



Tulane
University

**2018 Greenhouse Gas
Inventory Report**

INTRODUCTION

The following document is a report of the 2018 Greenhouse Gas (GHG) Inventory for Tulane University. Since 2007, the Office of Sustainability has conducted an annual inventory to document and present the GHG emissions related to the activities and operations of Tulane University. This report helps to analyze the university's contributions to climate change.

In 2008, Tulane University President Scott Cowen signed the Presidents' Climate Leadership Commitments, committing Tulane to conduct annual inventories of our GHG emissions and to develop a Climate Action Plan. The Tulane University 2014 Climate Action Plan (<https://campusservices.tulane.edu/departments/sustainability/climate-commitment>) highlights near-term, mid-term, and long-term strategies for reducing university GHG emissions. Specifically, the plan calls for a 15% reduction of 2007 baseline GHG emissions by 2020. It also states a goal of a 30% reduction of baseline emissions by 2025, with the eventual intention of achieving climate neutrality by 2050.

BOUNDARIES

This GHG Inventory includes emissions from all facilities that are operated by Tulane University. This includes the Uptown campus, the Downtown Health Sciences Campus, the Primate Research Center, the Tulane River and Coastal Center, the Houston Campus, and the Biloxi Campus, which closed in the Fall of 2018. Past inventories included the campus in Madison, Mississippi; however, this location closed in May of 2017 and was not included in this inventory. This year's inventory also includes updated building dimensions that were derived from a recent study conducted by the University Planning Office that produced a more accurate record of building square footage, totaling 7,441,108 ft². The Tulane Medical Center and the Tulane Lakeside Hospital are owned and operated by Hospital Corporation of America and are not included in this inventory. This inventory spans the period of January 1–December 31, 2018.

EMISSIONS SCOPES

Scope 1 emissions encompass all direct emissions from the university. This includes fossil fuels burned on site for building energy use, university-owned vehicle transportation emissions, and refrigerants.

Scope 2 emissions encompass indirect emissions that result from university utility purchases. These are the emissions released by the utility provider during generation of electricity, steam, and chilled water that the university purchases for use.

Scope 3 emissions encompass indirect emissions not accounted for in Scope 2 including emissions associated with waste disposal, commuter emissions, and study abroad air travel, among other factors.

The 2018 GHG Inventory reports on Scope 1 and Scope 2 GHG emissions. In past years, the university GHG inventories have included Scope 3 emissions; however, these emissions are difficult to measure and accurately quantify. Therefore, past figures represent only an estimation of the university's Scope 3 emissions. The Office of Sustainability has decided to include only Scopes 1 and 2 in the 2018 GHG Inventory in order to focus on direct and indirect emissions from our energy usage. This is common practice among other academic institutions, specifically schools within the Ivy+ Sustainability Consortium. The Office of Sustainability will continue to develop better procedures for estimating Scope 3 emissions and encourages interested students to contact us to pursue this project.

RESULTS

In 2018, Tulane University's Scope 1 and Scope 2 GHG emissions totaled 93,895 Metric Tons Carbon Dioxide Equivalent (MTCO_{2e}). This represents a 2.39% increase in GHG emissions from 2017 to 2018. Graph 1 below shows Scope 1 and Scope 2 emissions each year since Tulane joined the Presidents' Climate Commitments in 2007. The solid black line represents the 2020 reduction goal outlined in the Tulane Climate Action Plan. Table 1 below provides the exact values for Scope 1 and Scope 2 emissions calculated over time. Tulane's emissions have increased 11.5% since our 2007 baseline inventory. It is important to note that 2007 was not the most representative year to use as a baseline for measuring the university's emissions as the post-Katrina Tulane population was much lower than both previous and following years. Table 1 also shows the 2020 goal of a 15% reduction of 2007 emissions, equaling 71,522 MTCO_{2e}. Table 2 below shows the breakdown of each scope by source. By separating each source in this way, it is evident that the majority of the university's emissions are a result of purchased electricity. At Tulane, purchased electricity is used primarily for building energy use.

Graph 1: Tulane University Annual Emissions

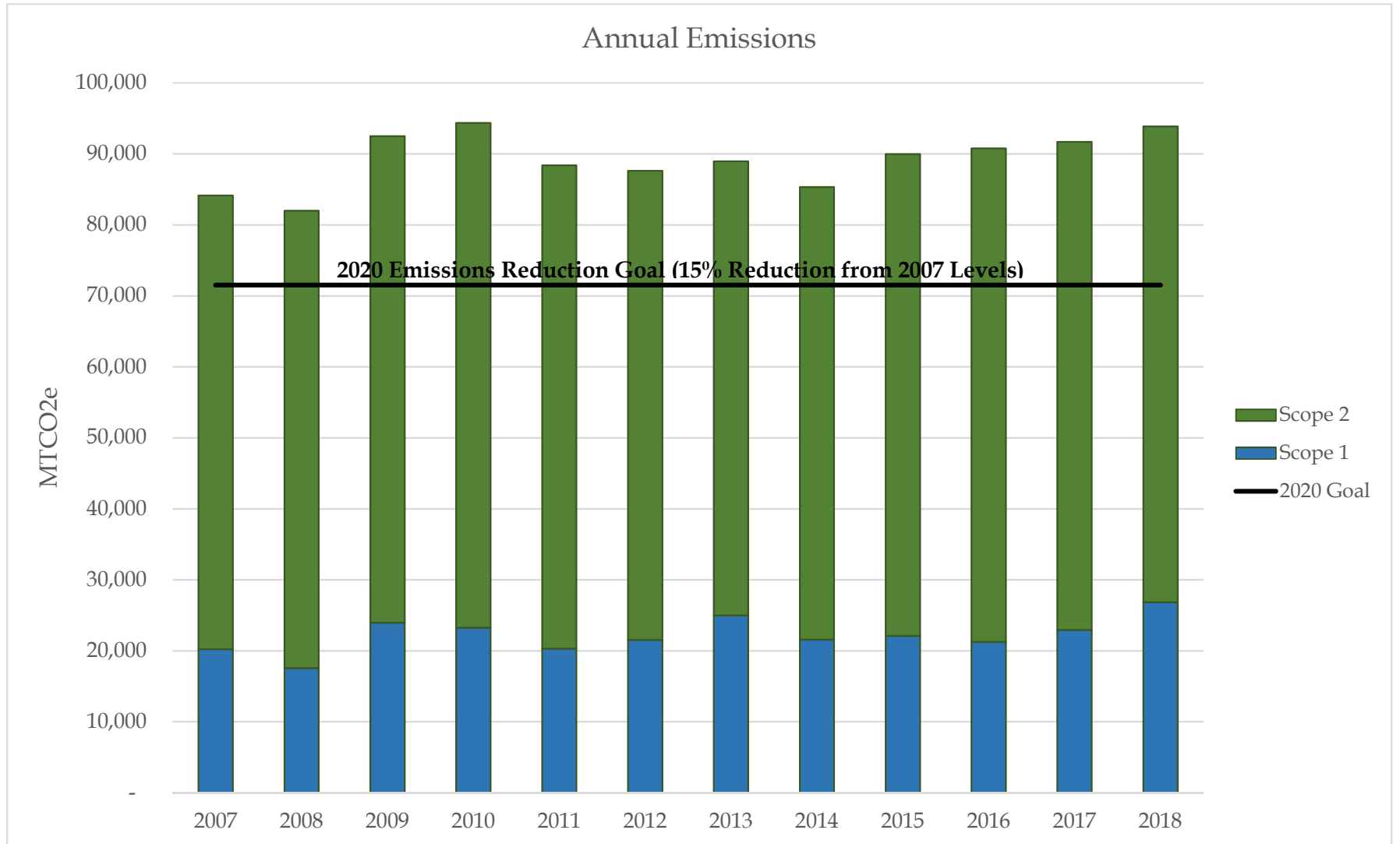


Table 1: Historical Annual Emissions

GHG Emissions (MTCO ₂ e)				
	Total Scope 1	Total Scope 2	Scope 1 & 2	2020 Goal
2007	20,244	63,900	84,144	71,522
2008	17,566	64,427	81,993	
2009	23,953	68,571	92,524	
2010	23,275	71,088	94,363	
2011	20,303	68,097	88,399	
2012	21,546	66,095	87,641	
2013	24,971	64,004	88,975	
2014	21,559	63,776	85,335	
2015	22,089	67,900	89,989	
2016	21,248	69,526	90,774	
2017	22,938	68,765	91,703	
2018	26,850	67,046	93,895	

**Table 2: 2018 Emissions
Scope & Source Breakdown**

Scope	Source	GHG MTCO ₂ e
1	Natural Gas	25,441.09
1	Direct Transportation	1,220.41
1	Refrigerants & Chemicals	188.1
Scope 1 Total		26,849.60
2	Purchased Electricity	66,580.28
2	Purchased Steam/Chilled Water	465.25
Scope 2 Total		67,045.53

Table 3 below provides normalized emissions each year since 2007, which represent measures of emission intensity over time. By calculating emission intensity factors, it is possible to compare Tulane’s performance over time, accounting for changes in student population and building area. In 2018, the student population increased to 12,413 full time equivalent. This resulted in a normalized value of 7.56 MTCO₂e per student. Although overall emissions increased from 2017 to 2018, emissions per student decreased slightly in the past year. As noted in the boundaries section earlier, the total building square footage has increased significantly from 2017 to 2018. These changes do not represent an overwhelming increase in building space, but rather reflect an updated account of building area. With the updated building square footage, MTCO₂e per 1,000 square foot increased slightly from 12.58 in 2017 to 12.62 in 2018. Normalizing emissions by student population and by building area help us understand the impact of growth on greenhouse gas emissions and shows whether the university is becoming more efficient in its operations, even as it adds students and new buildings.

Table 3: Normalized Emissions

Normalized Emissions												
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Full Time Student Equivalent (Full Time + 1/2 Part Time)	9,641	10,091	10,695	10,945	12,034	11,699	12,248	12,341	12,293	12,397	12,101	12,413
MTCO _{2e} (Scopes 1&2)	84,144	81,993	92,524	94,363	88,399	87,641	88,975	85,335	89,989	90,774	91,703	93,895
MTCO _{2e} / FTE Student	8.73	8.13	8.65	8.62	7.35	7.49	7.26	6.91	7.32	7.32	7.58	7.56
Building Area (1,000 sq. ft.)	6,747	7,038	7,156	7,168	7,193	7,210	7,210	7,475	7,297	7,303	7,292	7,441
MTCO _{2e} / 1,000 sq. ft.	12.47	11.65	12.93	13.16	12.29	12.16	12.34	11.42	12.33	12.43	12.58	12.62

2018 CHANGES IN INFRASTRUCTURE & OPERATIONS

There have been various changes in Tulane’s infrastructure and operations in the past year that may have influenced the university’s 2018 GHG emissions. In 2018, Tulane completed five energy saving projects, outlined in Table 4, and initiated four energy saving projects, outlined in Table 5. Other factors that may have contributed to changes in emissions during 2018 are also listed below.

Table 4: Energy Saving Projects Completed in 2018

PROJECT ▲	STATUS	INSTALL COMPLETE DATE	TYPE	Actual or Projected			Annual Savings		
				COST	ANNUAL ROI	PAYBACK (YRS)	EMISSIONS (MTCO2E)	ENERGY (MMBTU)	WATER (GAL)
Dorm Lighting Occupancy Sensors	Completed	11/27/2018	◦ Lighting	\$ 999	31.4%	2.4	3	18	0
HTML Lighting Lamps on 24 hours a day floors 1,2,3 &4	Completed	12/31/2018	◦ Lighting	\$ 8,505	237.7%	0.4	142	899	0
Jones Hall Stack Area on 24 hours a day	Completed	12/31/2018	◦ Lighting	\$ 102	8,797.0%	0.0	61	383	0
Lighting Retrofit- Off-Site Book Storage 900 S Jefferson Davis Parkway	Completed	12/31/2018	◦ Lighting	\$ 8,119	84.5%	1.1	52	327	0
Lindy Boggs VFD Changeout	Completed	05/24/2018	◦ Building Heating, Ventilation, Air Conditioning (HVAC)	\$ 20,907	173.7%	0.5	259	1,638	0

Table 5: Energy Saving Projects Initiated in 2018

PROJECT ▲	STATUS	INSTALL COMPLETE DATE	TYPE	Actual or Projected			Annual Savings		
				COST	ANNUAL ROI	PAYBACK (YRS)	EMISSIONS (MTCO2E)	ENERGY (MMBTU)	WATER (GAL)
Campus Interior Building Project-HTML	Proposed	01/01/2019	◦ Lighting	\$ 248,294	39.9%	2.0	836	5,281	0
Campus Wide Site LED Lighting Project Phase 2	Proposed	12/01/2018	◦ Lighting	\$ --	-10.0%	0.0	0	0	0
Chiller Optimization	Proposed	12/01/2018	◦ Central Power/Heating Plant	\$ 1,670,320	11.9%	4.6	2,160	13,649	0
Entergy EIF Shuttle	In-Progress	08/01/2018	◦ Transportation	\$ 13,950	-10.0%	0.0	0	0	0

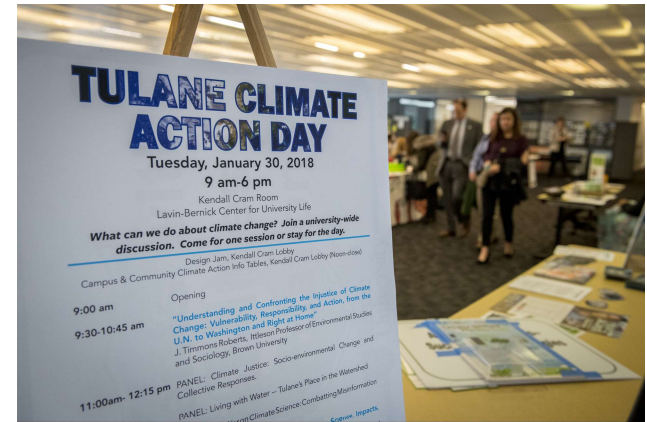
Other Changes Influencing Tulane’s Overall Energy Use & Related GHG Emissions

The following changes in infrastructure and population affected the university’s total GHG emissions:

- Tulane’s campus in Madison, Mississippi closed in May 2017.
- On the Uptown campus, the Goldring Woldenberg Complex Addition opened in January 2018 and Mussafer Hall opened in July 2018.
- Labs in Flower Hall were among the new laboratory build-outs.
- Full-time student enrollment increased by 300 students in Fall 2018.
- The Multi-purpose room in Yulman Stadium was converted into a dining facility in August 2018.

2018 TULANE CLIMATE ACTION

On January 30, 2018, Tulane University hosted Tulane Climate Action Day. An interdisciplinary group of Tulane students, staff, and faculty organized this full-day event. It included two keynote speakers, Dr. Timmons Roberts from Brown University and Dr. Katharine Hayhoe from Texas Tech University. The day also included three panels that discussed climate justice, water issues in New Orleans, and the politicized debate on climate science. This day concluded with a student Call-to-Action where a panel of students representing different environmental organizations on campus presented the work that their groups have been conducting.



DATA

University Profile

Statistics on university enrollment, including full-time student, staff, and faculty equivalent were derived from the data reported by the Tulane University registrar (<https://registrar.tulane.edu/enrollment-profiles>).

Electricity Bills

Energy use data for Tulane buildings was obtained from monthly utility bills provided by the Business Operations unit of Campus Services.

Fuel Cards

Vehicular fuel data for the University Transportation Fleet was compiled using Cardlink Fuel Summary Reports. These reports track the fuel type, either gasoline or diesel, and gallons of fuel purchased by each department in 2018. In 2018, the departments with the greatest gasoline fuel consumption were Shuttles and Transportation, the Primate Center, the Uptown Tulane Police Department, and Facilities Services. The largest consumers of diesel fuel in 2018 were Shuttles and Transportation, the Primate Center, and Facilities Services.

DATA (continued)

Refrigerants

In 2018, there were 290 pounds of R-134a (1,1,1,2-Tetrafluoroethane) used as refrigerants on Tulane's campus. This GHG has a different Global Warming Potential (GWP), or capacity to contribute to increased global temperatures, than CO₂. The calculator used to compute our emissions uses the specific GWP for R-134a in order to convert the pounds of this chemical used into the carbon dioxide equivalent of emissions, which is measured in MTCO₂e.

Houston Campus

Emissions for the Houston Campus were carried over from the 2017 inventory. This campus is located within a larger building, occupying 7% of the total building square footage. Emissions were calculated by multiplying the total energy used by the entire building by 7% in order to estimate the approximate energy used by Tulane operations at this location.

Renewable Energy Certificate

In 2018, the university purchased 1,204 Renewable Energy Certificates (RECs) from 3Degrees Group Inc. during the process of completing the LEED certification of the Goldring/Woldenberg Business Complex Addition. A REC represents the environmental benefit of 1-megawatt hour of renewable energy that can be paired with electricity. The RECs that Tulane contracted in 2018 equate to 601,172 kWh of green power purchased as certified by Green-e North America. The green power from these RECs was in the form of Black Liquor, a type of biomass fuel, and was provided by Zellstoff Celgar – TG3 (BC). Since we used a location-based method for calculating Scope 2 emissions, these RECs were not accounted for in the 2018 inventory.

CALCULATOR

The 2018 GHG Inventory for Tulane University was calculated using the Sustainability Indicator Management & Analysis Platform (SIMAP) designed by the Sustainability Institute at the University of New Hampshire. This is the second year the Office of Sustainability has used this tool as the inventory was previously determined using the Excel Campus Carbon Calculator, which has since been discontinued. In order to maintain consistency in our results, the historic annual GHG emission totals shown in this report represent emissions as they were calculated in that year. For the 2018 GHG inventory, Scope 2 emissions were calculated using a location-based method that utilizes an eGrid emissions factor. For more information on emissions factors and methodology used by the SIMAP calculator, visit <https://unhsimap.org/resources/changes-in-simap/emission-factors>.

CONCLUSIONS

Overall, Tulane University's GHG emissions increased 2.39% from 2017 to 2018. The 2014 Climate Action Plan sets forth a goal of 15% reduction of 2007 GHG emissions by 2020. This reduction goal requires Scope 1 and 2 combined emissions to be below 71,522 MTCO₂e. As 2007 Scope 1 and 2 emissions totaled 84,144 MTCO₂e, Tulane would need to reduce 2018 emissions 23.8% by 2020 in order to reach this target.

Emissions reduction efforts will need to be accelerated in order to compensate for the additional emissions that will result from the opening of the Commons in the fall of 2019. Operations of the Commons building is expected to add 1,617 MTCO₂e per year to the GHG emissions. The projected emissions associated with operating this building alone would result in a 1.02% increase in overall emissions. Moving forward, the university will need to consider the emissions associated with increased growth and respond with appropriately scaled action to decrease its overall carbon footprint.

Tulane University's Greenhouse Gas Emissions Inventory was conducted & written by Grace Cushing '19, Office of Sustainability Student Intern.