FORM GEN. 160 (REV. 6-80)

CITY OF LOS ANGELES
INTER-DEPARTMENTAL CORRESPONDENCE

DATE: February 14, 2024

TO: Honorable Katy Yaroslavsky, Chair
Honorable Tim McOsker, Vice chair
Honorable Nithya Raman, Member
Honorable Bob Blumenfield, Member
Honorable Eunisses Hernandez, Member
Energy and Environmental Committee

FROM: Barbara Romero, Director and General Manager
LA Sanitation and Environment

SUBJECT: **LA SANITATION AND ENVIRONMENT – REPORT BACK ON COUNCIL FILE 22-1402: ANNUAL COMMUNITY AND MUNICIPAL GREENHOUSE GAS INVENTORY REPORT**

This report and its attachments are in response to **Council File 22-1402** (Krekorian: O'Farrel) directing the following:

- Los Angeles Sanitation and Environment (LASAN) is to present to the City Council a Community and a Municipal Greenhouse Gas Emissions Inventory to inform progress toward meeting LA's climate change goals. The Municipal and Community inventories should be developed and reported by sector, based upon established Local Government Operations Protocol and Global Protocol for Community-Scale Greenhouse Gas Inventories. Departments, including proprietary departments, must share requested activity data for the previous year with LASAN by October 31 of each year. The inventory should be finalized and presented to the Council by January 15 of each year and used to inform the subsequent year's budget process.

This report highlights two distinct reports the 2022 community Greenhouse Gas (GHG) Inventory Report and 2022 Municipal GHG inventory Report and provides a comprehensive analysis and findings related to the City of Los Angeles's (City) GHG emissions from both a community-wide and a municipal perspective. This dual-focused approach emphasizes our commitment to a comprehensive understanding and reduction of our environmental footprint across the City.

RECOMMENDATIONS FOR COUNCIL ACTION

1. **INSTRUCT** LASAN to establish a City-Wide Climate Action Working Group in coordination with Los Angeles World Airports (LAWA), Department of Water & Power (DWP), Department of Transportation (LADOT), Bureau of Engineering (BOE), LA Sanitation (LASAN), General Services Department (GSD), among other relevant departments which will establish a Climate Cabinet, Technical Working Group, and routine energy audit reporting to enhance and reduce the City's Carbon footprint and lead city-wide climate efforts.
2. **DIRECT** LADWP, LASAN, GSD, LAWA, LADOT, and other relevant departments to coordinate on the creation of a comprehensive centralized database to track and manage the transition to an electrified vehicle fleet.

3. **DIRECT** the Office of the City Administrative Officer (CAO) to report back on the feasibility of integrating climate considerations into the City's budgeting process.

BACKGROUND AND OBJECTIVES

In 2022, at the community-wide level the City had achieved a 30% reduction in emissions compared to the 1990 baseline, and had made remarkable progress toward its other environmental targets. For municipal operations, the City is extremely close to its 2025 goal, only about 1% shy of the 55% reduction target set against the 2008 baseline. In community-wide efforts, however, while significant strides have been made, there remains a 20% gap to bridge in order to meet the 2025 target of a 50% reduction from the 1990 baseline. These figures underscore the City's commitment to environmental sustainability as well as the urgency of continued efforts to achieve these goals.

REPORT OVERVIEWS

A. 2022 Community GHG Inventory Report

In response to Council File 22-1402, LASAN is pleased to present the Annual Community Greenhouse Gas (GHG) Emissions Inventory Report. This report details the City's progress in reducing GHG emissions, aligning with its ambitious climate goals. The 2022 inventory highlights a significant milestone, with community-wide GHG emissions decreasing by 30% compared to the 1990 baseline. This achievement is a testament to the city's commitment to the objectives outlined in Los Angeles' Green New Deal, aiming for carbon neutrality by 2050. In the midst of our environmental successes, it is crucial to confront the escalating emissions challenges in the transportation sector. Proactive and innovative measures are vital to sustain our momentum towards a greener, carbon-neutral Los Angeles.

Key Findings

- **Stationary Energy:**

  A 40% reduction in emissions since 1990, driven by decarbonization of the power grid and energy efficiencies in buildings. The data indicates a significant shift toward more sustainable energy practices, with a 47% reduction in carbon emission intensity of the city's electricity from 2014 to 2022, underscoring the ongoing efforts to supply 100% renewable energy by 2045.

- **Transportation**:

  Since 1990, there has been an overall reduction of 11% in emissions, largely attributed to decreases in on-road transportation. However, this sector has also seen fluctuations, including increases in certain subsectors. Notably, a significant decrease in emissions due to reduced travel during the Stay at Home Order in 2020, was followed by a rebound in 2021 as travel resumed. Efforts to continue reducing emissions include promoting vehicle electrification, enhancing grid decarbonization, and expanding public transportation.

- **Solid Waste:**

  Landfill disposal, particularly of solid waste, emerges as the primary source of emissions in the waste sector, accounting for over 95% of its total emissions. This highlights the

significant impact of waste composition on emission levels, with paper, cardboard, and organic waste being the major contributors. These materials alone represent a combined 90% of emissions from landfill waste. Furthermore, the implementation of SB 1383 and a shift toward composting and food rescue practices are expected to substantially reduce the amount of organic waste being landfilled. This anticipated change marks a pivotal shift in the City's waste management practices, reflecting a more sustainable approach to handling waste.

- **Industrial Processes and Product Use (IPPU):**

  The Industrial Processes and Product Use (IPPU) sector has experienced an increase in emissions, from approximately 1.77 million MT CO_2e in 2014 to over 2.06 million MT CO_2e in 2022, primarily due to the use of hydrofluorocarbons (HFCs) and perfluorocarbons (PFCs) as substitutes for ozone depleting substances that were in use in 1990 and new processes associated with electronics and semiconductor production. The City is exploring policies that encourage the adoption of lower-emission alternatives.

B. 2022 Municipal GHG Inventory Report

LASAN, in strategic partnership with the Mayor's Office of Sustainability (MOS), proudly unveils the comprehensive 2022 Municipal Greenhouse Gas (GHG) Emissions Inventory Report. This pivotal report illuminates the City's steadfast journey toward its ambitious goal of achieving carbon neutrality by 2045l. Notably, as of 2022, the City has achieved a 54% reduction in emissions compared to the 2008 baseline. This achievement reflects the City's unwavering dedication to environmental sustainability and underscores the need for ongoing vigilance and innovative approaches to sustain and build upon this progress. Amidst these significant strides in GHG reduction, the report draws attention to a critical concern: the stagnation of emission reductions across various sectors since 2020. This emerging trend signals an urgent call for enhanced action and the formulation of revised, dynamic strategies to continue driving impactful environmental change.

Key Findings

- **Power Generation:**

  Despite a notable 55% reduction in emissions compared to the 2008 baseline, there has been a concern about leveling off since 2020. This stagnation points to the need for more aggressive measures in transitioning to renewable energy sources.

- **Buildings and Facilities:**

  Emissions in this sector have decreased by 47% from the 2008 baseline, but the rate of reduction has slowed down post-2020, emphasizing the need for further energy efficiency enhancements and renewable energy integration in municipal buildings.

- **Water Conveyance and Reclamation:**

  These sectors have collectively achieved a 64% reduction in emissions compared to 2008, yet the downward trend has shown signs of slowing.

- **Transportation (Vehicle and Transit Fleets):**

  The sector's emissions were reduced by 25% relative to the 2008 baseline, but a similar trend of leveling off post-2020 is observed. This indicates a need for accelerated adoption of zero-emission vehicles and alternative fuels.

- **Solid Waste Management**:

  The decrease in emissions, marked at 24% from the 2008 baseline, is primarily attributed to the methodology of a first-order decay model used in calculating solid waste emissions according to Local Government Operation Protocol (LGOP), rather than direct policy impacts. This year's collaboration with LASAN's Solid Resources Division has led to an alternate estimate of emissions, focusing on measured data inputs which differs from LGOP's methodologies, thereby providing another view of emission trends.

CONCLUSION

Los Angeles continues to demonstrate leadership in climate action, successfully decoupling GHG emissions from economic growth. The city's proactive approach, as evidenced by the reductions in key sectors, aligns with the vision of the Green New Deal. LASAN, in collaboration with the Mayor's Office of Sustainability, remains dedicated to refining GHG inventory methodologies and implementing strategies to achieve our long-term climate objectives.

The 2022 Municipal GHG Inventory Report not only celebrates Los Angeles' achievements in reducing its environmental impact while serving as a wake-up call to the challenges ahead. The leveling off of emissions reductions in key sectors since 2020 underscores the urgency of implementing more robust and innovative strategies. LASAN is committed to addressing these challenges head-on, ensuring that Los Angeles remains at the forefront of urban sustainability and climate action.

Attachments
Attachment 1: 2022 Annual Community Greenhouse Gas Inventory Report
Attachment 2: 2022 Annual Municipal Greenhouse Gas Inventory Report

CITY OF LOS ANGELES

2022 COMMUNITY GREENHOUSE GAS INVENTORY REPORT

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LA Sanitation & Environment
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Executive Summary

In 2022, Los Angeles achieved a significant milestone in its environmental efforts, with community-wide greenhouse gas (GHG) emissions falling 30% below the 1990 baseline, as depicted in Figure 1. The City is making progress towards its interim targets of a 50% reduction by 2025 and a 73% reduction by 2035. These efforts are part of a broader, ambitious plan encapsulated in Los Angeles' Green New Deal, which sets the ultimate goal of reaching carbon neutrality by 2050. This commitment reflects the City's proactive approach to combating climate change and fostering a sustainable future.

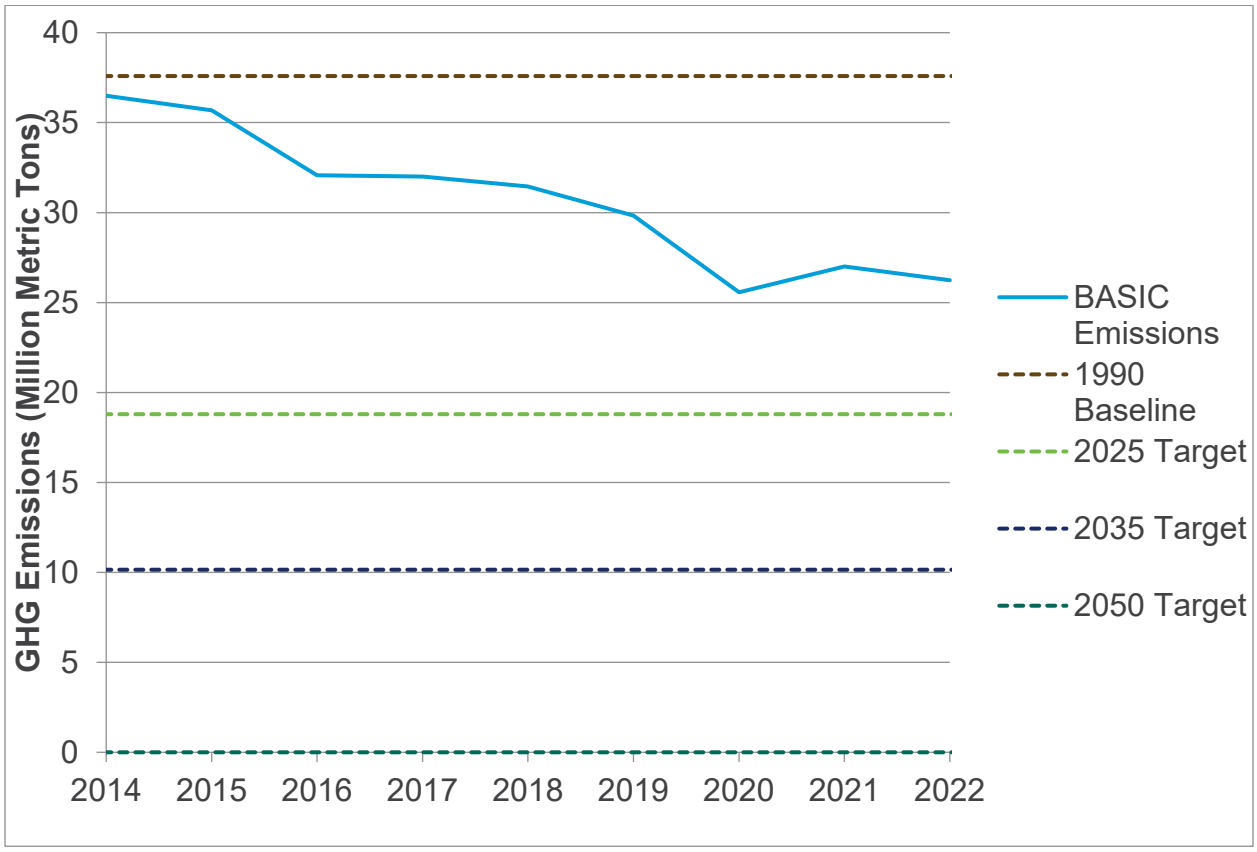

Figure 1. Emissions Progress Compared to Targets

In 2022, Los Angeles observed a notable shift in its community-wide greenhouse gas (GHG) emissions, which encompass emissions from the stationary energy, transportation, and solid waste sectors. The total emissions for the year were recorded at 26.2 million metric tons of carbon dioxide equivalent (MMT CO_2e), indicating a reduction from the previous year's figures. It's important to note that the dip in emissions observed in 2019 and 2020 can be largely attributed to the global COVID-19 pandemic, which led to reduced economic activity and travel, thereby temporarily impacting GHG emissions.

Table 1. BASIC Emissions by Sector (Million Metric Tons CO_2e)

	1990	2017	2018	2019	2020	2021	2022	1990 vs 2022 Percent Change
Stationary Energy	26.0	19.6	19.0	17.7	16.8	16.8	15.6	**-40%**
Transportation	10.4	11.1	11.1	10.7	7.4	9.0	9.3	**-11%**
Waste	1.2	1.3	1.3	1.3	1.3	1.2	1.3	**12%**
Total Emissions	37.6	32.1	31.3	29.8	25.6	27.0	26.2	**-30%**

As detailed in Table 1, the stationary energy sector saw a substantial decrease of 40% in emissions compared to the 1990 baseline, reducing to 15.6 MMT CO_2e in 2022. The transportation sector, which emitted 9.3 MMT CO_2e, experienced an 11% decrease from 1990 levels. The waste sector showed a modest increase of 12% compared to 1990, settling at 1.3 MMT CO_2e. Overall, these sectors contributed to a total decrease of 30% in GHG emissions compared to the 1990 baseline. This trend reflects the City's ongoing efforts to mitigate environmental impact and showcases a successful decoupling of emission levels from urban growth and development.

Figure 2 illustrates that despite an increase in gross domestic product (GDP) from 2021, the ratio of emissions per GDP unit has continued its downward trend. This ongoing reduction in emissions relative to economic output effectively demonstrates the decoupling of greenhouse gas (GHG) emissions from economic growth, indicating progress towards a more sustainable and less carbon-intensive economy.

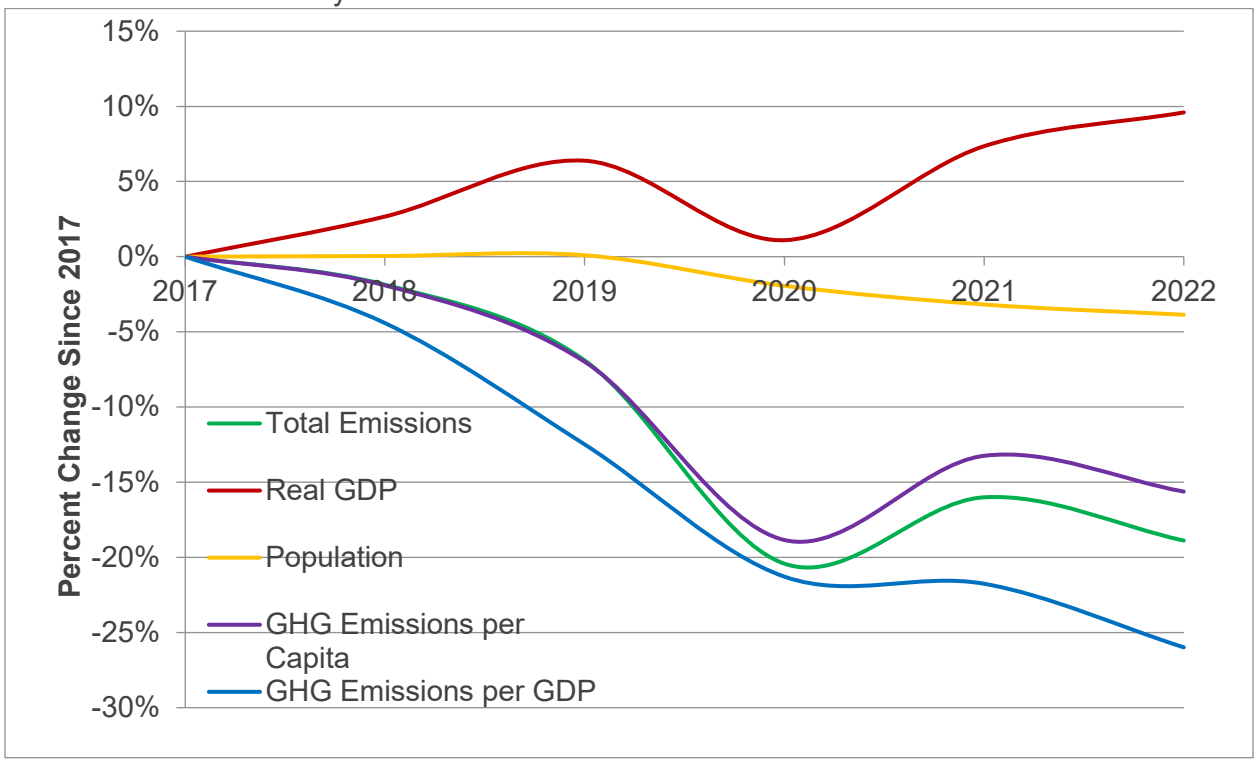

Figure 2. Emissions Trends and Metrics

1. Introduction

Climate change, a critical global challenge, requires decisive local actions. The City of Los Angeles is at the forefront of this battle, implementing robust measures to curb greenhouse gas (GHG) emissions and mitigate climate impacts. LA Sanitation and Environment (LASAN) plays a vital role in the City's climate strategy. Understanding the quantity, sources, and trends of Los Angeles' GHG emissions is crucial for effective climate action. This knowledge enables policymakers and stakeholders to take targeted and adaptive measures against climate change. LASAN's annual, detailed community GHG inventories are instrumental in gaining this insight and tracking the City's progress toward its ambitious climate objectives.

Since 2019, as originally requested by the Mayor's Office of Sustainability (MOS), LASAN has been responsible for preparing the City of Los Angeles' annual Community GHG Inventory. This task included enhancing the previously prepared inventories from a BASIC to a BASIC+ rating, a change necessitated by the availability of more comprehensive data sources. The BASIC+ inventory offers a deeper understanding of Los Angeles' emissions scenario because it includes industrial processes, product use, agriculture, forestry, and other land uses, along with Scope 3 emissions from stationary sources and transportation sectors.

To date, LASAN has compiled community-wide inventories for the years 2014-2022, in addition to the baseline year of 1990, as established in the City's Sustainable City pLAn. This report presents the 2022 Community GHG Inventory values alongside the updated values for the City's prior inventories, offering insights into the City's emission trends over time and using the 1990 figures as the benchmark for all reduction percentages.

2. Methodology

LASAN compiles the City of Los Angeles' Greenhouse Gas (GHG) inventory adhering to the standards set by the C40's Global Protocol for Community-Scale Greenhouse Gas Emissions (GPC), a globally recognized framework. This approach integrates two key methods: the scopes framework and the city-induced framework, accommodating emissions generated both inside and outside the City's borders. The inventory accounts for five GHGs: carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), and perfluorocarbons (PFCs), each with a specific Global Warming Potential (GWP). GWP measures a gas's heat-trapping ability relative to CO_2. For a consistent assessment, emissions of these gases are converted to CO_2 equivalents (CO_2e) throughout this report.

Table 2. Greenhouse Gas Global Warming Potential Factors

Greenhouse Gas	Formula	GWP*
Carbon Dioxide	CO_2	1
Methane	CH_4	25
Nitrous Oxide	N_2O	298
Hydrofluorocarbons	HFCs	124-14,800
Perfluorocarbons	PFCs	7,390-12,200
*100- year time horizon.		

This inventory employs the Intergovernmental Panel on Climate Change's (IPCC) AR4 GWP values, aligning with the California Air Resources Board's (CARB) methodology for the statewide California Greenhouse Gas Emissions Inventory (see Table 2).

2.1 Scopes

Scope 1 emissions are from sources located within the City boundary (in-boundary activities). These can also be considered "territorial" emissions because they are all produced within the geographic boundary. Scope 2 emissions occur from the use of grid-supplied electricity, heat, steam, and/or cooling within the city boundary. Scope 3 emissions are from sources outside the city boundary because of actions occurring within the city boundary (out-of-boundary activities).

2.2 BASIC vs BASIC+

The GPC categorizes two levels, BASIC and BASIC+ (see Figure 3). BASIC encompasses Scopes 1 and 2 emissions from stationary energy and transportation, and Scopes 1 and 3 from waste. BASIC+ extends this to include industrial processes, and product use (IPPU), and agriculture, forestry, and other land use (AFOLU), plus Scope 3 emissions from stationary energy and transportation sectors. Although BASIC+ offers a broader emission perspective, the City has limited direct control over these additional sectors. This report discusses all sectors under BASIC+, but tracks progress towards L.A.'s Green New Deal goals using BASIC emissions.

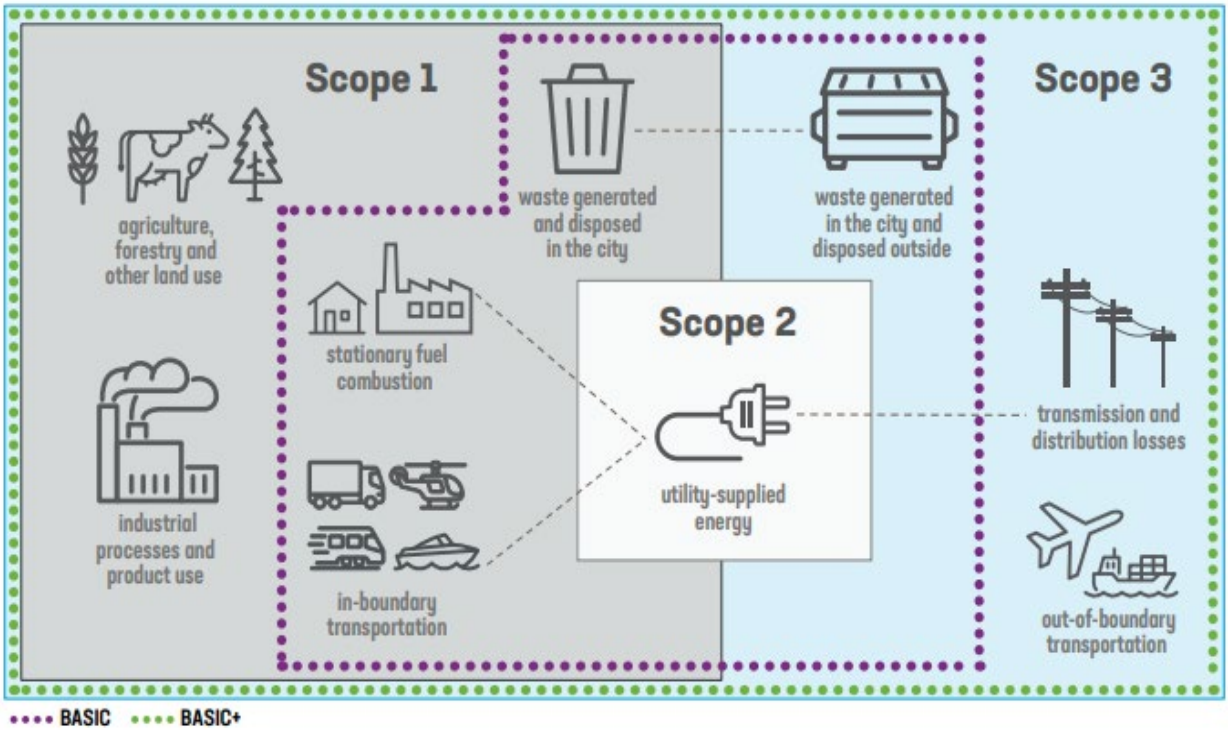

Figure 3. Sources Included in BASIC and BASIC+

2.3 Data Collection and Providers

LASAN's inventory preparation involves collaboration with multiple departments and agencies, ensuring a comprehensive data collection process. Table 3 summarizes these data contributors.

Table 3. Community GHG Inventory Data Providers

Data Provider	Data
City Department	
LASAN	Solid waste characterization; compost tonnage; biosolids; wastewater treatment
LADWP	Residential, commercial, institutional, and industrial electricity consumption; transmission and distribution losses; water services-related electricity consumption, power generation fuel consumption, EV charging electricity consumption
LAWA	Commercial jet fuel usage
POLA	Local harbor craft fuel usage
LA Animal Services Department	Livestock estimates
Regulatory Agency	
CARB	EMFAC2021 Model for vehicle fuel efficiency; off-road transportation emissions estimate; fuel estimate for vessel bunkering; industrial facilities involved with mineral, chemical, or metal production; ODS usage
South Coast Air Quality Management District (SCAQMD)	Industrial fuel consumption, landfill flaring
EPA	Refinery feed flaring; industrial facilities involved with mineral, chemical, or metal production
California Geologic Energy Management (CalGEM)	Oil and gas wells
FAA	Local aircraft fuel usage
CalRecycle	Solid waste disposal tonnage
CDFA	Fertilizer usage
Other	
Energy Information Administration (EIA)	Residential, commercial, and industrial wood and ethanol consumption
SoCal Gas	Residential, commercial, and industrial natural gas consumption
SCE	Utility's electricity emission factor
Google Environmental Insights Explorer	On-road VMTs
Amtrak	Annual trips estimate
Metrolink	Annual trips estimate
Burlington Northern Santa Fe (BNSF) Railway	Fuel usage
Union Pacific	Fuel usage
LA Metro	Rail propulsion electricity usage
International Council for Local Environmental Initiatives (ICLEI)	Land use change emissions estimate

3. Findings by Sector

The following sections present findings from the City's 2014-2022 Community GHG Inventories. Every year, LASAN continues to update the community GHG inventory to incorporate new procedures, as well as make improvements to data collection processes, methodologies, emissions factors, and quality assurance. Inventories from previous years are updated and revised to reflect these changes and to maintain a consistent time series following recommendations from the IPCC for developing GHG inventories. Therefore, the new inventory may report different emission levels than previous inventory reports.

As shown in Figure 4, the largest sector in Los Angeles' Community GHG Inventory (at the BASIC level) is the stationary energy sector, accounting for 60% of total emissions, followed by the transportation sector and the waste sector.

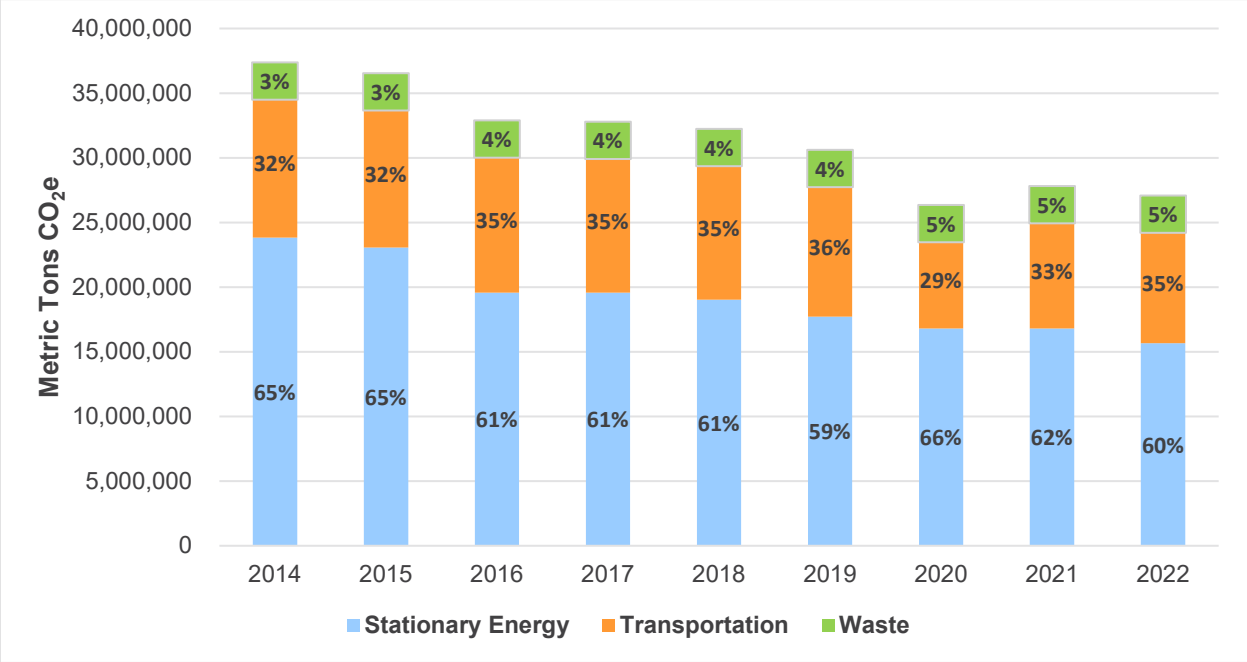

Figure 4. Basic Emissions by Sector

Between 2014 and 2022, Los Angeles saw significant changes in greenhouse gas (GHG) emissions in key sectors. In the stationary energy sector, emissions decreased from 23.8 million metric tons in 2014 to 15.6 million in 2022, a substantial reduction reflecting the City's energy efficiency and sustainable energy initiatives. The transportation sector, identified as the second-largest contributor to emissions, has shown a gradual decline compared to the 1990 baseline. Notably, a significant drop occurred in 2020, largely attributed to the COVID-19 pandemic. However, since the end of 2020, there has been a slow but steady upward trend in emissions. Waste sector emissions, while a smaller portion of the total, remained relatively stable, accounting for about 5% of the City's emissions throughout this period. These trends demonstrate Los Angeles' effective strategies in reducing its environmental impact in major emission-generating sectors.

3.1 Stationary Energy

The stationary energy sector includes fuel combustion and fugitive emissions that occur while generating, delivering, and consuming useful forms of energy (such as electricity or heat). The five main subsectors are residential buildings, commercial and institutional buildings and facilities, manufacturing industries and construction, energy industries, and fugitive emissions from oil and natural gas systems.

Table 4. BASIC Stationary Energy Emissions by Subsector (MT CO_2e)

	Residential buildings	Commercial and institutional buildings and facilities	Manufacturing industries and construction	Energy industries	Fugitive emissions from oil and natural gas systems	Total Stationary Energy Emissions
2014	6,585,035	8,460,163	3,995,230	4,587,057	214,610	23,842,094
2015	6,543,251	8,218,274	3,918,539	4,161,174	213,396	23,054,634
2016	5,394,410	6,226,515	3,446,961	4,294,149	216,983	19,579,017
2017	5,212,031	5,885,760	3,817,250	4,437,001	215,680	19,567,722
2018	5,099,756	5,902,502	3,324,850	4,494,205	216,611	19,037,923
2019	5,023,171	5,536,819	2,724,736	4,219,939	216,173	17,720,837
2020	5,039,695	4,700,410	2,660,925	4,201,503	211,973	16,814,505
2021	4,848,815	4,896,054	2,706,020	4,131,840	208,662	16,791,392
2022	4,641,986	4,856,690	1,840,049	4,061,659	207,544	15,607,928

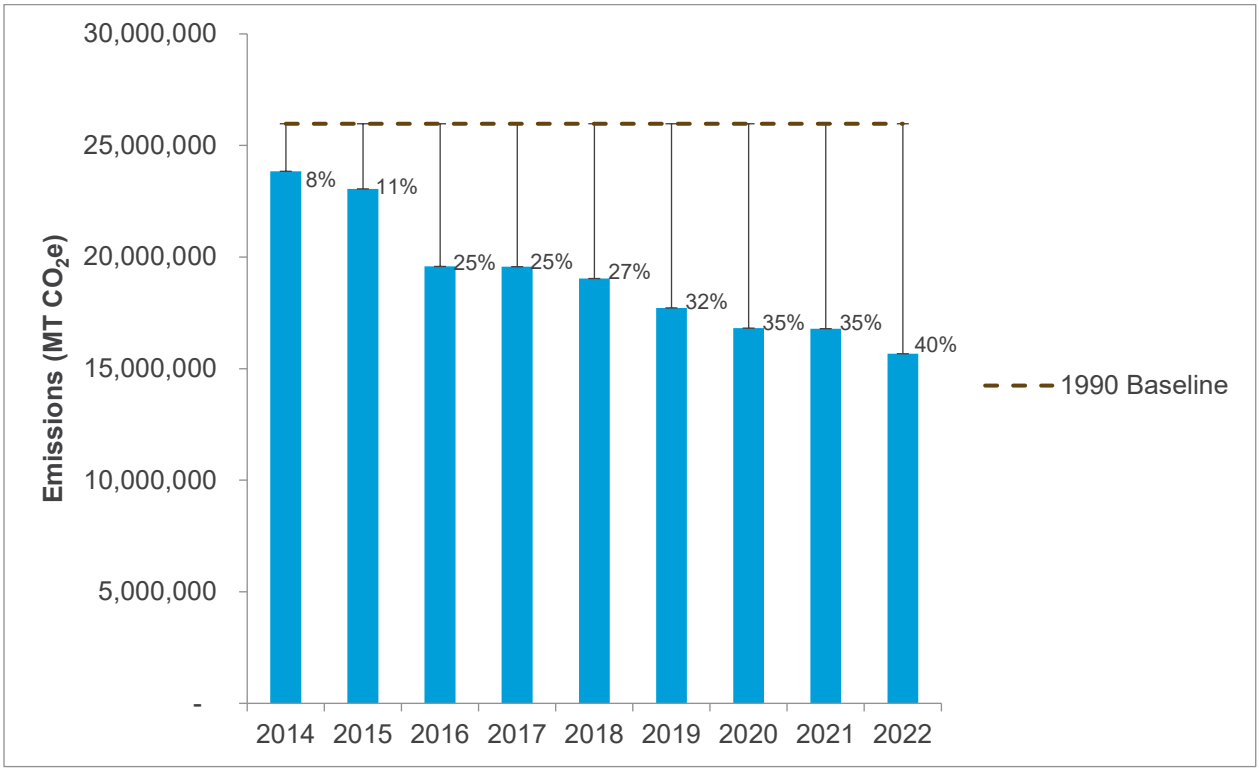

Figure 5. BASIC Stationary Energy Sector Emissions Reductions from Baseline

While Figure 5 shows a 5% decrease in emissions between 2021 and 2022, overall emissions in this sector have decreased by 40% since 1990 (Figure 5) with reductions primarily driven by decarbonization of the electricity grid.

Between 2014 and 2022, the carbon emissions intensity of the City's electricity has decreased by 47% (Figure 6).

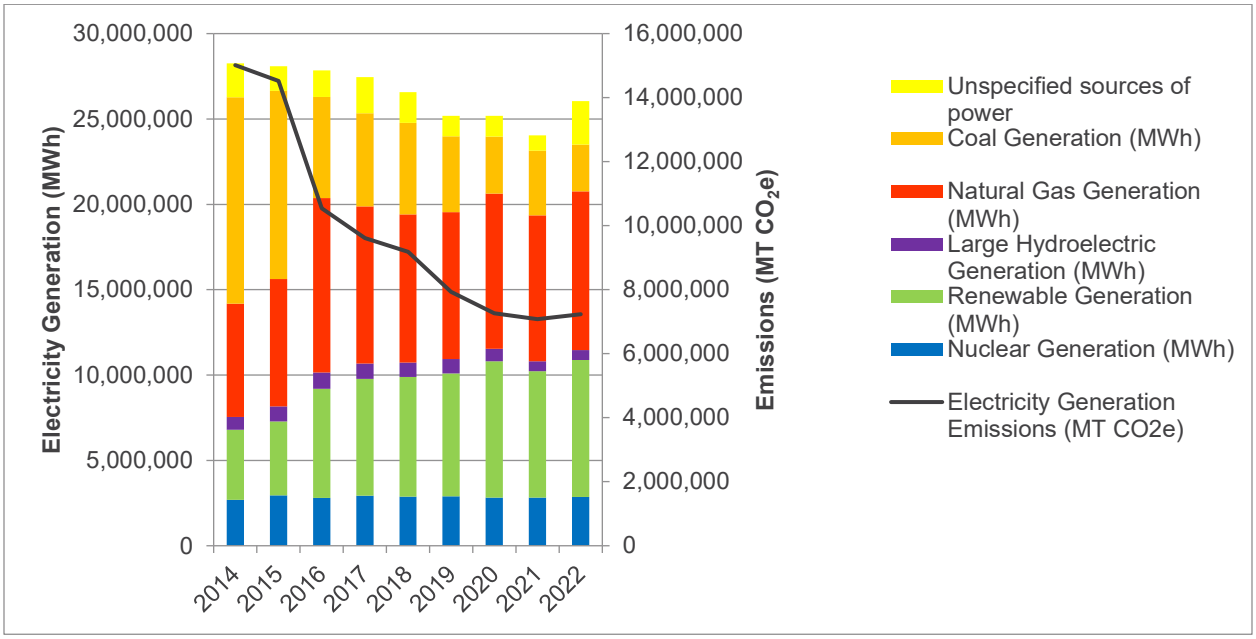

Figure 6. Electricity Generation Portfolio vs Emissions[1]

This decarbonization trend will continue as LADWP works towards supplying 100% renewable energy by 2045 as outlined in the LA100 plan and the Los Angeles' Green New Deal. The City of Los Angeles continues to advance towards its ambitious targets outlined in the Green New Deal, striving to reach its clean energy objectives potentially by 2035. While considerable progress has been made, achieving these goals necessitates further actions, specifically in decarbonizing buildings, enhancing energy efficiency across all sectors, and curtailing fuel combustion in industrial activities. The increased emissions going from the BASIC level in Table 4 to the BASIC+ level in Table 5 are primarily attributed to electricity transmission and distribution losses.

Within the stationary energy sector, emissions from residential and commercial buildings have shown a steady decline, as indicated in Table 5. However, it is the manufacturing industries and construction subsector, with a significant emission reduction in 2022, that draws attention. This year, emissions reported were 1,879,337 MT CO_2e, a notable decrease. A substantial part of this reduction is attributed to a single refinery, which reported approximately half the emissions typically recorded between 2014 and 2022. It is crucial to note that the verification of this data with the South Coast Air Quality Management District (AQMD), the provider of the emission data for the facility, has not yet occurred at the time of this report. This step is essential for ensuring

[1] Power generation and emissions data provided by LADWP.

the accuracy of the emissions decline and for understanding the underlying factors contributing to it.

Table 5. BASIC+ Stationary Energy Emissions by Subsector (MT CO_2e)

	Residential buildings	Commercial and institutional buildings and facilities	Manufacturing industries and construction	Energy industries	Fugitive emissions from oil and natural gas systems	Total Stationary Energy Emissions
2014	7,199,130	9,659,486	4,132,757	4,587,057	214,610	25,793,040
2015	7,100,858	9,311,586	4,031,961	4,161,174	213,396	24,818,912
2016	5,774,009	6,971,781	3,522,091	4,294,149	216,983	20,779,566
2017	5,559,937	6,440,128	3,886,707	4,437,001	215,680	20,583,289
2018	5,428,269	6,564,167	3,379,549	4,494,205	216,611	20,082,810
2019	5,316,558	6,079,030	2,770,620	4,219,939	216,173	18,663,914
2020	5,334,948	4,851,102	2,701,097	4,201,503	211,973	17,300,622
2021	5,130,246	5,454,444	2,744,493	4,131,840	208,662	17,669,685
2022	4,913,838	5,483,767	1,879,337	4,061,659	207,544	16,604,462

3.2 Transportation

The transportation sector includes GHG emissions from fuel combustion and electricity used for transportation activities. The sector covers five subsectors: on-road transportation,[2] railways, waterborne navigation, aviation, and off-road transportation.

Table 6. BASIC Transportation Emissions by Subsector (MT CO_2e)

	On-road transportation	Railways	Waterborne navigation	Aviation	Off-road transportation	Total Transportation Emissions
2014	11,128,431	98,421	55,892	17,336	239,507	11,539,586
2015	10,980,018	99,356	61,013	16,792	300,569	11,457,748
2016	10,827,904	82,100	58,348	14,906	276,693	11,259,952
2017	10,750,193	83,800	62,331	17,959	224,603	11,138,885
2018	10,605,673	85,269	66,092	16,828	321,258	11,095,119
2019	10,296,705	86,196	60,884	16,157	328,534	10,788,476
2020	6,961,453	76,900	60,734	14,068	327,406	7,440,562
2021	8,486,904	68,835	53,521	15,565	336,063	8,960,887
2022	8,836,599	66,992	50,811	15,116	342,143	9,311,662

Overall, emissions in this sector have decreased by 11% since 1990 (Figure 7), primarily from on-road transportation.

The data from Table 6 spans from 2014 to 2022, with on-road transportation showing a significant reduction in 2020 due to decreased travel during the California Stay at Home Order. A rebound occurred in 2021, with VMTs increasing by about 21.9% from the 2020 values, indicated by the rise in on-road emissions from 6,969,242 MT CO_2e in 2020 to 8,496,451 MT CO_2e in 2021. Strategies to reduce these emissions further include vehicle electrification, grid decarbonization, and improved public transport to decrease VMTs.

In contrast, the BASIC+ transportation emissions, detailed in Table 7, are significantly higher due to the inclusion of commercial cargo ship fuel in the waterborne navigation subsector and aircraft fuel in the aviation subsector. Although these activities fall outside the City's direct regulatory control, efforts are underway to mitigate their impact. For instance, Los Angeles World Airports (LAWA) is collaborating with tenants to promote the use of sustainable aviation jet fuel. Similarly, the Port of Los Angeles (POLA) is implementing initiatives to encourage oceangoing vessels to utilize shore-side electricity instead of diesel while docked, further contributing to emission reduction efforts in these sectors.

[2] Los Angeles' GHG inventory now uses Google's Environmental Insights Explorer (EIE) for more accurate transportation emissions data, as endorsed by C40 and ICLEI. This reflects a shift from previous demand model-based reports, providing detailed annual Vehicle Miles Traveled (VMT) and emissions updates in line with GPC standards, with historical data revised accordingly.

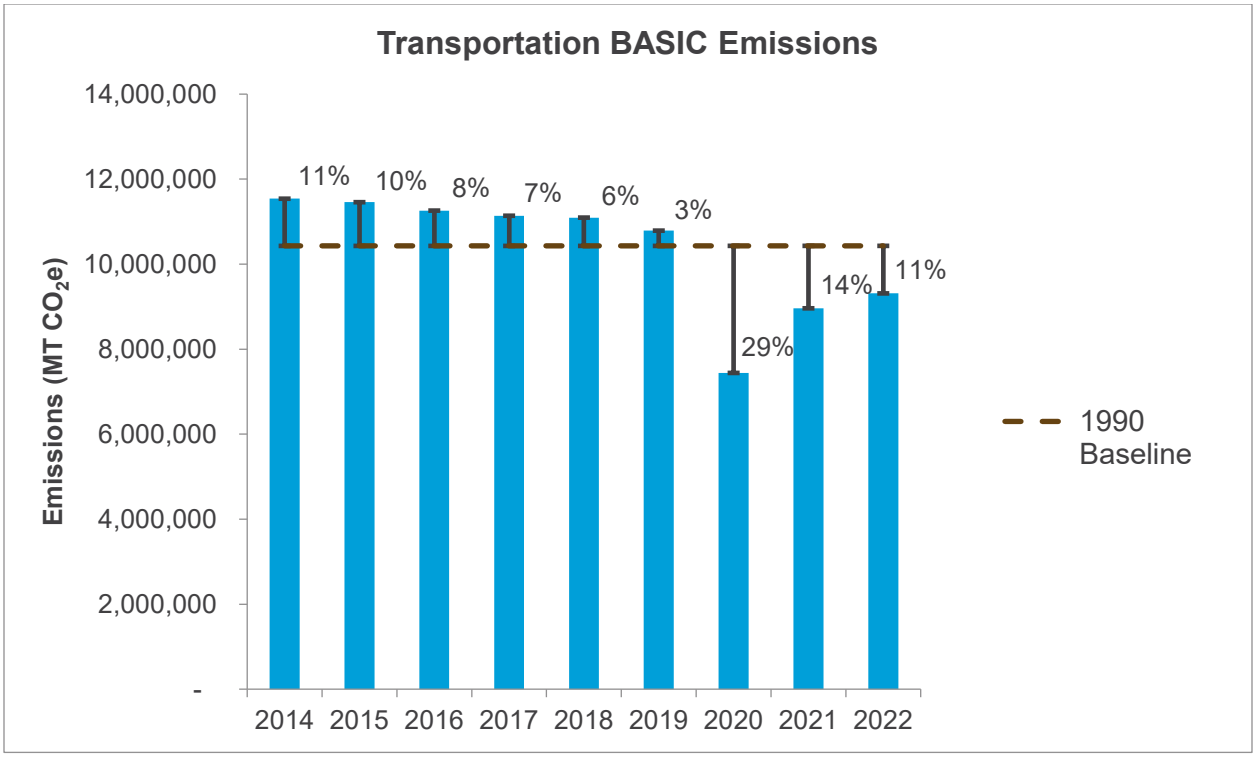

Figure 7. BASIC Transportation Sector Emissions Reductions from Baseline

Table 7. BASIC+ Transportation Emissions by Subsector (MT CO_2e)

	On-road transportation	Railways	Waterborne navigation	Aviation	Off-road transportation	Total Transportation Emissions
2014	11,130,442	205,088	2,866,564	15,837,678	162,034	30,201,806
2015	10,983,242	201,855	3,494,079	17,009,219	220,511	31,908,906
2016	10,834,904	187,229	4,479,269	18,323,514	194,183	34,019,099
2017	10,757,908	188,836	3,075,527	19,147,217	198,780	33,368,269
2018	10,615,163	197,534	3,964,351	19,559,534	234,565	34,571,148
2019	10,306,268	212,470	4,243,487	19,401,839	239,977	34,404,040
2020	6,969,242	187,027	2,929,032	11,451,145	237,695	21,774,141
2021	8,496,451	182,407	2,715,701	13,986,468	244,659	25,625,686
2022	8,474,522	181,187	2,082,160	15,219,316	342,143	26,299,327

3.3 Waste

The waste sector is responsible for emissions stemming from the disposal and treatment of both solid waste and wastewater, with processes such as decomposition and incineration as primary contributors.

Table 8. Waste Emissions by Subsector (MT CO_2e)[3]

	Solid waste generated in the city	Biological waste generated in the city	Incinerated and burned waste generated in the city	Wastewater generated in the city	Total Waste Emissions
2014	1,046,584	5,798	14,670	44,841	1,111,893
2015	1,111,432	6,871	13,314	46,839	1,178,456
2016	1,157,181	11,692	15,581	44,471	1,228,924
2017	1,228,286	5,189	3,890	49,616	1,286,980
2018	1,262,352	9,454	2,596	51,317	1,325,719
2019	1,267,111	8,363	2,262	53,344	1,331,079
2020	1,256,478	6,650	3,451	49,154	1,315,733
2021	1,186,929	8,213	3,158	48,453	1,246,753
2022	1,250,175	6,672	19,202	49,859	1,325,907

Landfill disposal, particularly of solid waste, dominates the sector's emissions, accounting for over 95% of the total (refer to Table 8). Public education campaigns and behavioral changes are critical in sustaining the reduction of waste-related emissions. It's important to note that waste sector emissions comprise about 5% of the City's total emissions, highlighting the potential for further emission reductions with continued effort and community engagement.

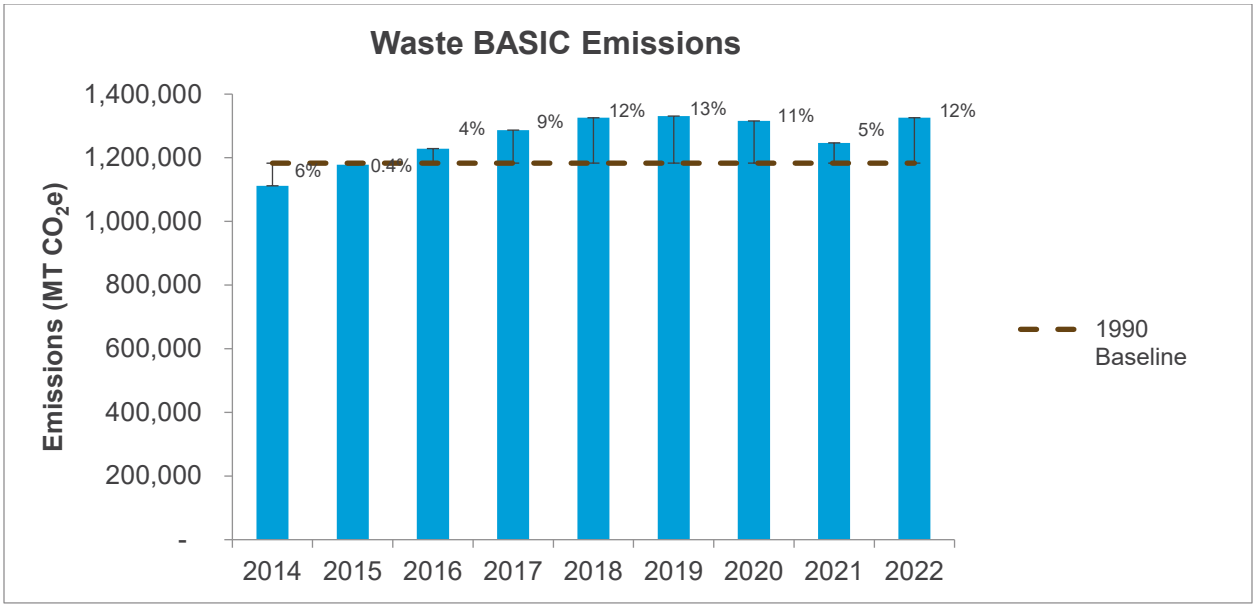

Figure 8. BASIC Waste Sector Emissions Reductions from Baseline

[3] For the waste sector, BASIC and BASIC+ emissions are the same (see Figure 3).

Figure 9 shows how waste composition significantly affects emissions levels; the different materials have varying organic content that decomposes at different rates. Paper and cardboard make up 23% of the City's waste by volume, yet they contribute to 53% of emissions from landfilled waste. Organic waste, while constituting 26% of the waste stream, accounts for 37% of emissions. These two categories alone represent 90% of emissions from landfilled waste, underscoring the importance of targeted waste reduction in these areas.[4]

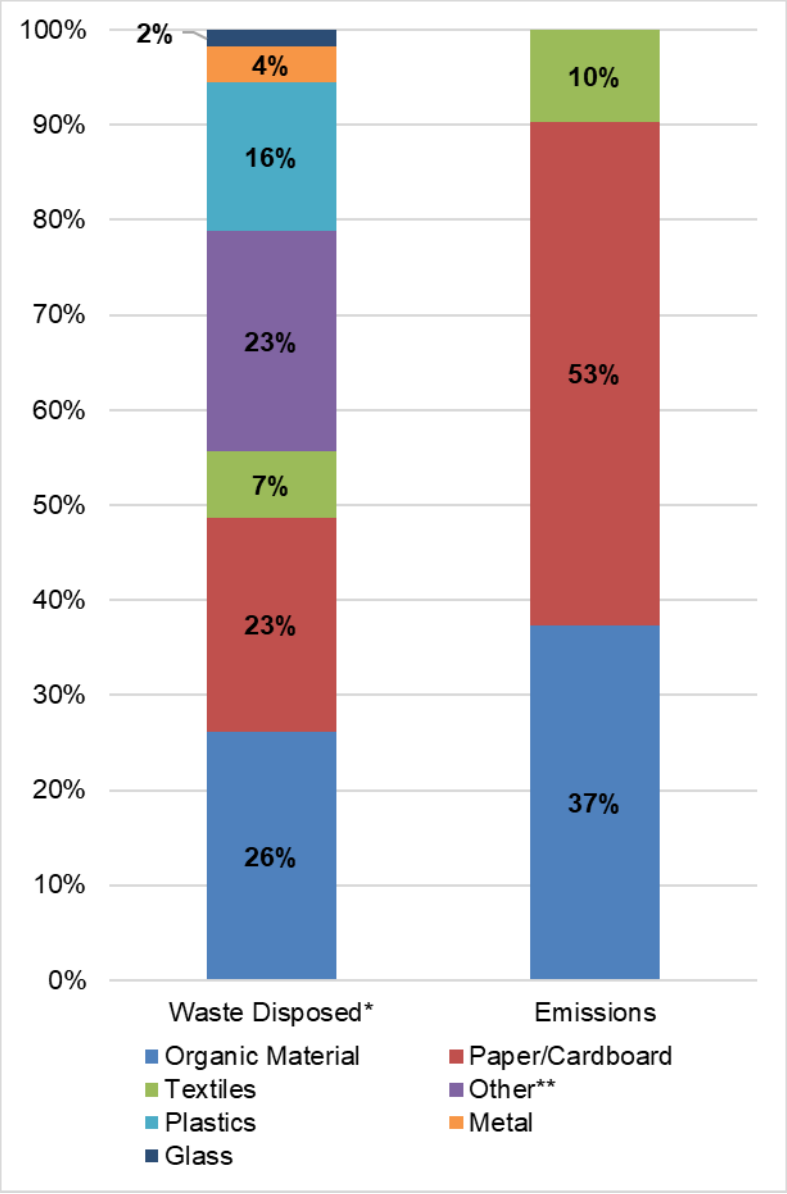

Figure 9. Landfilled Waste Characterization vs. Emissions

*Percentages may not total to 100 percent due to rounding.
**Other includes rubber and leather, electronics, gypsum board, inert material, household hazardous waste, special waste, and mixed residue.

[4] Waste characterization obtained from *Sunshine Canyon Landfill Comprehensive Waste Characterization Study,* May 2016.

3.4 Agriculture, Forestry, and Other Land Use

The AFOLU sector is characterized by GHG emissions from several sources, including land-use changes, enteric fermentation in livestock, and agricultural nutrient management. In the City's emissions framework, these emissions are detailed only in the BASIC+ inventory, not the BASIC total. While carbon sequestration data is captured for reference, it isn't factored into the net emissions for BASIC+.

The AFOLU sector is characterized by GHG emissions from several sources, including land-use changes, enteric fermentation in livestock, and agricultural nutrient management. In the City's emissions framework, these emissions are detailed only in the BASIC+ inventory, not the BASIC total. While carbon sequestration data is captured for reference, it isn't factored into the net emissions for BASIC+.

Table 9. AFOLU Emissions by Subsector (MT CO_2e)

	Livestock	Land		Aggregate Emission Sources		Total (sources)
	Sources	Sources	Sinks	Sources	Sinks	
2014	4,418	12,165	(112,706)	5,616	(79,865)	22,198
2015	4,418	12,165	(112,736)	5,689	(80,407)	22,271
2016	4,418	12,165	(112,541)	5,506	(63,510)	22,089
2017	4,418	11,581	(112,797)	6,018	(34,888)	22,016
2018	4,418	11,492	(112,827)	7,517	(45,678)	23,427
2019	4,418	11,344	(112,523)	32,810	(72,411)	48,572
2020	4,418	11,286	(112,729)	8,681	(76,818)	24,384
2021	4,275	11,224	(112,609)	12,144	(66,524)	27,643
2022	4,275	11,115	(112,716)	28,211	(58,158)	43,601

The emissions source in this sector is primarily from synthetic fertilizer, and the increase in emissions in 2022 is driven by an increase in synthetic fertilizer usage (Figure 10), which is also the case for 2019. The City's organic waste recycling and healthy soils programs support increasing composting production and application to enhance soil carbon sequestration, while providing additional benefits including water conservation, soil microbial health, erosion control, and air quality benefits. Compost can provide an alternative to using synthetic fertilizers.[5]

[5] LA Sanitation and Environment. Healthy Soils Strategy for the City of Los Angeles. https://www.lacitysan.org/san/sandocview?docname=cnt067543

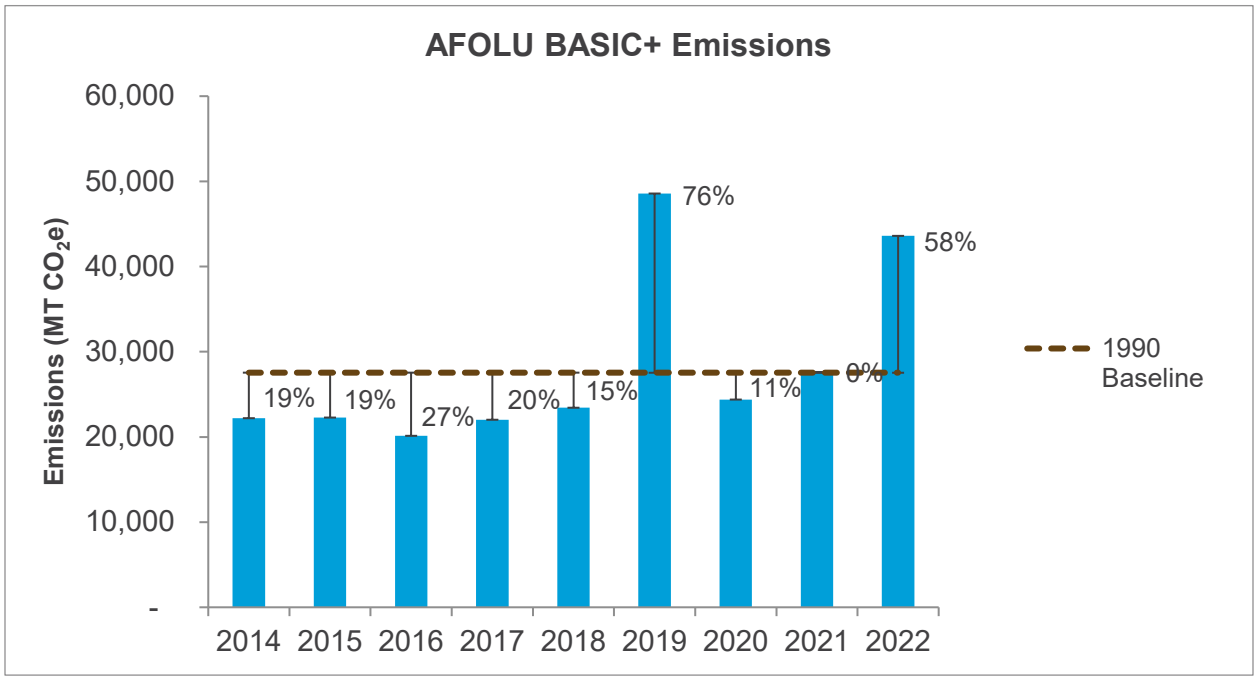

Figure 10. AFOLU Sector Emissions Reductions from Baseline

3.5 Industrial Processes and Product Use

The IPPU sector captures emissions from non-energy related industrial processes[6] and the use of products not related to energy generation. This includes emissions from substitutes for ozone-depleting substances (ODS), such as hydrofluorocarbons (HFCs) and perfluorocarbons (PFCs), widely used in refrigeration, air conditioning, foam production, and fire suppression systems. These emissions are part of the BASIC+ standard and thus are not included in the BASIC emissions tally.

Table 10. IPPU Emissions by Subsector (MT CO_2e)

	Industrial Processes	Product Use	Total IPPU Emissions
2014	-	1,790,652	1,790,652
2015	-	1,879,750	1,879,750
2016	-	1,925,515	1,925,515
2017	-	2,009,201	2,009,201
2018	-	2,050,501	2,050,501
2019	-	2,067,530	2,067,530
2020	-	2,071,863	2,071,863
2021	-	2,061,848	2,061,848
2022	-	2,058,893	2,058,893

A substantial portion of the IPPU emissions stems from the use of HFCs and PFCs. To mitigate this, the City is exploring policy options to incentivize the adoption of alternative cooling technologies, like cool roofs and cool pavements, which offer the dual benefits of reducing heat absorption and lowering cooling demands. The California Air Resources Board (CARB) is also proactive in this area, developing regulations that encourage the use of substances with a lower climate change potential.

Given the vast technological and industrial changes since 1990, the baseline year for IPPU emissions provides limited insights for comparison. The sector has evolved, with new processes and technologies emerging that were not present three decades ago, which now contribute to GHG emissions. For instance, emissions from IPPU in 1990 were recorded at a mere 10,000 MT CO_2e, contrasting sharply with the over 2 million MT CO_2e reported in recent years.

Thus, while historical data offer context, the focus must be on current and future actions. Efforts to find alternatives to ozone-depleting substances are paramount. This includes identifying new chemicals or methods that serve similar functions or devising innovative strategies to reduce the need for refrigerants and cooling agents altogether.

[6] Industrial process facilities are in the mineral, chemical, and metal production industries. No industrial facilities within Los Angeles meet the thresholds for reporting to statewide and national regulatory agencies, including CARB and the US EPA. As a result, industrial process emissions are not in this inventory. This does not necessarily mean there are no industrial process emissions, only that there are no facilities that meet the reporting thresholds.

The IPPU sector's evolution underscores the necessity for a dynamic and responsive approach to environmental management, one that acknowledges past practices while aggressively pursuing current opportunities for emission reductions.

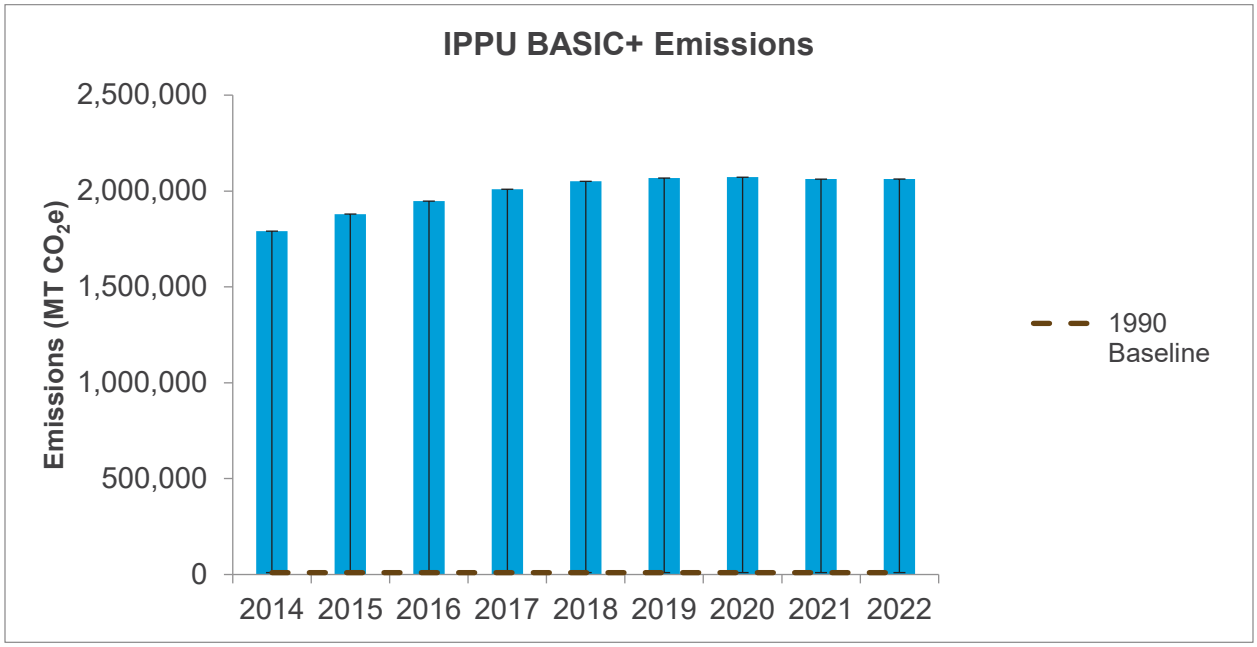

Figure 11. IPPU Sector Emissions Compared to Baseline

4. Conclusion

Los Angeles' determination and strategic action in combating climate change are evidenced by the significant decrease in greenhouse gas emissions recorded in the 2022 Community GHG Inventory. With a 30% reduction from the 1990 baseline, the City not only demonstrates its commitment to a sustainable future but also its capability to surpass targets, setting a precedent for urban climate initiatives globally.

The stationary energy sector, having achieved a 40% reduction, has been a cornerstone of this success, largely due to concerted efforts to decarbonize the energy grid. The transportation sector, despite a 4% increase over 2021, is down 11% compared to 1990 and remains a focus for ongoing advancements in electrification and sustainable transit solutions. Although the waste sector saw a slight increase, initiatives to enhance recycling and reduce landfill emissions are in effect to address these challenges.

This report underscores the City's success in decoupling emissions from economic growth, as shown by the continual drop in emissions per GDP unit. This indicates not only an improvement in environmental performance but also an advancement towards a greener economy that does not compromise economic vitality.

As Los Angeles moves forward, it will continue to innovate and implement targeted climate strategies, guided by the Green New Deal's vision for carbon neutrality by 2050. LASAN, supported by the Mayor’s Office of Sustainability, remains committed to refining the City's GHG inventory and fostering policies that enable these ambitious goals to be realized. The City's journey toward sustainability serves as a testament to what can be achieved through dedicated action, and it will continue to be a beacon of environmental stewardship for cities worldwide.

5. Preparers

LA Sanitation & Environment (LASAN), recognized as a national leader in environmental services and programs, is a critical partner in the City's climate response and in advancing the path towards the City's climate goals. LASAN is committed to proactively addressing climate change and supporting climate action in line with our mission to protect public health and the environment.

Building on nearly a decade of experience, LASAN's Climate Action Program supports the City's path towards carbon neutrality as outlined by the Sustainable City pLAn. LASAN collaborates with City departments, policymakers, and outside agencies on climate-related reports and activities.

For more information about the Climate Action Program, please contact us at san.climateaction@lacity.org or (213) 485-3640 or visit us at www.lacitysan.org/climateaction.

Last updated: January 2024

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CITY OF LOS ANGELES

2022 MUNICIPAL GREENHOUSE GAS INVENTORY REPORT

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Executive Summary

This report provides a comprehensive overview of the City of Los Angeles' efforts in managing its greenhouse gas (GHG) emissions, detailing the municipal GHG inventory from the baseline year of 2008 and from 2017 through 2022. This inventory serves as a crucial tool in quantifying the emissions generated from city operations, offering insights into the effectiveness of the City's environmental policies and initiatives.

In a landmark achievement in 2019, LA Sanitation & Environment (LASAN) unveiled the inaugural Municipal Greenhouse Gas Emissions Inventory Report. This report revealed a significant milestone: Los Angeles had surpassed its target, reducing municipal GHG emissions to 35% below the 2008 levels by 2025 – a commendable achievement attained eight years ahead of the scheduled target. In the same breath of progress, the City embraced the Green New Deal, setting forth ambitious, yet crucial, updated targets for municipal emissions reduction:

- A 55% reduction by 2025
- A 65% reduction by 2035
- Achieving carbon neutrality by 2045

As illustrated in Figure 1, the emissions have seen significant declines but recent years have not seen as much of a decrease as in the past. Notably, as of 2022, the City has achieved a 54% reduction in emissions compared to the 2008 baseline, aligning once again with the 2025 goal well ahead of time. However, it's critical to acknowledge a slight deviation in the current trend of GHG emissions. This deviation, albeit minor, signals a potential risk of not fully meeting the 2025 objectives. This observation underscores an urgent need for Los Angeles to reevaluate and fortify its environmental strategies.

The City stands at a pivotal juncture. To continue on this path of environmental stewardship and to meet its ambitious goals, it is imperative that Los Angeles commits to adopting and implementing more robust, sustainable practices. This commitment will not only steer the City back on track towards its 2025 targets but also pave the way for a sustainable and environmentally responsible future.

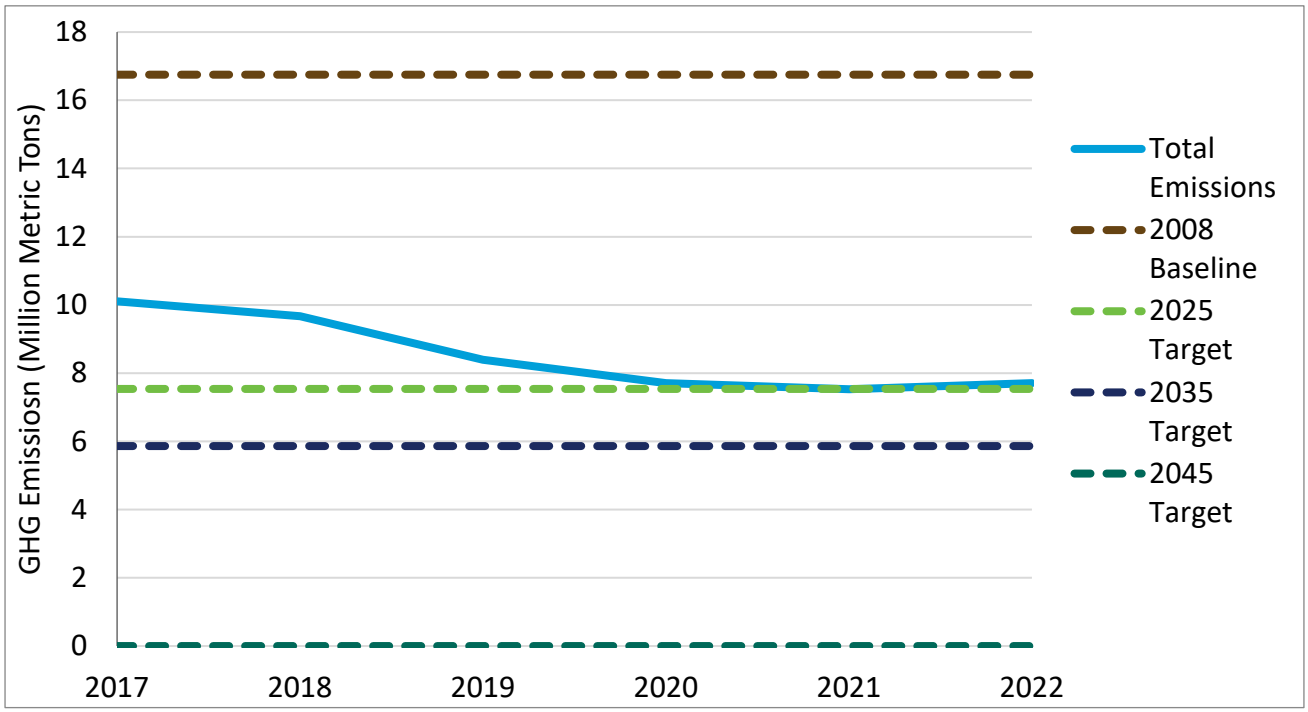

Figure 1. Municipal Emissions Progress Compared to Green New Deal Targets

1. Introduction

LA Sanitation & Environment (LASAN) is at the heart of Los Angeles' efforts to create a healthier, more sustainable city. Tasked in 2014 by the Mayor's Office of Sustainability (MOS), LASAN has been pivotal in tracking the city's greenhouse gas (GHG) emissions. This work is crucial for understanding and reducing our environmental impact, as highlighted in the City's first Municipal report, the 2017 Municipal Greenhouse Gas Inventory Report and continually reported annually since then.

Our journey towards a greener future, especially as we aim for municipal operation carbon neutrality by 2045 as part of the 2019 Green New Deal, is guided by these detailed reports. They help us see where we're making progress and where we need to focus more effort. In a city facing increasing heatwaves, droughts, and wildfires, LASAN's role is more important than ever.

Our commitment to regular GHG emissions reporting, following a detailed and organized approach, helps shape key city plans like the Sustainability City pLAn and LA's Green New Deal. These plans set specific goals for reducing emissions and making Los Angeles a leader in urban sustainability.

Together, we're working towards a future where Los Angeles is not only a great place to live but also a leader in environmental responsibility.

2. Methodology

2.1 Greenhouse Gasses and Global Warming Potential

In our efforts to understand and manage the City of Los Angeles' impact on climate change, we focus on the three primary greenhouse gasses (GHGs) recognized internationally:

- Carbon dioxide (CO_2)
- Methane (CH_4)
- Nitrous Oxide (N_2O)

We calculate the emissions of each of these gases separately. To understand their combined impact, we convert them into a common unit, metric tons of CO2 equivalent (CO2e), using Global Warming Potential (GWP) values. These values, sourced from the Intergovernmental Panel on Climate Change's Fourth Assessment Report (AR4), help us compare the impact of different gases on global warming (see Table 1 below).

Table 1. IPCC AR4 Global Warming Potential Values

Greenhouse Gas	Formula	GWP (100-year values)
Carbon Dioxide	CO_2	1
Methane	CH_4	25
Nitrous Oxide	N_2O	298

Our approach, using AR4 values, aligns with the California Air Resources Board's (CARB) standards for the statewide California Greenhouse Gas Emissions Inventory, ensuring consistency and comparability.

2.2 LGOP Methodology

To guarantee accuracy and consistency, our inventory adheres to the Local Government Operations Protocol (LGOP), a widely recognized framework for GHG emissions accounting. This protocol, published by ICLEI-Local Governments for Sustainability, California Air Resources Board, the California Climate Action Registry, and the Climate Registry, is popular among municipalities, allowing us to compare our progress with other cities.

2.2.1 Inventory Boundaries

Our inventory aims to capture the majority of GHG emissions over which the City of Los Angeles has operational control. This includes emissions from various city departments, bureaus, and agencies responsible for buildings, vehicle fleets, waste facilities, water supply, power generation, and water reclamation.

2.2.2 Scopes

In our efforts to comprehensively track and manage greenhouse gas emissions, the City of Los Angeles classifies these emissions into two included categories based on the Local Government

Operations Protocol (LGOP) sectors: direct (Scope 1) and indirect (Scope 2) emissions. Currently, our municipal inventories focus on these two scopes and do not include indirect scope 3 emissions.

Scope 1 direct emissions are emissions that occur right at the source, within the City's control. They can come from stationary sources like buildings, or mobile sources like city-operated vehicles, as well as from various industrial processes. Essentially, if it's a part of the City's operations and emits greenhouse gasses directly, it falls under Scope 1.

Scope 2 indirect emissions result from the City's consumption of electricity, heating, cooling, or steam that we purchase or acquire. While these emissions don't occur directly within our operations, they are a byproduct of the energy we use. They happen offsite away from where they're physically generated and emitted but are still a result of our activities.

Scope 3 covers all other indirect emissions not included in Scope 2. This could include emissions from transportation using vehicles the City doesn't own or control. While important, these emissions are not currently included in our reports due to limited data. However, we aim to incorporate them as we gather more information.

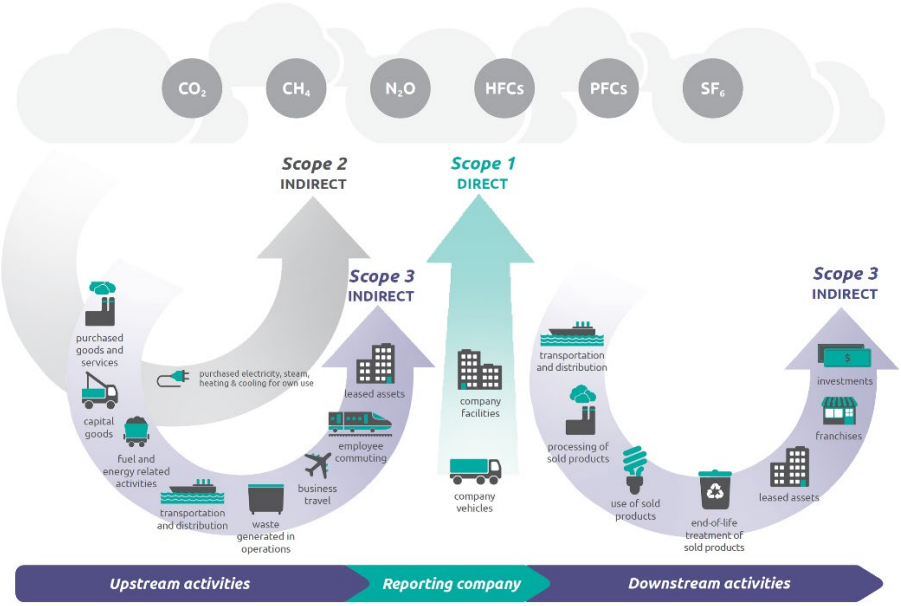

Figure 2. Overview of GHG Emission Scopes[1]

From these definitions, a municipality can generate scope 1 emissions at one of its owned facilities and consume that power at its other facilities as scope 2 emissions. When this occurs efforts should be made to ensure that emissions are not being double counted, usually by only counting the emissions at the source.

The City of Los Angeles's Municipal Inventory does have to account for this because we own and operate some of our utilities through LADWP. In Los Angeles's case, scope 2 emissions where the power was purchased from City plants are still calculated for each sector but are not included in the summation of total municipal emissions because they're accounted for in the power generation sector as scope 1 emissions already.

By categorizing emissions in this way, we can better understand and manage our impact on the environment, ensuring that our strategies are as effective as possible in reducing the City's carbon footprint.

[1] Source: Scope 1 and Scope 2 Inventory Guidance | US EPA, www.epa.gov/climateleadership/scope-1-and-scope-2-inventory-guidance. Accessed 27 Nov. 2023.

2.2.3 Sectors

Under LGOP, emissions are categorized into local government sectors. The local government sectors identified in LGOP are:

- Building and Other Facilities
- Streetlights and Traffic Signals
- Water Delivery Facilities
- Water Reclamation Facilities
- Port Facilities
- Airport Facilities
- Vehicle Fleet
- Transit Fleet
- Power Generation Facilities
- Solid Waste Facilities

These sectors create a framework that is relevant to local government activities and allow them to communicate inventory information clearly

2.3 Data Collection and Providers

Through cooperation and collaboration with a variety of departments and agencies, LASAN has established a data collection process for the preparation of the annual inventories. Table 2 below is a summary of the data providers.

Table 2. Municipal Inventory Data Providers

Data Provider	Data
City Departments	
Bureau of Street Services	Asphalt plant natural gas usage
General Services Department	Vehicle fuel usage
	Street Services' asphalt plant natural gas usage
LA Department of Transportation	Department vehicle fuel usage
LA Department of Water & Power	Department electricity usage
	Department natural gas usage
	Department vehicle fuel usage
	Power generation
LA Fire Department	Department vehicle fuel usage
LA Police Department	Department vehicle fuel usage
LA Sanitation & Environment	Wastewater process data
	Digester gas data
	Landfill gas data
Los Angeles World Airports	Department electricity usage
	Department natural gas usage
	Department vehicle fuel usage
Port of Los Angeles	Department electricity usage
	Department natural gas usage
	Department vehicle fuel usage
Utilities	
LA Department of Water & Power	Electricity usage
SoCal Gas	Natural gas usage

3. Findings by Sector

This section highlights the key findings from the City of Los Angeles' municipal greenhouse gas (GHG) inventories spanning from 2017 to 2022, in comparison with the 2008 baseline year. Each year, LA Sanitation & Environment (LASAN) diligently updates these inventories. This process involves not only incorporating revised protocols but also enhancing data collection methods, refining emission factors, and strengthening quality assurance measures. To ensure accuracy and consistency over time, previous years' inventories are also revised accordingly, aligning with the Intergovernmental Panel on Climate Change (IPCC) recommendations for developing GHG inventories.

Table 3 offers a detailed breakdown of total emissions by sector, alongside a comprehensive view of overall municipal emissions for the years 2008, and 2017-2022. As of 2022, the data indicates that power generation remains the largest contributor to municipal emissions, followed by emissions from solid waste facilities, and then emissions from buildings and other facilities. This information is crucial in guiding the City's efforts to target and reduce emissions effectively across different sectors. Currently, as shown in Figure 3, 2022 saw a total GHG emissions reduction of 54% compared to 2008 baseline.

Table 3. Total Emissions by Sector (MT CO_2e)

LGOP Category	2008	2018	2019	2020	2021	2022
Building and Other Facilities	266,795	170,628	155,099	136,609	141,070	142,190
Streetlight and Traffic Signals	153,247	45,203	38,865	30,654	32,453	31,083
Water Delivery Facilities	67,763	41,720	35,113	28,845	34,948	24,423
Water Reclamation Facilities	189,137	102,404	98,152	92,705	101,205	108,902
Port Facilities	7,654	6,822	6,380	5,013	4,705	5,310
Airport Facilities	135,388	90,801	91,605	78,381	79,089	83,686
Vehicle Fleet	191,292	161,986	145,038	132,047	137,959	143,956
Transit Fleet	35,263	29,370	20,420	19,980	24,122	21,330
Power Generation	16,206,619	9,179,050	7,931,835	7,263,656	7,078,694	7,234,813
Solid Waste Facilities	196,470	160,861	157,692	154,531	151,485	148,486
Total Municipal Emissions[2]	**16,750,555**	**9,668,591**	**8,394,385**	**7,709,448**	**7,530,111**	**7,703,731**

[2] As the City is both an electricity generator and consumer, adding Scope 1 and 2 emissions to generate a single City-wide total would result in double counting of emissions. Therefore, Scope 1 emissions are added together to generate the City-wide municipal total, and each sector's specific Scope 1 and Scope 2 are added together to show an overview of total emissions resulting from each sector's overall annual energy consumption.

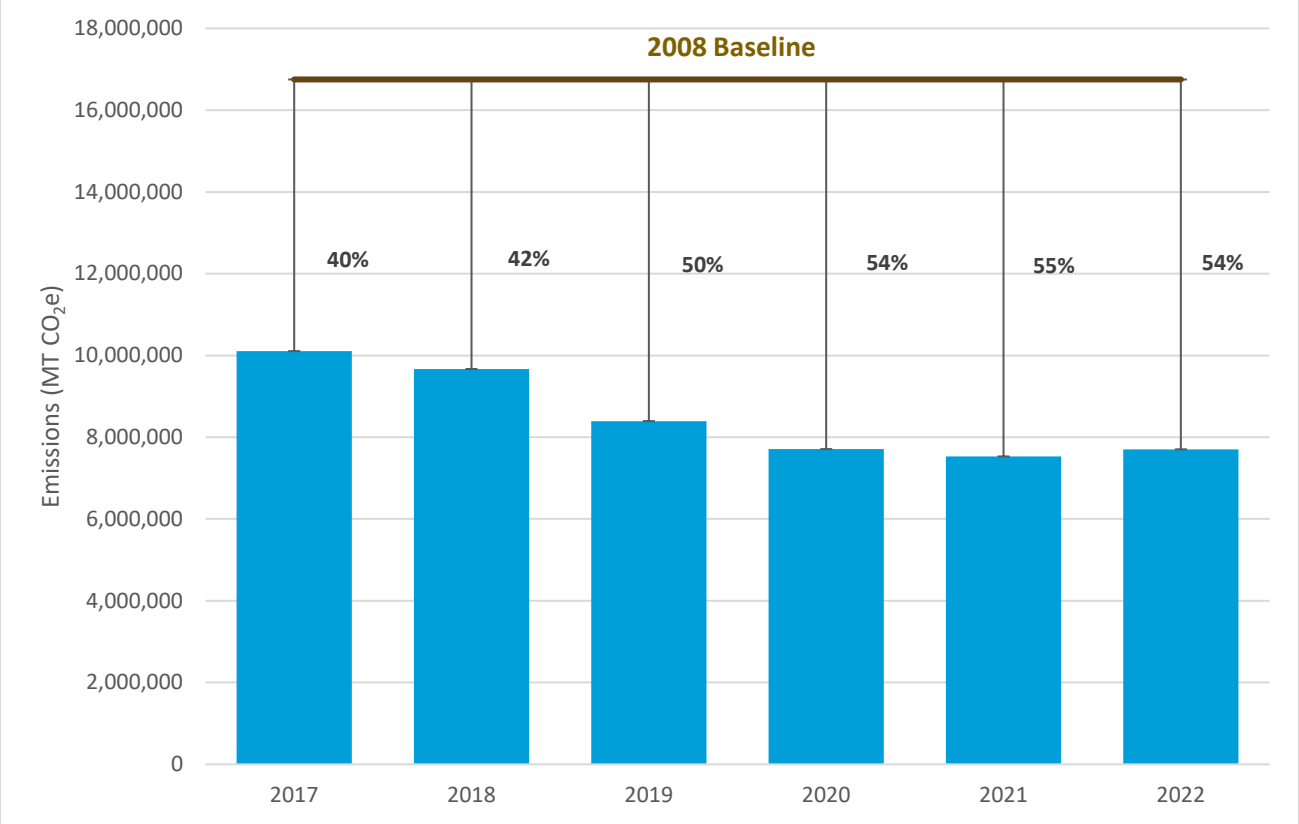

Figure 3. Overall Emissions Reductions

3.1 Power Generation

The power generation sector accounts for emissions associated with power either generated or purchased by the Los Angeles Department of Water and Power (LADWP) for consumption by its customers.

Table 4. Power Generation Facilities Emissions (MT CO_2e)

	2008	2018	2019	2020	2021	2022
Scope 1: Stationary Combustion	16,206,619	9,179,050	7,931,835	7,263,656	7,078,694	7,234,813
Total	**16,206,619**	**9,179,050**	**7,931,835**	**7,263,656**	**7,078,694**	**7,234,813**
Biogenic CO_2[3]	-	8,667	-	-	-	

Power generation is the largest source of emissions, generally accounting for over 93% of overall emissions. As of 2022, power generation emissions have decreased by 55% compared to the 2008 baseline, as illustrated by Table 4 and Figure 4.

[3] CO_2 emissions from biogenic material (e.g. biofuel) are reported separately for informational purposes and not counted in the emission totals. Carbon from biogenic sources already exists in the natural carbon cycle so biogenic CO_2 emissions are not an addition to the environment. CH_4 and N_2O emissions are included in the emissions totals.

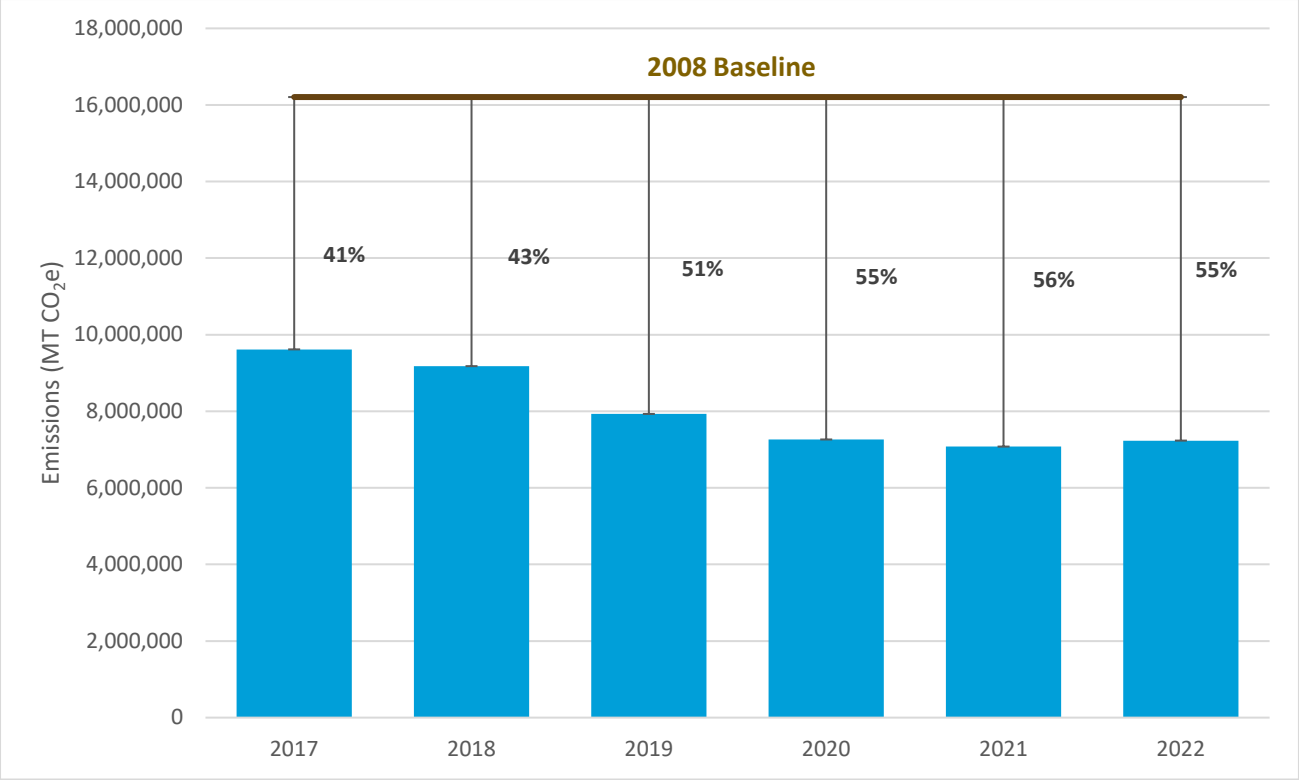

Figure 4. Power Generation Emissions Reduction from Baseline

Los Angeles is actively reducing its GHG emissions, a significant part of which is due to the LADWP shifting to cleaner, renewable energy sources. This transition away from carbon-heavy fuels means our electricity is now being generated with substantially fewer GHGs.

Looking ahead, the City is dedicated to the LA100 plan, which envisions sourcing all of Los Angeles' electricity from renewable energy by 2045, potentially achieving this milestone as early as 2035. This goal is in line with the Green New Deal's broader vision, marking a significant step towards a cleaner, more sustainable Los Angeles.

3.2 Buildings and Facilities

The building and facilities sector covers emissions associated with natural gas and electricity consumption from all City facilities that are used for municipal operations. This sector excludes facility energy used at landfill, seaport, airport, power generation, potable water, and water reclamation operations, as those emissions are covered in their respective sectors.

Table 5. Building and Facilities Emissions (MT CO_2e)

	2008	2018	2019	2020	2021	2022
Scope 1: Stationary Combustion	26,543	29,780	31,061	34,425	32,472	34,051
Scope 2: Purchased Electricity	240,252	140,848	124,038	102,183	108,598	108,139
Total	**266,795**	**170,628**	**155,099**	**136,609**	**141,070**	**142,190**

Electricity consumption, the primary contributor to this sector's emissions, has generally decreased since 2008, with a minor uptick in 2021 and 2022 compared to the lows achieved during the Covid-19 Pandemic. In 2022, the total emissions were 47% lower than the 2008 baseline, indicating a slight decrease from the previous year's emissions.

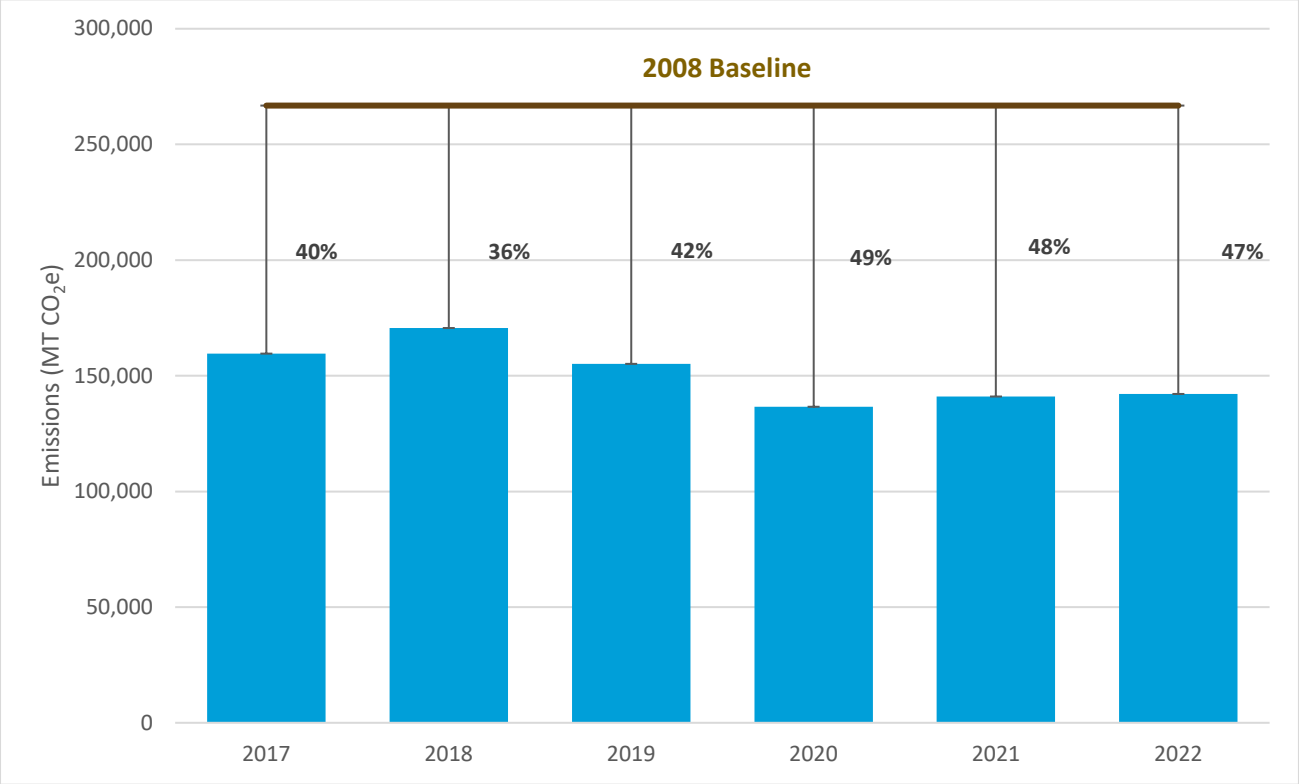

Figure 5. Building and Facilities Emissions Reductions from Baseline

The increase in Scope 1 emissions is partly due to higher natural gas usage for building heating, as well as increased usage at the City's asphalt plants and the conversion of pipeline natural gas to compressed natural gas (CNG) for fueling heavy-duty trucks and buses. While most CNG consumption is included in the Vehicle Fleet sector, some facilities compress pipeline natural gas on-site for fueling, contributing to higher consumption in recent years.

Despite these increases, the sector has seen an overall reduction in emissions compared to the baseline, thanks to reduced electricity usage and a decrease in the carbon intensity of the electrical grid.

Aligned with L.A.'s Green New Deal, a primary goal is to ensure all new municipally owned buildings and major renovations are fully electric. This initiative may initially increase electricity consumption, but it is expected to lead to an overall decrease in building emissions due to the reduced carbon intensity of LADWP's electricity.

3.3 Streetlights and Traffic Signals

Emissions reported in the streetlights and traffic signals sector consist of only Scope 2 purchased electricity emissions related to the operations of streetlights and traffic signals.

Table 6. Streetlights and Traffic Signals Emissions (MT CO_2e)

	2008	2018	2019	2020	2021	2022
Scope 2: Purchased Electricity	153,247	45,203	38,865	30,654	32,453	31,801
Total	**153,247**	**45,203**	**38,865**	**30,654**	**32,453**	**31,801**

On average, about 85% of emissions in this subsector are from streetlights. In 2018, electricity consumption associated with streetlights increased by approximately 25%, however, consumption has generally been decreasing since.

This decrease is likely attributed to the Bureau of Street Services' efforts to convert all streetlights and LA tunnel lights to 100% LED lights and integrate smart nodes to enhance energy efficiency.

Table 6, above, indicates emissions were higher than last year's emissions as a result of increased electricity consumption. Emissions are expected to decrease hereafter as the grid's carbon intensity decreases.

In 2022, overall emissions for this sector were 79% below the 2008 baseline, as seen in Figure 6.

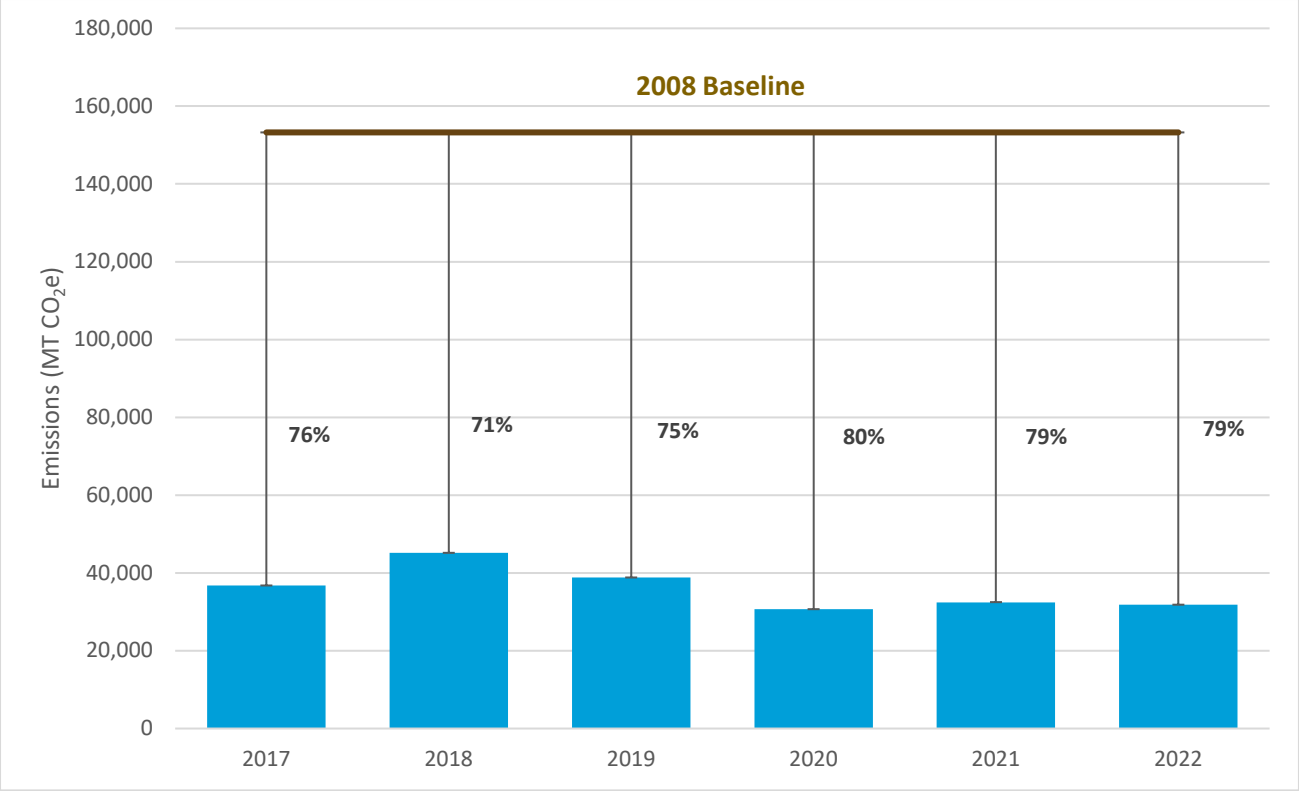

Figure 6. Streetlights and Traffic Signals Emissions Reductions from Baseline

3.4 Water Delivery

The water delivery sector contributes to GHG emissions through the activities of LADWP's potable water operations. This encompasses the emissions resulting from sourcing and conveying water to the city via the Los Angeles Aqueduct, which is managed by LADWP. However, it excludes emissions from initiatives like the Colorado River Aqueduct and the State Water Project, as these are beyond the City's control. Instead, the emissions from these projects are accounted for in the City of Los Angeles' Community Greenhouse Gas inventories.

Table 7. Water Delivery Emissions (MT CO_2e)

	2008	2018	2019	2020	2021	2022
Scope 1: Stationary Combustion	245	202	250	212	191	162
Scope 2: Purchased Electricity	67,518	41,518	34,863	28,634	34,757	24,261
Total	**67,763**	**41,720**	**35,113**	**28,845**	**34,948**	**24,422**

In 2022, the water delivery sector experienced a significant 14% reduction in emissions, as detailed in *Table 7*. This decrease can be largely attributed to the abundant water supply during the year, which facilitated more efficient water delivery operations and reduced the energy required for water transportation and processing. This efficiency gain is part of a continuing trend of emission reductions in this sector, as evidenced by the data in Figure 7, which shows that the overall emissions from water delivery in 2022 were already 64% below the 2008 baseline.

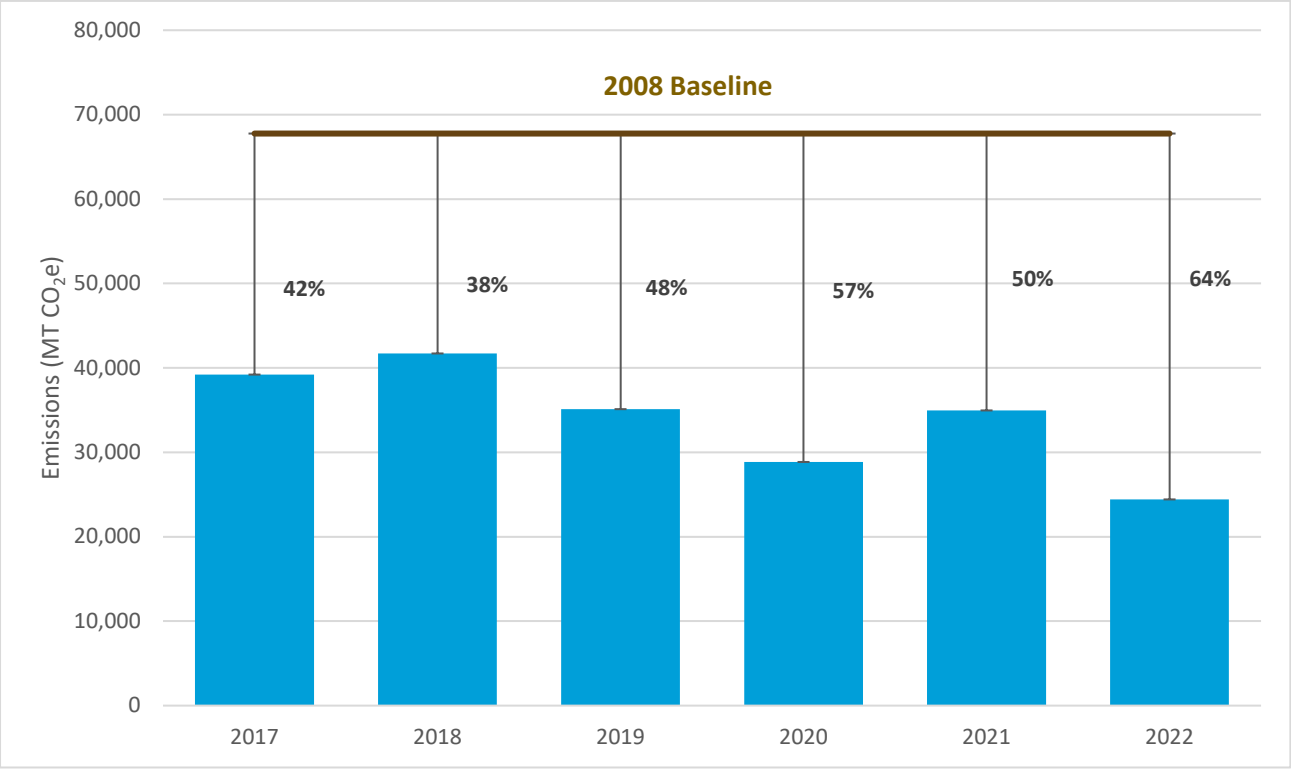

Figure 7. Water Delivery Emissions Reductions from Baseline

The City is actively working to diminish water demand by implementing conservation and water efficiency measures, alongside enhancing local water supply through initiatives in water recycling and stormwater capture. These strategies are anticipated to lead to a long-term reduction in emissions linked to the water delivery sector.

Furthermore, while the City does not have operational control over water delivery operations related to the Colorado River Aqueduct and State Water Project, and thus does not include them in this sector, it's important to note that importing water from these sources remains a high-energy process. Therefore, a key aspect of reducing these indirect emissions, which are external to the City's operational jurisdiction, lies in the continued efforts to decrease overall water demand.

3.5 Water Reclamation

The water reclamation sector, a significant contributor to the City's greenhouse gas (GHG) emissions, encompasses the operations of four key water reclamation facilities: Hyperion Water Reclamation Plant (HWRP), Terminal Island Water Reclamation Plant (TIWRP), Donald C. Tillman Water Reclamation Plant (DCTWRP), and Los Angeles-Glendale Water Reclamation Plant (LAGWRP). These facilities are responsible for emissions stemming from various wastewater processes and effluent discharge, as well as the energy consumption required for plant operations.

Notably, the sector's emissions include CH4 and N2O released during the combustion of digester gas, categorized under stationary combustion. However, in alignment with LGOP protocols, CO2 emissions resulting from digester gas combustion are deemed biogenic and thus excluded from the City's emissions inventory.

Table 8. Water Reclamation Facilities Emissions (MT CO_2e)

	2008	2018	2019	2020	2021	2022
Scope 1: Stationary Combustion and Process Emissions	49,256	79,967	78,458	74,548	74,704	89,620
Scope 2: Purchased Electricity	139,881	22,437	19,694	18,157	26,501	19,282
Total	**189,137**	**102,404**	**98,152**	**92,705**	**101,205**	**108,902**
Biogenic CO_2[4]	3,062	74,673	78,605	70,025	64,183	63,000

A significant reduction in emissions from this sector, amounting to 42% compared to the 2008 baseline, is evident as illustrated in Figure 8.

Despite the reduction in emissions, it is important to note that energy use in these facilities has increased by 4 percent. This uptick in energy consumption is a critical factor to consider, especially in the context of the City's ambitious Green New Deal, which aims for 100% water recycling. This initiative is expected to further increase energy demands at these facilities, potentially leading to a higher reliance on grid-supplied electricity. However, ongoing efforts to decarbonize the electrical grid are anticipated to mitigate the emissions associated with purchased electricity.

[4] CO_2 emissions from biogenic material (e.g. biofuel) are reported separately for informational purposes and not counted in the emission totals. Carbon from biogenic sources already exist in the natural carbon cycle so biogenic CO_2 emissions are not an addition to the environment. CH_4 and N_2O emissions are included in the emissions totals.

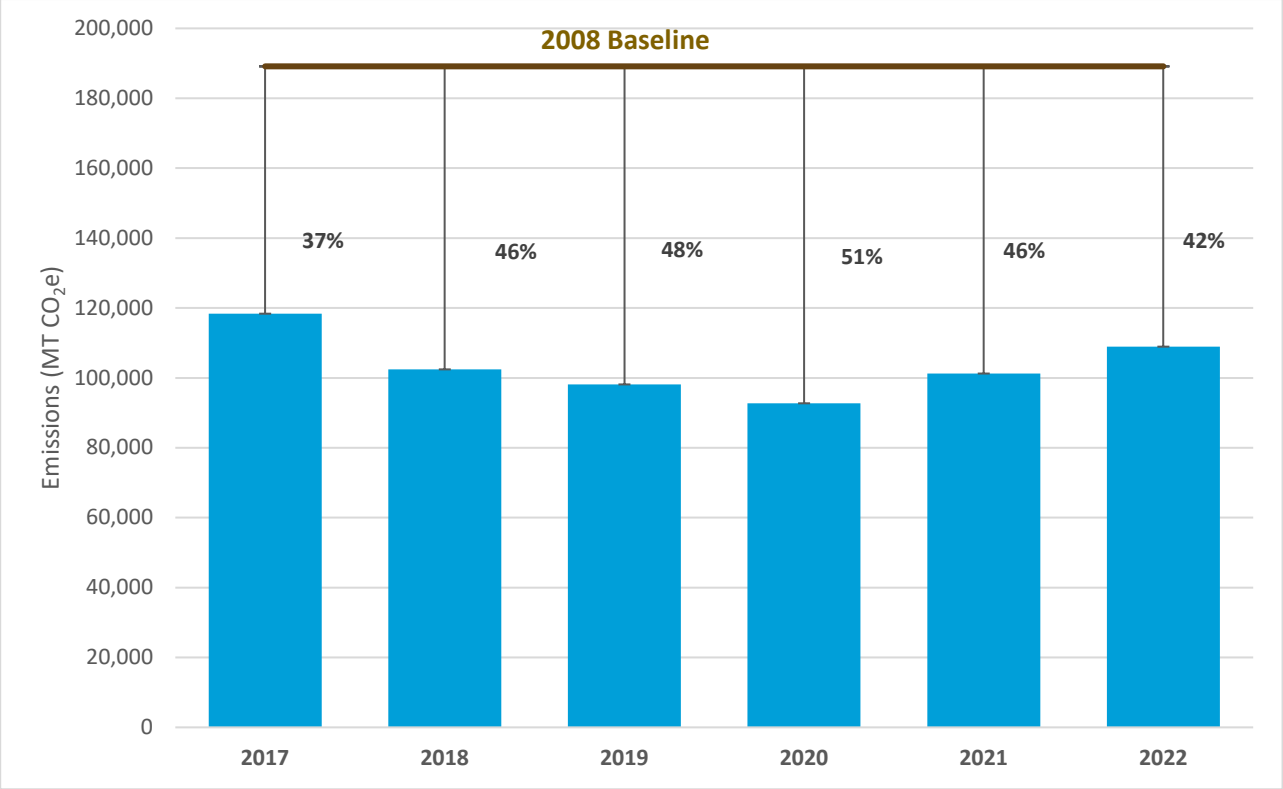

Figure 8. Water Reclamation Facilities Emissions Reductions from Baseline

3.6 Port

The port sector, specifically focusing on the Port of Los Angeles (POLA), is responsible for emissions generated by energy consumption in port-operated facilities. It's important to note that emissions from vehicles operated by the port are accounted for in the vehicle fleet sector (refer to section 3.8 Vehicle Fleet). Additionally, this sector excludes emissions from ships, vehicles, or facilities operated by third parties at POLA, which are included in the City of Los Angeles' Community Greenhouse Gas inventories.

Table 9. Port Facilities Emissions (MT CO_2e)

	2008	2018	2019	2020	2021	2022
Scope 1: Stationary Combustion	409	362	473	287	280	361
Scope 2: Purchased Electricity	7,245	6,460	5,907	4,726	4,425	4,949
Total	**7,654**	**6,822**	**6,380**	**5,013**	**4,705**	**5,310**

In 2022, despite a rise in emissions from stationary combustion, both Scope 1 and Scope 2 emissions declined compared to the 2008 baseline, as indicated in *Table 9*. Overall, emissions in this sector have decreased by 31% from the 2008 baseline, as depicted in Figure 9.

However, it's crucial to address the 7% increase in emissions from 2021 to 2022. This increase can be largely attributed to the unique challenges faced in 2021, as detailed in the Port of Los Angeles' latest Inventory of Air Emissions[5].

[5] Source: 2022 Inventory of Air Emissions | Port of Los Angeles, kentico.portoflosangeles.org/getmedia/409590b5-0e6a-4c15-8d9b-fcdb02624933/2022_Air_Emissions_Inventory. Accessed 28 Nov. 2023.

The year 2021 saw significant supply chain disruptions, notably the congestion of cargo vessels anchored outside the port complex, which led to increased emissions of diesel particulate matter (DPM), nitrogen oxides (NOx), and sulfur oxides (SOx). These disruptions were a primary factor contributing to the rise in emissions, despite ongoing efforts and initiatives aimed at reducing environmental impact.

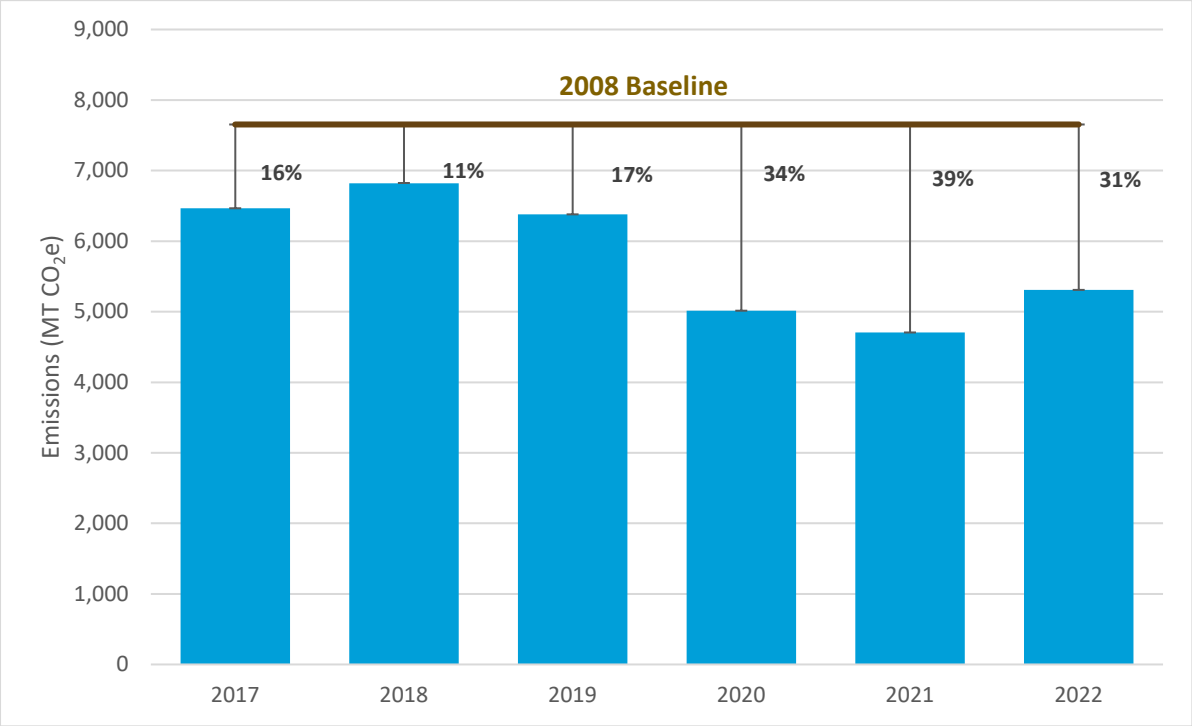

Figure 9. Port Facilities Emissions Reductions from Baseline

To address these challenges, POLA implemented various strategies, such as reducing congestion and ships at anchor, which positively influenced 2022 emissions. Initiatives included funding for zero-emission trucks, testing green technologies, and international collaborations to decarbonize ocean shipping. Measures like slow steaming toward San Pedro Bay and queuing ships 150 miles offshore significantly reduced emissions from ships.

Despite the increase in emissions in 2021 and 2022, the Port's long-term goals and initiatives, such as transitioning to zero-emission cargo-handling equipment and drayage trucks, demonstrate a commitment to environmental sustainability and a proactive approach to addressing greenhouse gas emissions. These ongoing efforts are expected to contribute to a continued overall decrease in emissions in the port sector, aligning with the broader objectives of reducing environmental impact and enhancing air quality in the region.

3.7 Airport

The airport sector encompasses emissions from Los Angeles International Airport (LAX) and Van Nuys Airport (VNY), focusing specifically on energy consumption at facilities operated by these airports. It's important to note that emissions from vehicles operated by the airports are accounted for in the vehicle fleet sector (refer to section 3.8 Vehicle Fleet). However, this sector does not include emissions from aircraft operated by third parties, which are instead included in the City of Los Angeles' Community Greenhouse Gas inventories.

Table 10. Airport Facilities Emissions (MT CO_2e)

	2008	2018	2019	2020	2021	2022
Scope 1: Stationary Combustion	44,457	27,013	29,159	29,762	30,204	31,083
Scope 2: Purchased Electricity	90,931	63,788	62,447	48,619	48,886	52,603
Total	**135,388**	**90,801**	**91,605**	**78,381**	**79,089**	**83,686**

In 2022, the airport sector experienced a slight increase in greenhouse gas (GHG) emissions. Despite this increase, emissions remained substantially lower than historical levels, maintaining a reduction of about 38% below the 2008 baseline, as depicted in Figure 10.

A significant factor in 2022 was the passenger traffic at LAX. The year saw approximately 66 million passengers, marking a considerable increase of about 37% compared to the previous year[6]. This surge in passenger numbers reflects a rebound in air travel, which likely contributed to the slight increase in GHG emissions.

Figure 10 illustrates the trajectory of emissions reductions from the 2008 baseline, highlighting the ongoing efforts to minimize the environmental impact of airport operations. Despite the challenges posed by increasing passenger numbers, the sustained reduction in emissions underscores the effectiveness of the measures implemented to enhance energy efficiency and reduce the carbon footprint of airport operations. The airport sector's commitment to environmental stewardship is evident in these continued efforts to balance operational demands with sustainability goals.

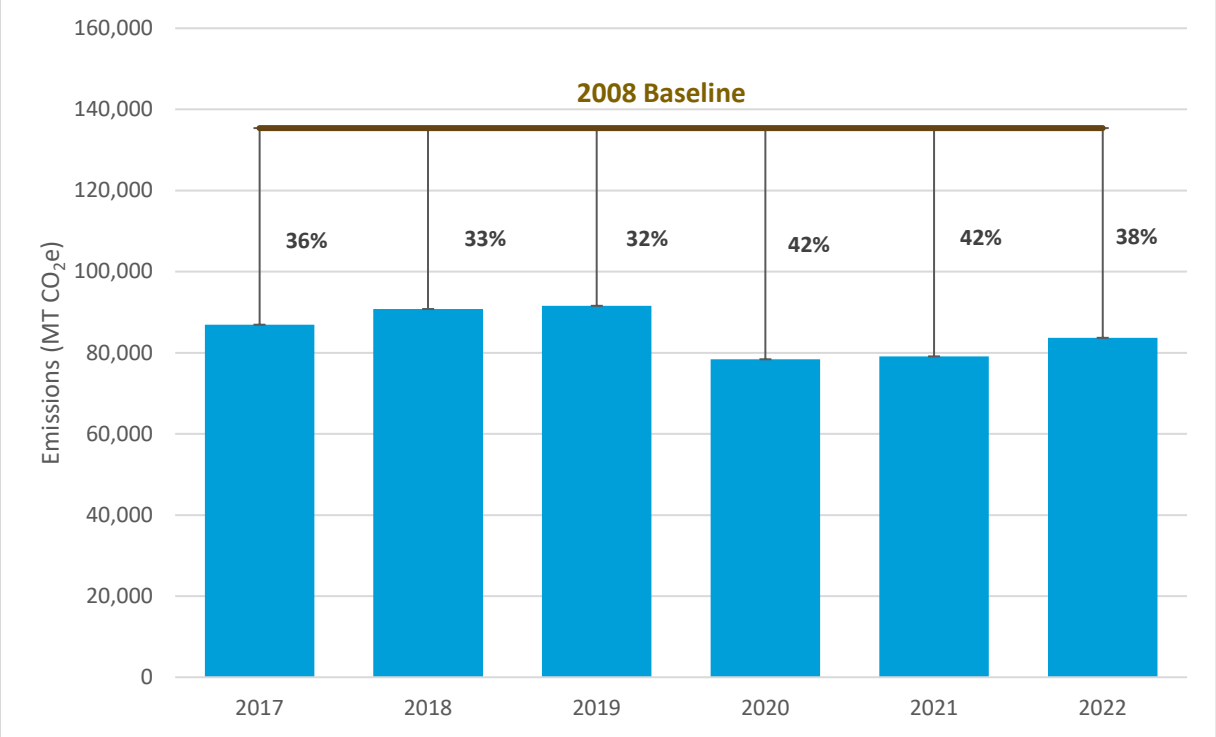

Figure 10. Airport Facilities Emissions Reductions from Baseline

[6] Source: LAX Specific Plan Aviation Activity Analysis Report CY 2022 - Lawa.Org, www.lawa.org/-/media/lawa-web/lawa-our-lax/studies-and-reports/aviation-activity-analysis/2022-aviation-activity-analysis_final.ashx. Accessed 28 Nov. 2023.

3.8 Vehicle Fleet

The vehicle fleet sector accounts for emissions from on-road and off-road vehicles operated by the City, excluding the Los Angeles Department of Transportation's (LADOT) public transit fleet. Public transit fleet emissions are accounted for in their own sector (see section 3.9 Transit Fleet).

Table 11 showcases the City's ongoing commitment to lowering emissions from its vehicle fleet. Significant reductions have been achieved primarily through reducing the use of conventional fuels like gasoline and diesel, and increasingly adopting lower-carbon alternatives such as compressed natural gas. Notably, the city has also incorporated renewable natural gas (RNG), as detailed in Figure 11.

Table 11. Vehicle Fleet Emissions (MT CO_2e)

	2008	2018	2019	2020	2021	2022
Scope 1: On- and Off-Road Mobile Combustion	191,292	161,986	145,038	132,047	137,959	143,955
Total	**191,292**	**161,986**	**145,038**	**132,047**	**137,959**	**143,955**
Biogenic CO_2[7]	-	13,754	13,741	11,865	8,736	7,095

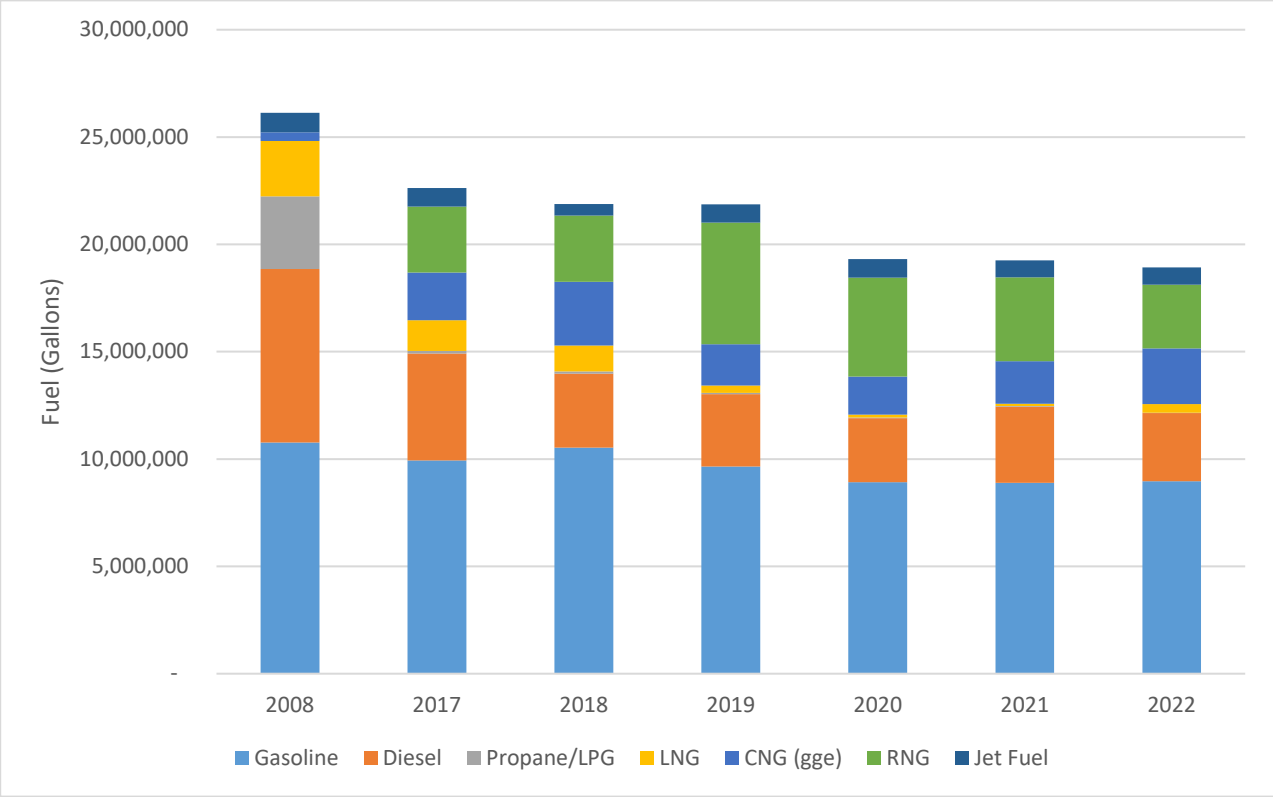

Figure 11. Fleet Fuel Consumption

In 2022, the vehicle fleet sector's emissions were 25% lower than the City's 2008 baseline, as illustrated in Figure 12. This marks a partial rebound from the previous year, driven by an increase in CNG consumption. However, a continued decline in emissions is anticipated as the City progresses

[7] CO_2 emissions from biogenic material (e.g. biofuel) are reported separately for informational purposes and not counted in the emission totals. Carbon from biogenic sources already exist in the natural carbon cycle so biogenic CO_2 emissions are not an addition to the environment. CH_4 and N_2O emissions are included in the emissions totals.

towards its Green New Deal objective of transitioning all City fleet vehicles to zero emissions by 2028, where technically feasible.

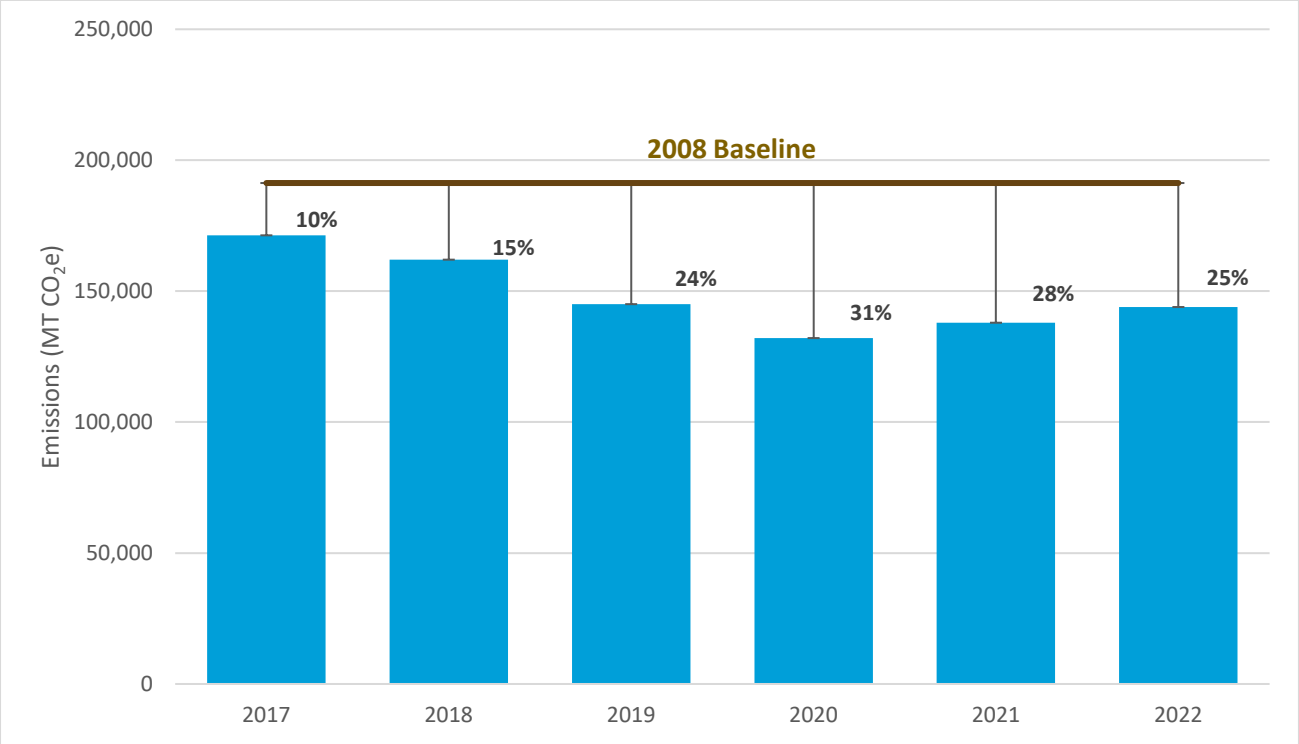

Figure 12. Vehicle Fleet Emissions Reductions from Baseline

3.9 Transit Fleet

The transit fleet sector accounts for emissions from Los Angeles' public transit fleet. This includes the City's DASH, Commuter Express, and Cityride services. This does not include emissions from the public transit fleet operated by the Los Angeles County Metropolitan Transportation Authority (Metro), which is outside the City's jurisdiction.

Table 12. Transit Fleet Emissions (MT CO_2e)

	2008	2018	2019	2020	2021	2022
Scope 1: On-Road Mobile Combustion	35,263	29,370	20,420	19,980	24,122	21,200
Total	**35,263**	**29,392**	**20,464**	**20,020**	**24,247**	**21,330**

Table 12 presents a downward trend in emissions over the past five years. This reduction is largely attributed to the City's initiative to shift from traditional, high-carbon fuels (like gasoline and diesel) to lower-carbon alternatives, namely Compressed Natural Gas (CNG) and Liquefied Natural Gas (LNG). As of 2022, the City's transit fleet emissions have been reduced by 40% compared to the 2008 baseline.

The City is actively working towards electrifying its transit fleet. A core goal of the L.A. Green New Deal is to achieve 100% fleet electrification by 2028. As the transit fleet moves towards electrification and the carbon intensity of electricity continues to decrease, a further reduction in emissions is anticipated.

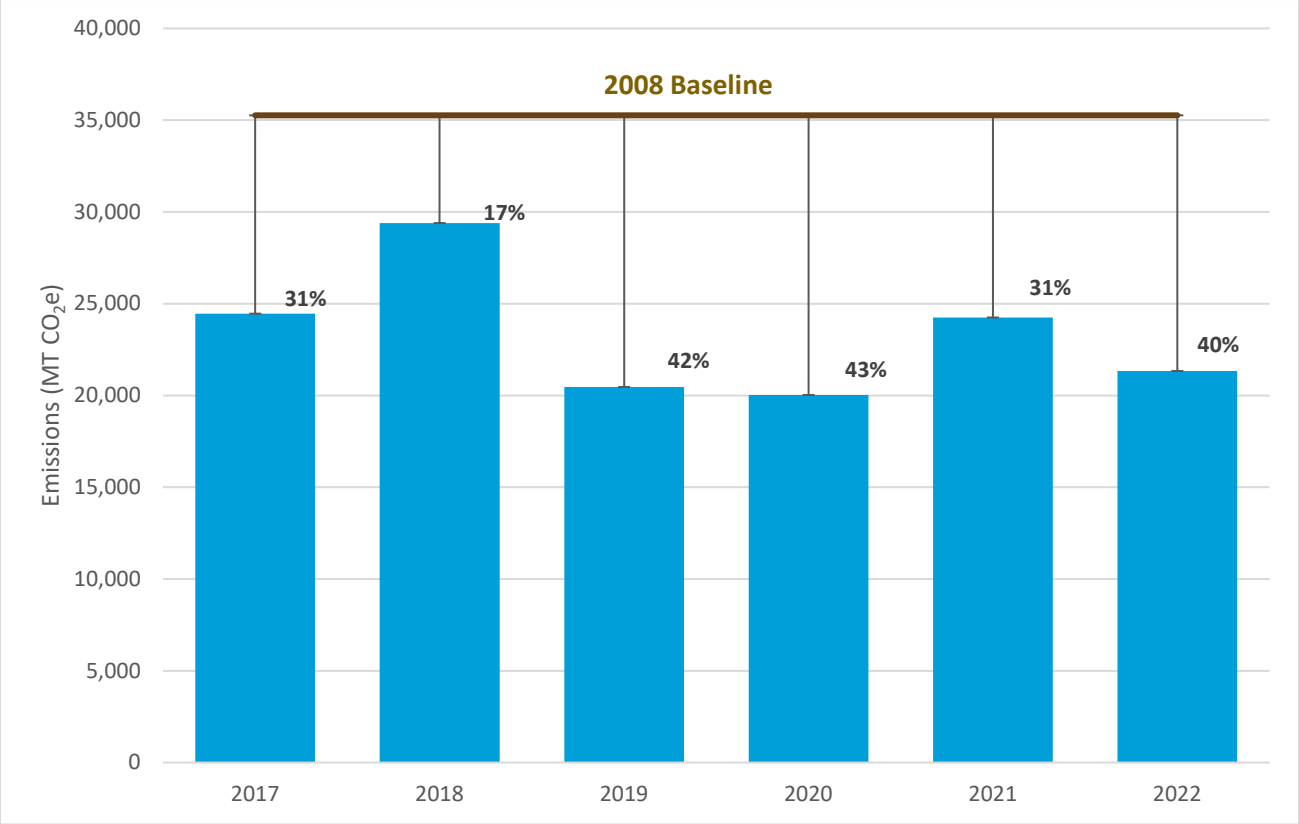

Figure 13. Transit Facilities Emissions Reductions from Baseline

3.10 Solid Waste Facilities

The solid waste sector encompasses emissions from five closed landfills - Bishop Canyon, Gaffey Street, Lopez Canyon, Sheldon-Arleta, and Toyon Canyon - all under the management of the City of Los Angeles. Although these facilities have ceased accepting solid waste, they continue to be sources of environmental impact through fugitive emissions from their landfill gas collection systems and stationary combustion emissions from the burning of captured landfill gas.

Table 13. Solid Waste Facilities Emissions (MT CO_2e)

	2008	2018	2019	2020	2021	2022
Scope 1: Fugitive Emissions and Stationary Combustion	196,440	160,861	157,692	154,531	151,485	148,486
Total	**196,440**	**160,861**	**157,692**	**154,531**	**151,485**	**148,486**
Biogenic CO_2[8]	55,029	45,056	44,168	43,282	42,430	41,589

Table 13 demonstrates emissions calculated in accordance with LGOP methodologies. According to the Protocol emissions for this sector should be calculated via a first order decay model with a variety of fixed or limited ranges of inputs. More refined calculations are possible but due to numerous variables in gathering data for these emissions, standards for further reporting are not available in the

[8] CO_2 emissions from biogenic material (e.g. biofuel) are reported separately for informational purposes and not counted in the emission totals. Carbon from biogenic sources already exist in the natural carbon cycle so biogenic CO_2 emissions are not an addition to the environment. CH_4 and N_2O emissions are included in the emissions totals.

latest edition of LGOP. In 2022, emissions calculated via the methodologies in LGOP for this sector were 24% below 2008 baseline levels, as illustrated by Figure 14.

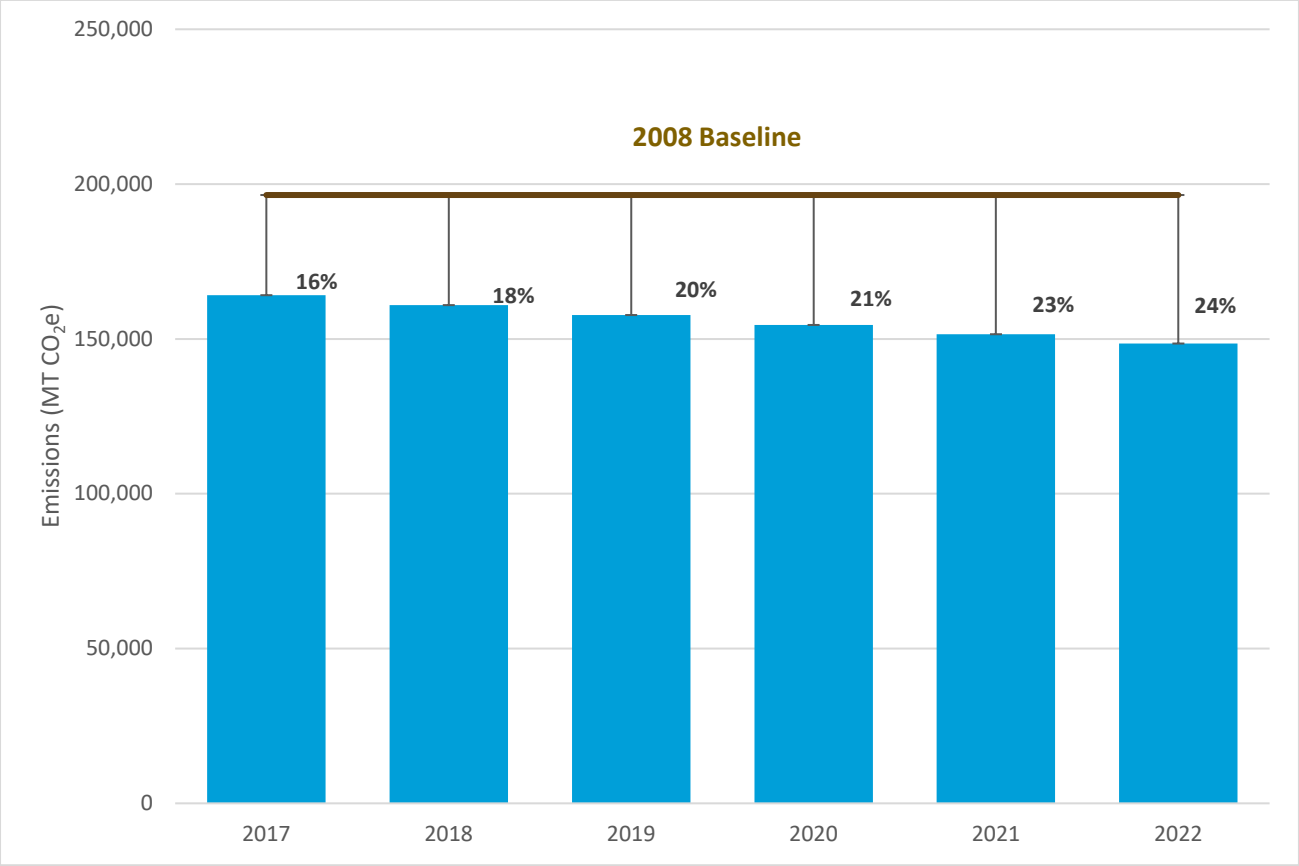

Figure 14. Solid Waste Facilities Emissions Reductions from Baseline

As we continue to monitor and manage emissions from our closed landfills, our facilities have provided the following additional data, offering deeper insights into our emission control measures and techniques that go beyond the techniques LGOP describes. In discussion with our Solid Resources staff, the following information has been described for these landfills' gas collection technologies and measurements. All landfills, except for Bishop Canyon, are equipped with gas collection and treatment systems. The precision in measuring methane composition is ensured by using a Landtec GEM5000 gas analyzer, which boasts an accuracy of ±0.5%. Furthermore, destruction rates are verified annually through EPA Method 3C gas chromatography, capable of detecting concentrations down to parts per billion (ppb). For flow measurements, Lopez Canyon employs an FCI GF90 mass flow meter, and other sites use devices with similar accuracy (±1% of reading plus 0.5% of scale) and repeatability (±0.5% of reading or better). These measures underscore our commitment to maintaining high standards of environmental stewardship and accuracy and result in significantly lower total emissions for the sector. Based on the data provided by Solid Resources the emissions based on the measured quantities for 2022 would be 105,924 MT CO_2e. We have kept the modeled values as the official numbers in accordance with LGOPs methodologies but the actual quantities may differ and potentially be significantly lower as indicated by values calculated from the measured data from Solid Resources.

4. Conclusion

In the heart of Los Angeles, our collective endeavors to diminish greenhouse gas emissions transcend mere statistics – they embody our unwavering dedication to fostering a healthier, more sustainable city. Our stride towards carbon neutrality by 2045 is not merely a theoretical ambition; it's a dynamic, communal mission that we breathe life into every single day. Our achievements thus far are noteworthy, having already realized a significant 54% reduction in emissions from our 2008 levels by 2022. However, a recent, albeit slight, deviation in this positive trajectory serves as a poignant reminder: our journey is far from over, and our vigilance is paramount to meet our ambitious 2025 targets.

At this pivotal juncture, Los Angeles is not just poised to continue its environmental stewardship but is also committed to amplifying these efforts. Our approach extends beyond governmental policies, permeating the very fabric of our daily existence. It's about each individual embracing sustainable choices – be it through energy conservation at home, opting for public transit, or supporting local eco-initiatives.

Our collective power for change has been evident in actions like transitioning to renewable energy sources, electrifying our municipal fleet, and implementing water conservation strategies. Yet, we face ongoing challenges such as the increased energy demands of our water facilities and the task of managing emissions from our ports and airports. These aren't mere obstacles; they represent opportunities for us to collectively innovate and devise groundbreaking solutions.

As we forge ahead, let us hold fast to the conviction that Los Angeles is resolute in its pledge to protect our environment. Reducing our carbon footprint is a shared journey, and the strategies outlined in LA’s Green New Deal are our compass. Equally crucial is the role each one of us plays in this collective endeavor. By altering our habits and fostering a culture steeped in sustainability, we are not just effecting change for the present – we are sculpting a vibrant, resilient Los Angeles for the generations to come. Let's persist in this journey together, fueled by commitment and optimism, as we pave the way for a brighter, greener future.

5. Preparers

LA Sanitation & Environment (LASAN), recognized as a national leader in environmental services and programs, is a critical partner in the City's climate action and response and in advancing the path towards the City's climate goals. LASAN is committed to proactively addressing climate change and supporting climate action in line with our mission to protect public health and the environment.

Building on nearly a decade of experience, LASAN's Climate Action Program supports the City's path towards carbon neutrality as outlined by the Sustainable City pLAn. This program collaborates with City departments, policymakers, and outside agencies on climate-related reports and activities.

For more information about the Climate Action Program, please contact us at san.climateaction@lacity.org or (213) 485-3640 or visit us at www.lacitysan.org/climateaction.

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