ALBANY, NEW YORK

2023 Inventory of Community and Government Operations Greenhouse Gas Emissions

Prepared For:

Albany, NY

Produced By:

ICLEI – Local Governments for Sustainability USA
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Executive Summary

The City of Albany recognizes that greenhouse gas (GHG) emissions from human activity are catalyzing profound climate change, the consequences of which pose substantial risks to the future health, wellbeing, and prosperity of the community. In recognition of this threat, Albany has taken a number of steps to reduce its contribution to climate change, including:

- The adoption of the City of Albany's first Climate Action Plan as part of "Albany 2030," the City's Comprehensive Plan, in 2013.
- The City's first Climate Vulnerability Assessment, also in 2013.
- Working with the New York Power Authority to complete a "Five Cities Energy Plan" in 2015 along with Syracuse, Rochester, Yonkers and Buffalo.
- The 2019 purchase of all 10,500 streetlights and their conversion to high-efficiency LED fixtures.
- Creating a Bicycle and Pedestrian Master Plan in 2021 in partnership with Capital District Transportation Committee.
- Securing funding to install 22 public EV charging stations in 2021-2022.
- Budgeting $11 million over five years for a fleet electrification study and implementation measures, to begin in 2024.
- Partnering with NYPA to construct a 1.5MW community solar farm on a capped landfill, to start 2025.

This report provides estimates of greenhouse gas emissions resulting from activities in the City as a whole and local government operations in 2023.

Key Findings: Community-Wide Inventory

Figure 1 shows community-wide emissions by sector. The largest contributor is Transportation & Mobile Sources with 37% of emissions. The next largest contributors are Commercial Energy (29%) and Residential Energy (21%). Actions to reduce emissions in all of these sectors will be a key part of a climate action plan. Industrial Energy, Solid Waste, Water & Wastewater, and Process & Fugitive Emissions were responsible for the remaining (13%) emissions.

The Inventory Results section of this report provides a detailed profile of emissions sources within Albany; information that is key to guiding local reduction efforts. These data will also provide a baseline against which the city will be able to compare future performance and demonstrate progress in reducing emissions.

COMMUNITY EMISSIONS AT A GLANCE

1 **Transportation & Mobile Sources** 37%

2 **Industrial Energy** 29%

3 **Residential Energy** 21%

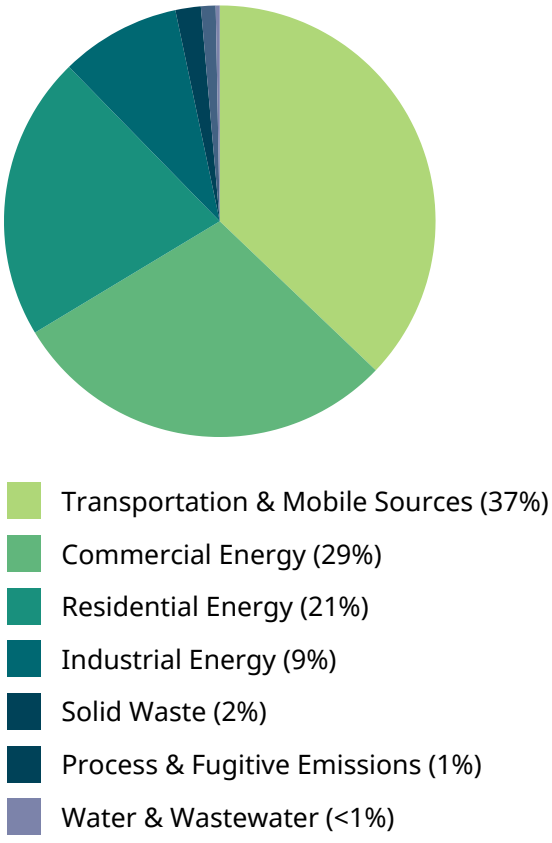


Figure 1: Community-Wide Emissions by Sector

Key Findings: Government Operations Inventory

Figure 2 shows government operations emissions by sector. The largest contributor is Solid Waste Facilities with 83% of emissions. The next largest contributors are Vehicle Fleet (5%) and Transit Fleet (5%). Actions to reduce emissions in these sectors will be explored as part of a climate action plan. Buildings & Facilities, Employee Commute, Street Lights & Traffic Signals, Water & Wastewater Facilities, and Process & Fugitive Emissions were responsible for the remaining (7%) emissions.

Emissions from government operations contribute to 6.2% of community-wide emissions.

GOVERNMENT OPERATIONS EMISSIONS AT A GLANCE

1 Solid Waste Facilities
83%

2 Vehicle Fleet
5%

3 Transit Fleet
5%

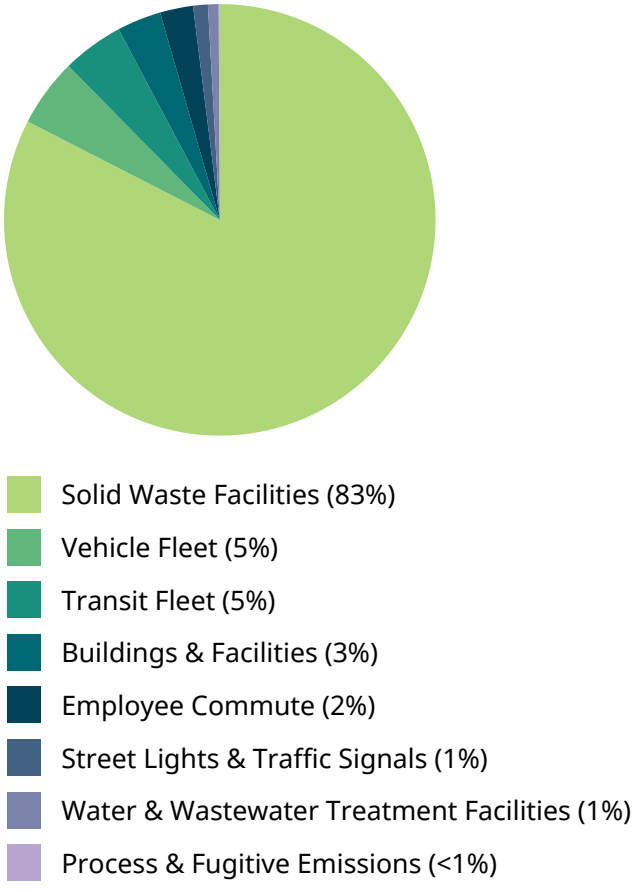


Figure 2: Government Operations Emissions by Sector

Introduction to Climate Change

Naturally occurring gases dispersed in the atmosphere determine the Earth's climate by trapping solar radiation. This phenomenon is known as the greenhouse effect. Overwhelming evidence shows that human activities are increasing the concentration of greenhouse gases and changing the global climate. The most significant contributor is burning fossil fuels for transportation, electricity generation and other purposes, which introduces large amounts of carbon dioxide and other greenhouse gases into the atmosphere.

Collectively, these gases intensify the natural greenhouse effect, causing global average surface and lower atmospheric temperatures to rise, threatening the safety, quality of life, and economic prosperity of global communities. Although the natural greenhouse effect is needed to keep the earth warm, a human-enhanced greenhouse effect with the rapid accumulation of GHGs in the atmosphere leads to too much heat and radiation being trapped. The Intergovernmental Panel on Climate Change (IPCC) 6th Assessment Report confirms that human activities have unequivocally caused an increase in carbon emissions [1]. Many regions are already experiencing the consequences of global climate change, and Albany is no exception.

[1] IPCC, 2021: Summary for Policymakers. In: Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [MassonDelmotte, V., P. Zhai, A. Pirani, S. L. Connors, C. Péan, S. Berger, N. Caud, Y. Chen, L. Goldfarb, M. I. Gomis, M. Huang, K. Leitzell, E. Lonnoy, J. B. R. Matthews, T. K. Maycock, T. Waterfield, O. Yelekçi, R. Yu and B. Zhou (eds.)]. Cambridge University Press. In Press.

According to the 2023 National Climate Assessment [2], many of the impacts of climate change described in the 2019 Assessment remain true for the Northeast. These include increasing exposure to extreme heat events, flooding, and poor air quality for urban residents. Additionally, these threats not only endanger lives, but also serve as stressors that confound other climate change consequences, such as socio-economic pressure on underserved communities within the City. Though the region has taken steps towards adaptation and mitigation responses to climate change, repeat impacts from extreme weather events and changing conditions continue to shape efforts and require new approaches.

Extreme weather has brought about flooding, heatwaves, and other impacts that will increasingly have chronic, problematic effects on the region and the community. Precipitation has risen across all seasons, with extreme precipitation events increasing by 60% - the largest in the U.S. In urban areas such as Albany, flash flooding will be a constant threat as localized cloudburst events caused by thunderstorms grow more common and severe.

Despite the increase in precipitation, the Northeast has only seen a minimal decrease in the frequency of droughts. Though these events may be less common, if only slightly, the high amounts of precipitation also work in tandem with rising temperatures to bring about a higher, longer-lasting humidity that reduces mobility from rural residents into and out from the community. For the droughts that do occur, growing temperatures will ensure they are longer lasting and more intense, leading to a general increase in heat stress. This will be especially dangerous in densely populated areas, putting residents at risk of heat-related injuries, especially in disadvantaged communities.

Extreme weather also brings about a number of other social and economic challenges. Residents who are low-income, minorities, and/or do not have a college degree will be more likely to experience transportation and property damage.

[2] U.S. Global Change Research Program. 2023. National Climate Assessment – Ch 21: Northeast. Retrieved from https://nca2023.globalchange.gov/chapter/21/

Albany is situated on the Hudson River estuary, which means the community is directly impacted by changes to the sea. As a result of climate change, ocean currents like the Gulf Stream have shifted northward, bringing increased salinity and subsurface temperatures to Northeast. Notable marine heatwaves in the region over the last decade have been correlated to this effect, which have also reduced the extent, duration, and temperature of the cold pool critical for fish productivity.
In addition to reduced fish stocks, the ecosystem of the region will suffer a number of other climate-related consequences. These include increased prevalence of disease and parasites among aquatic species, the replacement of native species with non-native species, and the acidification and de-oxygenation of the ocean. Furthermore, sea level rise will bring stronger storm surges, saltwater intrusion, salinization of soils, and shoreline erosion - all of which will contribute to habitat loss, infrastructure damage, and impact groundwater supplies.

Many communities in the United States are taking responsibility for addressing climate change at the local level. Albany is proud to be one of them. Since the City's small early efforts to address climate change at the turn of the century, Albany has developed a number of sustainability plans and tracked greenhouse gas emissions. These measures include 2012's Climate Action Plan and inventorying community-wide emissions in 2019 and local government operations in 2021. With the completion of the 2023 greenhouse gas inventories, Albany now looks to update its climate action plan, ensuring sustainability efforts are backed by up-to-date emissions counts that will help prioritize reduction actions pursued by the City.

Greenhouse Gas Inventory as a Step Toward Carbon Neutrality

Facing the climate crisis requires the concerted efforts of local governments and their partners - those that are close to the communities directly dealing with the impacts of climate change.

Cities, towns and counties are well placed to define coherent and inclusive plans that address integrated climate action — climate change adaptation, resilience and mitigation. Existing targets and plans need to be reviewed to bring in the necessary level of ambition and outline how to achieve net-zero emissions by 2050 at the latest. Creating a roadmap for climate neutrality requires Albany to identify priority sectors for action while considering climate justice, inclusiveness, local job creation and other aspects of sustainable development.

To complete this inventory, Albany utilized tools and guidelines from ICLEI - Local Governments for Sustainability (ICLEI), which provides authoritative direction for greenhouse gas emissions accounting and defines climate neutrality as follows:

> The targeted reduction of greenhouse gas (GHG) emissions and GHG avoidance in government operations and across the community in all sectors to an absolute net-zero emission level at the latest by 2050. In parallel to this, it is critical to adapt to climate change and enhance climate resilience across all sectors, in all systems and processes.

To achieve ambitious emissions reduction, and move toward climate neutrality, Albany will need to set clear goals and act rapidly following a holistic and integrated approach. Climate action is an opportunity for the community to experience a wide range of co-benefits, such as creating socio-economic opportunities, reducing poverty and inequality, and improving the health of people and nature.

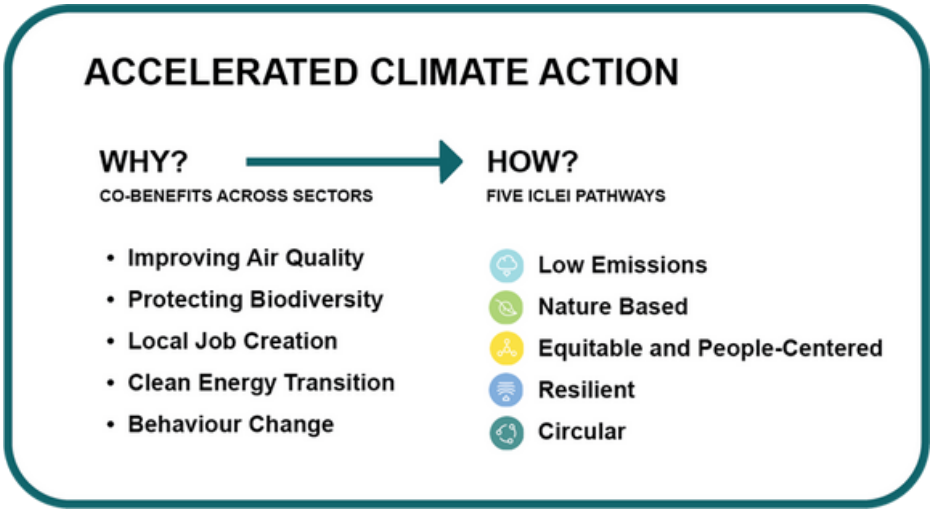


Figure 3: Co-Benefits and ICLEI Pathways to Accelerated Climate Action

ICLEI GreenClimateCities Framework

For this inventory, Albany's process is informed by ICLEI's GreenClimateCities Framework for integrated climate action. The stepwise approach shown below in Figure 3, which involves collecting and analyzing climate data, action, implementation, leadership, and collaboration—always with an equity lens.

The Framework is organized into Analyze, Act, and Accelerate phases for communities pursuing integrated climate action. The Framework incorporates greenhouse gas emissions reductions, climate adaptation actions, and equitable, inclusive decision-making. Albany's inventory has Science-Based Targets [3] and falls under Step C- Analyze and set a baseline.

Over 600 U.S. communities have followed this basic Framework, previously known as ICLEI's Five Milestones for Emissions Management, and today, it is represented through the streamlined Analyze-Act-Accelerate model shown below.

Figure 4: ICLEI GreenClimateCities Framework

[3] Science-Based Targets are calculated climate goals, in line with the latest climate science, that represent your community's fair share of the ambition necessary to meet the Paris Agreement commitment of keeping warming below 1.5°C. To achieve this goal, the Intergovernmental Panel on Climate Change (IPCC) states that we must reduce global emissions by 50% by 2030 and achieve climate neutrality by 2050. Equitably reducing global emissions by 50% requires that high-emitting, wealthy nations reduce their emissions by more than 50%.

Inventory Methodology

Understanding a Greenhouse Gas Emissions Inventory

The first step toward achieving tangible greenhouse gas (GHG) emission reductions requires identifying baseline emissions levels and sources and activities generating emissions in the community. This report presents emissions from the community as a whole. The government operations inventory is mostly a subset of the community inventory, as shown in Figure 3. For example, data on commercial energy use by the community include energy consumed by municipal buildings, and community vehicle-miles-traveled estimates include miles driven by municipal fleet vehicles.

As local governments continue to join the climate protection movement, the need for a standardized approach to quantify GHG emissions has proven essential. This inventory uses the approach and methods provided by the U.S. Community Protocol for Accounting and Reporting Greenhouse Gas Emissions (Community Protocol) and the Local Government Operations Protocol for Accounting and Reporting Greenhouse Gas Emissions (LGO Protocol), both of which are described below.

Figure 5: Relationship of Community and Government Operations Inventories

Three greenhouse gases are included in this inventory: carbon dioxide (CO2), methane (CH4) and nitrous oxide (N2O). Many of the charts in this report represent emissions in "carbon dioxide equivalent" (CO2e) values, calculated using the Global Warming Potentials (GWP) for methane and nitrous oxide from the IPCC 6th Assessment Report.

Table 1: Global Warming Potential Values (IPCC, 2021)

Greenhouse Gas	Global Warming Potential
Carbon Dioxide (CO2)	1
Methane (CH4) (Fossil Origin)	29.8
Methane (CH4) (Non-Fossil Origin)	27.2
Nitrous Oxide (N2O)	273

Community Emissions Protocol

Version 1.2 of the U.S. Community Protocol for Accounting and Reporting GHG Emissions [4] was released by ICLEI in 2019, and represents a national standard in guidance to help U.S. local governments develop effective community GHG emissions inventories. It establishes reporting requirements for all community GHG emissions inventories, provides detailed accounting guidance for quantifying GHG emissions associated with a range of emission sources and community activities, and provides a number of optional reporting frameworks to help local governments customize their community GHG emissions inventory reports based on their local goals and capacities.

The community inventory in this report includes emissions from the five Basic Emissions Generating Activities required by the Community Protocol. These activities are:

- Use of electricity by the community
- Use of fuel in residential and commercial stationary combustion equipment
- On-road passenger and freight motor vehicle travel
- Use of energy in potable water and wastewater treatment and distribution
- Generation of solid waste by the community

The community inventory also includes the following activities:

- Public transit travel and fuel use
- Biologic treatment of waste generated by the community
- Combustion and flaring of landfill gas
- Process emissions from wastewater treatment and effluent discharge
- Combustion and flaring of digester gas
- Emissions from septic systems
- Fugitive emissions from natural gas distribution

Local Government Operations (LGO) Protocol

In 2010, ICLEI, the California Air Resources Board (CARB), and the California Climate Action Registry (CCAR) released Version 1.1 of the LGO Protocol [5]. The LGO Protocol serves as the national standard for quantifying and reporting greenhouse emissions from local government operations. The purpose of the LGO Protocol is to provide the principles, approach, methodology, and procedures needed to develop a local government operations greenhouse gas emissions inventory.

The following activities are included in the LGO inventory:

- Electricity and natural gas consumption from buildings & facilities and street lights & traffic signals
- On-road transportation from employee commute, vehicle fleet, and transit fleet
- Government owned/operated landfill emissions

[4] ICLEI. 2012. US Community Protocol for Accounting and Reporting Greenhouse Gas Emissions. Retrieved from http://www.icleiusa.org/tools/ghg-protocol/community-protocol

[5] ICLEI. 2008. Local Government Operations Protocol for Accounting and Reporting Greenhouse Gas Emissions. Retrieved from https://icleiusa.org/ghg-protocols/

Quantifying Greenhouse Gas Emissions

Sources and Activities

Communities contribute to greenhouse gas emissions in many ways. Two central categorizations of emissions are used in the community inventory: 1) GHG emissions that are produced by "sources" located within the community boundary, and 2) GHG emissions produced as a consequence of community "activities."

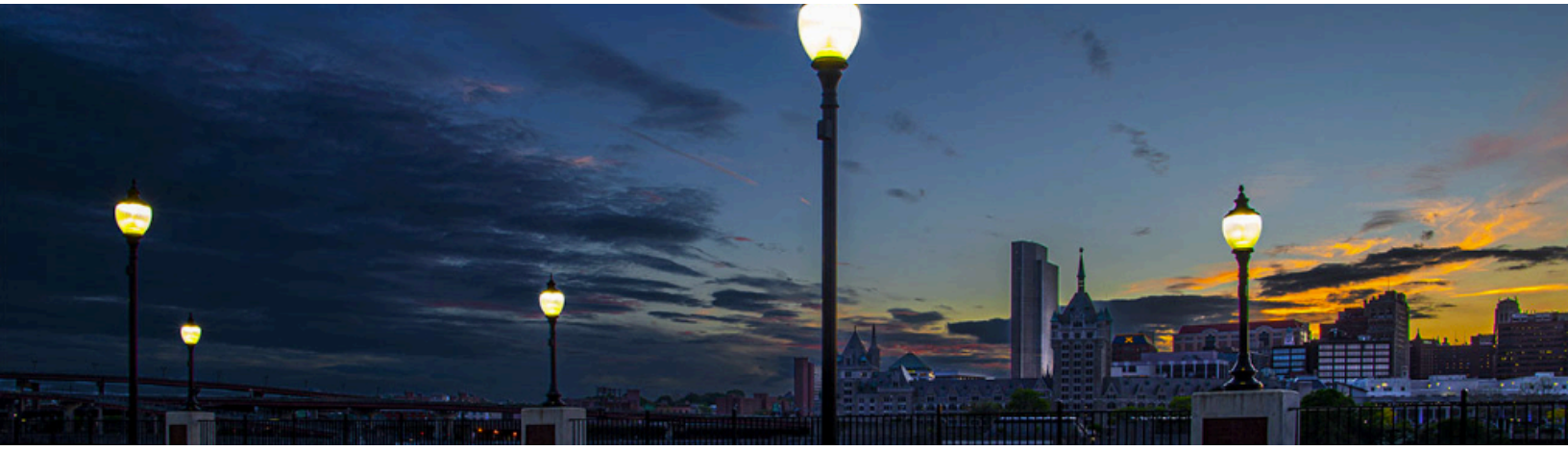
Table 2: Source vs. Activity for Greenhouse Gas Emissions (GHG)

Source	Activity
Any physical process inside the jurisdictional boundary that releases GHG emissions into the atmosphere.	The use of energy, materials (solid waste), and/or services by members of the community that result in the creation of GHG emissions.

Activities within a community include, but are not limited to: heating of homes, driving cars, and throwing away trash. Sources are where the emissions from those activities occur, which may or may not be the same place the activity occurs. When you drive your car, the source is the car's tailpipe. Similarly, when a gas furnace in your home runs, the source is the exhaust vent of the furnace. On the other hand, when you throw away trash the source is at the landfill the trash is sent to. When you flip a switch and use electricity, the source is the power plant where the electricity is generated. Because landfills and power plants are usually located outside the community, careful inclusion of both sources and activities provides a fuller picture of community emissions.

Base Year

The inventory process requires the selection of a base year with which to compare current emissions. Albany's LGO greenhouse gas emissions inventory utilizes 2023 as its baseline year because it is the most recent year for which the necessary data are available.



Quantification Methods

GHG emissions can be quantified in two ways:

- Measurement-based methodologies refer to the direct measurement of GHG emissions (from a monitoring system) emitted from a flue of a power plant, wastewater treatment plant, landfill, or industrial facility.
- Calculation-based methodologies calculate emissions using activity data and emission factors. To calculate emissions accordingly, the basic equation below is used:

Activity Data x Emission Factor = Emissions

Most emissions sources in this inventory are quantified using calculation-based methodologies. Activity data refer to the relevant measurement of energy use or other GHG-generating processes such as fuel consumption by fuel type, metered annual electricity consumption, and annual vehicle miles traveled. Please see the appendices for a detailed listing of the activity data used in composing this inventory.

Known emission factors are used to convert energy usage or other activity data into associated quantities of emissions. Emissions factors are usually expressed in terms of emissions per unit of activity data (e.g. lbs CO2/kWh of electricity). For this inventory, calculations were made using ICLEI's ClearPath Climate Planner tool.

Community Emissions Inventory Results

The total community-wide emissions for the 2023 inventory are shown in Table 3 and Figure 6.

Table 3: Community-Wide Emissions Inventory

Sector	Fuel or Source	2023 Usage	Usage Unit	2023 Emissions (MT CO2e)
Residential Energy	Electricity	591,823	MWh	83,475
	Natural Gas	27,500,882	Therms	146,259
	Distillate Fuel Oil No. 2	62,074	MMBtu	4,622
	HGL	33,072	MMBtu	2,052
	Kerosene	1,518	MMBtu	115
Residential Energy Total				**236,523**
Commercial Energy	Electricity	613,501	MWh	86,532
	Natural Gas	31,303,073	Therms	166,480
	Distillate Fuel Oil No. 2	786,358	MMBtu	58,547
	HGL	169,543	MMBtu	10,522
	Kerosene	3,229	MMBtu	244
	Wood	159,855	MMBtu	1,557
Commercial Energy Total				**323,883**
Industrial Energy	Electricity	471,124	MWh	66,450
	Natural Gas	6,358,700	Therms	33,748
	Distillate Fuel Oil No. 2	3,000	Gallons	31
Industrial Energy Total				**100,229**
Transportation & Mobile Sources	On-Road Gasoline	710,322,984	VMT	286,419
	On-Road Diesel	84,867,905	VMT	122,240
	Public Transit Gasoline	421,018	VMT	494
	Public Transit Diesel	1,169,576	VMT	2,654
	Public Transit Electricity	12,119	VMT	1
Transportation & Mobile Sources Total				**411,808**

Table 3: Community-Wide Emissions Inventory (Continued)

Sector	Fuel or Source	2023 Usage	Usage Unit	2023 Emissions (MT CO2e)
Solid Waste	Landfilled Waste	40,058	Tons	18,833*
	Composting	3,000	Tons	414
	Combustion of Landfill Gas	169,201,106	Cubic Feet / Year	22
	Flaring of Landfill Gas	985,257	Cubic Feet / Day	1,790
Solid Waste Total				**21,059**
Water & Wastewater	Potable Water Electricity	279,490	kWh	39
	Wastewater Treatment Electricity	9,378,699	kWh	1,323
	Wastewater Treatment Natural Gas	333,924	Therms	1,776
	Process N2O from Wastewater Treatment	101,228	Population Served	242
	Process N2O from Effluent Discharge	101,228	Population Served	639
	Combustion of Digester Gas	101,228	Population Served	6
	Flaring of Digester Gas	101,228	Population Served	122
	Septic Systems	163	Population Served	19
Water & Wastewater Total				**4,167**
Process & Fugitive Emissions	Fugitive Emissions from Natural Gas Distribution	65,496,579	Therms	12,094
Process & Fugitive Emissions Total				**12,094**
Total Gross Emissions				**1,109,762**

*Emissions for the Albany Landfill differ between the inventories due to protocol requirements. The U.S. Community Protocol requires end-of-life emissions associated with disposal of waste generated by members of the community during the analysis year.

Figure 6 shows the distribution of community-wide emissions by sector. Transportation & Mobile Sources is the largest contributor, followed by Commercial Energy & Residential Energy.

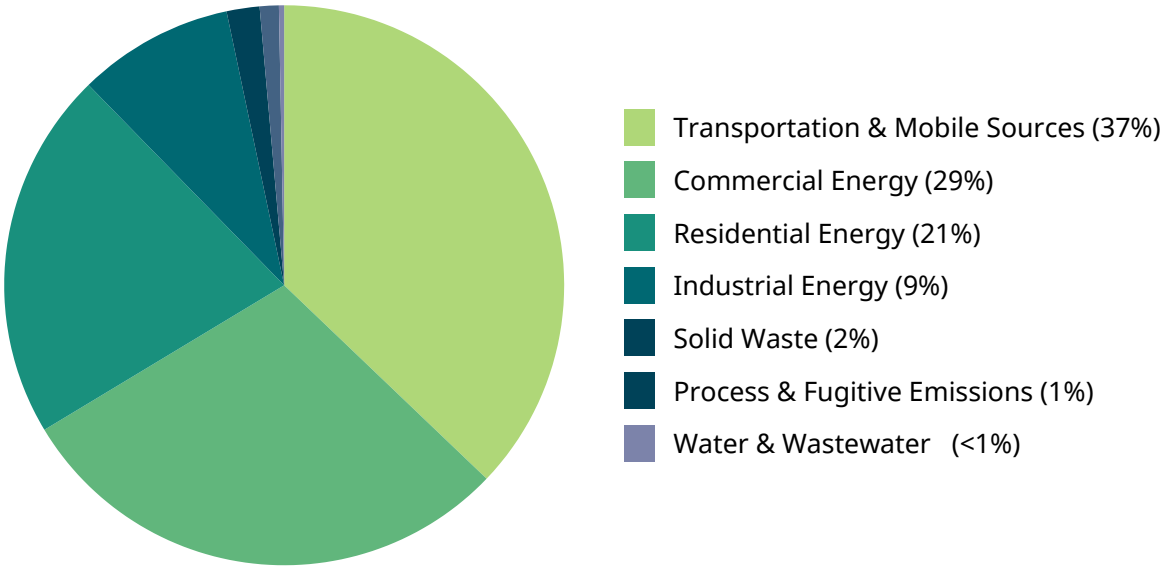


Figure 6: Community-Wide Emissions by Sector

Next Steps

The inventory should be used to focus and prioritize actions to reduce emissions. Based on the inventory results, ICLEI recommends the following high-impact actions (HIA) with the greatest potential for emissions reduction:

- Transportation & Mobile Sources
  - High-level VMT reduction - Generic reduction achieved through increased transit use, expansion of walking and bike infrastructure, and other alternative mode incentives
  - On-road electric vehicle (EV) adoption - Based on nationwide EV sales projections
- Residential/Commercial Energy
  - Building efficiency improvements - Existing buildings receive equipment upgrades through renovations and turnover; New buildings meet latest energy codes
  - Building electrification - New and existing buildings with natural gas and non-utility fuel equipment and appliances experience major retrofits or replacements with electric equipment and appliances

Completion of another GHG inventory in two to five years is recommended to assess progress resulting from any actions implemented. The detailed methodology section of this report, as well as notes and attached data files in the ClearPath Climate Planner tool and a master data Excel file provided to Albany, will be helpful to complete a future inventory consistent with this one.

Government Operations Emissions Inventory Results

The total government operations emissions for the 2023 inventory are shown in Table 4 and Figure 7.

Table 4: Government Operations Emissions Inventory

Sector	Fuel or Source	2023 Usage	Usage Unit	2023 Emissions (MT CO2e)
Buildings & Facilities	Electricity	4,345,271	kWh	613
	Natural Gas	303,483	Therms	1,614
Buildings & Facilities Total				**2,227**
Street Lights & Traffic Signals	Electricity	5,239,211	kWh	739
Street Lights & Traffic Signals Total				**739**
Vehicle Fleet	Gasoline	223,761	Gallons	1,965
	Diesel	151,408	Gallons	1,546
Vehicle Fleet Total				**3,511**
Transit Fleet	Gasoline	421,018	VMT	494
	Diesel	1,169,576	VMT	2,654
	Electricity	12,119	VMT	1
Transit Fleet Total				**3,149**
Employee Commute	Gasoline	4,753,556	VMT	1,648
	Diesel	51,114	VMT	29
	Transit	357,795	Passenger Miles	21
Employee Commute Travel Total				**1,697**
Solid Waste Facilities	Government Owned/Operated Landfill	2,062	CH4 MT	56,088*
	Composting	3,000	Tons	212
	Electricity	555,583	kWh	78
Solid Waste Facilities Total				**56,379**

*Emissions for the Albany Landfill differ between the inventories due to protocol requirements. The Local Government Operations Protocol requires the reporting of all scope 1 fugitive emissions, including CH4 from solid waste landfills.

Table 4: Government Operations Emissions Inventory (Continued)

Sector	Fuel or Source	2023 Usage	Usage Unit	2023 Emissions (MT CO2e)
Water & Wastewater Treatment Facilities	Potable Water Electricity	279,490	kWh	39
	Water Department Electricity	2,155,513	kWh	304
	Water Department Natural Gas	40,854	Therms	217
	Septic Systems	2	Population Served	0
Water & Wastewater Total				**561**
Process & Fugitive Emissions	Fugitive Emissions from Natural Gas Distribution	344,337	Therms	58
Process & Fugitive Emissions Total				**58**
Total Government Operations Emissions				**68,321**

Figure 7 shows the distribution of Government Operations emissions by sector. Solid Waste Facilities is the largest contributor, followed by Vehicle Fleet and Transit Fleet.

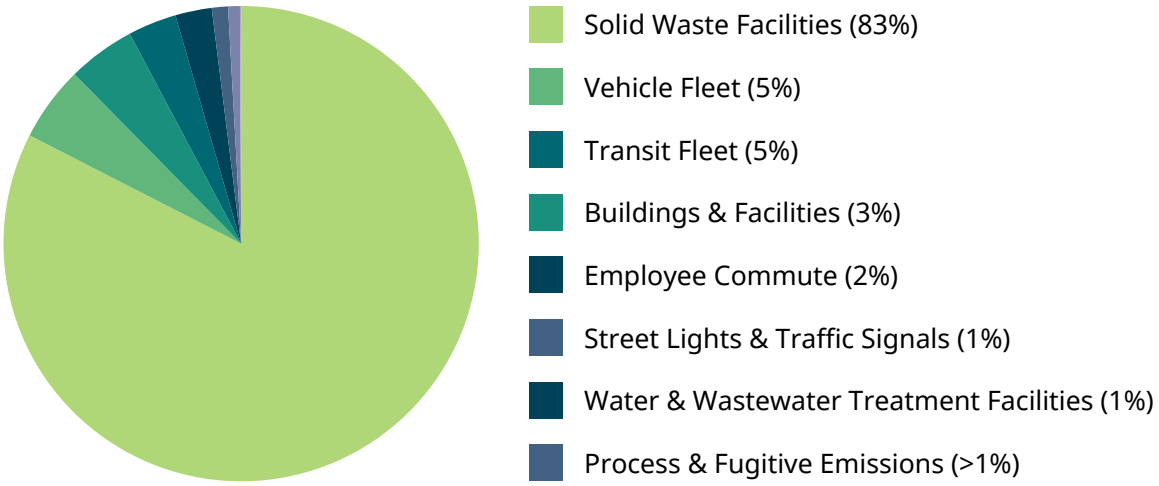


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Figure 7: Local Government Operations Emissions by Sector

Next Steps

The inventory should be used to focus and prioritize actions to reduce emissions. Based on the inventory results, the following areas have the greatest potential for emissions reduction:

- Vehicle Fleet
  - Convert on-road gasoline/vehicle fleet to electric
  - Purchase higher efficiency vehicle models or “right-size” vehicles for trip purposes, such as smaller vehicles for passenger transportation
- Buildings & Facilities
  - Retro-Commissioning - Upgrade inefficient and outdated equipment to the latest, most efficient models to save energy
  - Install solar panels at government facilities
- Employee Commute
  - Discount transit for municipal employees
  - Incentivize employee carpooling

Completion of another GHG inventory in two to five years is recommended to assess progress resulting from any actions implemented. The detailed methodology section of this report, as well as notes and attached data files in the ClearPath Climate Planner tool and a master data Excel file provided to Albany, will be helpful to complete a future inventory consistent with this one.

Greenhouse Gas Emissions Forecasts

Albany's most recent community-wide greenhouse gas (GHG) inventory includes emissions from activities and sources that took place within the city during the 2023 calendar year. Using the 2023 GHG inventory as a baseline, ICLEI prepared a basic "business-as-usual" forecast for 2030.

Business-As-Usual (BAU) Forecast

The BAU forecast (Figure 8) is a projection of emissions through the year 2030. The projected emissions estimated population growth [6], changes in automotive fuel efficiency standards [7], and changes to the carbon intensity of grid electricity [8].

Albany's 2023 emissions were 1,109,762 Metric Tons Carbon Dioxide equivalent (MT CO2e). Based on population growth, increasing on-road vehicle fuel efficiency, and utility decarbonization plans, Albany's 2030 emissions will be 955,262 MT CO2e. This is a 13.9% reduction in emissions.

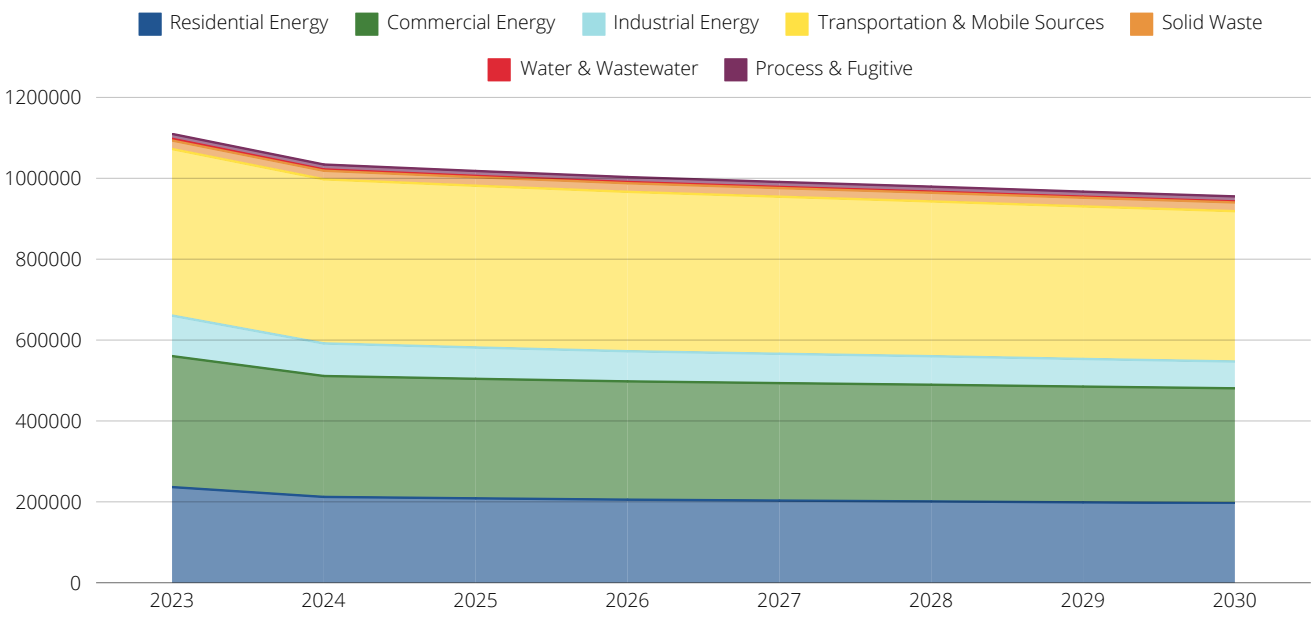


Figure 8: Business-As-Usual Forecast for Community-Wide Emissions from 2023-2030

[6] "2023 Population Estimates Released by the US Census" Capital District Regional Planning Commission
[7] ICLEI's Carbon Intensity Reference Sheet
[8] ICLEI's State Grid Intensity Projections

Conclusion

This inventory marks the completion of Step C - Analyze and Set a Baseline of the ICLEI GreenClimateCities Framework. The next steps are to set an emissions-reduction target and build upon the existing Community Plan with a more robust climate action plan that identifies specific quantified strategies that can cumulatively meet that target. Albany has already begun this process.

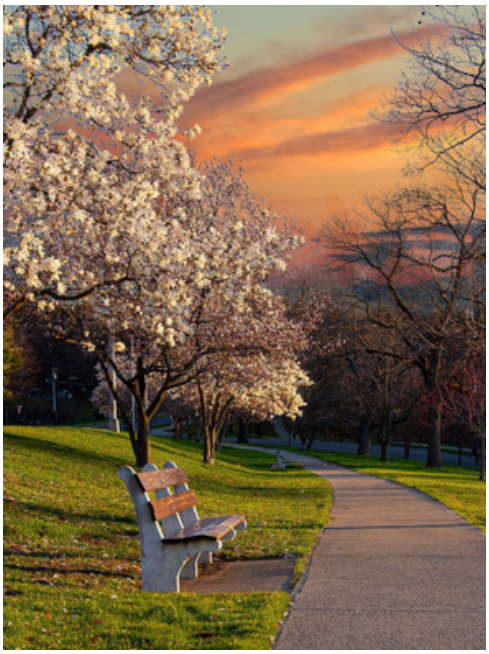
The Intergovernmental Panel on Climate Change (IPCC) states that to meet the Paris Agreement commitment of keeping warming below 1.5°C we must reduce global emissions by 50% by 2030 and reach climate neutrality by 2050. Equitably reducing global emissions by 50% requires that high-emitting, wealthy nations reduce their emissions by more than 50%. More than ever, it is imperative that countries, regions, and local governments set targets that are ambitious enough to slash carbon emissions between now and mid-century.

Science-Based Targets are calculated climate goals, in line with the latest climate science, that represent a community's fair share of the global ambition necessary to meet the Paris Agreement commitment. Community education, involvement, and partnerships will be instrumental to achieve a science-based target.

Albany's Science-Based Targets are yet to be determined, and will be defined by its Climate Action Plan.

Science-Based Targets are climate goals in line with the latest climate science. They represent the city's fair share of the ambition necessary to meet the Paris Agreement commitment to keep warming below 1.5°C [9].

In addition, Albany aims to track key energy use and emissions indicators on an on-going basis. It is recommended that communities update their inventories on a regular basis, especially as plans are implemented to ensure measurement and verification of impacts. Regular inventories also allow for "rolling averages" to provide insight into sustained changes and can help reduce the change of an anomalous year being incorrectly interpreted. This inventory shows that transportation patterns, as well as commercial and residential energy will be particularly important to focus on. Through these efforts and others, Albany can achieve environmental, economic, and social benefits beyond reducing emissions.



[9] "Science Based Climate Targets: A Guide for Cities." Science Based Targets Network, November 4, 2021. https://sciencebasedtargetsnetwork.org/.

Appendix: Methodology Details

Energy

Table 5: Energy Data Sources

Activity	Data Source	Data Gaps/Assumptions
Community-wide		
Residential, commercial, and industrial electricity consumption	New York State Energy Research and Development Authority (NYSERDA)	Data is aggregated from 2023 monthly data from NYSERDA's Utility Energy Registry
Residential, commercial, and industrial natural gas consumption		
Residential Non-utility Fuel Consumption	U.S. Energy Information Administration; U.S. Census Bureau	State-level consumption data is downscaled by household count for heating fuels
Commercial Non-utility Fuel Consumption	U.S. Energy Information Administration; U.S. Census Bureau	State-level consumption data is downscaled by commercial job counts
Industrial Non-utility Fuel Consumption	Environmental Protection Agency (EPA) Facility Level Information on Greenhouse gases Tool (FLIGHT)	N/A
Local Government Operations		
Electricity Consumption	City of Albany	N/A
Natural Gas Consumption		

Table 6: Projected Emission Factors for New York State Grid Electricity (2023 + eGrid 2022)

Emissions Factors for Electricity Consumption

Year	CO2 (lbs./MWh)	CH4 (lbs./GWh)	N2O (lbs./GWh)
2023	310	15	2

Transportation

Table 7: Transportation Data Sources

Activity	Data Source	Data Gaps/Assumptions
Community-wide		
On-road Transportation	Capital Region	Data is extrapolated annually from an average

Table 7: Transportation Data Sources (continued)

Activity	Data Source	Data Gaps/Assumptions
	Transportation Council; Replica	weekday in Fall 2021; Data is organized by fuel and vehicle type using ICLEI's Google EIE Transportation Directions/Template (Updated 7/2024) tool
Public Transit	Capital Region Transportation Council	Data is for the entire Capital District Transportation Authority system and downscaled by population to estimate the City of Albany allocation
Local Government Operations		
Government Vehicle Fleet	City of Albany	Only total fuel use was provided for 2023 - data was allocated to gasoline and diesel based on 2021 inventory fuel totals; VMT was not included, as Albany does not track this
Government Transit Fleet	Capital Region Transportation Council	Data is for the entire Capital District Transportation Authority system and downscaled by population to estimate the City of Albany allocation

For vehicle transportation, it is necessary to apply average miles per gallon and emissions factors for CH4 and N2O to each vehicle type. The factors used are shown in Table 8.

Table 8: MPG and Emissions Factors by Vehicle Type

Fuel	Vehicle Type	MPG	CH4 (g/mile)	N2O (g/mile)
Gasoline	Passenger car	25.3	0.0084	0.0069
Gasoline	Light truck	18.2	0.0117	0.0087
Gasoline	Heavy truck	5.383557	0.0719	0.0611
Gasoline	Motorcycle	44	0.0084	0.0069
Diesel	Passenger car	25.3	0.0005	0.001
Diesel	Light truck	18.2	0.001	0.0015

Fuel	Vehicle Type	MPG	CH4 (g/mile)	N2O (g/mile)
Gasoline	Heavy Truck	6.561615	0.0051	0.0048

Wastewater

Table 9: Wastewater Data Sources

Activity	Data Source	Data Gaps/Assumptions
Community-wide		
Wastewater Treatment Energy Use	City of Albany Community-Scale Inventory (2019)	Albany County Water Purification District did not respond - data from previous inventory scaled to 2023 by population
Process Emissions from Wastewater Treatment & Effluent Discharge		Nitrification answered no incorrectly in previous inventory - changed to yes per Capital Improvement Plan Engineering Report (June 2023)
Combustion/Flaring of Digester Gas		ClearPath defaults used for fraction of CH4 and destruction efficiency; Energy recovery from combustion unknown as there is no information in annual report
Fugitive Emissions from Septic Systems		Data is copied as Albany officials mentioned there was likely minimal change, if any
Local Government Operations		
Electricity Consumption	City of Albany	N/A
Natural Gas Consumption		
Fugitive Emissions from Septic Systems	City of Albany Community-Scale Inventory (2019)	Represents two city-owned buildings on septic -> Alcove & Feura Bush Filtration Plant. (Not in the City but are city owned)

Potable Water

Table 10: Potable Water Data Sources

Activity	Data Source	Data Gaps/Assumptions
Community-wide & Local Government Operations		
Supply of Potable Water Energy Use	City of Albany Department of Water	Metered volume of water used over unmetered

Solid Waste

Table 11: Solid Waste Data Sources

Activity	Data Source	Data Gaps/Assumptions
Community-wide		
Landfilled Waste	CHA Consulting	Waste from other communities not attributed to Albany's emissions and removed
Composting		Tonnage estimated from cubic yards
Combustion/Flaring of Landfill Gas		Albany's ratio of total waste applied to total combusted and flared gas to estimate emissions attributed to Albany
Local Government Operations		
Government Owned/Operated Landfill	EPA FLIGHT	2023 FLIGHT data unavailable - 2022 used in its place
Electricity Consumption	City of Albany	N/A

Fugitive Emissions

Table 12: Fugitive Emissions Data Sources

Activity	Data Source	Data Gaps/Assumptions
Community-wide and Local Government Operations		
Fugitive Emissions from Natural Gas Distribution	New York State Energy Research and Development Authority (NYSERDA)	ClearPath defaults used for natural gas characteristics inputs

Inventory Calculations

The 2023 inventory was calculated following the US Community Protocol and ICLEI's ClearPath Climate Planner software. As discussed in Inventory Methodology, the IPCC 6th Assessment was used for global warming potential (GWP) values to convert methane and nitrous oxide to CO2 equivalent units. ClearPath Climate Planner Climate Planner's inventory calculators allow for input of the sector activity (i.e. kWh or VMT) and emission factor to calculate the final carbon dioxide equivalent (CO2e) emissions.