# City of Akron Greenhouse Gas Inventory Report

Prepared in 2025 by Power A Clean Future Ohio using 2023 emissions data

Power A Clean Future Ohio
LOCAL COMMUNITIES LEADING THE WAY

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# Letter from Mayor Shammas Malik

Dear Akron Community Members,

I am proud to present our city's latest Greenhouse Gas (GHG) Inventory – the first comprehensive assessment of GHG emissions for our community in nearly 15 years. This inventory provides a critical snapshot of where we stand today, making it a foundational first step toward the bold climate action we must take together.

Over the past 15 years, our city has made meaningful progress in reducing GHG emissions and improving sustainability. This report highlights successes from landfill diversion, energy efficiency, wastewater process innovations, and many other initiatives. These achievements demonstrate that sustained effort and collaboration can deliver measurable results for our environment and our community.

Understanding our GHG emissions is essential to creating effective strategies to further reduce our environmental impact. This inventory captures emissions from across the community – from energy consumption and transportation to waste and industrial processes – providing a clear picture of the challenges and opportunities ahead.

The insights in this inventory will directly inform the next critical step in our journey: developing and publishing the city's first formal Climate Action Plan. This 12-15-month effort will leverage GHG data and reduction scenario modeling while engaging residents, businesses, and community partners to identify strategies that not only reduce greenhouse gas emissions but improve quality of life for Akronites – housing upgrades, utility bill savings, public health improvements, and increased resilience against climate change threats.

I want to thank all of the city staff who contributed to the effort of creating this GHG inventory. Your commitment is helping to chart a path toward a cleaner, healthier, and more prosperous future for everyone in our city.

This inventory is just the beginning. As we take the next steps, I encourage every member of our community to review this inventory and engage in the climate action planning process. Together, with the residents, businesses, and organizations that call Akron home, we can create a thriving future and safeguard our environment for generations to come.

Sincerely,

Mayor Shammas Malik

# Introduction

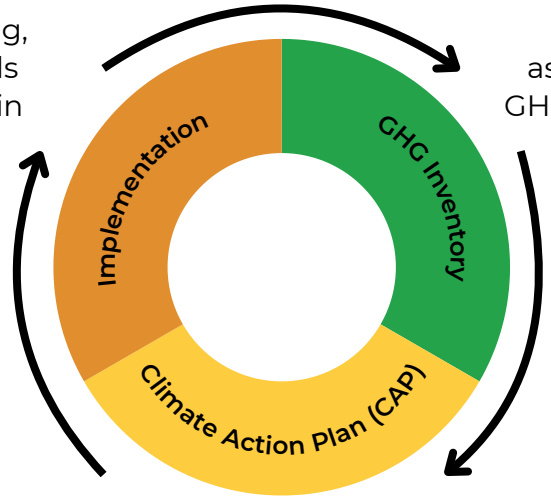
## Updating Akron's Greenhouse Gas Emissions Inventory

The City of Akron conducted its first data collection process and inventory in 2008 to determine the sources of local greenhouse gas (GHG) emissions, using 2005 GHG emissions data.[1] The City conducted a follow-up inventory in 2011 using 2009 GHG emissions data.[2] Akron is renewing its commitment to tracking GHG emissions over time and has developed an updated greenhouse gas emissions inventory in 2025 quantifying GHGs emitted in the year 2023.

A GHG inventory is a snapshot-in-time accounting of the GHG emissions associated with activities happening within a specific boundary. For a city like Akron, that entails everything related to life unfolding – vehicles transporting people and goods, houses and buildings using energy to function, businesses and organizations operating, the City conducting operations, waste being produced and managed, and so forth. Quantifying Akron's GHG emissions helps the City and community understand the current state of GHG emissions, measure and track GHG reduction progress, make informed decisions about GHG reduction goals and strategies, and assess the effectiveness of those strategies over time.

### Climate Action Planning Process

Implementing, executing, and managing the goals and initiatives outlined in the CAP

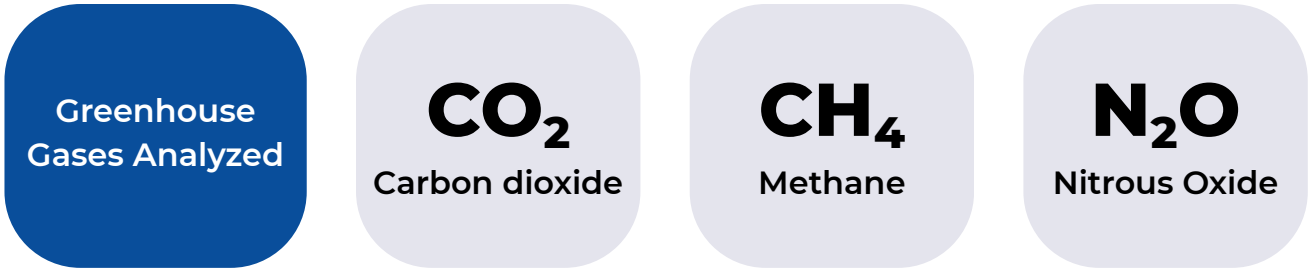



Measuring, tracking, assessing, and reporting GHG emissions and climate impacts

Engaging with experts and communities to prioritize issues and objectives while developing and refining the CAP

[1] City of Akron, Greenhouse Gas Analysis (September, 2008).
[2] City of Akron 2011 Greenhouse Gas Inventory (June, 2011). See also, Greenprint for Akron (March, 2012).

The City of Akron's Greenhouse Gas Inventory quantifies GHGs emitted in 2023 and provides a comprehensive overview comprised of the most common and impactful greenhouse gases: carbon dioxide ($CO_2$), methane ($CH_4$), and nitrous oxide ($N_2O$). These gases vary in their global warming potential (GWP), so emissions are standardized and reported in metric tons of carbon dioxide equivalents (MT $CO_2e$) to ensure consistency and comparability.




This inventory is an essential step in understanding Akron's current GHG profile, identifying new opportunities for meaningful emissions reductions, and tracking progress over time.

The inventory was developed in 2025 with support from Power a Clean Future Ohio through its no-cost technical assistance program and was conducted using the U.S. Environmental Protection Agency's (EPA) Local GHG Inventory Tool. This tool aligns with global and national protocols, including the Global Protocol for Community-Scale GHG Emission Inventories (GPC) and the International Local Government GHG Emissions Analysis Protocol (IEAP). Where available, data necessary to calculate GHG emissions were provided directly by the City of Akron. Where gaps existed, reasonable estimates were used to produce a full and accurate picture of GHG emissions across key sectors—Residential, Commercial, Industrial, and Energy Generation. GHG emissions from city operations are included in the commercial sector when viewed through a community-wide lens.[3] See Appendix A: Methodology of the City of Akron's GHG Inventory for more detailed methodology information.

[3] This inventory was created for the City of Akron with available data and reasonable estimates synthesized through the U.S. EPA Local GHG Inventory Tool and follows global and national best practices. GHG emissions were not captured using real-time point-source monitoring. By relying on the EPA Local GHG Inventory Tool and carrying out the principles of the GPC and IEAP, this inventory represents a complete and reliable snapshot-in-time of GHG emissions in Akron that was created by experts and can be replicated in future years.

# Akron Action:
# Progress on GHG Emissions Reductions

## Landfill Diversion Efforts

For many years, the City of Akron has worked to divert municipal solid waste from landfill facilities. For example, the City of Akron has collected and diverted leaves every fall to be beneficially reused as high-quality compost. City staff collects approximately 45,000 cubic yards of fallen leaves from residents annually, which is about 150 dump trucks full of leaves. The leaves are then turned into approximately 17,000 cubic yards of compost every year. It is estimated this waste diversion from landfills helps the City of Akron avoid approximately 835 MT $CO_2e$ annually.[4]

At the City of Akron's Drinking Water Supply Plant, solid particles are settled out during the water treatment process. Instead of being disposed of in a landfill, the particles become sludge that is pumped to drying basins. After fully drying, the material is hauled away to be beneficially reused as landscape topsoil. This unique EPA-approved sustainable process avoids approximately 14,000 short tons of landfill waste annually and saves nearly $1 million a year.

In addition, the City of Akron has more effectively diverted recyclables from landfills over time. In 2019, the City of Akron's recycling contamination rate – meaning, the percentage of residents' curbside recycling cart contents that was actually not recyclable – was nearly 40%. In partnership with Keep Akron Beautiful, the City of Akron developed Recycle Right, an educational campaign designed to improve the quality of recycling in curbside carts by providing residents with personalized education and feedback. Additionally, the City of Akron launched a glass drop off program for residents to recycle their glass. This drop off program avoids contamination from broken glass in single stream curbside recycling and ensures effective landfill diversion of recyclables overall.

Together, these efforts have been impactful and successful, reducing the recycling contamination rate to just 12% as of 2024. Because of this achievement, the City of Akron is more effectively diverting waste from landfill facilities. In 2024 alone, Akron diverted over 4,155 MT of waste from entering landfills through its curbside recycling and glass drop-off programs. In so doing, the City avoided

[4] 3 cubic yards of leaves equals about 225 pounds. Converted from volume to mass, total leaves collected in 2023 equaled about 1,687.5 short tons (st). Conversion figures from U.S. EPA Standard Volume-to-Weight Conversion Factors Document. GHG emissions data estimated using U.S. EPA WARM Tool, v16.

emitting about 925 MT $CO_2e$.[5] That amount of GHG avoidance is about the same as removing 216 gasoline-powered passenger vehicles from roadways for a year.[6] The enhancements have proven financially sustainable, too. A recycling program that once cost the City more than $205,000 annually in contamination fees has been transformed into an effective one that generated more than $56,000 in revenue in 2024.

## Tree Planting and Forestry Management

The City of Akron plays a key role in tree planting and tree canopy management – both inside city limits and on watershed properties it owns outside city limits.

Inside city limits, the City of Akron plants approximately 1,800 trees annually in devil strips (the grassy area between the street and the sidewalk) across Akron. In addition to planting new trees each year, City staff manages and cares for these "street trees" on an ongoing basis. In 2024, six employees maintained 55,000 street trees. Those street trees directly remove over 272 MT $CO_2e$ on average from the atmosphere every year.[7] Altogether, Akron's street trees and the broader tree canopy throughout the city remove on average over 46,000 MT $CO_2e$ from the atmosphere per year.

In addition, the City of Akron manages about 12,000 acres of forest and woody wetlands at its watershed properties beyond city limits. It has worked to create a long-term forestry management plan that addresses both short- and long-term strategies and goals to manage City-owned lands in perpetuity.

As part of that long-term forestry management plan, the City of Akron plants approximately 3,000 tree saplings annually. City staff focuses on selecting hearty, resilient, and native species, with many factors in mind, including: a changing climate; threats from pests and disease; biodiversity; the health of the forest and wetlands; and the health and quality of the Cuyahoga River.

The City of Akron cares for these trees with the objective of keeping the forest healthy. To do so, city teams practice sustainable forest management, invasive species removal, and pest and disease protection while working to reconnect parts of the forest, maintain healthy aquatic and riparian environments, and more. As a result of the City's long-standing stewardship of these lands, there is a thriving tree canopy that removes about 43,100 MT $CO_2e$ from the atmosphere annually.

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[5] GHG emissions data estimated using U.S. EPA WARM Tool, v16.
[6] Data estimated using U.S. EPA Greenhouse Gas Equivalencies Calculator.
[7] $CO_2e$ sequestration data provided by the City of Akron using iTree data.

## Electric Aggregation Programs

Electric aggregation programs enable municipalities to negotiate electric rates and secure power on behalf of residents and organizations. Since 2021, the City of Akron has maintained carbon-free electric aggregation programs for residents, commercial businesses, and municipal facilities.[8]

The Community Electric Aggregation Program serves electricity consumers from the residential, commercial, and government operations sectors. In 2023, the Community Electric Aggregation Program provided about 380,225,000 kWh of carbon-free electricity to these users.[9]

The Municipal Facilities Electric Aggregation Program is a separate program serving municipal government accounts. A majority of the electricity derived from the Municipal Facilities Electric Aggregation Program is used to operate the City's Water Reclamation Facility and Water Plant. Other uses include illuminating City-owned parking garages, serving fire stations, and supporting City offices. In 2023, the Municipal Facilities Electric Aggregation Program provided about 35,636,000 kWh of carbon-free electricity.

In 2023, 415,860,000 total kWh were served by these electric aggregation programs together, enabling users throughout Akron to light their homes, operate their businesses, and perform critical infrastructure tasks emissions free. By using Akron's carbon-free electric aggregation programs, users saved 172,778 MT $CO_2e$ GHG emissions that otherwise would have been emitted using a traditional electricity mix from the grid.[10]

## Wastewater Treatment Operations

The City of Akron treats wastewater produced within Akron as well as wastewater produced by users in surrounding municipalities. The scope of these operations is vast, serving roughly 330,000 people across a 96-square-mile area.

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[8] Carbon-free electricity supplied through the City of Akron's current Community Electric Aggregation Program contract (May 2025 - June 2026) is derived from nuclear energy.

[9] For comparison, the average Ohio household used about 811 kWh per month, or about 9,732 kWh per year, in 2023 according to the U.S. Energy Information Administration (EIA).

[10] Electricity emissions are estimated using U.S. EPA's 2022 RFCW eGRID subregion emission factors. U.S. EPA's eGRID subregions are used to estimate the typical fuel mix of sources used to generate electricity in a particular geographic region. Akron, Ohio lies within the RFC West eGRID subregion.

The City of Akron has for many decades utilized beneficial reuse technologies to reclaim biosolids from its Water Reclamation Facility. In 2013, the City of Akron integrated anaerobic biodigestion – a process by which bacteria break down organic matter in the absence of oxygen, producing biogas – into its wastewater treatment process. With this in place, blended, thickened biosolids are pumped from the Water Reclamation Facility (WRF) to the City's Renewable Energy Facility where the anaerobic biodigesters are located. There, the biosolids enter the biodigesters at about 30% solids. Bacteria decompose the biosolids and generate methane gas in the process, which is captured, conditioned, and used to power operations at both the Renewable Energy Facility and the Water Reclamation Facility.

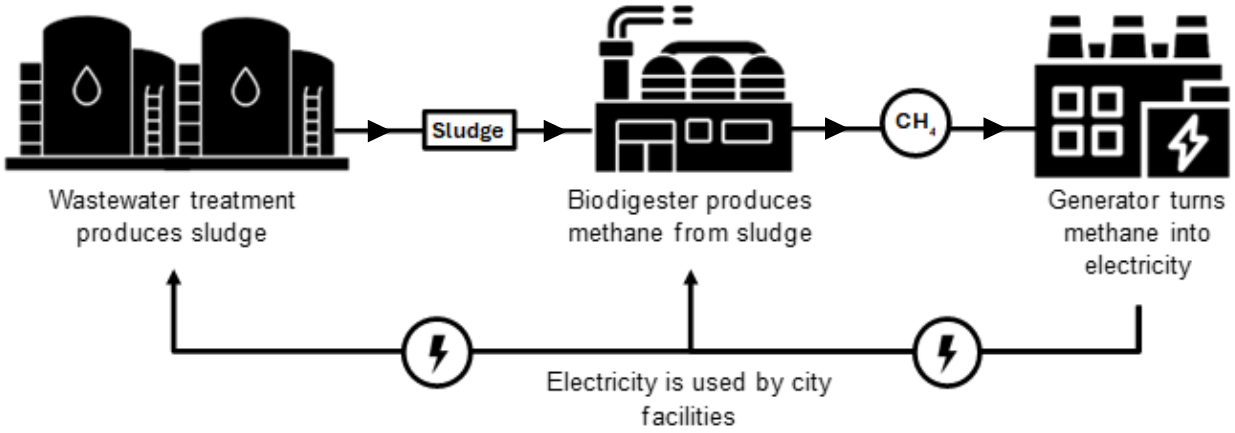



Figure: Process of capturing and beneficially reusing methane gas produced during biodigestion to power two City facilities – Water Reclamation Facility and Renewable Energy Facility.

The advanced operational flexibility at the Renewable Energy Facility allows staff to change and direct the end use of the biogas that's produced by the biodigesters. This operational flexibility prevents the need for flaring and avoids GHG emissions associated with the anaerobic treatment process.

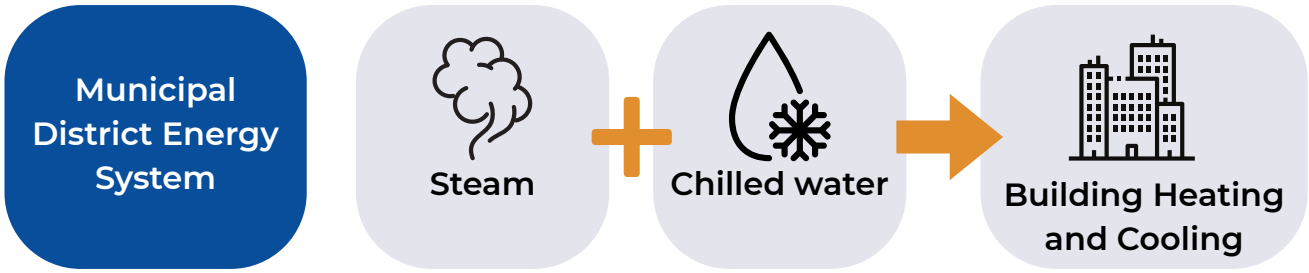
In addition to producing and capturing biogas for energy production, the biodigesters also help efficiently reuse biosolids as soil conditioner. The digested solids are dried, pelletized, and sold as soil conditioner. Before installing the biodigesters, the City of Akron created about 90,000 cubic yards of compost through its waste treatment process every year. That volume of product needed to be moved around the facility and transported away from the facility. It also required about 80,000 cubic yards of amendment to be transported into the facility each year. Now, with the anaerobic biodigesters, the City of Akron only creates 10,000 cubic yards of pelletized soil amendment product, which requires no additives or amendments to be trucked in. This enhancement has significantly reduced the number of trucks and truck trips affiliated with handling and transporting the end product – and that means the City of Akron reduced, and now continually avoids, the GHG emissions from all that prior trucking activity.

The City of Akron's wastewater treatment process has also been marked by a range of energy-efficient design choices and improvements over time. Those include:

- **Gravity-Based Wastewater Infrastructure**: Wastewater infrastructure, including intake to the WRF, largely relies on a gravity-based flow. The City of Akron only needs 36 pump stations for wastewater transport, which is a low number in the context of the 61 million gallons of average daily wastewater flow to the WRF. This gravity-based system enables the City of Akron's wastewater operations to avoid energy consumption, and the corresponding GHG emissions, that would otherwise be needed to pump wastewater to the WRF.
- **Efficient Aeration Basins**: The aerobic biological treatment of wastewater sludge is an essential part of the wastewater treatment process. The aeration process at Akron's WRF requires producing 40 million cubic feet per day of atmospheric air for introduction to the wastewater. It's not uncommon for this energy-intensive process to account for a significant portion of a wastewater plant's energy needs. In 2014, The City of Akron installed energy-efficient magnetic bearing blowers. Additionally, in 2019, the City of Akron introduced an efficient aeration system that physically produces smaller oxygen bubbles and instituted technology that prevents over-aeration. Together, these enhancements reduced the energy demand of the aeration process, and the corresponding GHG emissions. The blowers alone reduced energy consumption from the aeration process by about 300,000 kWh per month.
- **Efficient High-Solids Anaerobic Digesters**: In 2013, the City of Akron adopted anaerobic biodigestion to enhance the wastewater treatment process. Biosolids are pumped from the WRF to the Renewable Energy Facility, where they enter biodigesters at about 30% solids for anaerobic treatment. Because the anaerobic biodigester infrastructure was built for high-solids content, it requires just four tanks for biosolids, whereas a more traditional, low-solids biodigestion process would require about 12 tanks. That means, the City of Akron's biodigesters were built to require less energy – fewer tanks, less equipment, less pumping, thus reducing energy consumption-related emissions.
- **Heat Recovery for Anaerobic Digesters**: The individual tanks themselves are about one-third the size of traditional tanks. The small size results in reduced energy consumption compared to traditional tanks and low heat loss. In fact, the biodigester infrastructure was designed to ensure that the biodigesters could be heated by residual waste-heat from the engines. Only in the winter months do the biodigesters need to be heated traditionally. This energy-efficient design helps the City of Akron keep energy consumption low, avoiding the energy demand and associated GHG emissions required by more traditional anaerobic facilities.

## Municipal District Energy System

The City of Akron owns a municipal district energy system, which utilizes a central plant to produce steam and chilled water that is distributed to buildings through a network of underground pipes. The steam is used for participating buildings' heating needs, and the chilled water is used for their cooling needs. The efficient centralized system reduces or eliminates the need for the onsite burning of natural gas and the use of electricity for cooling at the buildings the system serves. The system has been third-party managed by Akron Energy Systems (AES) since 2010.



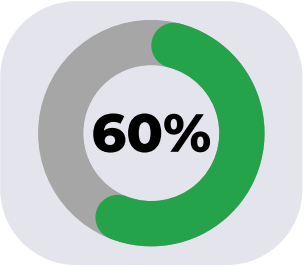

Akron's district energy system has become increasingly efficient over the years, helping to reduce GHG emissions over time. In 2005 and 2009, before AES took over operations, the district energy plant emitted roughly 115,212 MT $CO_2e$ and 103,419 MT $CO_2e$ respectively, primarily from coal combustion.

Since then, Akron's district energy system has undergone a major transformation. In 2015, AES replaced the system's coal-burning boilers with those that rely on cleaner natural gas, reducing emissions and operational expenses. AES has proactively sought further efficiencies, using infrared cameras to identify leaky underground steam transmissions lines, fixing and insulating faltering pipes, and regularly inspecting manhole covers.

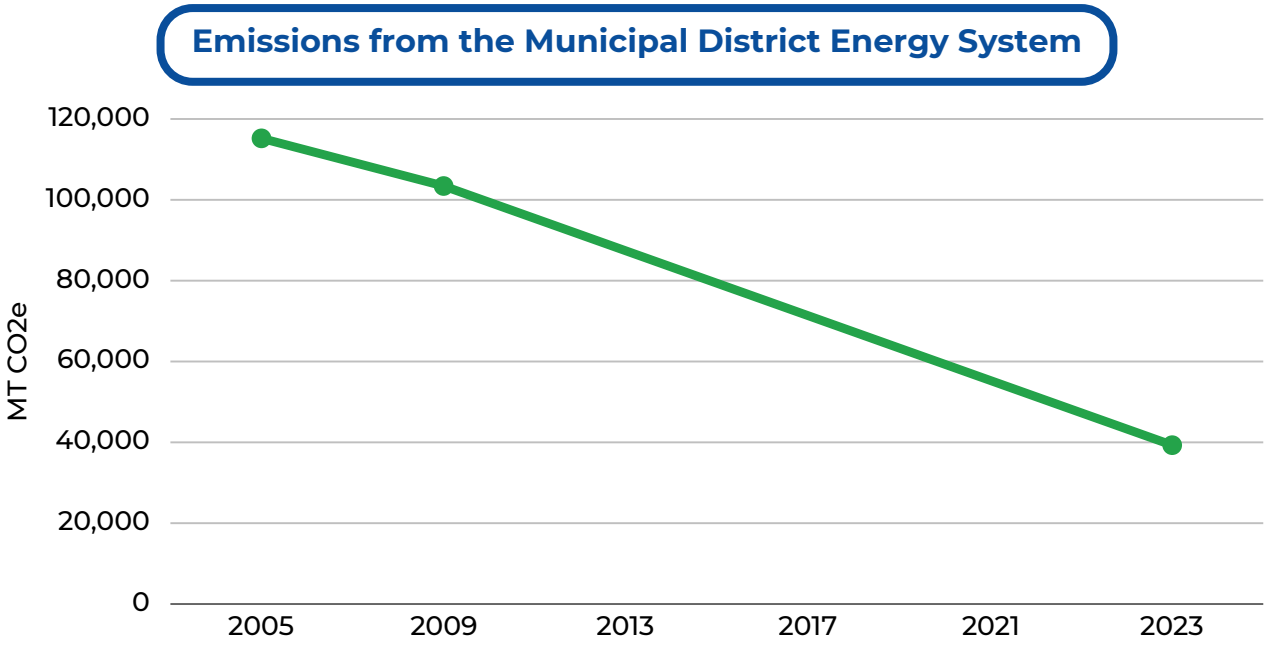
AES has also developed an innovative waste heat recovery apparatus, enabling the district energy system to recover waste heat and reuse it to serve commercial buildings. In fact, three commercial buildings in Akron are now served entirely by waste heat, which avoids energy production for their heating needs and the corresponding GHG emissions.

In addition, AES has helped the commercial buildings it serves to increase their energy efficiency over time. These efforts have reduced and avoided energy consumption and the corresponding GHG emissions. For example, AES recently provided new air cooling systems at the City of Akron's Summit Lake Community Center. Part of the work included extending air cooling to the community center's large gymnasium space. The changes were so energy efficient that, despite providing air cooling to a much larger square foot area, the Summit Lake Community Center's total consumption remains the same.

AES's advancements have significantly reduced GHG emissions from Akron's district energy system. In 2023, the district energy plant emitted about 41,586 MT $CO_2e$. This represents a 60% reduction in the district energy system's GHG emissions since 2009.



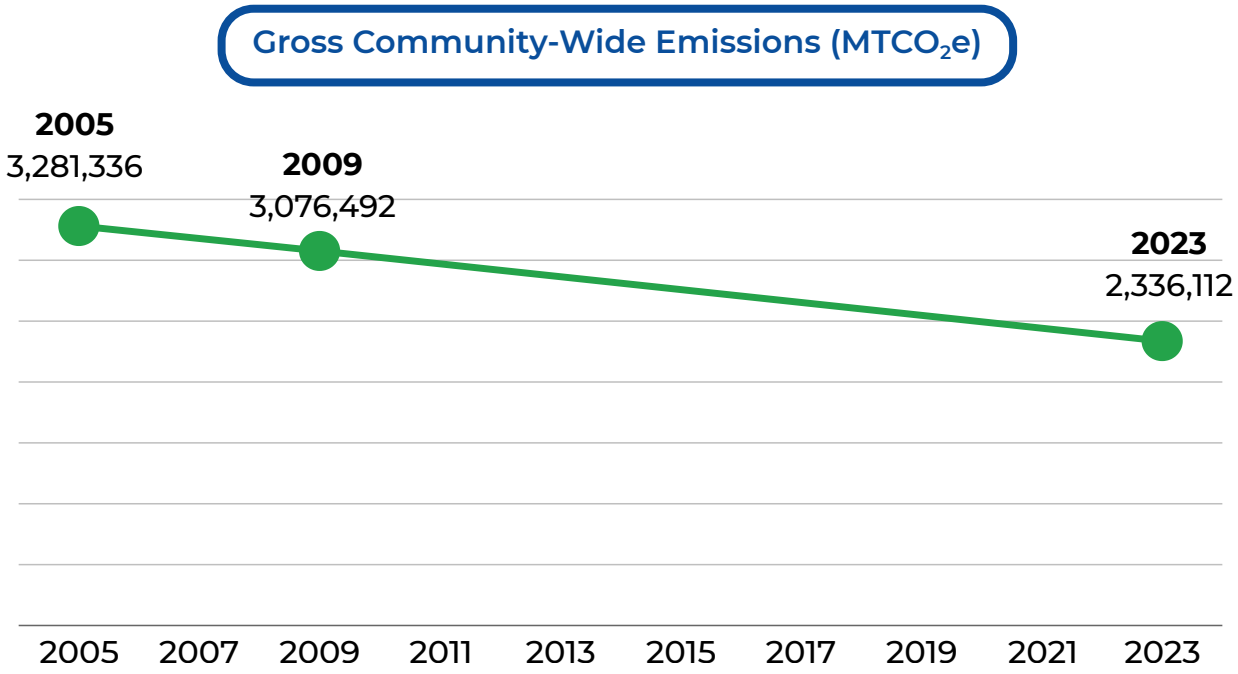

**Improvements in Akron's district energy system have reduced emissions by 60% from 2009 to 2023.**



## GHG Emissions Trends Since 2005[11]

Akron's GHG Inventory shows a continued GHG emissions reduction from 2005 and 2009. Community-wide GHG emissions fell substantially, from 3,281,336 MT $CO_2e$ in 2005 to 2,336,112 MT $CO_2e$ in 2023, a 29% decrease.

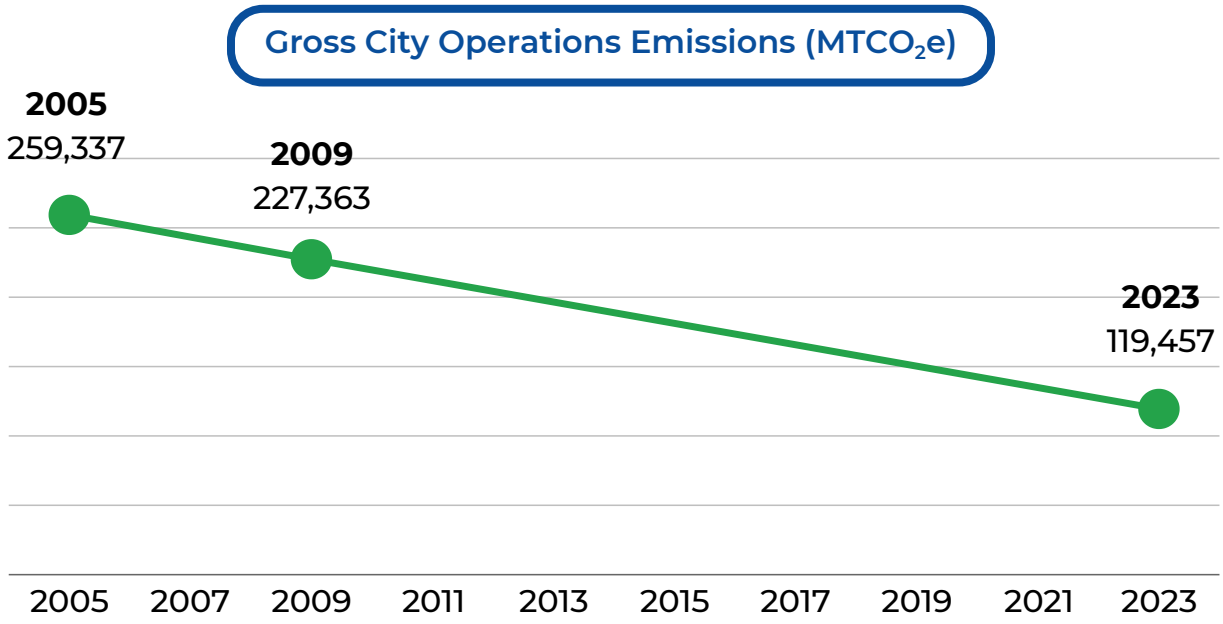

**Community-wide greenhouse gas emissions decreased by 29% from 2005 to 2023.**




[11] It should be noted that there are reasonable methodological differences between this GHG Inventory and the prior GHG inventories. Mainly, the calculation software tools and the global warming potentials (GWPs) are different. The City of Akron's 2008 Greenhouse Gas Emissions Analysis was based on 2005 data and used ICLEI - Local Governments for Sustainability's Clean air and Climate Protection (CACP) software tool. The 2011 Greenhouse Gas Inventory was based on 2009 data and used ICLEI - Local Governments for Sustainability's Climate and Air Pollution Planning Assistance (CAPPA v1.3) software tool. GWPs for greenhouse gases are also updated periodically, so this inventory, published in 2025, is using different GWPs than prior inventories. See Appendix A: Methodology of the City of Akron's GHG Inventory for more detailed methodology information about the current GHG inventory.

Emissions from City Operations, specifically, dropped 54%, from 259,337 MT $CO_2e$ in 2005 to 119,457 MT $CO_2e$ in 2023, indicating sustained municipal sustainability efforts.


**City Operations greenhouse gas emissions decreased by 54% from 2005 to 2023.**



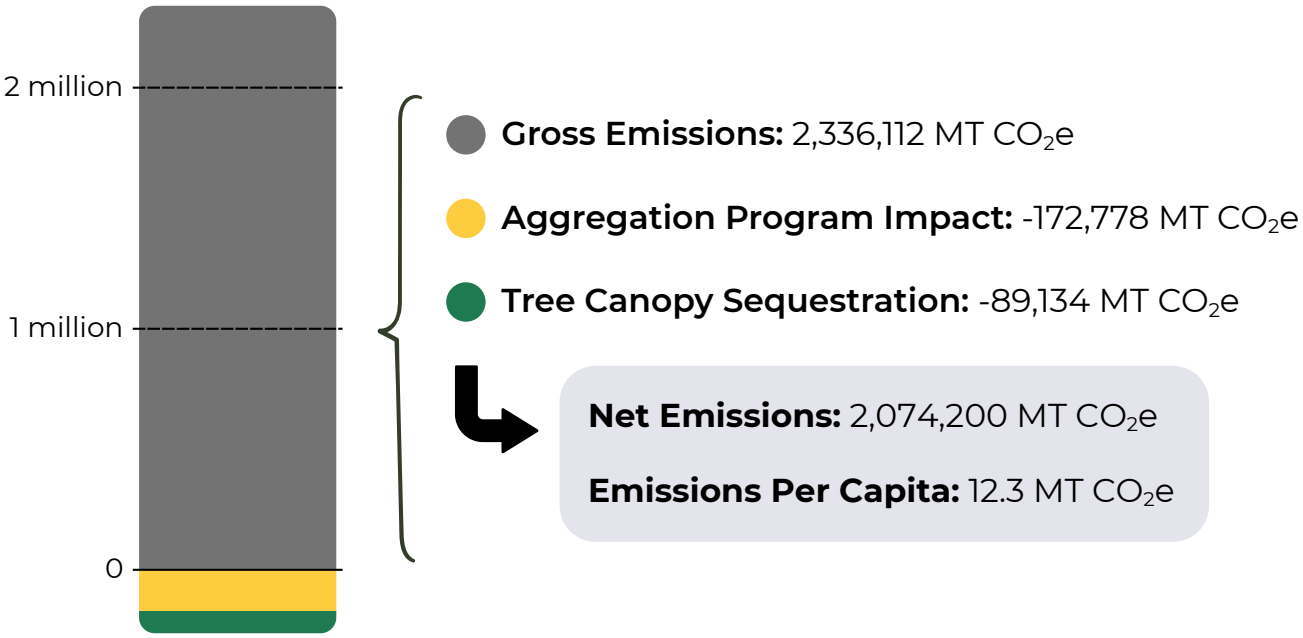
# GHG Inventory at a Glance

In 2023, Akron produced about 2.34 million MT $CO_2e$ community-wide. Electric aggregation programs offset emissions by 7%, and tree canopy-related carbon sequestration offset emissions by another 4%.[12] Together, these efforts brought total net emissions down to 2.07 million MT $CO_2e$—or 12.3 MT $CO_2e$ per person.[13]

**GHG Emission Offsets**

**7%**
**offset by electric aggregation programs**

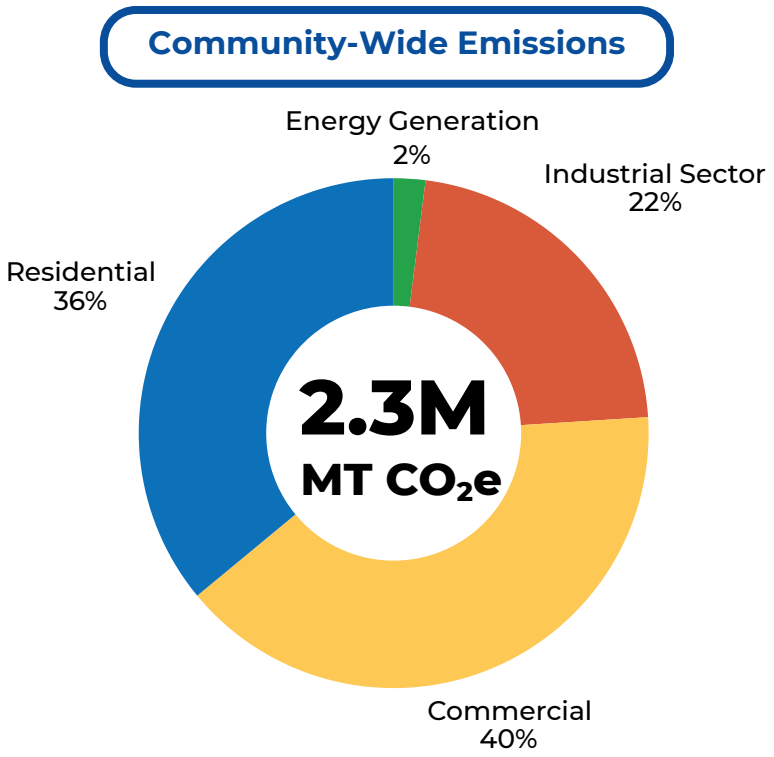
**4%**
**offset by tree canopy carbon sequestration**



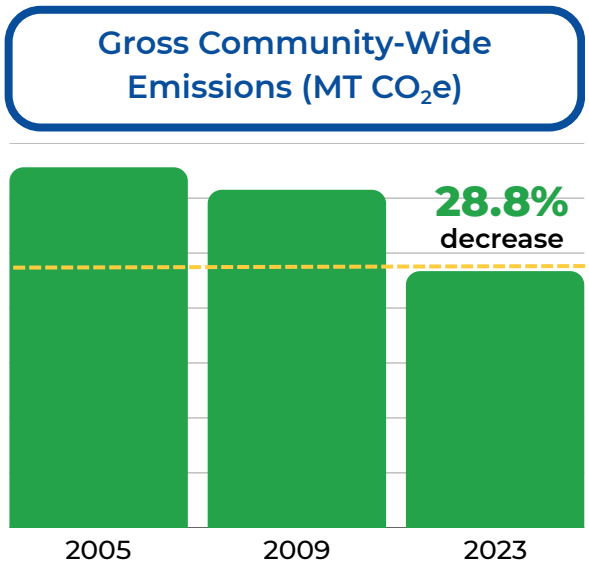

[12] In-city tree canopy related carbon offset data was acquired using the City of Akron's 2020 Tree Canopy Study to determine total urban tree canopy coverage. Tree canopy by sector was estimated using data from iTree.

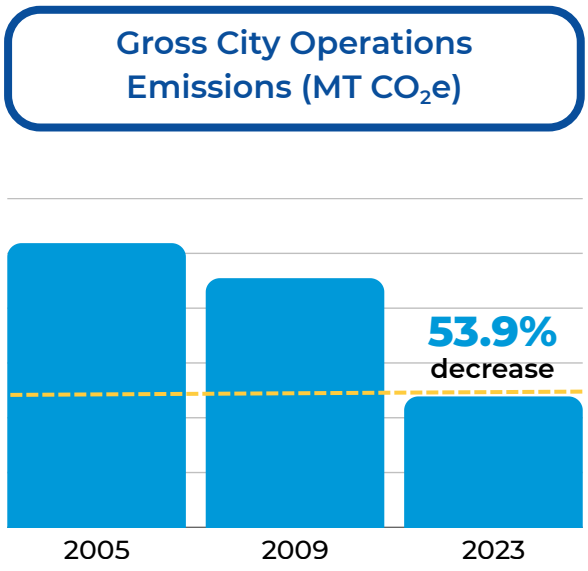
[13] The City of Akron performs well when comparing per-capita GHG emissions to peer cities elsewhere in Ohio. For more information, see the GHG Emissions Comparison section for more information.

Akron's GHG emissions come from a variety of sources, with the largest contributions from the commercial (40%) and residential (36%) sectors. Industrial activity accounts for 22% of emissions, while energy generation within city limits makes up just 2%.




Since 2005, Akron has made significant strides in cutting GHG emissions. Citywide emissions have been reduced by nearly 29%, and emissions from municipal operations have dropped by nearly 54%.



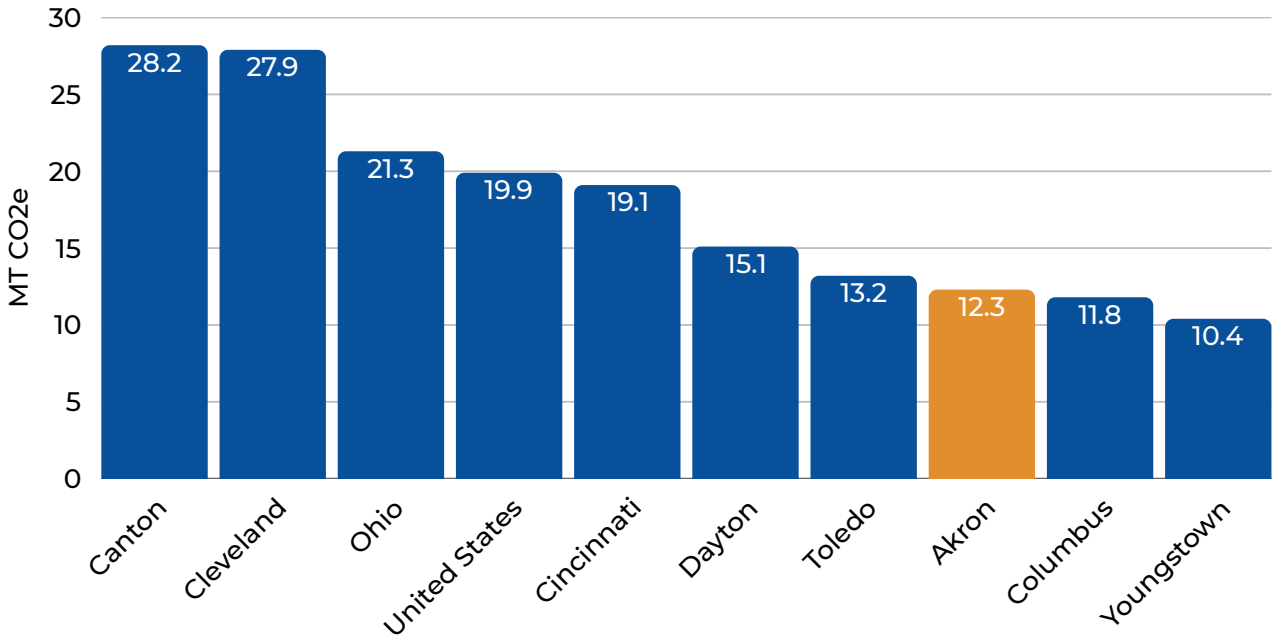



## GHG Emissions Comparison

**12.3**
**MT $CO_2e$**
**per capita emissions in Akron**

In 2023, Akron emitted an average of 12.3 MT $CO_2e$ per person. This is lower than the national and state averages and the averages for similar Ohio cities. Lower per capita emissions suggests that Akronites, on average, produce fewer GHG emissions than people living and working in other jurisdictions, reflecting Akron's progress toward reducing emissions detailed in the sections above.[14]

### Comparison of Per Capita Emissions to Peer Cities




[14] The GHG per capita metrics for peer cities are not reflective of the same calendar year and were likely created using different methodological tools.

# Community-Wide Emissions Inventory

A community-wide GHG inventory follows a geographic boundary and includes all emissions that occur as a result of activities within city limits. This may include emissions that occur outside of Akron (such as from the generation of electricity), so long as they relate to an activity within the city (energy demand/consumption).

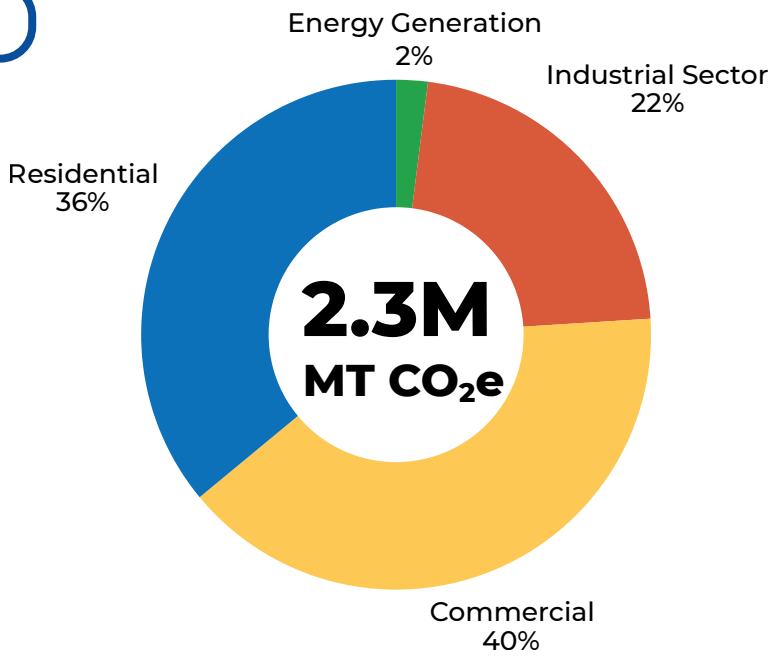
## GHG Emissions Overview

In 2023, gross community-wide emissions totaled 2,336,112 MT $CO_2e$.[15]

| Sector | Emissions (MT $CO_2e$) | Percent of Total |
|---|---|---|
| Residential Sector | 845,305 | 36% |
| Commercial Sector | 923,018 | 40% |
| Industrial Sector | 519,167 | 22% |
| Energy Generation | 48,621 | 2% |
| **Gross Total Emissions** | **2,336,112** | **100%** |

### Community-Wide Emissions

Together, the commercial, residential, and industrial sectors make up 98% of emissions while emissions from energy generation account for about 2% of total emissions. This includes the energy used to provide steam through Akron's district energy system.



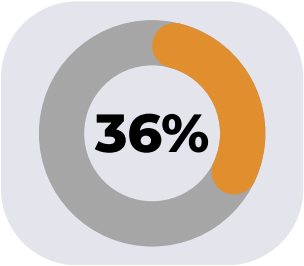

[15] Emissions data are rounded to the nearest whole number.

The inventory incorporates three sources that offset gross emissions: carbon sequestration from the tree canopy inside the city limits, carbon sequestration from the tree canopy outside the city limits on city-owned watershed properties, and carbon-free energy attributions acquired through the electric aggregation programs. Together, electric aggregation programs and the tree canopy are helping to offset gross emissions by 11% to 2,074,200 MT $CO_2e$.

| All Sectors | Emissions (MT $CO_2e$) | Percent of Total |
|---|---|---|
| Gross Emissions | 2,336,112 | 100% |
| Electric Aggregation Program Impact | -172,778 | -7% |
| In-City Tree Canopy Impact | -46,034 | -2% |
| Watershed Tree Canopy Impact | -43,100 | -2% |
| **Net Total Emissions** | **2,074,200** | **89%** |

## Residential Sector

The residential sector is responsible for 845,305 MT $CO_2e$, or 36% of gross community-wide emissions.

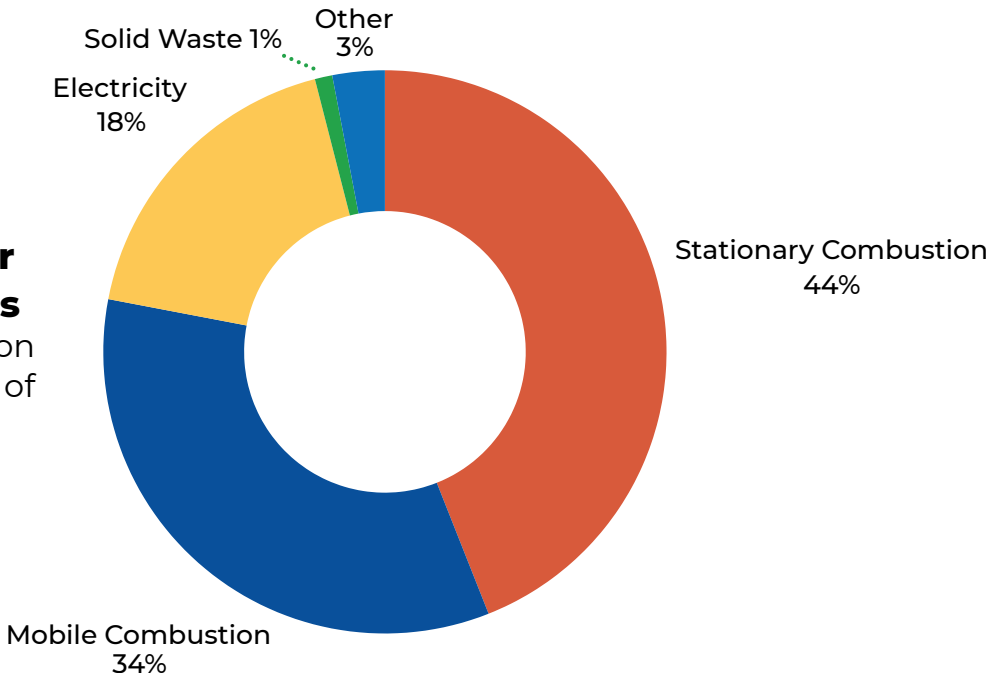



**The residential sector accounts for 36% of community-wide emissions.**

| Residential Emissions Sources | Emissions (MT $CO_2e$) | Percent of Sector |
|---|---|---|
| Stationary Combustion | 372,312 | 44% |
| Mobile Combustion | 290,591 | 34% |
| Electricity | 149,603 | 18% |
| Solid Waste | 6,598 | 1% |
| Other | 26,201 | 3% |
| **Gross Total Emissions** | **845,305** | **100%** |

The largest contributor to residential sector emissions is stationary combustion (44%), which includes the burning of natural gas, fuel oil, propane, and kerosene used to heat homes. Mobile sources account for 34% of emissions in the residential sector. This is attributed to use of personal vehicles, and to a lesser degree, off-road sources like lawnmowers. 18% of residential emissions result from the consumption of electricity. Solid waste accounts for 1% of residential sector emissions. The "Other" category here includes grid-level electricity line losses and fugitive emissions.

**Residential Sector Emissions Sources**
Stationary combustion is the largest source of residential emissions.




The purchase of carbon-free electricity through the Community Electric Aggregation Program offsets 13% of residential sector emissions, and the in-city tree canopy offsets GHG emissions another 1%.

| Residential Sector | Emissions (MT $CO_2e$) | Percent of Sector |
|---|---|---|
| Gross Emissions | 845,305 | 100% |
| Electric Aggregation Program Impact | -110,224 | -13% |
| In-City Tree Canopy Impact[16] | -11,974 | -1% |
| **Net Total Emissions** | **723,106** | **86%** |

[16] This figure represents total GHG emissions offset by in-city tree canopy located in residential areas.

## Commercial Sector

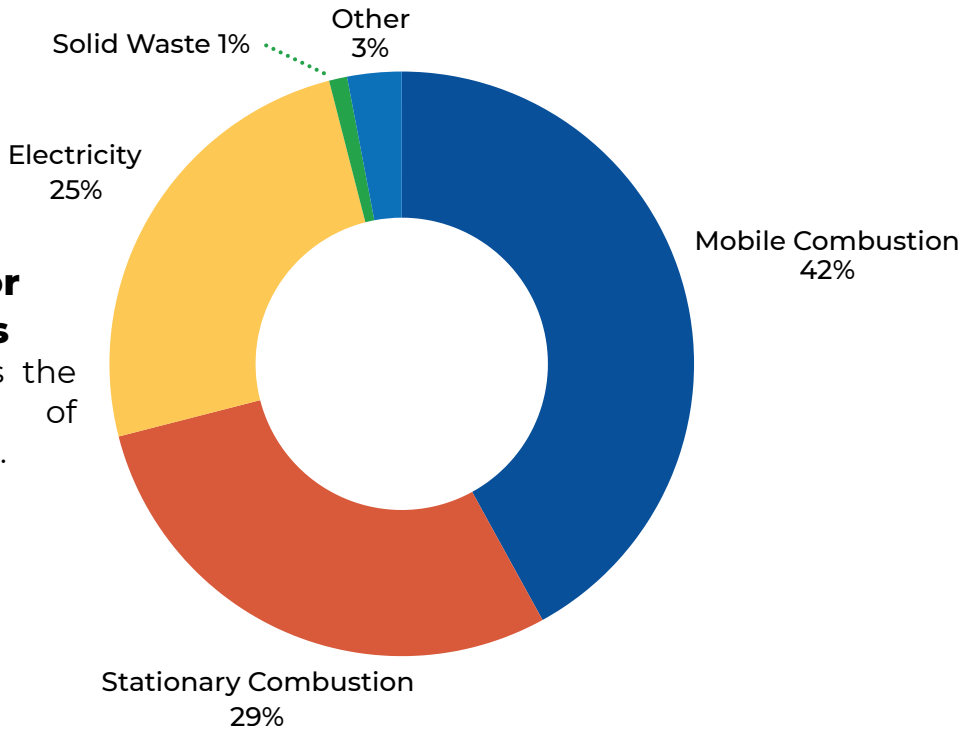
The commercial sector, which includes local government operations, is the largest contributor to GHG emissions at 40% of the gross community-wide emissions total, or 923,018 MT $CO_2e$.

| Commercial Emissions Sources | Emissions (MT $CO_2e$) | Percent of Sector |
|---|---|---|
| Mobile Combustion | 390,033 | 42% |
| Stationary Combustion | 270,558 | 29% |
| Electricity | 230,854 | 25% |
| Solid Waste | 7,063 | 1% |
| Other | 24,512 | 3% |
| **Gross Total Emissions** | **923,018** | **100%** |

The largest source of emissions in the commercial sector is mobile combustion at 390,033 MT $CO_2e$ (42% of the commercial sector total), which includes on-road vehicles, aviation, rail, and off-road sources such as lawnmowers and other mobile equipment. Stationary combustion emissions, the second-largest source, are driven largely by natural gas use, but also include fuel oil, propane, and kerosene use. The "Other" category includes agriculture and land management, wastewater treatment, electric grid line loss, and fugitive emissions.

**Commercial Sector Emissions Sources**

Mobile combustion is the largest source of commercial emissions.



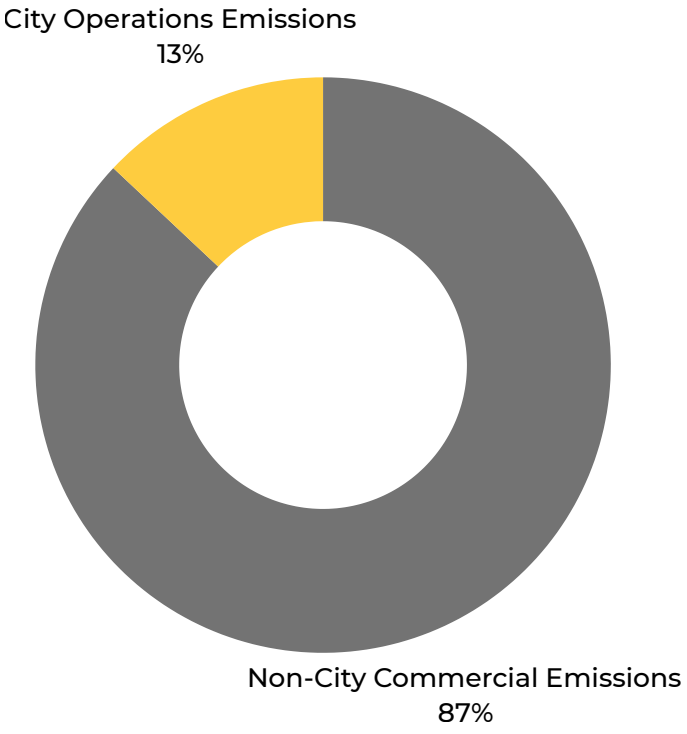
The Community Electric Aggregation Program and Municipal Facilities Electric Aggregation Program and the tree canopy play a significant role in offsetting commercial-sector emissions. Together, they offset 15% of the commercial sector's gross emissions total.

| Commercial Sector | Emissions (MT $CO_2e$) | Percent of Sector |
|---|---|---|
| Gross Emissions | 923,018 | 100% |
| Electric Aggregation Program Impact | -62,554 | -7% |
| In-City Tree Canopy Impact[17] | -32,189 | -3% |
| Watershed Tree Canopy Impact | -43,100 | -5% |
| **Net Total Emissions** | **785,175** | **85%** |

## City Operations in Commercial Sector

City operations are factored into the commercial sector when accounting for community-wide emissions.[18] City operations account for 13% of total commercial sector emissions.

For more detailed explanation of emissions associated with City operations, please see the City Operations Emissions Inventory section.




[17] This figure represents total GHG emissions offset by in-city tree canopy located in commercial areas.
[18] Operations from the City's district energy system are captured in the Energy Generation sector in the Community-Wide Emissions Inventory section. In the Government Operations Emissions Inventory section, emissions associated with the district energy system are attributed to Stationary Combustion emissions source.

## Industrial Sector

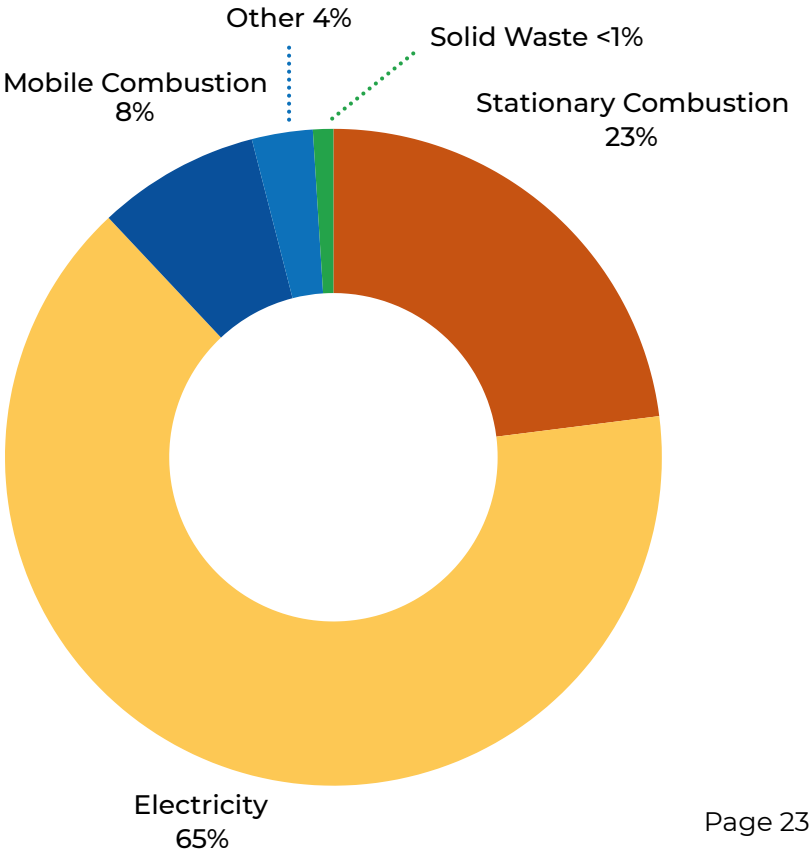
Industrial sector emissions are 519,167 MT $CO_2e$, accounting for 22% of total gross community-wide emissions.

| Industrial Emissions Sources | Emissions (MT $CO_2e$) | Percent of Sector |
|---|---|---|
| Electricity | 336,964 | 65% |
| Stationary Combustion | 118,243 | 23% |
| Mobile | 43,379 | 8% |
| Other | 19,180 | 4% |
| Solid Waste | 1,402 | <1% |
| **Gross Total Emissions** | **519,167** | **100%** |

Electricity is the largest contributor at 336,964 MT $CO_2e$, or 65% of all industrial sector emissions. Stationary combustion also contributes a significant portion of emissions (23% of the sector) at 118,243 MT $CO_2e$. Mobile emissions (8%) in this industrial sector are primarily produced by rail and off-road equipment. Solid waste emissions are relatively insignificant (less than 1%) compared to the previously noted industrial emissions sources. The "Other" category includes electric grid line loss and fugitive emissions.

**Industrial Sector Emissions Sources**

Electricity is the largest source of industrial emissions.



Unlike in other sectors, electric aggregation programs and the carbon sequestration power of the tree canopy do not play a significant role in offsetting emissions in the industrial sector.

| Industrial Sector | Emissions (MT $CO_2e$) | Percent of Sector |
|---|---|---|
| Gross Emissions | 519,167 | 100% |
| Electric Aggregation Program Impact[19] | 0 | 0% |
| In-City Tree Canopy Impact[20] | -1,870 | -<1% |
| **Net Total Emissions** | **517,297** | **99.6%** |

[19] Neither the Community Electric Aggregation Program nor the Municipal Facilities Electric Aggregation Program supplies electricity to industrial users. For more information, see the Electric Aggregation Programs section.

[20] This figure represents total GHG emissions offset by in-city tree canopy located in industrial areas.

# City Operations Emissions Inventory

A city operations inventory calculates emissions within an ownership/control boundary (as opposed to a geographical boundary). That means it reflects GHG emissions resulting from assets, processes, and activities that the city owns or controls.

## GHG Emissions Overview

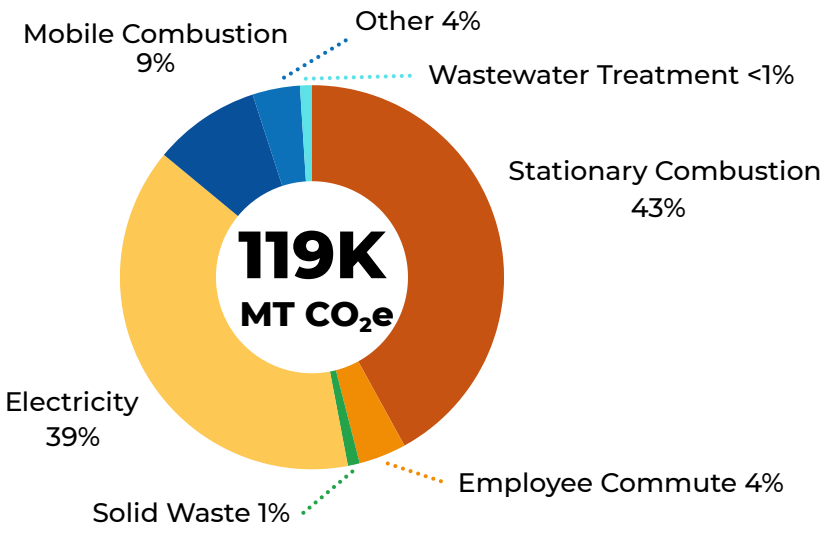
In 2023, gross emissions from city operations totaled 119,457 MT $CO_2e$.

| City Operations Emission Sources | Emissions (MT $CO_2e$) | Percent of City Operations |
|---|---|---|
| Stationary Combustion | 51,773 | 43% |
| Electricity | 46,045 | 39% |
| Mobile Combustion | 10,593 | 9% |
| Other | 4,509 | 4% |
| Employee Commute | 4,232 | 4% |
| Solid Waste | 1,356 | 1% |
| Wastewater Treatment | 949 | <1% |
| **Total Gross Emissions** | **119,457** | **100%** |

Energy consumption (stationary combustion and electricity) accounts for 82% of city operations emissions. The city's mobile fleet is responsible for 9% of emissions while employee commuting patterns contribute another 4%. Solid waste and wastewater treatment are both minimal contributors to city operations emissions. The "Other" category includes electric grid line loss and fugitive emissions.

## City Operations Emissions Sources

Stationary combustion is the largest source of city operations emissions.




The City of Akron owns watershed properties outside of the city limits. The tree canopy on these properties sequesters GHG emissions and offsets total emissions from city operations by 36%. Participation in electric aggregation programs offsets another 15%.

| City Operations | Emissions (MT $CO_2e$) | Percent of City Operations |
|---|---|---|
| Gross Emissions | 119,457 | 100% |
| Electric Aggregation Program Impact | -18,000 | -15% |
| In-City Tree Canopy Impact | -2,569 | -2% |
| Watershed Tree Canopy Impact | -43,100 | -36% |
| **Net Emissions** | **55,788** | **47%** |

## Unique Operations: Wastewater Treatment

The City of Akron treats wastewater produced within Akron as well as wastewater produced by surrounding municipalities. The scope of these operations is vast. The City of Akron treats wastewater for roughly 330,000 people across a 96-square-mile area. While Akron's contribution to wastewater makes up 58%, only 56% of GHG emissions from wastewater operations is attributed to Akron because there are a greater quantity of larger users (commercial and industrial) outside the City boundary.

| Wastewater Treatment Emissions | Emissions (MT $CO_2e$) | Percent of WWT Emissions |
|---|---|---|
| Within Akron | 530 | 56% |
| Outside of Akron | 419 | 44% |

Wastewater treatment emissions comprise less than 1% of total city operations sector emissions. This is due, in large part, to a unique wastewater treatment process the City of Akron maintains, marked by a fully-enclosed anaerobic biodigestion operation that captures emissions from the treatment process and uses them to power wastewater operations at two facilities.

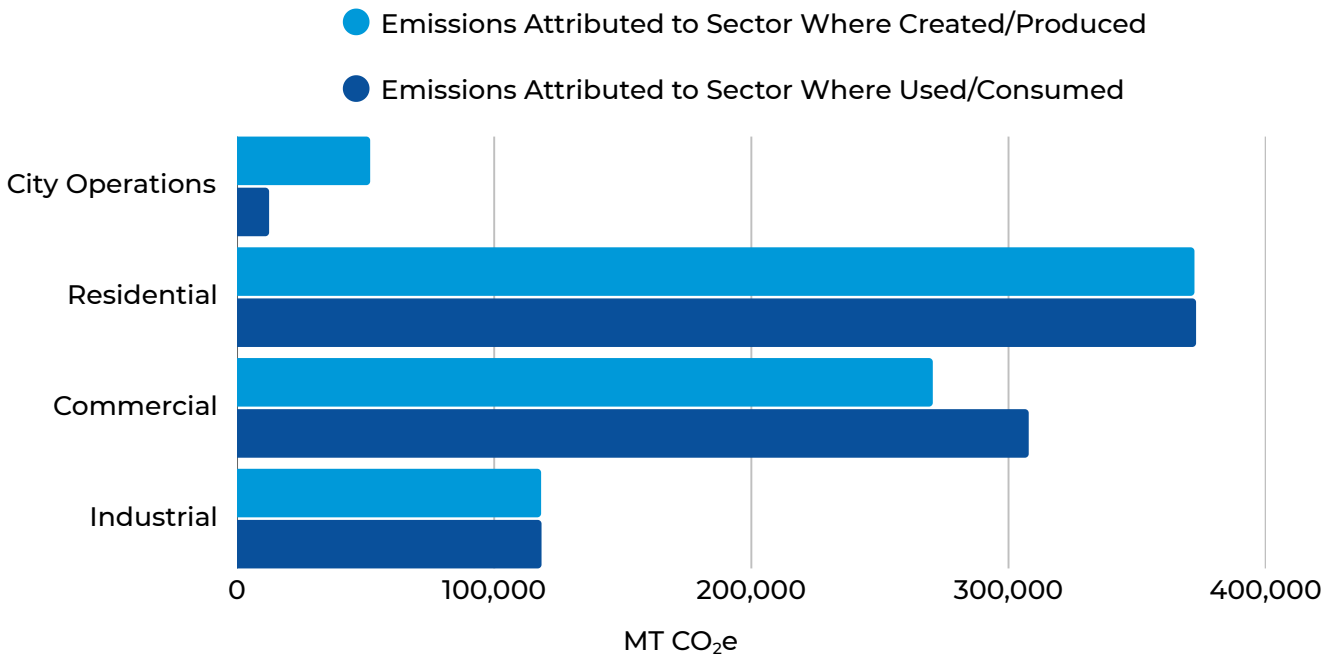
## Unique Operations: District Energy System

Akron also maintains a municipal district energy system, which centrally produces steam and chilled water that's delivered to municipal and non-municipal buildings in Akron through a network of pipes. The steam is used for participating buildings' heating needs, and the chilled water is used for their cooling needs.

The centralized district energy system eliminates or reduces participating buildings' needs for onsite natural gas combustion for heating and electricity consumption for cooling. Instead, the energy generation for those buildings' heating and cooling needs happens efficiently at the centralized district energy system. Correspondingly, the emissions associated with that energy generation are attributed to "City Operations" because the City owns and controls the district energy system. The energy and emissions commercial buildings served by the district energy system save are reflected in the Commercial sector.

The graph below shows this displacement of the emissions from the Commercial sector and reallocation of them in the City Operations sector.

**Reattribution of Heating-Based Emissions from the District Energy System**



# Conclusion

## Understanding Today, Building Tomorrow

The City has demonstrated leadership in reducing greenhouse gas emissions through efforts that span waste reduction and diversion, district energy system transformation, urban forestry, efficient municipal operations, and more. Akron's electric aggregation programs have enabled widespread access to carbon-free energy for residents, businesses, and municipal facilities. The City's municipal district energy system also stands out as a model of efficient, centralized energy generation, reducing the need for on-site fossil fuel combustion at participating facilities. Further, Akron's innovative approach to modernizing wastewater treatment highlights the City's steadfast commitment to reducing GHG emissions while providing quality services to residents and municipal clients. The tree canopy contributes a great deal to removing carbon pollution from the atmosphere. Together, these and other efforts underscore Akron's ability to implement practical and intentional data-driven strategies that produce real results.

The City of Akron's sustained efforts to reduce greenhouse gas offer a strong foundation for continued progress. This GHG inventory has provided a clear picture of current GHG emissions. From here, the City of Akron can identify potential GHG reduction strategies and goals, track progress more regularly over time, and assess the effectiveness of our efforts.

This GHG inventory is a first step toward the development of a comprehensive, community-wide Climate Action Plan (CAP). This 12-15-month planning effort will leverage GHG data, scenario modeling, and community engagement to identify strategies that not only reduce GHG emissions but improve quality of life more broadly for Akronites – housing upgrades, utility bill savings, public health improvements, and increased resilience against climate change threats.

The City of Akron will provide periodic updates throughout that climate action planning process and communicate the Climate Action Plan publicly once completed.

# Climate Action Steps You Can Take

There are a range of actions you can take to benefit the environment, and your wallet, by reducing greenhouse gas emissions[21]:

**Make energy efficient changes to your home or small business.** Reducing your energy consumption can reduce GHG emissions and lower your bills.

- Turn off lights when a room is unoccupied.
- Switch to LED lightbulbs.
- Unplug electronics when not in use.
- Make your next appliance an energy efficient ENERGY STAR one.
- Install weatherstripping and/or caulk around doors and windows to prevent leaks.
- Replace the air filter in your HVAC system regularly to ensure efficient operation.

**Get an energy audit to make targeted energy efficient improvements to your home or business.** Understanding energy use can help you target problem areas to reduce energy consumption and save money. Consider one of two pathways:

- Professional energy audit - a professional auditor will evaluate heating and air conditioning, air sealing, insulation, appliances, lighting, and more. Income-eligible residents can get a free energy audit through East Akron Neighborhood Development Corporation (EANDC).
- "Do-it-yourself" energy assessment - while a professional energy audit is more accurate, a self assessment can still pinpoint priority areas to address. The U.S. Department of Energy created a guide for self-directed assessments.

**Join the City of Akron's carbon-free electric aggregation program.** Residents and qualifying businesses can eliminate carbon emissions from electricity use by joining the City of Akron's 100% carbon-free Community Electric Aggregation Program. Residents and small businesses can also shop the open market for carbon-free electric suppliers.

[21] This is not an exhaustive list and reflects a range of common GHG reduction strategies, including no-cost and low-cost actions. Some of the action items in this list qualify for federal tax credits. Visit Rewiring America to learn about these tax credits and when they expire.

**Consider going solar.** Switching to solar energy can reduce GHG emissions and lower energy bills. There are many ways to adopt solar energy, including collective purchasing groups. Solar United Neighbors created a Go Solar Guide to help individuals determine which solar option is best for them. To learn more about the benefits of installing solar panels on your building, explore Google Project Sunroof.

**Make your next vehicle an electric or hybrid.** New and used EV adoption reduces transportation emissions. EVs can also lower fuel and maintenance costs, leading to long-term cost of ownership savings.

**Reduce car trips.** Traditional gas-powered vehicles produce GHG emissions. Choose biking, walking, or public transportation instead of driving.

- Bicyclists can use the Ohio & Erie Canal Towpath Trail, Freedom Trail, Bike & Hike Trail, Rubber City Heritage Trail and bike lanes on roads to traverse Akron emissions free.
- METRO Regional Transit Authority (METRO RTA) provides various transit routes throughout Akron and Summit County.
- Other regional transit authorities connect Akron to neighboring communities. The Portage Area Regional Transportation Authority (PARTA) connects Downtown Akron, the University of Akron, and Summa Akron City Hospital to Brimfield Township, Kent State University, and Downtown Kent via PARTA's Akron Express route. The Stark Area Regional Transit Authority (SARTA) connects Downtown Akron to Coventry Township, the Akron-Canton Airport, Belden Village, and Downtown Canton via SARTA's Downtown Canton/Akron Express route.

**Convert grass space to native landscaping.** Native plants absorb more stormwater, remove more carbon, and support our native ecosystem far more than traditional grass. Start small by introducing native plants to your backyard.

**Plant a tree.** Trees remove carbon and other air pollution and provide a range of benefits. Plant trees in your yard to provide shade and cooling. Choose a fruit-bearing tree to grow your own food.

**Support local food.** Grow your own food in your backyard or join a community garden. Support restaurants, grocery stores, and farmer's markets that sell locally grown food.

**Reduce food waste.** About a third of all food in the U.S. goes uneaten. Minimize food waste by planning meals ahead and shopping with a list. Eat what's in your fridge first and freeze food before it goes bad. Repurpose food scraps creatively.

**Compost food and yard scraps.** Reduce landfill waste that becomes methane in the atmosphere by starting a backyard compost bin or signing up for a local compost drop-off or collection service.

**Purchase clothing with sustainability in mind.** Avoid fast fashion, which uses high amounts of water and energy in manufacturing and shipping and produces large quantities of textile waste. Shop locally instead at second-hand clothing and thrift store businesses.

# Appendix A: Methodology of the City of Akron's GHG Inventory

## Overview

The City of Akron GHG Inventory, published in 2025, measures 2023 GHG emissions using the U.S. EPA's Local GHG Inventory Tool (Tool). The Tool is a free, interactive spreadsheet developed by the U.S. EPA to enable communities across the United States to evaluate their GHG emissions.

The Tool follows the Global Protocol for GHG Inventories (GHG Protocol), the globally recognized standard for measuring and managing GHG emissions. Developed by the World Resources Institute (WRI) and the World Business Council for Sustainable Development (WBCSD), the GHG Protocol provides a comprehensive framework for various entities, including corporations, organizations, cities, counties, states, and national governments, to develop consistent and reliable GHG inventories.

The GHG Protocol is built on several accounting principles, including relevance, completeness, consistency, transparency, and accuracy, to ensure quality, credibility, and uniformity across GHG inventories. It is the most widely used emissions calculation guideline globally – followed by organizations, companies, governments, and initiatives around the world.

The U.S. EPA Tool reflects the GHG Protocol's Global Protocol for Community-Scale GHG Emission Inventories (GPC), a standard for calculating community-wide emissions. It also reflects the International Local Government GHG Emissions Analysis Protocol (IEAP), a standard for calculating local government operations.

## Community-Wide Emissions

The U.S. EPA Tool, in alignment with the GHG Protocol's GPC framework for cities, generally follows these principles for determining community-wide emissions:

- **Geographic Boundary:** The most fundamental boundary is the jurisdictional boundary of the community (e.g., city limits, county lines). Emissions occurring within this geographic area are included, regardless of who owns or controls the source.[22]

[22] The City of Akron also includes GHG emissions offsets from the tree canopy located on its watershed properties in its Community Wide Emissions Inventory. The City owns and controls these lands. Despite taking place beyond city limits, carbon sequestration occurring there is a direct result of the City's asset management and as such is included in the Community Wide Emissions Inventory.

- **Consumption-Based vs. Production-Based Accounting Approaches:** For some GHG emissions sources, like electricity, the Tool encourages a consumption-based approach. This means accounting for the emissions associated with the electricity consumed within the community, even if the power is generated outside its borders. This provides a clearer picture of the GHG impact of the community's energy demand. For other GHG emissions sources, like solid waste, a generation-based approach is used, focusing on waste generated within the bounds of the community. This provides a clearer picture of the GHG impact of the community's waste production.
- **Scope of Activities:** The Tool accounts for emissions that result from all life unfolding in a city – vehicles being used for transportation, houses and workplaces consuming energy to function, industrial processes being conducted, solid waste being produced and going to landfill, and more.
- **Materiality Principle:** While aiming for completeness, GHG inventories consider materiality. Very minor or difficult-to-quantify emissions sources might be excluded if they are deemed insignificant to the overall inventory. The focus is on capturing the major sources.

## City Operations Emissions

A local government operations inventory typically calculates GHG emissions from sources under the city government's direct control, regardless of the geographic location of the emissions source. The Tool, in alignment with the International Local Government GHG Emissions Analysis Protocol (IEAP), follows these principles for determining city operations emissions:

- **Operational Control Boundary:** For a city operations inventory, the key principle is operational control. A city operations inventory focuses on the emissions associated with the assets, processes, and activities that the city government owns or controls. For example, the city government owns and operates a wastewater treatment plant. It controls and makes decisions about the technology used, the energy consumed, and the processes involved. Even if some of the producers of the wastewater that flows to the plant for treatment are outside city limits, the operation of the facility (where the treatment process unfolds) falls under the city's direct control.
- **Scope of Activities:** The Tool accounts for emissions that result from municipal assets, processes, and activities, including, but not limited to: energy consumption at buildings and facilities; operation of a municipal district energy system; wastewater treatment operations; use of a varied vehicle fleet; employees commuting to work; and more.
- **Materiality Principle:** While aiming for completeness, the Tool implicitly considers materiality. Very minor or difficult-to-quantify emissions sources might be excluded if they are deemed insignificant to the overall inventory. The focus is on capturing the major sources.

# Appendix B: Emissions Sources and Definitions

## Emissions Sources

The City of Akron's GHG Inventory captures assets, activities, and processes that produce GHG emissions within the following source categories:

Emissions Source Categories:

- **Stationary Combustion**
- **Fugitive Emissions** (so small that it's often included under "Other")
- **Electricity**
- **Electric Grid Line Losses** (so small that it's often included under "Other")
- **Mobile Combustion**
- **Solid Waste**
- **Wastewater Treatment**
- **Employee Commuting**
- **Agriculture and Land Management**

It also captures assets, activities, and processes that reduce/offset GHG emissions within the following source categories:

Emissions Reduction Categories:

- **In-City Tree Canopy**
- **Watershed Property Tree Canopy**
- **Electric Aggregation Program**

## Definitions

Emissions sources included in the GHG Inventory are defined as follows:

| | |
|---|---|
| **Agriculture and Land Management** | Emissions associated with livestock and the application of fertilizers. |
| **Electricity** | Emissions associated with the fossil fuel-based generation of electricity consumed across sectors. |
| **Electric Grid Line Losses** | Emissions associated with the generation of electricity that is lost as it travels from the point of generation to the point of end use. |
| **Stationary Combustion** | Emissions from the combustion of fuel in a fixed location to produce energy (electricity, heat, steam, etc.). |

| | |
|---|---|
| **Fugitive Emissions** | Emissions from natural gas and other gaseous fuels that escape through unintended infrastructure leaks during delivery and/or at the point of end use. |
| **Mobile Combustion** | Emissions from the combustion of fuels to power vehicles, planes, rail, and off-road vehicles or equipment. |
| **Exported Solid Waste Generation** | Emissions from waste exported to landfills outside of the city produce emissions as the waste decomposes. |
| **Solid Waste** | Emissions from solid waste produced within the city that is sent outside the city to anaerobically decompose in a landfill (waste production emissions). Emissions from solid waste produced inside or outside the city that anaerobically decomposes at a landfill within the city (landfill emissions). |
| **Wastewater Treatment** | Emissions from the treatment of wastewater. When wastewater treatment is identified as a source of emissions, it reflects emissions associated with the treatment process and not with energy needed to power wastewater treatment operations. |
| **Employee Commuting** | Emissions from employees traveling to/from work for the City of Akron. |
| **In-City Tree Canopy** | Emissions reductions/offsets associated with carbon sequestration from the tree canopy inside the city limits. |
| **Watershed Tree Canopy** | Emissions reductions/offsets associated with carbon sequestration from the tree canopy outside the city limits on city-owned watershed property. |
| **Electric Aggregation Program** | Emissions reductions/offsets from carbon-free energy purchased through an electric aggregation program. |

# Appendix C: Glossary of Terms Used in This Report

| | |
|---|---|
| **Aggregation Program** | A program whereby local governments bring citizens and small businesses together to gain group buying power to purchase competitively priced energy from a retail electric or natural gas supplier certified by the Public Utilities Commission of Ohio (PUCO). |
| **Carbon Dioxide Equivalents ($CO_2e$)** | A unit of measurement used to compare the emissions from various greenhouse gases based on their global warming potential. |
| **Carbon Sequestration** | The process of capturing and storing atmospheric carbon dioxide, often by trees and other vegetation. |
| **Emissions Source** | This refers to the source categories emissions are grouped by. Examples: stationary combustion, electricity, mobile combustion, etc. See Appendix B: Emissions Sources and Definitions for more information. |
| **U.S. EPA Tool** | A greenhouse gas calculation tool provided by the U.S. Environmental Protection Agency and based on standardized frameworks. There are technically two tools – one for community-wide emissions and one for local government operations emissions. |
| **Fugitive Emissions** | GHG emissions from natural gas and other gaseous fuels that escape through unintended infrastructure leaks during delivery and/or at the point of end use. |
| **Global Protocol for Community-Scale GHG Emission Inventories (GPC)** | A standardized framework for cities to measure and report their GHG emissions on a community-wide scale using the geography of the city as the boundary. |
| **Global Warming Potential (GWP)** | A measure of how much energy one MT of a gas will absorb relative to one MT of carbon dioxide over a period of time (usually 100 years). It approximates how effective different GHGs are at trapping heat in the atmosphere and contributing to warming. |

| | |
|---|---|
| **Greenhouse Gas (GHG) Inventory** | An accounting of the GHG emissions produced within a specific area/boundary over a certain period of time. |
| **Gross Emissions** | The total amount of GHG emissions before any offsets (e.g., carbon sequestration from tree canopy) are taken into account. |
| **International Local Government GHG Emissions Analysis Protocol (IEAP)** | A standardized framework for cities to measure and report their GHG emissions from city operations using an ownership/control boundary. |
| **Kilowatt-Hour (kWh)** | A standard metric unit of measurement for the amount of electricity a device uses while operating. One kilowatt-hour is equal to one thousand watt-hours (Wh). A watt hour represents the amount of energy delivered at a rate of one watt (W) for a period of one hour. One watt is the measure of the rate of energy transfer over a unit of time, equal to one joule (J) per second. Example: a 100 watt light bulb in use for ten hours uses 1,000 Wh, or 1 kWh of electricity. (100 watts x 10 hours = 1,000 Wh = 1kWh). |
| **Line Losses** | Electricity that is lost as it travels from the generation source to the point of use. |
| **Metric Tons (MT)** | GHG emissions ($CO_2e$) are presented in metric tons, MT, or sometimes tonnes, the international standard for reporting emissions. A metric ton is equal to about 2,205 pounds or 1.1 short tons. That's equivalent to the weight of one adult male crocodile. |
| **Mobile Combustion** | Emissions from the burning of fuel to power on-road vehicles, planes, and trains as well as off-road vehicles and equipment, such as mowers. |
| **Net Emissions** | The amount of GHG emissions after reductions (e.g., carbon sequestration from tree canopy) are factored in. |
| **Per-Capita GHG Emissions** | The amount of GHG emissions an individual person emits in a particular region on average. Determined by dividing a region's total net GHG emissions by its population. Per-capita GHG emissions assessments allow regions with different populations to compare their contributions to climate change, enabling individuals to make informed choices about their lifestyle and consumption patterns. |

| | |
|---|---|
| **Renewable Energy** | Carbon-free energy that comes from sources that are naturally replenished, such as solar, wind, and hydropower. |
| **Sector** | This refers to the GPC's sector reporting requirements for community-wide emissions: Residential, Commercial, Industrial, and Energy Generation. |
| **Short Ton (st)** | Common measurement for a ton in the United States. A short ton is equal to 2,000 pounds or 0.907 MT. |
| **Stationary Combustion** | GHG emissions from the combustion of fuel in a fixed location to produce energy (electricity, heat, steam, etc.). |
| **Watershed** | An area of land that drains to a common body of water. |