TULANE UNIVERSITY

2023 Greenhouse Gas Inventory Report

December 2, 2024

March 28, 2025: Addition of Appendix E

Introduction

Tulane University's Greenhouse Gas (GHG) Inventory measures the university's annual emissions in Metric Tons Carbon Dioxide Equivalent (MTCO2e). This inventory is conducted as a part of Tulane's participation in the Presidents' Climate Leadership Commitments, a national conglomerate of universities working to address climate change. The 2014 Tulane Climate Action Plan, adopted in 2015, sets three goals for emissions reductions: reduce GHG emissions by 15% from a 2007 emissions baseline by 2020; 30% reduction by 2025; and achieve carbon neutrality by 2050. The emissions inventory provides Tulane community members with information on the university's progress towards its emissions reduction and, eventually, carbon neutrality goals.

Over the course of 2023, Tulane University emitted 70,999 Metric Tons Carbon Dioxide Equivalent (MTCO2e), a decrease of 3.3% from the previous year. Likely reflecting substantial and expedited energy efficiency measures taken in 2022 through Project RISE. Project RISE, a 30-year Energy-as-a-Service agreement with Bernhard, LLC, accelerates the university's progress toward Tulane's climate action goals and reinforces our operational resilience. Appendix D provides an overview of Project RISE energy and water conservation projects to be implemented beginning in 2022 through 2025. In addition to projected energy reductions, Appendix D includes energy use reductions measured from both 2022 and 2023 of Project RISE.

The year 2020 marked the university's first benchmark year for GHG emission reduction, reduce emissions to levels below 71,522 MTCO2e. In 2021, GHG emissions were reduced by 15.84% from emission levels in 2007, achieving its 2020 emission reduction goal. In 2023, the university has again achieved the 2020 goal threshold. However, with new and purchased properties coming into the inventory in 2024, it will be a challenge to achieve 30% from 2007 emissions levels in performance year 2025.

Nevertheless, meaningful reductions have been realized. Tulane University has made significant emissions reductions while expanding the number of students served and size of the institution in building area. Since 2007, MTCO2e per FTE student (Full Time Equivalent) has decreased by 38% while MTCO2e per 1,000 square feet (sq. ft.) of building space has decreased by 28%.

Through Tulane's commitment to reducing its GHG emissions the university has regularly implemented strategies to facilitate improvement in its environmental impact. Among the significant projects underway through Project RISE on the uptown and downtown campuses, planning undertaken in 2022 made way for on-site solar photovoltaic systems to be installed on the uptown campus in 2024. On the Northshore, Tulane National Primate Research Center neared the completion of a multi-year renovation and expansion that should begin returning reduced emissions in the 2023-2024 academic year.

Boundaries

Tulane's GHG Inventory measures emissions from university operated facilities, transportation services, and rental properties between January 1 and December 31 of the reporting year. Areas and facilities covered in this report include the uptown campus, downtown health science campus, and the Tulane National Primate Research Center (TNPRC). For the 2023 reporting

year, the Tulane Lakeside Hospital and Tulane Medical Center, owned and operated by the Hospital Corporation of America, are not included in this inventory. For the STARS report submitted in March 2025 using 2023 emissions data, the TNPRC was not included in the institutional boundary, presented in Appendix E.

Greenhouse Gas Emissions Scopes

- **Scope 1** emissions are produced directly by the university through the combustion of fossil fuels in equipment and vehicles and through fugitive emissions (for example, the escape of hydrofluorocarbon refrigerants or other chemicals into the atmosphere).
- **Scope 2** emissions are generated indirectly by the university through the purchase of utilities including electricity, steam, and chilled water. See Appendix C for discussion of the emissions factor for the university's purchased electricity in 2023 and previous years.
- **Scope 3** emissions are all indirect emissions that result from the university's activities that are not captured in Scopes 1 and 2. Scope 3 includes but is not limited to: purchased goods and services, capital goods including construction, fuel, and energy related emissions (FERA), transportation for goods and services, waste, business travel, employee commuting, emissions generated by leased assets, and investments.

Tulane University does not currently inventory Scope 3 emissions annually. However, the implications of emissions beyond Scopes 1 and 2 are significant to addressing climate change and to mitigating the university's climate impact. Reliable and repeatable best practice reporting methods for Scope 3 emissions areas are in development.

2023 Greenhouse Gas Emissions

In 2023, Tulane University's greenhouse gas emissions were reduced from the preceding year by 3.3%. Tulane's Scope 1 and Scope 2 emissions total 70,999 Metric Tons Carbon Dioxide Equivalent (MTCO2e) in 2023.

Larger reductions may have been realized if the regional electric grid has utilized cleaner electric generation. In 2023, the electric grid emissions factor increased for the third year in a row, up 3.6% from 2022. Electricity emissions factors are discussed further in Appendix C.

The greenhouse gas emissions inventory also reflects a continued spike in fugitive emissions at 1% of our total annual emissions. This spike is attributed to substantial energy efficiency improvements to cooling equipment implemented through the second year of Project RISE improvements projected to reduce operational emissions moving forward, detailed in Appendix D.

Chart 1: Tulane University Annual Greenhouse Gas Emissions

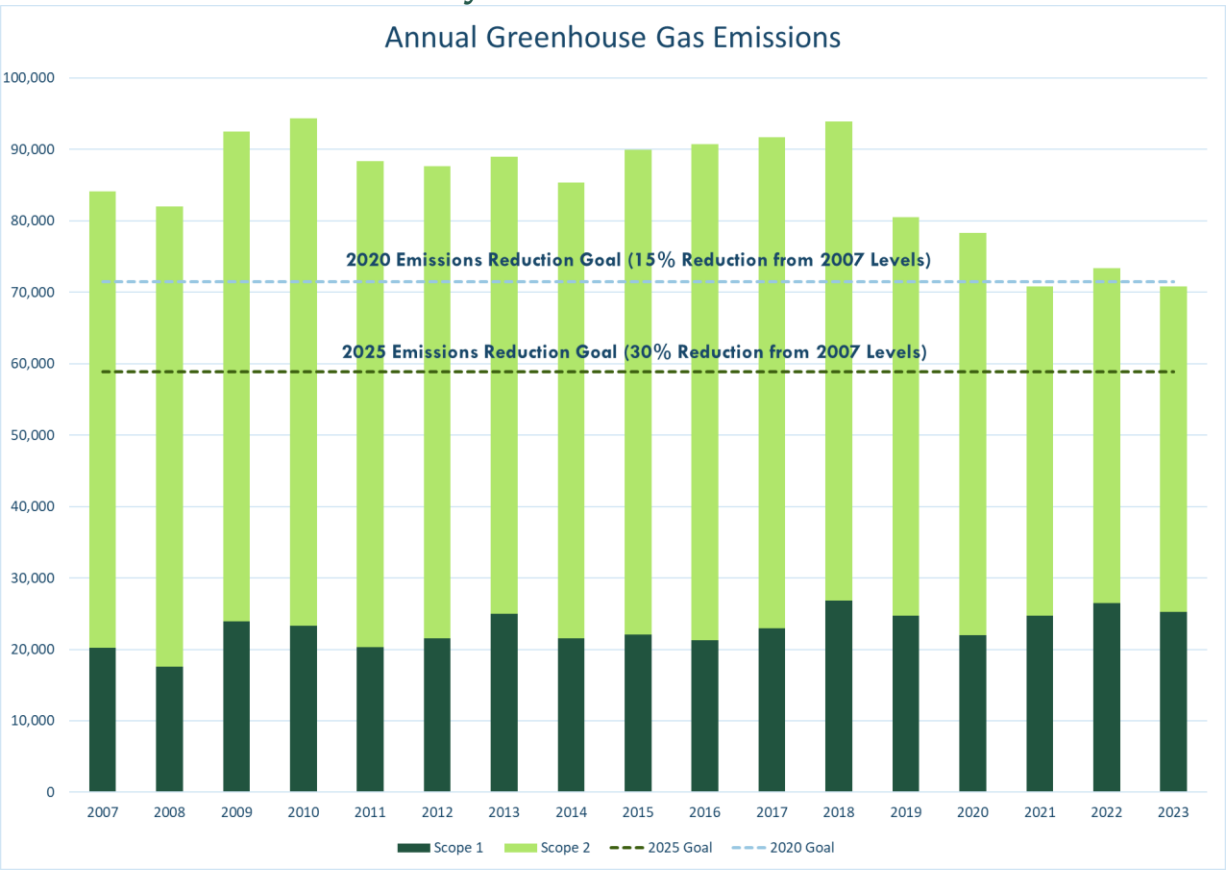

Chart 1 presents Scope 2 and Scope 2 emissions for each year stacked to convey the total emissions annually from 2007 through the current reporting year. Annual emissions are shown with Scope 1 emissions at the base in dark green with Scope 2 emissions stacked above in light green, together visualizing the total Scope 1 and 2 emissions with the height of the bar. Total annual emissions undulate relatively dramatically between 2007 and 2018. Beginning in 2019, a total emissions reduction trend begins showing much smaller variation from year to year. Most of the reductions observed since 2019 are achieved in Scope 2 emissions. Scope 1 emissions remain relatively steady, showing a slight increasing trend.

Table 1: Tulane University Annual Greenhouse Gas Emissions

GHG Emissions (MTCO2e)					
	Scope 1	Scope 2	Total Scope 1&2	Amount over 2020 Goal (71,522)	Amount over 2025 Goal (58,900)
2007	0020,244	63,900	84,144	12,622	25,244
2008	17,566	64,427	81,993	10,471	23,093
2009	23,953	68,571	92,524	21,002	33,624
2010	23,275	71,088	94,363	22,841	35,463
2011	20,303	68,097	88,399	16,877	29,499
2012	21,546	66,095	87,641	16,119	28,741
2013	24,971	64,004	88,975	17,453	30,075
2014	21,559	63,776	85,335	13,813	26,435
2015	22,089	67,900	89,989	18,467	31,089
2016	21,248	69,526	90,774	19,252	31,874
2017	22,938	68,765	91,703	20,181	32,803
2018	26850	67,046	93,895	22,373	34,995
2019	24,737	55,807	80,544	9,022	21,644
2020	21,949	56,388	78,337	6,815	19,437
2021	24,748	46,064	70,812	-710	11,912
2022	26,486	46,905	73,391	1,869	14,491
2023	25,362	45,637	70,999	-523	12,099

Table 1 details Scope 1 and Scope 2 emissions annually from 2007 through the current reporting year. This table also includes columns showing the how each year's performance falls relative to the Climate Action Plan 2020 and 2025 emissions reduction goals. Emissions in 2023 achieved the 2020 reduction goal by 523 further MTCO2e reductions. However, emissions in 2023 were 12,009 MTCO2e above the 2025 goal.

Table 2: Greenhouse Gas Emissions Reduction Progress

2023 Greenhouse Gas Emissions Reduction Progress	
Change 2022 to 2023	-3.3% decrease in emissions 2022 to 2023
Change from 2007 emissions	-16% below 2007 emissions

Table 2 presents the current reporting year against emissions from the preceding year and the baseline year, 2007. Greenhouse gas emissions in 2023 show a 3.3% reduction from 2022 and 16% reduction from the baseline year, 2007.

Emissions Intensity

2023 emissions figures show emissions intensity has reduced for both emissions per square foot and per full time equivalent student. Table 3 below catalogs the university's annual emissions together with institutional indicators of size and corresponding emissions intensity figures since 2007, the Climate Action Plan's baseline year. Two indicators of the university's size are used, the Full Time Equivalent (FTE)[1] student population and the total building area.[2]

Table 3: Emissions Intensity

	MTCO2e (Scopes 1&2)	Student Population, Full Time Equivalent (FTE)	MTCO2e/ FTE Student	Building Area (1,000 sq. ft.)	MTCO2e/ 1,000 sq. ft.
2007	84,144	9,641	**8.73**	6,747	**12.47**
2008	81,993	10,091	**8.13**	7,038	**11.65**
2009	92,524	10,695	**8.65**	7,156	**12.93**
2010	94,363	10,945	**8.62**	7,168	**13.16**
2011	88,399	12,034	**7.35**	7,193	**12.29**
2012	87,641	11,699	**7.49**	7,210	**12.16**
2013	88,975	12,248	**7.26**	7,210	**12.34**
2014	85,335	12,341	**6.91**	7,475	**11.42**
2015	89,989	12,293	**7.32**	7,297	**12.33**
2016	90,774	12,397	**7.32**	7,303	**12.43**
2017	91,703	12,101	**7.58**	7,292	**12.58**
2018	93,895	12,413	**7.56**	7,441	**12.62**
2019	80,544	12,784	**6.30**	7,498	**10.74**
2020	78,337	13,071	**5.99**	7,651	**10.24**
2021	70,812	13,447	**5.27**	7,730	**9.16**
2022	73,391	13,336	**5.50**	7,981	**9.52**
2023	70,999	13,115	**5.41**	7,981	**8.90**

Table 3 catalogs the university's total Scope 1 and Scope 2 emissions together with institutional indicators of size and corresponding emissions intensity figures annually since 2007, the Climate Action Plan's baseline year. Two indicators of the university's size are used, the Full Time Equivalent (FTE)[3] student population and the total building area.[4]

Since 2007 the student population and Tulane building area have each grown. The 2023 FTE student population is 36% larger than it was in 2007 and 7% larger than it was in 2015 when the Climate Action Plan was adopted. Despite the expansion of the student population, Tulane's

[1] Full Time Equivalent student population is calculated using the total number of full-time students plus half the number of part time students.
[2] Temporary structures, including temporary pavilions housing the Tulane School of Architecture, are not included in the university's total building square footage. The energy used by those structures is included in the calculation of annual greenhouse emissions.
[3] Full Time Equivalent student population is calculated using the total number of full-time students plus half the number of part time students.
[4] Temporary structures, including temporary pavilions housing the Tulane School of Architecture, are not included in the university's total building square footage. The energy used by those structures is included in the calculation of annual greenhouse emissions.

emissions per FTE student steadily trend toward reduced intensity per student. Emissions per student decreased from 8.73 MTCO2e/FTE in 2007 to 7.32 MTCO2e/FTE in 2015, landing in 2023 at 5.41 MTCO2e/FTE.

The emissions intensity for building area has also decreased, sliding from 12.33 MTCO2e per 1,000 square feet of building area in 2015 to 8.90 in 2023, a 28% reduction since the adoption of the Climate Action Plan. Emissions intensity in 2007 was not noticeably higher than 2015, at 12.47 MTCO2e per 1,000 square feet. However, the university expanded its building area by 18% between 2007 and 2023, indicating significant reductions in emissions associated with building operations, particularly since 2015. See Appendix A for a visualization of the emissions intensity data presented in Table 3.

Energy Use and Other Drivers of GHG Emissions

The greenhouse gas inventory reviews Scope 1 and Scope 2 emissions generated by the university annually. In 2023 the university's emissions are dominated by two energy sources: natural gas driving 33% of emissions and purchased electricity responsible for 62% of emissions. Remaining contributors, transportation fuel, fugitive emissions, and purchased steam and chilled water combined comprise 4% of the university's 2022 emissions.

The energy used by Tulane is principally purchased as electricity or natural gas. Electricity is used to power artificial lighting, electronics, pumps, fans, refrigerators, and other equipment within buildings and on our campus grounds. Natural gas, categorized as an on-campus stationary fuel together with propane, is used to produce heat through steam systems which is used to create heat and hot water for buildings. Where the equipment is in place and when the price of natural gas compared to electricity is favorable, natural gas is burned to generate both steam for heating and electricity for building use through Combined Heat and Power Unit (CHP) units in university operated central power plants.

Tulane purchases a small amount of steam and chilled water from district utilities to serve the downtown campus to supplement heating and cooling in buildings. Though small in relative terms, purchased chilled water and steam account for 2% of the university's annual emissions alone. This is one area of many Project RISE targets to improve operational efficiency and resilience.

Gasoline and diesel are primarily used by vehicles such as shuttles and transportation, athletics, and police departments. Facilities Services powers some equipment, landscaping equipment for example, using gasoline. During events and emergency situations, diesel fuel is the most common fuel used to power mobile generators. The shuttles fleet welcomed new electric vehicles in 2023, introducing electricity to the spectrum of energy sources that power university vehicles.

Fugitive emissions differ from other emissions contributors in the inventory. This category of accounts for emissions generated through the direct release of greenhouse gasses into the atmosphere. Refrigerants purchased for cooling equipment dominate this category. Because these chemicals are immediately damaging to the environment, extreme measures are taken to ensure that they are not released into the atmosphere during handling. Over time, they leak from cooling equipment and must be replaced. In accordance with greenhouse gas emissions

accounting practices, fugitive emissions are included in emissions tracking the year of their purchase. Fugitive emissions remained high in 2023 due to significant investment in new, energy efficient, cooling equipment installed through the year for Project RISE.

Chart 2: Overview of Scope 1 & Scope 2 Greenhouse Gas Emissions by Category

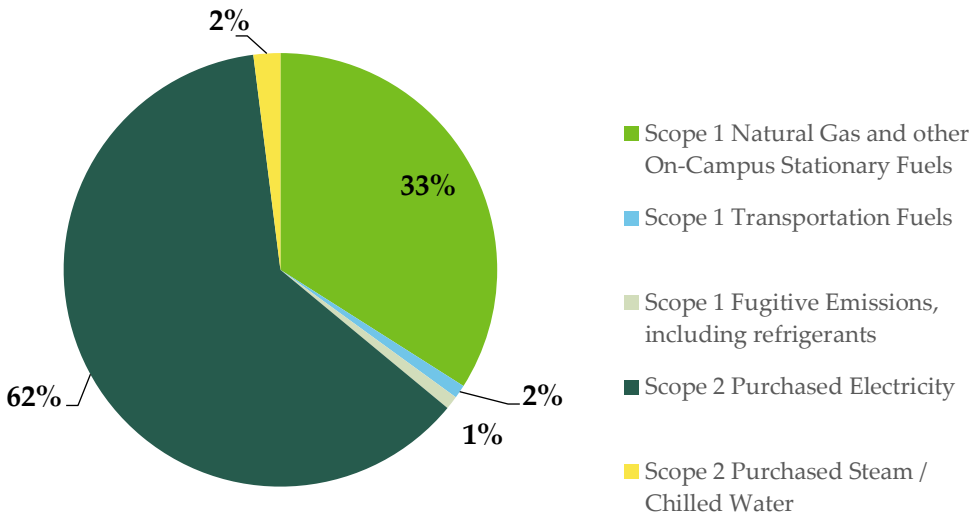

Chart 2 visualizes the sources of 2023 emissions in a pie chart. Natural gas, at 33% of 2023 emissions, transportation fuels, at 2%, and fugitive emissions at 1% comprise Scope 1 emissions. Purchased electricity at 62% and purchased steam and chilled water at 2% comprise Scope 2 emissions.

Table 4: Annual Scope 1 & Scope 2 Greenhouse Gas Emissions Sources

Scope, Source, & Units		2020	2021	2022	2023
1 Natural Gas, On-campus Stationary Fuels	Natural Gas, MMBTU	392,797	445,871	465,630	436,022
	Propane, MMBTU	44	56	32	40
1 Transportation Fuels	Gasoline, Gallons	70,670	61,094	59,252	76,443
	Diesel, Gallons	24,111	34,565	17,277	16,184
1 Fugitive Emissions	HCFC-22, lbs	125	132	0	60
	HFC-134a, lbs	n/a	4	25	0
	HFC-410a, lbs	144	105	725	625
	R-427A, lbs	n/a	n/a	300	475
	HFC-407C, lbs	n/a	n/a	50	125
2 Purchased Electricity	Purchased Electricity, kWh	143,998,808	135,591,816	135,894,790	130,339,624
2 Purchased Steam and Chilled Water	Purchased Steam, MMBTU	999	4,989	10,796	23,611

Purchased Chilled Water, MMBTU	3,533	5,073	4,937	360

Table 4 provides further detail into contributors to university Scope 1 and Scope 2 emissions by category annually from 2020 through the current reporting year.

Projects Affecting Emissions & Outlook

The university implemented several significant projects in 2023 to reduce the university's emissions across all campuses. Projects undertaken during 2023 that increase our emissions footprint are also addressed. At present, the majority of Scope 1 and Scope 2 emissions come from our buildings and supporting plant operations. This section recounts primary drivers of change in emissions patterns from our buildings and power plant operations starting with Project RISE, reviews notable projects beyond the Project RISE scope, and closes with a look ahead to 2024.

Project RISE in 2023

Tulane embarked on a 30-year Energy-as-a-Service partnership with Bernhard, LLC, in 2022 which includes the goal of reducing annual greenhouse gas emissions toward reaching carbon neutrality in 2050. Using the moniker "Project RISE," Bernhard began implementing energy optimization projects on the uptown and downtown campuses early in 2022.

Between 2022 and 2025, over $80 million in capital improvements will upgrade and strengthen the Universities Plant operations, HVAC, and energy infrastructure. The partnership includes a 1-megawatt solar generation facility on the uptown campus. Improving reliability and resilience of campus infrastructures is also a program goal. Bernhard takes on responsibility for risk of energy operations and maintenance. Appendix D provides two tables of measured and projected energy and water use reductions central to the Project RISE partnership.

Several improvements to the university's energy infrastructure and building systems were made during 2023, the second year of Project RISE, to reduce energy and water use as well as to improve our operational resilience. The most significant of these are recounted below.

Building Automation Systems

Building Automation System (BAS) installations of meters, sensors, and controls neared completion on the downtown campus with testing and verification were underway at the close of 2023. On the uptown campus, installation of BAS components was approximately 80% complete at the close of 2023. Occupancy schedules developed through retro-commissioning processes conducted on larger buildings were completed for the uptown campus buildings in 2023. These schedules paired with the complete BAS will allow energy managers to improve operational efficiencies.

Lighting Upgrades

Lighting upgrades to existing buildings were largely completed in 2022 for both campuses. Effective and efficient lighting strategies will continue to be an important part of the university's green building standards for new construction and major renovations.

Cooling Towers

Cooling tower upgrades were installed for the uptown central plant during October of 2023 to reduce energy consumption.

Chilled Water

A new chiller was installed in the uptown central plant during November to improve the campus chilled water system performance. Upgrades to chilled water systems downtown were also made to the School of Medicine plant in May and to the Health Sciences building on Perdido in March. With this installation, the Health Sciences building on Perdido will no longer draw on purchased chilled water. The School of Medicine central plant received a heat pump chiller in July of 2023.

Boilers

Four new hot water boilers for steam and heating systems were installed in the School of Medicine power plant. This work was completed in August. The Environmental Health Sciences building on Perdido received two similar boilers in March.

Resilience: Generator Installations

Temporary generators were installed on the uptown campus to provide operational resilience through variation in utility service and outages caused by storms. Downtown, a natural gas generator and portable electric substation (eHouse) were installed at the Health Sciences building on Perdido. Resilience projects can contribute both to reductions and increases in energy use depending on the context and timing of their use.

Operational Adjustments

Two major operational decisions were taken in 2023 that impacted emissions associated with energy use. They are adjustments to outside air dampers in ventilation systems and use of natural gas for the combined heat and power units.

Outside Air Dampers

Ventilation systems for buildings on the uptown and downtown campuses were modified to allow more outside air intake in March and July of 2023. This is a measure required by the building code to meet indoor air quality standards. The impact of this change on energy consumptions annually is estimated to be an increase of 111,752 kwh of electricity and 886 MMBTU of natural gas.

Plant Operations

Due to high natural gas prices, combined heat and power units in power plants uptown and downtown were not operated as extensively as planned through 2023. The impact of this adjusted operation on energy consumption is estimated to be 13,562,109 additional kwh of electricity purchased and 609,398 fewer MMBTU of natural gas consumed. This change also consumed 4,896 additional kilogallons (kgals) of water.

Building Construction and Demolition

During 2023 the size of the university increased by 4% across all campuses considering both additions and demolitions. Buildings remain a primary driver of the university's greenhouse gas emissions.

Uptown

In housing, the first phase of The Village, opened to students for the 2023 fall semester. These spaces include two residential halls, River and Lake, plus a social multi-use space called the Hub. This project achieved LEED Gold certification marking its achievement in environmental design and construction process.

The second phase of The Village began with the demolition of Irby, Phelps, and Patterson Houses at the close of the spring semester in 2023.

Among academic buildings, Richardson Memorial Hall remained out of use during its complete renovation and addition.

Downtown

No significant spaces came into use downtown during 2023.

Northshore

Northshore square footages were reconciled in 2023 to incorporate building additions. As a result, the total square footage for the Northshore campus in 2023 increased by 7,120 square feet to 206,449 square feet.

Vehicle Fleet Transition

The Tulane electric shuttles fleet arrived for service during the summer of 2023.[5] The project was announced in 2020 with the receipt of a grant from the Department of Energy to demonstrate electric vehicle transition for fleets in our region.[6] The have zero tailpipe emissions, therefore they do not contribute to local air quality concerns. Their greenhouse gas emissions are based on the emissions factor of the electricity they use. See Appendix C for further detail. These vehicles are projected to produce 30% fewer greenhouse gas emissions than comparable vehicles running on gasoline.

The electric vehicles are powered entirely by electricity and mark a significant step toward transitioning this and other university vehicles to more climate friendly models. Through the shuttles project, the university is gaining experience maintaining electric vehicles, monitoring fleet charging stations, training drivers, and incorporating them into daily use. With this

[5] Dunkle, Jaime. 2023. "Tulane debuts new 100% electric shuttles to reduce carbon footprint." Tulane News. December 7. https://news.tulane.edu/news/tulane-debuts-new-100-electric-shuttles-reduce-carbon-footprint

[6] Simon, Kate. 2021. "Tulane University receives award to demonstrate electric shuttle buses for New Orleans region." Tulane News. April 1. https://news.tulane.edu/pr/tulane-university-receives-award-demonstrate-electric-shuttle-buses-new-orleans-region

experience, the university is well positioned to expand electric vehicle transitions and realize greenhouse gas emissions reductions in transportation fuels.

Outlook

Looking ahead to 2024, the university has both significant emissions reductions to look forward to as well as notable additions to its portfolio of buildings.

Project RISE 2024 Energy and Water Conservation Projects

In 2024, Project RISE should see the implementation of the BAS on uptown and downtown campuses, enabling further energy reductions through detailed energy management. Uptown, the installation and activation of three on-site solar arrays, projected to generate 1 megawatt of electricity, are schedule for completion late in 2024, reducing energy demand and associated emissions.

These projects taken into consideration with many others project changes in the university's energy use pattern. Project RISE anticipates a 20,933 megawatt-hours (mWh) reduction in electricity use and an increase in natural gas consumption of 15,356 million British thermal units (MMBTU). See Appendix D for a thorough overview of further energy and water consumption projections through 2025.

Building Holdings, Construction, and Demolition

Forthcoming building demolitions, acquisitions, construction, and renovations that will impact the university's greenhouse gas emissions are noted below.

- Paul Hall, LEED Gold certified, opened for use during the spring semester of 2024.
- The Tulane Hospital building at 1415 Tulane Avenue, LaSalle Garage, and Saratoga Garage buildings with their associated energy use and greenhouse gas emissions will be incorporated into the greenhouse gas inventory report in 2024. Together these buildings introduce roughly 730,000 sq. ft. of former hospital space and 670,000 sq. ft. of garage space to the university's portfolio.
- Construction on residential halls Fogelman and Bayou began in 2023 and is projected to be complete by fall semester of 2025.
- The Northshore campus continues to expand. An addition underway during 2024 is anticipated to be completed early in 2025.

Tulane University's 2023 Greenhouse Gas Inventory Report was prepared by the Office of Sustainability with data from colleagues across the university.

Appendix A

Emissions Intensity

Chart 4: Tulane University Annual Greenhouse Gas Emissions Intensity

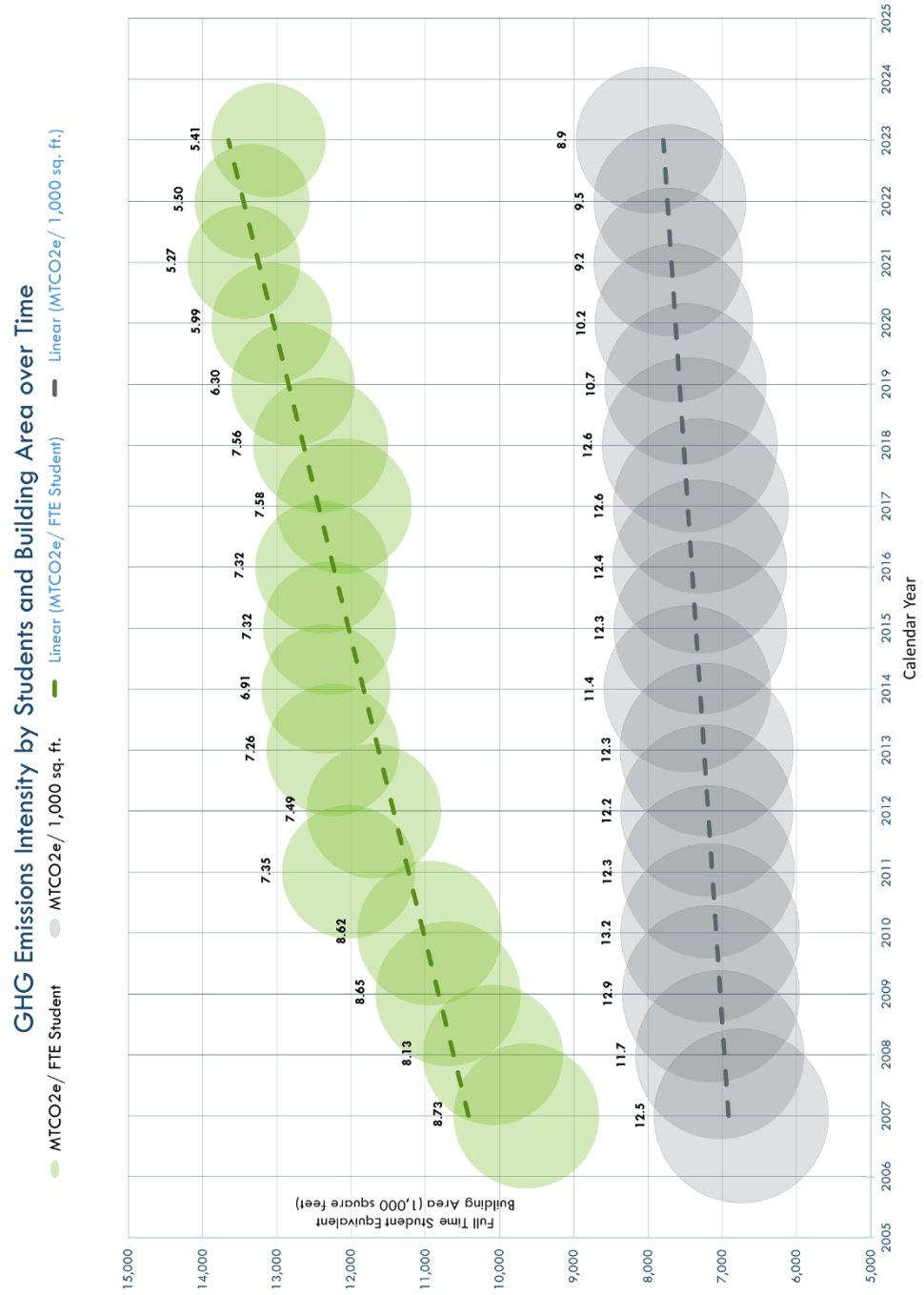

Chart 4 draws on emissions intensity data shared in Table 3 to visualize annual emissions intensity and institution size since 2007. The footprint of climate emissions per full time student equivalent, MTCO2e/FTE, is indicated by the area of the green circles, with the corresponding numerical value presented above each circle. Similarly, the magnitude of climate emissions per 1,000 square feet of building area is indicated by the area of the grey circles. The position of the circles on the x-axis indicates the corresponding performance year. The position of each circle on the y-axis indicates the corresponding full time student equivalent population or building area for that year. The chart shows decreasing emissions intensities through smaller circle sizes each year for both student population and building area. Both metrics of institutional growth, students served and building area, show an overall upward trajectory since 2007.

Appendix B

Climate & Weather

Energy use to heat and cool buildings is partially influenced by the weather over the course of a calendar year. Heating Degree Days (HDD) and Cooling Degree Days (CDD) are one method of tracking the climactic demand for energy to condition buildings. These data points provide a rough indication of how much and how often the external air temperature would require heating or cooling to sustain a temperature of 65 degrees Fahrenheit inside buildings.

The table below shows the annual Heating Degree Days and Cooling Degree Days based in actual weather patterns at New Orleans International Airport weather station (KMSY). Based on this data, 2023 saw fewer Heating Degree Days (a mild winter) and more Cooling Degree Days (a hot summer) than the two preceding years. In 2023, weather conditions encouraged more energy to cool buildings and less energy to warm buildings when compared to 2021 and 2020.

Table 5: Climate & Weather

KMSY New Orleans International Airport Weather Station	2007		2017	2018	2019	2020	2021	2022	2023
Heating Degree Days (HDD)[1]	1,116		1,247	1,247	1,182	835	1,101	1,354	896.9
Cooling Degree Days (CDD)[2]	3,433		3,538	3,538	3,455	3,672	3,374	3,347	3,770

[1] Fahrenheit-based heating degree days with a base temperature of 65 F.
[2] Fahrenheit-based cooling degree days with a base temperature of 65 F.
Data Source: BizEE Weather Data for Energy Saving, www.degreedays.net.

Appendix C

Emissions Factors for Purchased Electricity

Emissions factors, or emissions coefficients, are used to calculate the amount of greenhouse gas emissions released per one unit of energy. The emissions factor for purchased electricity is dependent on the types and amounts of each fuel utilized to generate the electricity. For the purposes of calculating annual greenhouse gas emissions, emissions factors are calculated annually for each major regional electric grid by the Environmental Protection Agency.

The regional electric grid serving southeast Louisiana and Tulane's campuses is the SERC Mississippi Valley electric grid. The emissions factor of this grid is incorporated into calculations and projections for Tulane's current Climate Action Plan, including the 2007 baseline year emissions, emissions reduction goals, and steps to achieve those goals.

Between 2020 and 2021, the SERC Mississippi Valley emissions factor decreased by 13%. The following year, between 2021 and 2022, the emissions factor increased by 4%. And again, for reporting year 2023, the emissions factor has increased 3.6% from the year before.

The variation in emissions factor from year to year often stems from the relative cost and operational needs of generating electricity from the sources available to utilities within the regional grid (natural gas, coal, nuclear…). As electricity generation becomes cleaner, the emissions factor is reduced.

The SERC Mississippi Valley electric grid includes Entergy New Orleans, Tulane's electricity, and natural gas provider south of Lake Pontchartrain. Cleco, the utility serving the Northshore campus. In May of 2021, the City of New Orleans adopted the Renewable and Clean Portfolio Standard (RCPS)[7] which requires Entergy New Orleans to provide customers with electricity from zero carbon sources by 2050. Intermediate performance goals are to provide electricity from 80% clean sources by 2030 and 100% clean (net-zero carbon emissions) by 2040. These improvements and others in the regional grid will help the university reach its carbon reduction goals for 2030 and 2050 when carried out.

Table 6: Scope 2 Electric Grid Emissions Factors

Scope 2 Electric Grid Emissions Factors							
	2017	2018	2019	2020	2021	2022	2023
eGrid Region	SRMV: SERC Mississippi Valley since 2007						

[7] The Renewable and Clean Portfolio Standard, retrieved May 31, 2022, online: https://cityofno.granicus.com/MetaViewer.php?view_id=&clip_id=3852&meta_id=538696

Emission Factors Version	AR4	AR4	AR5	AR5	AR5	AR6	AR6
Emission Factors Database	eGrid2014	eGrid2016	eGrid2018	eGrid2018 Unchanged in 2020 update	eGrid2020	eGrid2021	eGrid2022
CO2e	1027.1 lb/MWh	842.2 lb/MWh	858.4 lb/MWh	858.4 lb/MWh	740.36 lb/MWh	775.4 lb/MWH	803.7 lb/MWH

For more information on electricity emissions factors and the eGrid regions at the U.S, visit the EPA's Power Profiler website, accessed June, 2024. https://www.epa.gov/egrid/summary-data

Table 6 provides a chronology of emissions factors for the university's purchased electricity. For the reporting year 2023, the carbon dioxide equivalent emissions factor for the regional grid was 803.7 pounds per megawatt-hour. This figure is up 3.6% from 2022 when the emissions factor was 775.4 pounds per megawatt-hour.

Emissions from electricity receive special attention in this report because of their relative share of annual emissions, 62% in 2023. Both the buyer and the seller of electricity are responsible for the emissions released. The purchaser, in this case Tulane University, determines how much electricity they will consume through selection, maintenance, and repair of its equipment and facilities. The electric utility determines what fuel sources will be utilized to generate electricity, and thereby, the associated emissions.

Appendix D

2022-2025 Measured & Projected Reductions

Tables 7 and 8 present action areas for completion on the uptown and downtown campuses respectively by the end of 2025 as part of the university's Project RISE agreement with Bernhard launched in 2022. Data present energy and water conservation impacts measured through 2023 and projected performance into 2024 and 2025.

Table 7: Projected Reductions, Uptown Campus

	Measured		Projected		
Reductions: Electricity kWh	**2022**	**2023**	**2024**	**2025**	
Upgrade Chilled Water System	0	0	-7,485,304	2,447,968	
Upgrade Cooling Tower Water System	0	0	51,543	51,543	
Upgrade Steam and Heating Water System	0	0	29,452	326,594	
Install Combined Heating and Power	6,495,070	4,616,844	15,826,131	39,438,793	
Upgrade and Retro-Commission BAS	15,605	1,436,841	1,671,007	2,585,260	
Upgrade Air Handling Units	0	0	75,041	1,126,599	
Upgrade Interior and Exterior Lighting	1,167,711	7,090,474	7,090,474	7,090,474	
Install Solar	0	0	269,402	1,539,458	
Implement Water Conservation Program	0	0	0	0	
Projected Annual Reductions, kWh	**7,678,386**	**13,144,159**	**17,527,747**	**54,606,689**	**Original Target**
Percentage of progress through 2025	**14%**	**23%**	**31%**	**97%**	**56,586,304**
Reductions: Natural Gas MMBTU	**2022**	**2023**	**2024**	**2025**	
Upgrade Chilled Water System	0	0	0	0	
Upgrade Cooling Tower Water System	0	0	0	0	
Upgrade Steam and Heating Water System	0	0	0	0	
Install Combined Heating and Power	-68,476	-56,580	-85,602	-356,155	
Upgrade and Retro-Commission BAS	141	4,796	6,096	11,461	
Upgrade Air Handling Units	0	0	0	0	
Upgrade Interior and Exterior Lighting	0	0	0	0	

Implement Water Conservation Program	920	2,761	2,761	2,761	
Projected Annual Reductions, Natural Gas MMBTU	**-69,537**	**-49,023**	**-76,745**	**-341,933**	**Original Target**
Percentage of progress through 2025	**20%**	**14%**	**22%**	**100%**	**-341,545**
Reductions: Water KGals	**2022**	**2023**	**2024**	**2025**	
Upgrade Chilled Water System	0	0	0	0	
Upgrade Cooling Tower Water System	0	0	24,541	24,498	
Upgrade Steam and Heating Water System	0	0	0	0	
Install Combined Heating and Power	-565	-3,377	-6,080	-16,246	
Upgrade and Retro-Commission BAS	47	96	2414.93	3,960	
Upgrade Air Handling Units	0	0	0	0	
Upgrade Interior and Exterior Lighting	0	0	0	0	
Implement Water Conservation Program	4,449	13,941	13,941	13,941	
Projected Annual Reductions, Water KGals	**3,931**	**10,660**	**34,817**	**26,153**	**Original Target**
Percentage of progress through 2025	**15%**	**40%**	**132%**	**99%**	**26,359**

Table 8: Projected Reductions, Downtown Campus Selected Projects

	Measured		Projected	
Reductions: Electricity kWh	**2022**	**2023**	**2024**	**2025**
Upgrade Chilled Water System	0	0	-43,692	405,138
Upgrade Cooling Tower Water System	0	147,449	305,643	850,692

Upgrade Steam and Heating Water System	0	100,501	182,224	582,823	
Install Heat Pump Chiller Heater	0	-1,197,716	-1,038,214	-1,224,740	
Upgrade and Retro-Commission BAS	39,246	117,893	445,685	772,229	
Upgrade Air Handling Units	0	111,634	159,065	226,401	
Upgrade Interior and Exterior Lighting	1,811,621	3,394,932	3,394,932	3,394,932	
Implement Water Conservation Program	0	0	0	0	**Original Target**
Projected Annual Reductions, kWh	**1,850,831**	**2,674,693**	**3,405,645**	**5,007,474**	**6,654,564**
Percentage of progress through 2025	**15%**	**40%**	**51%**	**75%**	
Reductions: Natural Gas MMBTU	**2022**	**2023**	**2024**	**2025**	
Upgrade Chilled Water System	0	0	0	0	
Upgrade Cooling Tower Water System	0	0	0	0	
Upgrade Steam and Heating Water System	26,263	32,121	3,092	7,529	
Install Heat Pump Chiller Heater	0	23,167	42,138	49,708	
Upgrade and Retro-Commission BAS	57	1,647	1,822	3,310	
Upgrade Air Handling Units	0	0	0	0	
Upgrade Interior and Exterior Lighting	0	0	0	0	
Implement Water Conservation Program	245	842	842	842	**Original Target**
Projected Annual Reductions, Natural Gas MMBTU	**26,565**	**57,777**	**61,389**	**61,389**	**31,299**
Percentage of progress through 2025	**85%**	**185%**	**196%**	**196%**	
Reductions: Water KGals	**2022**	**2023**	**2024**	**2025**	
Upgrade Chilled Water System	0	0	0	0	
Upgrade Cooling Tower Water System	0	-810	-1004.8	-1004.8	
Upgrade Steam and Heating Water System	0	0	833	833	
Install Heat Pump Chiller Heater	0	381	4,132	4,132	
Upgrade and Retro-Commission BAS	1	0	185	185	
Upgrade Air Handling Units	0	0	0	0	

Upgrade Interior and Exterior Lighting	0	0	0	0	
Implement Water Conservation Program	526	3,968	3,968	3,968	**Original Target**
Projected Annual Reductions, Water KGals	**527**	**3,539**	**8,114**	**8,114**	**8,635**
Percentage of progress through 2025	**6%**	**41%**	**94%**	**94%**	

Appendix E

Emissions Data, Excepting the Tulane National Primate Research Center

For the purpose completing the Sustainability, Tracking, and Rating Assessment Tool developed by the Association for the Advancement of Sustainability in Higher Education, the table below reflects emissions and energy use at the university without the Tulane National Primate Research Center.

Because the research center serves a unique population not taken into account in the STARS reporting tool and facility operates so distinctly from the other university facilities, the decision was made to remove that data for the purpose of the STARS report alone.

Table 9: Annual Scope 1 & Scope 2 Greenhouse Gas Emissions Sources for STARS Report

Scope, Source, & Units			2023
1	Natural Gas, On-campus Stationary Fuels	Natural Gas, MMBTU	359,319
		Propane, Gallons	168
1	Transportation Fuels	Gasoline, Gallons	55,352
		Diesel, Gallons	7,182
1	Fugitive Emissions	HCFC-22, lbs	60
		HFC-134a, lbs	0
		HFC-410a, lbs	625
		R-427A, lbs	475
		HFC-407C, lbs	125
2	Purchased Electricity	Purchased Electricity, kWh	116,434,175
2	Purchased Steam and Chilled Water	Purchased Steam, MMBTU	23,611
		Purchased Chilled Water, MMBTU	360

Table 10: Annual Scope 1 & Scope 2 Greenhouse Gas Emissions for STARS Report

	Scope 1 MTCO2e	Scope 2 MTCO2e	Total MTCO2e
2023 Without TNPRC	22,902	36,951	59,853