

THE UNIVERSITY OF CHICAGO

Sustainability Plan Update

December 2019

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Climate Change and Energy

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EXECUTIVE SUMMARY



THE UNIVERSITY OF
CHICAGO

Office of
Sustainability

Sustainability at the University of Chicago

The University of Chicago is committed to creating a sustainable campus. With its tradition of rigorous inquiry, the University is positioned to evaluate the challenges of sustainability and create measurable results.



Executive Summary

Managing greenhouse gas emissions is the top sustainability priority of the University of Chicago. Energy consumption in campus buildings has the largest impact on University greenhouse gas emissions, contributing approximately 70% of the University's annual greenhouse gas emissions. Reducing building energy usage impacts University greenhouse gas emissions while avoiding operating cost.

RECENT AWARDS

Bon Appétit's Student Activist Grant for Sustainability Initiatives

Phoenix Sustainability Initiative Service Group

Mayor's Leadership Circle by Retrofit Chicago

Regenstein Library and Joe and Rika Mansueto Library

ASHRAE® Illinois Chapter Excellence in Engineering Award

Searle Chemistry Laboratory

ENERGY STAR® Certification

Rosenwald Hall and Walker Museum

Peoples Gas Award®

Commitment To Energy Efficiency

1 CLIMATE CHANGE AND ENERGY

11%

decrease in carbon intensity from target base year to 2018

2 HIGH PERFORMANCE BUILDINGS

1 LBC
Living Building Challenge

2 PLATINUM
13 GOLD
4 SILVER

LEED Certified Buildings

3 MULTI-MODAL TRANSPORTATION

14%
University faculty and staff

40%
student drivers


reduction in single occupancy vehicles driven between 2004 to 2019*

4 WASTE REDUCTION

40%

waste diverted from landfills in 2018

5 FOOD SYSTEMS



energy efficient equipment upgrades include commercial-grade dishwasher that utilizes exhaust heat to heat incoming cold water

6 GREEN SPACE

10

new green spaces throughout campus reconnect us with nature in the urban environment

7 WATER CONSERVATION

6%

approximate increase in total annual water consumption from 2013 to 2017

8 ENVIRONMENTALLY PREFERABLE PROCUREMENT

132

water filtration units installed on campus to replace 5-gallon plastic bottled water service

9 BUILDING AWARENESS AND PARTNERSHIPS



UChicago sustainability map and self-guided walking tour

*Data based on transportation survey conducted in 2004, 2014, and 2019. Although there has been an increase in single occupancy driver-ship between 2014 and 2019, there is an overall decrease trend since 2004.

Area 1: Climate Change and Energy

2025 goal: the University has a goal to reduce its greenhouse gas emissions by 20% by 2025.

Greenhouse gas emissions reduction is the key sustainability goal as the University seeks to understand and reduce its contribution to climate change.

Greenhouse gas emissions are tied to all major campus operations, including buildings, transportation, waste, food, green space, and procurement. Each of these areas is included in the Sustainability Plan, with energy efficiency in buildings as the top priority. By reducing building energy use, the University reduces greenhouse gas emissions and avoids operating costs.

The University of Chicago Greenhouse Gas Emissions Reduction Plan (FY2018–FY2025) was developed and posted in 2018 as an outline to guide achieving the 2025 goal. The plan includes five strategies, as indicated in table 1.1, and is currently being implemented.

Since natural gas and electricity use in campus buildings contribute approximately 70% of the University’s greenhouse gas emissions, and reducing energy use results in cost avoidance to the University, the majority of actions have

been in identifying and implementing energy conservation measures. Refer to Area 2: High Performance Buildings, later in this update, for additional information.

The first step in managing greenhouse gas emissions is to quantify them. The University’s greenhouse gas emissions inventory provides a clear understanding of the emissions profile. Understanding the inventory enables the Office of Sustainability (sustainability.uchicago.edu), in collaboration with Facilities Services Operations and various partners across campus to develop and implement sustainability initiatives targeted to areas of specific concern or inefficiency. Further, it allows the monitoring of sustainability progress for cost effectiveness, environmental benefit, and social responsibility.

As shown in figure 1.1, University carbon intensity for scopes 1 and 2 decreased by approximately 11% from the target base year to fiscal year 2018. Figure 1.2 shows scopes 1, 2, and 3 greenhouse gas emissions by source for fiscal year 2018. Refer to [the University of Chicago Greenhouse Gas Emissions Inventory Report 2012–2018](#) for additional information.

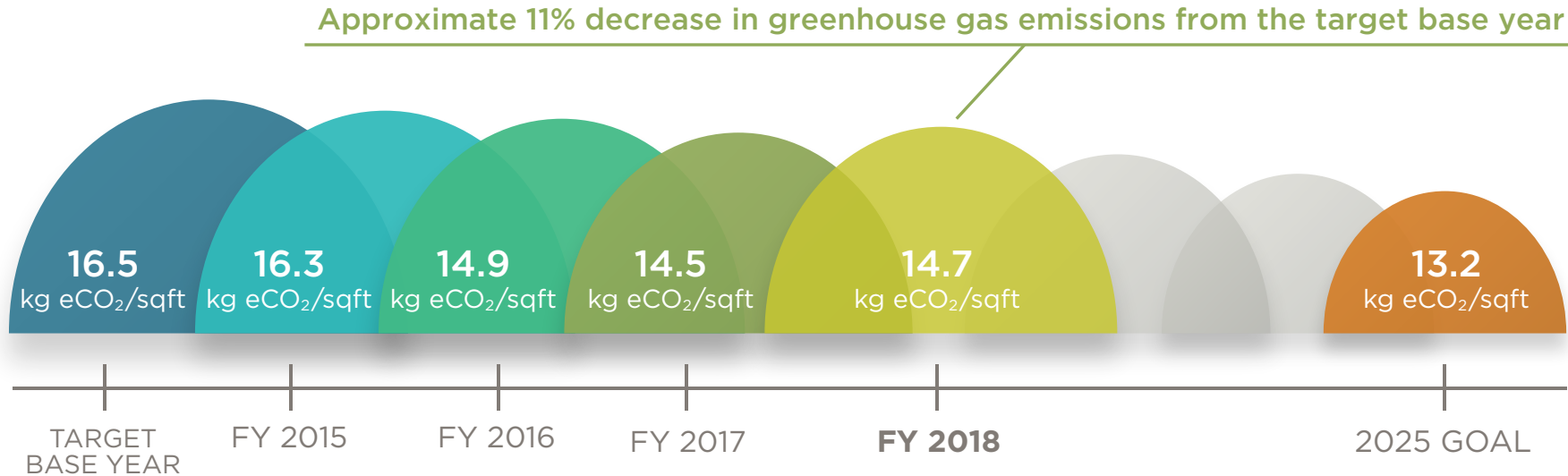
Measure Type	Description	Anticipated Greenhouse Gas Emissions Reduction Contributions
Building Preventative Maintenance and Commissioning (PM+Cx)	Investigate the top energy consuming buildings on campus for operational improvement and energy conservation opportunities.	36.5%
Central Plant Efficiency Upgrades	Implement energy efficiency upgrades at the campus steam and chilled water plants.	28.7%
Building-level Capital Energy Efficiency Projects	Implement capital projects that are identified through the PM+Cx process.	10.4%
Lighting Upgrades	Indoor and outdoor lighting upgrades around campus.	2.0%
Off-site Renewable Energy	Purchase renewable energy credits for off-site energy production.	22.4%
TOTAL		100.0%

Figure 1.1: Scopes 1 and 2 Carbon Intensity (Greenhouse Gas Emissions Per Square Foot)

Scopes 1 and 2 Carbon Intensity (Greenhouse Gas Emissions Per Square Foot)

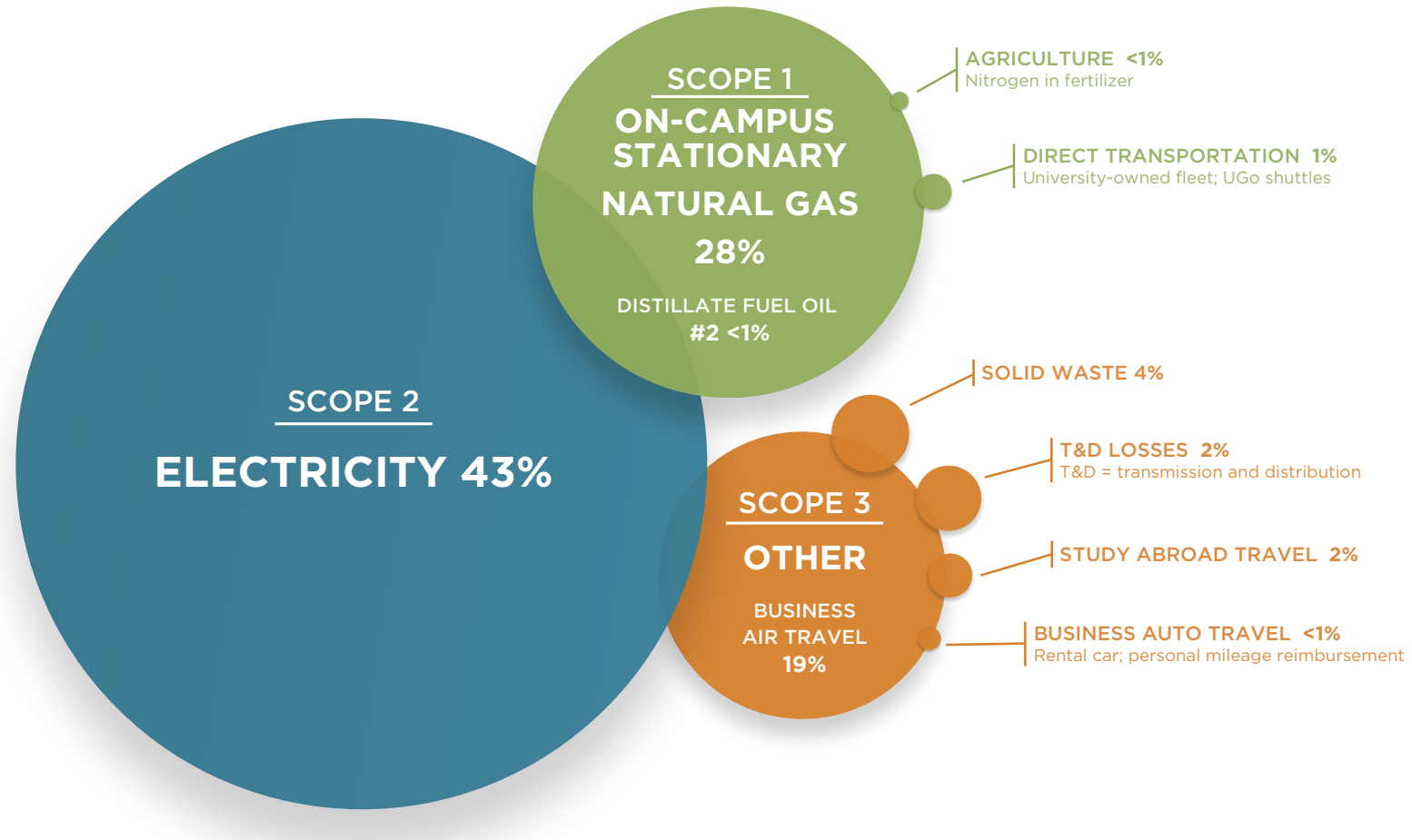
UNIVERSITY GREENHOUSE GAS EMISSIONS

Carbon intensity (greenhouse gas emissions per square foot) is measured in kilograms equivalent carbon dioxide per square foot (kg eCO₂/sqft). The 2025 goal is based on scopes 1 and 2 carbon intensity.



A NOTE ON TARGET BASE YEAR The target base year is calculated and is the average of the greenhouse gas emissions from fiscal years 2012 through 2014. It is used for setting and tracking progress toward the Sustainability Plan greenhouse gas emissions reduction goal. For example, to assess performance for fiscal year 2018, the greenhouse gas emissions from fiscal year 2018 (14.7 kg eCO₂/sqft) are compared to the greenhouse gas emissions from the target base year (16.5 kg eCO₂/sqft). This comparison reveals an approximate 11 percent decrease in greenhouse gas emissions. Greenhouse gas emissions for each subsequent year will be compared to the target base year, and performance will be assessed accordingly.

Figure 1.2: FY2018 Scopes 1, 2, and 3 Greenhouse Gas Emissions by Source



Area 2: High Performance Buildings

Goal: Reduce the consumption of natural gas and electricity

Through 2019, approximately 330+ energy conservation measures have been implemented. Highlights of implemented energy conservation measures include:

- Completed 12 projects using ComEd’s retro-commissioning program.
- Completed Preventative Maintenance and Commissioning (PM + Cx) projects in 14 buildings.
- Completed multiple central plant efficiency projects to recover waste heat from boilers, return more condensate from the buildings, install steam blanket insulation, and chilled water optimization.
- Improved lighting quality and controls in 16 buildings, and exterior lighting, saving over one million kilowatt hours annually.
- Retrofitted over 3,900 lighting fixtures with LED kits in exterior Poulsen® lights and three buildings.
- Implemented a shut-the-sash program at Searle Chemistry Laboratory that used fume hood data collected by the building automation system to encourage positive behavior in laboratory occupants resulting in a 43% reduction in fume hood airflow.

Table 2.1: Campus Site ¹ Energy Use Intensity ²	
Fiscal Year	Total ³ Energy Use Intensity [kBtu/sqft ⁴]
2012	154.5
2013	163.3
2014	171.8
2015	163.6
2016	155.7
2017	145.1
2018	155.6

¹Site energy is the amount of energy consumed that is shown on the utility bill, and does not take into consideration the creation and distribution of energy from the source.

²The portfolio of buildings included in the campus energy use intensity is a slightly larger portfolio than those included in the greenhouse gas emissions inventory, and includes steam and chilled water plants.

³In this case, *total* means natural energy use intensity from natural gas usage and electricity usage.

⁴FICM gross square feet.

Energy Use Intensity

Campus energy use intensity, a measure of total energy use per square foot in campus buildings, is an important metric used to determine campus energy performance. Table 2.1 indicates the total campus energy use intensity from natural gas and electricity usage in campus buildings by fiscal year.

Energy Management Information System

The University of Chicago increasingly relies on data to assess and improve its [energy management program](#). In 2018, Facilities Services installed an energy management information system (EMIS) to serve the University and medical campus.

The University’s EMIS houses and tracks campus utility data and allows for improved benchmarking and analyses for over 200 buildings, including monthly and interval data, normalized energy use, energy use intensity, and comparison between buildings of similar size or use type.

The energy management information system is used to create dashboards to assess campus energy performance, communicate and engage with building managers and occupants, check the validity of meter data, prioritize energy conservation efforts, and ensure persistence of savings when energy conservation measures are completed.

LEED and Living Building Challenge

The U.S. Green Building Council’s LEED® (Leadership in Energy and Environmental Design) green building certification program is the preeminent program for the design and construction of high-performance buildings. [Nineteen University buildings have achieved LEED® certification](#).

Keller Center is the University’s first LEED® Platinum building and first Living Building Challenge certified building. It is University policy that new major capital projects with a construction cost greater than \$5 million pursue LEED® Silver.

For projects under \$5 million, Facilities Services has recently amended the University’s [Facilities Services Facility Standards](#) project guidelines to support integrating sustainable strategies that are readily achievable on small projects. Areas addressed include: sites and grounds including storm water management, heating, ventilation, and air conditioning retrofits including energy metering; lighting controls and building automation systems; plumbing fixtures; and design strategies, furniture, fixtures and equipment. Projects initiated during fiscal year 2020 will serve as a pilot.

See also [Facilities Focus](#).



Keller Center
LEED® Platinum
Living Building Challenge Certified
Photo by Tom Rossiter

Area 3: Multi-Modal Transportation

Goal: Reduce transportation related greenhouse gas emissions

Campus Planning + Sustainability is collaborating with Transportation and Parking to identify near-term and long-term strategies and recommendations to encourage the reduction of single-occupancy vehicles on campus. The results of a recent campus-wide survey provided data to support this effort.

Additional accomplishments in the area of multi-modal transportation include:

- Implemented undergraduate student UPASS in 2016.
- Improved CTA and shuttle service to increase ridership while reducing operating costs.
- Researched series of parking best practices and recommended changes to current systems. Phased implementation began in 2019 with increased parking rates.
- Identified transit subsidies and additional shuttle services to help reduce the number of single occupancy vehicles traveling to campus.

Area 4: Waste Reduction

Goal: Reduce the amount of total landfilled waste

Several efforts are taking place on campus related to waste diversion.

- The University has a new waste hauler, with an increased focus to divert waste from landfills.
- In 2019, the Office of Sustainability and Facilities Services, in collaboration with Housing and Residence Life, developed a pilot residence hall recycling initiative. New signage was developed, posted, and tested with waste audits.
- A new recycling initiative is underway at Regenstein Library with newly developed signage and is currently being tested with waste audits.
- [Facilities Services Facility Standards](#) were amended to include a construction waste policy for all projects, including those under \$5 million in construction costs.

Area 5: Food Systems

Goal: Increase the amount of responsibly raised, grown, and sourced food purchased by UChicago Dining

UChicago Dining, in partnership with Bon Appétit, strives to reduce the environmental footprint while developing programs that promote sustainability through environmentally friendly products and practices, sustainable food and local purchasing options, energy and water conservation efforts, and waste management. Below are some highlights:

- Food scraps from the residential dining commons are put into ecodigesters.
- Emphasis on fresh whole foods that are raised, grown, harvested, and produced locally or sustainably wherever possible.
- 100% of ground beef is sourced from suppliers certified by Humane Farm Animal Care Certified Humane program. 100% of pork comes from sows raised in higher-welfare group housing and are never given antibiotics or growth promoters. Plant-forward menus offered daily.
- China plates and reusable utensils are used when possible instead of disposables. When disposables need to be used, only biodegradable or recyclable products are provided. Biodegradable paper straws provided in all academic cafés and residential dining commons.
- Leftover food from vendor and the residential dining commons is regularly donated through UChicago Food Recovery Network.

Area 6: Green Space

Goal: Continue the development and implementation of sustainable design and maintenance of all campus grounds

Sustainable practices were implemented through design, installation, and maintenance activities on campus grounds.

- Over 85% of plantings increase biodiversity on campus through careful selection of plant types and species that are native or naturalized to the area, thus requiring minimal fertilizer and irrigation, and providing vital habitat for insects, birds, and wildlife.
- 15 locations are included in the smart irrigation system.
- Existing stormwater detention tanks were investigated to determine the feasibility of retrofitting them for irrigation.

Figure 7.1: Water Consumption (Total Usage) in 1,000 Cubic Feet per Fiscal Year

UNIVERSITY WATER CONSUMPTION

Water usage is measured in thousands of cubic feet per fiscal year (1,000 ft³/FY). The University has a goal to reduce potable water consumption for purposes that do not require it.

Area 7: Water Conservation

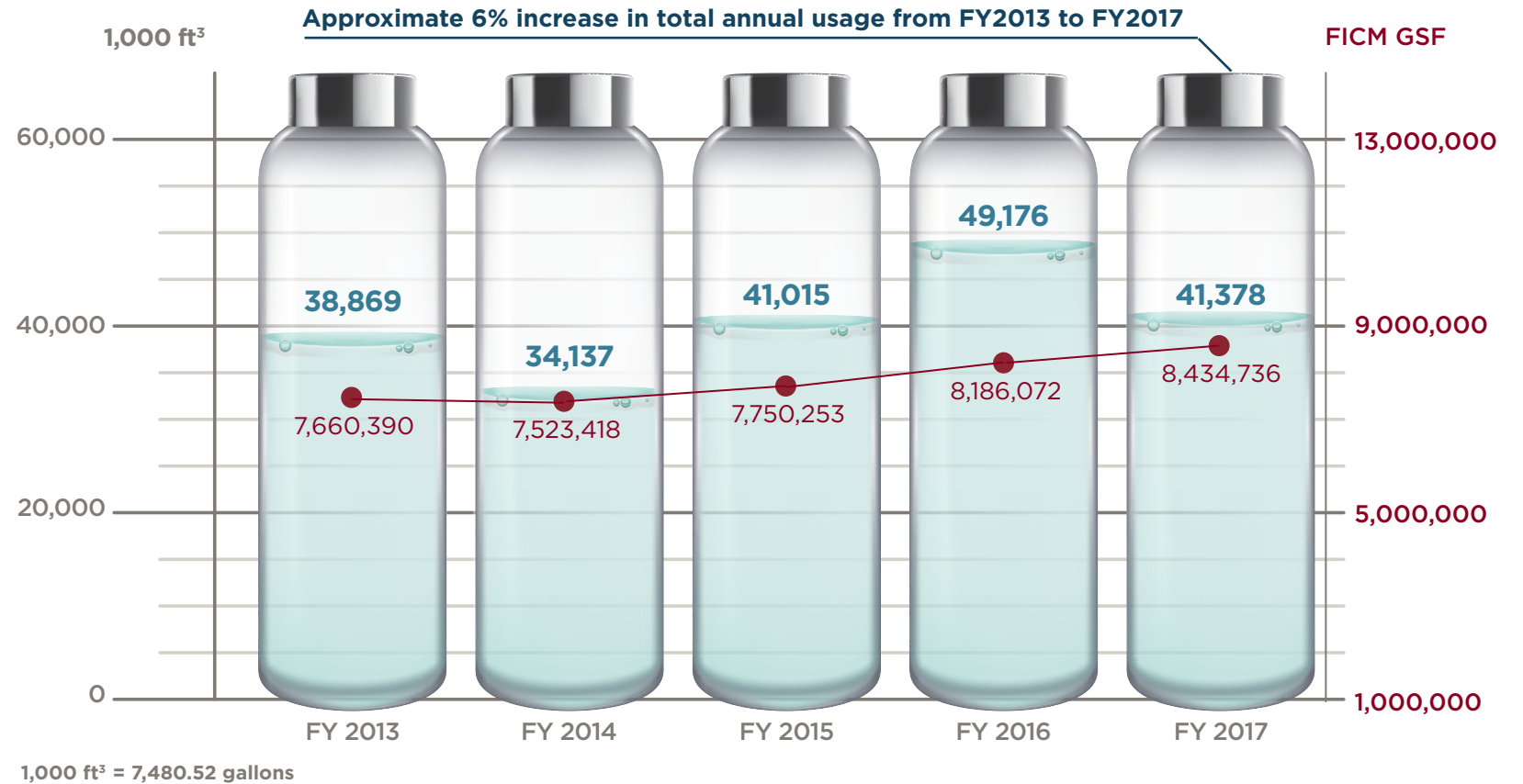
Goal: Reduce the consumption of potable water

The reduction of potable water remains an important goal on the University of Chicago campus. Much like the greenhouse gas emissions, the amount of potable water use on campus was quantified to establish a water use profile by fiscal year.

As shown in figure 7.1, the total potable water consumption has increased approximately 6% from the fiscal year 2013 to fiscal year 2017. The main reasons for this increase include:

- An increase in the fiscal year 2017 building area (square footage) compared to the fiscal year 2013 building area (square footage). The increase of 774,347 square feet was due to new construction and renovation.
- Buildings with an increase in water use intensity (gallons per square feet) from fiscal year 2013 to fiscal year 2017, including the South Steam Plant and the West Campus Combined Utility Plant.

A plan to identify ways for potable water use reduction is in progress.



A NOTE ON POTABLE WATER USE TARGET BASE YEAR The target base year is the potable water use for fiscal year 2013. It is used for setting and tracking progress toward the Sustainability Plan potable water use reduction goal. For example, to assess performance for fiscal year 2017, the total potable water use for fiscal year 2017 (41,378,000 ft³) is compared to the potable water use from the target base year (38,869,000 ft³). This comparison reveals an approximate 6 percent increase in potable water use from the target base year to fiscal year 2017. Potable water use for each subsequent year will be compared to the target base year, and performance will be assessed accordingly.

Area 8: Environmentally Preferable Procurement

Goal: When feasible, reduce the environmental impact of products and services throughout the University supply chain

Social, economic, and environmental sustainability are a priority for UChicago Procurement. Some examples of sustainability accomplishments are highlighted below.

- Sustainability and UChicago Local language is incorporated into the standard request for proposal template. Potential suppliers are requested to articulate their commitment to both initiatives and goals in their proposals so their environmental, social, and governance performance can be understood as part of the total overall value evaluation. [UChicago Local](#) has sustainability benefits since expenditures are closer to campus, logistics costs and greenhouse gas emissions are reduced, and local communities are engaged.
- Vending machine replacement to energy efficient models is an ongoing effort on campus:
 - Beverage vending machines are being replaced with ENERGY STAR® compliant devices.
 - Snack vending machines are being replaced with devices that have LED lighting, low power consumption, and motion activated lighting sensors.
- Paper form elimination is an ongoing effort for the Procurement Services department. Several paper forms have already been digitized through the implementation of various system enhancements and tools used for the procure to pay process.

Area 9: Building Awareness and Partnerships

Goal: Involve the entire University community in creating a more sustainable campus

Environmental Frontiers (EF) creates collaborative research and educational opportunities focused on the intersection of environmental sustainability and urbanization, with the goal of giving students in the College a scientific and practical understanding of sustainable urban development.

EFCampus enables students in the College to use campus data as a case study for understanding a path to a more sustainable future, on campus and beyond. EFCampus is designed to bring together campus stakeholders including students, faculty, and administrators, to collaboratively explore issues of campus sustainability and provide a unique research opportunity for students interested in environmental conservation and sustainable urbanization.

Environmental Frontiers is a partnership between Mansueto Institute for Urban Innovation, the Program on the Global Environment, the Center for Robust Decision Making on Climate and Energy Policy, the Office of the Provost, and Facilities Services. As part of EF, a pilot green labs shut-the-sash behavioral project involving laboratory energy use reduction at Searle Chemistry Laboratory is in progress. The project encourages lab occupants to shut-the-sash when not in use and is evaluated and monitored by Office of Sustainability interns who are students in the College. Additionally, a survey of campus laboratory equipment was conducted by Office of Sustainability interns to quantify laboratory plug loads and identify areas to reduce energy consumption. See also [Cutting the Carbon Footprint in UChicago Labs](#).















The University of Chicago [sustainability map](#) can be used as a self-guided campus tour and was developed to provide sustainability information for students, faculty, staff, the community, visitors, and alumni.



THE UNIVERSITY OF CHICAGO

SUSTAINABILITY MAP

Key

-  Buildings with Public Water Bottle Filling Stations
-  Bike rack placement and the number of spaces
-  Medical Campus bike racks
-  Bus Stop
-  Divvy Bikes Station
-  Metra Train Station
-  UCHICAGO Shuttle Daytime Stop
Routes & Live Tracker: uchicago.transloc.com
-  UCHICAGO Shuttle Nighttime Stop
Routes & Live Tracker: uchicago.transloc.com
-  LEED Buildings
-  Green Roofs
-  Rooftop Solar Photovoltaics
-  Garden
-  Campus Café
-  Campus Food/Eatery



Identification of water bottle filling station locations completed in collaboration with Caitlin Piccirillo-Stosser, AB'18.

click map to activate

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sustainability.uchicago.edu

ACKNOWLEDGMENTS

Collecting the data and information required for the University of Chicago Sustainability Plan Update was a collaborative effort, involving contributions from many University departments and individuals. The Office of Sustainability offers a sincere thank you to everyone who contributed.

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THE UNIVERSITY OF
CHICAGO

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