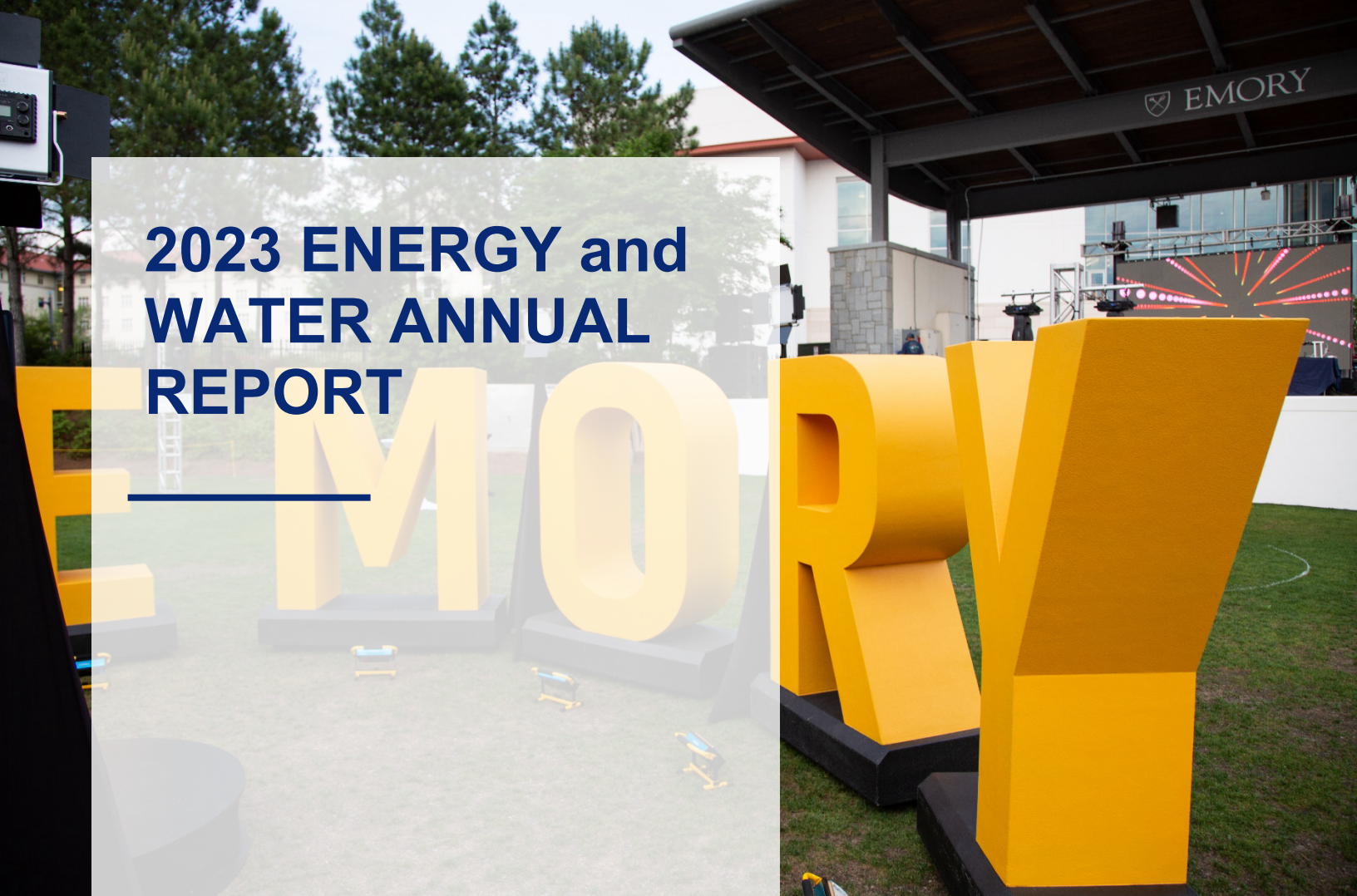


# 2023 ENERGY and WATER ANNUAL REPORT

---



---

Division of Emory Campus Services  
Justin Thomas – Energy Manager

---

# Summary

In **2023**, Emory continued to make progress on its 2025 Sustainability Vision goals to reduce energy use intensity (EUI) by 50% and overall energy consumption by 25% by 2025. The scope of this report is limited to Emory-owned buildings on the main Atlanta Campus, including the Clairmont campus and Clifton corridor healthcare facilities. From a 2015 baseline, in 2023, Emory achieved an EUI reduction of **14.8%** and a total energy use reduction of **10.8%**. Emory also strives to reduce potable water consumption by 50% by 2025. Emory's water reduction efforts in 2023 resulted in a 21% decrease in potable water consumption. Emory is committed to self-generating 10% of energy needed on campus. Emory currently has a steam turbine generator and on-site solar arrays that have a combined capacity of over **4.5 MW**. In 2023, Emory self-generated **1.4%** of the total electricity used on campus.

For more information, you can access Emory's Sustainability Vision and Strategic Plan at the following web address: [https://sustainability.emory.edu/wp-content/uploads/2018/01/VisionReport2-3-20-FINAL\\_with-updated-investment-language.pdf](https://sustainability.emory.edu/wp-content/uploads/2018/01/VisionReport2-3-20-FINAL_with-updated-investment-language.pdf)

At the time of publication, Emory is creating the 2025-2036 Sustainability Vision and Strategic Plan, which will serve as an enterprise-wide framework guiding Emory University's and Emory Healthcare's sustainability efforts for the next decade. Visit [sustainability.emory.edu](https://sustainability.emory.edu) to learn more

## 2025 Energy Reduction Goals from a 2015 Baseline

- ✚ 25% reduction in Emory University total energy consumption
- ✚ 50% reduction in Emory University energy use per square foot (EUI)
- ✚ 25% reduction in Emory Healthcare total energy consumption
- ✚ 10% self-generation of energy used on campus to replace fossil fuel sources
- ✚ 50% reduction in Emory Campus total potable water consumption

---

# Utility Overview – Atlanta Campus



## Steam

Emory operates five 100,000 lb/hr steam boilers that consume natural gas and fuel oil when the natural gas supply is interrupted. The boiler plant annually consumes about 786 million cubic feet of natural gas to produce about 693 million lbs. of steam. The cost of the natural gas used in the steam plant can range from \$2-5 million dollars a year depending on natural gas market conditions. One of the newly installed boilers operates at 250psi and then drops the pressure through a 1MW steam turbine generator to distribution pressure of 115psi. The steam is distributed underground to 59 buildings on the central campus for space heating, water heating, humidification, and process loads. Steam consumption is metered at every building. Looking ahead, additional alarms and sensors will be added to more quickly detect and address operational issues.

## Natural Gas

Southern Company Gas annually delivers approximately 830 million cubic feet of natural gas, purchased through marketers, to the central steam plant and directly to some facilities. Emory purchases mostly interruptible gas for the steam plant but has a base load volume of firm gas to provide reliability during high volume days. Other uses of this natural gas on campus can include heating spaces not connected to the steam plant and various types of burners in labs or kitchens. The cost of this gas can range from \$200k-\$800 annually depending on market conditions.

---

## **Chilled Water**

Three main chilled water plants provide cold water for space cooling to numerous buildings through underground distribution systems. There are additional plants in building mechanical spaces that supply chilled water directly to a specific building. The plants provide annually about 50,000,000 ton-hours of cooling by supplying 42° F water used to cool and dehumidify air entering and circulating in the buildings. Chilled water consumption is metered at each building on the distribution system. It costs the university roughly 3.5 million dollars per year to produce this chilled water annually.

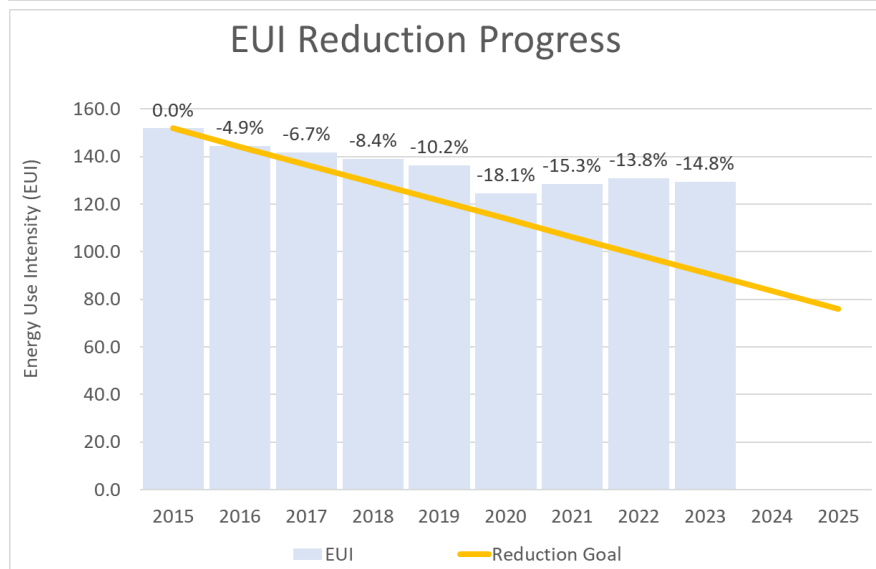
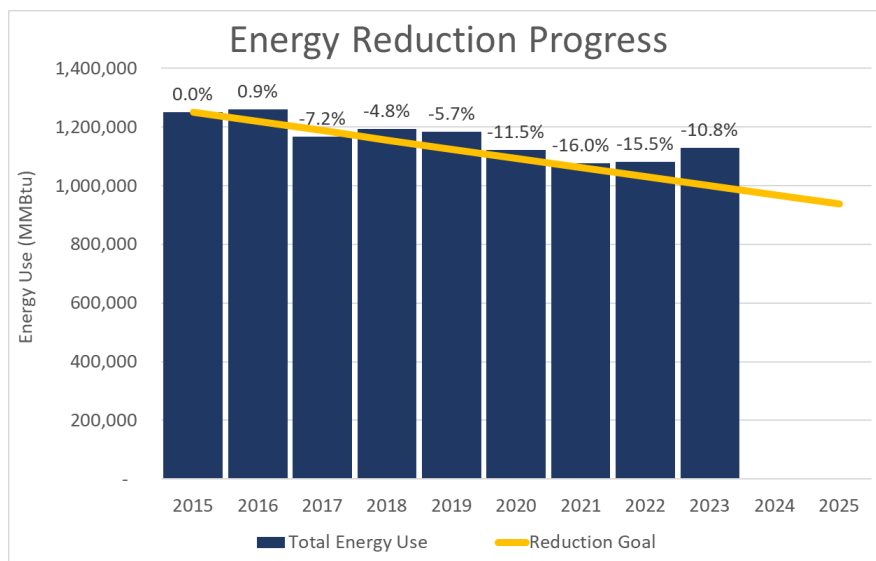
## **Electricity**

In 2023, Georgia Power provided over 272 million kilowatt hours of electricity to the central campus facilities with a peak summer electric demand of about 44 megawatts. This power typically costs the university roughly \$20 million dollars annually. Electric power is primarily fed by Georgia Power through two substations and then delivered by the Emory 20kV distribution system. Buildings not connected to Emory's distribution system receive electricity directly from Georgia Power. Electricity consumption is metered by either Georgia Power directly, or Emory meters at every building.

# Energy Reductions

## Energy & Sustainability Initiatives

Reaching Emory’s ambitious energy reduction goals requires continuous process improvement, innovative energy reduction strategies, and detailed monitoring of building energy performance across campus. These strategies include selecting higher performing fixtures when renovating spaces, the continuous commissioning program, solar power projects, and the use of fault detection software to determine and resolve problems in mechanical systems quickly. The graphs below highlight Emory’s progress towards our energy goals.



---

While Emory has made progress towards these ambitious goals, we are not on track to meet these 10-year goals in 2025.

## **Recommissioning**

Emory continues to support in-house commissioning of campus projects and recommissioning of existing buildings. Recommissioning is a strategic process that optimizes existing building systems to return them to their originally commissioned state where possible. Recommissioning is currently the major driver of the EUI reductions for the University. Emory uses Fault Detection and Diagnostics (FDD) to identify anomalies in equipment and system operation that in most cases can be corrected remotely through the building controls system or in some cases results in required field corrections.

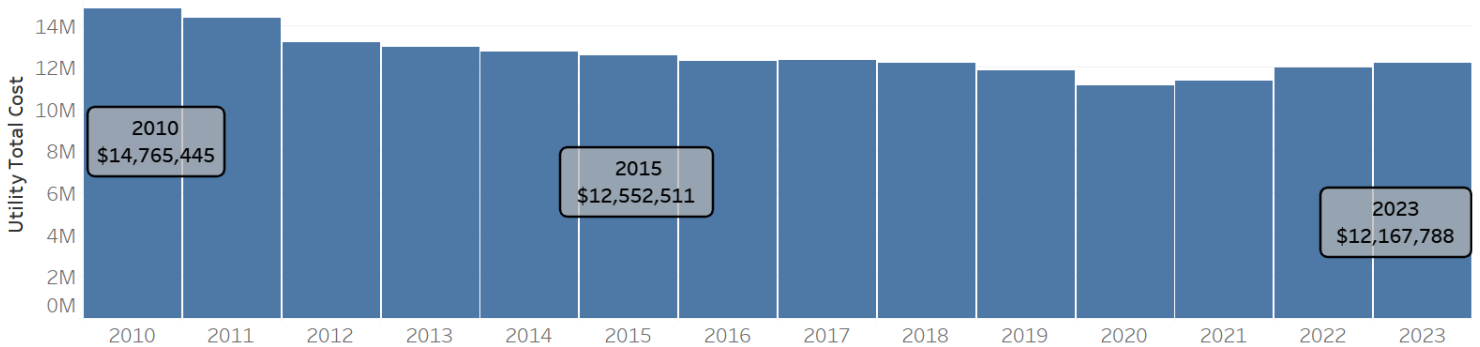
## **Sustainable Performance Program (SPP)**

The Sustainable Performance Program (SPP) is a continuous commissioning program that strives to keep building heating, ventilation and air-conditioning (HVAC) systems optimized and prevent performance degradation. Existing buildings are first recommissioned to ensure they are operating optimally, then added to the SPP with the goal of maintaining that optimal performance over time. Fault Detection and Diagnostics (FDD) rules and software are crucial in identifying issues that arise to maintain that high performance level.

The SPP program has a total annual utility savings of \$3.1M compared to the 2010 baseline when the program was started. Our annual cost of the SPP entails two Continuous Commissioning FTEs, and \$38,000 in software expenses so the payback of this program is substantial making it the most valuable energy saving program at Emory within the last decade.

SPP has resulted in a \$3.1M in annual energy savings from a 2011 baseline

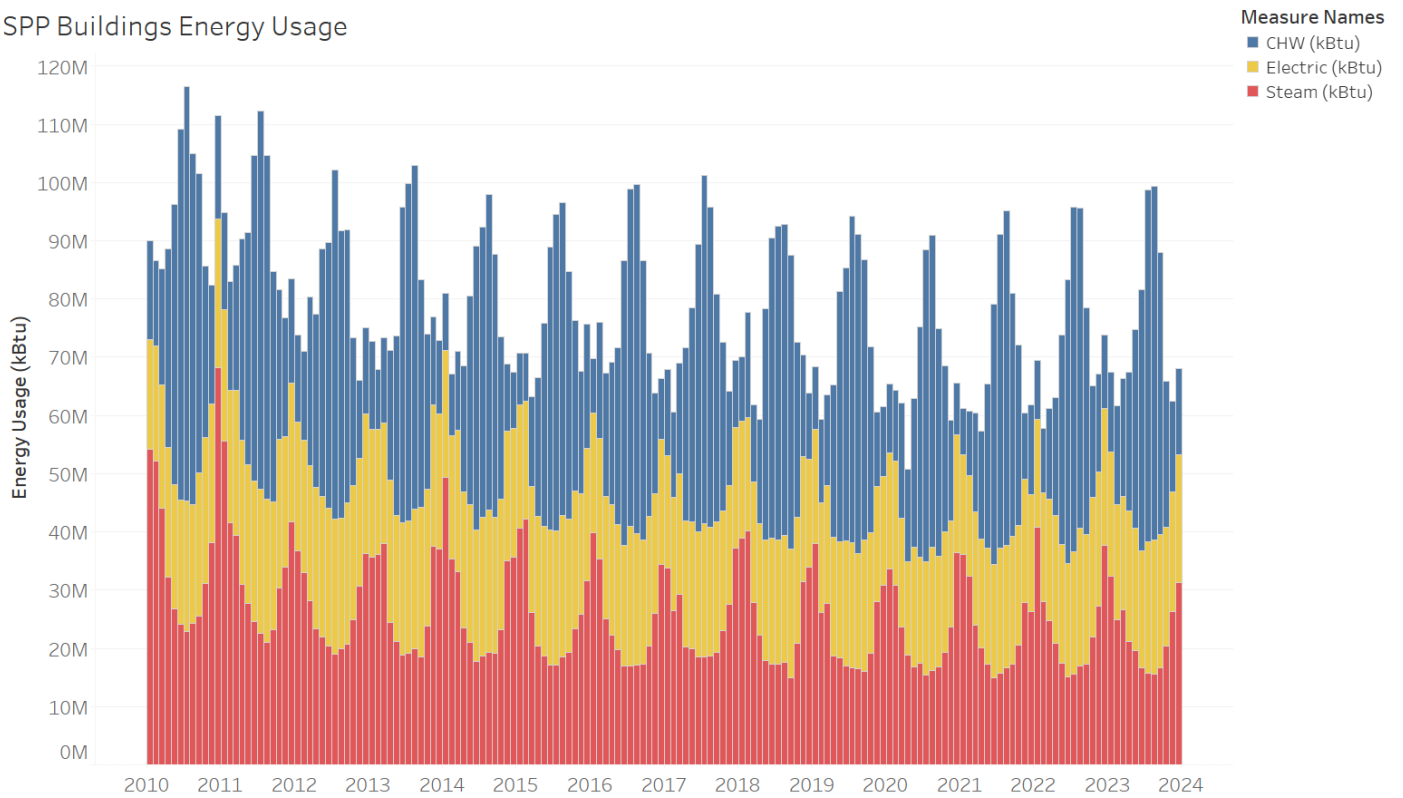
Cost to run SPP buildings



Property Name	Year Added to SPP	Property Name	Year Added to SPP
1721 - Goizueta Business School	2012	1130 - B. Jones Center	2016
1020 - Williams School of Medicine	2013	1722 - Goizueta Foundation Center	2016
1131 - Math & Science Center	2013	1980 - Woodruff Library	2016
1784 - North Decatur Building	2013	2045 - Psychology & Interdisciplinary Sciences	2016
2030 - MacMillan-Gambrell Hall	2013	2172 - Emory Children's Center	2016
2041 - Emerson Hall	2013	1522 - Claudia Nance Rollins Building	2017
1370 - 1462 Clifton Road	2014	1400 - Woodruff PE Center	2018
1515 - Woodruff School of Nursing	2014	1460 - Anthropology	2018
1518 - Grace Crum Rollins School of Public Health	2014	2040 - Atwood Chemistry	2019
1940 - O. Wayne Rollins Research Center	2014	3232 - Health Sciences Research Building	2019
1941 - Whitehead Biomedical Research	2014	1022 Alumni Memorial University Center AMUC	2020
3210 - Cox Hall	2014	1028 - Emory Student Center	2020
3261 - Schwartz Performing Arts Center	2014	1830 - Convocation Hall	2020
1580 - Candler Library	2015	1525 - 1525 Clifton	2021
1720 - Rich Memorial Building	2015	1535 - Callaway Memorial Center	2021
2043 - Rita Anne Rollins Building/Ethics (Theology)	2015		

In 2023, the new Health Science Research Building (phase 2) and the R. Randall Rollins School of Public Health building were added to the SPP. This brings the total of buildings in the program to 35 and adds roughly 550,000 sqft for a total of roughly 5,000,000 sf in the program.

SPP Buildings Energy Usage



2023 also entailed continuing focus on the campus-wide control system migrations from Siemens Insight to Siemens DesigoCC. This effort is significant in that it requires dedicated Engineering resources that otherwise would be focused on expanding the SPP program. Once buildings are migrated, our Fault Detection and Diagnostic rules must be re-integrated with and re-constructed within the new control system. Despite this large lift, the Engineering team still managed to identify 335 issues in our buildings, 247 of which were resolved.



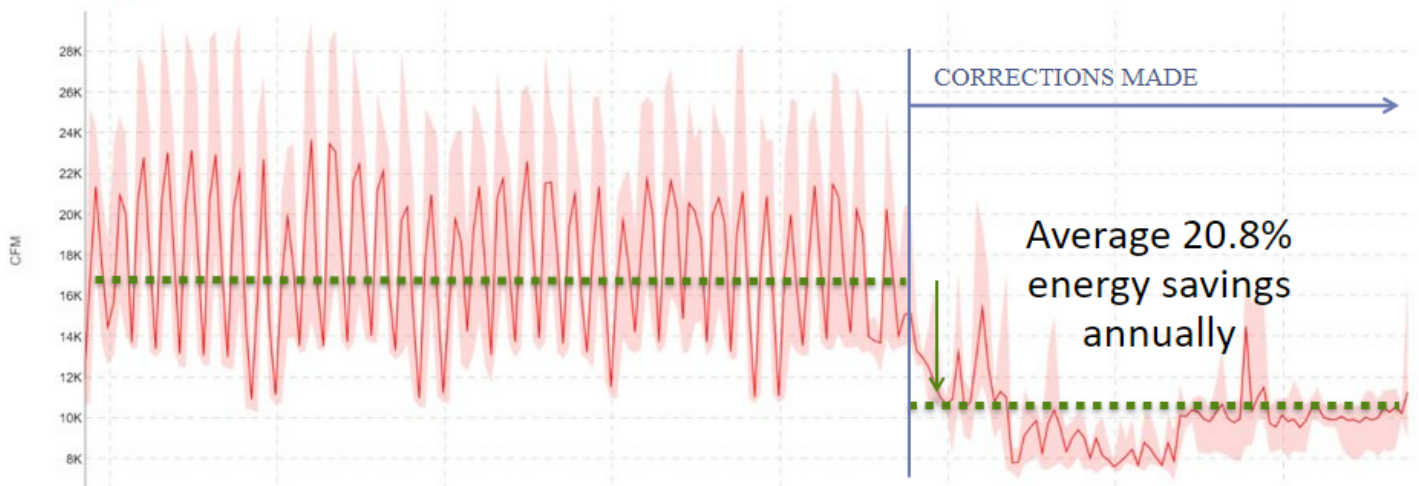
## Emory Student Center

The Emory Student Center (ESC) received a lot of attention for having multiple mechanical systems, still relatively new, that were not performing up to expectations. A few projects were identified to help get the ESC back on track to performing at or close to intended design.

### Emory Student Center Projects

- ✚ Kitchen Hood modifications – **complete**
- ✚ Occupancy sensor adjustments – **complete**
- ✚ Geothermal chiller controls modifications – **in progress**
- ✚ VAV terminal unit modifications – **in progress**
- ✚ Air source heat pumps – **in progress**

The chart below highlights the energy reductions realized from modifications made to the kitchen hoods that reduced exhaust hood fan speeds.



---

## Transportation Electrification

Emory continues to expand the fleet of electric vehicles used on campus. While each group is responsible for their vehicles, Campus Services and the Parking and Transportation group both evaluate replacing vehicles with all electric alternatives. Ford F-150 Lighting work trucks as well as a new all electric Kia to support Campus Services have been purchased. Emory must expand electric charging infrastructure to support additional charging campus wide. Campus Services is evaluating the electric capacity in our workspace to add more EV charging, and that initiative will continue to

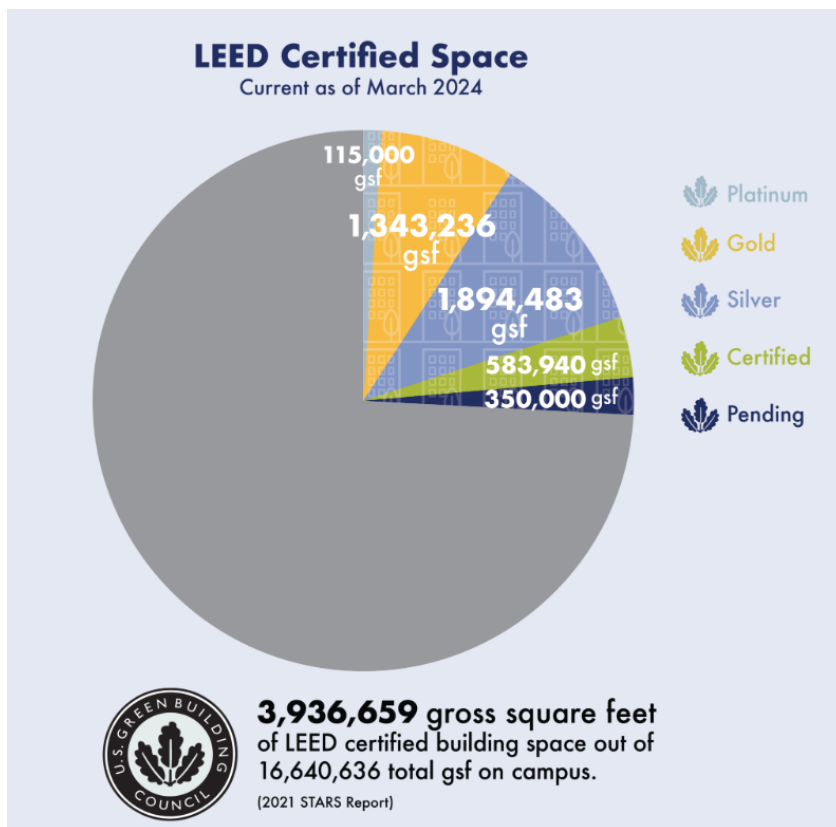


other spaces on campus. The Parking and Transportation group currently have installed four electric vehicle chargers in Peavine parking deck, two at the Clairmont Tower, and one fast charger in front of the Oxford Road bookstore. They are piloting level one chargers on campus as a better solution that would allow people with EVs to park their car and charge all day. Currently EV users that park at a level two charger must move their car once charged or incur fees. By using level one chargers, Emory can potentially expand the amount of charging infrastructure, and allow people to leave their car on a trickle charge without the need to move. The pilot is currently ongoing with a hope to roll the chargers out on a larger scale soon. Emory

currently uses locally sourced biodiesel in our bus fleet which gives off roughly 75% fewer emissions than typical diesel fuel. Emory's current electric fleet consists of 148 fully electric vehicles (cars and golf carts), three gas hybrids, and one plug-in hybrid.

## LEED Construction

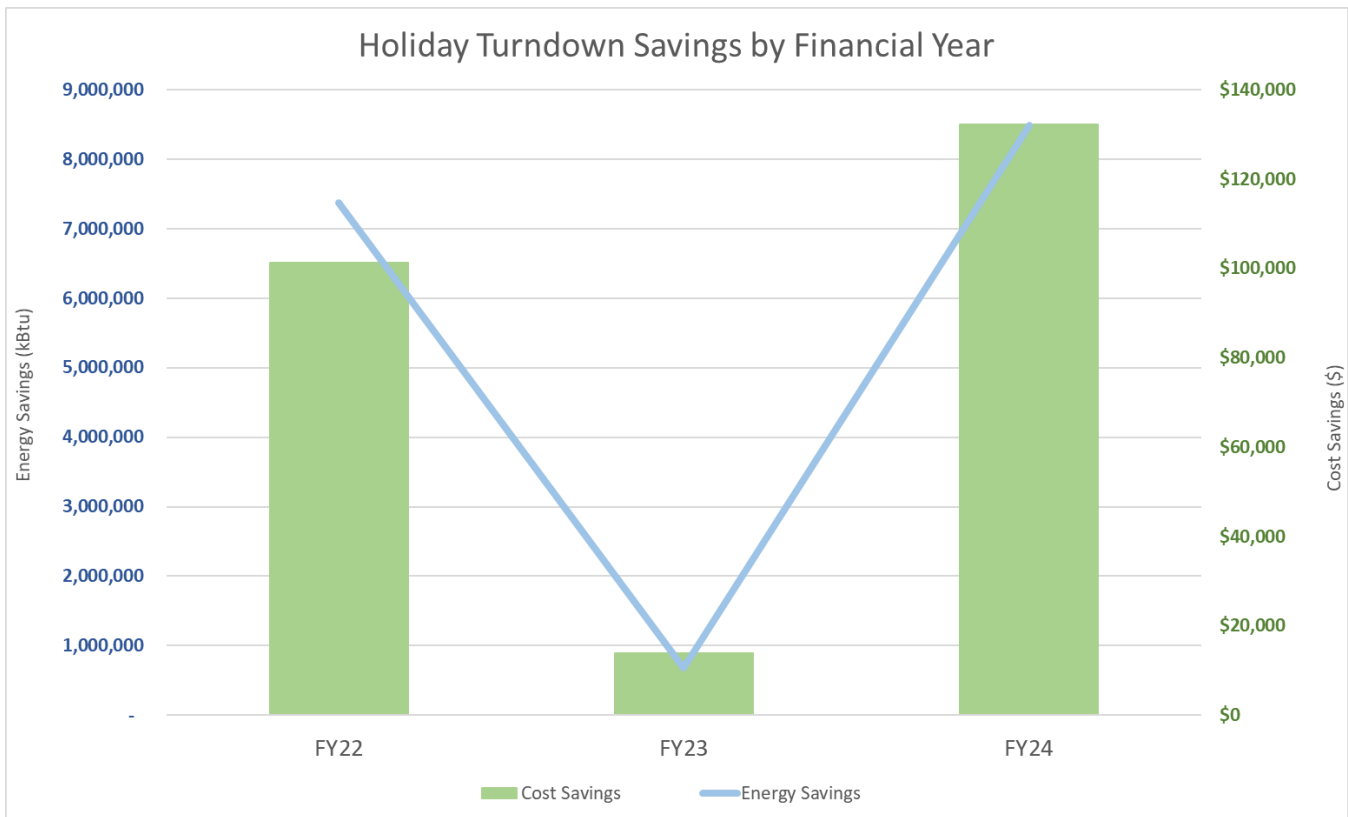
To meet Emory’s long-term energy reduction goals, special attention must be paid to the removal, addition, and renovation of buildings on campus. The minimum design and construction standard for Emory is LEED Silver; however, for most new buildings Emory targets LEED Gold. The Randall R. Rollins and Health Sciences Research II buildings have both achieved LEED Gold. In 2019, the Emory Student Center officially opened its doors boasting a LEED Platinum certification.



## Holiday Turndown

During official University winter holidays, the heating systems in buildings across Emory’s campus are programmed to maintain a 55° F minimum set point which helps save energy. Roughly 27 buildings participated in the holiday turndown to help save energy during the 2023-2024 holiday period. Since Engineering is currently performing Building Automation Systems (BAS) migrations, some of the buildings were not able to

be turned down as easily as those setback profiles were disrupted. This resulted in a slightly smaller building list than before, however, unlike last year the weather was favorable for turndowns, so we were able to get a great savings from the participating buildings. The holiday turndown resulted in cumulative savings of **\$132,000** in utility costs.



The chart above highlights the energy and cost reductions from the holiday turndown during each financial year. FY 2023 shows a much smaller impact than the other years because of the sustained extreme cold weather days. These weather conditions put the buildings in danger of falling below their minimum design temperature. The heat was run during the turndown period to avoid any potential damage.

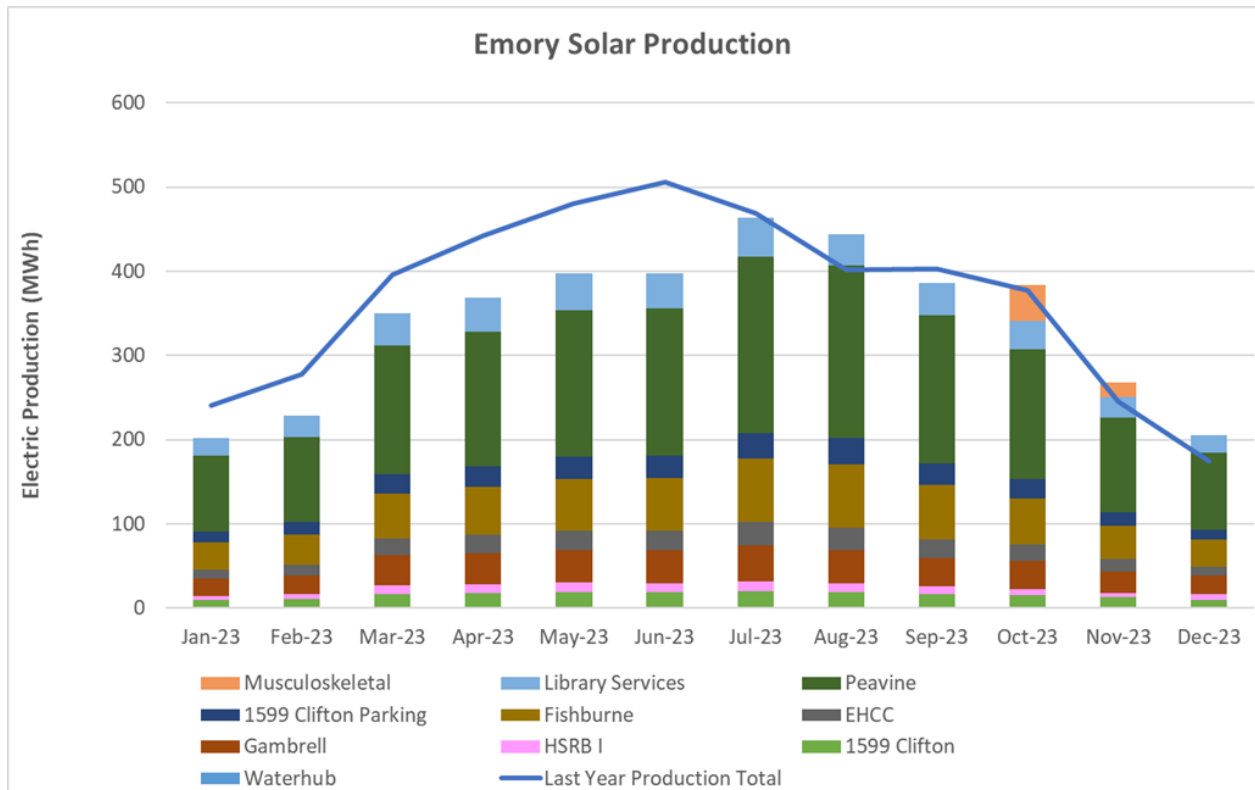
# On-Campus Energy Generation

## Solar Produced Electricity

To date, Emory has installed ten solar projects with a combined capacity of 3.6 MW. In 2023, Emory’s solar projects produced over **4,094 MWh** of electricity. That is equal to the electricity used in powering 337 homes for one year!



Additional solar projects are in the evaluation process primarily at the parking decks across campus.



---

The chart above shows the solar energy production totals. Given that there were no major changes, the production level is similar to totals in 2022.

## Steam Electric Production

In 2016, Emory commissioned a steam turbine generator that was added to the steam plant for electricity generation. This 1 MW steam turbine uses higher pressure steam to rotate a generator that produces electricity. The unit has continued to undergo substantial repair and testing much of the year and has been out of commission. Emory generated **203 MWh** of power from the steam turbine generator in 2023.



---

# Water Reduction

Emory University uses roughly 220 million gallons of water each year. That equals to roughly filling up 333 Olympic sized swimming pools! The potable water is provided by the Dekalb County Department of Watershed Management and flows through over 8 miles of underground pipes weaving across campus.

## The WaterHub at Emory

Launched in 2015, Emory's WaterHub is an on-site water reclamation system which utilizes eco-engineering processes to clean wastewater for non-potable use on campus, primarily for utility water make-up and toilet flushing. This water reclamation facility is the first of its kind in the United States. In 2023, Emory's WaterHub displaced over **104 million gallons** of city potable water to Emory's major utility plants. The

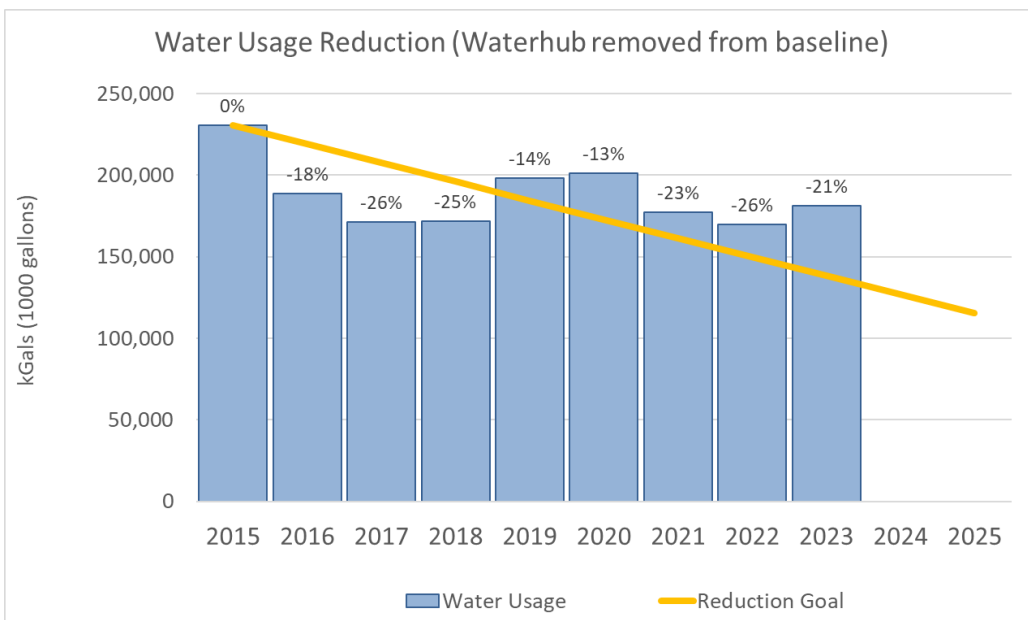
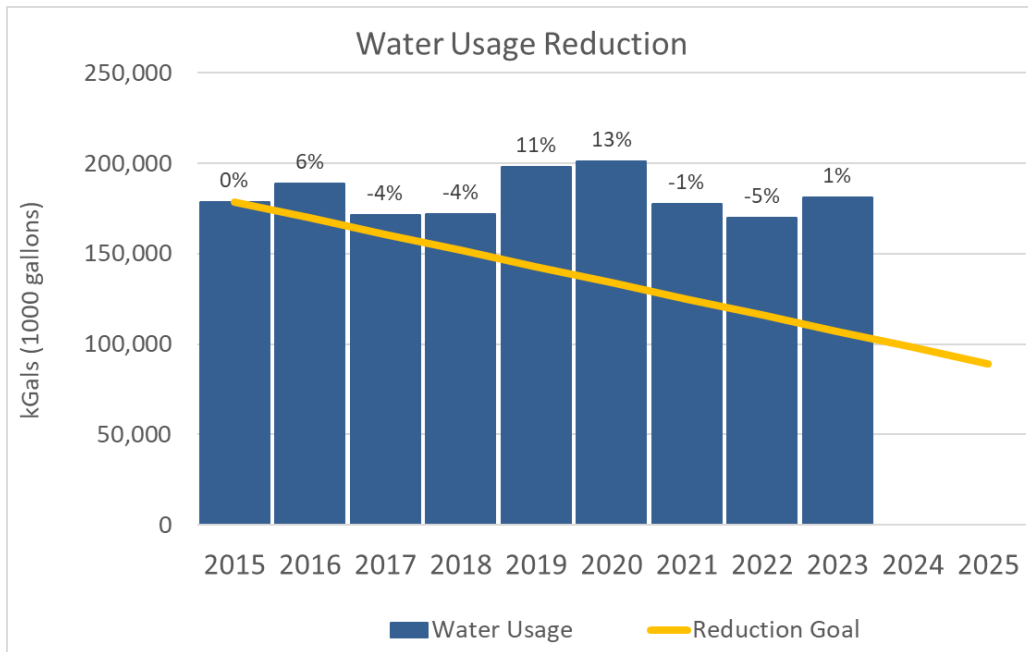


facility provides 75% of total water sent to cooling towers around campus. Since operations began, the WaterHub has used over 63,200 kWh of solar energy produced from its panels (approximately 6,036 kWh in 2023).

## Water Reduction

One of Emory's biggest hurdles in reductions is water usage. Campus Services is currently evaluating a few large initiatives to transition all faucets and toilets to low flow fixtures at some of our older facilities. The reality is, however, that low-flow fixtures have been part of Emory's design standards for some time now. There are

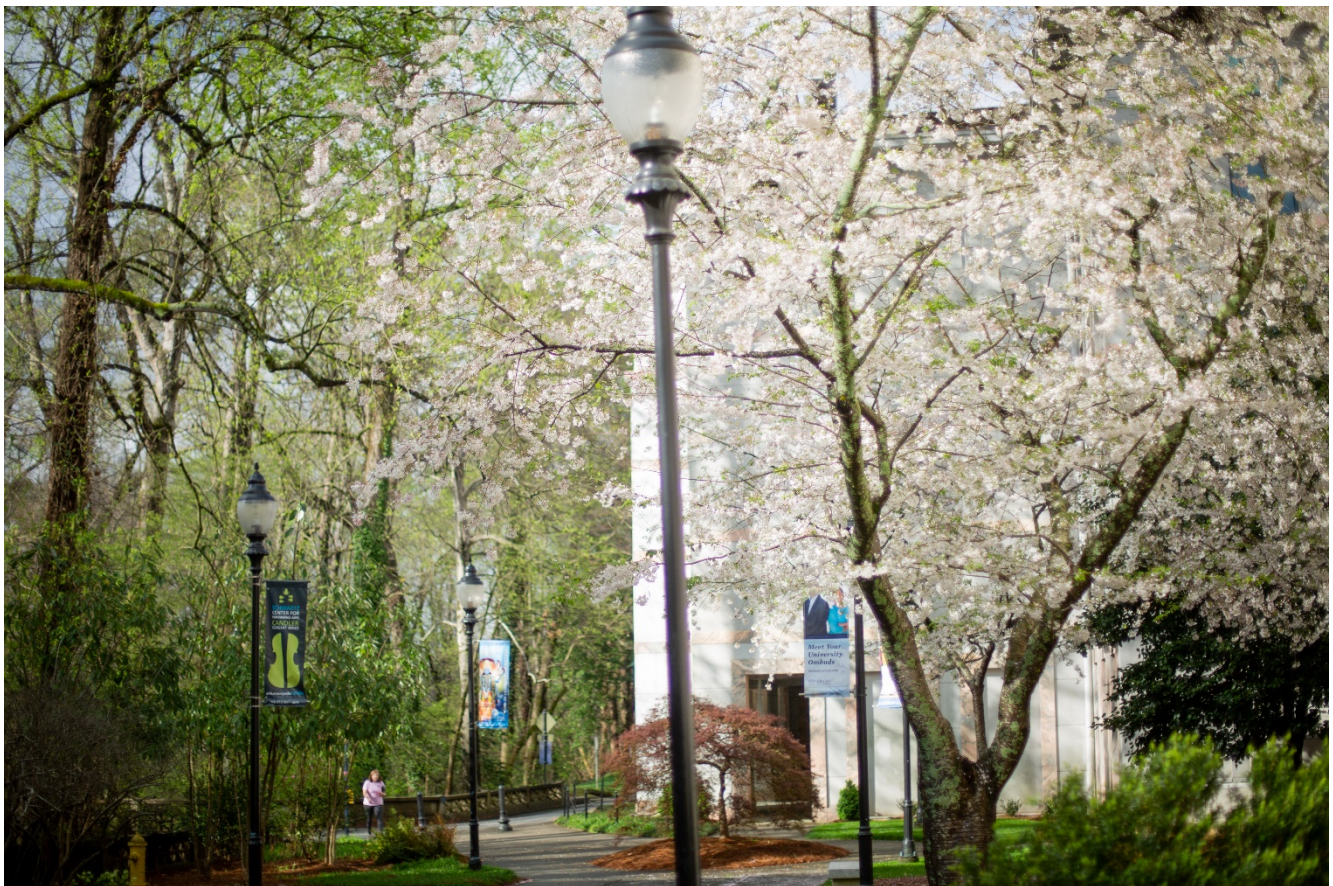
other projects being reviewed around increasing the capture and reuse of rainwater at strategic buildings across campus that may help reduce water usage. Currently Emory’s water usage has increased by **1%** from the 2015 baseline. The WaterHub was designed to help reduce Emory’s water usage, however, since it was built in 2015, its water reduction impact is included in our 2015 baseline year. If the WaterHub’s impact is removed from our baseline, Emory has achieved a water reduction of **21%**.





---

Emory continued the use of smart irrigation technology known as UgMO (Underground monitoring). UgMO uses specialized sensors buried in the soil to detect moisture levels. The system then uses algorithms to determine how much irrigation water is needed to maintain a healthy landscape while minimizing water waste. In addition to smart irrigation, Emory also uses underground cisterns to capture and store rainwater.



---

**For questions or additional information  
regarding this report - contact:  
Justin Thomas, CEM  
Energy Manager, Emory University  
[Justin.Thomas@emory.edu](mailto:Justin.Thomas@emory.edu)**



**EMORY  
UNIVERSITY**