

THE UNIVERSITY OF CHICAGO

Greenhouse Gas Emissions Inventory Report 2012-2017

May 2018



THE UNIVERSITY OF
CHICAGO

Office of
Sustainability

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INTRODUCTION

Executive Summary

This report includes a brief background on environmental sustainability at the University of Chicago, an overview of the methodology employed to calculate the University's greenhouse gas emissions, and a summary of results of the University's current greenhouse gas emissions inventory. This inventory includes the University of Chicago Hyde Park campus, excluding the medical campus.

The University of Chicago

Located in the Hyde Park community on Chicago's South Side, 15 minutes south of the city center, the University of Chicago (uchicago.edu) is recognized as one of the world's most accomplished and prestigious intellectual communities. The University of Chicago 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. To do this, the University has established an ambitious plan to quantify and manage greenhouse gas emissions, raise visibility and awareness of environmental issues on campus, and engage University students, faculty, and staff in developing sustainable programs and practices. The University is addressing the everyday issues of sustainability while seeking to understand the long-term impacts of decisions made today and valuing the benefits of a thriving planet.

With its tradition of rigorous inquiry, the University is uniquely 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 our resource consumption across several categories, so understanding the scope and sources of our emissions is a critical step in campus sustainability planning. Managing greenhouse gas emissions is one of the University's top sustainability priorities and a [Facilities Services Theme](#).

The University of Chicago has a [Sustainability Plan](#) that 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

The University of Chicago recognizes the importance of acting responsibly to avoid the worst global impacts of climate change. Greenhouse gas emissions reduction is the key sustainability goal as the University seeks to understand and reduce its contribution to climate change.

The University has a goal to reduce its greenhouse gas emissions by 20 percent 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 and various partners across campus, to develop sustainability programs targeted to areas of specific concern or inefficiency. Further, it allows the monitoring of sustainability progress for cost effectiveness, environmental benefit, and social responsibility.



BACKGROUND REPORTING AND METHODOLOGY

Inventory Overview

Greenhouse gas emissions inventory data was collected for fiscal years 2009 through 2017. The inventory was completed according to widely accepted referenced standards and approved calculation tools. The greenhouse gas emissions were quantified using the University of New Hampshire Campus Carbon Calculator, specifically designed for universities, and the 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)* and *The World Resources Institute Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard (Revised Edition) (2004)*.

Units of Measure and Calculations

Equivalent Carbon Dioxide (eCO₂)

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 25 metric tons of carbon dioxide, and emitting a metric ton of sulfur hexafluoride (SF₆) is equivalent to emitting 22,800 metric tons of carbon dioxide. The global warming potential of several prominent gases is 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 following units of measure are used for greenhouse gas emissions.

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

Temporal Boundary

The temporal boundary is fiscal years 2012 through 2017. 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 5 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 at the right and in Table 1.2. Some portions of scope 3 are based on estimates and calculations.

Greenhouse gas emissions from refrigerants and chemicals, including HFCs (hydrofluorocarbons) and PFCs (perfluorocarbons), are omitted from this report. The following greenhouse gases are also not reported: 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).

Scopes

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)

- Daily commuting to/from campus by students, faculty, and staff (fuel combusted in vehicles) (not reported)
- Air or ground travel for University business or 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

BACKGROUND REPORTING AND METHODOLOGY

Table 1.1: 100-Year Global Warming Potentials

Common Name	Chemical Formula	GWP
Carbon dioxide	CO ₂	1
Methane	CH ₄	25
Nitrous oxide	N ₂ O	298
Sulfur hexafluoride	SF ₆	22,800

Source: [IPCC Fourth Assessment Report](#)

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
Student, Faculty, and Staff Commuting to/from Campus‡	[various]
Business Travel (Air, Automobile)	[miles/FY]
Study Abroad Travel (Air)	[miles/FY]
Landfilled Waste	[short tons§/FY]

* Distillate fuel oil #2 usage in FY2017 was zero gallons.
 † Omitted from reporting. Expected to be a very small amount of overall University emissions. Reporting is anticipated when verifiable and reliable data is available.
 ‡ Omitted from reporting.
 § 1 short ton = 2,000 pounds

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 2017, the greenhouse gas emissions from fiscal year 2017 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 indicate that in order to comply with the *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.

Therefore, the decision was made to begin the inventory at fiscal year 2012, but still keep the fiscal year 2009 through 2011 data on file for historical purposes. All future reporting, starting with this report, will include fiscal year 2012 through the present.

$$\text{target base year} = \text{aveGHGEmissions}(\text{FY2012}, \text{FY2013}, \text{FY2014})$$

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 (emissions per square foot) allows the emissions to be examined without penalty or reward for such changes in square footage as new construction or demolition.

Carbon intensity is used for the 2025 goal, and is therefore the metric reported on pages 6 and 7 of this report.

2025 Goal Reporting Summary

2025 goal: The University has a goal to reduce its greenhouse gas emissions by 20 percent 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 fiscal years 2012, 2013, and 2014 greenhouse gas emissions.

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

RESULTS

The results of the University of Chicago greenhouse gas emissions inventory indicate that carbon intensity (greenhouse gas emissions per square foot) for scopes 1 and 2 has declined approximately 6 percent from the target base year to fiscal year 2017.

The main reasons for this decline include:

- A decline in carbon intensity from natural gas consumption
- A decline in carbon intensity from electricity consumption

This means that for both natural gas and electricity, the University consumed less per square foot in campus buildings in fiscal year 2017 than in the target base year.

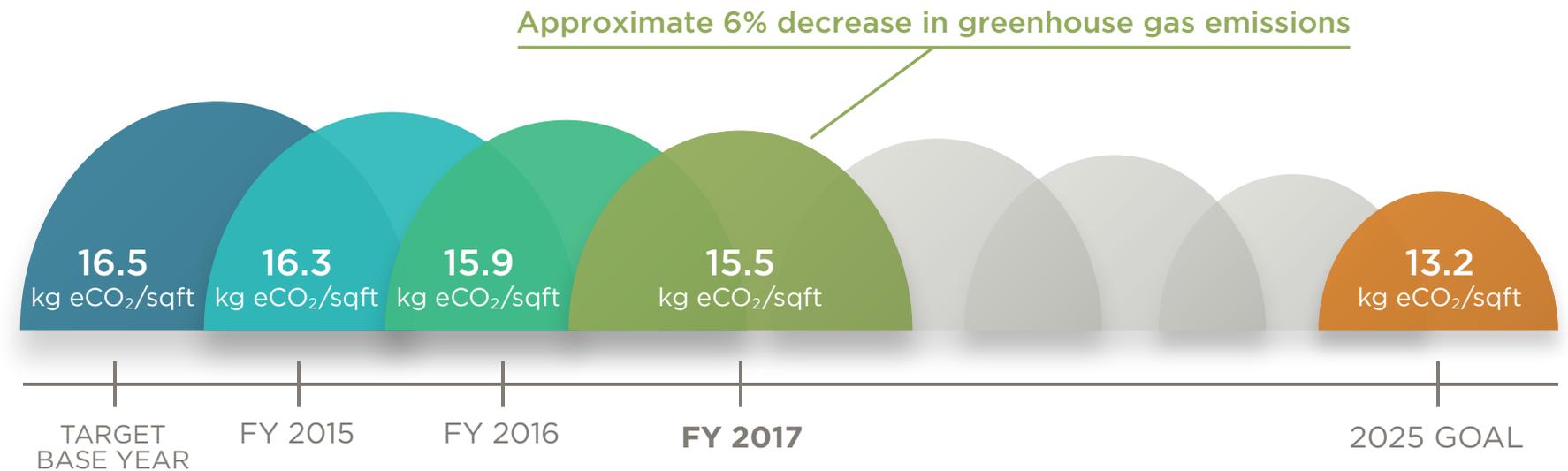
Figure 2.1 shows that carbon intensity has decreased annually from the target base year.

As indicated in Figures 2.2 and 2.3, in fiscal year 2017 electricity was 49 percent of the overall emissions, natural gas was 24 percent of the overall emissions, and 27 percent of the overall emissions were from other sources. Business air travel was the third-largest contributor to greenhouse gas emissions, at approximately 18 percent.

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 2017, the greenhouse gas emissions from fiscal year 2017 (15.5 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 6 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.

RESULTS

Figure 2.2: Greenhouse Gas Emissions by Source (FY2017)

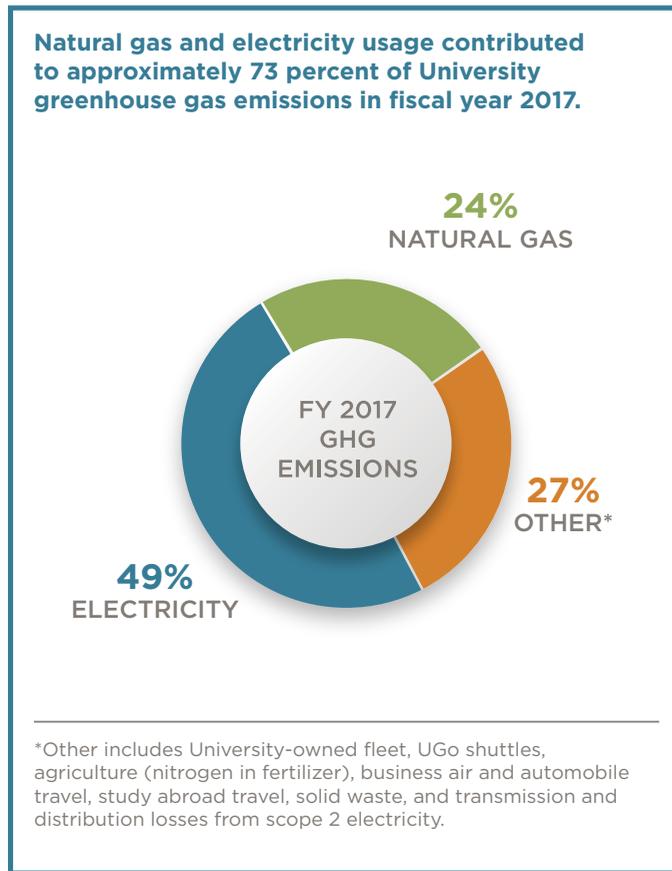
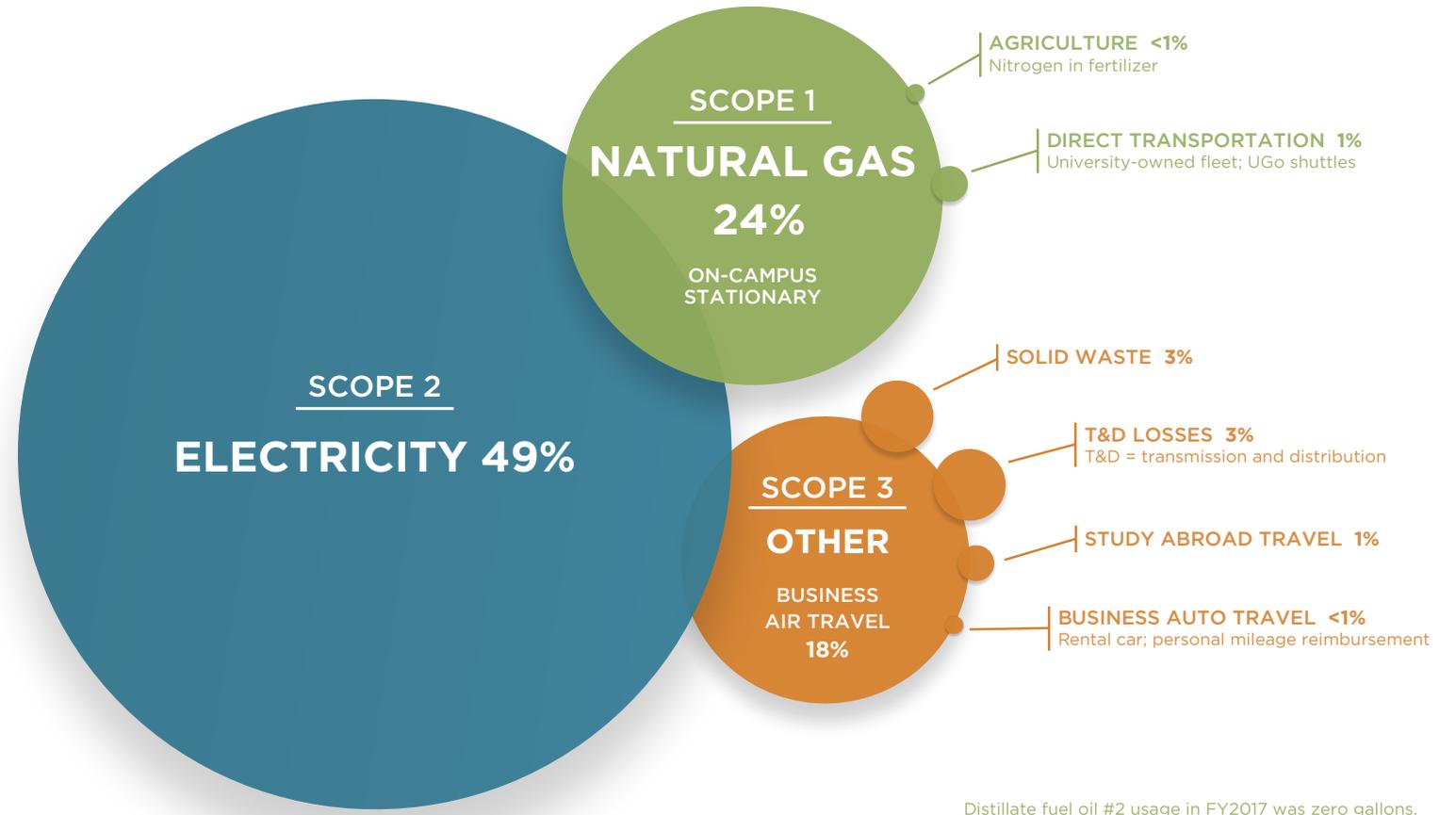


Figure 2.3: Scopes 1, 2, and 3 Greenhouse Gas Emissions by Source (FY2017)



Emissions Reduction Plan

Managing greenhouse gas emissions is a top priority for the University; it allows for progress in multiple areas of the [Sustainability Plan](#). The results of the University’s greenhouse gas emissions inventory indicate progress, but underscore the need for additional action, especially in the area of energy efficiency. It is necessary to reduce electricity and natural gas consumption—the two largest contributors to the University’s greenhouse gas emissions. Since the 2025 goal is based on scopes 1 and 2 emissions, and natural gas and electricity usage in campus buildings contributes to approximately 70

percent of the University’s greenhouse gas emissions, limiting electricity and natural gas consumption in campus buildings will make the biggest impact on reducing greenhouse gas emissions.

To achieve the 2025 goal, energy efficiency projects are currently planned for fiscal years 2018 through 2025, as outlined in the [University of Chicago Greenhouse Gas Emissions Reduction Plan \(FY2018–FY2025\)](#).

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 FY2017	NA	-1.67%	10.01%	-47.87%	6.22%	16.23%	-21.97%	-1.11%	-16.79%	-34.53%	-1.22%	6.22%	1.17%	3.53%	2.92%
Fiscal Year															
2012	7,984,412	41,564.4	1,706.0	37.0	83,477.2	24,517.5	1,239.7	2,546.0	7,236.7	8,428.0	43,307.4	83,477.2	43,967.9	126,784.6	170,752.6
2013	7,857,616	44,450.0	1,841.3	11.1	82,475.0	26,991.3	1,418.1	2,531.7	6,981.4	8,326.8	46,302.4	82,475.0	46,249.4	128,777.3	175,026.7
2014	7,674,162	48,352.7	1,993.7	11.4	82,097.5	31,317.8	1,619.5	2,384.3	6,882.7	4,293.6	50,357.8	82,097.5	46,498.0	132,455.2	178,953.2
2015	7,947,480	45,883.8	1,912.2	16.1	81,732.9	32,593.7	1,613.1	2,656.3	7,241.4	4,274.6	47,812.0	81,732.9	48,378.9	129,544.9	177,923.9
2016	8,383,298	45,260.4	1,772.0	10.6	86,500.5	32,224.0	1,039.6	2,196.0	5,772.2	4,523.9	47,043.0	86,500.5	45,755.7	133,543.4	179,299.1
2017	8,631,963	44,043.0	2,031.8	10.3	87,825.4	32,088.8	1,112.5	2,459.6	5,852.8	4,593.2	46,085.1	87,825.4	46,106.9	133,910.5	180,017.3
target base year emissions	NA	44,789.0	1,847.0	19.8	82,683.2	27,608.9	1,425.8	2,487.3	7,033.6	7,016.2	46,655.8	82,683.2	45,571.8	129,339.1	174,910.8
FY2017 % of total	NA	24.47%	1.13%	0.01%	48.79%	17.83%	0.62%	1.37%	3.25%	2.55%	25.60%	48.79%	25.61%	74.39%	100.00%
FY2017 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 FY2017	NA	-10.82%	-0.23%	-52.29%	-3.56%	5.34%	-29.29%	-10.18%	-24.43%	-40.32%	-10.41%	-3.56%	-8.18%	-6.03%	-6.59%
Fiscal Year															
2012	7,984,412	5.2	0.2	0.005	10.5	3.1	0.2	0.3	0.9	1.1	5.4	10.5	5.5	15.9	21.4
2013	7,857,616	5.7	0.2	0.001	10.5	3.4	0.2	0.3	0.9	1.1	5.9	10.5	5.9	16.4	22.3
2014	7,674,162	6.3	0.3	0.001	10.7	4.1	0.2	0.3	0.9	0.6	6.6	10.7	6.1	17.3	23.3
2015	7,947,480	5.8	0.2	0.002	10.3	4.1	0.2	0.3	0.9	0.5	6.0	10.3	6.1	16.3	22.4
2016	8,383,298	5.4	0.2	0.001	10.3	3.8	0.1	0.3	0.7	0.5	5.6	10.3	5.5	15.9	21.4
2017	8,631,963	5.1	0.2	0.001	10.2	3.7	0.1	0.3	0.7	0.5	5.3	10.2	5.3	15.5	20.9
target base year emissions	NA	5.72	0.2	0.003	10.5	3.5	0.2	0.3	0.9	0.9	6.0	10.5	5.8	16.5	22.3
FY2017 % of total	NA	24.47%	1.13%	0.01%	48.79%	17.83%	0.62%	1.37%	3.25%	2.55%	25.60%	48.79%	25.61%	74.39%	100.00%
FY2017 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

RANK

1. Electricity	48.79%	top 3
2. Other on-campus stationary ¹	24.47%	
3. Directly financed air travel	17.83%	
4. Solid Waste	3.25%	middle
5. Scope 2 transmission & distribution losses ⁵	2.55%	
6. Study abroad air travel	1.37%	
7. Direct transportation ²	1.13%	
8. Other directly financed travel ⁴	0.62%	<2%
9. Agriculture ³	0.01%	

TARGET BASE YEAR CALCULATION

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

$$\text{target base year} = \text{averageGHGemissions}(\text{FY2012}, \text{FY2013}, \text{FY2014})$$

$$\text{target base year}_{2025\text{goal}} = \frac{[(\text{FY2012 emissions/sqft}) + (\text{FY2013 emissions/sqft}) + (\text{FY2014 emissions/sqft})]}{3}$$

Greenhouse Gas Emissions

Given

$$\text{GHG emissions} = (\text{usage}) * (\text{EF}) * (\text{GWP})$$

Electricity = 150,000,000 kWh

CO₂ EF (emissions factor) = 0.68196 kg CO₂/kWh

CH₄ EF = 0.0000107220 kg CH₄/kWh

N₂O EF = 0.0000157027 kg N₂O/kWh

CO₂ GWP (global warming potential) = 1

CH₄ GWP = 25

N₂O GWP = 298

GWP Source: [IPCC Fourth Assessment Report](#)

Emissions Factor Source: [United States Environmental Protection Agency](#)

Find

Calculate the greenhouse gas emissions for 150,000,000 kWh of electricity produced.

Solution

$$\text{CO}_2 \text{ emissions} = (\text{usage}) * (\text{EF}) * (\text{GWP})$$

$$= (150,000,000 \text{ kWh}) * (0.68196 \text{ kg CO}_2/\text{kWh}) * (1)$$

$$= 102,294,000 \text{ kg CO}_2$$

$$\text{CH}_4 \text{ emissions} = (\text{usage}) * (\text{EF}) * (\text{GWP})$$

$$= (150,000,000 \text{ kWh}) * (0.0000107220 \text{ kg CH}_4/\text{kWh}) * (25)$$

$$= 40,207.5 \text{ kg CH}_4$$

$$\text{N}_2\text{O emissions} = (\text{usage}) * (\text{EF}) * (\text{GWP})$$

$$= (150,000,000 \text{ kWh}) * (0.0000157027 \text{ kg N}_2\text{O}/\text{kWh}) * (298)$$

$$= 701,909.2 \text{ kg N}_2\text{O}$$

$$\text{TOTAL GHG emissions} = \text{CO}_2 \text{ emissions} + \text{CH}_4 \text{ emissions} + \text{N}_2\text{O emissions}$$

$$= 102,294,000 \text{ kg eCO}_2 + 40,207.5 \text{ kg eCO}_2 + 701,909.2 \text{ kg eCO}_2$$

$$= 103,036,116.7 \text{ kg eCO}_2$$

$$= \mathbf{103,036.1 \text{ MT eCO}_2}$$

APPENDIX C

Greenhouse Gas Emissions Inventory Organizational Boundary FY2012-FY2017

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
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	Physics Research Center					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						

¹Half of the utilities and area (square footage) are included in the GHG inventory since the other half of the property is occupied by the medical center.

APPENDIX C

Greenhouse Gas Emissions Inventory Organizational Boundary FY2012-FY2017

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
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						

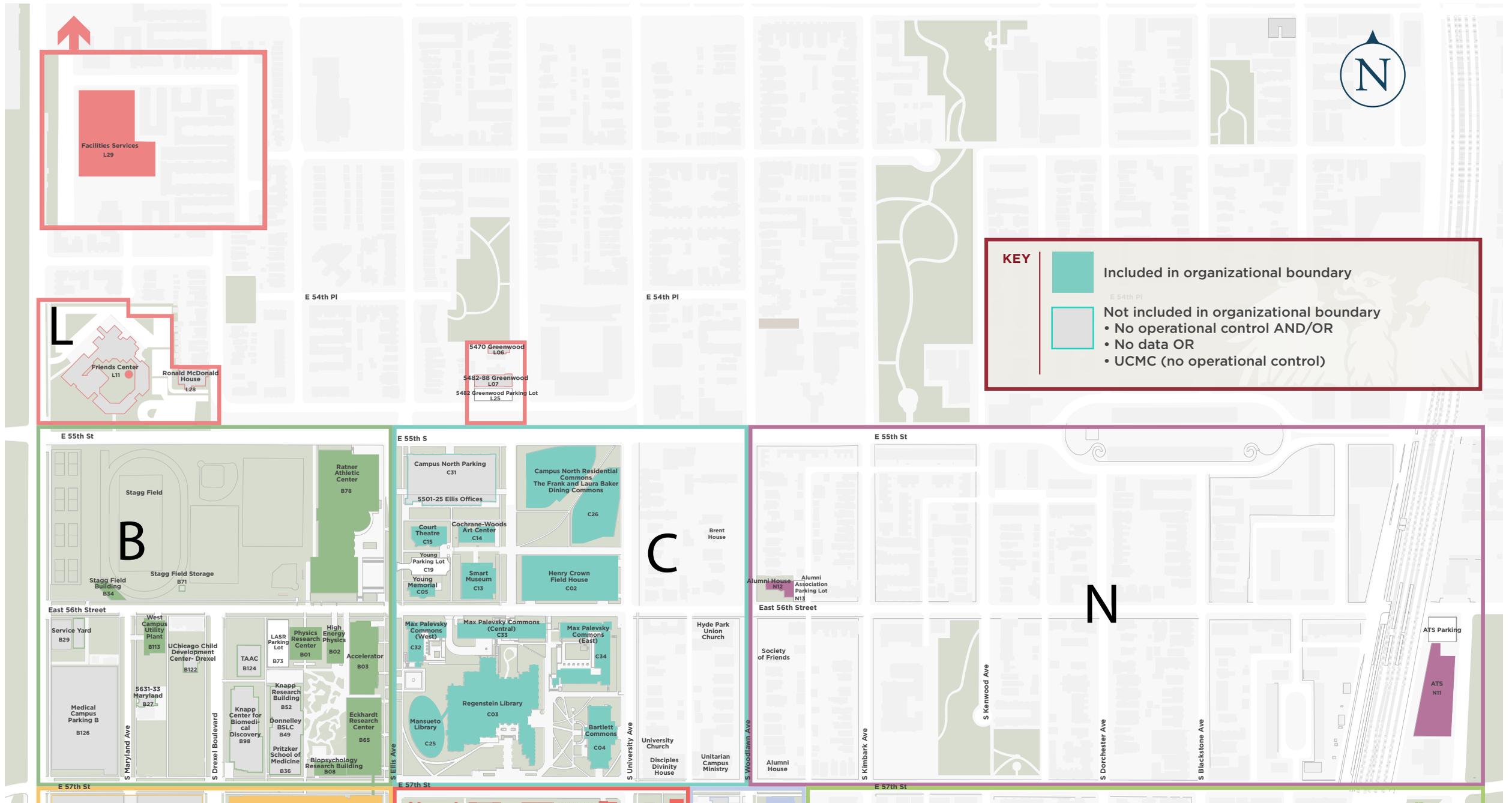
APPENDIX C

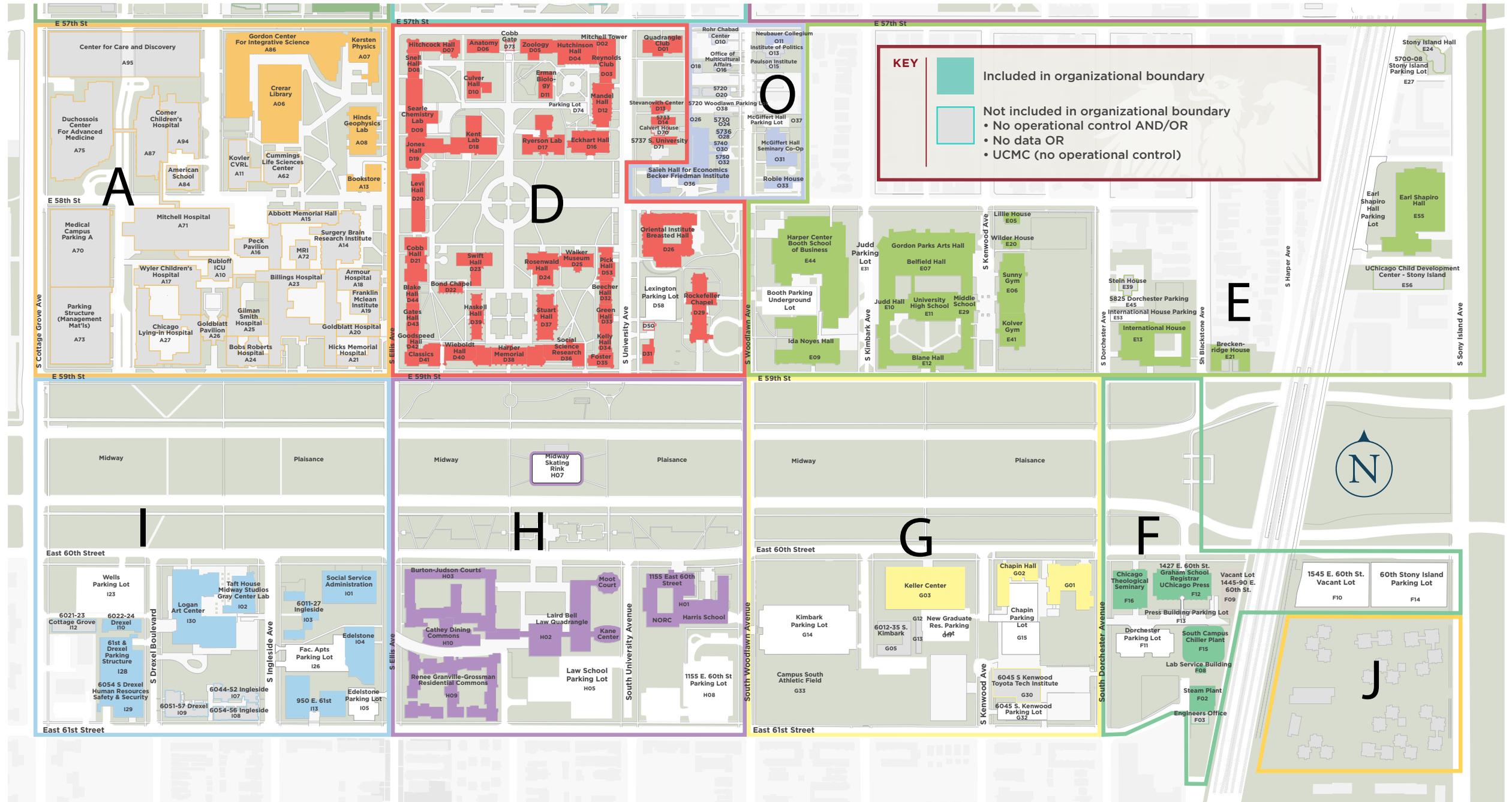
Greenhouse Gas Emissions Inventory Organizational Boundary FY2012-FY2017

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
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	New Graduate Residence Hall/now 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





APPENDIX D:

Acronyms and Chemical Formulas

Maroon text indicates UChicago-specific acronyms

Btu	British thermal unit
CCC	University of New Hampshire Campus Carbon Calculator Also referred to as UNH CCC
CH₄	methane
CO₂	carbon dioxide
CR	The Climate Registry
eCO₂	equivalent CO ₂
EF	emissions factor
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
kWh	kilowatt hour
MMBtu	1 MMBtu = 1x10 ⁶ Btu
MT	1 metric ton = 1,000 kg
(NF₃)³	nitrogen trifluoride
N₂O	nitrous oxide
OS	Office of Sustainability
PFC	perfluorocarbons
SF₆	sulfur hexafluoride
SP	Sustainability Plan
UNH CCC	University of New Hampshire Campus Carbon Calculator

Links

The University of Chicago
uchicago.edu

Facilities Services
facilities.uchicago.edu

Office of Sustainability
sustainability.uchicago.edu

Sustainability Plan
sustainability.uchicago.edu/sp

Greenhouse Gas Emissions Reduction Plan 2018-2025
[sustainability/uploads/images/UChicago_OS_GHG_Emissions_Reduction_Plan_FY18-FY25_\(E\).pdf](http://sustainability/uploads/images/UChicago_OS_GHG_Emissions_Reduction_Plan_FY18-FY25_(E).pdf)

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

Additional Resources

Sources

Referenced Standards

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

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

Global Warming Potentials (GWPs)

IPCC Fourth Assessment Report

Emissions Factors

United States Environmental Protection Agency

Climate Zone

Chicago is in CBECS climate zone 2.

United States Climate Zones for 2003 CBECS (Commercial Buildings Energy Consumption Survey)

Area (square footage)

Facilities Inventory and Classification Manual (FICM)

Institutional Data

BUILDING AREA

- 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.

POPULATION (INSTITUTIONAL DATA)

- Population includes students, faculty, staff, and lab school students.
- Guests and visitors are not included in the population.
- Harper Court staff population is included, even though Harper Court (building) is not within the GHG 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.

Scope 1

DISTILLATE FUEL OIL#2

- Fuel oil is used for emergencies, like when People’s Gas has a natural gas curtailment. Fuel oil usage in FY2017 was zero.
- Data reported is only for significant sources, including West Campus Combined Utility Plant and South Campus Chiller Plant only.

UGO DAYTIME AND UGO NIGHTRIDE SHUTTLES

Since the lease between UChicago and First Transit 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 calculations.

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.

UCHICAGO POLICE DEPARTMENT FLEET

The UCPD fleet does not have any vehicles that use diesel fuel. The UCPD fleet is University owned.

REFRIGERANTS AND CHEMICALS

This report does not include fugitive emissions from refrigerants and other chemicals.

FERTILIZER

- Assumed 100% synthetic fertilizer from 2012 going forward, making the University’s GHG emissions due to fertilizer appear worse than they actually are. Actual fertilizer is a mix of synthetic and organic materials.
- Numbers reported for fiscal year 2012 through fiscal year 2015 indicate amount *purchased*, not amount *used*. For fiscal year 2016 and forward, amount *used* per fiscal year was tracked and reported.

Scope 3

BUSINESS TRAVEL, AIR AND AUTOMOBILE

- 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.
- 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.
- The rental car data is partial data as it reflects only what is booked through the University’s preferred contracts with Enterprise/National.
- For personal mileage reimbursement, the data is only for employees (anyone on University payroll).

STUDY ABROAD TRAVEL, AIR

Assumed all study abroad travel originated from Chicago O’Hare International Airport per student participating in the program. In reality, the actual distances of the flights differs based on where the student flew from (likely their home state for domestic students).

LANDFILLED WASTE

- Data includes all buildings included in the GHG Organizational Boundary, as well as many residential properties not within the GHG boundary (which contribute a small portion of the total data).
- Residence halls and dining not included in the data until 2011 or 2012.
- Data does not include Harper Court, Gleacher Center, or any leased space.
- Data does not include construction waste.
- The data for December 2016, May 2017, and June 2017 were missing for FY2017; the prior year’s totals for these months were used as an estimate.

THE UNIVERSITY OF CHICAGO

Greenhouse Gas Emissions Inventory Report 2012–2017

May 2018

sustainability.uchicago.edu

ACKNOWLEDGMENTS

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