



# ANNUAL ENERGY & WATER REPORT 2022

Emory University – Campus Services

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**In 2022**, Emory continued to make progress on its 2025 Sustainability Vision goals to reduce energy use per square foot (EUI) by 50 percent and overall energy consumption by 25 percent by 2025. This year brought much change from operating with minimal occupancy because of COVID to a full return of students, faculty, and staff to campus in the fall. From a 2015 baseline, in 2021, Emory achieved an EUI reduction of **12.9%** and a total energy use reduction of **7.1%**. Emory also targets to reduce potable water consumption 50% by 2025 and has made some progress towards this goal. Emory's current reduction stands around **5%**. 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 **4.6 MW**. In 2022, Emory self-generated **1.8%** of the total electricity used on campus.

The scope of this report encompasses Emory's Atlanta campus, Clairmont, and Briarcliff facilities.

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)

## 2025 Energy Reduction Goals from a 2015 Baseline

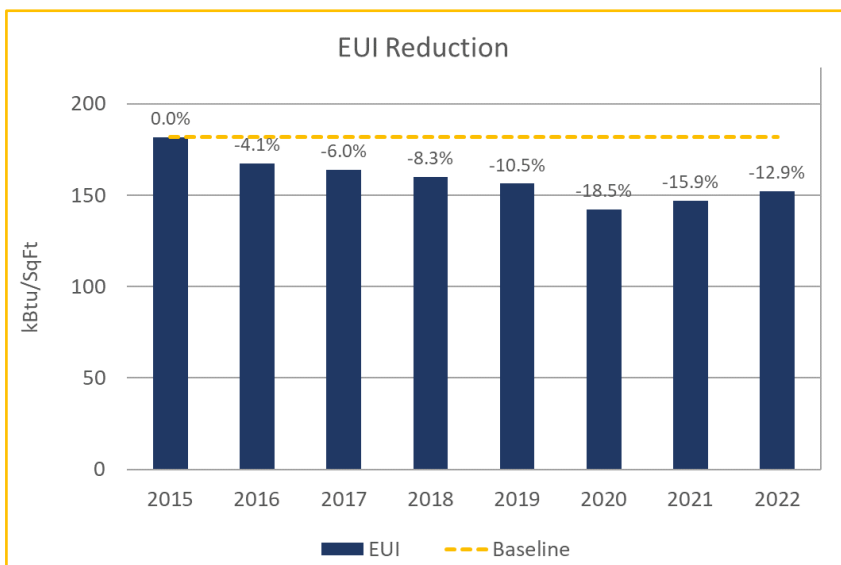
- ❖ 25% reduction in Emory University total energy consumption
- ❖ 50% reduction in Emory University energy use per square foot (EUI)
- ❖ 25% reduction in Emory Healthcare total energy consumption
- ❖ 10% self-generation of energy used on campus to replace fossil fuel sources
- ❖ 50% reduction in Emory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

# EFFORTS TO ACHIEVE ENERGY REDUCTION

## Energy & Sustainability Initiatives

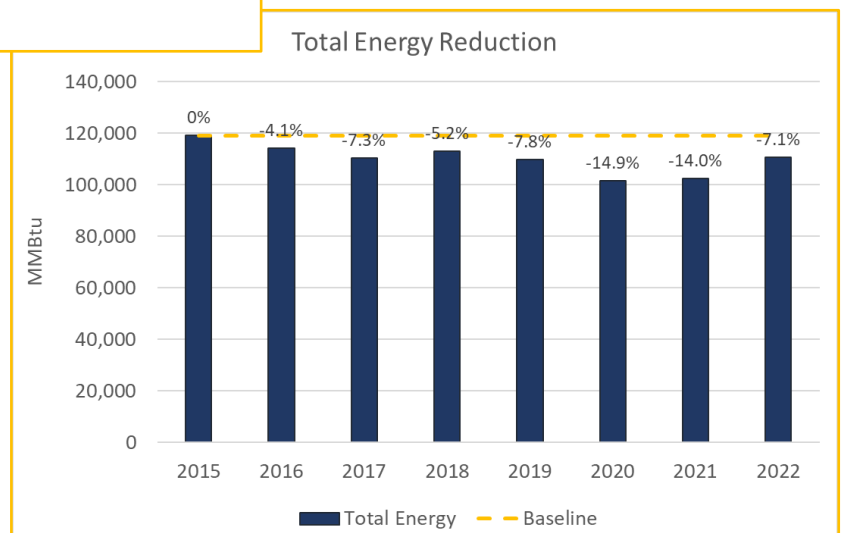
Reaching Emory's ambitious energy reduction goals requires continuous process improvement, innovative energy reduction strategies, and detailed monitoring of building energy performance across campus. Emory is currently working with in house resources and consulting with 3<sup>rd</sup> parties to help lay out the road map for projects to implement in the buildings and around campus to reduce energy and greenhouse gas emissions. We hope to have this roadmap completed by August 2023 which will allow us to secure funding for these various projects.

Emory is currently making progress to reduce building energy use by 50% and total energy by 25%. The graphs below show our progress to date:



**Through 2022, Emory has realized an EUI reduction of 12.9% since 2015**

**Through 2022, Emory has achieved a total energy reduction of 7.1% since 2015**



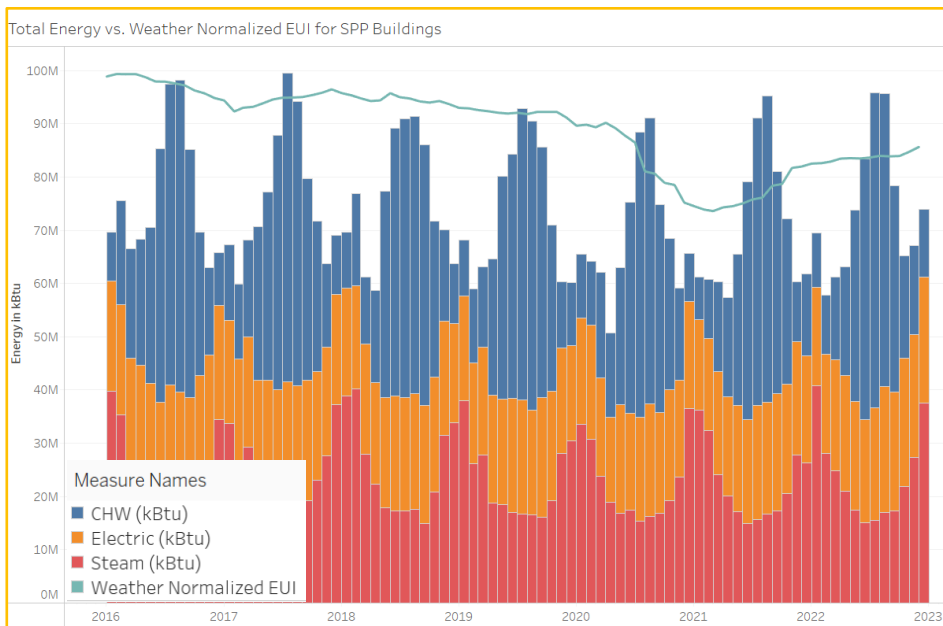
## Recommissioning

Emory continues to support in-house commissioning of campus projects, as well as 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 the major driver of the EUI reductions for the University. Emory is using 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. Our standout recommissioning project was completed at the Goizueta Business school which resulted in a **60%** in energy usage, however most projects result in a **29%** reduction in energy usage on average.

## Sustainable Performance Program (SPP)

The SPP is a continuous commissioning program that strives to keep building HVAC systems optimized and prevent performance degradation. First, buildings are recommissioned to ensure they are operating optimally. At that point they can be added to the SPP program with the goal of maintaining that optimal performance over time. Fault Detection and Diagnostics software is crucial in identifying issues that arise to maintain that high performance level. In 2022, 264 issues were identified and 217 resolved. In 2022, no buildings were added to the program, and the number of participating buildings remains at 33. In 2022, a lot of the focus from the SPP group was put on the campus-wide Siemens Insight to Siemens DesigoCC migrations. These migrations are necessary as the operating platforms are aging out and will

not be supported beyond Q2 of 2026. To date, we have 11 of the 68 Siemens sites converted to DesigoCC. Upon completion of each building conversion, a recommissioning process is performed to confirm optimal operation, and the SPP sites must be rebuilt in our Fault Detection and Diagnostics software.





The chart above is used to monitor the SPP program building's energy usage in Tableau. The Weather Normalized EUI trend line (teal) shows that overall SPP buildings have trended down in energy use. 2022 saw an increase over 2021, primarily due to the 2021 data reflecting significantly reduced occupancy and building use during the pandemic. The SPP is conserving right at \$2.5M/year in energy costs as compared to a 2011 baseline.

## Electric Vehicles

Another initiative that has recently received more attention and funding is expanding Emory's use of electric vehicles on campus and electric vehicle charging infrastructure for students, faculty, staff, and the public. This is our current list of locations with chargers installed and counts; Starvine parking deck (1), Michael Street parking deck (3), Peavine parking deck (2), Clairmont Tower (1), Oxford Road bookstore (1). There are currently plans to add more chargers in most of these locations. In addition to these, Emory has installed 6 chargers for 6 new Emory fully electric commuter busses to service people on campus and the public. The busses will be placed in service in the fall of 2023 and used primarily for longer commute trips for the greatest impact in reducing fuel use.



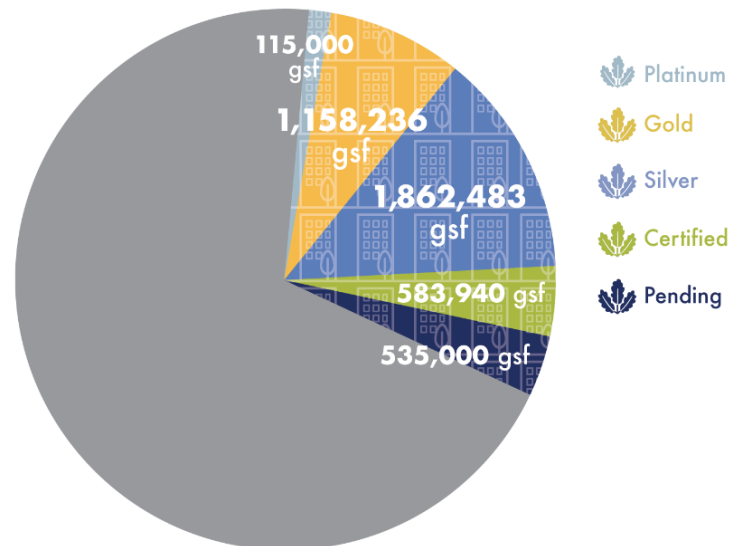
Emory currently uses locally sourced biodiesel in our shuttle buses but are excited about upgrading with these fully electric busses with hopes of expanding. Emory's current electric fleet of cars and golfcarts consists of 145 fully electric vehicles, 3 gas hybrids, and 1 plug in hybrid.

## Leadership in Energy and Environmental Design 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. The new Randall R. Rollins building, and Health Science Research Building II are both targeting LEED Gold certification. In 2019, the Emory Student Center (ESC) officially opened its doors boasting a LEED Platinum certification that includes several innovative energy saving technologies such as geothermal heating and cooling, solar thermal hot water heating, and chilled beams to reduce forced air energy. Currently some of these energy saving technologies are not functioning as expected leading to the ESC performing far below expectations. Emory has invested 1 million dollars towards investigating, repairing, and or replacing these systems to get the building closer to designed energy performance.

### LEED Certified Space

Current as of March 2022

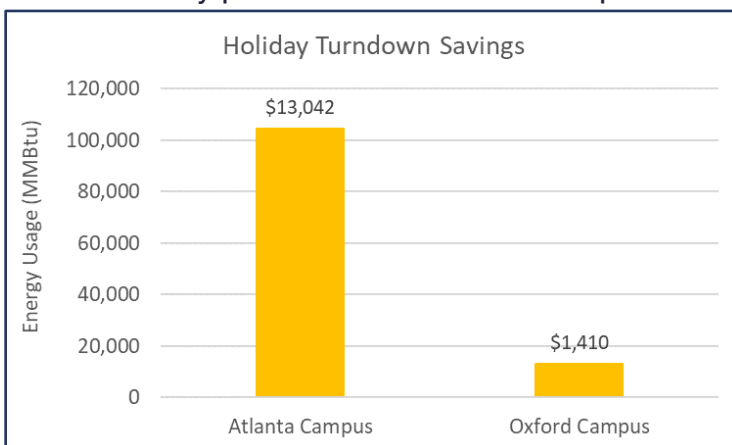


**4,254,659** gross square feet of LEED certified building space out of 16,640,636 total gsf on campus.

(2021 STARS Report)

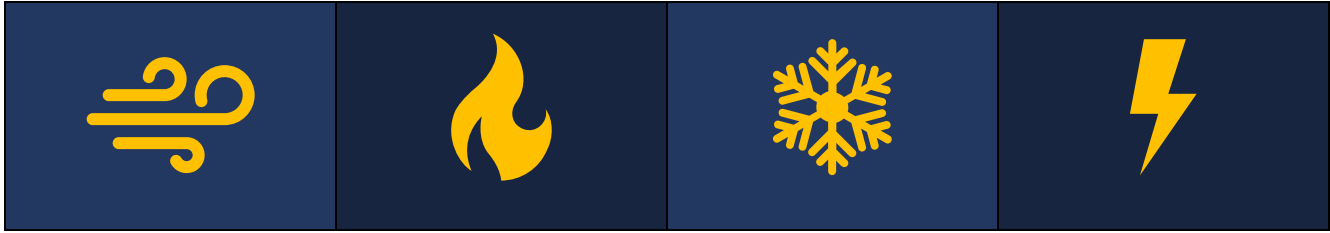
## Holiday Turndown

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 44 buildings participated in the holiday turndown to help save energy during the 2022-2023 holiday period. Over the turndown period Emory experienced multiple extreme cold



temperature days which reduce the potential savings since buildings had to be heated to maintain minimum design temperatures. Emory's Atlanta and Oxford campus both saw a **3%** reduction from adjusting setpoints down. The holiday turndown managed to save **\$14,000** in utility costs over a 3 week period.

# 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.

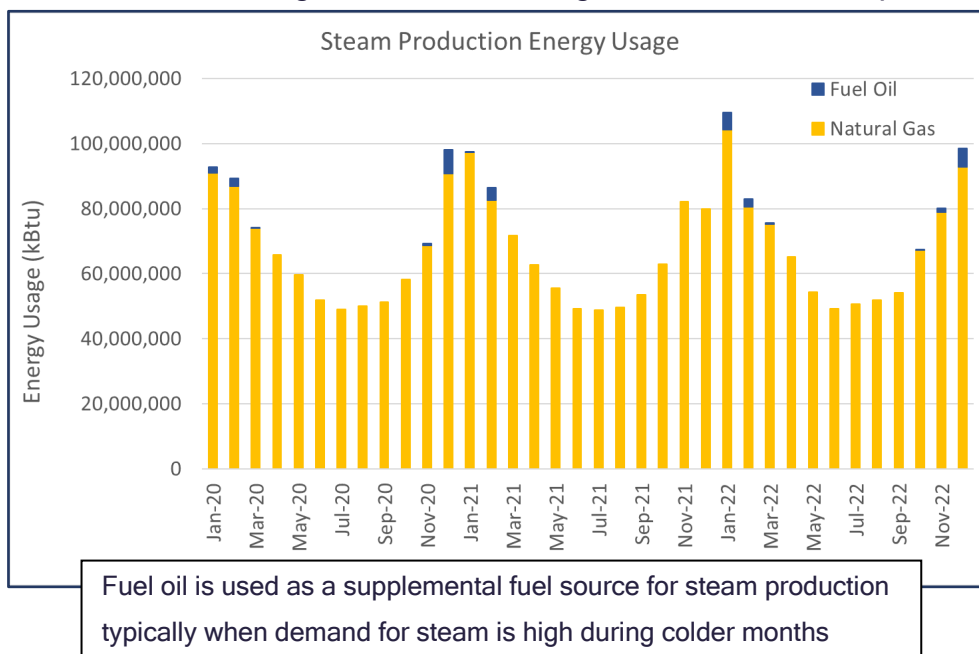
The boiler plant annually consumes about 786 million cubic feet of natural gas to produce about 693 million lbs. of steam. One of the newly installed boilers operates at 250psi and then drops the

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 as well as 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.



## Chilled Water

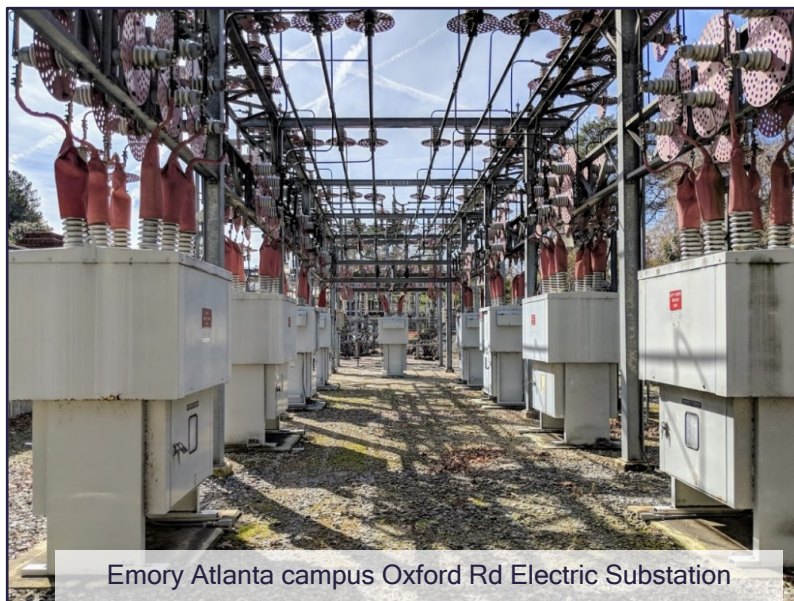
Three main chilled water plants provide cold water for space cooling to numerous buildings through underground distribution systems. There are additional plants in building mechanical spaces that supply chilled water directly to a specific building.



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. In 2022, Emory nearly completed construction to upgrade chillers in the Michael Street chiller plant that will significantly boost reliability and efficiency for meeting the campus cooling load.

## Electricity

In 2021, Georgia Power provided over 250 million kilowatt hours of electricity to the central campus facilities with a peak summer electric demand of about 42 megawatts. 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.

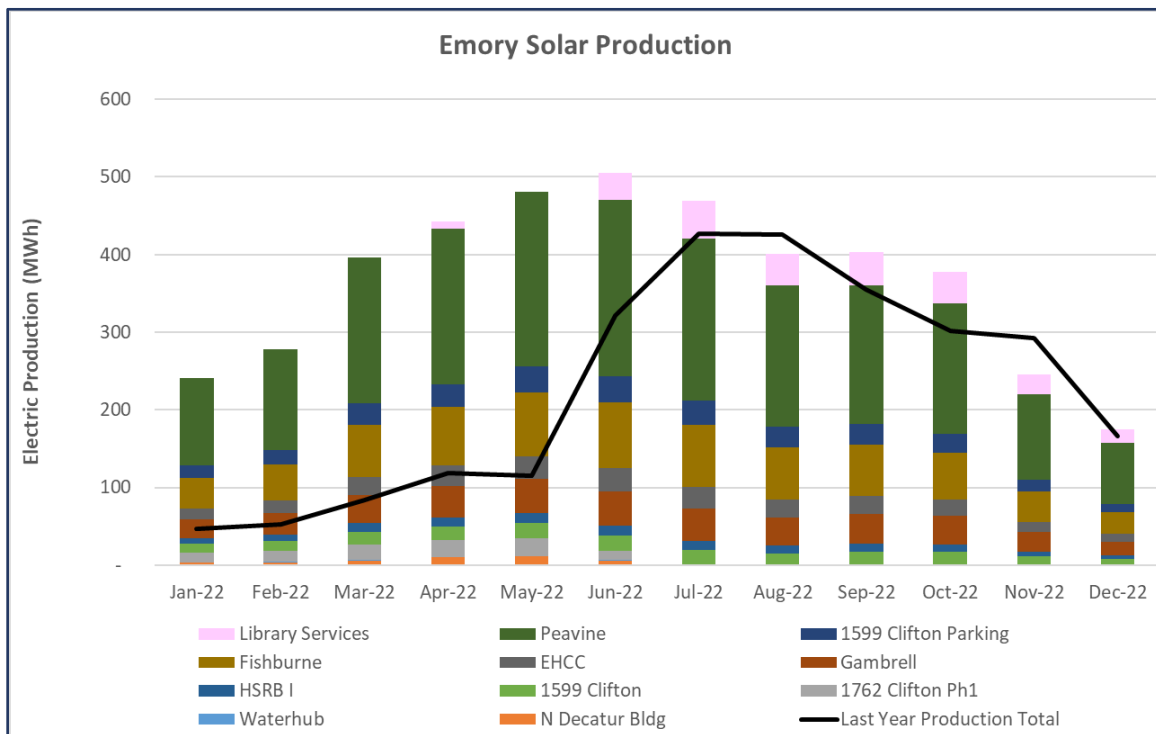


Emory Atlanta campus Oxford Rd Electric Substation

# EFFORTS TO ACHIEVE SELF-GENERATION

## Solar Produced Electricity

To date, Emory has installed twelve solar projects with a combined capacity of **3.6 MW**. In 2022, Emory's solar projects produced over **4412 MWh** of electricity, a 63% increase over 2021.



## Combined Heat & Power 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. In June 2022, the generator was removed from service for substantial maintenance and repairs. The generator is expected to be back online in mid-2023. Emory generated **388 MWh** of power from the steam turbine generator in the beginning of 2022 (pictured left).





# EFFORTS TO ACHIEVE WATER REDUCTION

## The WaterHub at Emory

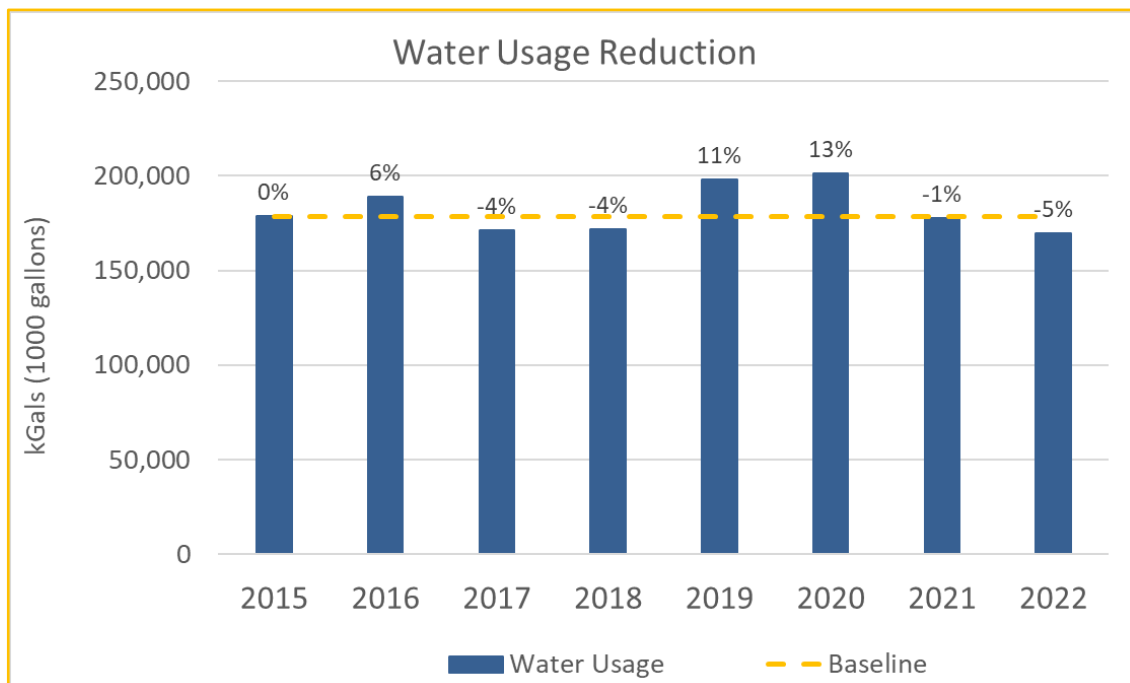
Launched in 2015, Emory's WaterHub is an on-site water reclamation system which utilizes eco-engineering processes to clean wastewater for non-potable use on campus, primarily for utility water make-up and toilet flushing.



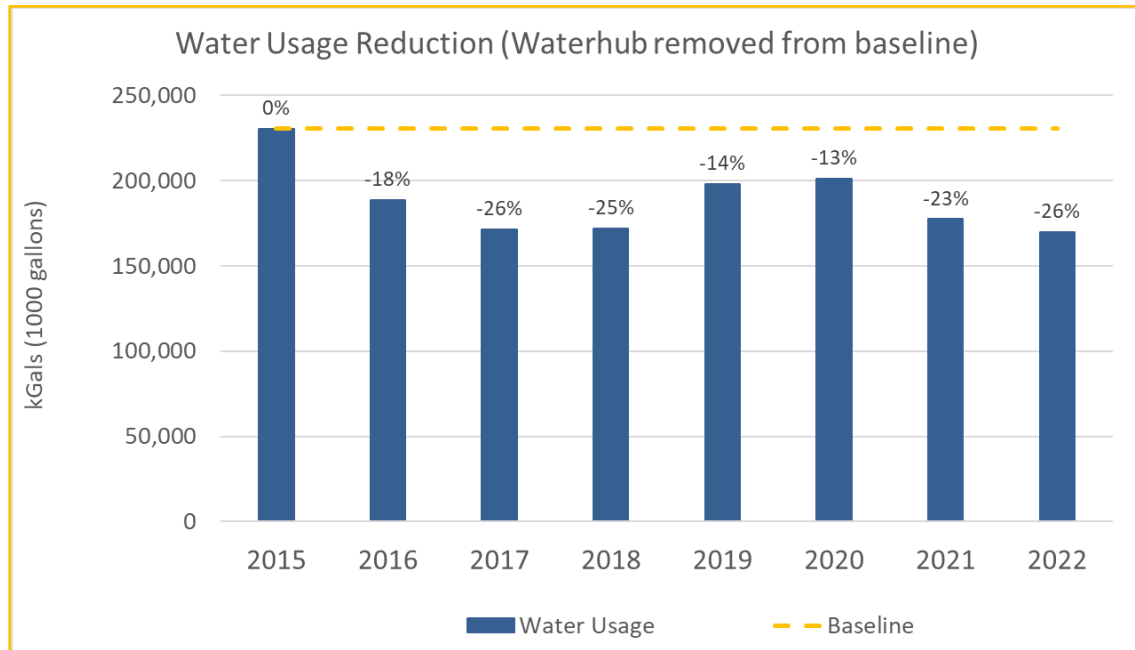
This water reclamation facility is the first of its kind in the United States. In 2022, Emory's WaterHub displaced over **64 million** gallons of city potable water to Emory's major utility plants. The facility provides **75%** of total water sent to cooling towers around campus. Since operations began, the WaterHub has used over 55,200 kWh of solar energy produced from its panels (approximately 6,600 kWh in 2022).

## Water Reduction

Emory has a current water reduction of **5%** from our 2015 baseline. Emory is currently upgrading many of the water meters around campus to better track usage. Dekalb county provides data on our water usage which has proved to be unreliable.



The WaterHub is Emory's largest contributor to water usage reductions to meet our goals. Since the WaterHub came online in 2015, the usage gets factored into our baseline for tracking water reduction, which unfortunately does not show the effect on Emory's water potable water consumption. The chart below better tells the story of the WaterHub's impact at Emory.



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  
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