City of Dallas

City of Dallas

2023 Greenhouse Gas Emissions Inventory Report

Prepared for the Office of Environmental Quality and Sustainability

Photo by David Worthington

Acknowledgments

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Atmos Energy

City of Dallas Department of Aviation

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City of Dallas Department of Equipment and Fleet Management

City of Dallas Department of Facilities and Real Estate Management

City of Dallas Department of Human Resources

City of Dallas Department of Park and Recreation

City of Dallas Department of Sanitation Services

City of Dallas Office of Bond & Construction Management

City of Dallas Office of Environmental Quality and Sustainability

Dallas Fort Worth International Airport Environmental Affairs Department

Dallas Water Utilities

North Central Texas Council of Governments (NCTCOG)

Oncor Electric Delivery

Texas Trees Foundation

Gresham Smith

ICF

ACRONYMS

AFOLU
Agriculture, Forestry, and Other Land Uses

AR4
IPCC Fourth Assessment Report

AR5
IPCC Fifth Assessment Report

CECAP
Comprehensive Environmental and Climate Action Plan

CH_4
Methane

CNG
Compressed Natural Gas

CO_2e
Carbon Dioxide Equivalent

COP27
27th Conference of Parties

DWU
Dallas Water Utilities

EIA
Energy Information Administration

eGRID
Emissions & Generation Resource Integrated Database

EPA
Environmental Protection Agency

ERCOT
Electric Reliability Council of Texas

GDP
Gross Domestic Product

GHG
Greenhouse Gas

GWP
Global Warming Potential

HFC
Hydrofluorocarbons

ICLEI
Local Governments for Sustainability (formerly International Council for Local Environmental Initiatives)

IPCC
Intergovernmental Panel on Climate Change

IPPU
Industrial Process and Product Use

LFG
Landfill gas

LGO
Local Government Operations

MT
Metric Tons

MSW
Municipal Solid Waste

N_2O
Nitrous Oxide

NCTCOG
North Central Texas Council of Governments

NF_3
Nitrogen Trifluoride

ODS
Ozone Depleting Substances

PFC
Perfluorocarbons

REC
Renewable Energy Credit

RNG
Renewable Natural Gas

SED
EIA State Energy Data

SF_6
Sulfur Hexafluoride

T&D
Transmission and Distribution

TPI
Try Parking It Application

UNFCCC
United Nations Framework Convention on Climate Change

VMT
Vehicle Miles Traveled

WRI
World Resources Institute

WTP
Water Treatment Plant

WWTP
Wastewater Treatment Plant

Executive Summary

The City of Dallas (City) continues to demonstrate its commitment to climate action through the development of its 2023 greenhouse gas (GHG) emissions inventory. This inventory serves as a critical tool for tracking progress toward the City's climate goals, informing policy, and enhancing transparency and accountability in environmental governance. Building on the foundation established in the 2015 and 2019 inventories, the 2023 inventory reflects the City's ongoing efforts to reduce emissions in alignment with the Comprehensive Environmental and Climate Action Plan (CECAP)[1]. The CECAP targets a 43% reduction in community-wide GHG emissions from 2015 levels by 2030 and net-zero emissions by 2050. This inventory report evaluates progress toward those goals, highlighting an 11% reduction in community-wide emissions since 2015.

This report presents an analysis of the 2023 GHG emissions inventory for the City of Dallas, along with a comprehensive explanation of the methodologies, data sources, and protocols used in its development. Inventory year 2023 was selected to ensure the use of complete and validated data, as data for 2024 was not fully available at the outset of inventory development. In addition, inventory year 2023 maintains the frequency established by 2015 and 2019 inventories. This inventory includes both **community-wide and local government operations (LGO) emissions**, offering a comprehensive view of the City's carbon footprint. The community-wide GHG emissions inventory includes the GHGs emitted in 2023 within the geographic boundary of the City of Dallas, including energy consumption, transportation, waste generation and treatment, industrial processes, and land-use change. In addition, the subset of GHG emissions that are attributable to City government operations are calculated and specifically identified in the LGO emissions inventory.

For comparison purposes, this report includes an updated and expanded assessment of the City's GHG emissions estimates since the 2015 and 2019 GHG emissions inventory reports to highlight trends and changes in the City's GHG emissions. Both the community-wide and LGO inventories include a wider scope of emissions generating activities and offer more detailed data compared to the City's previous inventories, reflecting advancements in methodologies and improved data availability. This inventory also incorporates recalculations of previous years' estimates to ensure consistency and comparability across the 2015 through 2023 time series. These updates, which incorporate methodological and data refinements, are detailed in the relevant methodology sections. Figure ES-1 illustrates community-wide emissions by sector from 2015 to 2023.

PROGRESS TOWARDS CECAP GOALS

Dallas has **reduced community-wide emissions** by approximately 11% since 2015, in line with the 2030 target.

The City has **implemented key CECAP strategies,** including energy efficiency upgrades, renewable energy procurement, and expanded waste diversion programs.

Continued progress will require **sustained investment** in building electrification, clean transportation, and sustainable climate solutions.

1 City of Dallas. Dallas Comprehensive Environmental and Climate Action Plan (CECAP). 2024. https://www.dallasclimateaction.com/cecap

Executive Summary

Figure ES-1. Community-wide Emissions by Year and Sector

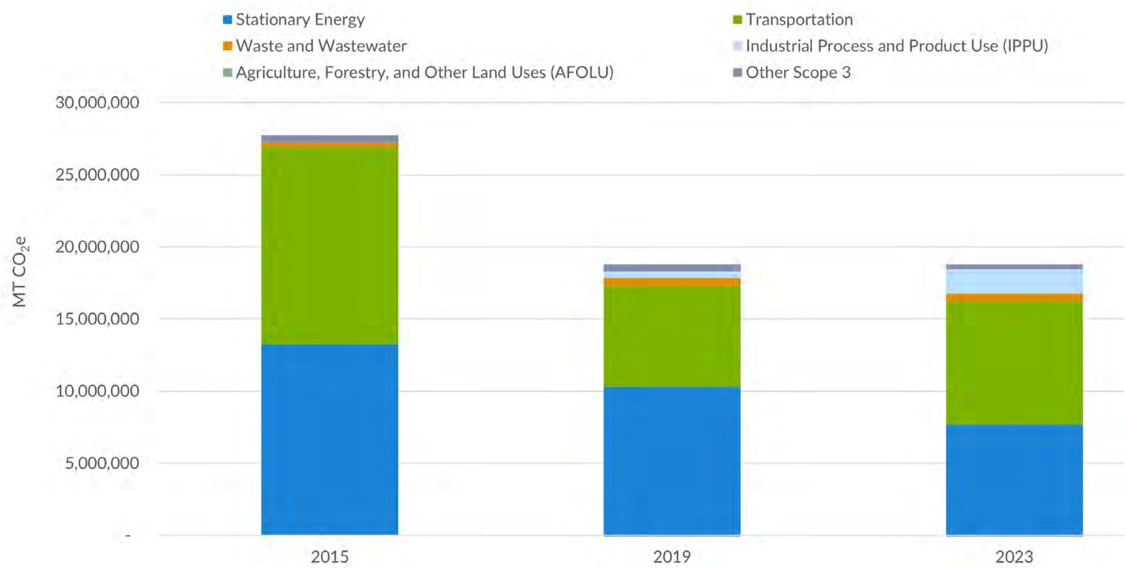
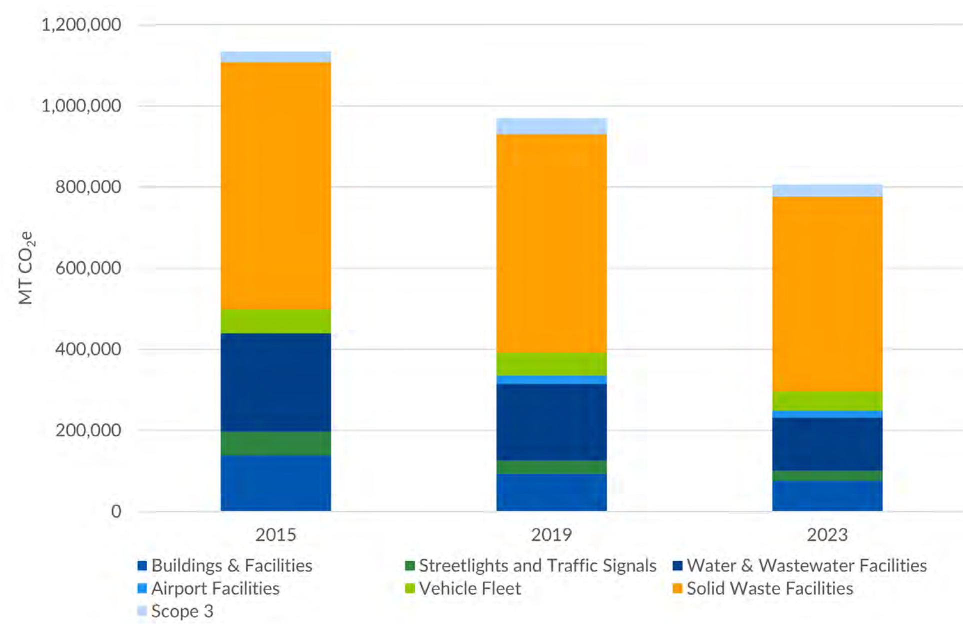


Figure ES-2. LGO GHG Emissions



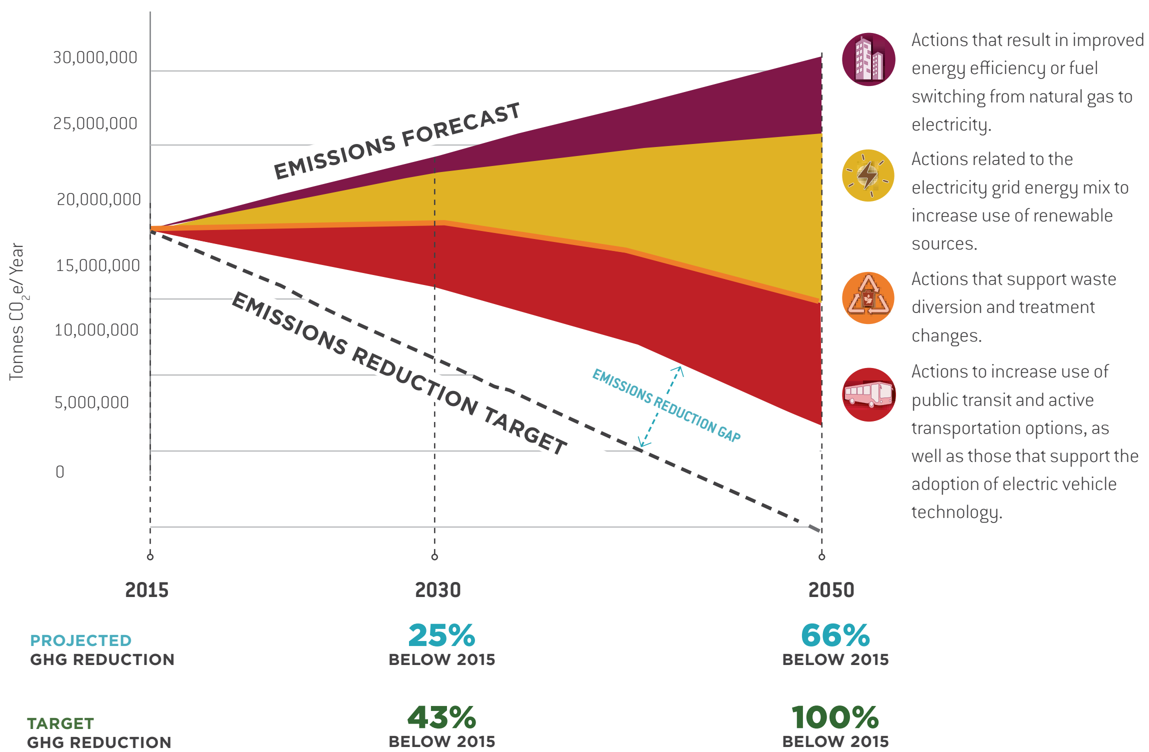
Key Findings

The key findings of the 2023 GHG emissions inventory are summarized as follows:

- In 2023, total community-wide emissions were approximately 18,641,321 metric tons of carbon dioxide equivalent (MT CO_2e)[2], representing an 11% decrease from 2015 and a 1% increase from 2019 (see Figure ES-1). Emissions reductions can be attributed to decreased consumption of natural gas in the commercial and residential sectors, lower electricity usage by passenger rail, reduced landfilled waste, and diminished flaring of landfill gas. Additional details on the drivers behind these trends are provided in the corresponding sections of the report.
- Emissions from electricity use declined due to a cleaner regional electricity grid. Between 2019 and 2023, the carbon intensity of the regional electricity grid dropped by 15%.
- Emissions from aviation increased from 191,079 MT CO_2e in 2019 to 1,440,447 MT CO_2e in 2023, representing a 654% increase due to updated methodologies that now account for full-flight emissions rather than only takeoff and landing, following a change in requirements of the Airport Carbon Accreditation program, considered the industry standard for GHG accounting. For comparison purposes, total community-wide emissions represented a 5.8% decrease from 2019 and a 17.0% decrease from 2015 when excluding aviation.
- Solid waste emissions declined by 28% from 2019, reflecting a decrease in the amount of landfilled waste.
- In 2023, total LGO emissions were 804,033 MT CO_2e, representing 4% of total community-wide emissions and a 17% decrease from 2019 (see Figure ES-2).

2 MTCO_2e is a standard way to measure the impact of different greenhouse gases (e.g. methane and nitrous oxide) by expressing them in terms of how much carbon dioxide (CO_2) would cause the same amount of warming.

Figure ES-3. Excerpt from CECAP Report - Dallas GHG Emissions Forecast and Emissions Reduction Actions Compared to Reduction Targets



Looking Ahead

As the City of Dallas and surrounding community continues to grow, with the population having increased by 1.7% from 2020 to 2024[3], the City remains committed to leading by example, reducing emissions from its own operations, supporting community-wide decarbonization, and building a more sustainable, resilient future for all residents.

The CECAP guides the City of Dallas's sustainability efforts and this inventory evaluates progress towards achieving those targets. Figure ES-3 visualizes the City's GHG reduction targets and emissions forecasts as quantified for the CECAP, providing context for the emissions reductions achieved in 2023 as laid out in this report.

3 *U.S. Census Bureau. Dallas city QuickFacts. 2024. https://www.census.gov/quickfacts/fact/table/dallascitytexas/PST120224#PST120224*

Section 1

Introduction

This greenhouse gas (GHG) emissions inventory report is a comprehensive accounting of emissions within the City of Dallas (City), Texas, encompassing both community-wide sources and emissions from local government operations (LGO) for the calendar year 2023. This inventory was developed in accordance with the City's Comprehensive Environmental and Climate Action Plan (CECAP) directive to regularly update the City's GHG emissions inventory. The CECAP contains targets of reducing GHG emissions 43% below 2015 levels by 2030 and achieving net zero emissions by 2050. This report evaluates progress toward those goals, highlighting an 11% reduction in community-wide emissions since 2015. In addition, this report updates and expands upon the previous 2015 and 2019 GHG emissions inventories and offers a detailed analysis of emissions and progress toward the City's climate goals.

The inventory includes GHG emissions from energy consumption, transportation, waste, industrial processes, and land-use change, and it identifies GHG emissions attributable to City government operations. Furthermore, reporting the local government operations emissions inventory provides detail on the emissions-generating activities and sources that are within the government's ownership and control. This information provides government officials with actionable insight into the opportunities and challenges that exist for reducing emissions attributable to government operations.

This report is organized into the following sections: an overview of GHG inventories and their scientific basis; a detailed review of the scope and boundaries of this inventory; a discussion of the results of the community-wide inventory; a discussion of the results of the LGO inventory; and methodological descriptions for each source category. Appendices provide full emissions and activity data.

Section 1.1

Overview of GHG Emissions Inventories

Greenhouse gases trap heat in the Earth's atmosphere by absorbing infrared radiation which warms the planet. These gases include carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), sulfur hexafluoride (SF_6), and nitrogen trifluoride (NF_3). While some of these gases occur naturally in the environment, human activities have significantly changed their atmospheric concentrations. Scientists agree that it is extremely likely that most of the observed temperature increase since 1950 is due to anthropogenic or human-caused increases in GHGs in the atmosphere[4].

The amount of warming caused by each GHG depends on how effectively the gas traps heat and how long it stays in the atmosphere. Global Warming Potential (GWP) accounts for the difference in climate impact for each GHG by comparing it to one molecule of CO_2 whose GWP value is one. Different GHGs have varying effects on the planetary climate when viewed at different timescales. For example, on a 100-year scale, CH_4 has a global warming potential of 28, meaning that over a century, one metric ton of CH_4 will trap approximately 28 times more heat in the atmosphere than one metric ton of CO_2. The Intergovernmental Panel on Climate Change (IPCC) developed the GWP concept to compare the amount of heat that different GHGs trap. These values are periodically updated based on further scientific study and the responses to changes in the atmosphere. Updated GWP values are published in the IPCC Assessment Reports[5]. Throughout this report the relative contribution of each gas is shown in metric tons of carbon dioxide equivalent (MT CO_2e). Recent decisions on common metrics adopted at the 27th United Nations Framework Convention on Climate Change (UNFCCC) Conference of Parties (COP27) require Parties to use 100-year GWP values from the IPCC Fifth Assessment Report (AR5)[6]. The GWP values used in this report, assuming a 100-year time horizon, are summarized in Table 1-1.

Table 1-1. AR5 Global Warming Potentials (GWPs)

Gas	GWP	Gas	GWP
CO_2	1	HFC-227ea	3,350
CH_4	28	HFC-236fa	8,060
N_2O	265	HFC-4310mee	1,650
HFC-23	12,400	CF_4	6,630
HFC-32	677	C_2F_6	11,100
HFC-125	3,170	C_4F_{10}	9,200
HFC-134a	1,300	C_6F_{14}	7,910
HFC-143a	4,800	SF_6	23,500
HFC-152a	138	NF_3	16,100

The persistence of anthropogenic GHG emissions in the atmosphere has had, and continues to have, significant impacts. Global climate is being altered, and a net warming effect of the atmosphere and oceans is causing glaciers and sea ice levels to decrease, global mean sea levels to rise, and an increase in extreme weather events[7]. In an effort to better understand the sources and drivers of GHG emissions and to mitigate their global impact, organizations at all levels—including federal, state and local governments, multinational firms, and local enterprises—develop GHG emission inventories. A GHG emissions inventory quantifies both GHG emissions and GHG sinks for a given jurisdictional or organizational boundary. GHG emissions are GHGs released into the atmosphere, while GHG sinks are systems that absorb more GHGs than they emit, such as forests, soil, and wetlands. The results of these inventories, which are continually improved over time to reflect advances in GHG accounting, are used to inform strategies and policies for emission reductions and to track the progress of actions over time.

4 Intergovernmental Panel on Climate Change. Fifth Assessment Report. 2013. https://www.ipcc.ch/report/ar5/wg1/
5 IPCC Fifth Assessment Report. 2013. https://www.ipcc.ch/report/ar5/wg1/
6 IPCC Fifth Assessment Report. 2013. https://www.ipcc.ch/report/ar5/wg1/
7 IPCC Fifth Assessment Report. 2013. https://www.ipcc.ch/report/ar5/wg1/

Section 1.2

Inventory Scope and Methodology

This report presents an analysis of the City of Dallas 2023 GHG Emissions Inventory, along with a comprehensive explanation of the methodologies, data sources, and protocols used in its development. The inventory includes the GHGs emitted in 2023 within the geographic boundary of the City of Dallas including energy consumption, transportation, waste generation and treatment, industrial processes, and land-use change. In addition, the subset of GHG emissions that are attributable to City government operations are calculated and specifically identified in Section 4.

For comparison purposes, an updated and expanded assessment of the City's progress on GHG emissions reductions since the 2015 and 2019 inventories is summarized, offering trend insights and alignment with the City's CECAP targets.[8] While comparability and consistency are a core principle of GHG emissions accounting, accuracy and completeness are also essential. To the extent possible, this report aims to ensure direct comparability across inventory years. However, due to evolving methodologies and data availability, this 2023 GHG emissions inventory includes a wider scope of emissions generating activities at a greater level of specificity compared to the previous inventories. To maintain comparability, this report includes several recalculations of emissions estimates for previous inventory years to apply the best available data and methodologies. Any changes made to previous GHG emissions inventory estimates are noted in the relevant methodology sections. Additionally, any changes to methodologies between inventory years are also highlighted in this report's methodology sections.

In the development of this report, several GHG emissions reporting protocols were consulted, including the Local Governments for Sustainability (ICLEI) U.S. Community Protocol[9], the ICLEI Local Government Operations Protocol[10] , and the Greenhouse Gas Global Protocol for Community-Scale Greenhouse Gas Emission Inventories[11]. The community-wide emissions inventory follows the *Global Protocol for Community-Scale Greenhouse Gas Emission Inventories* developed in collaboration with World Resource Institute (WRI), the Local Governments for Sustainability (ICLEI), and the C40 Cities Coalition. The local government operations emissions inventory follows the Local Government Operations Protocol developed by the California Air Resources Board, California Climate Action Registry, The Climate Registry, and ICLEI.

8 *City of Dallas. Dallas CECAP. 2024.* https://www.dallasclimateaction.com/cecap

9 *ICLEI. U.S. Community Protocol for Accounting and Reporting of Greenhouse Gas Emissions Version 1.2. 2019.* https://icleiusa.org/ghg-protocols/

10 *ICLEI. Local Government Operations Protocol Version 1.1. 2010.* https://iclei.org/e-library/local-government-operations-protocol/

11 *Greenhouse Gas Protocol. Global Protocol for Community-Scale Greenhouse Gas Emission Inventories Version 1.1. 2014.* https://ghgprotocol.org/sites/default/files/ghgp/standards/GHGP_GPC_0.pdf

The assumptions, methodologies, and data sources used to develop the emission estimates for each source are described throughout this report. This transparency allows for the replication and assessment of these results for future inventory years. Changes made to improve the accuracy of emissions estimates from previous inventoried are also documented in the relevant methodology sections. Furthermore, for clarity and transparency, GHG emissions inventories must define the various parameters of the analysis. These include geographic area, time span, gases inventoried, GWP values used, and emissions sources and activities. The parameters of the 2023 emissions inventory are defined in Table 1-2.

Table 1-2. Inventory Scope Comparison

Metric	Community-wide Inventory CW	Local Government Operations Inventory LGO
Geographic Area	Municipal boundary	Sources and activities owned and/or controlled by the city government.
Time Span	**Calendar Year 2023**	
Gases Inventoried	Carbon Dioxide (CO_2), Methane (CH_4), Nitrous Oxide (N_2O), Hydrofluorocarbons (HFCs), Perfluorocarbons (PFCs), Sulfur Hexafluoride (SF_6)	
GWPs	IPCC 5th Assessment 100-Year Values (AR5). As presented in Table 1-1.	
Scope	**Scope 1** (direct emissions from sources located within the municipal boundary) **Scope 2** (emissions occurring due to the use of grid-supplied electricity, heat, steam, and/or cooling) **Scope 3** (all other emissions that occur outside the city boundary due to activities taking place within the city boundary)	**Scope 1** (direct emissions from city-owned or controlled sources) **Scope 2** (indirect emissions from purchased utilities in city owned or controlled facilities, equipment, or other assets) **Scope 3** (indirect and process emissions upstream or downstream that are influenced by city government operation and activities)
Sectors	• Stationary energy • Transportation • Waste and wastewater • Industrial process and product use (IPPU) • Agriculture, forestry, and other land uses (AFOLU) • Process and fugitive emissions • Solid waste • Upstream impact of activities	• Buildings and facilities • Streetlights and traffic signals • Water and wastewater facilities • Airport facilities • Vehicle fleet • Solid waste facilities • Scope 3 emissions
Protocols	ICLEI Community Protocol	ICLEI Local Government Operations Protocol

Section 1.3

Quality Assurance and Quality Control (QA/QC)

Data integrity is fundamental to a GHG emissions inventory. To achieve the necessary level of rigor, a number of QA/QC measures were applied during the development of this GHG emissions inventory. These elements help ensure the inventory is accurate, consistent, and aligned with best practices over time.

These QA/QC measures include:

- Analyzing alternative data sources and integrating those providing improved quality, accuracy or completeness.
- Proper data management practices such as organization, incorporation, and aggregation of data.
- Thorough review processes to validate activity data and emissions results.
- Clear documentation of the methodologies and assumptions used throughout the inventory development process.

Uncertainty is inherent in all GHG emissions inventories due to factors like incomplete data, reliance on average or default emission factors, and gaps in scientific understanding of emission pathways. Furthermore, there is inherent uncertainty in emission factors and activity data through metering and instrumentation, as noted by the ICLEI Local Government Operations Protocol[12]. For well-understood and well measured sources like the combustion of fossil fuels, uncertainty is typically low and depends on the accuracy of activity data. However, for sources like fugitive emissions from industrial processes where metering and measurement are more difficult, emissions estimates typically have greater uncertainty. By following the GHG emissions accounting protocols, along with QA/QC measures, this inventory reduces reporting uncertainty in the GHG emissions estimates.

12 *ICLEI. Local Government Operations Protocol Version 1.1. 2010.* https://iclei.org/e-library/local-government-operations-protocol/

Section 2.1

Community-wide GHG Emissions Inventory

CW

Total community-wide emissions in 2023, including direct (scope 1) and indirect (scope 2 and 3) emissions associated with stationary energy consumption, transportation, waste and wastewater, and industrial processes and product use, were estimated at 18,641,321 MT CO_2e[13]. This represents a 1.1% increase from 2019, but an 11.0% reduction from 2015, indicating moderate long-term progress despite short-term fluctuations.

The increase in total emissions between 2019 and 2023 was largely attributable to a methodological update in aviation emissions accounting which now includes full-flight fuel use rather than fuel expended during takeoff and landing. When excluding emissions from aviation, 2023 community-wide emissions decreased 5.8% from 2019 and 17.0% from 2015.

In comparison, from 2015 to 2023, the City of Dallas achieved reductions in emissions from stationary energy and waste, while emissions from transportation and industrial processes and product use increased. Emissions from stationary energy have decreased 31% since 2015 and 15% since 2019, driven by a cleaner Electric Reliability Council of Texas (ERCOT) electricity grid that increased renewable energy generation and reduced coal reliance. Emissions from on-road transportation have increased slightly since 2019, following observed national trends in increased vehicle miles traveled. The trend of increasing miles traveled is expected to continue; however, vehicle model turnover is expected to lead to lower emissions per vehicle mile based in part on the growing share of electric vehicles.[14] Furthermore, emissions from product uses, particularly refrigerants and other high-GWP gases, have increased due to increased cooling demand and equipment turnover supporting the phase out of ozone depleting substances.

13 The City does not have significant agriculture, forestry, and other land use (AFOLU) emissions, but it does have carbon sequestration from urban trees. This value is included for informational purposes but is not included in totals. See section 3.6 for more details.

14 EPA. The 2024 EPA Automotive Trends Report: Greenhouse Gas Emissions, Fuel Economy, and Technology Since 1975. 2024. https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P101CUZD.pdf

Section 2.2

Local Government Operations GHG Emissions Inventory

LGO

In 2023, the City of Dallas LGO generated approximately 804,033 MT CO_2e. These emissions represent the direct (scope 1) and indirect (scope 2 and 3) emissions associated with the delivery of public services, including energy use in municipal buildings, fuel consumption by the vehicle fleet, operation of wastewater and water treatment facilities, solid waste services, and other government-controlled functions.

Where applicable, emissions estimates from 2015 and 2019 were recalculated for consistency including adapting 2015 emissions from the IPCC fourth Assessment Report (AR4) to the fifth Assessment Report (AR5) GWPs. These recalculations reflect methodological enhancements and expanded data coverage, including enhanced granularity in activity data and emissions factors. These changes are highlighted in the methodology sections of each LGO source.

The City of Dallas reduced LGO emissions 29% from 2015 to 2023. From 2019 to 2023, the City of Dallas achieved a 17% reduction in overall LGO emissions. This decrease is partially explained by ERCOT experiencing a notable transition toward cleaner energy sources, such as natural gas and renewables. Scope 1 and 3 emissions also decreased compared to the previous inventory. Scope 1 reductions were driven by decreases in waste generation and decreases in emissions from the City's vehicle fleet. Scope 3 reductions resulted from decreases in emissions from the transmission and distribution of grid-purchased electricity. The emissions trends are discussed in further detail in Section 3.

Section 2.3

Comparison to Other C40 Cities

Emissions from the City of Dallas are comparable in magnitude to other large North American cities and reflect a similar sector breakdown, with stationary energy and transportation as the main contributors (see Figure 2-1). The C40 cities network is a global network of 94 mayors of cities across the globe that are united in action to confront the climate crisis[15]. Many C40 cities produce GHG emissions inventories and the results of the City of Dallas's community-wide GHG emissions inventory are compared to similar C40 city inventories. Fourteen North American C40 cities are used to compare GHG emissions inventory results on the basis of population, geographical area, and gross domestic product (GDP). The most recent inventory year was used for each city, which ranges between calendar years 2020 and 2022[16]. Inventory data is sourced from C40 Cities' GHG Interactive Dashboard Data[17]. Table 2-1 compares the City of Dallas community GHG emissions inventory to the average and median values of the comparison cities. Figure 2-1 compares the North American C40 City emissions by sector.

Figure 2-2 illustrates the relationship between GHG emissions and population. As expected, cities with larger populations have higher total emissions. However, among cities with populations under 2 million, Dallas stands out with notably higher emissions.

Figure 2-1. GHG Emissions Compared to North America C40 Cities by Sector

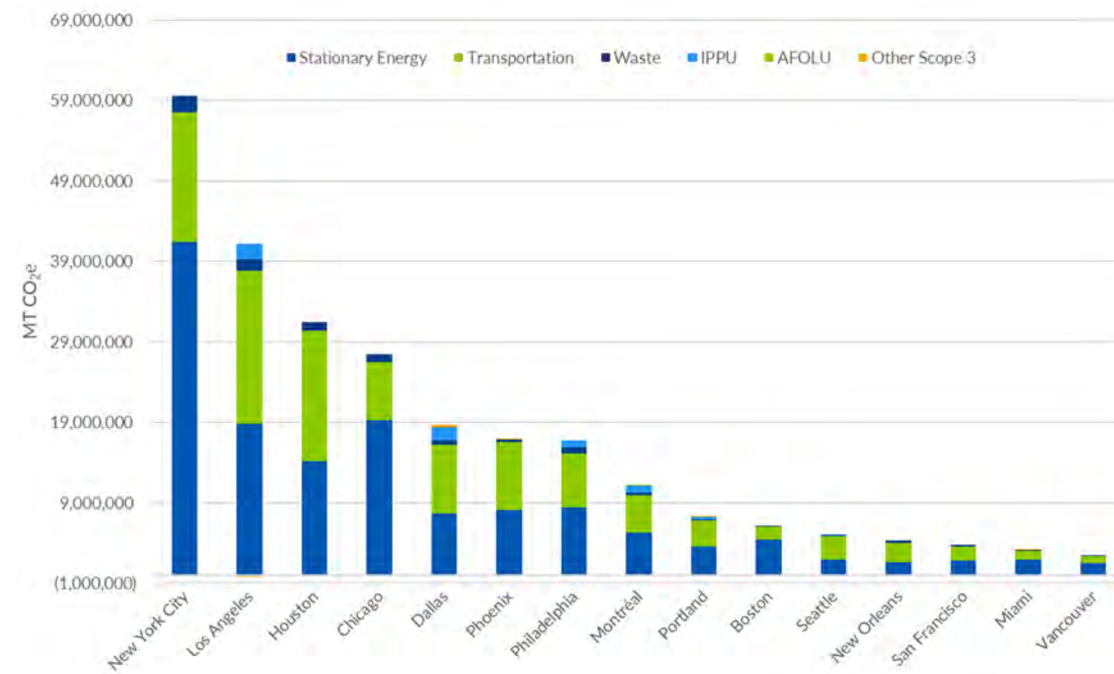


Table 2-1. 2023 GHG Emissions, Population, Area, and GDP from Dallas Compared to North American C40 Cities

Metric	Average of Other C40 Cities	Median of Other C40 Cities	Dallas - Community-wide Inventory
GHG Emissions (MT CO_2e)	24,329,910	13,181,805	18,641,321
Population	1,927,530	1,178,022	1,302,868
Area (square miles)	586	469	385
GDP (Billions)	365	172	191

15 C40 Cities Network. About C40. 2025. https://www.c40.org/about-c40/

16 Note: This does not include Chicago, whose most recent inventory year was 2019.

17 C40 Cities Network. GHG Interactive Dashboard Data. 2024. https://www.c40knowledgehub.org/s/article/C40-cities-greenhouse-gas-emissions-interactive-dashboard

Figure 2-2. 2023 GHG Emissions Compared to North America C40 Cities by Population

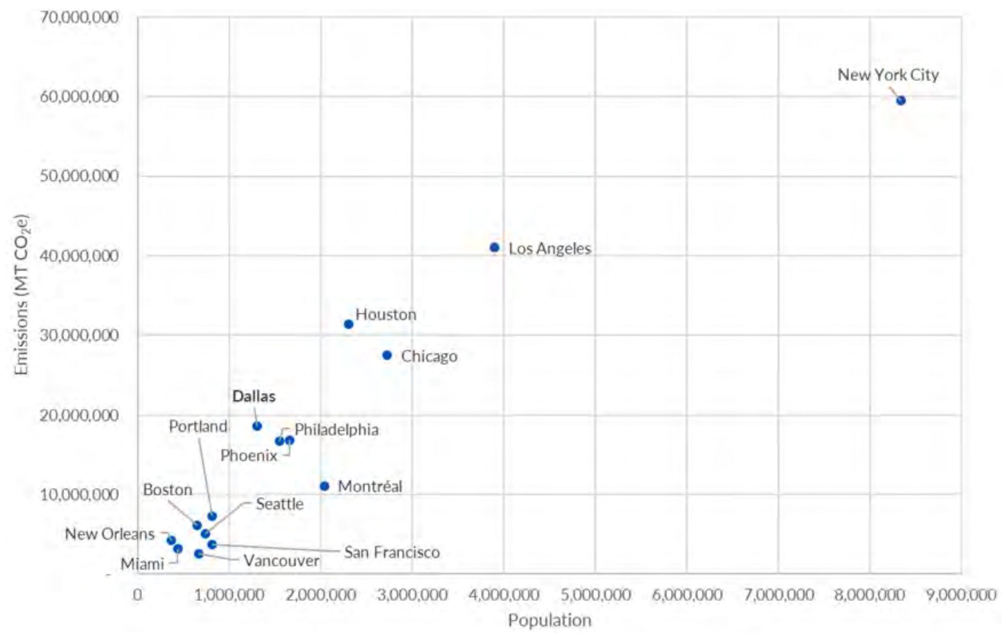
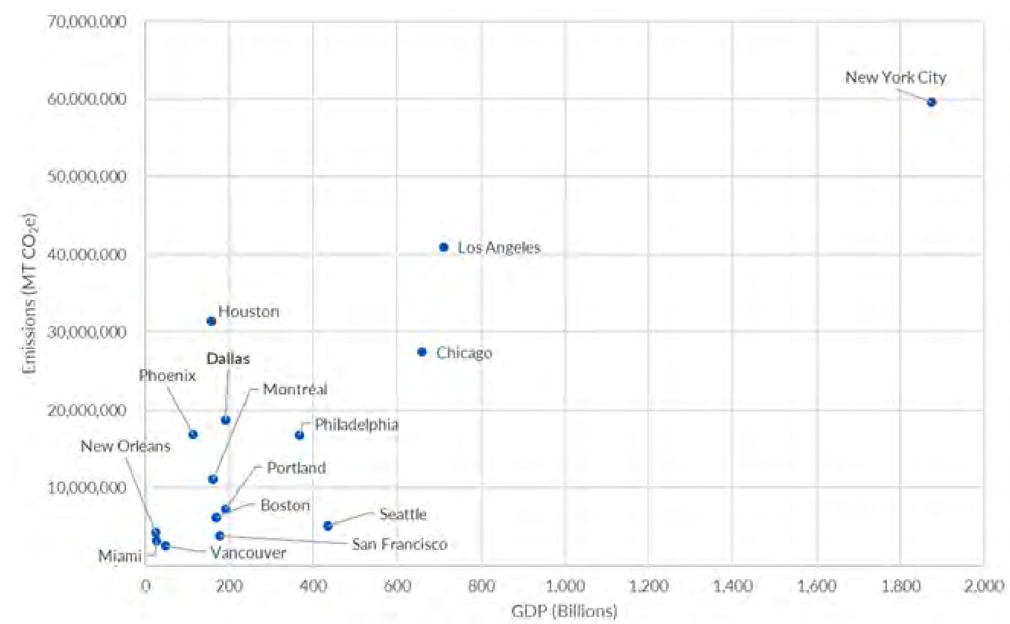


Figure 2-3. Emissions Compared to North America C40 Cities by Geographical Area

Figure 2-3 illustrates the relationship between GHG emissions and geographic area of North American C40 cities, offering insight into how land use and urban sprawl might influence GHG emissions. Generally, cities with greater geographical area have higher total emissions, though this is not always the case. Among cities with a geographical area under 400 square miles, Dallas stands out with notably higher emissions.

Figure 2-4 compares total GHG emissions to gross domestic product (GDP) for various city's respective inventory years. In general, cities with higher GDP tend to generate more emissions due to a variety of factors such as higher economic activity, greater energy demand, and consumption patterns. It is important to note that while this figure explores the relationship between emissions and GDP, other influential factors—such as population—are closely correlated with both variables and may affect how cities compare.

Figure 2-4. 2023 GHG Emissions Compared to North America C40 Cities by GDP



Section 3

Community-wide GHG Emissions Inventory

CW

The City of Dallas covers approximately 385 square miles and about 1.3 million residents live within the City limits. Additionally, Dallas is a major center of commerce, a destination for leisure and entertainment, and a major throughway for various modes of transportation resulting in several activities and sources that emit GHG emissions. Table 3-1 presents various metrics for the City of Dallas, while Figure 3-1 shows the boundaries of the City.[18]

Figure 3-1. City of Dallas Boundaries

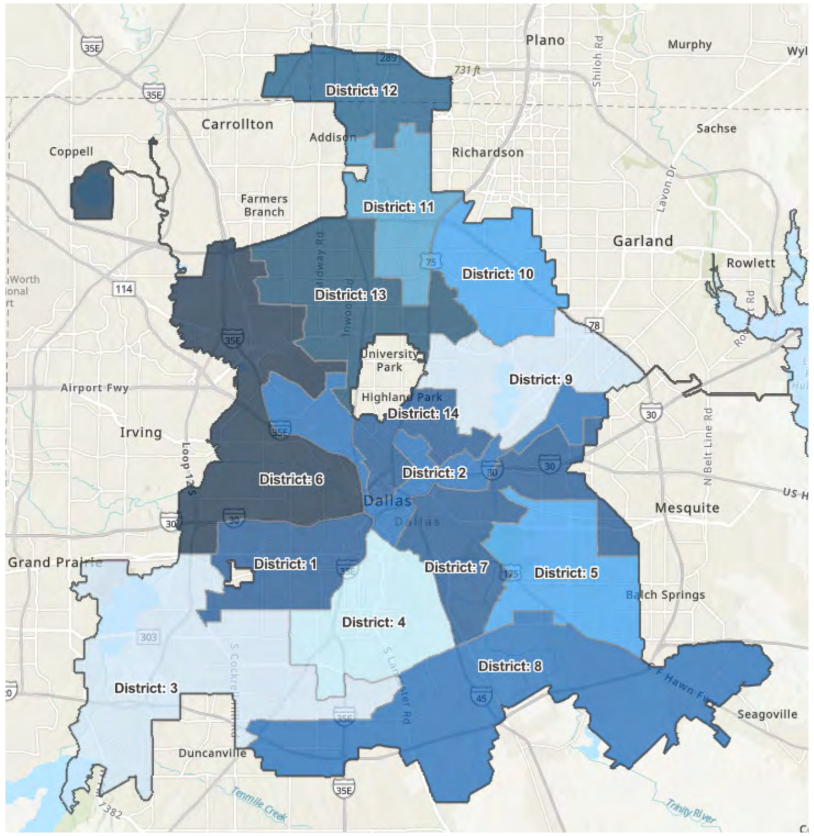


Table 3-1. 2023 City of Dallas Statistics

Metric	Data	Source
Land area	385 square miles	City of Dallas Financial Transparency[a]
Population	1,302,868	US Census Bureau[b]
Housing units	572,194	US Census Bureau[b]
Median household income	$67,760	US Census Bureau[b]
Employment rate	66.70%	US Census Bureau[c]
Climate zone	3A (Hot-Humid)	US DOE[d]
Heating degree days	1,732	Climate Prediction Center[e]
Cooling degree days	94	Climate Prediction Center[f]

a. *City of Dallas. Financial Transparency. 2025. https://dallascityhall.com/departments/budget/financialtransparency/Pages/Current-Budget.aspx*
b. *U.S. Census Bureau. Dallas city QuickFacts. 2024. https://www.census.gov/quickfacts/fact/table/dallascitytexas/PST120224#PST12022*
c. *U.S. Census Bureau. Dallas City, Texas profile. 2023. https://data.census.gov/profile?q=Dallas+city,+Texas*
d. *U.S. Department of Energy (DOE). Guide to Determining Climate Regions by County. 2015. https://www.energy.gov/sites/prod/files/2015/10/f27/ba_climate_region_guide_7.3.pdf*
e. *National Oceanic and Atmospheric Administration (NOAA). Heating Degree Day Data Monthly Summary. 2025. https://www.cpc.ncep.noaa.gov/products/analysis_monitoring/cdus/degree_days/mctyhddy.txt*
f. *NOAA. Cooling Degree Day Data Monthly Summary. 2025. https://www.cpc.ncep.noaa.gov/products/analysis_monitoring/cdus/degree_days/mctycddy.txt*

18 *City of Dallas. District Boundaries ArcGIS Layer. 2025. https://dallasgis.maps.arcgis.com/*

Section 3.1

Boundary and Scope

Table 3-2 defines the parameters of the 2023 City of Dallas community-wide GHG emissions inventory. In a community-wide GHG emissions inventory, "scopes" (i.e., Scope 1, Scope 2, Scope 3) categorize emissions based on the location where they are released. Figure 3-2 illustrates how community-level scopes relate to each other.

Figure 3-2. Community-wide Inventory Emissions Accounting Scopes

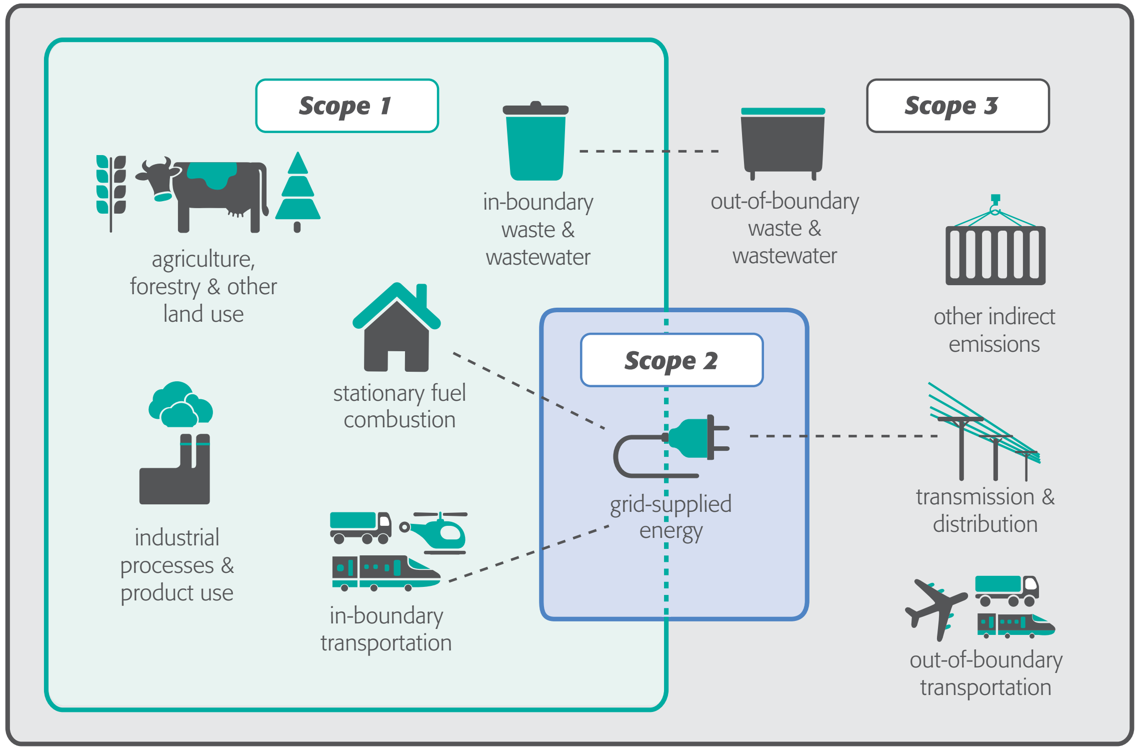


Table 3-2. Community-wide Inventory Boundary and Parameters

Metric	Description
Geographic Area	Municipal boundary
Time Span	Calendar year 2023
Gases Inventoried	Carbon Dioxide (CO_2), Methane (CH_4), Nitrous Oxide (N_2O), Hydrofluorocarbons (HFCs), Perfluorocarbons (PFCs), Sulfur Hexafluoride (SF_6)
GWPs	IPCC 5th Assessment 100-Year Values (AR5). As presented in Table 1-1.
Scope	**Scope 1** GHG emissions from sources located within the city boundary **Scope 2** GHG emissions occurring due to the use of grid-supplied electricity, heat, steam, and/or cooling within the city boundary **Scope 3** All other GHG emissions that occur outside the city boundary due to activities taking place within the city boundary.
Sectors	• Stationary energy • Transportation • Waste and wastewater • Industrial process and product use (IPPU) • Agriculture, forestry, and other land uses (AFOLU) • Process and fugitive emissions • Solid waste • Upstream impact of activities
Protocols	ICLEI Community Protocol

In addition to scopes, ICLEI guidance classifies GHG emissions from activities within a city into six main sectors, each including various subsectors. Table 3-3 lists the sectors and subsectors used to further categorize GHG emissions in a city-wide inventory. Not all cities generate emissions in every one of these subsectors, and each city has its own unique set of activities occurring within its boundaries that influence the emissions of GHGs.

Lastly, the ICLEI U.S. Community Protocol defines a minimum set of five Basic Emissions Generating Activities for inclusion in all Protocol-compliant GHG emissions inventory reports. These activities are emphasized because local governments often have influence over them, the data associated with the activities is readily available, and the emissions generated by the activities are typically significant.

The list of five Basic Emissions Generating Activities includes:

1. **Use of electricity by the community** – Power plant emissions associated with generating electricity used within the jurisdictional boundary of the community, regardless of the location of the electricity generation facility.
2. **Use of fuel in residential and commercial stationary combustion equipment** - Combustion emissions associated with fuels used in residential and commercial stationary applications (e.g., natural gas used in boilers and furnaces) within the jurisdictional boundary of the community, excluding fuels used for production of electricity or district energy.
3. **On-road passenger and freight motor vehicle travel** - Emissions associated with transportation fuels used by on-road passenger and freight motor vehicles.
4. **Use of energy in potable water and wastewater treatment and distribution** - Emissions associated with energy used in the treatment and delivery of potable water used in the community and in the collection and treatment of wastewater used in the community, regardless of the location of the water and wastewater infrastructure.
5. **Generation of solid waste by the community** - End-of-life emissions (i.e., projected future methane emissions) associated with disposal of waste generated by members of the community during the analysis year, regardless of disposal location or method.

This GHG emissions inventory reports emissions for each of the sectors listed in Table 3-3, as well as the five basic emissions generating activities in the following sections.

Table 3-3. Sectors and Sub-Sectors for Community-wide GHG Emissions Inventories

Metric	Description
Stationary	• Residential buildings • Commercial and institutional buildings and facilities • Manufacturing industries and construction • Energy industries • Agriculture, forestry, and fishing activities • Non-specified sources • Fugitive emissions from oil and natural gas systems
Transportation	• On-road • Railways • Waterborne navigation • Aviation • Off-road
Waste and Wastewater	• Solid waste disposal • Biological treatment of waste • Incineration and open burning • Wastewater treatment and discharge
Industrial Processes and Product Uses	• Industrial processes • Product use
Agriculture, Forestry, and Other Land-Use	• Livestock • Land • Aggregate sources and non-CO_2 emission sources on land
Other Scope 3	• Any other emissions occurring outside the geographic boundary as a result of city activities

Section 3.2

Stationary Energy

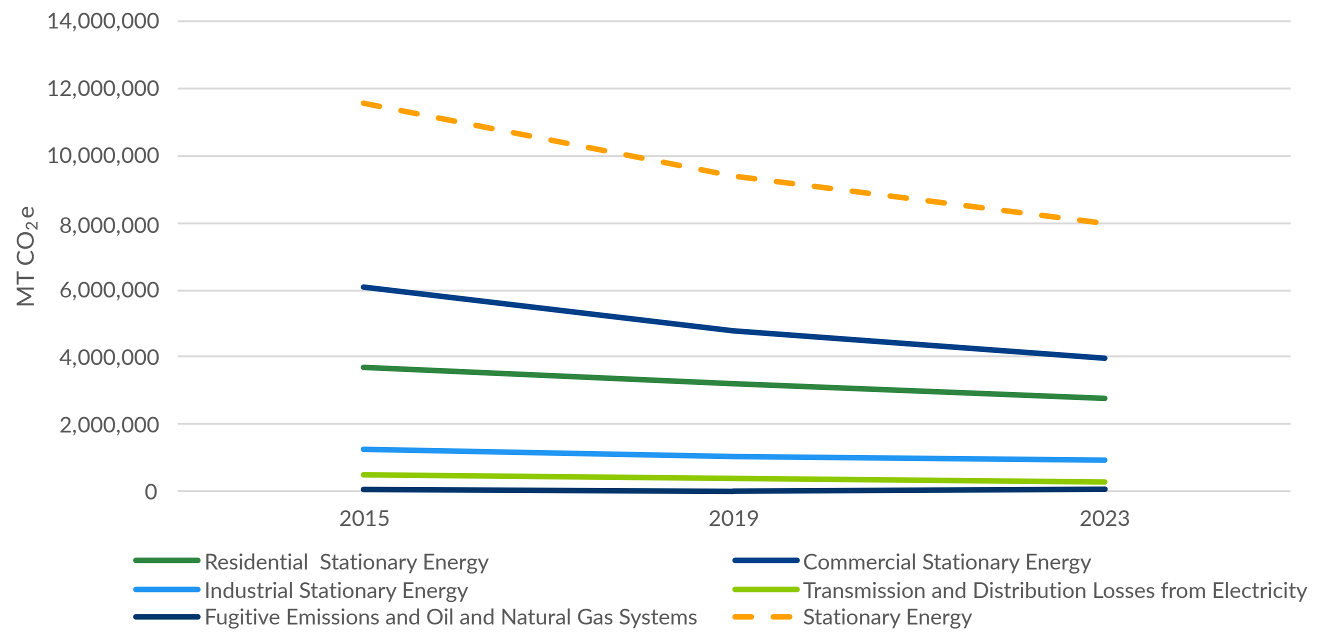
In the City of Dallas, stationary energy sources are one of the largest contributors to GHG emissions. These sources include fuel combustion for electricity supplied to buildings, space heating in buildings, and fugitive emissions released during the generation, delivery, and consumption of energy (i.e., electricity, heat, cooling/refrigeration).

This GHG emissions inventory categorized stationary energy into four categories: emissions from natural gas use, emissions from other fuel use (which includes distillate fuel oil, kerosene, coal or coke, and residual fuel oil), emissions from electricity usage, and emissions associated with the transmission and distribution of energy (see Figure 3-3). These were further disaggregated by economic end-use sector as a representation of where consumption occurs (residential, commercial, industrial, and transportation when relevant).

Scope 1 emissions from natural gas use and other fuel use occurring within the City boundary made up 16% (1,281,372 MT CO_2e) of the total stationary energy category. Scope 2 stationary energy emissions came from electricity use and accounted for 6,396,226 MT CO_2e including 3,311,535 MT CO_2e from commercial buildings, 2,164,801 MT CO_2e from residential buildings and 919,891 MT CO_2e from the industrial sector. Scope 3 emissions from the transmission and distribution of electricity and natural gas generated 274,492 MT CO_2e and 37,518 MT CO_2e, respectively.

The 2020 CECAP sets stationary energy emissions targets including a decrease in residential energy use by 10% and 25% in 2030 and 2050, respectively. In addition, the CECAP sets targets for increased renewable energy generation and use. There have been no significant changes in residential energy consumption since 2020; however, increased renewable generation has reduced overall emissions from stationary consumption.

Figure 3-3. Stationary Energy Emissions by Category



Note: Emissions from electricity use are allocated to end-use sectors (residential, commercial, industrial)

Section 3.2.1

Gas and Fuel Use

Natural gas and other fuels are used in residences, businesses, and industrial facilities in the City of Dallas. Natural gas is also consumed in the waste and wastewater sector, and those emissions are captured within Section 3.4. Natural gas (6.5%) and other fuel use (0.3%) emissions represented a combined 6.9% of emissions for the City of Dallas in 2023.

As shown in Figure 3-4, in 2023, emissions from natural gas were 1,220,291 MT CO_2e, a 17.7% reduction from 2019. According to Atmos Energy, this decline in emissions from natural gas was primarily attributable to reduced gas usage from the commercial end-use sector. These reductions are likely a result of increases in energy efficiency projects supported by Property Assessed Clean Energy (PACE) financing programs that have made low-cost loans for energy efficiency, electrification, and renewable energy retrofits available to owners of commercial, industrial, and multi-family residential properties[19]. Despite reductions since prior inventory years, commercial use of natural gas continued to be the largest contributor to emissions (612,244 MT CO_2e) followed closely by residential natural gas use (600,338 MT CO_2e).

The category for "other fuel use" includes the combustion of distillate fuel oil, residual fuel oil, kerosene, and coal or coke products. Total emissions from other fuel use were 60,901 MT CO_2e in 2023, a 28% increase since 2019 (see Figure 3-5). The emissions from other fuel use are equivalent to 5% of the emissions from natural gas usage in 2023. Unlike natural gas emissions, emissions from other fuel use have increased since previous inventory years, according to the state-level data.

Methodology

The volume of natural gas purchased and consumed by sector was provided by Atmos Energy and converted into heat content using the U.S. Energy Information Administration's (EIA) natural gas heat content conversion value. In order to estimate emissions from natural gas consumption, emission factors from EPA's *Emission Factor Hub* were applied.

Data on other fuels used was derived using EIA State Energy Data (SEDs) and appropriate apportioning factors. SEDs data is only published at the state level and requires distributing consumption values to the city level for use in this GHG emissions inventory. At the time of compilation, EIA SEDs had not released 2023 energy consumption data; therefore, 2023 values were set equal to 2022 values (latest available data). For the commercial and residential sectors, which are driven by individual activity, population values were used to disaggregate state-level data. For the industrial sector, EPA FLIGHT[20] data was used to identify the portion of industrial activity occurring within the geographic boundary of the City of Dallas for the appropriate year. The identified portion was then used as a scaling factor for industrial fuel use. Similar to natural gas, other fuel use emissions were estimated by applying emission factors from EPA's *Emission Factor Hub.*

Figure 3-4. Emissions from Natural Gas by Sector

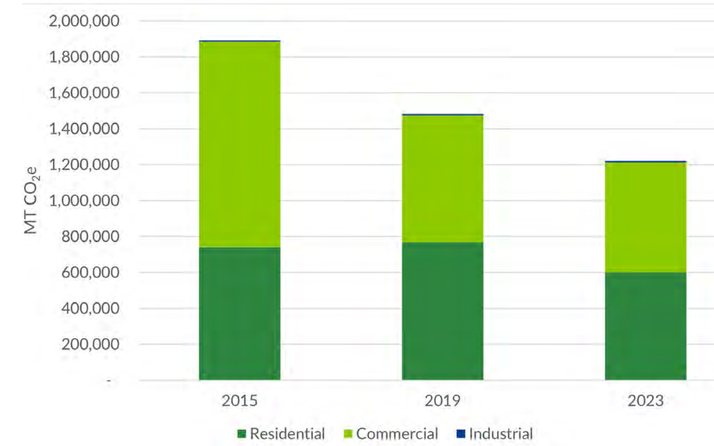
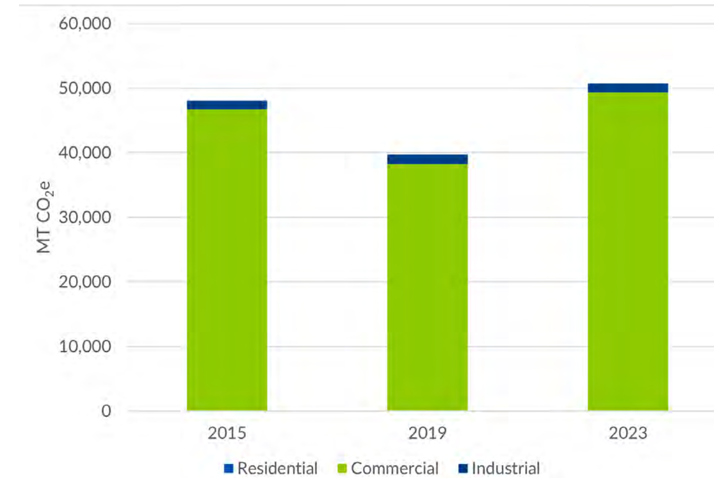


Figure 3-5. Emissions from Other Fuel Use by Sector



19 More information on PACE programs in Texas can be found at https://www.dallasecodev.org/260/Property-Assessed-Clean-Energy-PACG

20 Environmental Protection Agency (EPA). Facility Level Information on Greenhouse Gases Tool (FLIGHT) 2025. https://ghgdata.epa.gov/ghgp/main.do

Section 3.2.2

Electricity Use

Electricity is used in residences, businesses, institutions, and industries for lighting, cooling, and powering equipment and machinery. GHG emissions from electricity use made up more than 40% of the total community-wide emissions in 2019 and more than 30% of the total community-wide emissions in 2023.

In 2023, emissions from electricity use were 6,396,226 MT CO_2e. Commercial use of electricity was the largest contributor to overall emissions, accounting for 52% of consumption (3,311,535 MT CO_2e). Residential electricity use was responsible for 34% of consumption (2,164,801 MT CO_2e) and industrial the remaining 14% (919,891 MT CO_2e). See Figure 3-6 for electricity use by sector in 2015, 2019, and 2023. For the purposes of the community-wide GHG emissions inventory, electricity from waste and wastewater was accounted for within the industrial sector.

The City of Dallas's current and future Scope 2 emissions are dictated by two main factors: electricity consumption from the regional power grid and the emissions-intensity of the electricity generated for the power grid. Over 19,000 gigawatt hours of electricity were consumed in the City of Dallas in 2023. Electricity consumption in the area covered by ERCOT is expected to continue to increase due to factors such as population growth, the expansion of data centers, artificial intelligence operations, and the transition from gas to electric power[21].

From 2019 to 2023, emissions decreased by 16% due to the declining emissions-intensity of grid supplied electricity (see Figure 3-7). Electricity supplied to Dallas customers is generated from a variety of sources, including fossil fuels, which produce CO_2, CH_4, and N_2O emissions.

Since 2002, natural gas has become the primary source of electricity generation as the regional grid shifts away from coal. In 2023, 49% of regional grid electricity generated using natural gas, followed by renewables (mainly wind at 23% and solar at 6%), coal (13%), nuclear (9%), biomass, and oil (both at less than 1%). Since 2019, electricity generation from renewable sources has increased by over 9% in the state of Texas. Most notably there has been a 4% increase in electricity generation from wind and a 5% increase in electricity generation from solar. Figure 3-8 shows the electricity generation mix from 2015 to 2023, with renewables including wind, solar, geothermal, hydro, biomass, and other. Even though the state has placed record amounts of wind-generated energy online in the last several years, Texas has the 25th highest state-wide average emissions factor compared to other U.S. states and is above the U.S. average emissions rate. Emissions from electricity could be further reduced if the emissions-intensity of the grid decreases (i.e., the "greening of the grid") or if end-use energy efficiency improves.

Figure 3-6. Electricity Use by Sector

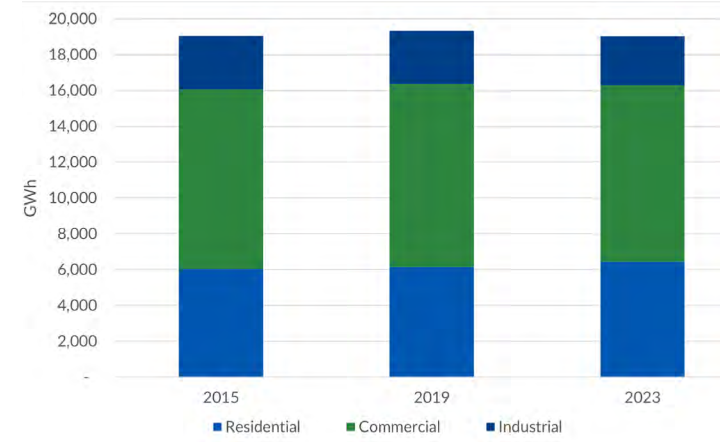
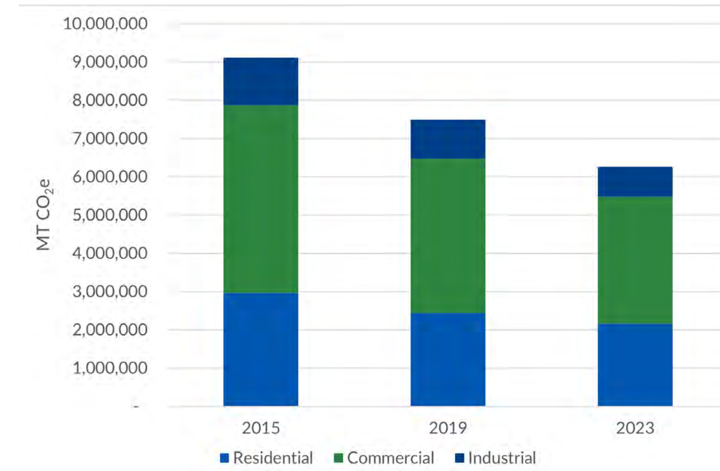
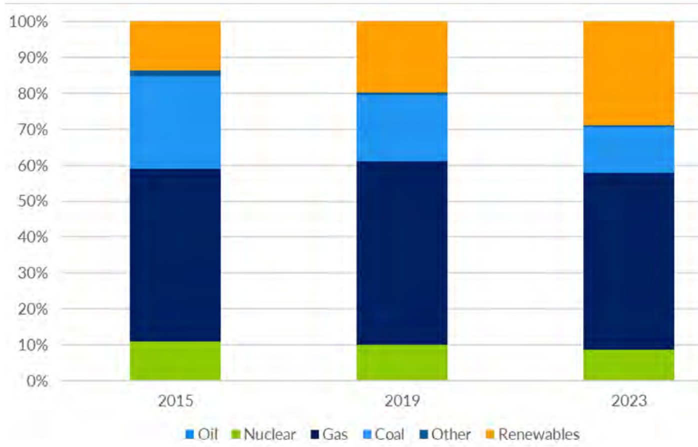


Figure 3-7. Emissions from Electricity Use by Sector



21 Electric Reliability Council of Texas (ERCOT). Long-Term Load Forecast Update (2025-2031) and Methodology Changes. https://www.ercot.com/files/docs/2025/04/07/8.1-Long-Term-Load-Forecast-Update-2025-2031-and-Methodology-Changes.pdf

Figure 3-8. Electricity Generation Mix



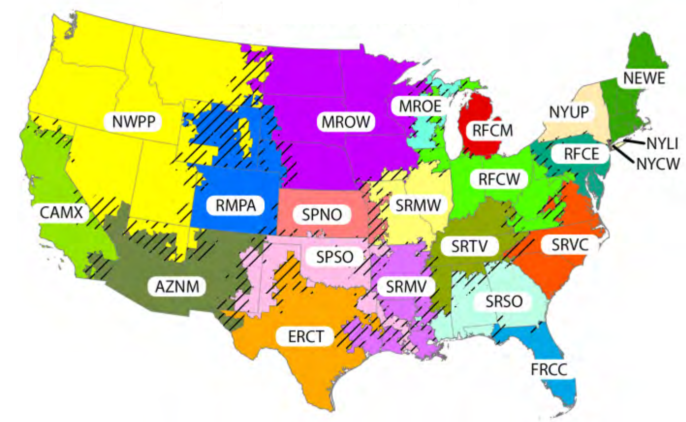
The City of Dallas has more control over City-wide end-use efficiency improvements, including changing to more efficient lightbulbs, weatherizing buildings, or installing more efficient and electrified appliances.

Dallas outlines efficiency and building standards as part of its 2020 CECAP report, which include (1) reducing energy use in existing buildings by 10% by 2030 and 25% by 2050 and (2) making all new construction starting in 2030 100% net zero.

Methodology

In 2023, total electricity consumption for the City of Dallas was provided by Oncor in total kWh per month. Consumption data was not available at the sector level (i.e., residential, commercial, industrial). In order to apportion estimates to the appropriate sector, consumption data from the 2015 and 2019 GHG emissions inventories were used to generate a breakout factor. However, in order to integrate the long-term impacts on electricity use from the COVID 19 pandemic, breakout percentages from 2019 were adjusted to reflect changing electricity consumption trends. Adjustment factors were informed by multiple research studies conducted since 2020, such as the U.S. EIA survey on Energy-Related Changes in *Office Buildings Following the COVID-19 Pandemic* which concluded a strong trend indicating fewer people inside office buildings, reduced tenancy, and increased vacancies due to a shift in work-from-home policies[22]. The inventory team used the EIA *Short Term Energy Outlook* to quantify the impacts of these observed changes[23] and generate the adjusted 2019 breakout of electricity consumption by sector. These findings indicate that commercial electricity consumption decreased 3% as a result of long-term impacts of the pandemic. In comparison, residential electricity consumption increased by 2% and industrial electricity consumption increased by 1%.

Figure 3-9. Map of eGRID Subregions



To estimate GHG emissions from electricity consumption, the EPA Emissions & Generation Resource Integrated Database (eGRID), a widely recognized and authoritative tool, was used. eGRID provides region-specific emission factors that reflect the average emissions associated with electricity generation in different parts of the United States. These factors account for the mix of power plants that supply electricity to each region. The U.S. electricity grid is divided into eGRID subregions, which are geographic areas defined by the EPA based on the actual flow of electricity and the structure of the power grid (see Figure 3-9)[24]. Each subregion has a unique emissions profile depending on its energy generation mix.

22 U.S. Energy Information Administration (EIA). Energy-Related Changes in Office Buildings Following the COIVD-19 Pandemic. 2024. https://www.eia.gov/consumption/commercial/reports/2024/covid/pdf/Energy-Related%20Changes%20in%20Office%20Buildings%20Following%20the%20COVID-19%20Pandemic.pdf

23 EIA. Short-Term Energy Outlook. 2025. https://www.eia.gov/outlooks/steo/

24 EPA. Map of eGRID Subregions. 2020. https://19january2021snapshot.epa.gov/sites/static/files/styles/large/public/2020-03/2018_egrid_subregions.png

These subregions are more accurate for emissions accounting than using national averages because they reflect the local generation and consumption patterns. The City of Dallas is located in the Texas Reliability Entity (TRE) North subregion, also referred to as the eGRID subregion ERCOT. This region is part of the Electric Reliability Council of Texas (ERCOT) grid, which operates independently from the rest of the U.S. grid. The ERCOT subregion has a distinct emissions profile due to its unique energy mix.

Section 3.2.3

Transmission and Distribution of Electricity and Natural Gas

Transmission and distribution (T&D) losses from electricity refer to the energy lost as electricity travels from power plants to end-users through the electrical grid. These losses occur due to the inherent inefficiencies in the electrical system, including resistance in wires, transformers, and other equipment used for transmitting and distributing electricity. T&D losses from natural gas refer to methane and other GHGs that escape during the delivery of natural gas from production facilities to end-users. These losses occur due to leaks, venting, and equipment inefficiencies within pipelines, compressor stations, and other infrastructure. T&D emissions are all classified as Scope 3.

In 2023, emissions from the transmission and distribution of electricity were 274,492 MT CO_2e, representing 1.5% of community-wide emissions. Notably emissions from T&D losses decreased by 41.0% since 2015 and 28.1% since 2019. Total electricity consumption within the City has remained stable during this period indicating that the decline in emissions was primarily due to the declining loss rate and the cleaning of the electric grid. Emissions from natural gas T&D losses were 37,518 MT CO_2e, representing less than 1% of community-wide emissions.

The loss rate represents the portion of energy that is lost while traveling through distribution infrastructure. Between 2015 and 2023, the rate of electricity lost during transmission and distribution declined from 5.2% to 4.2% and the loss rate for natural gas remained at 4.2%. Several factors influence the loss rate during T&D, including the distance, age and condition of grid infrastructure, along with the amount of electricity being transmitted and distributed.

Methodology

Loss rates were taken from EPA's eGRID to maintain consistency with consumption emissions estimates. The loss rate was applied to total electricity consumed to determine the value of electricity lost during transmission and distribution. Emissions estimates were developed using the same methodology as electricity consumed by the end user.

Section 3.3

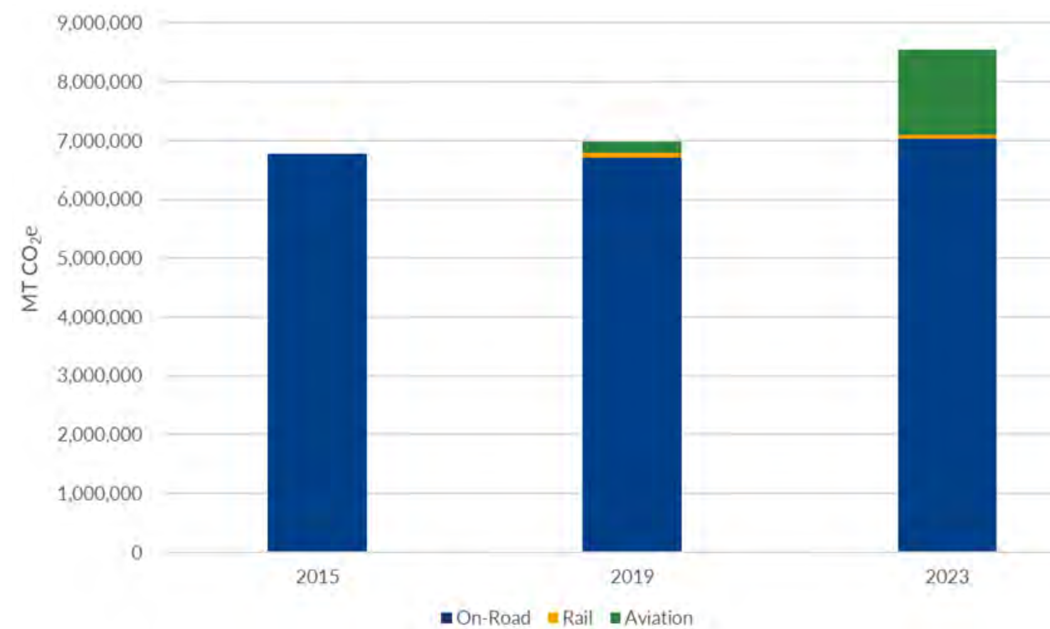
Transportation

The transportation sector includes on-road vehicles (e.g., cars, trucks, and buses), passenger and freight rail, and aviation. Figure 3-10 shows transportation sector emissions by sub-sector for each year.

Scope 1 emissions (emissions from gas use and other fuel use occurring within the City's boundary) made up 49.6% of the total transportation sector emissions at 4,240,720 MT CO_2e in 2023. These emissions result from activities such as combustion of motor vehicle gasoline, combustion of diesel fuel for rail, and combustion of aviation fuels. Scope 2 emissions in the transportation sector result from electricity used by rail passenger transport and made up less than 1% of total transportation sector emissions. Scope 3 emissions made up the remaining 50.1% of emissions in the transportation sector and came from cross-boundary on-road travel and aviation travel.

The 2020 CECAP outlines a range of strategies to reduce transportation-related emissions within the City of Dallas. Several of these actions focus on shifting travelers away from single occupancy vehicles by enhancing the accessibility, reliability, and reach of public transit systems, developing micro-mobility infrastructure, and establishing mobility hubs. Mobility hubs are stations that integrate multiple transportation options to encourage multimodal travel[25] . Additional actions are aimed at decarbonizing transportation directly, such as electrifying Dallas Area Rapid Transit (DART), an agency independent of the City, transitioning the City's bus fleets to 100% electric, and increasing the availability of electric vehicle infrastructure.

Figure 3-10. Transportation Sector Emissions by Sub-sector and Year



Note: Aviation and rail emissions were not estimated for the 2015 community GHG emissions inventory.

25 ARUP & The Research Institute of Sweden (RISE). *Mobility Hubs of the Future: Toward a New Mobility Behaviour.* 2020. https://www.ri.se/sites/default/files/2020-12/RISE-Arup_Mobility_hubs_report_FINAL.pdf

Section 3.3.1

On-Road Transportation

Emissions from on-road transportation made up 82% (7,034,518 MT CO_2e) of emissions from the transportation sector in 2023. Due to the geographic boundary of the GHG emissions inventory, on-road emissions are separated by Scope 1 and Scope 3. Scope 1 emissions include on-road emissions from in-boundary trips (accounting for 19.3% of vehicle miles) as well as the in-boundary portion of cross boundary trips (accounting for 40.3% of vehicle miles). In 2023, Scope 1 on-road emissions totaled 4,197,190 MT CO_2e. Scope 3 emissions reflect the out of boundary portion of cross boundary trips (accounting for 40.3% of vehicle miles) and totaled 2,837,328 MT CO_2e in 2023.

Reported vehicle miles travelled (VMT) increased by 4% from 2019 to 2023. This increase can be attributed to economic growth, growing population, and a greater flow of cross boundary trips, especially from outside of the City of Dallas into the City. Associated emissions from on-road vehicles have similarly increased by 5%. The larger increase in on-road vehicle emissions compared to VMT can be attributed to the greater percentage of vehicle miles being driven by light and heavy trucks, opposed to passenger vehicle miles (a roughly 4% decrease from 2019).

Methodology

On-road transportation emissions were quantified using EPA's Motor Vehicle Emissions Simulator (MOVES5) with inputs from North Central Texas Council of Governments (NCTCOG). Outputs include VMT and emission factors for CH_4 and N_2O. CO_2 emissions were derived from fuel use, utilizing ClearPath fuel efficiency data to convert from VMT to fuel consumption, and EPA emission factors to convert from fuel consumption to CO_2 emissions. On-road emissions were also broken out into Scope 1 emissions from travel within the boundary of the City, and Scope 3 emissions from the out of boundary portion of cross boundary trips. Vehicle miles traveled were apportioned based on the flow of vehicle travel from the U.S. Census OnTheMap tool based on employment and residence statistics. Cross-boundary trips were then divided evenly between Scope 1 and Scope 3 emissions for miles driven outside of the City boundary. This analysis of traffic flow was developed by the U.S. Census OntheMap tool.

For the purposes of this GHG emissions inventory, 2015 and 2019 emissions were recalculated to align with methodologies used in 2023.

Section 3.3.2

Rail Transportation

In 2023, rail transportation generated 69,092 MT CO_2e or approximately 1% of transportation sector emissions. Within rail transportation, 30,678 MT CO_2e came from passenger rail and 38,414 MT CO_2e came from freight rail. Emissions from freight rail are the result of diesel fuel usage, while emissions from passenger rail are the result of both diesel and electricity consumption (85% and 15% of emissions from passenger rail, respectively).

Emissions from rail transportation have decreased by 15% since 2019. This decrease was primarily the result of a cleaner electric grid and a 16.7% decrease in freight rail diesel consumption. Emissions from rail transportation were not calculated in 2015.

Methodology

Emissions were calculated for rail transportation in the City of Dallas by first calculating fuel consumption per track mile for each rail transportation system. The systems included in 2023 calculations were those that operate within the City of Dallas boundaries: BNSF Railway Company (BNSF); Dallas Area Rapid Transit (DART); Dallas, Garland & Northeastern Railroad (DGNO); Fort Worth and Wester Railroad (FWWR); Kansas City Southern Railway (KCS); Trinity Railway Express (TRE); and Union Pacific (UP)[26]. The fuel consumption per track mileage was calculated by dividing each system's total track milage in 2023 by their total fuel or electricity use in 2023. Where 2023 data was unavailable, 2019 data was used as a proxy.

The fuel consumption per track mile for each system's network was then multiplied by the total track mileage within Dallas to obtain the fuel consumption attributed to rail transportation within the City of Dallas. These calculations were performed for each rail system, rail type (passenger or freight), and fuel type (diesel or electricity). The track miles within the City of Dallas were assumed to be the same between 2019 and 2023, and these mileages were obtained from the NCTCOG during the 2019 GHG emissions inventory. The resulting values were summed. This methodology aligns with the rail transportation emissions calculations performed for the 2019 GHG emissions inventory. However, during the assembly of the 2023 emissions estimates, 2019 emissions estimates for rail transportation were recalculated to correct an overestimation in previous inventories.

26 *Note that KCS merged with Canadian Pacific in 2023 to form Canadian Pacific Kansas City (CPKC).*

Section 3.3.3

Aviation

Aviation emissions from the City of Dallas originate from three facilities located within the City boundary: Dallas Love Field, Dallas Executive Airport, and Dallas Heliport/Vertiport. In 2023, total aviation emissions were 1,440,447 MT CO_2e, accounting for approximately 17% of transportation emissions in 2023. Of this total, Scope 1 emissions—primarily from on-site fuel combustion and facility operations—contributed 432 MT CO_2e, while Scope 3 emissions—largely from tenant aircraft operations—accounted for 1,440,015 MT CO_2e.

The substantial increase (654%) in reported aviation emissions between 2019 and 2023 is attributable to a methodological update made to calculate emissions from tenant aircraft. The Department of Aviation participates in the Airports Council International's Airport Carbon Accreditation program, a global, third-party verified carbon management certification program for airports, considered the industry standard for airport carbon accounting. For the 2019 calendar year, Dallas Love Field was enrolled in the program at level 3, which required reporting only the landing and takeoff portion of aircraft flights using flight data. As the airport advanced to the more stringent level 4 in the program starting with the 2022 calendar year, full flight emissions were required to be reported using data on aviation fuel dispensing on airport property. As such, the methodology changed to account for the expanded reporting requirements. This change in methodology led to a nearly 700% increase in reported emissions, despite stability in aviation activity.

Aviation emissions were only included from facilities that were within the City of Dallas boundary, according to guidance from the ICLEI Community Protocol. However, the greater Dallas community has substantial emissions associated with the Dallas-Fort Worth (DFW) International Airport. Because DFW is out of the City of Dallas boundary, it is not included in this community GHG emissions inventory. For informational purposes only, DFW reported 9,084,279 MT CO_2e of GHG emissions across Scopes 1, 2, and 3 in 2023.

The 2020 CECAP set the goal to achieve level 3+ in the Airport Carbon Accreditation program at Dallas Love Field for carbon neutral operations and to pursue accreditation for Dallas Executive Airport. In June 2022, level 3 was achieved for the 2019 calendar year, and in May 2024, level 4 and carbon neutral operations were achieved for the 2022 calendar year. This status was maintained for the 2023 inventory year.

Methodology

Emissions from aviation were provided by the Department of Aviation for the three aviation facilities within the City of Dallas boundary: Dallas Love Field, Dallas Executive Airport, and Dallas Heliport/Vertiport. Participating airports used a combination of custom excel based calculations and the Airports Council International's Airport Carbon Emissions Reporting Tool (ACERT). ACERT is a spreadsheet-based tool to estimate GHG emissions from airport operations. ACERT helps airports quantify emissions from sources such as electricity use, heating, on-site fuel combustion, and ground support equipment, and follows internationally recognized methodologies. It is designed for airports of all sizes to support carbon management and reporting initiatives.

Aviation emissions were not included in the 2015 GHG emissions inventory.

Section 3.4

Waste

The solid waste category includes emissions from the decomposition of waste, flaring of landfill gas, and energy consumption for waste processing. The water and wastewater category includes emissions from process and digester emissions generated from Dallas Water Utilities. In the City of Dallas, solid waste emissions are generated from three facilities: McCommas Bluff Landfill and Deepwood Landfill that are owned by the City of Dallas and Trinity Oaks Landfill that is not owned by the City of Dallas. McCommas Bluff Landfill is active, while Trinity Oaks Landfill and Deepwood Landfill are closed; at the closed sites, captured landfill gas is flared to convert methane to carbon dioxide, reducing harmful emissions.

When organic material in municipal solid waste (MSW), such as paper, food scraps, and wood products, is placed in landfills, it undergoes decomposition by both aerobic and anaerobic bacteria. This decomposition process generates biogas, which consists of approximately 50% biogenic CO_2 and 50% CH_4 by volume. According to ICLEI guidelines and emissions accounting best practices, biogenic CO_2 emissions from landfills are not reported under the Waste sector because they are considered part of the natural carbon cycle, rather than net contributors to atmospheric greenhouse gas concentrations. In addition to decomposition of waste, landfill flaring is a process used to safely dispose of landfill gas, primarily CH_4 and CO_2, by burning it rather than allowing it to escape into the atmosphere. During flaring, CH_4 is converted to CO_2, water vapor, and trace compounds. This conversion is beneficial because CO_2 has a lower global warming potential compared to CH_4.

The 2020 CECAP aims to increase landfill waste diversion to 35% by 2030 and 45% by 2040. In order to achieve this goal, the City of Dallas plans to promote reduction, recycling, and composting within the community as well as develop a comprehensive green procurement plan. In addition to solid waste goals, the City set GHG reduction targets for treatment facilities at 45% reduction by 2035 and 100% reduction by 2050.

Section 3.4.1

Landfilled Solid Waste

Solid waste emissions in Dallas are attributed to three landfill sites: McCommas Bluff Landfill, Deepwood Landfill, and Trinity Oaks Landfill. McCommas Bluff Landfill operates as the City's primary active landfill, receiving and disposing of waste from across Dallas. It is equipped with a landfill gas (LFG) capture system and converts a significant portion of recovered gas to renewable natural gas (RNG) while the remaining LFG is flared to reduce methane emissions. The 2020 CECAP sets the goal of expanding the capture and use of LFG to power operations.

Deepwood Landfill and Trinity Oaks Landfill are both closed (in 2003 and 2021 respectively) and no longer accept waste. Both sites continue to generate methane through the decomposition of previously received materials.

Emissions from solid waste declined over the same period. When using consistent methodologies, solid waste emissions were 610,212 MT CO_2e in 2015, 664,063 MT CO_2e in 2019, and 479,318 MT CO_2e in 2023. This reduction was driven primarily by the decline in waste volumes.

Solid waste emissions are based primarily on tons of waste landfilled. In 2023 1,409,441 tons of waste were put in landfills, representing a 28% reduction in total landfilled waste from 2019. The decline in landfilled waste is due to increased diversion to recycling and composting.

Methodology

Activity data on tons of waste landfilled was collected from the Dallas Department of Sanitation Services. Due to data availability, the current GHG emissions inventory uses an emission factor for aggregated waste types based on previously conducted waste characterization studies on the City of Dallas. Conducting an updated waste audit and source specific emissions calculations is a future improvement for GHG emissions inventory estimates.

Section 3.4.2

Potable Water and Wastewater Treatment


DWU Facility

Dallas Water Utilities (DWU) operates the City's drinking water and wastewater systems, which include the treatment and distribution of clean water to homes and businesses, as well as the collection and treatment of sewage. The treatment of wastewater produces emissions from the aerobic and anaerobic decomposition of organic material. Additionally, the biological treatment process includes nitrogen removal, which is essential to protecting the quality of receiving waters. This process results in emissions of N_2O. In addition to process emissions, emissions associated with energy use at water and wastewater facilities are reported and captured within the industrial end-use sector stationary energy emissions. The Scope 1 emissions associated with potable water and wastewater in 2023 were 252.3 MT CO_2e. Emissions decreased 0.1 MT CO_2e between 2019 and 2023, in part due to the consistency of organic material contained in the City's wastewater.

In addition to CH_4 and N_2O, digesters also produce CO_2 emissions. These emissions are considered biogenic CO_2 and therefore were not included in GHG emissions inventory totals.

The 2020 CECAP introduces strategies to reduce emissions from the processing and treatment of water and wastewater. Several strategies target reduced water usage such as encouraging drought-tolerant landscaping, evaluating water reuse opportunities, and improved leak detection systems. Strategies to reduce treatment emissions include introducing technologies to lower nutrient release into Dallas water bodies, reduce energy consumption, and reduce chemical use. Continued investment and improvements in sewer collection and storm water drainage systems is also identified.

Methodology

DWU monitors the daily nitrogen load at processing facilities. The daily nitrogen load value was converted from nitrogen to N_2O using a standard conversion factor and annualized to get annual process emissions.

DWU similarly provided data on both the volume of digester gas that was used for energy and combusted (not used) at the Southside Wastewater Treatment Plant in 2023. DWU provided the energy content of digester gas. This value is variable and based primarily on the methane concentration, carbon content, makeup of organic material, and digester conditions. These values were used to determine the energy use of the digester, which was multiplied by a digester gas specific emission factor from EPA and consistent with ICLEI default values.

Section 3.5

Industrial Processes and Product Uses (IPPU)

In Dallas, emissions from industrial processes and product use (IPPU) include emissions from the non-energy uses of fossil fuels, chemicals, and other substances. The City of Dallas is primarily commercial and residential, and therefore, industrial emissions are primarily from a small set of large industrial facilities that trigger federal reporting mandates.

Section 3.5.1

Industrial Processes

Industrial facilities large enough to trigger the federal mandate report their emissions to the EPA FLIGHT. The FLIGHT database identified three facilities that generate Scope 1, Scope 2, and Scope 3 emissions within the City of Dallas excluding power plants, petroleum and natural gas systems, and landfills.

The first two facilities were the University of Texas Southwestern Medical Center and Westrock Paper Mill, which included only stationary combustion emissions. Natural gas emissions were removed to avoid double counting with Atmos provided data, which removed all emissions from Westrock Paper Mill and most emissions from The University of Texas Southwestern Medical Center (with some remaining emissions from the use of distillate fuel oil). The third facility, Texas Instruments North Campus, reported information on both stationary combustion (which underwent the same adjustment as the other two entries) as well as electronics manufacturing for 2023. All emissions associated with electronics manufacturing were included in GHG emissions inventory totals as the industry employs a large number of high GWP gases.

Overall emissions totaled 458,986 MT CO_2e, an 8% decrease from 2019 due to lower reported GHG emissions from Texas Instruments North Campus electronics manufacturing.

Texas Instruments has committed to a 50% reduction in the energy intensity per chip by 2025, and as of 2023, the corporate sustainability report indicated that energy intensity had decreased by 10%,[27] which is in line with the reductions observed in the FLIGHT data.

Methodology

Emissions from industrial processes were procured from EPA's FLIGHT tool. The FLIGHT database provides direct, facility-specific emissions data based on consistent reporting standards and approved methodologies. Data is publicly accessible and regularly updated making it an accurate, complete and transparent source of emissions data.

This tool includes reported emissions from large facilities emitting over 25,000 MT CO_2e per year. Facilities report one or more sources of emissions by subsector. Industrial process emissions include all emissions aside from stationary combustion emissions from utility-provided natural gas to avoid double counting. For each facility, a detailed emissions report was procured from FLIGHT. GHG emissions inventory emissions estimates include all emissions reported from facilities from FLIGHT excluding power plant, petroleum and natural gas systems, and landfills. In addition, stationary combustion emissions from natural gas were removed from this category to avoid double counting with Atmos provided natural gas usage data.

27 *Texas Instruments. 2023 Corporate Citizenship Report. 2024. https://www.ti.com/lit/ml/szzo105/szzo105.pdf*

Section 3.5.2

Product Uses

Product uses include emissions from the solvent use, the electronics industry, and the substitution of ozone depleting substances (ODS). ODS substitutes are gases used to replace those phased out pursuant to the Clean Air Act and the Montreal Protocol. These gases are used in refrigerants, aerosols, air conditioners, and other products. Many commonly used refrigerants today, such as hydrofluorocarbons (HFCs) and perfluorocarbons (PFCs), were introduced as alternatives to ozone depleting substances. Though these replacement chemicals do not harm the ozone layer, they are powerful GHGs with high GWPs.

Trends at the national level, such as the increasing use of cooling technologies in residential, commercial, and transportation sectors, have contributed to an overall increase in refrigerant-related emissions. The City of Dallas's GHG emissions inventory shows a similar trend, with 2023 product use emissions totaling 1,256,172 MT CO_2e, an increase of approximately 30% since 2019. This increase was driven primarily by national increases in emissions from refrigeration and air conditioning, which is reflective of increased cooling degree days[28].

Previous inventories did not include emissions from product uses and those values have been calculated for consistency and comparability.

Methodology

The preferred method of calculating GHG emissions from product uses requires detailed facility-level data on chemical sales and the operational history of relevant equipment. However, due to the difficulty of obtaining such granular data accurately and efficiently, ICLEI protocols include guidance for applying a top-down approach that scales national-level emissions estimates to the local level using appropriate proxy indicators.

At the national level, emissions from product uses are estimated using EPA's Vintaging Model, which tracks the characteristics of equipment currently in use for more than 70 different end-use categories and applies HFC and PFC leak rates to estimate annual emissions. National product use emissions estimates were taken from the U.S. Inventory of Greenhouse Gas Emissions and Sinks: 1990 – 2022.[29] During this GHG emissions inventory's development, updated estimates for 2023 had not been released by the U.S. EPA. Therefore, 2023 values were assumed to be equal to those reported in 2022.

To estimate local emissions, national emissions were apportioned to the City using scaling factors recommended by ICLEI and specific to each product use category. For aerosols, population was used as a scaling factor under the assumption that aerosol use is proportional to the number of residents. Commercial refrigeration was scaled using GDP as a proxy for commercial activity. Since city-level GDP data for the City of Dallas is not published, this GHG emissions inventory uses Dallas County GDP data from the Federal Reserve Bank of St. Louis.[30] To estimate the share attributable to the City of Dallas, the GHG emissions inventory applied a correction factor based on the city-to-county employment ratio using data from the U.S. Census Bureau[31]. This ratio adjusted GDP estimate for the City was used to scale U.S. GDP data from the Bureau of Economic Analysis to determine the City of Dallas's share of national commercial activity[32]. That share was applied to national commercial refrigeration emissions estimates.

Finally, ICLEI recommends scaling mobile air conditioning data using the relative number of vehicles. Vehicle registration data from the Texas Department of Motor Vehicles and the Federal Highway Administration[33,34] was used to generate a scaling value for the City of Dallas.

28 *Note: Cooling degree days measure how hot the mean temperature is in order to quantify energy demand for cooling.*
29 *EPA. Inventory of U.S. Greenhouse Gas Emissions and Sinks 1990-2022.* https://www.epa.gov/ghgemissions/inventory-us-greenhouse-gas-emissions-and-sinks-1990-2022
30 *Federal Reserve Bank of St. Louis. Gross Domestic Product: All Industries in Dallas County, TX. 2024.* https://fred.stlouisfed.org/series/GDPALL48113?u
31 *U.S. Census Bureau. OnTheMap. 2025.* https://onthemap.ces.census.gov/
32 *Bureau of Economic Analysis. Regional Data, GDP and Personal Income.* https://apps.bea.gov/itable/
33 *Texas Department of Motor Vehicles. Vehicle Registrations by Registration Class.* https://www.txdmv.gov/about-us/reports-and-data?field_publication_category_target_id=3225
34 *Federal Highway Administration. Highway Statistics Series. 2022.* https://www.fhwa.dot.gov/policyinformation/statistics/2022/mv1.cfm

Section 3.6

Agriculture, Forestry, and Other Land Use (AFOLU)

The agriculture, forestry, and other land use (AFOLU) sector encompasses emissions from activities such as enteric fermentation, manure management, fertilizer application, and agricultural soil management, as well as carbon sequestration from terrestrial sinks. While the City of Dallas does not have significant AFOLU emissions, carbon sequestration by urban trees was estimated and reported for informational purposes. This value is not included in the total GHG emissions estimates included in this report.

The 2023 GHG emissions inventory estimates that 87,072 MT CO_2e of emissions were sequestered by the urban forest tree canopies in the City of Dallas. This sequestered amount of GHGs was equivalent to 0.5% of community GHG emissions in 2023.

The 2020 CECAP sets targets for the expansion of tree canopy cover and green spaces as well as the reduction of the urban heat island index.

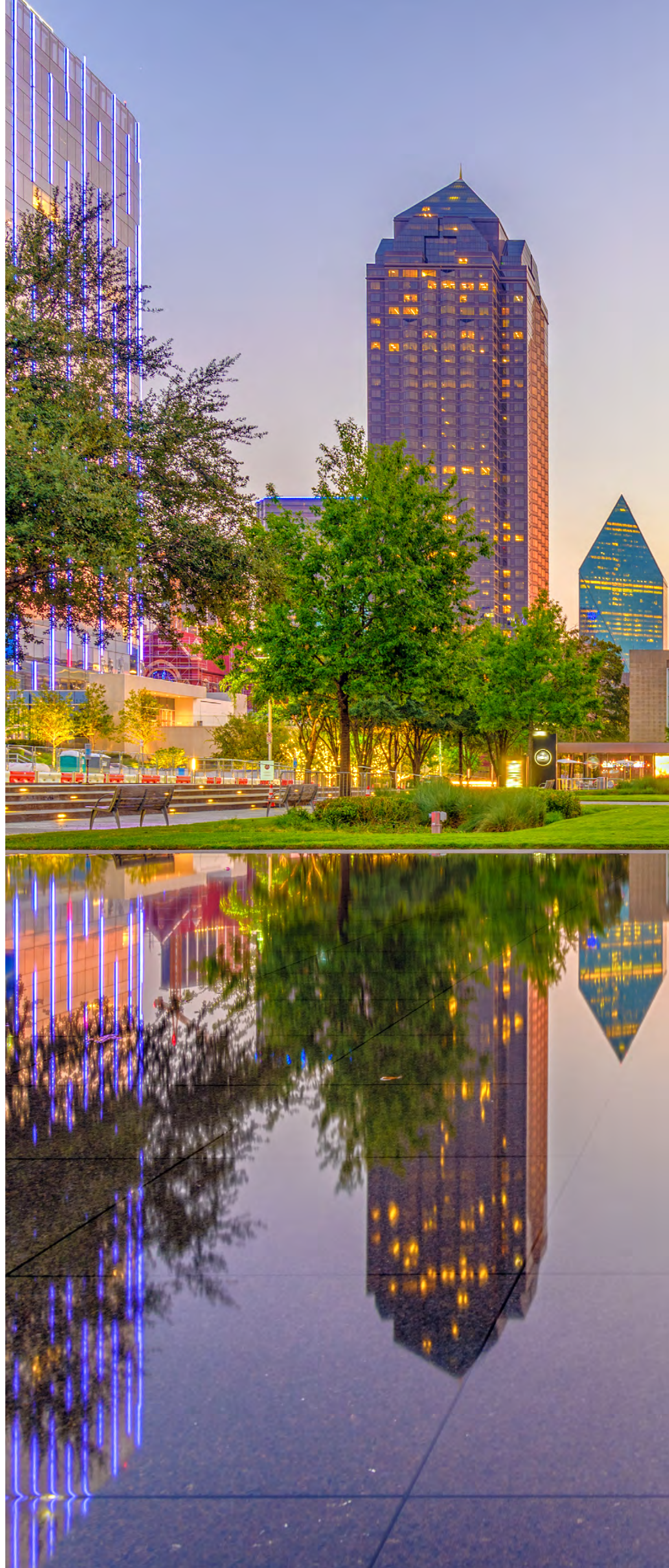
Methodology

The sequestration quantification from tree canopy cover is reported in the Texas Trees Foundation's Dallas Urban Forest Master Plan[35]. This report discusses the level of canopy cover and the annual sequestration of carbon from the urban canopy. The quantification of sequestration was completed using the USDA Forest Service's i-Tree tool[36].

The latest Urban Forest Master Plan was published in 2021. Given the City of Dallas's tree canopy is unlikely to change significantly year over year, estimates for inventory years 2019 and 2023 were assumed to be equal to the 2021 value published in the report.

35 Texas Trees Foundation. Dallas Urban Forest Master Plan 2021. 2021. https://www.texastrees.org/wp-content/uploads/2021/07/TTF_UFMP2020_05-30-21_MECHANICAL_spreads.pdf

36 U.S. Forest Service. i-Tree. 2006. https://research.fs.usda.gov/products/dataandtools/i-tree



Section 4

Local Government Operations GHG Emissions Inventory

LGO

The LGO GHG emissions inventory is a subset of the City of Dallas community-wide GHG emissions inventory reported in Section 3. The LGO inventory is provided in this report to inform the Dallas City Government of the emissions generated by the activities and sources under its ownership and control. The City government can use this information to identify GHG emissions reduction opportunities and to demonstrate leadership through action.

The Dallas City Government has a total of approximately 16,000 employees across 80 departments and operates with an annual total budget exceeding $4 billion dollars and an annual capital budget of over $900 million dollars[37]. While local government operations vary between jurisdictions, several key community services are commonly provided. These include water supply, waste collection, sanitation, transit vehicles and light duty fleet, roads, primary education, and healthcare.

For the Dallas LGO inventory, activities and sources of GHG emissions are primarily concentrated in City owned and operated landfills, water and wastewater treatment facilities, and buildings. Additionally, the fleet of City vehicles, including those used by police, parks maintenance, and sanitation services, significantly contribute to GHG emissions. In the following sections, the GHG emissions from these sources and activities are discussed and analyzed.

37 City of Dallas. Current Budgets. 2025. https://dallascityhall.com/departments/budget/financialtransparency/Pages/Current-Budget.aspx

Section 4.1

Boundary and Scope

The LGO GHG emissions inventory used an operational control boundary, meaning it accounts for 100% of the GHG emissions from operations where it has full authority to direct day-to-day activities. This includes emissions from facilities and activities where the organization has the authority to introduce and implement its operating policies (see Figure 4-1).

Similar to the community-wide GHG emissions inventory, the LGO GHG emissions inventory is developed in accordance with ICLEI protocols. The ICLEI Local Government Operations Protocol is designed to provide a standard set of guidelines to assist local governments in quantifying and reporting their GHG emissions. Furthermore, the protocol enables a consistent and thorough inventory of GHG emissions, aiding in the monitoring of emissions reduction progress over time and against established GHG reduction targets.

To continue to improve GHG emissions inventory estimates and support actionable insights, the City of Dallas expanded the inventory scope to include an additional Scope 3 category of business travel. While emissions from business travel represent a very minor source of emissions for the City government operations, including these emissions in the 2023 GHG emissions inventory improves completeness and accuracy. Other Scope 3 sources, such as upstream supply chain emissions from purchased goods and services, could be further accounted for in future inventories to enhance transparency, support more informed decision-making, and align with best practices in GHG accounting. Table 4-1 outlines the boundaries of the LGO GHG emissions inventory.

Figure 4-1. GHG Emissions Scopes for Local Government Operations Inventories [11]

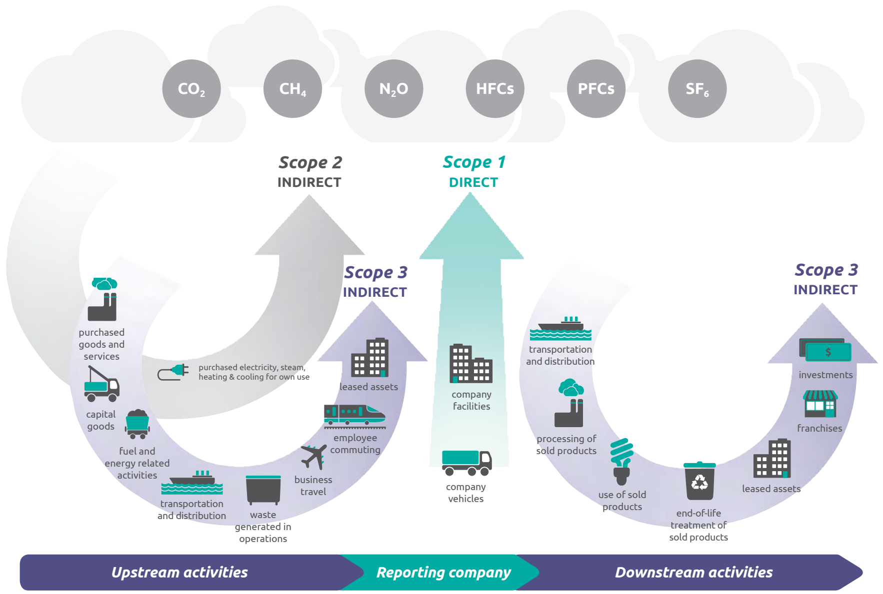


Table 4-1. Boundary of LGO GHG Emissions Inventory

Metric	Description
Geographic Area	Sources and activities owned and/or controlled by the city government.
Time Span	Calendar year 2023
Gases Inventoried	Carbon Dioxide (CO_2), Methane (CH_4), Nitrous Oxide (N_2O), Hydrofluorocarbons (HFCs), Perfluorocarbons (PFCs), Sulfur Hexafluoride (SF6)
GWPs	IPCC 5th Assessment 100-Year Values (AR5). As presented in Table 1-1.
Scope	Scope 1 (Direct emissions from owned or controlled sources) Scope 2 (Indirect emissions from purchased utilities) Scope 3 (Indirect and process emissions influenced by, but outside of city government operations)
Sectors	• Buildings and Facilities • Streetlights and Traffic Signals • Water and Wastewater Facilities • Airport Facilities • Port Facilities • Power Generation Facilities • Equipment and Fleet Management, Transit Vehicle & Light Duty Fleet • Solid Waste Facilities • Scope 3 Emissions (e.g., employee commute and business travel) • Transit Fleet
Protocols	ICLEI Local Government Operations Protocol

Section 4.2

Results Overview

Total LGO emissions in 2023 were 804,033 MT CO_2e, representing 4% of total community-wide emissions. LGO emissions have decreased from 1,128,526 MT CO_2e in 2015 and 966,538 MT CO_2e in 2019. This decrease is primarily explained by ERCOT experiencing a notable transition from coal-fired power generation to cleaner energy sources, such as natural gas and renewables. This shift has led to a substantial reduction in CO_2e emissions per megawatt-hour (MWh) of electricity generated. Given that electricity use is captured within inventory sectors for the LGO GHG emissions inventory, this change has led to reduced emissions across inventory sectors. Based on the granularity of the data used in these estimates, additional contributors to this emissions reduction include decreased electricity consumption from streetlighting and wastewater treatment facilities, as well as a reduction in landfilled waste.

Figure 4-2 and Figure 4-3 illustrate Dallas City Government GHG emissions by scope. Figure 4-4 and Figure 4-5 illustrate Dallas City Government GHG emissions by sector. In 2023, Scope 1 emissions were primarily a product of Solid Waste Facilities and Buildings and Facilities, following similar trends from previous inventory years. Scope 1 emissions reductions were driven by a reduction in waste generation and reduced emissions from the City's transit vehicle and light duty fleet. Scope 3 emissions also declined. These reductions were primarily attributable to decreased emissions from the transmission and distribution of grid purchased electricity following the City-wide trend discussed in Section 3.2.3.

Figure 4-2. 2023 Dallas City Government GHG Emissions by Scope

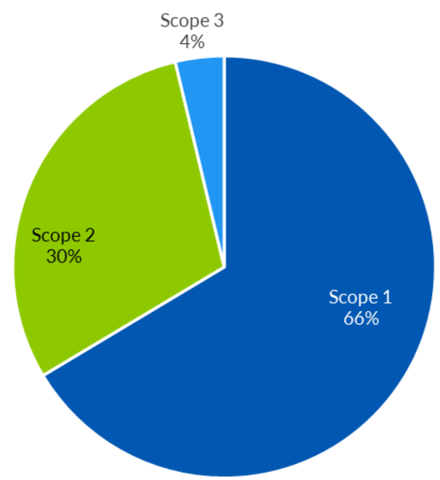


Figure 4-4. 2023 Dallas Government GHG Emissions by Sector

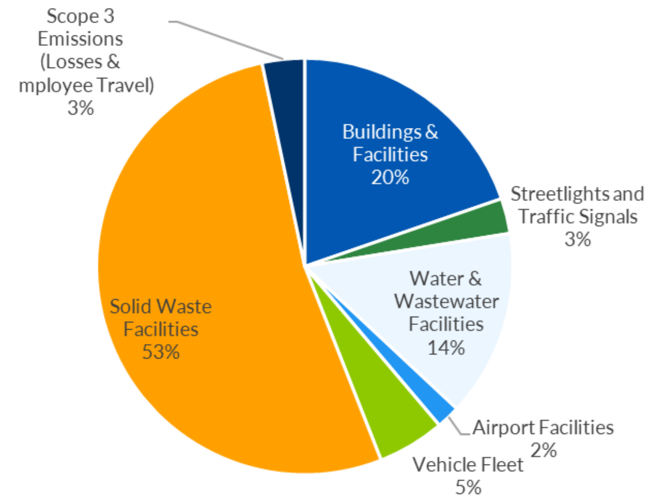


Figure 4-3. Dallas City Government Emissions by Scope

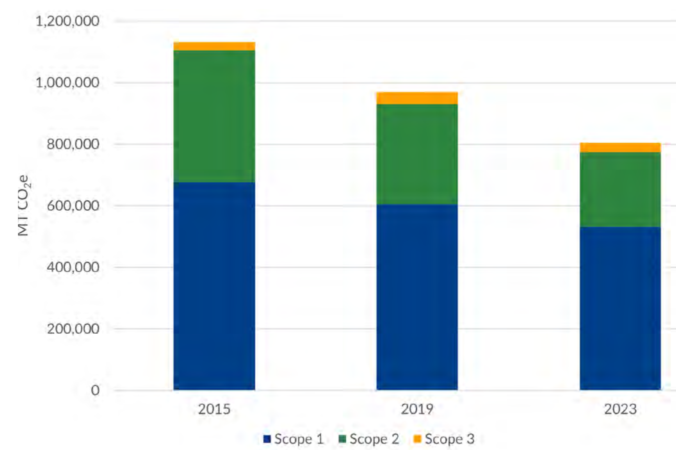
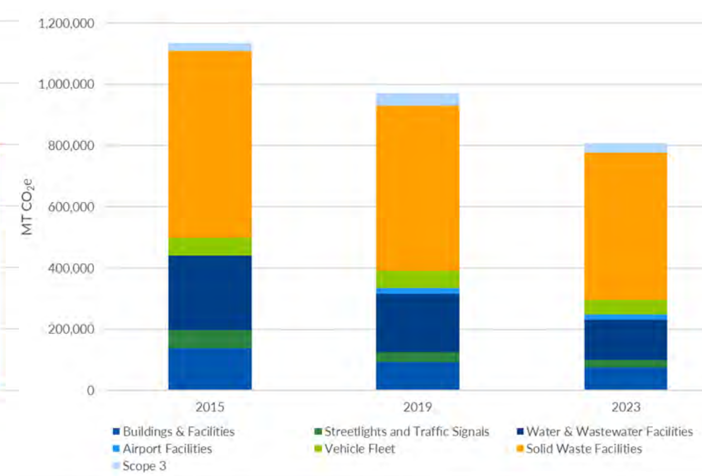


Figure 4-5. Dallas City Government GHG Emissions by Sector



Section 4.3

Electricity Usage

The ICLEI Local Government Operations Protocol recommends reporting Scope 2 emissions using the location-based method only. However, the GHG Protocols require dual reporting of Scope 2 emissions using both the location-based method and the market-based method. The location-based method quantifies Scope 2 GHG emissions based on average energy generation emission factors for defined geographic locations and is used as the default method for the community-wide GHG emissions inventory. The market-based method quantifies emissions based on measured GHG emissions emitted by electricity generators from which the reporter contractually purchases electricity bundled with contractual instruments. In compliance with both recommendations, the GHG emissions reported for the Dallas City Government are calculated using the location-based method. Location-based electricity estimates are included in all GHG emissions inventory totals. Market-based emissions were calculated as well to satisfy recommended reporting and are included for informational purposes only.

In 2023, the City of Dallas maintained its commitment to clean energy by offsetting the emissions from municipal electricity purchases through a long-term electricity supply agreement with TXU Energy. This agreement included the purchase and retirement of Renewable Energy Credits (RECs) sourced from wind energy projects in Texas that offset the emissions from purchased electricity from the grid. In 2023, the emissions avoided from the purchase and retirement of RECs was estimated to be 246,253 MT CO_2e. Avoided emissions were not included in inventory totals and are presented for informational purposes only. Emissions avoided from the purchase and retirement of RECs were included in the 2015 GHG emissions inventory under Buildings and Other Facilities. However, they should not have been included in GHG emissions inventory totals. Doing so would be double counting because the renewable energy was already accounted for in the regional eGRID electricity emission factors. The calculations have been corrected for comparison purposes in this report.

For informational purposes, when calculating emissions from electricity consumption using the market-based method, RECs would effectively cause the emissions factor for purchased energy to be 0 kg per kWh, making the City's market-based Scope 2 emissions from purchased electricity 0 MT CO_2e.

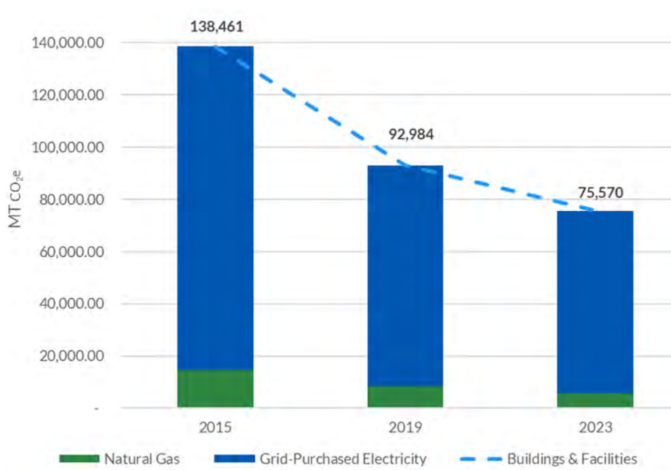
In this LGO GHG emissions inventory, emissions from electricity use were disaggregated by their end-use sector (e.g., buildings, streetlights, water, and wastewater facilities). These estimates were developed using electricity billing records provided by the City through Oncor. Received data was aggregated by facility and department, allowing for the proper allocation of emissions.

Section 4.4

Buildings & Facilities

Dallas government buildings and facilities use electricity and fuel for space conditioning, water heating, plug and process loads, and other energy needs. This energy consumption results in both direct and indirect GHG emissions. Since there are separate reporting categories for Water and Wastewater Treatment Facilities, Airport Facilities, and Solid Waste Facilities, the data in this section covers all other government-owned or operated buildings and facilities. These include administrative buildings, police and fire facilities, parks and recreation facilities, libraries, and more. Detailed activity data and emissions for this sector are provided below. In 2023, Buildings and Other Facilities contributed 75,570 MT CO_2e, which isequivalent to 9% of all LGO Inventory GHG emissions (see Figure 4-6).

Figure 4-6. Emissions from Buildings and Facilities



The categories that contributed to these emissions were pipelined natural gas and electricity usage. For the purposes of this GHG emissions inventory, it was assumed that other fuel consumption (such as motor gasoline) is captured in other relevant sections of this report. Note that transmission and distribution losses from natural gas and electricity usage were considered under a separate category.

Section 4.4.1

Pipelined Natural Gas

Emissions from natural gas consumption were 5,587 MT CO_2e in 2023 representing less than 1% of total LGO emissions and a significant decrease from 2015 and 2019 estimates. Fewer buildings reported natural gas usage and, overall, buildings consumed less natural gas. While no single factor was identified, this reduction appears to be driven by a general decrease in consumption.

Methodology

The City of Dallas provided a record of their 2023 collective billings for natural gas provided by the utility Atmos Energy. This data included all pipelined natural gas in 100 cubic feet (CCF) from all City of Dallas facilities except for the Department of Aviation, Dallas Water Utilities (DWU), and Department of Sanitation Services. The natural gas used by facilities in those departments are reported elsewhere in this LGO GHG emissions inventory, under Airport Facilities, Water and Wastewater Facilities, and Solid Waste Facilities, respectively. Natural gas emission factors were procured from Table 1 of the EPA Emission Factor Hub to calculate the Scope 1 emissions from pipelined natural gas for Buildings and Facilities[38].

Section 4.4.2

Electricity Consumption

The electricity used by streetlights and traffic signals, Dallas Water Utilities, the Department of Aviation, and the Department of Sanitation Services are included elsewhere in this LGO GHG emissions inventory, under Streetlights and Traffic Signals, Airport Facilities, Water and Wastewater Facilities, and Solid Waste Facilities, respectively. The remaining facilities are accounted for here in the Buildings and Other Facilities category. Electricity emission factors for 2023 were obtained from the eGRID database for the ERCOT subregion, that includes the City.

In 2023, buildings and other facilities emitted 69,984 MT CO_2e from purchased electricity, accounting for 8.7% of LGO emissions. This represents a 17% decrease in emissions from purchased electricity compared to 2019 and was driven primarily by the greening of the grid, along with a 3% reduction in electricity use compared to 2019.

38 EPA. GHG Emissions Factor Hub. 2025. https://www.epa.gov/system/files/documents/2025-01/ghg-emission-factors-hub-2025.pdf

Section 4.5

Streetlights and Traffic Signals

Electricity consumed by City owned and operated streetlights and traffic signals is reported separately from other facilities because they are typically metered independently and have a specific use profile. The City of Dallas owns or operates many of the streetlight and traffic signals in the City, but those operated by the utility Oncor are not included in this LGO GHG emissions inventory.

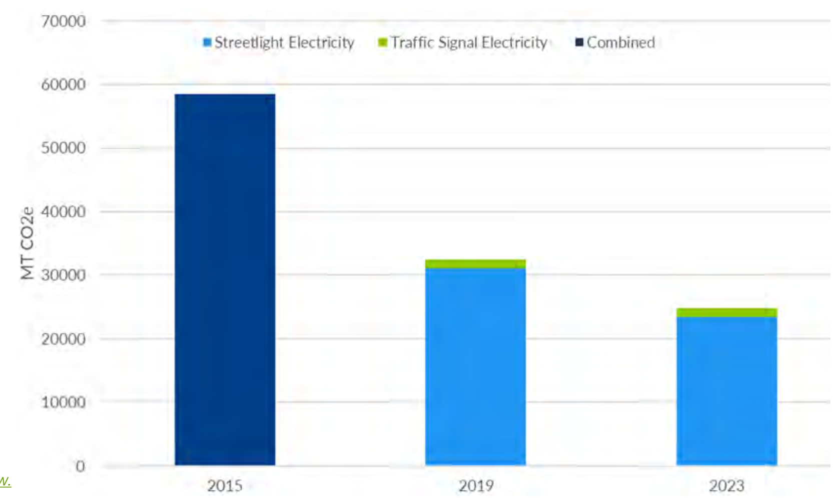
Streetlights and traffic signals contributed 24,867 MT CO_2e of emissions in 2023, equivalent to 3.1% of all LGO emissions. Emissions from streetlights and traffic signals have steadily decreased since the 2015 and 2019 GHG emissions inventories due to a decreased number of streetlights and decreased electricity usage as reported by Oncor (see Figure 4-7).

Methodology

Electricity consumption data was taken directly from utility meter records from Oncor provided by the City of Dallas. Recorded data included all electricity used by City of Dallas facilities in kWh, which was aggregated by facility and department. Electricity used by streetlights and traffic signals was reported separately.

Electricity emission factors from eGRID 2023 for the ERCOT region were applied to calculate emissions[39].

Figure 4-7. Emissions from Streetlights and Traffic Signals Electricity



39 EPA. Emissions & Generation Resource Integrated Database (eGRID 2023). 2025. https://www.epa.gov/egrid/detailed-data

Section 4.6

Water and Wastewater Facilities

Dallas Water Utilities (DWU) provides water and wastewater services to approximately 2.6 million people in the City of Dallas and nearby communities. DWU operates three water treatment plants (WTPs) (Bachman, East Side, and Elm Fork) and two wastewater treatment plants (WWTPs) (Central and Southside). The majority of GHG emissions from these facilities are the result of the consumption of natural gas and electricity for operations. In addition, the Southside WWTP has a biogas digester that captures the biogas produced during the anaerobic digestion of wastewater solids and is used to fuel on-site power generation. The digester produces minimal emissions and contributes to reductions in grid electricity dependence.

In 2023, water and wastewater facilities operated by the City of Dallas produced 132,154 MT CO_2e, equivalent to 16.4% of total LGO emissions. Electricity usage accounted for 99.9% of emissions for this category. Natural gas usage contributed 0.1% to total emissions while Southside's anaerobic digester contributed less than 0.1%. Figure 4-8 shows 2023 water and wastewater facility emissions broken out by source.[40]

Emissions from water and wastewater treatment facilities have decreased across inventory years, as shown in Figure 4-9. Emissions in this category decreased 30.3% in 2023, down from 189,703 MT CO_2e in 2019 to 132,154 MT CO_2e in 2023. This change was driven by declining Scope 2 electricity consumption emissions due to renewable energy generation in the ERCOT subregion. In addition, there was decreased electricity consumption, primarily from Southside WWTP.

Figure 4-8. 2023 Emissions from Water and Wastewater Facilities by Source

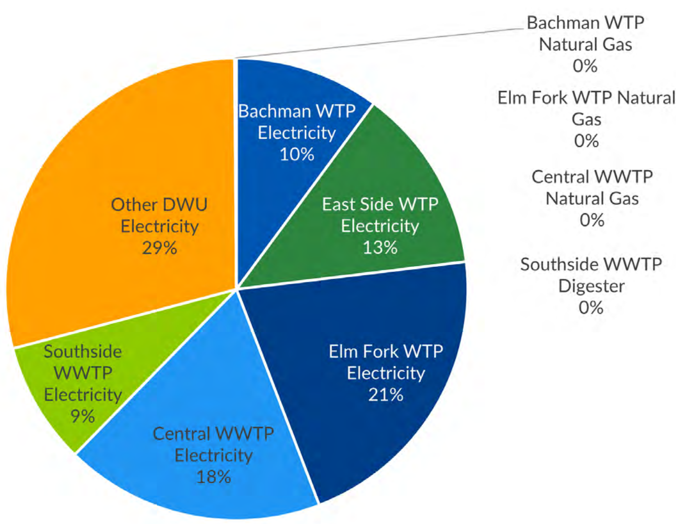
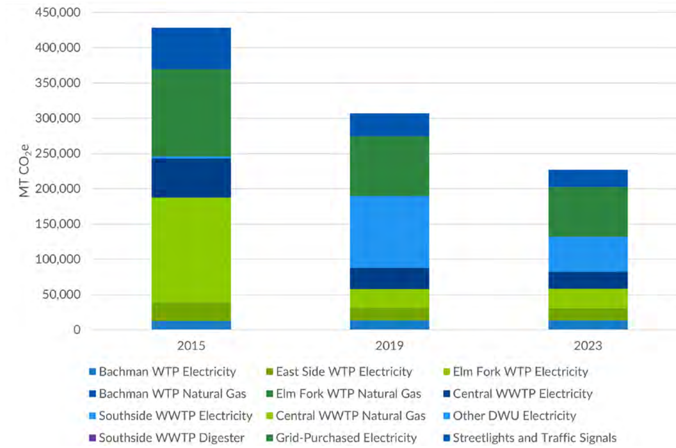


Figure 4-9. Emissions from Water and Wastewater Treatment Facilities



Methodology

Activity data on natural gas usage, electricity usage (for all DWU operations), and anaerobic digester emissions (Southside only) were provided directly by the facilities. Natural gas emission factors were procured from Table 1 of the EPA Emission Factor Hub to calculate Scope 1 emissions[41]. Electricity emission factors from eGRID 2023 for the ERCOT region were applied to calculate Scope 2 emissions[42].

Emissions in this category have been calculated for 2023 using the same methodology as was used in 2015 and 2019. Note that emissions from natural gas usage from the Bachman and Elm Fork water treatment facilities were not reported in 2015.

40 Other DWU Electricity includes remaining electricity consumption from DWU and WTP to align with overall emissions from water and wastewater facilities.

41 EPA. GHG Emissions Factor Hub. 2025. https://www.epa.gov/system/files/documents/2025-01/ghg-emission-factors-hub-2025.pdf

42 EPA. eGRID 2023. 2025. https://www.epa.gov/egrid/detailed-data

Section 4.7

Port Facilities

The City of Dallas did not own or operate port facilities in 2023; therefore, this category is not applicable.

Section 4.8

Airport Facilities

The City of Dallas owns and operates three aviation facilities: Dallas Love Field, Dallas Executive Airport, and the Dallas Heliport/Vertiport. Emissions from these facilities attributable to the City of Dallas include natural gas (3,087 MT CO_2e) and electricity used (13,718 MT CO_2e) by Dallas's Department of Aviation. Dallas Love Field used the most natural gas (575,472 Therms), followed by Dallas Executive Airport (5,635 Therms). Dallas Heliport/Vertiport did not use any natural gas in 2023. The airport facilities category of the 2023 LGO GHG emissions inventory contributed 16,805 MT CO_2e, equivalent to 2.1% of all LGO emissions.

Emissions decreased by 17.6% between 2019 and 2023, from 20,385 MT CO_2e to 16,805 MT CO_2e. This decrease can primarily be attributed to a 21.3% reduction in electricity usage. However, natural gas usage increased over the same period resulting in a smaller percentage reduction in overall emissions from airport facilities between 2019 and 2023.

Methodology

The emissions from natural gas used by Dallas Love Field, Dallas Executive Airport, and Dallas Heliport/Vertiport were directly reported by the facilities in tons of CO_2e.

Additionally, this category considers electricity usage from the City of Dallas Department of Aviation. The City of Dallas provided a record of their billings for electricity provided by the utility Oncor. This included all electricity used by City of Dallas facilities in kWh and was aggregated by facility and department. The electricity used by the Department of Aviation was broken out from these totals. Electricity emission factors from eGRID 2023 for the ERCOT region were applied to calculate emissions.[43]

Natural gas usage from airport facilities was not reported in 2015 or 2019. However, the data was collected in 2019, allowing values to be calculated for the most recent GHG emissions inventory. Additionally, electricity usage from aviation facilities was not independently calculated in 2015.

43 EPA. eGRID 2023. 2025. https://www.epa.gov/egrid/detailed-data

Section 4.9

Equipment and Fleet Management, Transit Vehicle & Light Duty Fleet

The City of Dallas General Fund Fleet consists of approximately 5,789 vehicles, including light-duty, medium-duty, and heavy-duty vehicles, as well as off-road vehicles and other equipment. These classifications are designated by a vehicle's Gross Vehicle Weight Rating also known as GVWR. A vehicle's GVWR is the combined weight of the vehicle, its occupants, cargo and any towed attachments.

These classifications are as such:

Light Duty

Class 1 and 2 have a GVWR between 0-10,000 pounds and include cars through ¾ ton pick-up trucks. There are 3,771 units classified as Light Duty of which 892 are marked patrol cars.

Medium Duty

Class 3, 4, 5, 6 have a GVWR of between 10,001- 26,000 pounds and include one-ton pickup trucks through day cabs and dump trucks. There are a total of 376 units classified as medium duty.

Heavy Duty

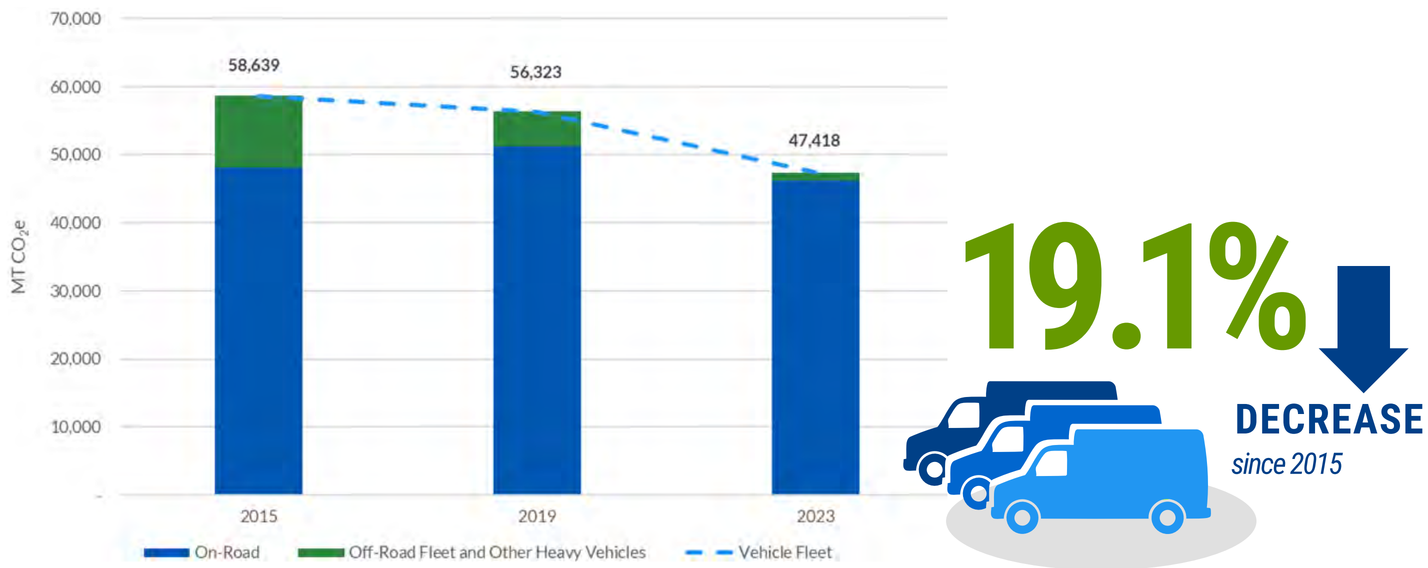
Class 7 and 8 have a GVWR of between 26,001 and higher and include garbage trucks and other specialty units like vac-trucks and concrete trucks. There are a total of 743 units classified as heavy duty.

Off-road vehicles and equipment are the remaining 899 units. These are trailers, mobile compressors, mobile generators and equipment used for digging, trenching, laying asphalt, and all other City functions.

The fleet uses various fuel types, including gasoline, diesel, biodiesel, compressed natural gas (CNG), and electricity (hybrid electricity and battery electric vehicles). Emissions data is reported based on fuel type and vehicle category, with detailed activity data and emissions provided in Figure 4-10. Emissions from electricity-powered vehicles are not included in emissions totals as that electricity usage is assumed to be considered in the Buildings and Facilities section (since this is where electric-powered vehicles are assumed to recharge).

In 2023, the City of Dallas's vehicle fleet contributed 47,418 MT CO_2e, which is equivalent to 5.9% of total LGO emissions. Since Scope 2 emissions from electricity usage were considered elsewhere in the LGO GHG emissions inventory, the emissions in this category are all Scope 1 and come from the mobile combustion of fuels. If Scope 2 emissions from electricity usage had been included in this section, the 22,273 kWh of electricity used by electric and hybrid vehicles would contribute an additional 7.48 MT CO_2e.

Figure 4-10. Vehicle Fleet Emissions



Emissions from the City's vehicle fleet have decreased steadily since 2015, as shown in Figure 4-10. Emissions decreased a total of 19.1% since 2015, including a 15.8% decrease between 2019 and 2023 due to decreases in total on-road vehicle fuel use.

Methodology

The NCTCOG provided data on 2023 Vehicle miles travelled (VMT) by vehicle type as well as average fuel economy (i.e., miles per gallon) by vehicle type. Actual fuel consumption by fuel type was collected directly from City departments.

To estimate fuel usage by both fuel type and vehicle type, the VMT and fuel economy data from NCTCOG were used to generate preliminary fuel consumption estimates by vehicle category. These proportions (i.e., the relative shares of passenger vehicles, light trucks, and heavy trucks) were then applied to the City's reported total fuel usage to allocate fuel consumption more accurately across vehicle types.

Gasoline and diesel (both on-road and off-road) emission factors from the EPA Emission Factor Hub, biodiesel emission factors from the 2006 IPCC Guidelines for National Greenhouse Gas Inventories, and CNG emission factors from ICLEI ClearPath were used to calculate Scope 1 emissions[44].

Electricity emission factors from eGRID 2023 for the ERCOT region were applied to calculate emissions from the on-road electric fleet, provided for informational purposes only, as emissions were accounted for in other sectors.[45]

Section 4.10

Transit Fleet

The City of Dallas did not own or operate transit fleets in 2023.

44 EPA. GHG Emissions Factor Hub. 2025. https://www.epa.gov/system/files/documents/2025-01/ghg-emission-factors-hub-2025.pdf
45 EPA. eGRID 2023. 2025. https://www.epa.gov/egrid/detailed-data

Section 4.11

Solid Waste Facilities

Solid waste emissions in Dallas are generated from the collection, transportation, and landfilling of waste at one facility: the McCommas Bluff Landfill. Solid waste emissions are also generated from landfill gas flaring at one closed facility: Deepwood Landfill. Altogether, emissions from this sector include those from the decomposition of landfilled waste, flaring of landfill gas, and energy consumption for waste processing. Solid waste emissions include Scope 2 emissions from electricity used by the City of Dallas Department of Sanitation Services. In addition, GHG emissions avoided from recycling are included as informational only and excluded from inventory totals.

Emissions from solid waste facilities accounted for 59.4% of the total LGO emissions (477,202 MT CO_2e). In 2023, the McCommas Bluff Landfill received 1,409,441 wet tons of waste, which contributed 99.4% of emissions from solid waste facilities (473,900 MT CO_2e). McCommas Bluff Landfill and Deepwood Landfill produced a total of 2,878 MT CO_2e of emissions from gas flaring. Additionally, the Department of Sanitation Services at the City of Dallas government used 1,262,491 kWh of electricity in 2023, which contributed 424 MT CO_2e of Scope 2 emissions.

Using consistent methodology, emissions from solid waste facilities have decreased since 2015 driven primarily by decreasing tons of landfilled waste. Emissions from landfill gas flaring have also decreased over the timeseries, potentially indicating an increased use of landfill gas in operations.

The 2015 and 2023 inventories collected data on the amount of waste that was diverted to recycling. Recycling waste prevents the anaerobic decomposition process, which generates methane gas and is the main source of emissions from landfills. In addition, recycling materials reduces the demand for raw materials, which can be more carbon-intensive to mine, extract, or produce. To quantify these benefits, the 2015 and 2023 inventories estimated the amount of emissions avoided by diverting waste from landfills through recycling. The amount of waste recycled decreased from 56,052 tons in 2015 to 53,268 tons in 2023. This decrease follows the trend in declining waste generation. In 2023, recycling avoided 153,809 MT CO_2e of emissions. These estimates are for informational purposes only and are not included in the inventory totals, which aligns with ICLEI LGO Protocols.[46]

Methodology

Landfilled waste tonnage and recycling tonnages were provided by the City of Dallas, as was the McCommas Bluff Landfill and Deepwood Landfill gas flaring data. These emissions were very minimal at less than 1% of

2023 Scope 1 emissions from Solid Waste Facilities.

The City of Dallas provided a record of their billings for electricity provided by the utility Oncor. This included all electricity used by City of Dallas facilities in kWh and aggregated by facility and department. The electricity used by the Department of Sanitation Services was broken out from these totals. Electricity emission factors from eGRID 2023 for the ERCOT region were applied to calculate emissions.[47]

The emissions avoided by recycling 53,268 tons of waste instead of landfilling were calculated using the EPA's WARM Model (version 15.2), assuming that all recycled waste could be considered mixed recyclables.[48] Note that this was calculated in the same way for the 2015 GHG emissions inventory but was not calculated for the 2019 GHG emissions inventory. A potential improvement for future GHG inventories would be to obtain 2019 recycling tonnage and calculate emissions avoided for 2019 using the same methodology.

46 ICLEI. Local Government Operations Protocol Version 1.1. 2010. https://iclei.org/e-library/local-government-operations-protocol/
47 EPA. eGRID 2023. 2025. https://www.epa.gov/egrid/detailed-data
48 EPA. Waste Reduction Model (WARM). 2025. https://www.epa.gov/waste-reduction-model

Section 4.12

Transmission and Distribution Losses

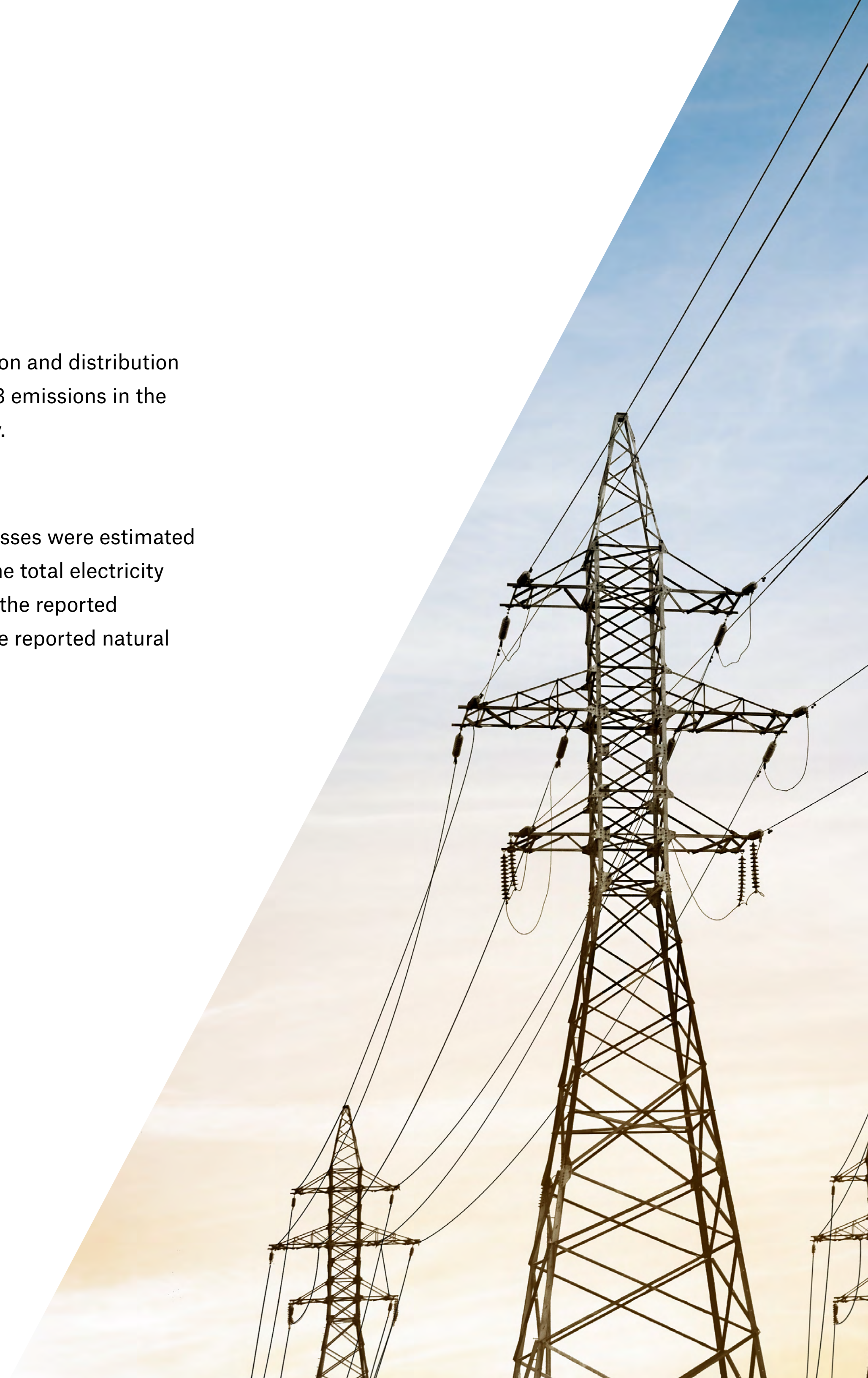
In 2023, emissions attributed to transmission and distribution losses from grid-purchased electricity were 10,121 MT CO_2e, representing a nearly 60% decline from the previous GHG emissions inventory estimate. The decrease in emissions was primarily driven by a lower reported loss rate. Declining electricity consumption contributed to lower overall emissions in this GHG emissions inventory.

In addition to losses of grid-purchased electricity, pipeline losses from purchased natural gas generate Scope 3 emissions. In 2023, there were 1,688,926 Therms of natural gas lost during transmission and distribution, generating 377 MT CO_2e of emissions.

Together, emissions from transmission and distribution losses accounted for 35% of Scope 3 emissions in the 2023 LGO GHG emissions inventory.

Methodology

Electricity and natural gas system losses were estimated by applying a reported loss rate to the total electricity and natural gas consumed. In 2023, the reported electricity loss rate was 4.2% and the reported natural gas leakage rate was 0.4%.



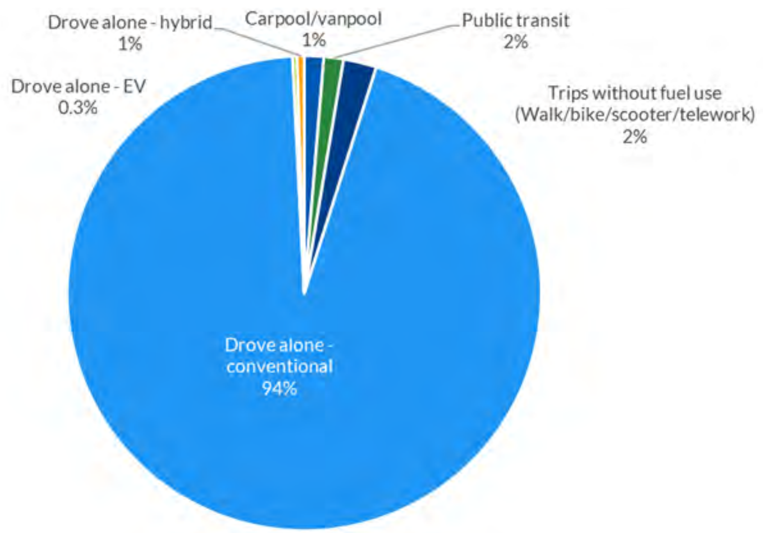
Section 4.13

Employee Commute

In 2023, the commutes of City of Dallas employees contributed 19,359 MT CO_2e of Scope 3 emissions. This makes up 64.5% of LGO Scope 3 emissions, or 2.4% of all LGO emissions.

Employee commute emissions were estimated based on data received from two surveys, which included trip distance, commute frequency, mode of transportation, and vehicle occupancy. Since these survey results represented only a portion of all City employee commutes, assumptions were made to estimate emissions from all City employees' commutes. Figure 4-11 shows the split between employee commute modes for 2023.

Figure 4-11. 2023 Employee Commute Mode Split



The 2023 GHG emissions inventory utilized a more comprehensive methodology for estimating emissions from employee commutes. The 2023 GHG emissions inventory did not estimate emissions avoided through sustainable transportation or teleworking initiatives as the 2015 and 2019 inventories did. For consistency, these avoided emissions were also removed from the 2015 and 2019 inventories. Due to incomplete timeseries data, 2023 employee commute estimates are not comparable with previous years.

Methodology

In assembling the 2023 emissions estimates for employee commutes, there were two available sources of information:

1. **Commute Data from "Try Parking It" (TPI)** application users. Some employees used this app to track their commutes. Because this application was oriented towards users tracking their emissions reduced through carpooling and vanpooling, this data source was assumed to be skewed higher in vehicle trips. Also, TPI does not collect or disaggregate drive alone vehicle trips by vehicle type (conventional fuel, EV, hybrid).
2. **Manual Surveys performed by individual City of Dallas departments.** This survey data contains the number of trips each month for some employees within specific departments. This survey data did not include all departments, all employees within each department, or survey data for every month in 2023.

To obtain the total passenger miles for each mode, average VMT per trip for was multiplied by the number of annual trips for that mode from the TPI data. The number of annual passenger trips also comes from TPI data, but it was apportioned to each mode based on the department survey data. This attempts to correct biases in the TPI data, which is skewed towards drive alone or carpool modes.

After VMT per mode was determined, estimates were doubled based on the assumption that each employee commutes to work and from work using the same mode.

To calculate the emissions from employee commutes, passenger miles were multiplied by emission factors for each of the following modes of transportation: carpool and vanpool, public transit, trips without fuel use (walk, bike, scooter, telework, etc.), drive alone conventional vehicle, drive alone electric vehicle, and drive alone hybrid vehicle.

Neither source provided comprehensive data for all City of Dallas employees, therefore several assumptions were made.

These assumptions include:

- Carpool trips were classified to include one driver and up to three passengers. Vanpool trips include one driver and four or more passengers. Rideshare trips include one driver and any number of passengers. The average carpool occupancy of two employees was used in calculations.
- Each City employee was assumed to commute an average of 218 days in 2023. This estimate was informed by the number of Holidays, PTO, and Sick days available to City employees as reported by the City.
- Each employee commuted to work using the same mode that they commuted from work using.
- Drive alone conventional vehicles were assumed to run on gasoline (as opposed to diesel).
- Emission factors in kg GHG / passenger mile were estimated using corporate commute emission factors. These emission factors were calculated using diverse sources so as to be tailored to the City of Dallas region.
- Emission factors for drive-alone conventional vehicles, carpool trips, and vanpool trips were based on emission factors for gasoline passenger cars from EPA's Emission Factor Hub Table 10. EFs for carpool and vanpool trips were assumed to have 2 and 3 passengers, respectively.
- Emission factors for public transit were calculated based on bus and public transit emission factors from EPA's Emission Factor Hub Table 10. It was assumed that public transit trips were split equally between public buses and commuter rail, so the emission factors for each GHG were averages of the public bus and commuter rail EFs.
- Emission factors for drive alone EV and hybrid vehicles were calculated using eGRID ERCOT electricity factors, EPA's Emission Factor Hub Table 10 values for passenger gasoline cars, and AFLEET fuel economies for hybrid and EV vehicles[49].

49 *Argonne National Laboratory. Alternative Fuel Life-Cycle Environmental and Economic Transportation (AFLEET) Tool. 2023. https://afleet.esia.anl.gov/home/*

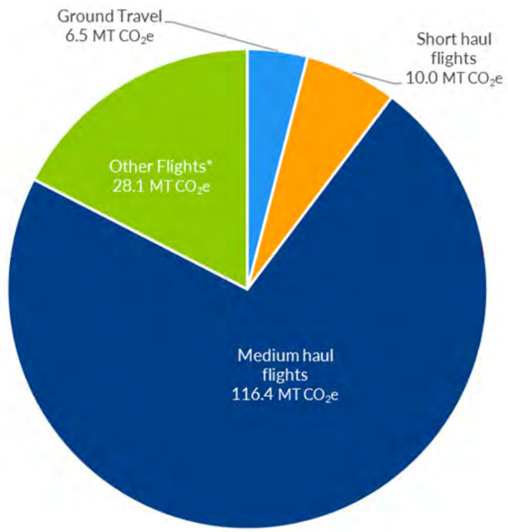
Section 4.14

Business Travel

Scope 3 business travel emissions refer to indirect GHG emissions resulting from employee travel for work purposes, including air travel, rental cars, and other transportation services not owned or operated by the reporting organization. Emissions from business travel were estimated for the first time in the 2023 GHG emissions inventory.

In 2023, business travel resulted in emissions of 161.0 MT CO_2e with 154.5 MT CO_2e coming from employee air travel and 6.5 MT CO_2e coming from employee ground travel. Together, this is equivalent to 0.5% of all LGO Scope 3 emissions. Figure 4-12 shows the emissions from air and ground travel in 2023.

Figure 4-12. 2023 Emissions from Air and Ground Travel (MT CO_2e)



Methodology

The City of Dallas provided records of business travel flights for calendar year 2023. The received data contained both complete records (including origin, destination, and flight cost) and incomplete records. Several assumptions were made to fill data gaps and calculate overall emissions.

First, estimates were calculated from complete records by categorizing each flight as short-haul, medium-haul, or long-haul using origin and destination to determine approximate flight length. Flight records that included a non-Dallas destination, but no origin, were assumed to originate in Dallas. The appropriate emission factor from EPA's GHG Emission Factor Hub was applied to these records.

Not all flight records included the flight origin or flight destination. In order to estimate emissions, a calculated scaling factor of emissions per dollar was applied to the remaining records to estimate emissions for flights that did not have recorded origin and destination data.

In general, expenditure-based factors for air travel introduce a significant level of uncertainty due to the volatility of airline prices. This GHG emissions inventory aims to reduce uncertainty by using a Dallas specific emissions factor that captures Dallas operating procedures.

For employee ground travel, expense reports provided by the City of Dallas showed the costs for taxi services and passenger car rentals. To determine emission factors for ground travel based on spend, environmentally-extended input-output (EEIO) models were consulted for the specific industries of taxi services and passenger car rentals. EEIO models bridge economic calculations with environmental decision making by reviewing the supply chain of nearly 400 industries and calculating the total emissions of the industry based on land and water impacts, energy and mineral use, and air pollution. These total calculations are then reviewed against the economic output of the industry to develop a per dollar emission factor for numerous environmental impacts including GHG emissions. These emission factors were then applied to the spend data received from the City of Dallas to calculate CO_2e emissions from ground travel.

Section 5

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Appendix A

Full Emissions Data

Table A-1. Community-Wide GHG Emissions by Year

CW	GHG Emissions (MT CO_2e)		
Source	2015	2019	2023
Stationary Energy	11,580,190.01	9,423,524.60	7,989,570.06
Residential Stationary Energy	3,708,714.60	3,207,452.83	2,765,179.38
Commercial Stationary Energy	6,107,495.69	4,787,313.93	3,982,976.51
Industrial Stationary Energy	1,246,566.62	1,026,391.30	929,442.55
Transmission and Distribution Losses from Electricity	465,443.53	381,916.38	274,491.88
Fugitive Emissions and Oil and Natural Gas Systems	51,969.56	20,450.16	37,479.74
Transportation	7,196,814.26	6,977,020.19	8,544,056.56
On-Road	6,767,204.26	6,704,597.00	7,034,517.77
Railways	222,302.00	81,344.33	69,092.18
Aviation	207,308.00	191,078.86	1,440,446.61
Waste and Wastewater	610,355.08	664,315.40	479,570.09
Solid Waste	610,212.42	664,063.04	479,317.78
Wastewater Treatment and Discharge	142.66	252.36	252.31
Industrial Process and Product Use (IPPU)	1,632,965.10	1,466,907.61	1,715,517.58
Industrial Processes	601,099.79	499,250.20	458,985.97
Product Uses	1,031,865.31	967,657.41	1,256,171.61
Forestry	(78,092.70)	(87,072.00)	(87,072.00)
Land Use	(78,092.70)	(87,072.00)	(87,072.00)
Community-wide Inventory Total	**20,942,231.76**	**18,444,695.80**	**18,641,320.78**

Table A-2. LGO GHG Emissions by Year

LGO	GHG Emissions (MT CO_2e)		
Source	2015	2019	2023
Buildings and Facilities	138,461.00	92,984.00	75,570.36
Natural Gas Usage	14,602.00	8,289.00	5,586.54
Grid-Purchased Electricity	123,859.00	84,695.00	69,983.83
Streetlights and Traffic Signals	58,438.00	32,506.00	24,866.80
Streetlight Electricity	-	31,045.00	23,482.60
Traffic Signal Electricity	-	1,461.00	1,384.19
Water and Wastewater Facilities	242,736.49	189,702.71	132,153.66
Natural Gas Usage		1.60	180.30
Electricity	242,628.29	189,701.00	131,973.29
Digester Emissions	108.20	0.11	0.06
Airport Facilities		20,385.35	16,804.52
Airport Facilities Electricity	-	17,426.00	13,718.00
Airport Facilities Natural Gas Usage	-	2,959.35	3,086.52
Vehicle Fleet	58,639.33	56,323.00	47,418.16
On-Road	48,133.33	51,240.00	46,136.26
Off-Road Fleet and Other Heavy Vehicles	10,506.00	5,083.00	1,281.90

LGO	GHG Emissions (MT CO_2e)		
Source	2015	2019	2023
Solid Waste Facilities	604,343.96	538,099.36	477,201.84
Landfills	600,457.23	530,453.00	473,900.00
Landfill Gas Flaring	3,210.41	4,025.36	2,877.62
Electricity	676.34	621.00	424.22
Recycling Waste *(Informational only)*	*(128,958.00)*		*(153,809.63)*
Scope 3 Emissions	25,907.20	39,537.40	30,017.75
Transmission and Distribution Losses from Grid-Purchased Electricity	21,945.00	26,010.00	10,120.58
Pipeline Losses from Purchased Natural Gas	3,962.20	361.00	376.77
Employee Business Travel	-	-	161.03
Employee Commute	-	12,923.00	19,290.86
Employee Commute (Public Transit)	-	243.40	68.51
LGO Total	**1,128,525.99**	**966,537.82**	**804,033.09**

Notes: Blank Cells for 2015 and 2019 indicate years where an emissions source was not included in that year's inventory. Rows labeled as informational only are values within a sector that are included in a total from another sector (primarily buildings and facilities)

Appendix B

2023 Activity Data

Community-wide Activity Data

Stationary Energy

Table B-1. Community-Wide GHG Emissions by Year

CW

Source	2015	2019	2023
Residential	13,962,104	14,474,537	11,302,729
Commercial	21,511,302	13,310,123	11,526,871
Industrial	142,918	144,018	145,118
Water and Wastewater Treatment*	-	-	3,395
Transportation*	-	-	8,474,466
Total	**35,616,324**	**27,928,678**	**22,974,717**

**Informational only – not included in totals*

Table B-2. Other Fuel Use - MMBTU

Source	2015	2019	2023
Residential Fuel Use	715.24	357.62	536.43
Distillate Fuel Oil	402.3	268.2	357.6
Kerosene	312.9	89.4	178.8
Coal or Coke	-	-	-
Residual Fuel Oil	-	-	-
Commercial Fuel Use	754,126.00	618,544.25	797,755.34
Distillate Fuel Oil	744,604.4	616,979.7	796,146.1
Kerosene	1,877.5	1,564.6	1,609.3
Coal or Coke	7,644.1	-	-
Residual Fuel Oil	-	-	-
Industrial Fuel Use	20,809.97	23,147.13	22,237.58
Distillate Fuel Oil	17,639.6	20,657.8	19,840.1
Kerosene	22.6	10.3	12.2
Coal or Coke	2,277.1	1,103.7	707.1
Residual Fuel Oil	870.6	1,375.3	1,678.2
Total	**775,651.21**	**642,048.99**	**820,529.35**
Distillate Fuel Oil	762,646.3	637,905.7	816,343.8
Kerosene	2,213.0	1,664.2	1,800.2
Coal or Coke	9,921.2	1,103.7	707.1
Residual Fuel Oil	870.6	1,375.3	1,678.2

Table B-3. Electricity Usage - GWh

Source	2015	2019	2023
Residential Electricity Use	6,050	6,165	6,443
Commercial Electricity Use	10,009	10,199	9,855
Industrial Electricity Use	2,523	2,571	2,345
Water and Wastewater Treatment Electricity Usage	471	411	393
Total	**19,054**	**18,935**	**19,035**

Transportation

Table B-4. On-Road - VMT

Scope	2015	2019	2023
Scope 1	19,148,294,573	9,084,782,511	9,292,972,660
Scope 3	12,196,669,961	5,894,296,576	6,282,111,903

Table B-5. Rail Fuel Usage

Source	2019	2023
Passenger Rail Electricity Consumption, MWh	77,095	77,356
Passenger Rail Diesel Consumption, Gallons	283,364	280,649
Freight Rail Diesel Consumption, Gallons	2,762,721	2,301,217

Note: Rail electricity and diesel consumption were not included in the 2015 inventory

Table B-6. Aviation Emissions by Airport and Scope - $MTCO_2e$

Source	2019	2023
Dallas Love Airport		
Scope 1	372.6	419.0
Scope 3	198,326.9	1,574,969.0
Dallas Executive Airport		
Scope 1	2.0	13.0
Scope 3	11,966.8	12,694.0
Dallas Heliport/Vertiport		
Scope 1	3.0	44.0
Scope 3	-	5.0

Notes: Aviation Emissions were not included in the 2015 inventory. Scope 2 emissions are not included to avoid double counting with reported electricity emissions from Oncor.

Waste

Table B-7. Landfilled Waste - Wet Tons

Source	2015	2019	2023
Landfilled Waste, McCommas Bluff	1,790,927	1,952,572	1,409,441

Table B-8. Flared Landfilled Gas by Landfill

Source	2015	2019	2023
McCommas Bluff			
Flared Landfill Gas (scf/year)	944,651,000	767,025,000	548,550,000
Methane Emissions from Landfill Gas (kg CH4)	97,337.0	143,702.1	102,770.8
Deepwood			
Flared Landfill Gas (scf/year)	5,561,040	1,141,627	956,088
Methane Emissions from Landfill Gas (kg CH4)	343.8	1.4	1.4
Trinity Oaks			
Flared Landfill Gas (scf/year)	323,541,358	318,009,765	283,048,986
Methane Emissions from Landfill Gas (kg CH4)	200,090.0	125,750.0	90,720.0
Total			
Flared Landfill Gas (scf/year)	1,273,753,398	1,086,176,392	832,555,074
Methane Emissions from Landfill Gas (kg CH4)	297,770.8	269,453.5	193,492.2

Table B-9. Process N_2O Emissions from Water Treatment

Source	2023
Daily Nitrogen (N) Load [kg N/day] (from Central WWTP)	332

Table B-10. Digester Emissions from Water Treatment - scf/year

Source	2015	2019	2023
Digester Emissions from Water Treatment	1,728,000	438,300	413,910

IPPU

Table B-11. Industrial Processes - MT of Gas by GHGRP Subpart

CW

Scope	2015	2019	2023
Subpart C: Stationary Combustion			
CO2	58.7	105.5	71.4
Subpart I: Electronics Manufacturing			
N2O	46.9	36.0	52.2
NF3	3.1	3.1	3.2
SF6	1.3	1.8	1.9
HFCs	1.3	1.4	1.5
PFCs	52.2	40.4	36.9
HFEs	0.4	0.02	0.4
Fully Fluorinated GHGs	3.8	4.7	3.3
Subpart U: Miscellaneous use of Carbonate*			
CO2	3,856.5	-	-

**Occidental Chemical Dallas Silicate Plant was closed between 2015 and 2019, leading to 0 reports under subpart U for the 2019 and 2023 inventory.*

Product Uses – No relevant activity data.

AFOLU

Table B-12. Tree Canopy Coverage

Source	2015	2019*	2023
Dallas Land Area, Acres	247,040.0	247,040.0	247,040.0
Canopy Coverage, %	28.7%	32.0%	32.0%
Tree Canopy Cover, Acres	70,900.5	79,052.8	79,052.8

**2019 tree canopy coverage was recalculated for the 2023 inventory.*

LGO Activity Data

Table B-13. Buildings and Facilities Activity Data

LGO

Scope	Source	Activity Data	Unit
Scope 1	Natural Gas (Pipelined)	1,051,791	Therms
Scope 1*	Biodiesel	1,313,802	Bbtu
Scope 1	Diesel	1,998,960	Gallons
Scope 1	(Motor) Gasoline	2,970,144	Gallons
Scope 2	Other Misc Electricity Usage	208,273,899	kWh
Informational Only	*RECs*	*732,856,000*	*kWh*

**Biogenic emissions not included in totals.*

Table B-14. Streetlights and Traffic Signals Electricity Usage - kWh

Scope	Source	Activity Data	Unit
Scope 2	Streetlight Electricity	69,884,913	kWh
Scope 2	Traffic Signal Electricity	4,119,402	kWh
Total		**74,004,315**	**kWh**

Table B-15. Water and Wastewater Facilities Activity Data

Scope	Source	Activity Data	Unit
Scope 1	Bachman WTP Natural Gas	14,045.0	Therms
Scope 1	East Side WTP Natural Gas	-	Therms
Scope 1	Elm Fork WTP Natural Gas	19,867.1	Therms
Scope 1	Central Wastewater Treatment Plan Natural Gas	33.6	Therms
Scope 1	Southside Wastewater Treatment Plant -Digester	413,910.0	scf/yr
Scope 2	Bachman WTP Electricity	39,821,908.0	kWh
Scope 2	East Side WTP Electricity	51,003,064.0	kWh
Scope 2	Elm Fork WTP Electricity	82,881,671.9	kWh
Scope 2	Central Wastewater Treatment Plant Electricity	71,375,828.0	kWh
Scope 2	Southside Wastewater Treatment Plant Electricity	33,650,453.0	kWh
Scope 2	Water and Wastewater Facilities Other Electricity	114,023,418.5	kWh

Table B-16. Airport Facility Fuel Data

Scope	Source	Activity Data	Unit
Scope 1	Dallas Love Field, Natural gas*	575,472	Therms
Scope 1	Dallas Executive Airport, Natural gas*	5,635	Therms
Scope 1	Dallas Heliport/ Vertiport, Natural gas*	-	Therms
Scope 2	Electricity AVI Department	40,825,169	kWh

**Calculated based on emissions data.*

Table B-17. Vehicle Fleet Fuel Use

Scope	Source	Activity Data	Unit
Scope 1	On-Road Gasoline Fleet	2,930,565	Gallons
Scope 1	On-Road Diesel Fleet	1,688,928	Gallons
Scope 1	On-Road Biodiesel (B20) Fleet	1,451,713	Gallons
Scope 1	On-Road CNG Fleet	356,016	Gallons
Scope 1	On-Road Hybrid Fleet (Gasoline portion)	68,776	Gallons
Scope 1	Off-Road Fleet and Other Heavy Vehicles (Diesel)	121,968	Gallons
Scope 2	On-Road Electricity Fleet	22,273	kWh

Table B-18. Solid Waste Facilities Activity Data

Scope	Source	Activity Data	Unit
Scope 1	Landfill Waste	1,409,441	Wet Tons
Scope 1	Gas Flaring	549,506,088	scf/year
	McCommas Bluff	*548,550,000*	*scf/year*
	Deepwood	*956,088*	*scf/year*
Scope 2	Electricity, SAN Department	1,262,491	kWh
Informational Only	*Waste diverted to recycling*	*5,3268*	*tons*

Table B-19. Transmission and Distribution Losses

Scope	Source	Activity Data	Unit
Scope 3	Transmission and Distribution Losses from Grid-Purchased Electricity	717,122,217	kWh
Scope 3	Pipeline Losses from Purchased Natural Gas	1,688,926	Therms

Table B-20. Employee Commute - VMT

LGO

Scope	Source	Activity Data	Unit
Scope 3	Carpool/vanpool	885,936	Miles
Scope 3	Public transit	901,540	Miles
Scope 3	Trips without fuel use (Walk/bike/scooter/telework)	1,519,257	Miles
Scope 3	Drove alone (TOTAL)	63,943,213	Miles
	Drove alone - conventional	*63,411,770*	*Miles*
	Drove alone - EV	*200,277*	*Miles*
	Drove alone - hybrid	*331,166*	*Miles*
Total		**67,249,947**	**Miles**

Table B-21. Business Travel Activity Data

Scope	Source	Activity Data	Unit
Scope 3	Employee flights - Short haul	4,488	Miles
Scope 3	Employee flights - Medium haul	92,189	Miles
Scope 3	Employee flights - Long haul	0	Miles
Scope 3	Employee flights - Extrapolated based on cost	NA	Miles
Scope 3	Ground Travel - Passenger Car Rental	52,337.4	$
Scope 3	Ground Travel - Taxi Services	1,991.2	$