Upper Midwest Association for Campus Sustainability

September 27–28, 2019 • Carleton College, Northfield, MN

Key Facilities Metrics – Basic Metrics ALL Leaders Should Know to Redefine/Advance Sustainability

Sally Grans Korsh, Senior Advisor
Facilities Management & Environmental Policy
National Association of College and University Business Officers

sgranskorsh@nacubo.org

NACUBO

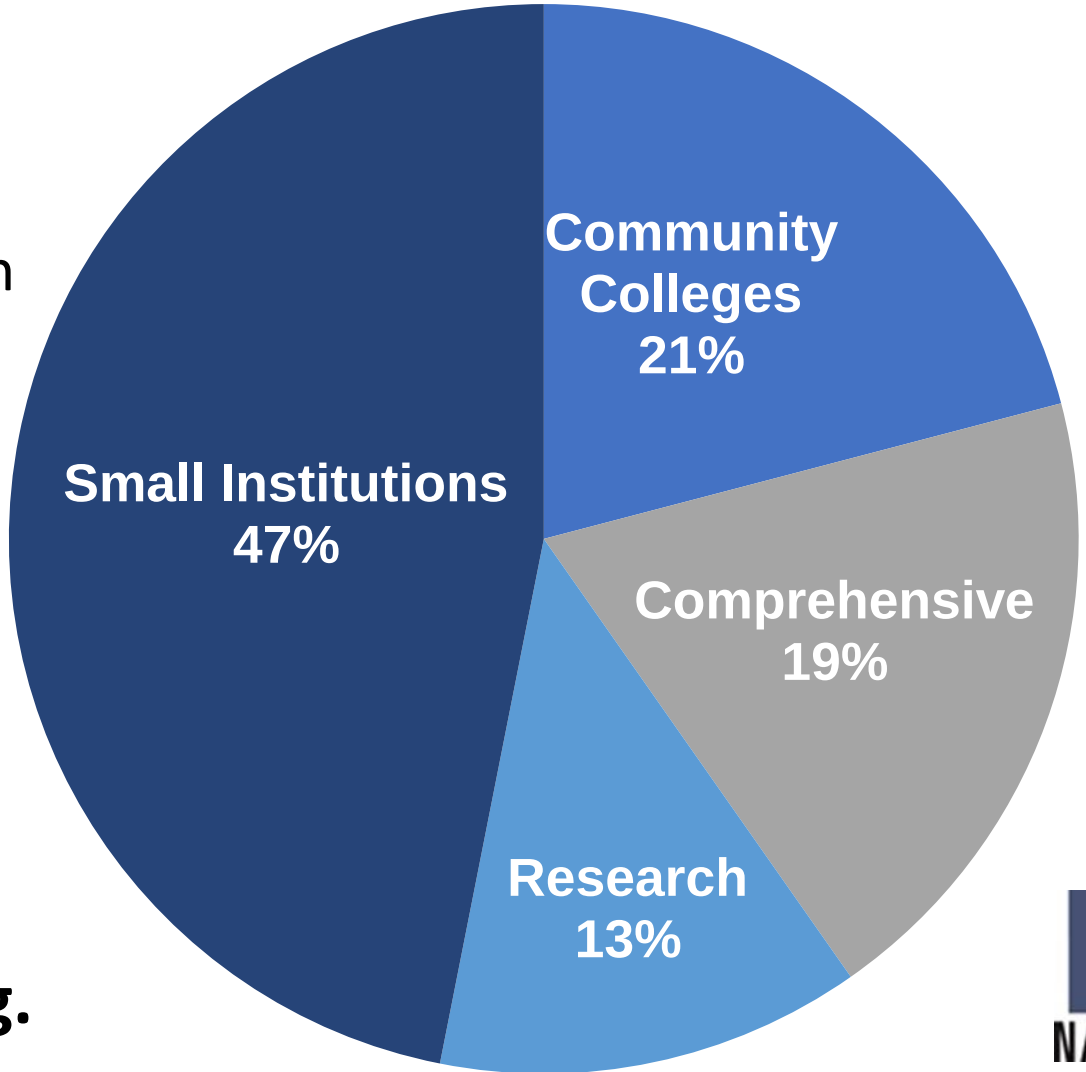
National Association of College & University Business Officers (NACUBO)

www.nacubo.org

Specifically represents chief business and financial officers through advocacy efforts, community service and professional development activities.

Mission- to advance the economic viability, business practices and support for higher education institutions in pursuit of their missions.

2,000 members



Institutional sliding fee based dues.
IF *your* campus belongs,
***anyone* with that campus email can belong.**

www.nacubo.org/topics/

NATIONAL ASSOCIATION OF COLLEGE AND UNIVERSITY BUSINESS OFFICERS

CURRENT

November 29, 2017

Senate GOP Tax Plan Would Make Big Changes Beyond Higher Education 618

The Senate GOP tax plan, which will be debated on the Senate floor this week, contains noteworthy changes for nonprofits, corporations, and individuals alike.

Take Action on Tax Reform

Text ACTNOW to 52886 to join the movement to #protectgiving and ask lawmakers to fix the provisions that create new taxes that will raise operating costs or badly hurt the ability of nonprofits—including colleges and universities—to educate, heal, nourish, and serve our nation. You can also get involved here 142.

Perkins Loan Program Schools Must Report Cash on Hand by December 15

SPONSOR

The power to enrich futures Closing the gender gap

Bank of America Merrill Lynch

LEARN

Upcoming Events

2018 Facilities and Administrative Rates - Long Form 38

January 29-30, 2018

New Look! Business Officer Magazine More +

National Association of College and University Business Officers

NACUBO

My NACUBO →

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Home › Topics › Facilities & Environmental Compliance

Facilities and Environmental Compliance

Share:

- APPA/NACUBO Key Facilities Metrics Survey
- Campus Environmental Resource Center (Campus ERC)
- Facilities Sustainability Resources
- Campus Efficiency Posters
- Space and Energy Issues
- Sustainability
- Webinars/Podcasts on Campus Operations
- Facilities Related *Business Officer* Magazine Articles
- Resource Organizations
- Glossary of Terms

Contact

Sally Grans Korsh
Director, Facilities Management and Environmental Policy
202.861.2571
sgranskorsh@nacubo.org

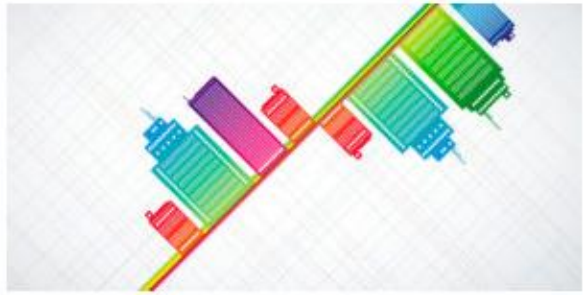
Facilities Sustainability Resources

4/06/2018

ts on issues that pertain udgeting. Find out the ncorporated.

Use the checklist to trigger conversations, ask good questions, and review and transform your campus goals and trajectory.

The intention of this simplistic checklist is to broaden inquisitiveness on advancing campus financial and environmental sustainability. Execution is far more complicated than implied by these categories

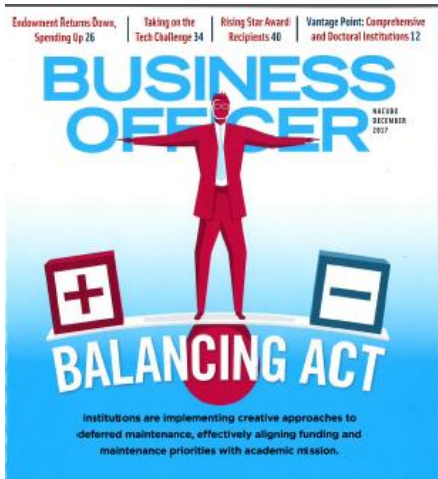


Resource Reshuffle

Breezy and Bright

https://www.businessofficermagazine.org

- Energy Savings Contracts - Deferred maintenance
- Green Revolving Funds
- Power Purchase Agreements (PPA)
- Public Private Partnerships (P3)
- Leadership
- Net Zero, Water savings, Safety, and more!



Home > Distance Learning > NACUBO Podcasts

NACUBO PODCASTS

NACUBO is pleased to offer you audio programming though podcasts that you can listen to any time you want. Subscribe today and join your colleagues in this newly revitalized learning platform.

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New episodes of **NACUBO In Brief** are available every two weeks.

SO WHAT IS A PODCAST?

A podcast is essentially a radio show that you can get on the internet.

HOW DO I LISTEN?

You have two options: you can listen to a podcast through a website like ours (this is called streaming). Or, you can download a podcast, which means you're saving it on your phone, or tablet, or computer, and you can listen to it anytime, even without an internet connection.

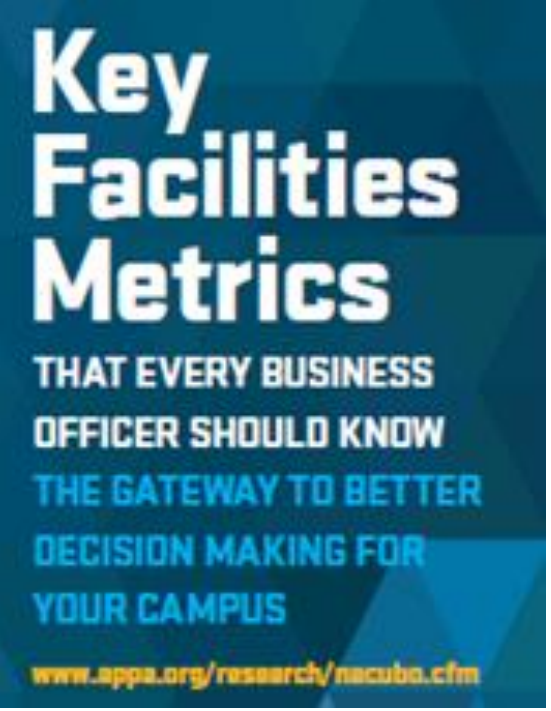
DISTANCE LEARNING

Open to the World!

41 Presenters on *CBO Speaks*: the Role of CBO/path/stories

24 Presenters on *NACUBO In Brief*: Knowledge sharing - 4 relating directly to sustainability

NACUBO



Survey's on Consumption: Evaluate, Lead, Plan, Execute

- **APPA/NACUBO Key Facilities Metric**
  BTU, Electrical, Water, Waste (Garbage and Recycle) and Carbon
- **APPA Key Performance Indicator**
  Customized reports based on facilities inventory, ownership costs, operations, management budget, customer satisfaction, staffing component
- **AASHE – STARS**
  Comprehensive: Academics, Engagement, Operations, Planning and Administration, Innovation

Key Facilities Metrics

...that every business officer should know

www.appa.org/research/nacubo.cfm

Simple Key Metrics:

1. BTU – or EU Energy Intensity
2. KW – Electric
3. Water
4. Waste: recycle/organics or garbage
5. Carbon Footprint

Results by Square Foot or per Student FYE

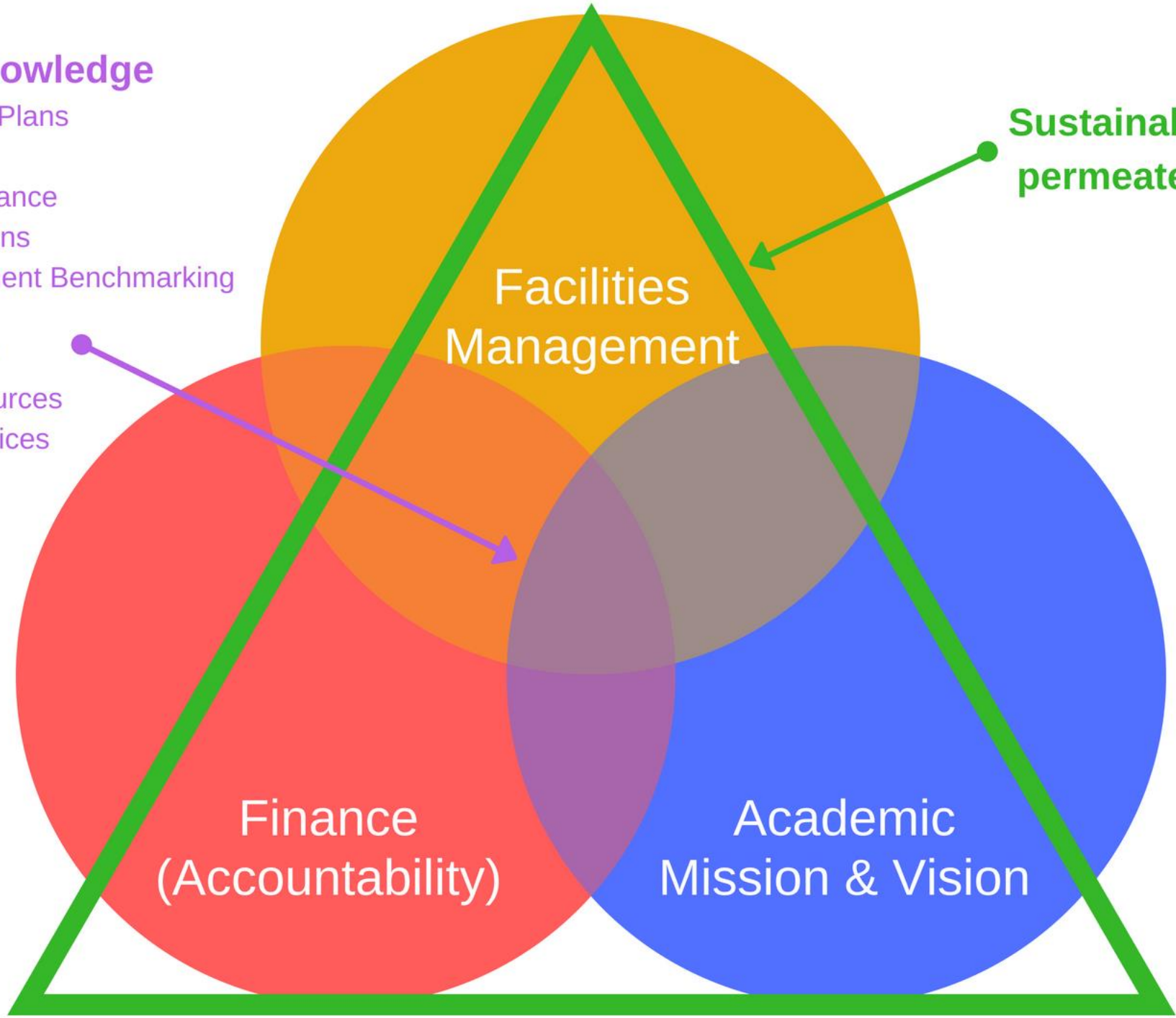
5th Year results available at www.NACUBO.org/KeyFacilitiesSurvey

6th Year Survey closes Dec 13, 2019 for the 2018-19 academic year.

Intersecting Knowledge

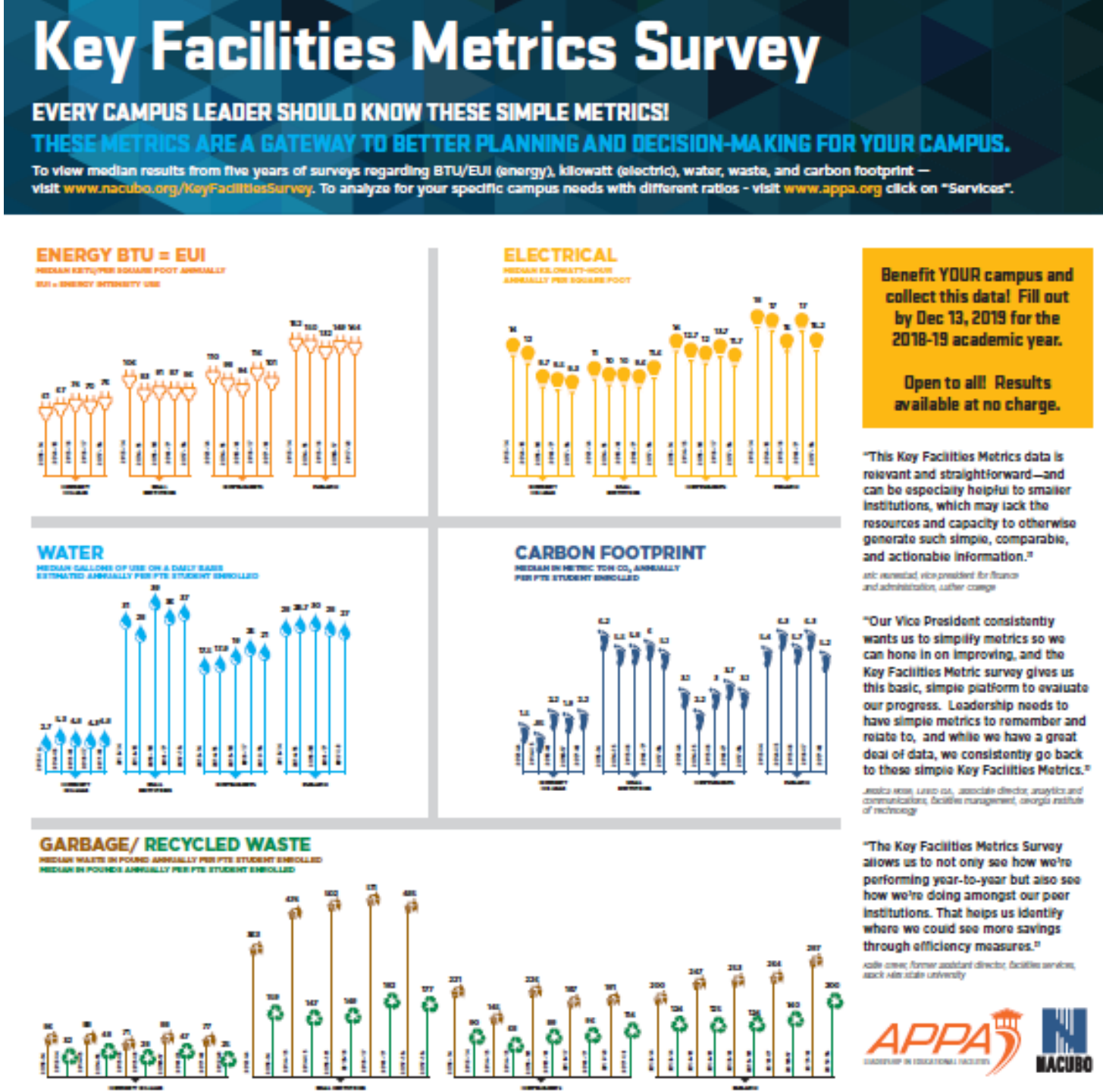
- Short/Long Term Plans
- Space Use
- Deferred Maintenance
- Ongoing Operations
- Utilities Management Benchmarking
- Capital Funding
- Energy Efficiency
- Renewable Resources
- Sustainable Practices

Sustainability issues permeate all factors

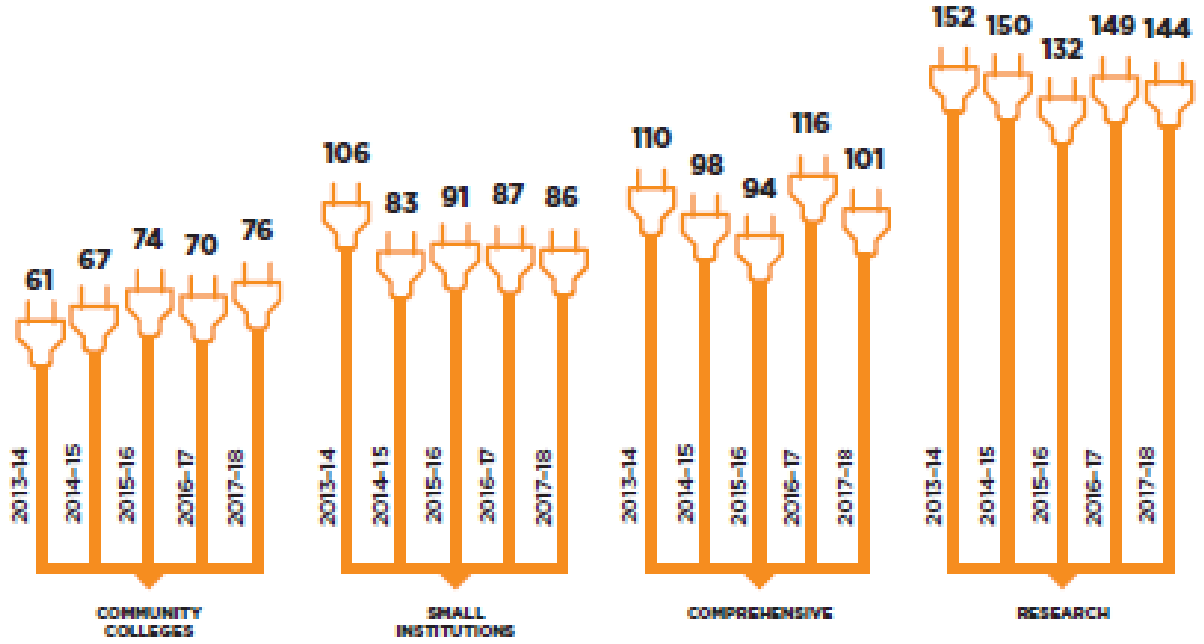


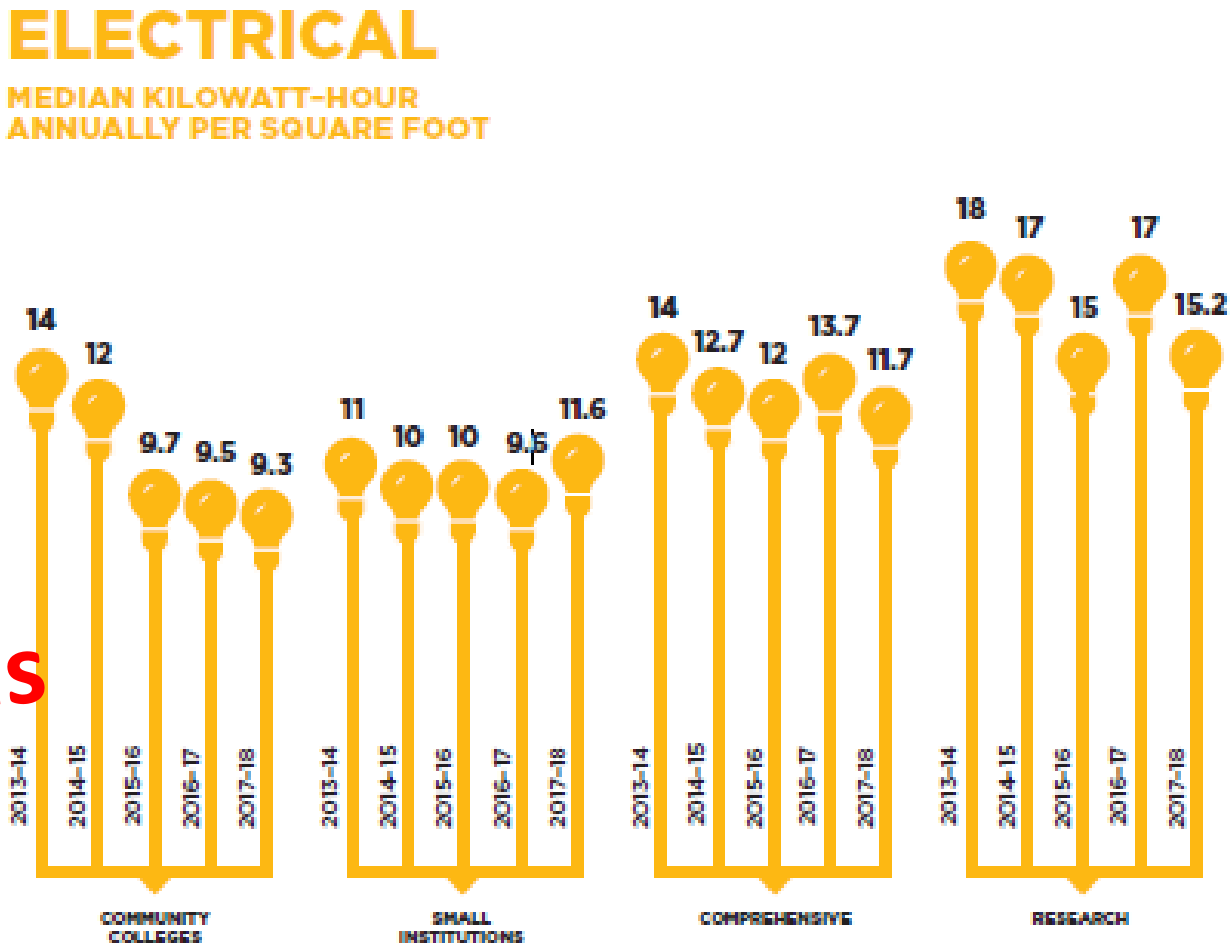
Aggregate Results

www.nacubo.org/KeyFacilitiesSurvey



Trending:
Where is Your Campus?



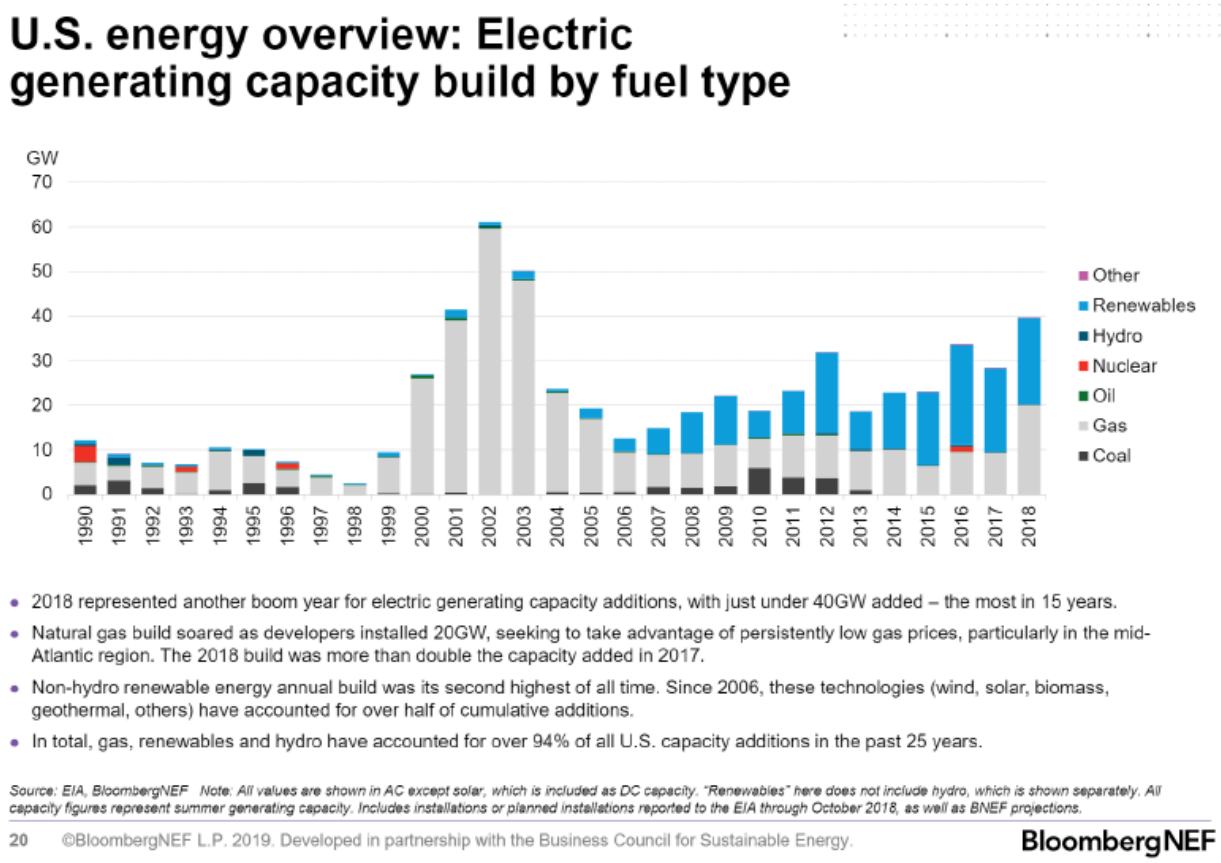


Buildings responsible for 40% carbon dioxide emissions

Why care? Any successful climate protection strategy must consider

Buildings are responsible for almost 40 percent of U.S. carbon dioxide emissions.

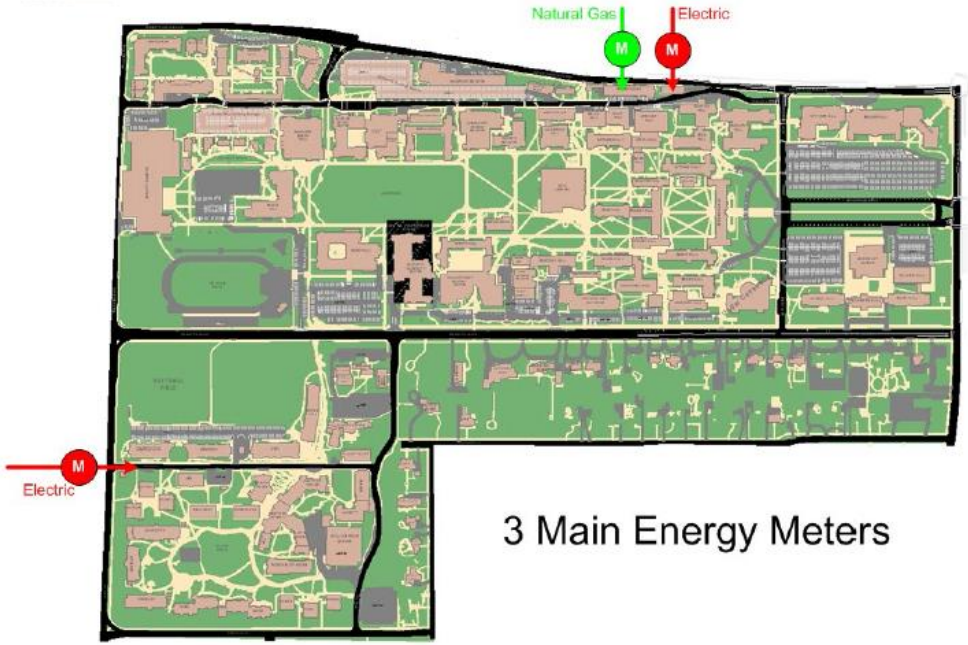
From houses and hotels to schools and skyscrapers, buildings in the United States use use about 40 percent of the country's energy for lighting, heating, cooling, and appliances. 30 percent of the electricity buildings use is generated from coal-burning power plants, which release greenhouse gases, causing climate change.



Collaboration

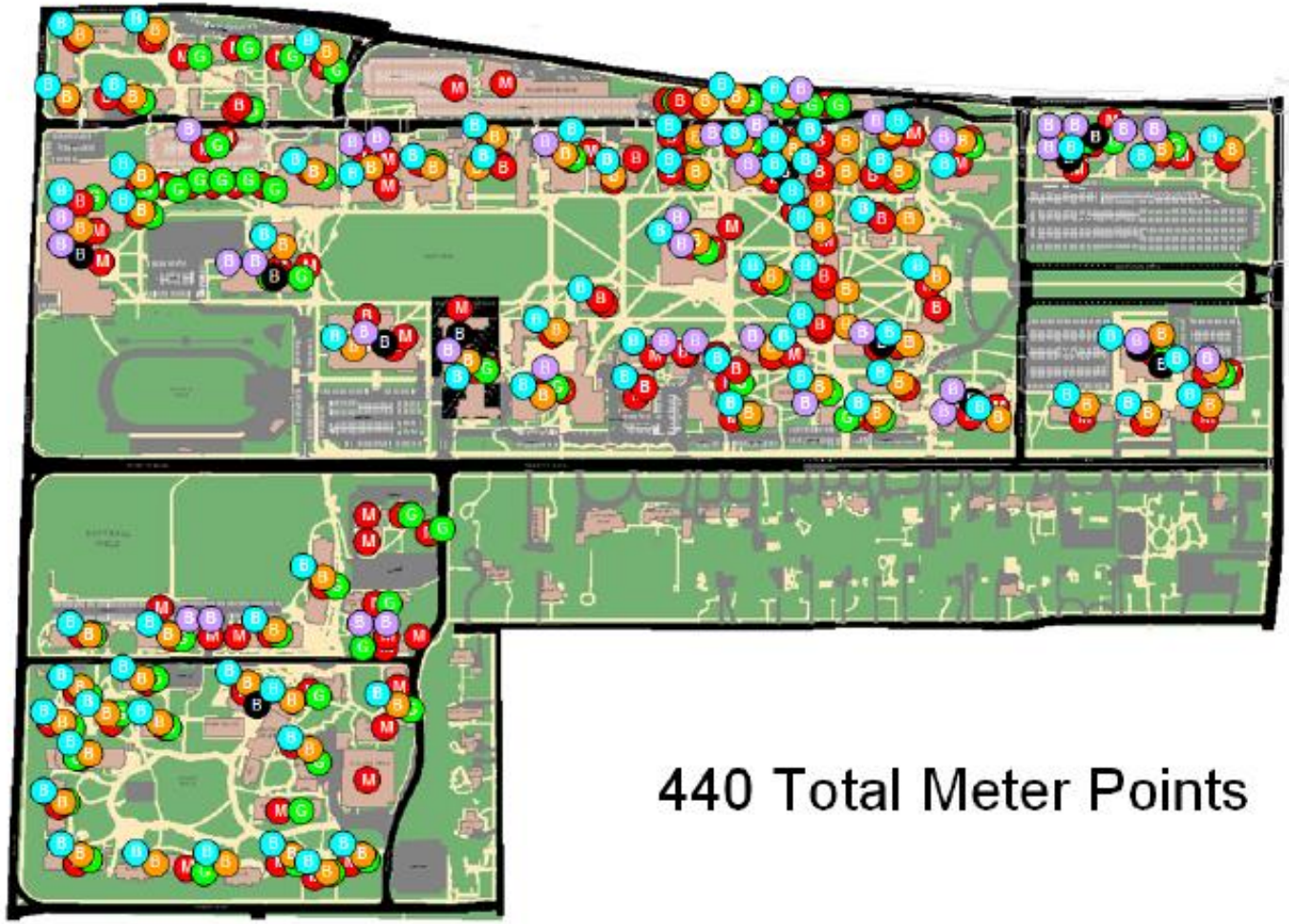
Apr	50,555	$37,916
May	48,000	$36,000
June	42,555	$32,276
July	44,000	$59,400
Aug	41,555	$31,316
Sept	49,555	$37,166
Oct	51,750	$36,225
Nov	53,650	$40,237
Dec	51,950	$38,988
Jan	54,750	$41,062
Feb	55,250	$41,437
March	51,250	$38,437

Campus Energy Supply



3 Main Energy Meters

Building-Level Metering



440 Total Meter Points

An Enabling Mechanism

COST RECOVERY

- Allocate energy costs based on actual usage – align incentive structure
- Indirect cost recoveries for research

PRIORITIZATION

- Target high energy use buildings to prioritize energy reduction projects

IMPROVE OPERATIONS

- Retro-commission existing buildings
- Identify and correct operational problems
- Allow efficiency monitoring of high demand equipment (e.g. chillers)

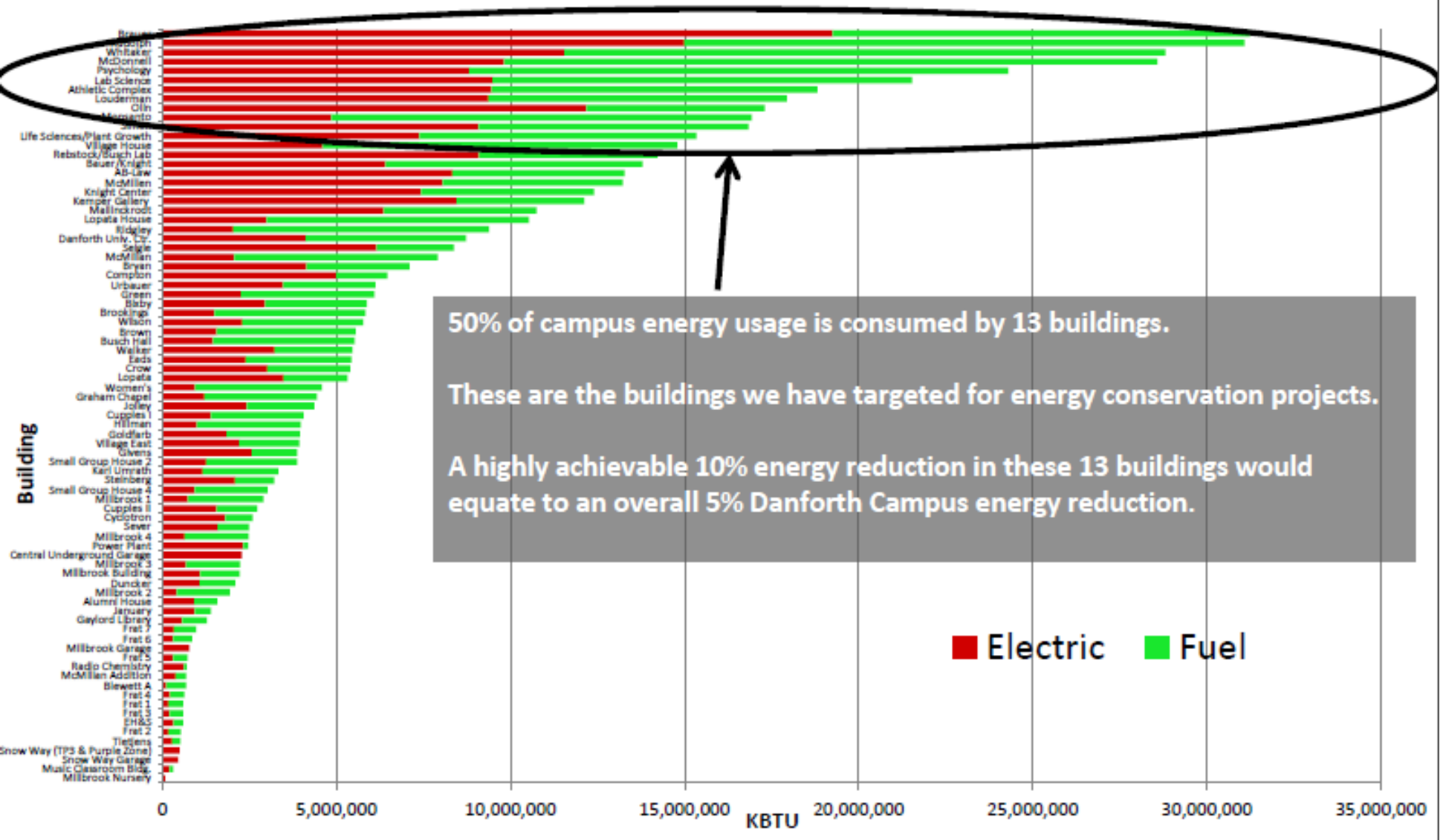
VERIFICATION

- Verify performance of new buildings vs. predicted (LEED M&V)
- Verify energy savings from energy conservation measures

PLANNING

- Provide data for capacity planning
- Better insight and analytics to boost decision-maker confidence

Prioritization



- **Collaborating with students: 8 Residential Halls**
- **Student supported with green fund and WPPSEF grant**
- **Programming/all costs touchscreen approx. $7,300 each**
- Students use as a competition
- Serves to advance culture, knowledge, and change behavior
- Living Learning program component advantage

Collaboration

Slippery Rock University

Highlight Win Win Win

GEORGIA COLLEGE
GEORGIA'S PUBLIC LIBERAL ARTS UNIVERSITY

Retrofit lighting
saves energy, saves labor, yields safety benefit.

2012 94,221 kWh
2017 20,965 kWh

$17,000 - Funded w/$3 Student Sustainabilty Fee

Savings estimated annually $7,500
Payback of 27 months
Actual savings higher at $10,612
Additional utility rebate savings $3,888

Shut it Down – When not Around

Collaboration

- **Major holidays or breaks** mass email forwarded to faculty, staff, and students.
- **Shut Down**
  - Turn off lights
  - Empty refrigerators
  - Unplug all computers and any other phantom electrical usage
  - Turn down (or up) thermostats
- *Changing campus culture*
- *Receiving positive comments!*

Sam Houston State University

Collaboration with Faculty Involved

- Operationally: long break times
- First week of December (finals – no labs) until start of labs second week in Jan.
- Moved chemicals from 64 fume hoods to 8 fume hoods; saving thousands

Anoka-Ramsey Community College
Cambridge · Coon Rapids

Depict the Energy Savings

GRID POWER REDUCTIONS 2011- 2016

$103,427
in electricity costs

1.9 MILLION
kWh

↓9% in costs

↓16% in kWh

LED RETROFITS

LED lighting saves on energy costs, maintenance, and improves overall appearance. In 2015, Agave Hall became the first fully LED building in the district.

Converted to LED as of Spring 2017:

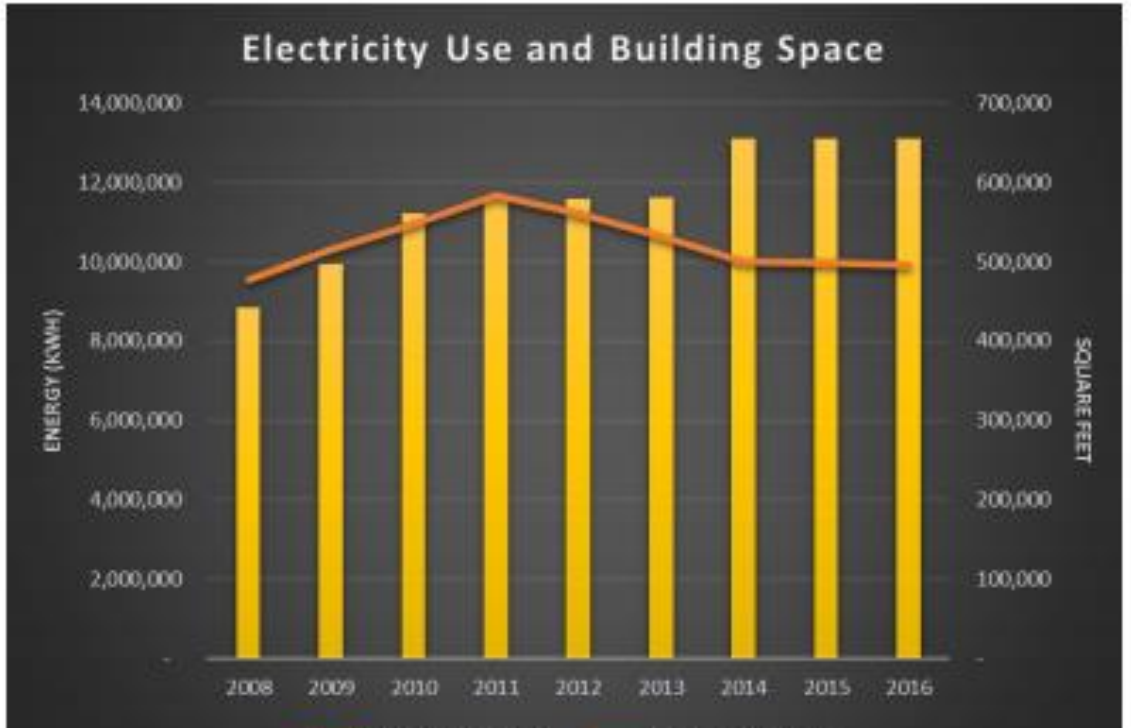
383,700 SQUARE FEET or 59% OF BUILDING SPACE

24 ACRES OF PARKING LOTS and 2.4 MILES OF PATHWAYS / ROADWAYS

TEMPERATURE SET POINTS

In 2014, temperature set points were adopted for the college: 75 - 78°F IN THE SUMMER and NO WARMER THAN 72°F IN THE WINTER. Optimal start times set to reach temperature target.

There is a 5% SAVINGS when increasing set point by 3°F in the summer.

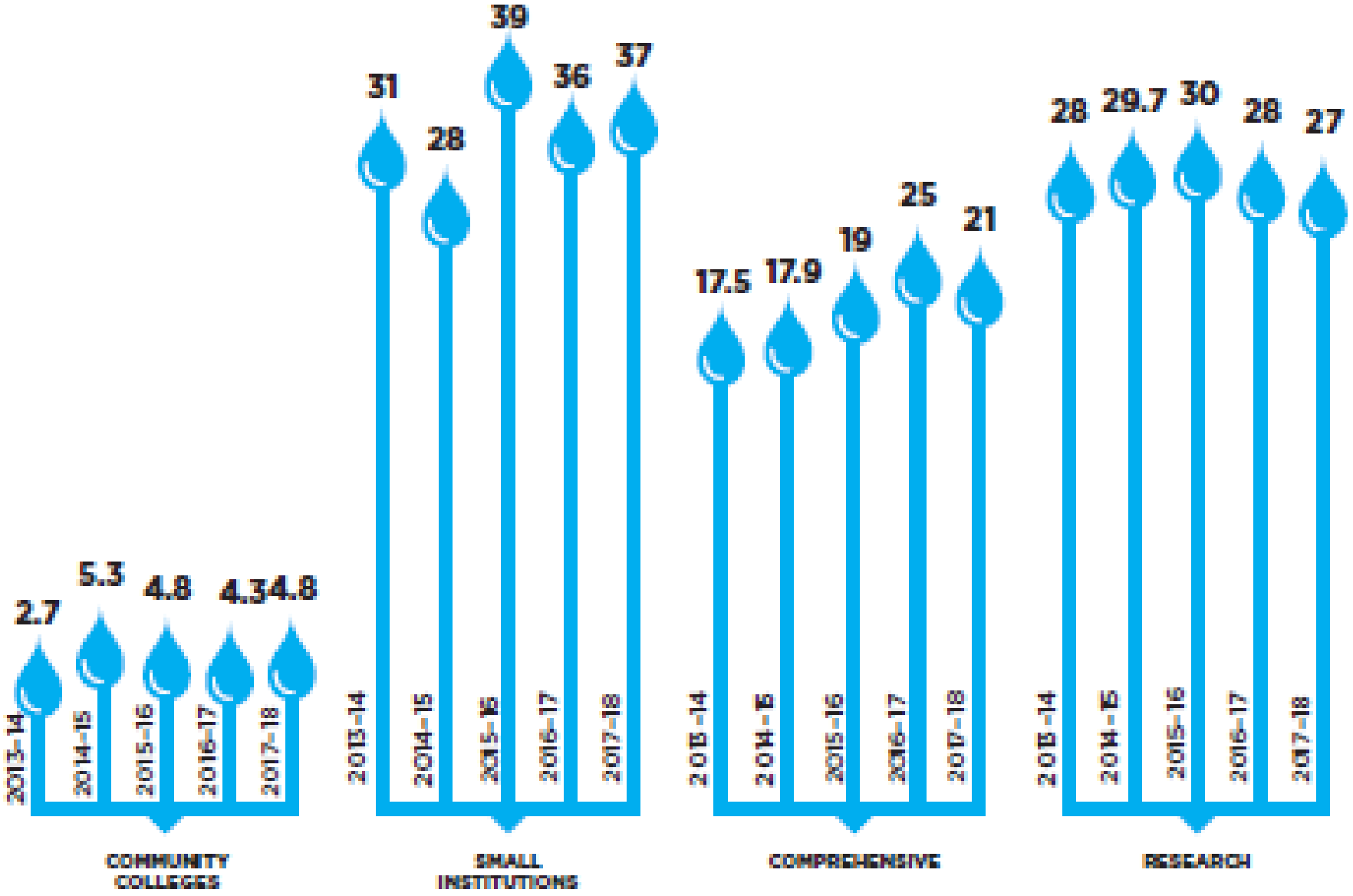


CHANDLER-GILBERT COMMUNITY COLLEGE

A MARICOPA COMMUNITY COLLEGE

WATER

MEDIAN GALLONS OF USE ON A DAILY BASIS ESTIMATED ANNUALLY PER FTE STUDENT ENROLLED



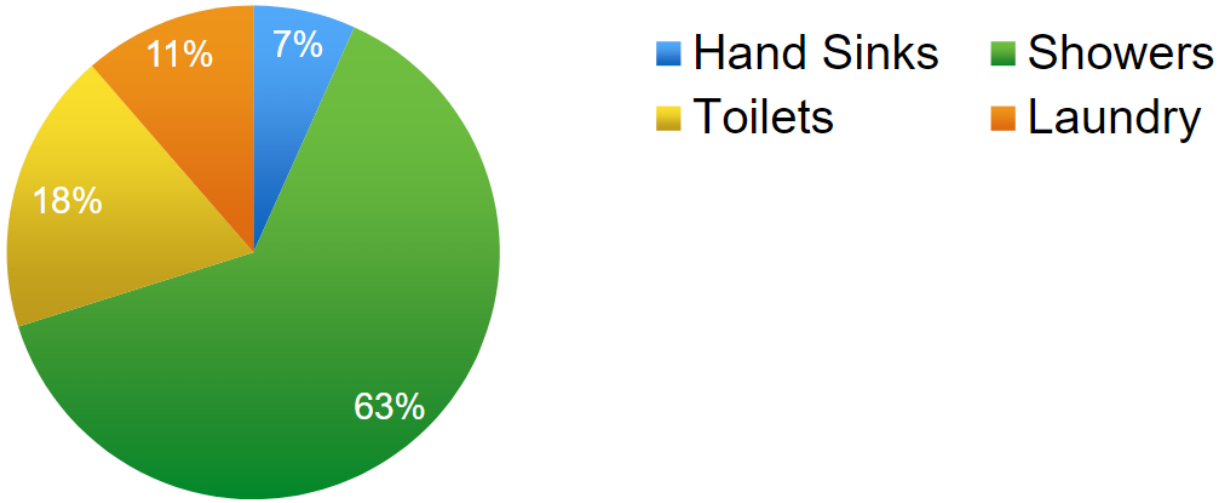
Price of Water

COMBINED WATER AND SEWER PRICES IN 30 MAJOR U.S. CITIES.

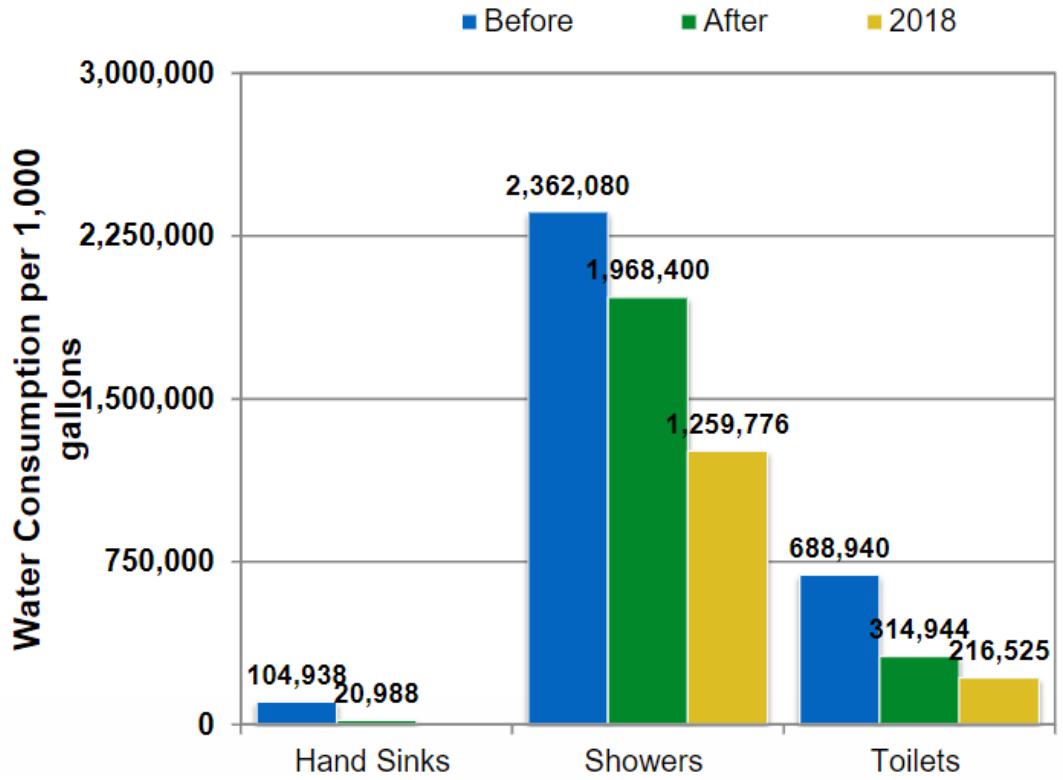
WaterSignal

SOURCE: MULTIHOUSING PRO, CIRCLE OF BLUE RESEARCH BASED ON UTILITY WATER RATES. RATES CURRENT AS OF APRIL 1, 2015. MONTLY BILL CALCULATED FOR A FAMILY OF FOUR USING 100 GALLONS PER PERSON PER DAY.

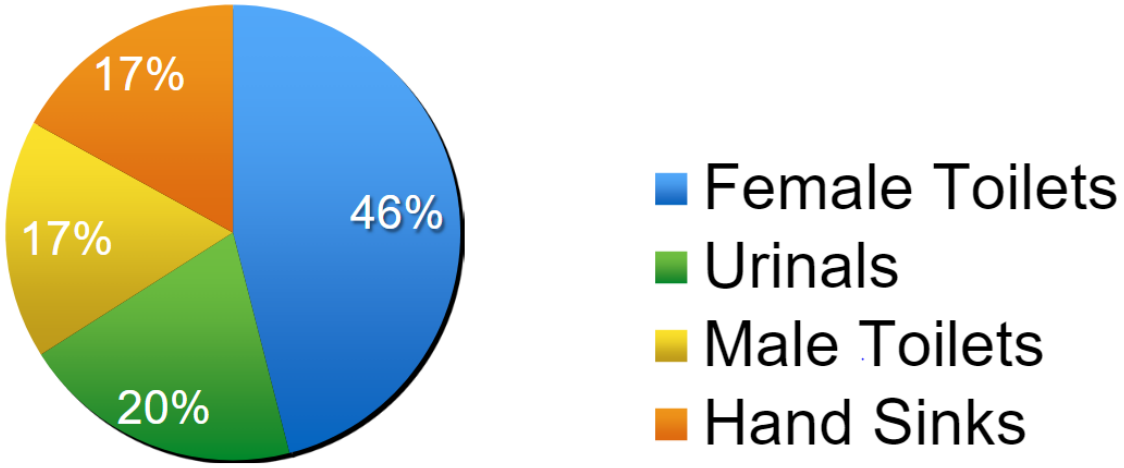
Indoor Water Use by Fixture



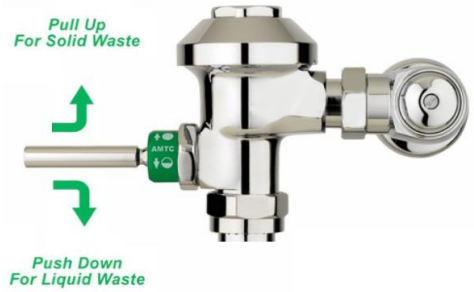
Water Consumption By Fixture



University of Arizona Other Restroom Water Use by Fixture



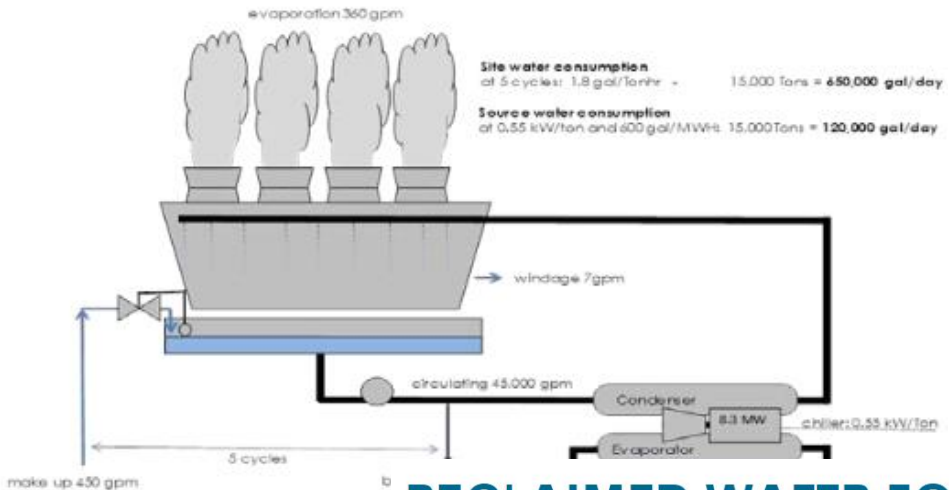
Dual Flush Handle



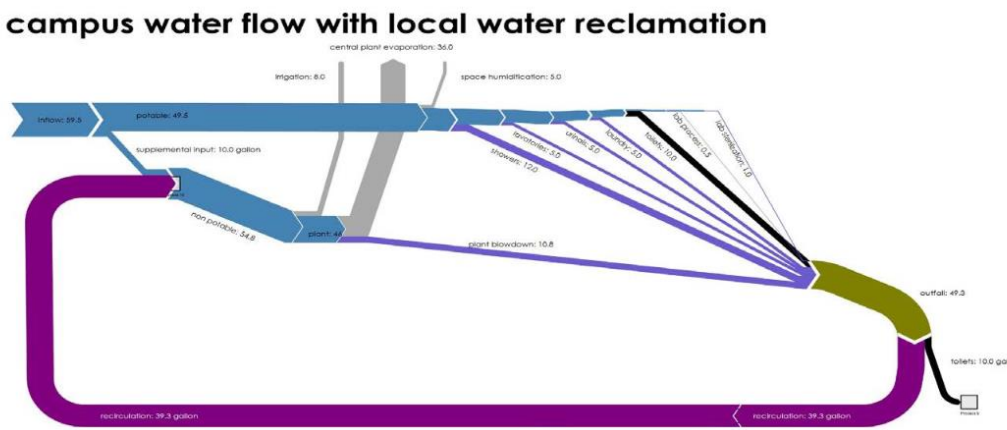
30% Water Reduction Liquid Waste

Largest Single Campus Consumer: Cooling Towers

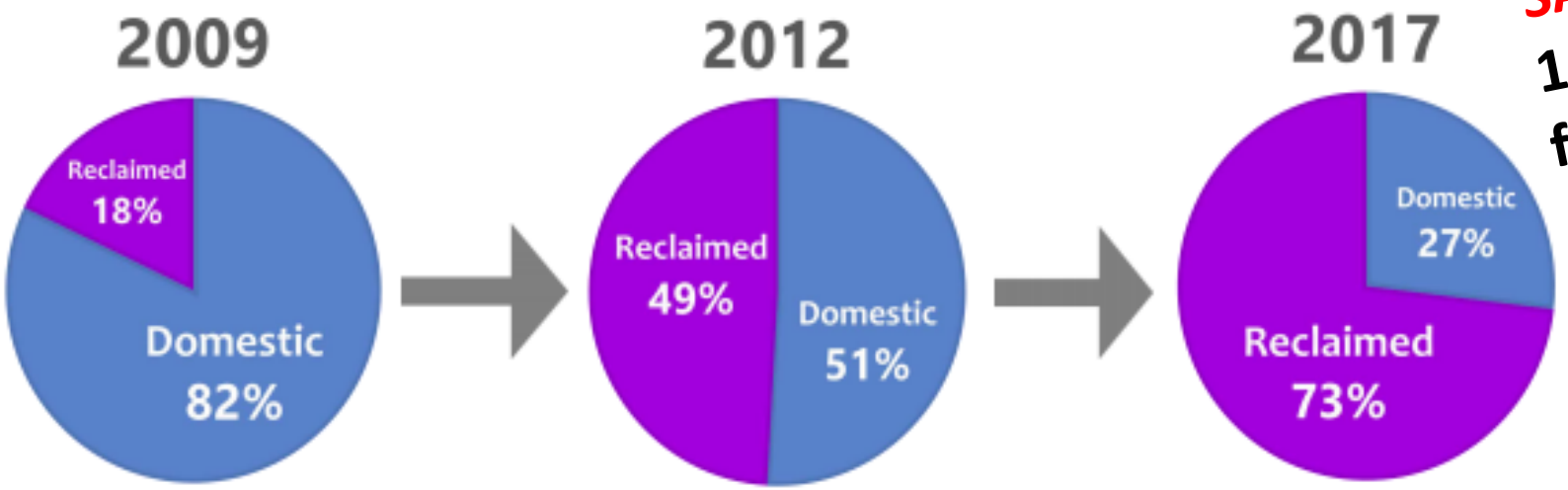
thermal extracted	15,000	Ton		
	12,000	BTU/hr		
	180	MMBTU/hr	cooling effect	
chiller efficiency	0.5	kW/Ton		
	7,500	kW/hr		
	26	MMBTU/hr	energy in	
heat rejected	**206**	MMBTU/hr	energy out	
	7.0	COP		
	1000	BTU/lbm	latent heat	
	205,590	lbm/hr		
	8.34	lbm/gal		
evaporation	**24,651**	gal/hr	411	gpm
concentration	5	cycle		
blowdown	**6,163**	gal/hr	103	gpm
	25%	blowdown/evaporation		
	1.64	gal/Tonhr		
	0.41	gal/Tonhr		
tower make up rate	**2.05**	**gal/Tonhr**		
tower efficiency	+			



RECLAIMED WATER FOR COOLING TOWER WATER USE: (Treated Sewage Effluent)



RECLAIMED WATER is municipal **WASTEWATER** that has been treated. Instead of discharging into the waterways, it is **REUSED** by for non-potable use. This practice **CONSERVES** our limited drinking water supply for the future.



SAVINGS:

10,000,000 gallons reclaimed from cooling towers

10,000,000 g. reclaimed irrigation

150,000 g. bottles saved

GALLONS SWITCHED TO RECLAIMED IN 2016

COOLING TOWERS
UP TO 10 MILLION GALLONS

IRRIGATION
UP TO 10 MILLION GALLONS

$88,000 SAVINGS

WATER BOTTLE REFILL STATIONS

36 STATIONS installed 2014 - 2017
Eliminate waste from **300,000**
DISPOSABLE PLASTIC BOTTLES annually

CHANDLER-GILBERT COMMUNITY COLLEGE

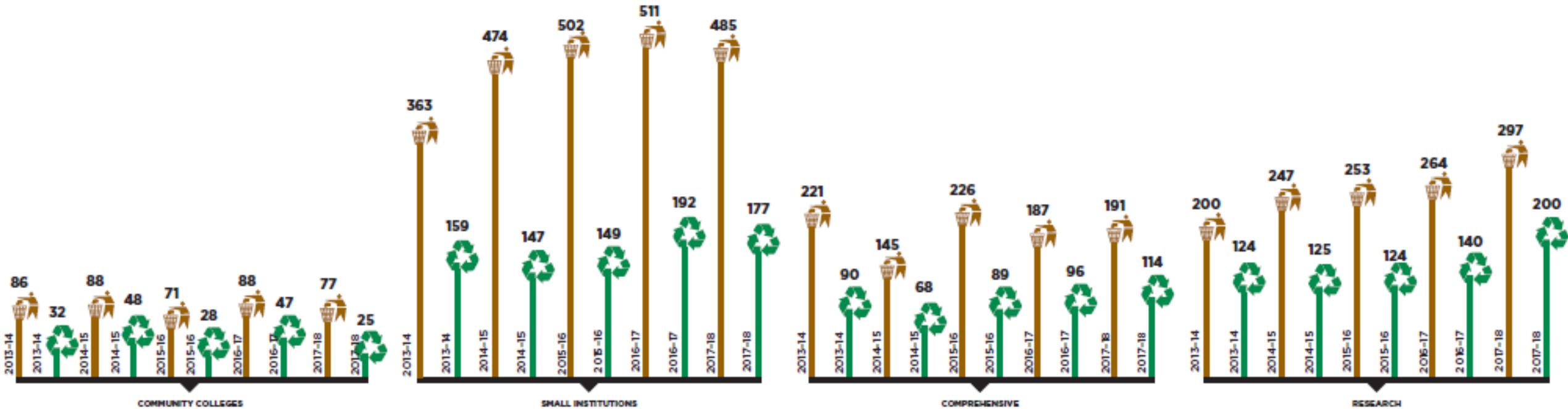
Water Conservation – Grey Water

- Two new buildings: Student Center and Workforce Training Building captured rain water from roof
- 4,000 gallon cistern
- Radiating filter funnels to a 200 gallon tank used to flush toilets
- Cost approx. $50,000 for tank and operations - filters
- Four year payback
- Communicate this issue!

RARITAN VALLEY COMMUNITY COLLEGE

GARBAGE/ RECYCLED WASTE

MEDIAN WASTE IN POUND ANNUALLY PER FTE STUDENT ENROLLED
MEDIAN IN POUNDS ANNUALLY PER FTE STUDENT ENROLLED



Data to Compel – Relatable Graphics!

- **Community College** student – annual per year:
  88 pounds garbage + 44 pounds recycle = 132 Pounds
- **Research University** student – annual per year:
  264 pounds garbage + 140 pounds recycle = 404 Pounds

www.nacubo.org/CampusPosters

OUTSTANDING ORGANICS AT UNITY COLLEGE

5/2016
A student presented options for on-site processing of organic waste to increase the College's diversion rate from landfills.

7/2016
The Business Office and Sustainability Office contracted Agri-Cycle and Exeter Agri-Energy to collect and process organic waste from dining facilities.

10-12/2016
Environmental Solutions and Scenarios class projects demonstrated that 40-60% of residence hall waste is organic and most students are eager to recycle it!

1-4/2017
Sustainability Office, Residence Life, and Facilities launched a pilot organics collection in one residence hall. Student residents were trained in the new system.

4/2017
Residential organics collection pilot was declared a success and receives the green light to expand to all residence halls.

7/2017
Dining Services won Gold in Waste Management and the overall Sustainability Grand Prize at the National Association of Colleges & University Food Services (NACUFS) Conference.

8/2017
Sustainability Office and Facilities expanded the organics program to all residence halls. Existing bins were retrofitted to save costs.

1/2018
Administrative offices voluntarily piloted organics collection for employees... more to come!

AGRI-CYCLE

What happens to the waste?

*Agri-cycle energy image

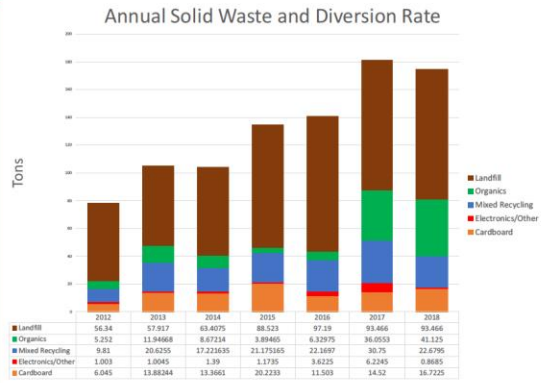
INGREDIENTS FOR SUCCESS:

CONSISTENCY

PARTNERS

PURCHASING

TRAINING



	2012	2013	2014	2015	2016	2017	2018
Landfill	56.34	57.917	63.4075	88.523	97.19	93.466	93.466
Organics	5.252	11.94668	8.67214	3.89465	6.32975	36.0553	41.125
Mixed Recycling	9.81	20.6255	17.221635	21.175165	22.1697	30.75	22.6795
Electronics/Other	1.003	1.0045	1.39	1.1735	3.6225	6.2245	0.8685
Cardboard	6.045	13.88244	13.3661	20.2233	11.503	14.52	16.7225

PROGRAM COSTS

First Year
- Operation: $1,400 for pick up
  $1,995 for disposal
- Infrastructure: $450
  Organics bins for dining, signage, and one trail bin for residence hall

Second Year*
- Operation: $1,100 for pick up
  $2,303 for disposal
- Infrastructure: $2,500
  Bins for expansion of program to residence halls.

*Data through end of May FY18

Total Cost to Date = $9,748

Total Tons Diverted to Date: 217

Luther College–On the Road to Zero Waste

What is a Pulper?

- In 2016, Luther installed a WasteXpress System in the cafeteria dish room. Before, students were responsible for scraping their own compost and trash before placing dishes on the carousel.
- Now, the scraping happens behind the scenes in the dish room. The pulper pulverizes consumer plate waste and removes 90% of the moisture. This process makes the finished product much easier to break down in the college compost pile, reduces the volume needing to be transported to the college farm, and makes the compost cleaner with no silverware, plastics or other contaminants.
- Overall, the pulper will help Luther College reach the goal reducing organics sent to landfill by **90%**.

Campus Impact

The student Union houses three out of the four campus dining locations, including the cafeteria. Waste audit results show the impact of the pulper on contents of the Union dumpster.

Before the Pulper:

70% organics

70% Organics | 26% True Trash | 4% Recyclables

After the Pulper:

12% organics

12% Organics | 75% True Trash | 13% Recyclables

"True trash" can be defined as any item that can not be recycled, reused, or composted through our current infrastructure. The goal is to be close to 100% true trash.

Zero Waste Goal: Reduce dining services food waste (% of organics in the dumptster) by 90% by May 2018.

Waste Infrastructure Improvements

- **Recycling Roll-Off**
  In 2014, blue recycling roll-offs were strategically placed outside of all residence halls to serve as drop off points for paper, plastic/metals, and cardboard recycling.

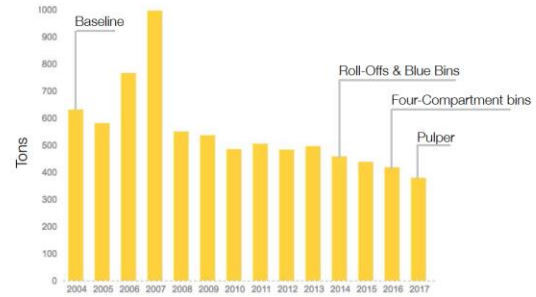
- **Personal Blue Recycling Bins**
  At the same time, personal blue recycling bins were placed into every residence hall room in order to put the responsibility on the student to sort their recyclables.

- **Four-Compartment Bins**
  Four-compartment bins were placed in central locations throughout all academic buildings on campus in 2016. The four-compartment bins provide students, staff, and faculty abundant opportunities to conveniently compost and recycle plastics/metals and paper.

Solid Waste Reduction

40% reduction from baseline

24% reduction since streamlining waste infrastructure



Zero Waste Goal: 50% reduction in campus waste by May 2018, 70% by 2020, and 90% by 2025.

Move-Out Efforts

Luther's move-out process is the most engaging sustainability education initiative that occurs during the year.

Through signage and one-on-one education, students are encouraged to donate usable items to the donation collection room in their residence halls and to recycle all paper, plastic, metal and cardboard.

Last move-out there were...

10 Total donation rooms conveniently located around campus

37 Luther students that volunteered their time or helped through work study

400 Total hours of help towards on campus move-out efforts

Students donated...

11 full 18' trucks of clothing, furniture and other materials for local thrift stores

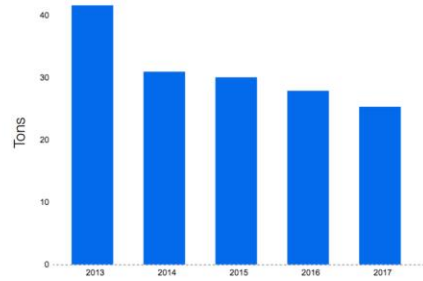
300 pounds of toiletries and laundry soap

1600 pounds of food to the food pantry

Volunteers were in charge of ensuring that only "true trash" lands in the dumpsters. They organized donation rooms, loaded donation trucks, dumpster dived for items that should be recycled or donated, and answered any questions students may have had.

Outcomes

40% reduction in move-out waste over the past 5 years



Zero Waste Goal: Reduce move-out waste 50% by May 2018.

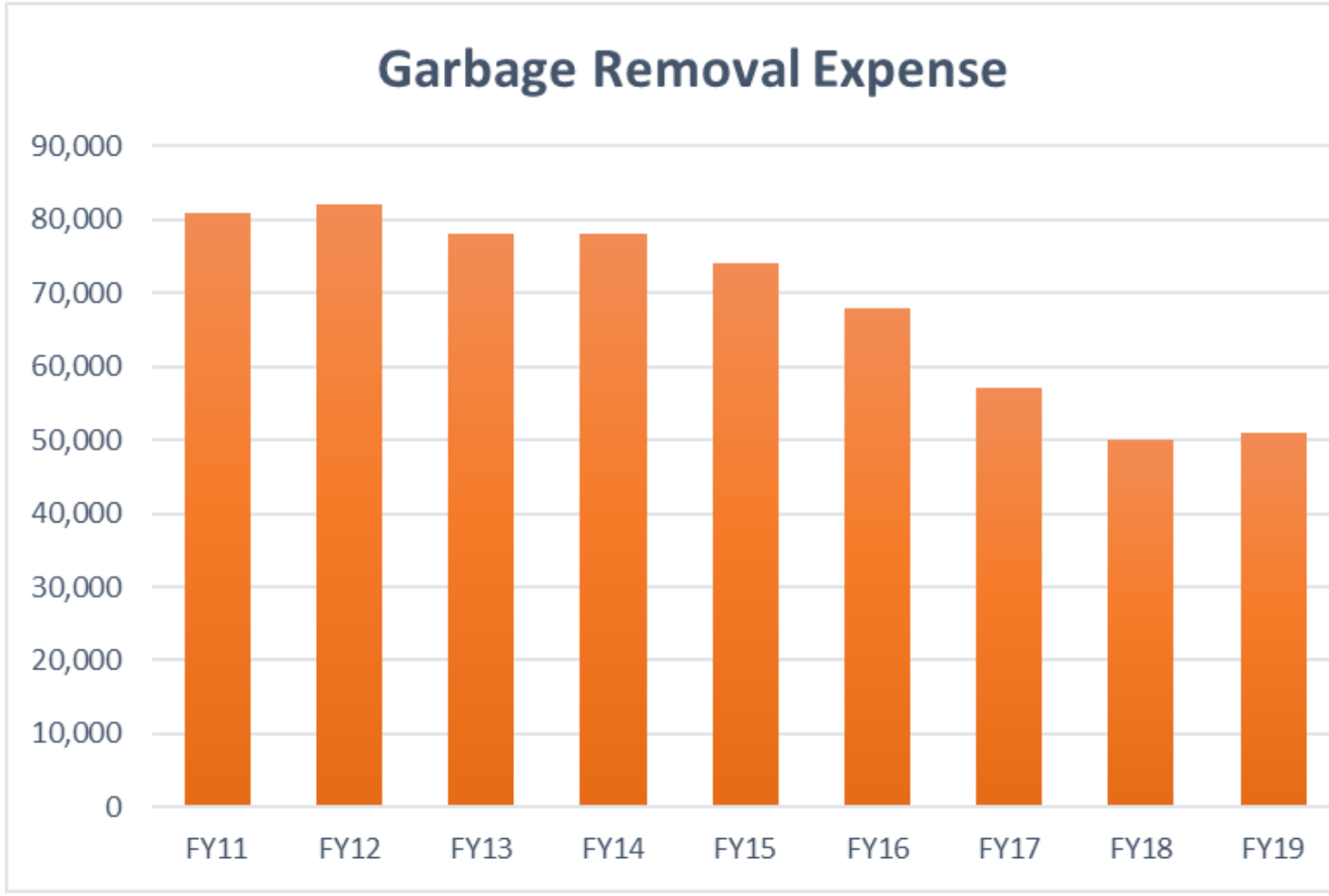
Eric Runestad, Vice President for Finance and Administration, *eric.runestad@luther.edu*, Luther College

Garbage Reduction

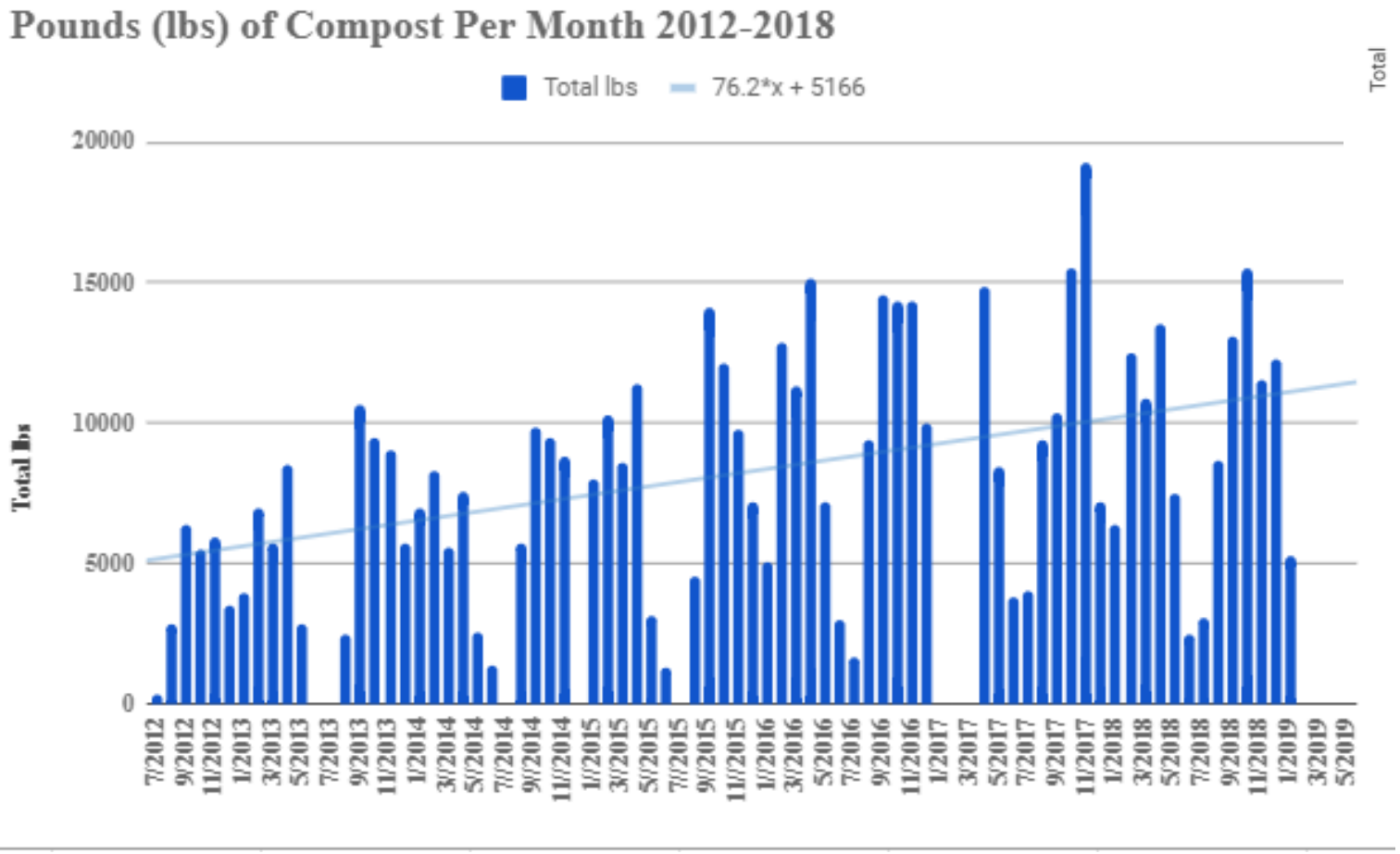
- Campus has a long history of recycling, in the late 90's it was reported out yearly to campus.
- After significant work on composting and recycling garbage bill kept going up.
- **Steps:**
  - Conversation with hauler to add scales to their trucks
  - After a month of data could see many dumpsters were nearly empty at pickup
  - Removed dumpsters, renegotiated rates - less trucks on campus, more recycling

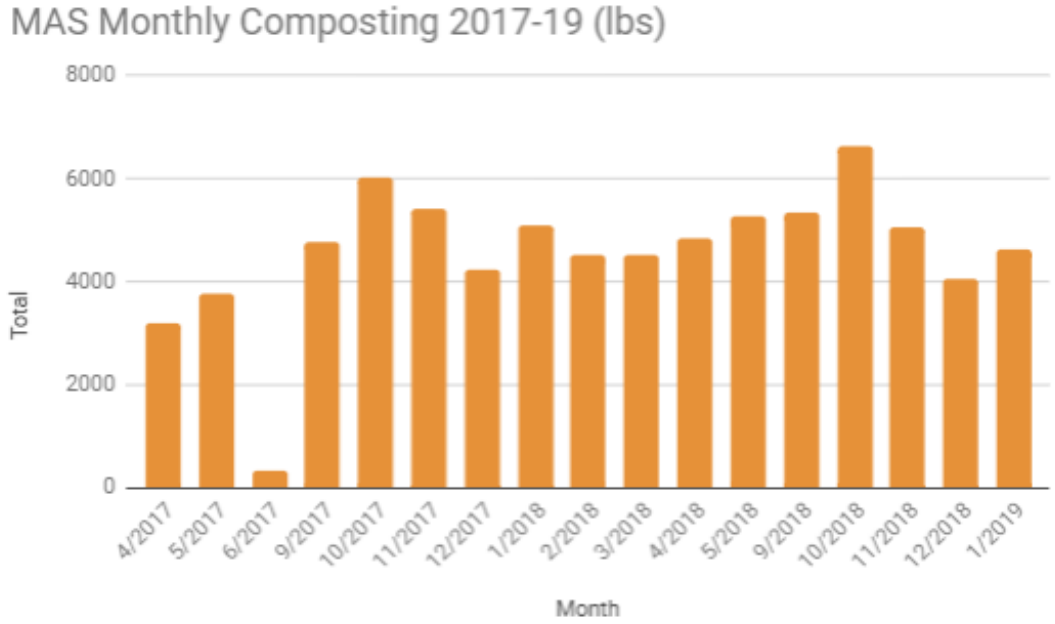
Garbage Reduction - $30,000 for campus

- Steps:
  - Talked with custodial staff about eliminating dumpster locations
  - Worked on heavy garbage days = move in/out days, picnics, large campus gatherings to cut down on garbage



Composting

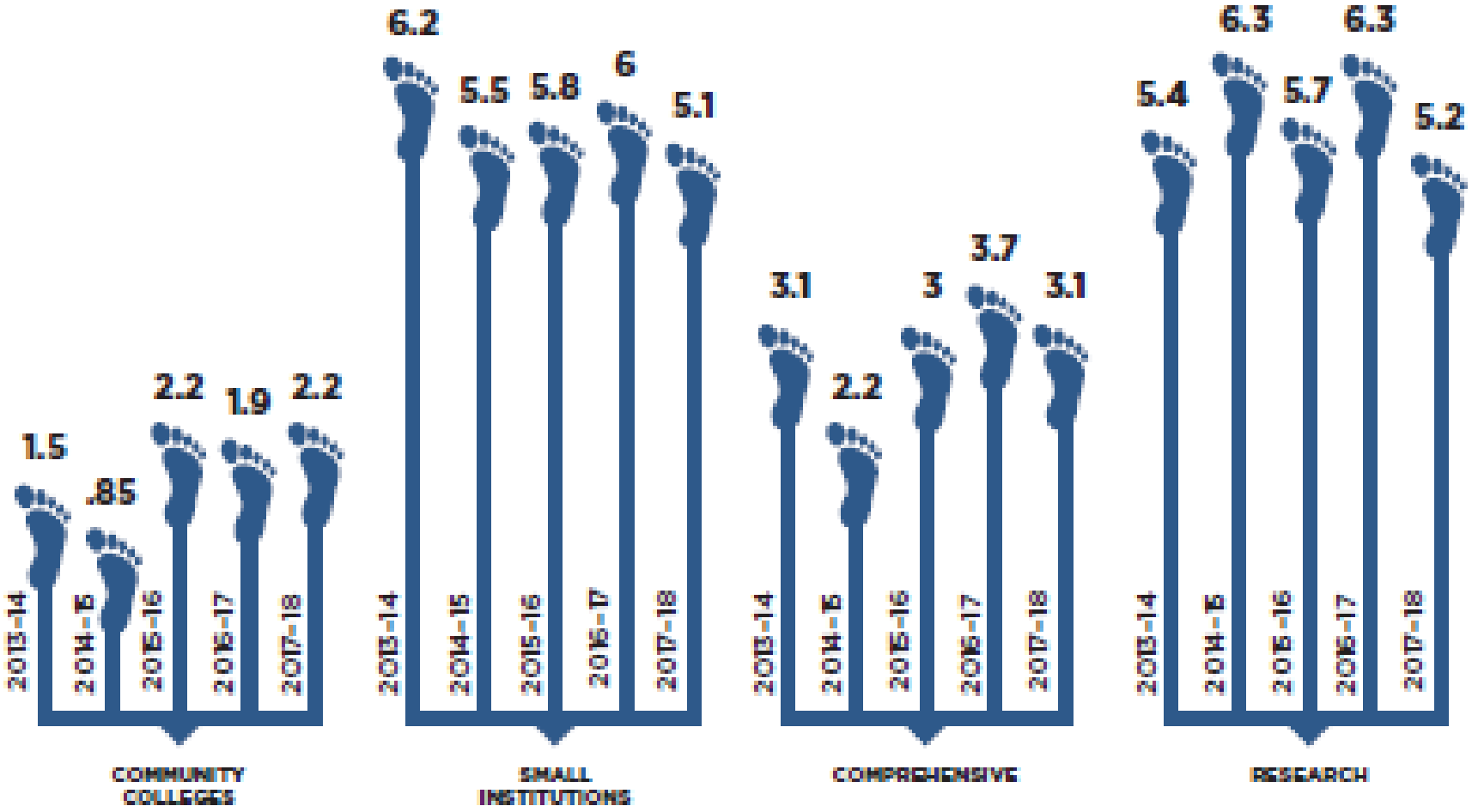




UNIVERSITY OF MINNESOTA MORRIS

CARBON FOOTPRINT

MEDIAN IN METRIC TON CO_2 ANNUALLY PER FTE STUDENT ENROLLED



Transfer Data to Make Meaningful

- New Construction
- LED Lighting and Lighting Controls
- Efficient Commercial Kitchen Equipment
- HVAC Equipment

Sam Houston State University

PERFORMANCE OF ENERGY EFFICIENCY UPGRADES AND UTILITY INCENTIVES

2017 PROGRAM INCENTIVE $34,858

ESTIMATED KWH SAVINGS 1,066,280

Annual Carbon Impact*

*Calculated through the Environmental Protection Agency

158 Cars off the road

-or-

84,347 Gallons of gasoline

-or-

1,743 Barrels of oil

-or-

707 Acres of U.S. forests

Fill out the survey!

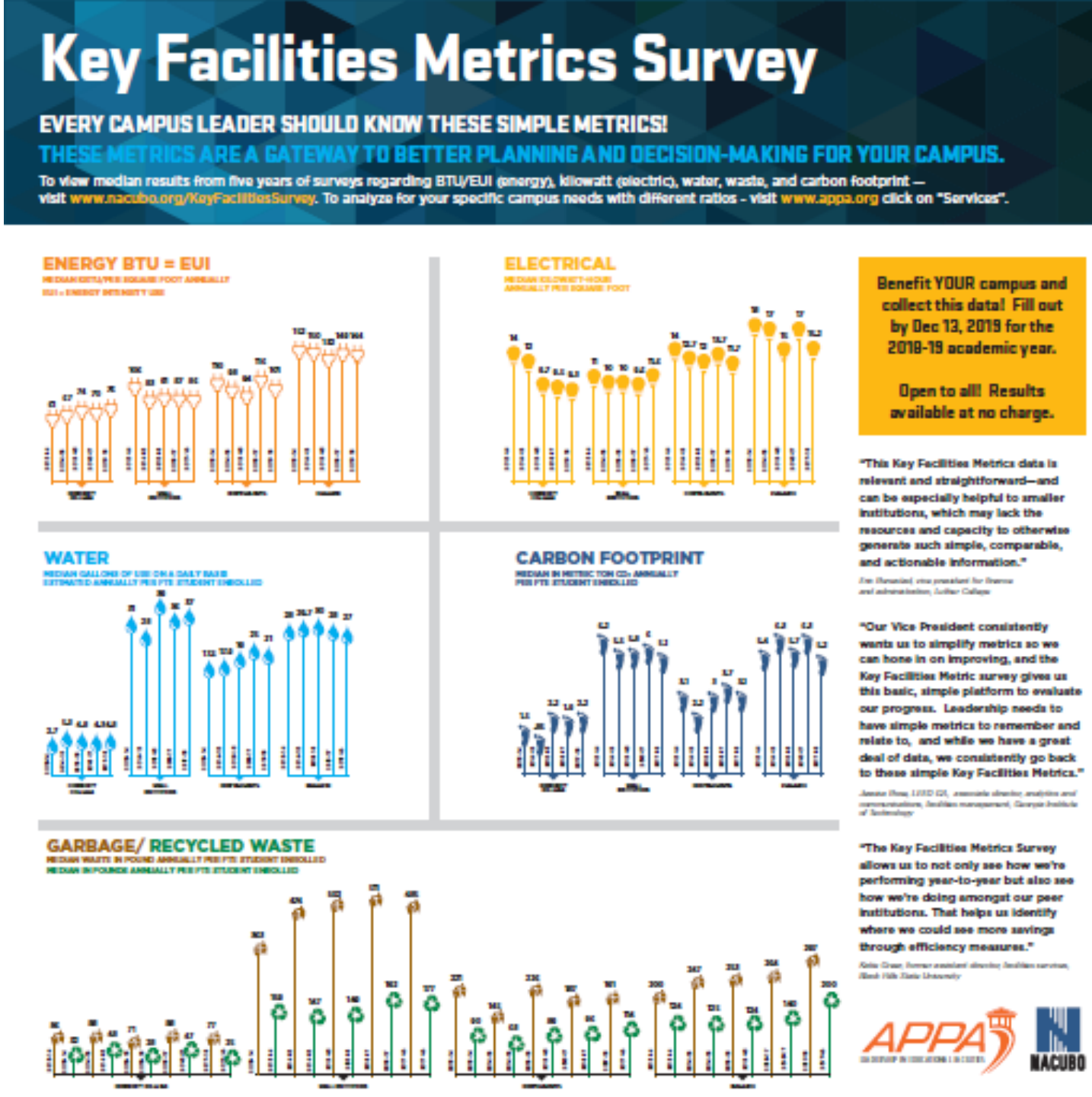
www.nacubo.org/KeyFacilitiesSurvey

Per Gross Square foot and Per SFTE

5th year results available

www.nacubo.org/KeyFacilitiesSurvey

Survey for 2018-19 Open NOW – Closes Dec 13, 2019



Questions? Contact me!

Upper Midwest Association for Campus Sustainability

Key Facilities Metrics – Basic Metrics ALL Leaders Should Know to Redefine/Advance Sustainability

Sally Grans Korsh, Senior Advisor
Facilities Management & Environmental Policy
National Association of College and University Business Officers

sgranskorsh@nacubo.org

202-861-2571 612-310-3881

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- **Key Facilities Metrics: Basic Metrics ALL Leaders Should Know to Redefine/Advance Sustainability, Sally Grans Korsh, NACUBO sgranskorsh@nacubo.org**
- **Location: Weitz 233**
- Five years ago, APPA and NAUCBO joined forces to create the Key Facilities Metrics survey. This is a seven-question survey that quantifies basic campus consumption issues: BTU, Electrical, Water, Waste and Carbon. The survey was started to encourage leadership to know these basic facts - just as campus leaders know the number of students or program offered at a campus. The presentation will highlight how campuses have improved consumption issues and advanced communications between facilities, sustainability, and finance offices. Many UMACS members participate – so for both those that do AND those that DO NOT will highlight benefits with results of five years of data will be discussed. The survey is open now until early December 2019 to catch data from the 2018-19 academic year. Explore the phrase - "What you don't measure you cannot manage". Unique about this survey is that it is open to ANY campus, and membership in APPA or NACUBO is not required. If a campus already enters data into the AASHE STARS or APPA Key Performance Indicator – then this survey is extremely simple and entering data from a sophisticated campus assists in overall results. However, if a campus does not already enter in those surveys – this is a great start to quantify your consumption issues and not all campuses can enter every one of the data points – but campuses are encouraged to answer what they can.
- **UN Sustainable Development Goals:** Affordable and Clean Energy, Sustainable Cities and Communities, Responsible Consumption and Production, Climate Action, Life Below Water, Life on Land, Partnership for the Goals