

THE UNIVERSITY OF CHICAGO

Greenhouse Gas Emissions Inventory Report 2012–2018

October 2019



THE UNIVERSITY OF
CHICAGO

Office of
Sustainability

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Introduction

Executive Summary

The University of Chicago Greenhouse Gas Emissions Inventory Report 2012-2018 is the latest release of the greenhouse gas emissions inventory and has been updated from the 2016 and 2018 releases of the inventory results.

This report includes a brief background on environmental sustainability at the University of Chicago, a look how the University's greenhouse gas emissions are calculated, a summary of changes from the previous releases of the inventory results (2016 and 2018), and the results of the University's current greenhouse gas emissions inventory.

The greenhouse gas emissions inventory includes the University of Chicago Hyde Park campus, excluding the medical campus.

The University of Chicago

The University of Chicago is located in the Hyde Park community on Chicago's South Side, 15 minutes south of the city center. Chicago's Hyde Park campus covers 217 acres and includes more than 135 buildings operated and managed by Facilities Services. These buildings host and support multiple academic programs, research, arts, and culture. Various space functions include classrooms, laboratories, administration, athletics, and recreation. Facilities Services (facilities.uchicago.edu) is responsible for the design, construction, renovation, operation, and maintenance of campus and residential buildings, property, and infrastructure.

UChicago Sustainability

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.

One such challenge is climate change, a complex and global phenomenon that requires an in-depth understanding of greenhouse gas emissions. These emissions are a reflection of natural resource consumption across several sources, so understanding the scopes and sources of emissions is a critical step in campus sustainability planning. Managing greenhouse gas emissions is one of the University's top sustainability priorities.

Raising visibility and awareness of environmental issues on campus, and engaging students, faculty, and staff to develop and implement sustainable initiatives is also important.

The University of Chicago [Sustainability Plan](#) includes goals in nine areas: Climate Change and Energy, High Performance Buildings, Multi-Modal Transportation, Waste Reduction, Food Systems, Green Space, Water Conservation, Environmentally Preferable Procurement, and Building Awareness and Partnerships. The Climate Change and Energy area of the Sustainability Plan outlines the 2025 goal.

2025 Goal

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

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

Greenhouse gas emissions are tied to all major campus operations, including buildings, transportation, waste, food, landscape, 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 realizes major economic benefits.

The first step in managing greenhouse gas emissions is quantifying the emissions. 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.

Reporting and Methodology

Inventory Overview

Greenhouse gas emissions inventory data was collected for fiscal years 2009 through 2018. The inventory was completed according to widely accepted referenced standards and approved calculation tools. The greenhouse gas emissions were quantified using Sustainability Indicator Management and Analysis Platform (SIMAP™). The referenced standards used for the greenhouse gas emissions inventory include *The Climate Registry General Reporting Protocol, Version 2.0* (2013), *The Climate Registry General Reporting Protocol, Version 3.0* (2019), and *The World Resources Institute Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard (Revised Edition)* (2004).

Calculations

Emissions from greenhouse gases (such as carbon dioxide, methane, and nitrous oxide) can be calculated by taking the amount of fossil fuel consumed and multiplying it by the appropriate emissions factor and global warming potential.

The global warming potential is used to convert metric tons of specific greenhouse gases to metric tons of carbon dioxide equivalents. This conversion is based on the gas's relative

impact on climate change compared to that of carbon dioxide. The global warming potential indicates the contribution each gas makes to climate change relative to carbon dioxide.

For example, emitting a metric ton of methane (CH₄) has the same impact on climate change as emitting 28 metric tons of carbon dioxide. The global warming potentials of several prominent gases relative to CO₂ are reported in Table 1.1. By converting all emissions into the same unit, the contribution of emissions sources can be more easily aggregated and compared. This also enables comparison between organizations. Therefore, the units of measure shown at right are used for greenhouse gas emissions.

Table 1.1: 100-Year Global Warming Potentials

Common Name	Chemical Formula	GWP
Carbon dioxide	CO ₂	1
Methane	CH ₄	28
Nitrous oxide	N ₂ O	265

Source: [IPCC Fifth Assessment Report](#)

Note the update in global warming potentials in the FY2012–FY2018 UChicago greenhouse gas emissions inventory from the Intergovernmental Panel on Climate Change Fourth Assessment Report to the Fifth Assessment Report. See page 8 for additional information.

Units of Measure

Carbon Intensity
kilograms equivalent carbon dioxide per square foot per fiscal year
[kg eCO₂/sqft/FY]

Absolute Emissions
metric tons equivalent carbon dioxide per fiscal year
[MT eCO₂/FY]

Where:
eCO₂ = equivalent carbon dioxide
FY = fiscal year
MT = 1 metric ton = 1,000 kilograms

Reporting and Methodology

Temporal Boundary

The temporal boundary is fiscal years 2012 through 2018. The University's fiscal year is July 1 through June 30. For example, fiscal year 2012 is July 1, 2011, through June 30, 2012. See page 7 for more information.

Organizational Boundary

The operational control approach was used to define the organizational boundary, since this is how the University can make the most impact for a positive change. Operational control is defined as having the authority to introduce and implement operating policies. Under the operational control approach, emissions from each operation within the University's operational control must be reported.

Operational Boundary (Scopes)

Emissions from scopes 1, 2, and 3, as applicable to the University of Chicago, are tracked and reported, as indicated in Table 1.2.

The 2025 goal is based on carbon intensity (emissions per square foot) and includes scopes 1 and 2.

Greenhouse gas emissions from refrigerants and chemicals, including HFCs (hydrofluorocarbons) and PFCs (perfluorocarbons), are omitted from this report and will be included, as appropriate, when verifiable and reliable data is available. The following greenhouse gases are also not reported as they are not present on campus: SF₆ (sulfur hexafluoride) and (NF₃)³ (nitrogen trifluoride).

The following greenhouse gases are tracked and reported: CO₂ (carbon dioxide), CH₄ (methane), and N₂O (nitrous oxide).

Scope 1: Direct Emissions (mandatory reporting)

- Combusting fuels on campus for heating and cooling
- Combusting fuels to power campus-owned transportation vehicles
- Off-gassing of fertilizers used on campus
- Fugitive release of refrigerants and chemicals that are greenhouse gases (not reported)

Scope 2: Indirect Emissions (mandatory reporting)

Off-campus combustion of fuels to produce electricity, steam, or chilled water for the campus

Scope 3: Other Indirect Emissions (optional reporting, not included in 2025 goal)

- Air and ground travel for University business and air travel for study abroad (fuel combusted in personal or transit vehicles/aircraft)
- Solid landfilled waste (landfill methane and/or emissions from incineration only)
- Transmission and distribution losses from scope 2 electricity

Reporting and Methodology

Table 1.2: Data Compiled for the Greenhouse Gas Emissions Inventory

Institutional	Unit of Measure
Student, Faculty, and Staff Population	[count/FY]
FICM Gross Area	[sqft/FY]
Scope 1: Direct Emissions (mandatory reporting)	Unit of Measure
Distillate Fuel Oil #2	[gallons/FY]
Natural Gas	[MMBtu/FY]
Unleaded Fuel (University-Owned Fleet and UGo Shuttles)	[gallons/FY]
Diesel Fuel (University-Owned Fleet and UGo Shuttles)	[gallons/FY]
Refrigerants and Chemicals, Fugitive Emissions [†]	[pounds/FY]
Fertilizer, Nitrogen	[pounds N/FY]
Scope 2: Indirect Emissions (mandatory reporting)	Unit of Measure
Electricity	[kWh/FY]
Scope 3: Other Indirect Emissions (optional reporting)	Unit of Measure
Business Travel (Air, Automobile)	[miles/FY]
Study Abroad Travel (Air)	[miles/FY]
Landfilled Waste	[short tons [‡] /FY]

[†]Omitted from reporting. Expected to be a very small amount of overall University emissions. Reporting is anticipated when verifiable and reliable data is available.

[‡]1 short ton = 2,000 pounds



Quadrangle Club
Photo by Kathleen Golomb

Reporting and Methodology

Target Base Year

The target base year is used as a basis for setting and tracking progress toward a greenhouse gas emissions reduction goal. In other words, the target base year is used to assess greenhouse gas emissions performance. For example, to assess performance for fiscal year 2018, the greenhouse gas emissions from fiscal year 2018 are compared to the greenhouse gas emissions from the target base year.

The target base year can be calculated or selected based on when reliable and verifiable emissions data are available. If calculated, the target base year is an average of annual emissions over several consecutive years. This is done to account for unusual fluctuations (such as weather) in greenhouse gas emissions that would make a single year's data unrepresentative of the University's typical emissions profile. The target base year emissions should be as close to a "typical" year as possible.

The results of the greenhouse gas emissions inventory data integrity analysis indicated that in order to comply with *The World Resources Institute Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard (Revised Edition)* (2004), the target base year should be calculated using an average of fiscal years 2012 through 2014 because of the following reasons:

- This average is typical of the University's emissions profile.
- The data from these years is verifiable and reliable.

The target base year is an average of greenhouse gas emissions for fiscal years 2012, 2013, and 2014.

Therefore, the decision was made to begin the inventory at fiscal year 2012, but still keep the fiscal years 2009 through 2011 data on file for historical purposes. The result is that the University of Chicago official greenhouse gas emissions inventory begins at fiscal year 2012.

Analysis

The greenhouse gas emissions inventory was evaluated in two ways:

- Absolute Emissions
[MT eCO₂/FY]
- Carbon Intensity
(emissions per square foot)
[kg eCO₂/sqft/FY]

Carbon intensity is used for the 2025 goal.

2025 Goal Reporting Summary

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

The 2025 goal is based on carbon intensity (emissions per square foot) and includes scopes 1 and 2.

The 2025 goal is measured by comparing 2025 greenhouse gas emissions to the target base year greenhouse gas emissions.

The target base year is an average of greenhouse gas emissions for fiscal years 2012, 2013, and 2014.

Emissions from scope 3, as applicable to the University of Chicago, are tracked and reported, although they are not part of the 2025 goal.

Summary of Updates

The below items were updated from the FY2012–FY2017 University of Chicago greenhouse gas emissions inventory.

Global Warming Potentials

The global warming potentials were updated by the Intergovernmental Panel on Climate Change from the Fourth Assessment Report to the Fifth Assessment Report. This update was included in the UChicago FY2012–FY2018 greenhouse gas emissions inventory to reflect the latest global warming potentials available, as it is best practice. This update impacts emissions from all scopes in the inventory, but the impact on overall University greenhouse gas emissions was negligible.

Emissions Factors

Regional emissions and generation resource integrated database (eGRID) emissions factors were updated by the United States Environmental Protection Agency to eGRID2016. This update had significant impact on scope 2 emissions (electricity), as discussed on page 9. This update also impacted scope 3 emissions (transmissions and distribution losses from scope 2 electricity). However, scope 3 is not part of the 2025 goal. For a summary of what is new in eGRID2016, refer to the [United States Environmental Protection Agency](#).

Additional Updates

In the Sustainability Plan (November 2016), the target base year was reported as 25.5 kg eCO₂/sqft. This includes scopes 1, 2, and 3, and includes commuting.

In the FY2012–FY2017 greenhouse gas emissions inventory (May 2018), the target base year was reported as 16.5 kg eCO₂/sqft. This does not include scope 3 or commuting. This is because the 2025 goal is based on scopes 1 and 2 only, and commuting, part of scope 3 emissions, had been dropped entirely from the inventory since a recent commuting survey had not been conducted, and reliable and verifiable commuting data was no longer available.

In the current greenhouse gas emissions inventory (FY2012–FY2018), the fiscal year 2016 and fiscal year 2017 carbon intensity is reported differently (it has decreased) from previous reporting. This is because of the change in regional United States EPA emissions factors as discussed at left. When regional United States EPA emissions factors are updated, they are applied retroactively, where applicable, making the greenhouse gas emissions inventory dynamic. To demonstrate this point, Table 1.3 summarizes the emissions factors used in fiscal year 2017 and fiscal year 2018 reporting.

Table 1.3: Global Warming Potentials and Regional U.S. EPA eGrid Emissions Factors

Fiscal Year	FY2017 Reporting		FY2018 Reporting	
	GWP	EF	GWP	EF
2012	AR4	rel. 2015, eGRID2012, 10th ed.	AR5	rel. 2015, eGRID2012, 10th ed.
2013	AR4	rel. 2015, eGRID2012, 10th ed.	AR5	rel. 2015, eGRID2012, 10th ed.
2014	AR4	rel. 2017, eGrid2014, 11th ed.	AR5	rel. 2017, eGrid 2014, 11th ed.
2015	AR4	rel. 2017, eGrid2014, 11th ed.	AR5	rel. 2017, eGrid 2014, 11th ed.
2016	AR4	rel. 2017, eGrid2014, 11th ed.	AR5	rel. 2018, eGRID2016, 12th ed.§
2017	AR4	rel. 2017, eGrid2014, 11th ed.	AR5	rel. 2018, eGRID2016, 12th ed.§
2018	NA	NA	AR5	rel. 2018, eGRID2016, 12th ed.§

Global Warming Potential source:

[IPCC Fourth Assessment Report](#)
[IPCC Fifth Assessment Report](#)

Emissions Factor source:

[United States Environmental Protection Agency Emissions and Generation Resource Integrated Database \(eGrid\)](#)

§The latest version of the United States Environmental Protection Agency eGRID emissions factors were released on February 15, 2018, are called eGRID2016, are from 2016 data, and are the twelfth edition.

Notes:

The eGRID sub-region symbol is RFCW.
 The eGRID region name is RFC West.

Results

2025 goal carbon intensity decreased by 11% from the target base year to fiscal year 2018.

Table 2.1 includes a summary of greenhouse gas emissions for fiscal years 2012 through 2018, both by carbon intensity and absolute emissions. As shown in Figure 2.1, University carbon intensity for scopes 1 and 2 decreased by approximately 11% from the target base year to fiscal year 2018. A more detailed analysis of the results explains why.

Scope 2 electricity

As indicated in Figures 2.2 and 2.3, electricity was the largest contributor to greenhouse gas emissions at 43% of overall campus emissions in fiscal year 2018. Despite a 3% increase in electricity consumption from the target base year to fiscal year 2018, carbon intensity scope 2 electricity decreased by 16% from the target base year to fiscal year 2018. This is because:

- The United States Environmental Protection Agency regional eGrid emissions factors were updated as noted on page 8. This update caused emissions attributed to scope 2 electricity to decline, despite an increase in usage. Had the emissions factors not been updated, carbon intensity attributed to scope 2 electricity would have decreased by 7% from the target base year to fiscal year 2018.
- The consumption of electricity per area decreased 7% from the target base year when compared to fiscal year 2018.

Scope 1 On-Campus Stationary

On-campus stationary sources are the largest contributors to scope 1 greenhouse gas emissions and include natural gas and distillate fuel oil #2. As indicated in Figures 2.2 and 2.3, on-campus stationary sources were the second largest contributor to overall campus greenhouse gas emissions at 28% in fiscal year 2018. Since distillate fuel oil #2 was less than 1% of greenhouse gas emissions in fiscal year 2018, natural gas was 28% of overall campus emissions in fiscal year 2018.

Despite a 10% increase in natural gas consumption from the target base year to fiscal year 2018, carbon intensity attributed to scope 1 on-campus stationary sources declined nearly 2% from the target base year to fiscal year 2018 due to an increased efficiency on a per square foot basis.

Scope 1 Other

In addition to on-campus stationary sources, scope 1 includes direct transportation (UGo shuttles and University-owned fleet) at 1% of overall campus greenhouse gas emissions in fiscal year 2018, and agriculture (nitrogen in fertilizer) at less than 1% of overall campus greenhouse gas emissions in fiscal year 2018. Refer to Figures 2.2 and 2.3 for additional information.

Scope 3

While scope 3 is not part of the 2025 goal, it is important to note the third largest contributor to overall campus greenhouse gas emissions in fiscal year 2018 was business air travel at 19%. Other sources of scope 3 emissions in fiscal year 2018 included solid landfilled waste (4%), transmission and distribution losses from scope 2 electricity (2%), study abroad travel (2%), and business automobile travel (1%). Total scope 3 emissions were 28% of overall campus greenhouse gas emissions in fiscal year 2018. Refer to Figures 2.2 and 2.3 for additional information.

FY2017 to FY2018

While the 2025 goal is based on a comparison between the target base year (an average of emissions for fiscal years 2012, 2013, and 2014) and the current fiscal year being evaluated, it is interesting to compare the current fiscal year being evaluated (2018) with the previous fiscal year (2017).

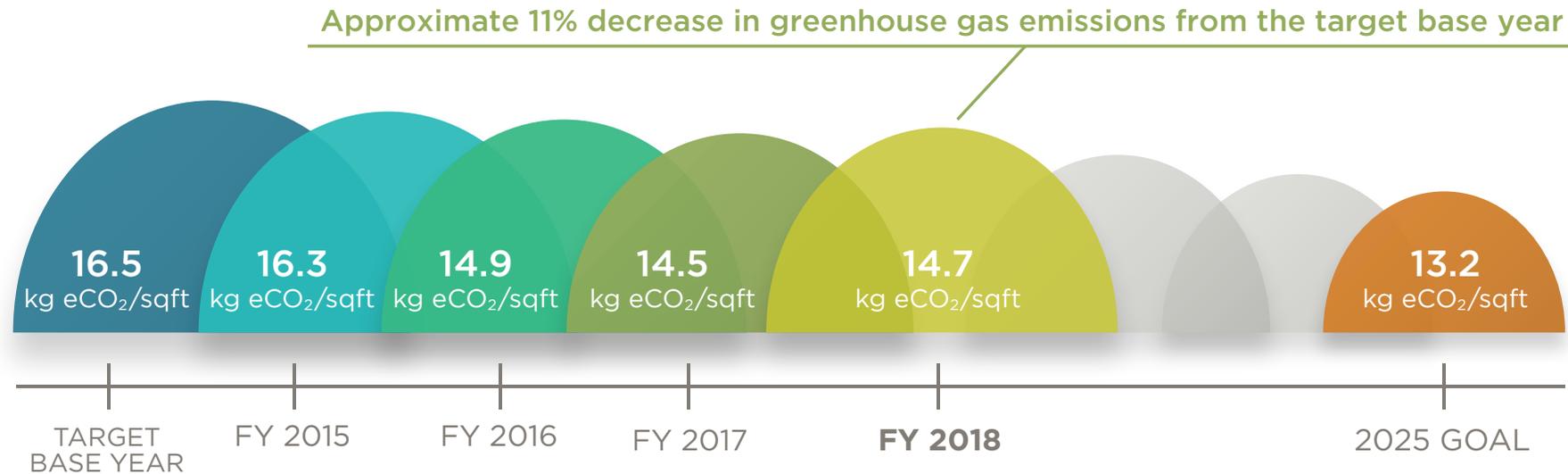
While Figure 2.1 shows that carbon intensity has decreased annually from the target base year through fiscal year 2017, carbon intensity has increased approximately 1.4% from fiscal year 2017 to fiscal year 2018. This increase in carbon intensity from fiscal year 2017 to fiscal year 2018 occurred because of an increase of scope 1 emissions, mostly attributed to an increase of natural gas consumption between fiscal year 2017 and fiscal year 2018. Natural gas consumption increased 10% from fiscal 2017 to fiscal year 2018. When weather-dependent energy consumption data from fiscal years 2017 and 2018 (found to be natural gas) are weather normalized using the ratio-based method, there is still a 4% increase of natural gas consumption from fiscal year 2017 to fiscal year 2018.

Results

Figure 2.1: 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% 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.

Results

Figure 2.2: FY2018 Greenhouse Gas Emissions by Source

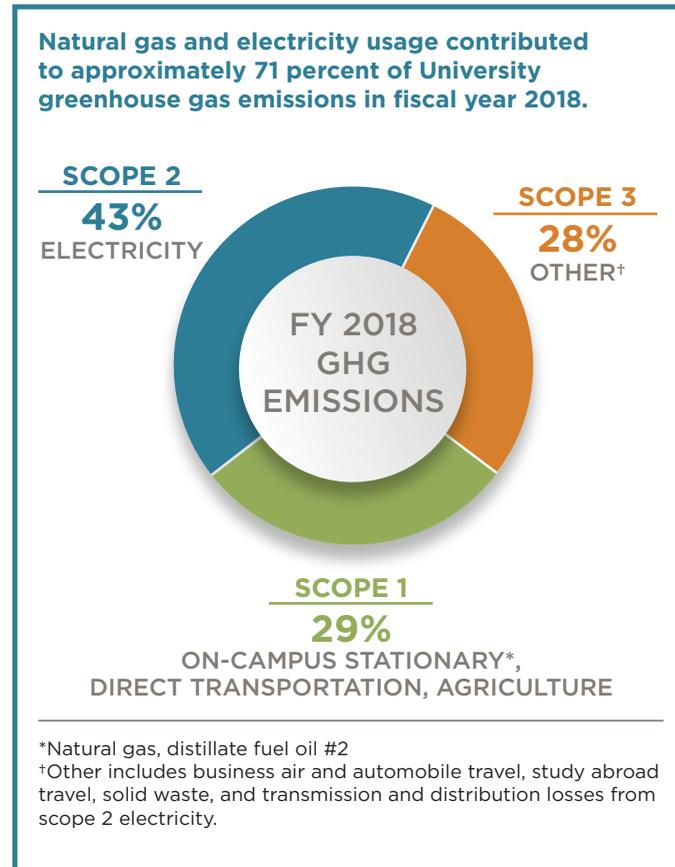
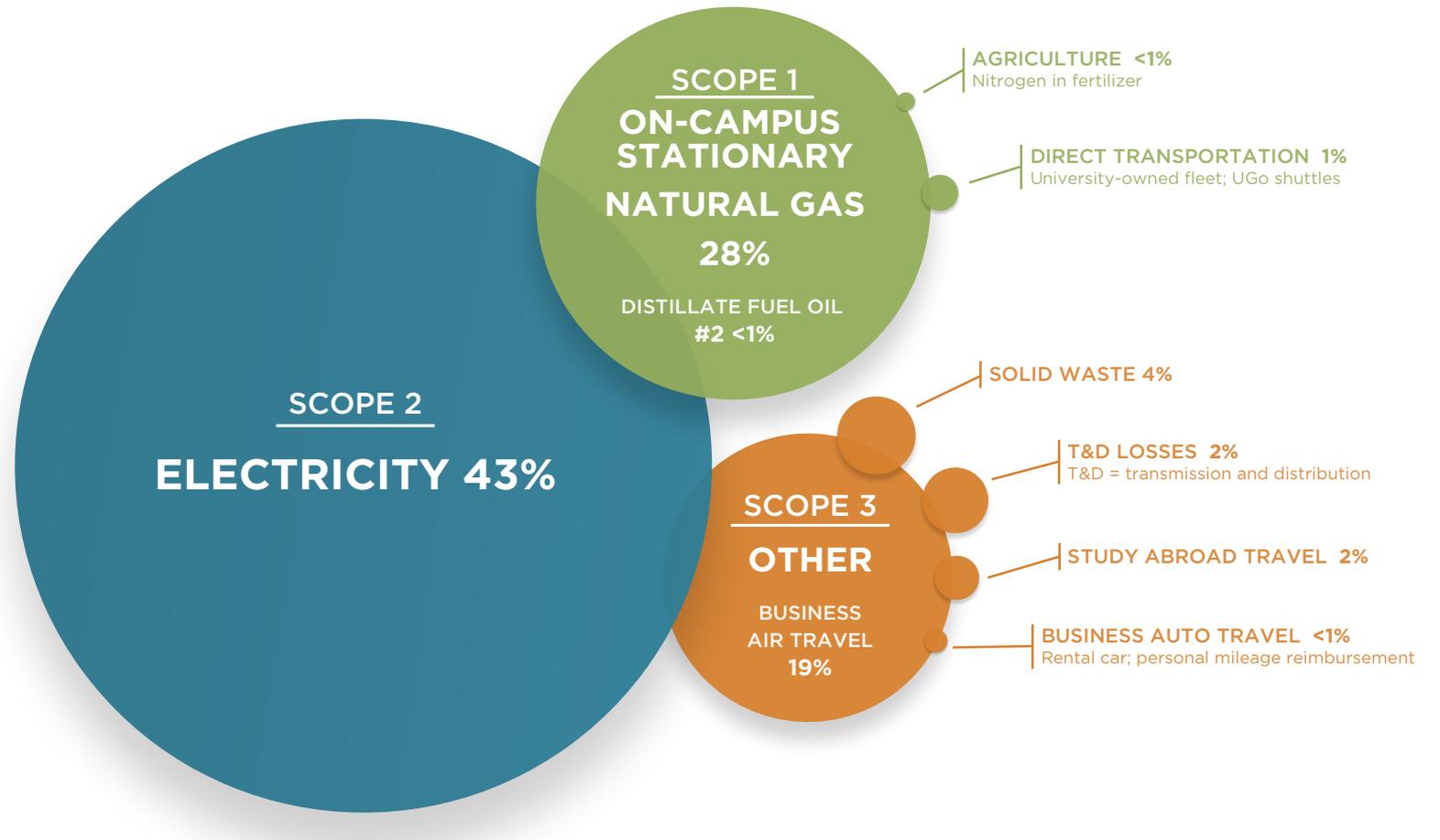


Figure 2.3: FY2018 Scopes 1, 2, and 3 Greenhouse Gas Emissions by Source



Results

Table 2.1: Greenhouse Gas Emissions Inventory Results FY2012-FY2018 Location-Based Method						
Fiscal Year	Absolute Emissions			Carbon Intensity		
	Scope 1 [MT eCO ₂]	Scope 2 [MT eCO ₂]	Scope 3 [MT eCO ₂]	2025 Goal		Scope 3 [kg eCO ₂ /sqft]
				Scope 1 [kg eCO ₂ /sqft]	Scope 2 [kg eCO ₂ /sqft]	
2012	43,310.2	83,437.3	44,820.9	5.4	10.5	5.6
2013	46,308.6	82,435.5	47,070.5	5.9	10.5	6.0
2014	50,364.5	82,431.3	47,327.0	6.6	10.7	6.2
2015	47,817.9	82,065.3	49,250.4	6.0	10.3	6.2
2016	47,049.4	78,145.9	45,584.5	5.6	9.3	5.4
2017	46,091.0	79,342.9	45,918.3	5.3	9.2	5.3
2018	51,240.5	76,723.0	48,578.5	5.9	8.8	5.6
target base year	46,661.1	82,768.0	46,406.1	6.0	10.6	5.9

- Verifiable and reliable data is used to the best of its availability during the current reporting period. Decisions are made with the best information available during the reporting period, and on the side of over reporting. Greenhouse gas emissions inventories are dynamic. When new data, information, emissions factors, and/or global warming potentials become available that were not available during the reporting period, they are incorporated in the next reporting period, as appropriate.
- Referenced standards: *The Climate Registry General Reporting Protocol, Version 2.0* (2013), *The Climate Registry General Reporting Protocol, Version 3.0* (2019), and *The World Resources Institute Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard (Revised Edition)* (2004).
- The greenhouse gas emissions are calculated using the operational control approach and the location-based method.
- The greenhouse gas emissions inventory includes the University of Chicago Hyde Park campus, excluding the medical campus.
- Goal: Reduce greenhouse gas emissions by 20% by 2025 for scopes 1 and 2 carbon intensity.
- Target base year: the average of emissions from fiscal years 2012, 2013, and 2014.

- Scope 1
 - Natural Gas
 - Distillate Fuel Oil #2
 - Unleaded and Diesel Fuel (University-Owned Fleet and UGo Shuttles)
 - Fertilizer, Nitrogen
- Scope 2
Purchased Electricity
- Scope 3 (included in reporting, not included in 2025 goal)
 - Business Travel (Air, Automobile)
 - Study Abroad Travel (Air)
 - Landfilled Waste
 - Transmission and Distribution Losses from Scope 2 Electricity

Conclusion

Managing greenhouse gas emissions is a top priority for the University of Chicago and it allows for progress in multiple areas of the **Sustainability Plan**.

The results of the UChicago 2012–2018 greenhouse gas emissions inventory indicate progress, but demonstrate the need for additional action, especially in area 2 of the Sustainability Plan, High Performance Buildings.

Since the 2025 goal is based on scopes 1 and 2 greenhouse gas emissions, and natural gas and electricity use in campus buildings contribute to approximately 70% of the University's greenhouse gas emissions, reducing electricity and natural gas consumption in campus buildings will make the biggest impact on reducing University greenhouse gas emissions.

Energy efficiency projects are currently underway and planned through 2025, as outlined in the **University of Chicago Greenhouse Gas Emissions Reduction Plan (FY2018–FY2025)**.

Only by collaborating together as a campus community, will the 2025 goal be achieved. For ways to get involved, please visit sustainability.uchicago.edu.



Science Quadrangle
Photo by Kate Joyce

Location-Based Method

ABSOLUTE EMISSIONS	INSTITUTIONAL	SCOPE 1			SCOPE 2	SCOPE 3				SCOPE 1	SCOPE 2	SCOPE 3	SCOPES 1+2	SCOPES 1+2+3	
	Area [sqft]	Other On-Campus Stationary ¹ [MT eCO ₂]	Direct Transportation ² [MT eCO ₂]	Agriculture ³ [MT eCO ₂]	Electricity [MT eCO ₂]	Directly Financed Air Travel [MT eCO ₂]	Other Directly Financed Travel ⁴ [MT eCO ₂]	Study Abroad Air Travel [MT eCO ₂]	Solid Waste [MT eCO ₂]	Scope 2 T&D Losses ⁵ [MT eCO ₂]	TOTAL [MT eCO ₂]				
% Change Target Base Year to FY2018	NA	9.03%	29.36%	-29.74%	-7.30%	23.28%	6.76%	7.09%	-14.14%	-48.62%	9.81%	-7.30%	4.68%	-1.13%	0.40%
Fiscal Year															
2012	7,984,412	41,574.0	1,703.2	32.9	83,437.3	24,509.1	1,237.6	2,545.1	8,105.1	8,424.0	43,310.2	83,437.3	44,820.9	126,747.5	171,568.3
2013	7,857,616	44,460.3	1,838.5	9.8	82,435.5	26,982.0	1,415.7	2,530.8	7,819.2	8,322.8	46,308.6	82,435.5	47,070.5	128,744.1	175,814.6
2014	7,674,162	48,363.7	1,990.6	10.1	82,431.3	31,307.0	1,616.8	2,383.5	7,708.6	4,311.1	50,364.5	82,431.3	47,327.0	132,795.8	180,122.8
2015	7,947,480	45,894.4	1,909.2	14.3	82,065.3	32,582.4	1,610.3	2,655.4	8,110.3	4,292.0	47,817.9	82,065.3	49,250.4	129,883.1	179,133.5
2016	8,383,298	45,270.8	1,769.2	9.4	78,145.9	32,212.9	1,037.9	2,195.2	6,464.9	3,673.7	47,049.4	78,145.9	45,584.5	125,195.3	170,779.7
2017	8,631,963	44,053.2	2,028.7	9.2	79,342.9	32,077.7	1,110.6	2,458.8	6,541.2	3,730.0	46,091.0	79,342.9	45,918.3	125,433.9	171,352.2
2018	8,684,797	48,842.6	2,385.5	12.4	76,723.0	34,025.9	1,519.6	2,662.8	6,763.5	3,606.8	51,240.5	76,723.0	48,578.5	127,963.5	176,542.0
target base year emissions	NA	44,799.3	1,844.1	17.6	82,768.0	27,599.4	1,423.4	2,486.5	7,877.6	7,019.3	46,661.1	82,768.0	46,406.1	129,429.1	175,835.2
FY2018 % of total	NA	27.67%	1.35%	0.01%	43.46%	19.27%	0.86%	1.51%	3.83%	2.04%	29.02%	43.46%	27.52%	72.48%	100.00%
FY2018 rank	NA	2	7	9	1	3	8	6	4	5					

CARBON INTENSITY (EMISSIONS/SQFT)	INSTITUTIONAL	SCOPE 1			SCOPE 2	SCOPE 3				SCOPE 1	SCOPE 2	SCOPE 3	SCOPES 1+2	SCOPES 1+2+3	
	Area [sqft]	Other On-Campus Stationary ¹ [kg eCO ₂ / sqft]	Direct Transportation ² [kg eCO ₂ / sqft]	Agriculture ³ [kg eCO ₂ / sqft]	Electricity [kg eCO ₂ / sqft]	Directly Financed Air Travel [kg eCO ₂ / sqft]	Other Directly Financed Travel ⁴ [kg eCO ₂ / sqft]	Study Abroad Air Travel [kg eCO ₂ / sqft]	Solid Waste [kg eCO ₂ / sqft]	Scope 2 T&D Losses ⁵ [kg eCO ₂ / sqft]	TOTAL [kg eCO ₂ / sqft]				
% Change Target Base Year to FY2018	NA	-1.72%	16.61%	-36.09%	-16.35%	11.06%	-3.84%	-3.32%	-22.50%	-53.44%	-1.01%	-16.35%	-5.57%	-10.82%	-9.43%
Fiscal Year															
2012	7,984,412	5.2	0.2	0.004	10.5	3.1	0.2	0.3	1.0	1.1	5.4	10.5	5.6	15.9	21.5
2013	7,857,616	5.7	0.2	0.001	10.5	3.4	0.2	0.3	1.0	1.1	5.9	10.5	6.0	16.4	22.4
2014	7,674,162	6.3	0.3	0.001	10.7	4.1	0.2	0.3	1.0	0.6	6.6	10.7	6.2	17.3	23.5
2015	7,947,480	5.8	0.2	0.002	10.3	4.1	0.2	0.3	1.0	0.5	6.0	10.3	6.2	16.3	22.5
2016	8,383,298	5.4	0.2	0.001	9.3	3.8	0.1	0.3	0.8	0.4	5.6	9.3	5.4	14.9	20.4
2017	8,631,963	5.1	0.2	0.001	9.2	3.7	0.1	0.3	0.8	0.4	5.3	9.2	5.3	14.5	19.9
2018	8,684,797	5.6	0.3	0.00	8.8	3.9	0.2	0.3	0.8	0.4	5.9	8.8	5.6	14.7	20.3
target base year emissions	NA	5.72	0.2	0.002	10.6	3.5	0.2	0.3	1.0	0.9	6.0	10.6	5.9	16.5	22.4
FY2018 % of total	NA	27.67%	1.35%	0.01%	43.46%	19.27%	0.86%	1.51%	3.83%	2.04%	29.02%	43.46%	27.52%	72.48%	100.00%
FY2018 rank	NA	2	7	9	1	3	8	6	4	5					

FOOTNOTES

- ¹natural gas; distillate fuel oil #2
 - ²University-owned fleet; UGo shuttles
 - ³Nitrogen in fertilizer
 - ⁴Rental car; personal mileage reimbursement
 - ⁵T&D = transmission & distribution
- weather normalized

RANK

1. Electricity	43.46%	
2. Other on-campus stationary ¹	27.67%	top 3
3. Directly financed air travel	19.27%	
4. Solid Waste	3.83%	
5. Scope 2 transmission & distribution losses ⁵	2.04%	middle
6. Study abroad air travel	1.51%	
7. Direct transportation ²	1.35%	
8. Other directly financed travel ⁴	0.86%	<2%
9. Agriculture ³	0.01%	

TARGET BASE YEAR CALCULATION

To obtain target base year, calculate the average greenhouse gas emissions from FY2012 through FY2014.

$$target\ base\ year = \frac{\left(\frac{FY2012\ emissions}{sqft} \right) + \left(\frac{FY2013\ emissions}{sqft} \right) + \left(\frac{FY2014\ emissions}{sqft} \right)}{3}$$

Appendix B

Greenhouse Gas Emissions Inventory Organizational Boundary FY2012–FY2018

online **offline** A building is online (area and utility data included in the greenhouse gas emissions calculations) if utility data is available for six months or more of the fiscal year.

Property Code	Property Name	FY2012	FY2013	FY2014	FY2015	FY2016	FY2017	FY2018
A06	John Crerar Library							
A07	Kersten Physics Teaching Center							
A08	Hinds Laboratory							
A12	Ingleside Hall			demolished				
A13	Bookstore							
A86	Gordon Center for Integrative Science ¹							
B01	Michelson Center for Physics					renovation	renovation	
B02	High Energy Physics							
B03	Accelerator Building							
B04	Astronomy and Astrophysics Center		demolished					
B06	Low Temperature Laboratory	demolished						
B07	Research Institutes		demolished					
B08	Biopsychological Research Building							
B34	Stagg Field Building							
B65	William Eckhardt Research Center					new const.		
B78	Ratner Athletics Center							
B113	West Campus Combined Utility Plant							
C01	Pierce Hall			demolished				
C02	Henry Crown Field House							
C03	Regenstein Library							
C04	Bartlett Commons							
C05	Young Memorial Building							
C13	Smart Museum of Art							
C14	Cochrane-Woods Art Center							
C15	Court Theatre							
C25	Joe and Rika Mansueto Library	new const.						
C26	Campus North Residential Commons						new const.	
C32	Max Palevsky Commons A/West							
C33	Max Palevsky Commons B/Center							
C34	Max Palevsky Commons C/East							
D01	Quadrangle Club							
D02	Mitchell Tower							
D03	Reynolds Clubhouse							
D04	Hutchinson Commons							
D05	Zoology Building							
D06	Anatomy Building							
D07	Hitchcock Hall							
D08	Snell Hall							
D09	Searle Chemistry Laboratory							
D10	Culver Hall							
D11	Erman Biology Center							

¹Utilities and area (square footage) are adjusted to include portion of the building included in the organizational boundary (since the other portion of the property is occupied by the Medical Center).

Appendix B

Greenhouse Gas Emissions Inventory Organizational Boundary FY2012–FY2018

online **offline** A building is online (area and utility data included in the greenhouse gas emissions calculations) if utility data is available for six months or more of the fiscal year.

Property Code	Property Name	FY2012	FY2013	FY2014	FY2015	FY2016	FY2017	FY2018
D12	Mandel Hall							
D13	5727 South University Avenue							
D14	5733 South University Avenue							
D16	Eckhart Hall							
D17	Ryerson Laboratory							
D18	Kent Chemical Laboratory							
D19	Jones Laboratory							
D20	Edward H. Levi Hall							
D21	Cobb Lecture Hall							
D22	Bond Chapel							
D23	Swift Hall							
D24	Rosenwald Hall							
D25	Walker Museum							
D26	Oriental Institute							
D29	Rockefeller Chapel							
D31	5855 South University Avenue							
D32	Beecher Hall							
D33	Green Hall							
D34	Kelly Hall							
D35	Foster Hall							
D36	Social Science Research Building							
D37	Stuart Hall							
D38	Harper Memorial Library							
D39	Haskell Hall							
D40	Wieboldt Hall							
D41	Classics Building							
D42	Goodspeed Hall							
D43	Gates Hall							
D44	Blake Hall							
D48	5737 South University Avenue						renovation	
D53	Pick Hall							
E05	Lillie House							
E06	Sunny Gymnasium							
E07	Belfield Hall							
E09	Ida Noyes Hall							
E10	Judd Hall							
E11	University High School							
E12	Blaine Hall							
E13	International House							
E20	Wilder House							
E21	Breckinridge House							

Appendix B

Greenhouse Gas Emissions Inventory Organizational Boundary FY2012–FY2018

online **offline** A building is online (area and utility data included in the greenhouse gas emissions calculations) if utility data is available for six months or more of the fiscal year.

Property Code	Property Name	FY2012	FY2013	FY2014	FY2015	FY2016	FY2017	FY2018
E29	Middle School							
E30	Gordon Parks Arts Hall					new const.		
E41	Kovler Gymnasium							
E44	Charles M. Harper Center							
E55	Earl Shapiro Hall				new const.			
F02	Steam Plant Power Plant							
F08	Laboratory Service Building							
F12	1427 East 60th Street							
F15	South Campus Chiller Plant							
F16	Chicago Theological Seminary	new const.						
G01	1365 East 60th Street				inactive			
G02	Chapin Hall							
G03	Keller Center						renovation	
G04	Mott Building						demolished	
H01	1155 East 60th Street							
H02	Laird Bell Law Quadrangle							
H03	Burton-Judson Courts							
H09	Renee Granville-Grossman Residential Commons							
H10	Arley D. Cathey Dining Commons							
I01	Social Service Administration							
I02	Midway Studios							
I03	6011-27 South Ingleside Avenue							
I04	Edelstone Center							
I10	6022-24 South Drexel Avenue							
I13	950 East 61st Street							
I29	6054 South Drexel Avenue							
I30	Reva and David Logan Center for the Arts		new const.					
L29	Facilities Services					new const.		
N11	5608 South Stony Island Blvd							
N12	Alumni House							
O11	Neubauer Collegium for Culture and Society					new const. ²		
O16/D54	5710 South Woodlawn Avenue							
O20/D45	5720 South Woodlawn Avenue							
O24/D46	5730 South Woodlawn Avenue							
O28/D47	5736 South Woodlawn Avenue							
O30/D15	5740 South Woodlawn Avenue			renovation				
O31/E52	McGiffert Hall			renovation				
O32/D49	5750 South Woodlawn Avenue			renovation				
O33/E01	Robie House							
O36/D69	Saieh Hall for Economics		renovation	renovation				

²Adaptive reuse

Acronyms and Chemical Formulas

Maroon text indicates UChicago-specific acronyms

BTU	British thermal unit
CH ₄	methane
CBECS	Commercial Buildings Energy Consumption Survey
CO ₂	carbon dioxide
CR	The Climate Registry
eCO ₂	equivalent CO ₂
EF	emissions factor
eGRID	emissions and generation resource integrated database
FICM	Facilities Inventory and Classification Manual
FS	Facilities Services
(FS) ²	Facilities Services Facility Standards
FY	fiscal year
GHG	greenhouse gas
GWP	global warming potential
HFC	hydrofluorocarbons
IPCC	Intergovernmental Panel on Climate Change
kWh	kilowatt hour
MMBtu	1 MMBtu = 1x10 ⁶ Btu
MT	1 metric ton = 1,000 kg
(NF ₃) ³	nitrogen trifluoride
N ₂ O	nitrous oxide
OS	Office of Sustainability
PFC	perfluorocarbons
SF ₆	sulfur hexafluoride
SP	Sustainability Plan

Links

The University of Chicago
uchicago.edu

Facilities Services
facilities.uchicago.edu

Office of Sustainability
sustainability.uchicago.edu

Sustainability Plan
sustainability.uchicago.edu/sp

Facilities Services Facility Standards (FS)²
facilities.uchicago.edu/about/partners/facilitiesstandards

Sources

Referenced Standards

The Climate Registry General Reporting Protocol, Version 2.0 (2013)
The Climate Registry General Reporting Protocol, Version 3.0 (2019)

The World Resources Institute Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard (Revised Edition) (2004)

Global Warming Potentials
[IPCC Fifth Assessment Report](#)

Emissions Factors

[United States Environmental Protection Agency Emissions and Generation Resource Integrated Database \(eGrid\)](#)

- The eGRID sub-region symbol is RFCW.
- The eGRID region name is RFC West.

Calculation Tool

[Sustainability Indicator Management and Analysis Platform \(SIMAP™\)](#)

Area (square footage)

[Facilities Inventory and Classification Manual \(FICM\)](#)

Climate Zone

Chicago is in CBECS climate zone 2.

[United States Climate Zones for 2003 CBECS](#)

- Verifiable and reliable data is used to the best of its availability during the current reporting period. Decisions are made with the best information available during the reporting period, and on the side of over reporting. Greenhouse gas emissions inventories are dynamic. When new data, information, emissions factors, and/or global warming potentials become available that were not available during the reporting period, they are incorporated in the next reporting period, as appropriate.
- Referenced standards: *The Climate Registry General Reporting Protocol, Version 2.0* (2013), *The Climate Registry General Reporting Protocol, Version 3.0* (2019), and *The World Resources Institute Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard (Revised Edition)* (2004).
- The greenhouse gas emissions inventory includes the University of Chicago Hyde Park campus, excluding the Medical Campus.
- The greenhouse gas emissions are calculated using the operational control approach and the location-based method.
- Goal: Reduce greenhouse gas emissions by 20% by 2025 for scopes 1 and 2 carbon intensity.
- Target base year: 2012–2014 average emissions.
- Scopes; Scope 1: Natural Gas, Distillate Fuel Oil #2, Unleaded Fuel (University-Owned Fleet and UGo Shuttles), Diesel Fuel (University-Owned Fleet and UGo Shuttles), Fertilizer, Nitrogen; Scope 2: Purchased Electricity; Scope 3 (included in reporting, not included in 2025 goal): Business Travel (Air, Automobile), Study Abroad Travel (Air), Landfilled Waste, Transmission and Distribution Losses from Scope 2 Electricity.
- Population includes students, faculty, staff, and the University of Chicago Laboratory School students.
- Each fiscal year’s Autumn Quarter demographic data is used as the data point (i.e. for FY2017, Autumn Quarter 2016 data is used).
- Harper Court staff population is included, even though Harper Court (building) is not within the greenhouse gas emissions organizational boundary. The Harper Court staff population is included because occupants of Harper Court also inhabit campus, contribute to the waste, use the shuttles, water, and other resources on campus. Additionally, they participate in commuting to/from campus, and business travel. The Harper Court building is not included because it is not University owned and is not within the University’s operational control.
- Guests and visitors are excluded from the population data.
- Biological Sciences Division population is excluded since BSD is also excluded from the physical campus scope of the inventory.
- Biological Sciences Division properties are excluded except where under Facilities Services operational control.
- Building areas are measured in gross square feet using Facilities Inventory and Classification Manual (FICM) areas.
- For new construction or demolished buildings: if a building is “online” (utility data is available for it) for 6 months or more (≥ 6 mo) of the fiscal year, its area and utility data are included in the greenhouse gas emissions calculations.
- E44 Charles M. Harper Center is not within the operational control of Facilities Services but it is included in the greenhouse gas emissions inventory because it is contiguous to the rest of campus, a high profile professional school, and a campus partner.
- 100-year global warming potentials IPCC Fifth Assessment Report. United States Environmental Protection Agency Emissions and Generation Resource Integrated Database (eGrid) eGRID sub-region symbol RFCW, eGRID region name RFC West.
- Utility data is from utility billing.
- Steam data is adjusted to include the portion of steam serving the buildings in the organizational boundary.
- A86 Gordon Center for Integrative Science: utilities and area (sqft) are adjusted to include the portion of the building included in the organizational boundary since the other portion of the building is occupied by the medical campus. 100% of fuel oil is included in the inventory as it is used for required testing of the emergency generators and the generators are operated by Facilities Services.
- Fuel oil for buildings on the medical campus is excluded from the inventory.
- Fuel oil is zero for some fiscal years.
- University-owned fleet data tracked and reported is only what is included in the IT Services database (fuel that was filled up on campus at the Fuel Depot). If fuel was filled up off campus, it is not tracked and reported.
- Data includes fuel used for all University-owned fleet such as Facilities Services, the Library, IT Services, the Press Building, the University of Chicago Booth School of Business, UCPD (starting in FY2017), etcetera. It excludes the medical center fleet.
- The UCPD fleet does not have any vehicles that use diesel fuel. The UCPD fleet is University owned.
- UGo Daytime and UGo Nightride shuttles: Since the lease between UChicago and the shuttle vendor is an operating lease, and the consolidation method is operational control, the gallons of fuel usage from the UGo Shuttles are included in scope 1 of the greenhouse gas emissions inventory calculations.
- This report excludes fugitive emissions from refrigerants and other chemicals.
- The air travel data is all employee (anyone on the University payroll) air travel from expense reporting.
- A portion of the faculty/staff air travel data contains student air travel. This occurs when the employee (anyone on University payroll) purchases the travel on behalf of the student.
- Conversion factors for USD (\$) to miles of international and domestic air travel were used from [Airlines for America](#), except for fiscal year 2015, which was extrapolated from previous years since Airlines for America did not have any 2015 conversion rates listed. Note: Airlines for America no longer reporting on the passenger yield data point that is necessary to convert air travel dollars to miles. In the absence of this data, the last available year’s data (FY2017) is used for FY2018.
- The rental car data is partial data as it reflects only what is booked through the University’s preferred contracts.
- For personal mileage reimbursement, the data is only for employees (anyone on University payroll).
- Assumed all study abroad travel originated from Chicago O’Hare International Airport per student participating in the program.
- Landfilled waste: Data includes all buildings included in the greenhouse gas emissions organizational boundary, as well as many residential properties not within the organizational boundary (which contribute a small portion of the total data). Data excludes Harper Court, Gleacher Center, or any leased space. Data excludes construction waste. New waste hauler arrived on campus in 2016.

THE UNIVERSITY OF CHICAGO

Greenhouse Gas Emissions Inventory Report 2012–2018

October 2019

sustainability.uchicago.edu

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PROJECT TEAM

Sara Popenhagen, sustainability manager
Brian Bozell, energy and utilities manager
James Cook, space information manager
Nathan Bartlett, graphic artist (pp. 10–11)

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