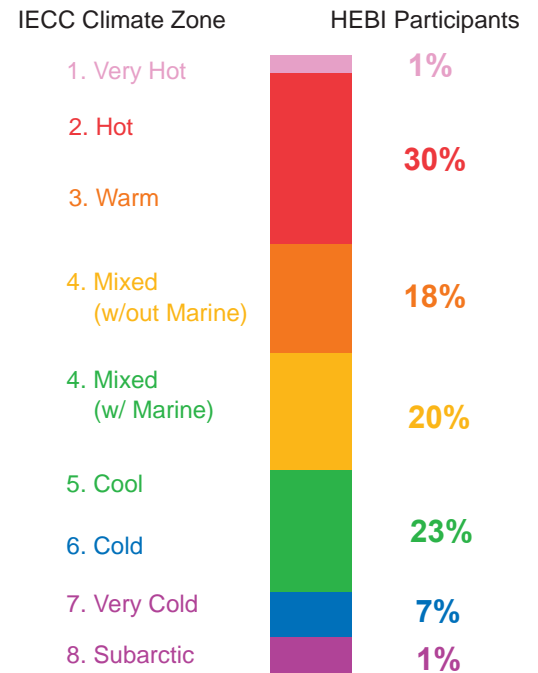
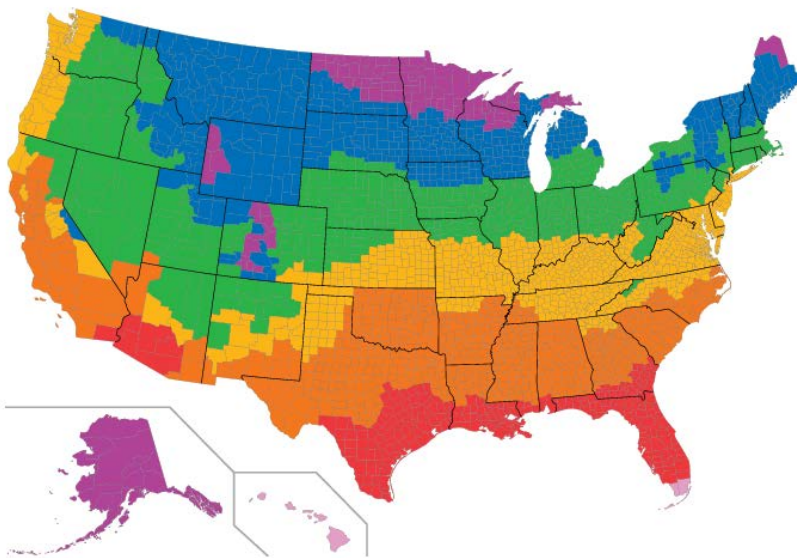
1. To learn more about the Carnegie Classification framework for classifying colleges and universities, visit carnegieclassifications.iu.edu.

2021 Residential Fall Term Headcount %



88 reporting campuses

International Energy Conservation Code (IECC) Climate Zone²



2. Canadian climate zones were not referenced in this image but were extrapolated from IECC data.

*A total of 88 campus submissions, representing 51 unique institutions.

88 reporting campuses

COVID-19 Impacts

Survey respondents had the option of reporting the impacts of COVID-19 on campus operations in 2021, including building occupancy, food service, and hours of operation. In March 2020, many higher education institutions closed campus buildings and adopted virtual learning to prevent the spread of COVID-19. A year later, COVID-19 continued to impact campus operations, as many institutions remained wholly or partially closed to in-person learning, adopted hybrid learning models, and invested in air filtration to minimize community spread of the virus.

Below is a summary of responses to the question “Looking across CY 2021, on average, what operational impacts did your HEBI campus experience due to the COVID-19 pandemic?” Respondents were able to select more than one response.

Operational Impacts from COVID-19

| Percentage of Respondents | Operational Impacts Experienced Due to the COVID-19 Pandemic |
|---------------------------|---|
| 82% | Classes were virtual for some of or all the year |
| 82% | Substantial decrease in number of hours of faculty and staff working in campus buildings compared to pre-pandemic |
| 72% | Substantial increase in outside air ventilation and/or filtration compared to pre-pandemic |
| 50% | Substantial decrease in hours that some or all buildings were “open” and operating compared to pre-pandemic |
| 45% | Substantial decrease in food service offerings (hours of operation, outlets open, etc.) for students and staff |
| 44% | Campus housing occupancy was substantially lower than pre-pandemic |
| 6% | No impact or N/A |

88 reporting campuses

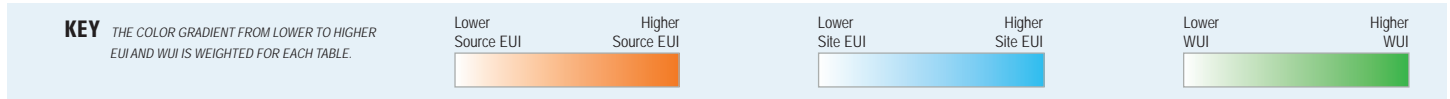
Residential Occupancy from COVID-19

| Percentage of Respondents | Operational Impacts Experienced Due to the COVID-19 Pandemic |
|---------------------------|--|
| 38% | Decreased 1-25% |
| 25% | Decreased 26-50% |
| 13% | Decreased 51% or more |
| 25% | No change |

8 reporting campuses

PERFORMANCE RESULTS

The tables below display the source EUI and WUI performance values of participating HEBI campuses based on calendar year 2021 data. There are tables for four different characteristics: Carnegie Classification, IECC Climate Zone, Percent of 2021 Fall Residents Living On-Campus, and Actual EUI by Expected Energy Use. Each table has rows that represent individual peer groups based on those variables and columns with the performance of campuses in the given peer group at the 10th, 25th, 50th (median), 75th, and 90th percentiles, excluding outliers.



CARNEGIE CLASSIFICATION

| Peer Group | Source EUI (kBtu/ft ²) | | | | | | Site EUI (kBtu/ft ²) | | | | | | WUI (gal/ft ²) | | | | | |
|---|------------------------------------|------------|------|------------------|------|------|----------------------------------|------------|------|------------------|------|------|------------------------------|------------|------|------------------|------|------|
| | Count (excludes outliers) | Percentile | | | | | Count (excludes outliers) | Percentile | | | | | Count (excludes outliers) | Percentile | | | | |
| | | 10th | 25th | 50th (median) | 75th | 90th | | 10th | 25th | 50th (median) | 75th | 90th | | 10th | 25th | 50th (median) | 75th | 90th |
| Associate's College / Special Focus Institution | 35 | 77 | 110 | 151 | 184 | 234 | 35 | 38 | 53 | 76 | 91 | 119 | 15 | 3 | 12 | 16 | 22 | 30 |
| Baccalaureate / Associate's College | 4 | 81 | 89 | 122 | 164 | 189 | 4 | 29 | 32 | 47 | 75 | 102 | 3 | N/A | N/A | N/A | N/A | N/A |
| Baccalaureate College | 6 | 128 | 139 | 173 | 212 | 229 | 6 | 84 | 86 | 91 | 100 | 106 | 1 | N/A | N/A | N/A | N/A | N/A |
| Master's College or University | 12 | 117 | 132 | 144 | 163 | 169 | 12 | 62 | 66 | 83 | 101 | 131 | 10 | 15 | 17 | 27 | 30 | 33 |
| Doctoral University | 33 | 141 | 176 | 206 | 268 | 342 | 33 | 84 | 97 | 120 | 179 | 220 | 20 | 15 | 19 | 20 | 27 | 34 |

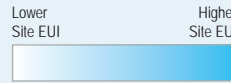
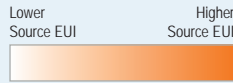
TAKEAWAY: Doctoral universities had the highest median source and site EUI values, while master's colleges or universities had the highest median WUI. Performance varied widely within each Carnegie Classification.

IECC CLIMATE ZONE

| Peer Group | Source EUI (kBtu/ft ²) | | | | | | Site EUI (kBtu/ft ²) | | | | | | WUI (gal/ft ²) | | | | | |
|-----------------------------|------------------------------------|------------|------|------------------|------|------|----------------------------------|------------|------|------------------|------|------|------------------------------|------------|------|------------------|------|------|
| | Count (excludes outliers) | Percentile | | | | | Count (excludes outliers) | Percentile | | | | | Count (excludes outliers) | Percentile | | | | |
| | | 10th | 25th | 50th (median) | 75th | 90th | | 10th | 25th | 50th (median) | 75th | 90th | | 10th | 25th | 50th (median) | 75th | 90th |
| 1: Very Hot & 2: Hot | 26 | 74 | 96 | 157 | 219 | 242 | 26 | 30 | 41 | 61 | 95 | 114 | 3 | N/A | N/A | N/A | N/A | N/A |
| 3: Warm | 18 | 90 | 127 | 149 | 201 | 267 | 18 | 58 | 66 | 80 | 111 | 146 | 14 | 17 | 24 | 28 | 35 | 74 |
| 4: Mixed w/Marine | 5 | 152 | 153 | 169 | 170 | 174 | 5 | 77 | 81 | 92 | 105 | 115 | 4 | 6 | 9 | 13 | 16 | 18 |
| 4: Mixed w/out Marine | 19 | 134 | 155 | 176 | 190 | 240 | 19 | 74 | 89 | 101 | 115 | 138 | 11 | 14 | 16 | 20 | 24 | 28 |
| 5: Cool | 15 | 126 | 180 | 210 | 259 | 377 | 15 | 73 | 108 | 130 | 194 | 231 | 11 | 13 | 15 | 20 | 23 | 31 |
| 6: Cold | 6 | 133 | 135 | 147 | 175 | 246 | 6 | 85 | 89 | 96 | 132 | 170 | 5 | 18 | 19 | 19 | 28 | 30 |
| 7: Very Cold & 8: Subarctic | 1 | N/A | N/A | N/A | N/A | N/A | 1 | N/A | N/A | N/A | N/A | N/A | 1 | N/A | N/A | N/A | N/A | N/A |

TAKEAWAY: Climate zone 6 (cold) showed the lowest median energy use, with the highest median energy use in zone 5 (cool). There were not clear trends across the other climate zones. For water use, the highest median value was in zone 3 (warm).

KEY THE COLOR GRADIENT FROM LOWER TO HIGHER EUI AND WUI IS WEIGHTED FOR EACH TABLE.



FALL TERM RESIDENTIAL HEADCOUNT PERCENTAGE

| Peer Group | Source EUI (kBtu/ft ²) | | | | | | Site EUI (kBtu/ft ²) | | | | | | WUI (gal/ft ²) | | | | | |
|-----------------|------------------------------------|------------|------|------------------|------|------|----------------------------------|------------|------|------------------|------|------|------------------------------|------------|------|------------------|------|------|
| | Count (excludes outliers) | Percentile | | | | | Count (excludes outliers) | Percentile | | | | | Count (excludes outliers) | Percentile | | | | |
| | | 10th | 25th | 50th (median) | 75th | 90th | | 10th | 25th | 50th (median) | 75th | 90th | | 10th | 25th | 50th (median) | 75th | 90th |
| 0% FT Headcount | 41 | 85 | 115 | 153 | 210 | 280 | 41 | 37 | 56 | 76 | 109 | 127 | 18 | 4 | 12 | 17 | 27 | 49 |
| 1% to 10% | 2 | N/A | N/A | N/A | N/A | N/A | 2 | N/A | N/A | N/A | N/A | N/A | 3 | N/A | N/A | N/A | N/A | N/A |
| 10 to 19% | 11 | 132 | 139 | 153 | 189 | 221 | 11 | 71 | 82 | 93 | 101 | 116 | 5 | 16 | 19 | 24 | 30 | 62 |
| 20 to 29% | 11 | 162 | 181 | 198 | 249 | 262 | 11 | 98 | 101 | 107 | 156 | 196 | 7 | 11 | 15 | 19 | 22 | 24 |
| 30 to 49% | 12 | 131 | 149 | 196 | 224 | 279 | 12 | 64 | 89 | 101 | 129 | 154 | 8 | 14 | 17 | 20 | 23 | 31 |
| 50 to 100% | 12 | 123 | 145 | 169 | 186 | 215 | 12 | 77 | 84 | 101 | 129 | 143 | 8 | 17 | 20 | 23 | 28 | 28 |

TAKEAWAY: EUI and WUI were at their lowest when there were no residents on campus. EUI and WUI peaked at a given threshold of percent residential, after which they declined.

ACTUAL EUI BY EXPECTED ENERGY USE

These charts compare the actual EUI of campuses to the expected EUI they would have if they performed at the median level for campuses of their type. The expected EUI for a campus is calculated by applying the U.S. national median EUI for different space uses reported by the campus (e.g., food service, laboratory, office, etc.) to the weighted square footage for each space use. The peer group is then set for a range of expected median EUIs. As such, this chart shows how well campuses in each peer group performed relative to expectations based on the property type mix of their campus.

| Peer Group | Source EUI (kBtu/ft ²) | | | | | |
|--|------------------------------------|------------|------|------------------|------|------|
| | Count (excludes outliers) | Percentile | | | | |
| | | 10th | 25th | 50th (median) | 75th | 90th |
| 160 to 182 expected kbtu/ft ² | 58 | 85 | 116 | 162 | 197 | 239 |
| 182 to 200 expected kbtu/ft ² | 15 | 106 | 133 | 154 | 195 | 209 |
| 200 to 225 expected kbtu/ft ² | 10 | 161 | 180 | 231 | 297 | 341 |
| Over 225 expected kbtu/ft ² | 7 | 145 | 204 | 284 | 318 | 366 |

| Peer Group | Site EUI (kBtu/ft ²) | | | | | |
|--|----------------------------------|------------|------|------------------|------|------|
| | Count (excludes outliers) | Percentile | | | | |
| | | 10th | 25th | 50th (median) | 75th | 90th |
| 80 to 85 expected kbtu/ft ² | 58 | 41 | 62 | 85 | 105 | 128 |
| 85 to 90 expected kbtu/ft ² | 8 | 32 | 54 | 81 | 97 | 140 |
| 90 to 95 expected kbtu/ft ² | 15 | 79 | 96 | 121 | 135 | 196 |
| Over 95 expected kbtu/ft ² | 9 | 74 | 90 | 127 | 221 | 245 |

TAKEAWAY: Actual EUI generally increased with expected EUI. The 182 to 200 kBtu/ft² group mostly outperformed expectations. Overall, there was wide variation in actual performance within each expected EUI peer group

2022 HEBI Participant List

| | |
|--|--|
| American University ¹ | Franklin W. Olin College of Engineering ³ |
| Arizona State University ¹ | Front Range Community College ² |
| Arkansas Tech University ¹ | Gallaudet University ³ |
| Ashland Community & Technical College ¹ | Gateway Community & Technical College ¹ |
| Auraria Higher Education Center ¹ | Georgetown University ³ |
| Bellevue College ¹ | Georgian Court University ² |
| Big Sandy Community & Technical College ¹ | Hawai'i Pacific University ¹ |
| Bluegrass Community & Technical College ¹ | Henderson Community College ¹ |
| Boise State University ¹ | Hopkinsville Community College ¹ |
| Boston University ¹ | Houston Community College ³ |
| Brandeis University ¹ | Husson University ³ |
| Bucknell University ¹ | Illinois Institute of Technology ¹ |
| California State University ³ | Jackson State University ² |
| Case Western Reserve University ³ | Jefferson Community & Technical College ¹ |
| Central Carolina Technical College ¹ | Lehigh University ¹ |
| Central Washington University ¹ | Lenoir-Rhyne University ¹ |
| Christopher Newport University ² | Macalester College ³ |
| Cleveland State University ¹ | Madisonville College ¹ |
| College of Charleston ¹ | Manhattan College ³ |
| Colorado Mountain College ¹ | Maysville Community & Technical College ¹ |
| Colorado State University ¹ | Medical University of South Carolina ² |
| Community College of Allegheny County ¹ | Milwaukee Area Technical College ¹ |
| Concordia University ¹ | Montclair State University ³ |
| Contra Costa Community College District ² | Montgomery College ³ |
| Cuyahoga Community College ¹ | Morehouse College ³ |
| Dalhousie University ¹ | NorQuest College ² |
| Dallas College ¹ | North Seattle College ¹ |
| Dominican University ³ | Northern Illinois University ² |
| Duquesne University ¹ | Northwestern University ² |
| Elizabethtown Community & Technical College ¹ | Oakton Community College ¹ |
| Emerson College ² | Ohio University ³ |
| Endicott College ³ | Owensboro Community & Technical College ¹ |

¹ Institution participated in HEBI round one (data not included in this scorecard)

² Institution participated in HEBI round two (data included in this scorecard)

³ Institution participated in HEBI rounds one and two (round 2 data included in this scorecard)

2022 HEBI Participant List (cont'd)

| | |
|--|--|
| Portland Community College ³ | University of Minnesota ³ |
| Portland State University ¹ | University of Nebraska, Lincoln ² |
| Radford University ² | University of New Brunswick ³ |
| Raritan Valley Community College ³ | University of North Carolina at Charlotte ³ |
| Red River College ¹ | University of North Texas ² |
| Saint Peter's University ³ | University of Pittsburgh ¹ |
| Salisbury University ³ | University of Southern California ³ |
| Seattle Central College ¹ | University of St Thomas ³ |
| Seminole State College of Florida ³ | University of Tennessee ¹ |
| Somerset Community College ¹ | University of the South ¹ |
| Sonoma County Junior College District ² | University of Utah ¹ |
| South Seattle College ¹ | University of Virginia ³ |
| Southcentral KY Community & Technical College ¹ | Valencia College ¹ |
| Southeast KY Community & Technical College ¹ | Washington and Lee University ¹ |
| Southern Illinois University Carbondale ² | Washington State University ¹ |
| Stanford University ¹ | Wells College ³ |
| State University of New York at Albany ³ | Wentworth Institute of Technology ³ |
| Texas State University ² | West Kentucky Community & Technical College ¹ |
| The Catholic University of America ¹ | Whitman College ¹ |
| The College of New Jersey ¹ | Xavier University of Louisiana ² |
| The College of Saint Scholastica ¹ | Yale University ¹ |
| The University of Texas at San Antonio ¹ | |
| Towson University ³ | |
| University of Alberta ¹ | |
| University of Arizona ¹ | |
| University of California, San Francisco ³ | |
| University of Chicago ³ | |
| University of Cincinnati ¹ | |
| University of Connecticut ¹ | |
| University of Kansas ¹ | |
| University of Miami ² | |
| University of Michigan ³ | |

¹ Institution participated in HEBI round one (data not included in this scorecard)

² Institution participated in HEBI round two (data included in this scorecard)

³ Institution participated in HEBI rounds one and two (round 2 data included in this scorecard)

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To explore ENERGY STAR tool and resources for higher education insitutions, please visit:

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