2017 Annual Energy and Utilities Report
In 2017, Emory has continued its dedication to reduce energy use per square foot (EUI) by 50 percent in 10 years, and overall by 25% as part of the 2015 Sustainability Vision and Strategic Plan. To date, Emory has achieved an overall EUI reduction of 8.6% since 2015. Emory also targets to reduce potable water consumption 50% by 2025 and has made great progress through the first two and a half years operating its WaterHub. Emory is committed to self-generate 10% of campus electric use, and currently has installed over 1.25MW made up of solar and co-generation with a steam turbine.

The 2025 total energy use reduction goal of 25% challenges Emory to reduce energy consumption while also meeting its current building expansion plans. The new design and construction standards, with a minimum LEED Silver requirement, have been a large contributor to the energy reduction goals to date. In addition to energy reductions, in-house Building Commissioning, HVAC optimization, lighting retrofits, and other conservation projects will enable Emory to meet these goals.

- Continue to increase electricity generation on-campus to reach the goal of 10% self-generation by 2025.
- Create and leverage incentives for all operating units to conserve energy and water including the use of a sustainability revolving loan fund.
- Expand the Commissioning programs which aim to maintain optimal performance of a building’s mechanical systems.
- Eliminate drinking water use for non-potable uses (i.e. toilet flushing, HVAC)
- Maintain operational excellence for Emory utility systems including steam and chilled water
- New construction/major renovations will have targeted EUIs 25% lower than campus average or current conditions.
- Leverage Sustainability Representatives from every major building on campus to assist in meeting Emory’s goals.
Utility Performance

The 2025 Goals (with a 2015 Baseline) are to reduce:

- Total Energy Consumption 25% to 1.2 million mmBtu.
- Energy Use Intensity (EUI) by 50% to 137.5 kBtu/sqft.
- Potable Water Consumption by 50%.

Since 2005, Emory has reduced EUI by 33.6%.
Georgia Power provides over 270 million kilowatt hours of electricity annually to the central campus facilities with a peak summer electric demand of about 45 megawatts. Electric power is primarily fed by Georgia Power through two substations and then delivered by the Emory 20kV distribution system. Electricity consumption is metered either by Georgia Power directly or by Emory meters at every building.

Self-Generation

As part of the 2025 goals, Emory is committed to self-generate 10% of energy used on campus to replace fossil fuel sources. Currently, Emory has installed four solar projects with a combined capacity of 1.36 MW. In 2017, Emory’s solar projects produced over 458 MWh of electricity; a 20% increase over 2016.

In 2017, Emory commissioned a steam turbine generator with a nameplate capacity of 1MW. This electricity will not only offset electricity purchases but will also provide back-up power in the case off-site power is lost. In 2017, 1.89 MWh were generated on campus, approximately 1% of campus energy usage. Self-Generation at Emory has increased 400% year over year.
Efficiency Initiatives

**Revolving Loan Fund**

Launched in 2017, this self-replenishing program will be used to fund capital-intensive energy and water efficiency projects across campus. Preliminary plans were approved in late 2017 for the first project which will replace constant volume laboratory fume hoods in the O. Wayne Rollins Building with variable air volume fume hoods. This project will reduce overall energy consumption in addition to improving safety. This project will move towards implementation in 2018 and has an estimated simple payback of 3.5 years. The revolving loan fund will help Emory develop more efficiency projects, saving both natural and financial resources.

**Lighting Upgrades**

As part of its ongoing initiative to upgrade its parking decks, Emory completed two additional retrofit projects, bringing its total to five. Along with a typical **70%** reduction in energy usage; the lighting quality, lighting levels, and nighttime safety were improved at each location. The Fishburne parking deck lighting project decreased the connected lighting load from **40kW** to **13.5kW** while the 1525 Clifton Parking deck project decreased the connected lighting load by **70%**. A smaller project completed in 2017 was an upgrade of the Briarcliff campus site lighting which reduced the connected lighting load from **19.4 kW** to **9 kW**.

The lighting upgrades resulted in over **$200,000** in savings and a reduction of over **3,000 MWh**.

**Holiday Turndown**

Over the two periods of official University winter holidays, the heating systems in buildings across Emory’s campus are programmed to maintain a 55° F minimum set point. Adjusting the minimum set point reduces energy costs while still protecting building contents. This effort has expanded to include 5 additional buildings in 2017 and resulted in an overall energy reduction of **710,000 kWh** in comparison to normal building operations.

The energy reduction from the 2017 Holiday Turndown is equivalent to **57.1** homes’ energy use for one year.
Recommissioning

Recommissioning is an ongoing strategic process, which optimizes existing building systems by identifying controls, schedules, faulty equipment or installations and setting the building back on course for energy efficiency. Beginning with the 2017 fiscal year, all new project commissioning has been done in-house. Not only does this save money but it also keeps project knowledge in-house, allowing Emory to train and support its operating staff more effectively.

Sustainable Performance Program (SPP)

The SPP is a continuous commissioning program that strives to keep the building HVAC systems optimized and prevent performance degradation. Prior to 2017, there were 22 buildings in the program. Three additional buildings were added in 2017. This year, the commissioning group added a full time specialist who is solely focused on addressing issues uncovered by the Fault Detection and Diagnostic systems and programming. Now, Emory has 4,500 energy alarms built among the buildings in the SPP. These alarms identify not only energy waste but also serve to find broken components that affect occupant comfort. This allows Emory to focus its time efficiently on the 25 buildings included in the program to drive energy reductions and quickly react to issues.

Since 2016, three buildings added to the SPP Program have provided over $260,000 in operating cost savings.

Woodruff Library Total Energy Usage

Woodruff Library Energy Usage after implementation of the SPP Program
Launched in 2015, Emory’s WaterHub is an on-site water reclamation system which utilizes eco-engineering processes to clean waste water primarily for utility water make-up. In 2017, Emory’s WaterHub displaced nearly 60 million gallons of city potable water to Emory’s major utility plants, providing 98% of total make-up to cooling towers around campus. Since operations began, the WaterHub used over 20,000 kWh of solar energy (approximately 7,000 kWh in 2017).

Supported by the Energy and Utilities Department as well as the Office is Sustainability Initiatives, four selected student docents rotate every semester to provide public access to the WaterHub for both the Emory students and staff as well as the surrounding community. This world-class facility has attracted the attention of many facilities managers, corporate executives, sustainability personnel, and more. In 2017 alone, over 1,000 people visited and toured the WaterHub facility.

Emory displaced nearly 60 million gallons of city potable water in 2017. This is enough water to fill an Olympic sized swimming pool over 90 times.
Steam Production

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 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. A new boiler was installed in 2017, replacing a 45 year old inefficient unit.

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

The focus in 2017 for Emory’s chilled water system was the ongoing maintenance of equipment and replacement of older components with newer, more energy efficient components across campus. A new cooling tower was installed at the Woodruff Memorial Research building (WMRB) to serve the west wing that replaced an older, more inefficient unit. There was also a repair to the plate frame heat exchanger at the 1525 Clifton Road building. This new exchanger provides the ability to shut down the chiller and run about 70% less hours annually.
LEED Construction

In order to meet Emory’s long-term energy reduction goals, special attention must be paid to the removal of old buildings and addition of new buildings on campus. The minimum design and construction standard for Emory is LEED Silver. In summer 2017, the Dobbs University Center was demolished to make room for the new Campus Life Center (CLC) which will meet the LEED Silver requirement as well as have a target EUI 50% lower than the current campus average. To help achieve the energy goals set for the CLC, Emory has incorporated a geothermal heat pump system that will be installed in 2018. The building will also feature solar hot water heating for the kitchen and a chilled beam system that supplements the geothermal heating and cooling system.

Geothermal heat pump systems utilize the temperature from ground to heat and cool the building.

Demolition of the Dobbs University Center

Sustainability Initiatives

Achieving Emory’s water and energy reduction goals requires extensive engagement across all levels of the University, especially coordination between Energy & Utilities and the Office of Sustainability. Programs such as the Revolving Loan Fund, Holiday Turndown and the Annual October Energy Competition engage the campus community and raise awareness of Emory’s energy goals.

Annual October Energy Competition

Every October, all major buildings on Emory’s main campus compete for the greatest percentage energy reduction from the prior year. The 2017 winners for Emory’s Atlanta Campus are the Emory Clinic Building A, the North Decatur Building, Alabama Hall and Fleming Hall. The campus saved over 800,000 kWh in comparison to October 2016.

Energy and Water Task Force

A team of Emory University students, faculty and staff was created to identify ways to reduce the energy and water needs of Emory University and engage campus in these conservation efforts. Notably, the temperature policy to keep building thermostats within a range of 68 degrees 76 degrees.
2017 Awards

Atlanta Better Buildings Challenge:

MVP Award - College/ University

The Atlanta Better Buildings Challenge (ABBC) is part of the Department of Energy’s national competition among cities to enroll the most square feet of building space into a commitment to reduce energy and water use by 20% by 2020. Emory has signed onto the City of Atlanta’s commitment, making Emory the largest participant in the program.

DOE Smart Energy Analytics Campaign:

Energy Performance in a Portfolio

The Smart Energy Analytics Campaign is a program led by the U.S. Department of Energy (DOE) that encourages the use of a wide variety of commercially available Energy Management and Information Systems (EMIS) technologies and ongoing monitoring practices to help uncover energy-saving opportunities and improve building performance for the long run. In 2017, Emory University received an award for Energy Performance in a Portfolio by achieving a 25% reduction in whole building energy use since implementation of existing building commissioning and in-house Fault Detection and Diagnostics as part of the Sustainable Performance Program (SPP).