

Loyola University Chicago FY22 GHG Emissions Inventory - January 2023

Introduction

Loyola University Chicago's Office of Sustainability led the annual Greenhouse Gas Emissions Inventory, supported by several departments and data managers throughout the university. We utilized SIMAP (Sustainability Indicator Management & Analysis Platform)'s Campus Carbon Calculator.

SIMAP is a web-based tool managed by the UNH Sustainability Institute that provides a platform for data entry and analysis for a subscription fee.

Boundary Setting

The scope of this inventory includes Loyola's two lakeside campuses (Lake Shore Campus and Water Tower Campus) the 2022 Fiscal Year (July 1, 2021 to June 30, 2022). Only the Lakeside Campuses are considered for this work to maintain continuity with our baseline from 2008 and to reflect the commitments in our 2015 Climate Action Plan, A Just Future.

Future inventories will include Loyola's remaining U.S. campuses and academic centers (Health Sciences Campus, LUREC, Cuneo Mansion) and will reset baseline and goals.

Additional boundary data and sources are included below:

Boundary Data	FY22 Information	Source
Operating Budget	\$615,650,000	LUC Consolidated Financial Statement (Operating Expenses)
Energy Budget	\$7,004,274	Facilities Department
Full Time Students	15,097	LUC 2021-2022 Official Statistics
Part Time Students	1,802	LUC 2021-2022 Official Statistics
Total Student Enrollment	16,899	LUC 2021-2022 Official Statistics
Residential Students	4,960	Office of Institutional Effectiveness
Faculty	1,964	Human Resources
Staff	1,332	Human Resources
Total Building Space	4,664,622 gsf	Facilities Department
Endowment Size	\$1,205,589,000	LUC Consolidated Financial Statement (Short-term and Long-term Investments)
Heating Degree Days	5,834	Degreedays.net, KORD Station
Cooling Degree Days	1,344	Degreedays.net, KORD Station

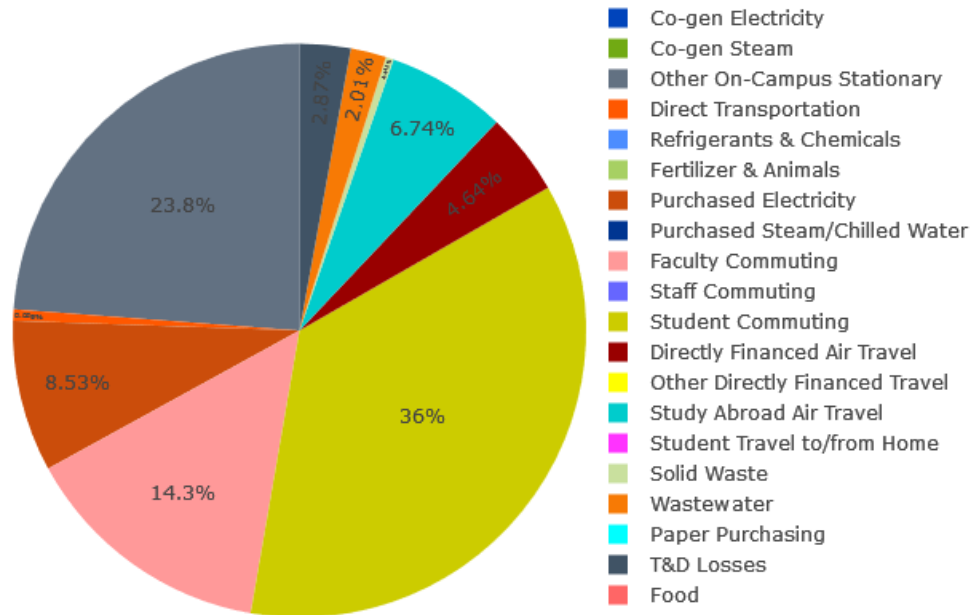
Loyola's Carbon Footprint – SIMAP

Overall Summary

This is the summary output of SIMAP in table and chart form.

	Emissions Inventory (MT CO2e)	NOTES
Scope 1	9,275	
Scope 2	3,234*	Incorporates GreenE RECs
Scope 3	24,881	Omits Potable Water and NG T&D due to SIMAP
Offsets	*	Incorporated into Scope 2
Net GHG Inventory	37,390	

Carbon: 2022



Scope 1 Emissions

Scope 1 emissions are direct emissions from sources that are owned and/or controlled by the institution. This includes the combustion of fuels in college-owned facilities or vehicles, fugitive emissions from refrigeration, and emissions from on-campus agriculture or livestock. Loyola has no co-generation facilities on the Lakeside Campuses and limited stationary and direct transportation (fleet) sources.

	Input quantity and unit	SIMAP Calculator
On-Campus Stationary Natural Gas	1,701,397 Therms	Assumes an emissions factor of 53.02 kg CO ₂ per MMBTU of natural gas consumed 9,032 MT CO₂e
Direct Transportation – Gasoline	26,496 Gallons of gasoline	Assumes an emissions factor of 8.59 kg CO ₂ per gallon = 227.6 MT CO₂e
Direct Transportation – Diesel	1,441 Gallons of on-road diesel	Assumes an emissions factor of 10.16 kg CO ₂ per gallon Diesel = 14.7 MT CO₂e
Refrigerants & Chemicals	De minimus	De minimus
Agriculture – Synthetic Nitrogen	500 lbs of nitrogen in chemical fertilizer	Assumes an emissions factor of 0.00944 kg N ₂ O/lb N = 1.25 MT CO₂e

NOTE: Sources that add up to less than 5% are considered “de minimus” and need not be inventoried if the resources required to inventory them are restrictive. Where possible, these items are included on the ‘high-end’ of their range so that a conservative approach is considered.

Direct Transportation

We extrapolated direct combustion gallons of gasoline and diesel through spending data. In FY22, the university spent \$92,682 on fuel, which is assumed to be 95% gasoline and 5% diesel. We then used U.S. Energy Information Administration data to determine the average cost per gallon of gasoline (all grades, Chicago) and diesel (Midwest) in 2022.

Scope 2 Emissions

Scope 2 emissions are indirect emissions from sources that are neither owned nor operated by your institution but whose products are directly linked to on-campus energy consumption. This includes purchased electricity, steam and chilled water. Loyola has no purchased steam or chilled water sources.

	Input quantity and unit	SIMAP Calculator
Purchased Electricity	56,999,494 kWh of electricity – GreenE Texas Wind RECs for 47,518,000 kWh (Gross emissions of 19,442 MT CO₂e – RECs of 16,207 MT CO₂e)	Customized emissions factor of 1.405802 metric tonne/MMBTU (grid-specific) = 3,234 MT CO₂e

Customized Emissions Factor

Loyola Chicago pursues a Market-Based Accounting for Scope 2 with an emissions factor provided by our retail Electricity Supplier, Constellation New Energy. We also track location-based emissions factors for electricity provided by eGrid and automatically calculated within the SIMAP platform.

Purchased Electricity and Unbundled RECs

In September 2021, Loyola increased the purchase of unbundled renewable energy certificates (RECs) from 50% to 100% for wind energy generation in Texas to offset all of the university's purchased electricity going forward. While also purchasing 50% for July-early September which averages out to 83.4% for the year. See Offsets section for more information

Scope 3 Emissions

Scope 3 emissions include other indirect emissions attributed to an institution. This includes emissions from sources that are neither owned nor operated by an institution but are directly financed or otherwise encouraged or influenced by the institution. These include air travel, commuting, solid waste disposal and transportation/distribution losses from energy.

	Input quantity and unit	SIMAP Calculator
Electricity Transmission & Distribution Losses	Assumes a 5.3% line loss for purchased electricity 56,999,494 kWh	Assumes a 0.053 ratio T&D Loss / kWh for purchased electricity 1,088 MT CO₂e
Natural Gas Production, Processing, Transmission, Storage, and Distribution Emissions	Assumes 117.6 lbs CO ₂ per Million BTU (RESNET ANSI 301 Addendum) 1,701,400 Therms	771.74 MT CO₂e (Not included in summary as no field available in SIMAP)
Faculty/Staff Commuting – Vehicle/Carpool	13,560,724 Miles	0.36 kg CO ₂ /passenger mile = 4,755 MT CO₂e
Faculty/Staff Commuting – Bus	980,596 Passenger Miles	0.33 kg CO ₂ / passenger mile = 64 MT CO₂e
Faculty/Staff Commuting – Light Rail	2,279,677 Passenger Miles	0.16 kg CO ₂ /passenger mile = 320 MT CO₂e
Faculty/Staff Commuting – Commuter Rail	1,910,905 Passenger Miles	0.15 kg CO ₂ /passenger mile = 274 MT CO₂e
Student Commuting – Vehicle/Carpool	31,238,047 Miles	0.36 kg CO ₂ /passenger mile = 10,593 MT CO₂e
Student Commuting – Bus	2,514,104 Passenger Miles	0.33 kg CO ₂ / passenger mile = 164 MT CO₂e
Student Commuting – Light Rail	15,965,928 Passenger Miles	0.16 kg CO ₂ /passenger mile = 2,243 MT CO₂e
Student Commuting – Commuter Rail	4,578,068 Passenger Miles	0.15 kg CO ₂ /passenger mile = 658 MT CO₂e
Faculty/Staff Air Travel	Assumes the emissions factor of 0.000482417 MT CO ₂ e/mile 4,005,907 Passenger Miles	1,760 MT CO₂e

Study Abroad Travel	Average roundtrip mileage per destination times the # of travelers. 5,808,174 Passenger Miles	2,555 MT CO2e
Solid Waste: Landfilled Waste with CH4 Recovery and Electric Generation	Materials to landfill – 1,070 Tons Materials to recycling – 607 Tons Materials to composting – 242 Tons	Assumes the emissions factor of 5.6 kg CH4/short ton 168 MT CO2e
Potable Water	Data from City of Chicago water meter, assumes 0.52 MWh per MG and 0.566 MT per MWh for treatment of potable water 95,441,000 Gallons of water	Estimated to be 89 MT CO2e through internal calculator but not reported in SIMAP due to lack of reporting field.
Wastewater Treatment	Data from City of Chicago water meter plus assumptions on surface catchments = 117,143,552 gallons to the sewer. Aerobic with Anaerobic Digester.	233.7 MT CO2e

Commuting Data

Commuting data by mode is extrapolated with a widely circulated 2021 survey of Loyola students, staff, and faculty. The survey collected information on commuting frequency, distance, and modes including single occupancy vehicles, high occupancy vehicles, bus (CTA), light rail (CTA), commuter rail (Metra/RTA), bicycle, and walking. The results from this survey are used to assume mode share and miles per mode for the entire university population. Walking and biking are not included in this inventory because they do not have associated carbon emissions.

Faculty/Staff Air Travel

Business air travel is extrapolated through spending data. University spending in the following categories is included: Airlines, Travel Agent, Reimbursement, and Unknown. Coefficients are assigned to each of these categories to capture a conservative estimate for how much of each category was truly dedicated to air travel. The coefficients used are: Airlines (1), Travel Agent (0.5), Reimbursement (0.33), and Unknown (0.33). These are applied to the total spending per category to estimate the total air fare paid (\$1,590,580). This number is multiplied by 0.8 to account for an estimated 20% in taxes and fees. Average cost per air mile in 2022 (\$0.26) was established from data provided by the U.S. Bureau of Travel Statistics and used to calculate the estimated number of air miles flown by staff or faculty at the Water Tower Campus and Lake Shore Campus.

Waste and Recycling

Tonnage of materials sent to landfills, recycling facilities, and composting facilities are reported to Loyola by LRS, the university’s solid waste hauler. This number includes materials sent to landfills from the Lake Shore, Water Tower, and Health Sciences Campuses.

Water

Potable Water and Wastewater are reported by Loyola, however SIMAP only has a field for Wastewater. LUC publicly reports a potable water emissions estimate using an emissions factor derived from the City of Chicago’s 2008 Climate Action Plan. The wastewater volume is calculated making assumptions for stormwater capture on various catchments with associated infiltration coefficients plus the potable water volume.

Offsets

Offsets refer to a reduction in emissions of carbon dioxide or greenhouse gases made in order to compensate for or to offset an emission made elsewhere. For the sake of this inventory all Renewable Energy Credits are Green-e Certified Renewable Energy Credits (RECs) procured to offset energy use.

	Input quantity and unit	SIMAP Calculator
Green Power Certificates (Unbundled RECs)	LUC-retired Green-e certified wind RECs 47,518 MWh	LUC-retired Green-e certified wind RECs 16,207 MT CO2e offset

Loyola University has increasingly invested in Renewable Energy Credits to account for our purchased electricity. Initially purchased to support LEED building requirements, this commitment increased to Residence Halls (~24% of demand), then 50% and in September of 2021 Loyola began purchasing 100% RECs for all electricity use.

Gross Inventory Summary – SIMAP

Scope	Activity	LUC Data Source	Emissions Factor	Measure	MT CO2e
1	On-Campus Stationary Natural Gas	Facilities Dept Utility Data	53.02 kg CO2/MMBTU	17170,140MMBTU	9,032 MT CO2e
1	Direct Transportation: Gasoline	Finance Dept spending data	8.59 kg CO2 per gallon	26,496 gallons	227 MT CO2e
1	Direct Transportation: Diesel	Finance Dept spending data	10.16 kg CO2 per gallon	1,441 gallons	14 MT CO2e
1	Agriculture: Synthetic Nitrogen	Facilities Dept.	0.00944 kg N2O per lb N	500 pounds	1.25 MT CO2e
2	Purchased Electricity	Facilities Dept Utility Data	1.405802 metric tonne/MMBTU	56,999,494 kWh	3,234 MT CO2e
3	Electricity Transmission & Distribution Losses	Facilities Dept Utility Data	0.053 ratio T&D Loss / kWh	56,999,494 kWh	1,088 MT CO2e
3	Natural Gas Production, Processing,	Facilities Dept Utility Data	Assumes 117.6 lbs CO2 per Million BTU	1,701,400 Therms	771.74 MT CO2e (Not included in

	Transmission, Storage, and Distribution Emissions		(RESNET ANSI 301 Addendum)		summary as no field available in SIMAP)
3	Faculty/Staff Commuting: Vehicle/Carpool	2021 Commuter Survey + LUC Demographics	0.36 kg CO2/passenger mile	13,560,724 Miles	4,755 MT CO2e
3	Faculty/Staff Commuting: Bus	2021 Commuter Survey + LUC Demographics	0.33 kg CO2/passenger mile	980,596 Passenger Miles	64 MT CO2e
3	Faculty/Staff Commuting: Light Rail	2021 Commuter Survey + LUC Demographics	0.16 kg CO2/passenger mile	2,279,677 Passenger Miles	320 MT CO2e
3	Faculty/Staff Commuting: Commuter Rail	2021 Commuter Survey + LUC Demographics	0.15 kg CO2/passenger mile	1,910,905 Passenger Miles	274 MT CO2e
3	Student Commuting: Vehicle/Carpool	2021 Commuter Survey + LUC Demographics	0.36 kg CO2/passenger mile	31,238,017 Miles	10,593 MT CO2e
3	Student Commuting: Bus	2021 Commuter Survey + LUC Demographics	0.33 kg CO2/passenger mile	2,514,104 passenger miles	164 MT CO2e
3	Student Commuting: Light Rail	2021 Commuter Survey + LUC Demographics	0.16 kg CO2/passenger mile	15,965,928 passenger miles	2,243 MT CO2e
3	Student Commuting: Commuter Rail	2021 Commuter Survey + LUC Demographics	0.15 kg CO2/passenger mile	4,578,068 passenger miles	658 MT CO2e
3	Faculty/Staff Air Travel	Finance Dept spending data	0.16 kg CO2/passenger mile	4,005,907 miles	1,760 MT CO2e
3	Sold Waste: Landfilled Waste CH4 Recovery and Elect. Generation	Lakeshore Recycling Systems data	5.6 kg CH4/short ton	1,070 Short Tons	167.8 MT CO2e
3	Student Study Abroad Air Travel	Office of International Programs	0.16 kg CO2/passenger mile	5,808,174 miles	2,555 MT CO2e
3	Potable Water	Dept. Of Water Management Billing Meter	Assumes 0.52 MWh per MG and 0.566 MT per MWh for treatment of potable water	95,441,000 gallons	89 MT CO2e
3	Wastewater Treatment	Dept. Of Water Management Billing Meter	0.000284778 kg CH4/gallon	95,441,000 gallons	233.7 MT CO2e
Renewable Energy	Wind RECs (non-additional, GreenE certified)	Facilities Dept Utility Data		47,518 MWh	