The University of Alabama in Huntsville
Energy Management Strategy

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Overview

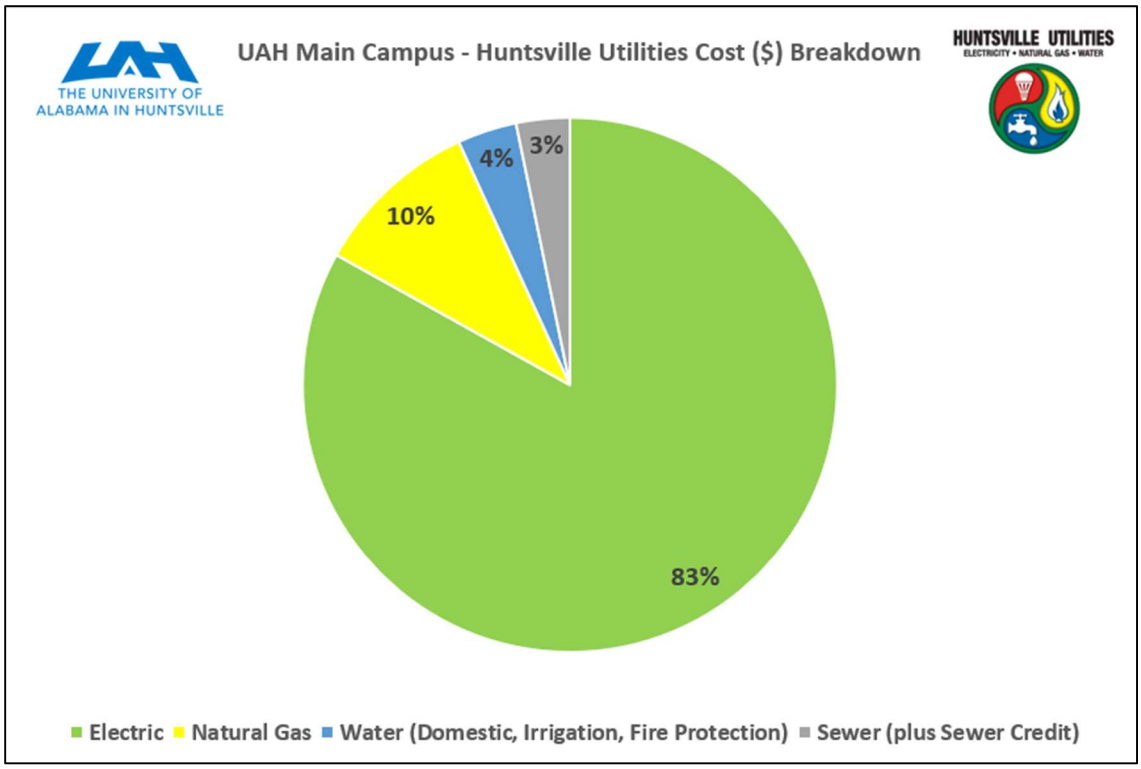
The University of Alabama in Huntsville (UAH) campus is located in Huntsville, Alabama within the Cummings Research Park. The 500+ acre campus includes nearly 100 buildings encompassing nearly 3.4 million gross square feet, a parking deck and a 9-acre lake to support over 12,000 students, faculty, and staff.

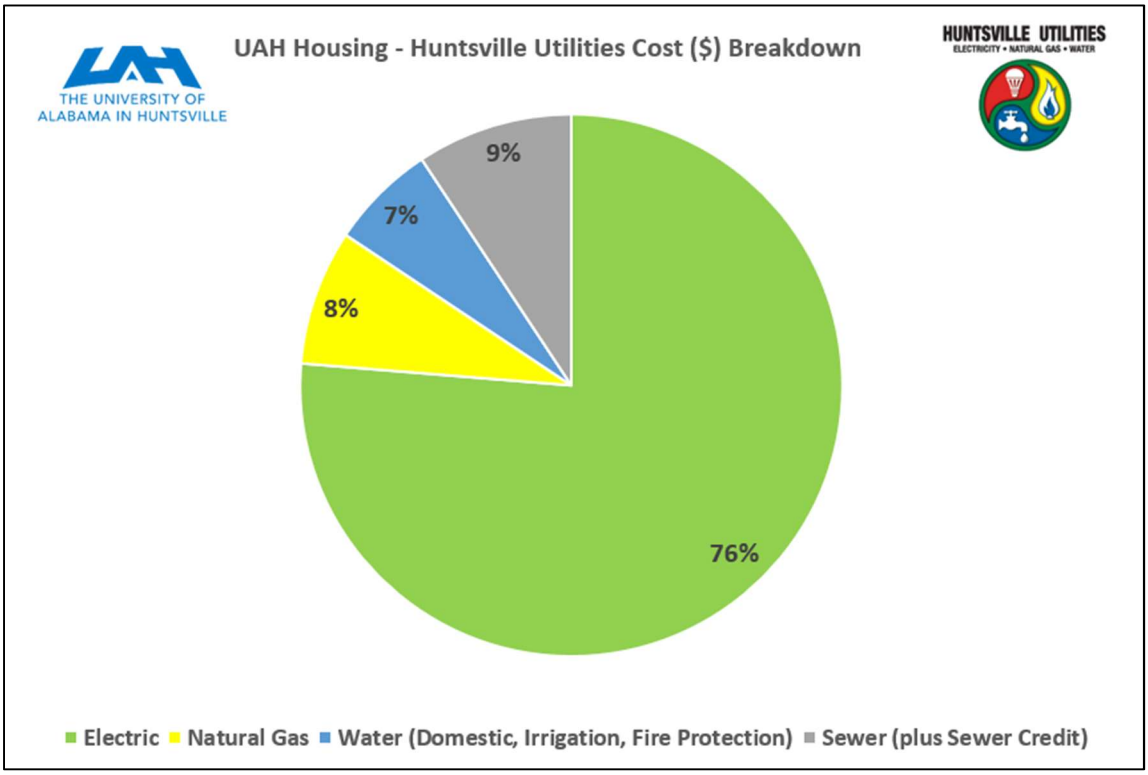
UAH is one of Huntsville Utilities' largest utilities customers. The three main collective bills are broken into Main Campus (including E&G, Auxiliaries, and the Lowe House), Executive Plaza, and Housing. The Main Campus collective bill is comprised of approximately (156) total customer accounts including (1) GSA-3 (1,001-5,000kW) account, (30) GSA -2 (51-1,000kW) accounts, and (20) GSA -1 (0-50kW) and outdoor lighting accounts as well as (28) natural gas accounts, (44) water/sewer accounts, (10) fire protection accounts and (23) irrigation accounts. The Executive Plaza collective bill is comprised of approximately (28) total customer accounts including (7) GSA -2 accounts and (6) GSA -1 accounts as well as (14) water/sewer accounts and (1) fire protection account. The Housing collective bill is comprised of approximately (208) total customer accounts including one (7) GSA -2 accounts, (10) GSA -1 accounts, (135) Residential electric accounts as well as (19) natural gas accounts, (29) water/sewer accounts, (4) fire protection accounts and (4) irrigation accounts.

UAH typically spends over $6.5 million dollars annually on utilities. Therefore, it is essential that the campus adopt an energy policy to promote the conservation of energy. This will result in cost savings that can be invested in University infrastructure upgrades in addition to conserving our natural resources. Although energy conservation is the focus of this policy, comfortable work and learning conditions must also be achieved.

The Main Campus Utilities and Housing Utilities annual costs be broken down into electric, natural gas, water (domestic, irrigation, fire protection), and sewer (plus sewer credits). The FY2021 utilities cost breakdowns in the charts below show that electric and natural gas account for nearly up to 93% of the overall annual utility cost.

Facilities & Operations promotes a culture of sustainability and financial stewardship with strategies and projects that support energy conservation, cost reduction, and infrastructure improvement.


UAH Main Campus - Huntsville Utilities Cost ($) Breakdown
THE UNIVERSITY OF ALABAMA IN HUNTSVILLE
HUNTSVILLE UTILITIES
ELECTRICITY • NATURAL GAS • WATER
3%
4%
10%
83%
Electric
Natural Gas
Water (Domestic, Irrigation, Fire Protection)
Sewer (plus Sewer Credit)


UAH Housing - Huntsville Utilities Cost ($) Breakdown
THE UNIVERSITY OF ALABAMA IN HUNTSVILLE
HUNTSVILLE UTILITIES
ELECTRICITY • NATURAL GAS • WATER
9%
7%
8%
76%
Electric
Natural Gas
Water (Domestic, Irrigation, Fire Protection)
Sewer (plus Sewer Credit)

UAH's Energy Management Strategy

The University's energy management program is designed to reduce utility consumption along with operating and maintenance expenditures by the implementation of energy conservation projects. The University's Energy Management Policy is the guiding document for the Energy Management Strategy and its tactics are below. The UAH Energy Management Strategy will be updated periodically or as circumstances require. The primary goals are:

1. Reduce operating expenses and promote sustainability**.** The COVID19 pandemic increased remote work and learning resulting in limited operations on campus. This inspired the Facilities & Operations Staff to find additional ways to reduce energy consumption. An energy management program can reduce expenses and promote sustainability through more efficient operation of its energy-consuming equipment, especially heating, cooling and lighting functions.

2. Continuously improve energy efficiency**.** UAH is developing an Energy Conservation Measure (ECM) plan with prioritized projects over multiple years. UAH will engage an Energy Consultant to perform a level 2 energy audit to identify a broad rand of ECMs with various returns on investments (ROIs).

3. Leverage end-of-useful-life-cycle and technology obsolescence**.** UAH's Facilities & Operations utilizes an Annual Capital Development Plan (ACDP) plan to communicate, prioritize and implement capital projects and deferred maintenance needs. A sound energy management program can help justify capital projects, including those with equipment end-of-useful-life-cycle and technology obsolescence issues. Feasible energy conservation projects will provide both qualitative benefits (e.g., new air conditioning units and lighting retrofits will make workspace more comfortable for employees) along with quantitative (operating cost, heat load and maintenance reduction) benefits.

Key components:

The overall goal is to reduce energy consumption when operationally, financially and sustainably feasible. Energy management planning directly impacts the triple bottom line of the university: Energy, Environment, and Economics. To accomplish this objective UAH Facilities & Operations utilizes the following processes:

A. Benchmark Energy Performance - An energy performance baseline was established in FY2018 to quantify the energy use intensity (EUI) for the campus. The EUI is expressed as energy per square foot per year. It's calculated by dividing the total energy consumed by the building in one year (measured in kBtu) by the total gross floor area of the building. Source energy is the most equitable unit of evaluation, and enables a complete assessment of energy efficiency. Building square footage fluctuations normalize the energy consumption metric.

EUI is used to: (1) measure and monitor building energy performance, (2) compare building performance to similar UAH buildings, and other institutions (3) prioritize energy conservation measures. A quarterly and annual utility report will be used to track and trend energy performance and reported to leadership. The F&O Southern Association of Colleges and Schools (SACS) Assessment Report will also be used to assess energy performance, goals, and outcomes.

B. Planning and Prioritization - Energy conservation projects are researched, quantified and prioritized based on several factors including:

   i. *End of Useful Life cycle*- Capital improvement projects that replace lighting, heating/ventilation/air conditioning, control systems, and other building related projects typically have opportunity to reduce building energy consumption and improve workspace comfort and functionality.

   ii. *High Priority*- Include "Low hanging fruit" projects with a 3 year or less simple payback (return on investment).

   iii. *Medium Priority*- Projects with a simple payback period of 3-6 years and are typically justifiable if funds are available.

   iv. *Low Priority*- These projects typically have 6-10 years simple paybacks. Rebates and incentives often help justify these investments.

   v. *High visibility*- includes projects that may not have a favorable payback period but significantly increase energy awareness such as lighting dimmers and solar photovoltaic panels.

C. Energy Awareness - The purpose is to promote an energy conservation emphasis across the campus through education and participation. This can be done by communicating plans and accomplishments via University Sustainability Committee, success stories and UAH website.

D. Facilities & Operations Standards

1. *Lighting:* To reduce energy and improve illumination:

- UAH will consider energy reduction lighting projects when the existing illumination is failing and/or obsolete, and the ROI is feasible, the technology is proven and aesthetics are improved.
- UAH also uses motion and occupancy sensors and other smart lighting controls when technology and return on investments are favorable.

2. *Heating, Ventilation and Air Conditioning:* In order to maintain reasonable comfort and lower energy expenditures the University has established the standards for comfort heating and cooling. Even during periods of closure the University has opportunities to save money on utilities that can be spent in other areas. Past history has shown that very few people occupy the buildings for any substantial time during the holidays. With this in mind, buildings will be only minimally heated/cooled during nights, weekends, and holiday periods except for buildings that contain 24/7 occupancy, special collections, or sensitive equipment or buildings that are officially open during these periods. Per the UAH Energy Management Policy, HVAC thermostats will have the following set points:

	Cooling Mode	Heating Mode
Occupied Space	70-74 degrees F	68-72 degrees F
Unoccupied Space	80 degrees F	64 degrees F

3. *Equipment and Appliances:* Per the UAH Energy Management Policy, users should turn off (or if possible, put in sleep mode) the following equipment and components on campus during limited and/or closed operations:
    - Non-essential interior lighting that is not already turned off via Building Automation
    - Office computers, printers, and monitors
    - Copy machines and scanners
    - Personal space heaters and appliances
    - Any other non-essential electronically operated equipment

Energy Management Program Resources

A comprehensive energy management program requires resources including competent personnel to manage the program, specialized energy consultants to provide support, and engineering firms to provide design and construction services for energy conservation projects.

UAH's energy program resources are:

- Director, Utilities & Sustainability - The Facilities & Operations Department manages the campus energy program via one full time employee who also handles the budget for the main campus utilities, tracks the energy performance for the entire campus, and manages the ECM list and Energy Management Plan.

- Utility Providers – UAH will foster partnerships with its utilities service providers, Huntsville Utilities and TVA, in order to maintain constant and consistent communication.

- Energy Consulting Firms - As needed and approved, UAH will utilize energy consulting engineers for special projects including audits, ECM quantification, and retro – commissioning.

- University Sustainability Committee – The campus group's charge is to provide guidance and involvement for grassroots for sustainability participation on campus; to provide leadership in sustainability efforts and initiatives within respective departments on campus; to enhance collaboration and partnerships across campus; to provide feedback and support to the UAH Sustainability Program.

- Professional Associations – Staff and consultants both participate in professional associations including AEE, AASHE, STARS, IFMA and ASHRAE best practice for knowledge training and certifications.

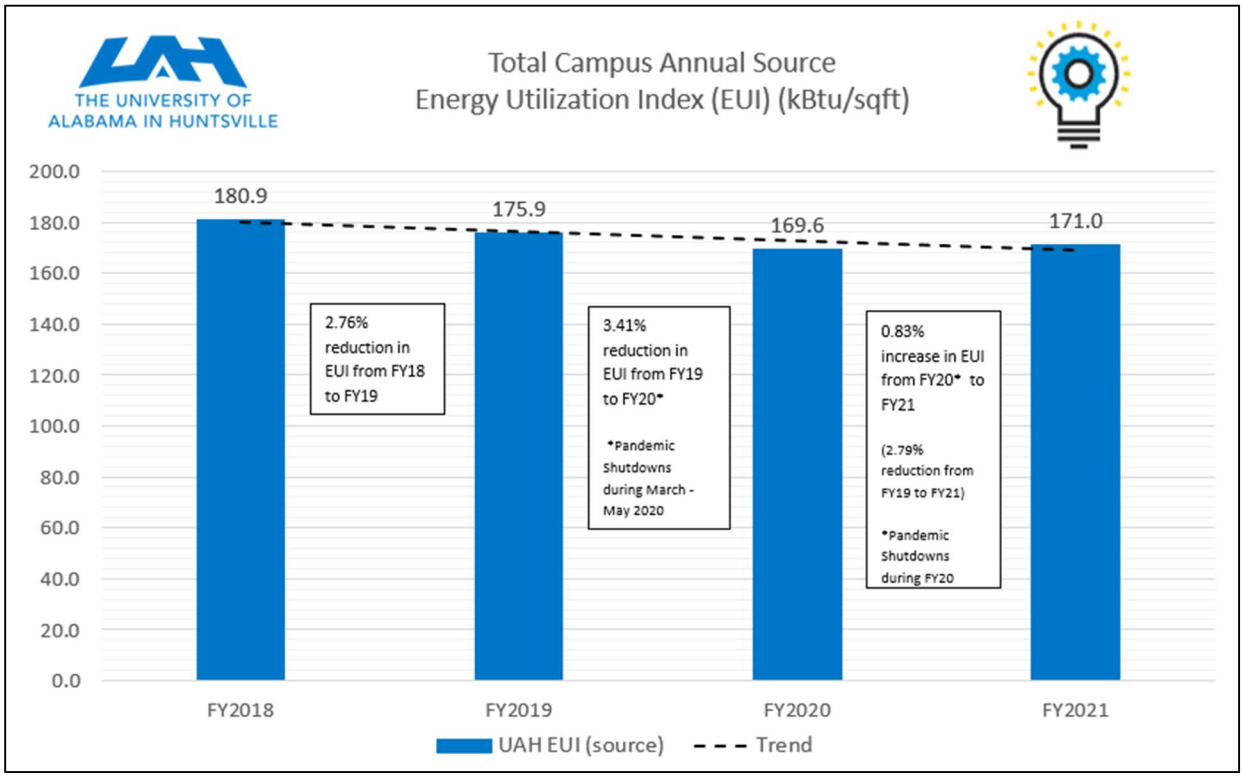
Goals and Accomplishments

The Total Campus Annual Source Energy Utilization Index (EUI) chart below includes electrical and natural gas data from the Main Campus and Housing Consolidated Utilities bills (Executive Plaza is not included). The Source EUI is expressed as energy per square foot per year. It is calculated by dividing the total energy consumed by the buildings in one year (measured in kBtu and then converted to source energy) by the total gross floor area of the buildings. Generally, a lower EUI signifies better energy conservation performance. Based on the reference table in Portfolio Manager Technical Reference: U.S. National Energy Use Intensity, the national median (or mid-point) energy use of colleges/universities is 180.6 Source EUI. UAH FY21 EUI of 11.0 fall within that range.

UAH is striving to reduce overall campus energy consumption by 20% over the next decade or 2% annually via energy conservation measures (ECM) including LED lighting retrofits measured and verified via electrical metering, fixture outputs, and utility bills. A 20% reduction from the baseline EUI in FY2018 of 181 correlates to a EUO goal of 147 by FY2028.

Since FY2018, the Total Campus (Main Campus + Housing) EUI has seen a reduction of 5.47% over the last three years which equates to 1.82% in annual reductions slightly below the 2% annual goal. The total Campus (Main Campus + Housing) Energy Utilization Index (EUI) – (kBtu/sqft) is based on Fiscal Year (Oct – Sept). This reduction was due to low/no cost measures such as the

COVID Energy Conservation Protocol implemented during limited campus operations and the execution of several energy projects listed below.



These four energy conservation measures completed in FY2020 have reduced UAH's electrical consumption approximately 608,744 kWh, which is 1.34% of total electrical consumption.

1. ECM-001 Library 2nd Floor Lighting Retrofit – 86,719 kWh annual savings (project completed November 2019)
2. ECM-002 Spragins Hall Basketball Court Lighting Retrofit – 165,003 kWh annual savings (project completed February 2020)
3. ECM-003 IMF Parking Deck / Parking Lot W20 Lighting Retrofit – 278,918 kWh annual savings (project completed January 2020)
4. ECM – 004 UFC Ball Court Lighting Retrofit – 78,104 kWh annual savings (project completed December 2019)

These six energy conservation measures completed in FY2021 have reduced UAH's electrical consumption approximately 498,821 kWh, which is approximately 1% of FY2021's total (Main Campus + Housing) electrical consumption.

1. ECM-005 (IMF – UFC exterior) 118,166 kWh saved (December 2020)
2. ECM-006 (Roberts Hall Sculpture Studio) 50,524 kWh (October 2020)

3. ECM-007 (Parking lot W21, W23, W24, W26, W31) 67,163 kWh saved (December 2020 - April 2021)
4. ECM-008 (PPB Parking lot – W33) 16,648 kWh saved (April 2021)
5. ECM-009 (Phase 1 of Parking Lot Lighting Retrofit RFP P00232) 239,202 kWh saved (August 2021)
6. ECM-010 (JRC lot W32 – HU owned lights) 7,118 kWh saved (April 2021)

Conclusion

UAH is committed to developing and executing a cost effective and sustainable energy management strategy that will reduce energy consumption, lower operating cost, extend equipment life, and provide a comfortable campus. UAH will continue to achieve energy reductions through its commitment to energy awareness, fiscal responsibility and good stewards of the environment.

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