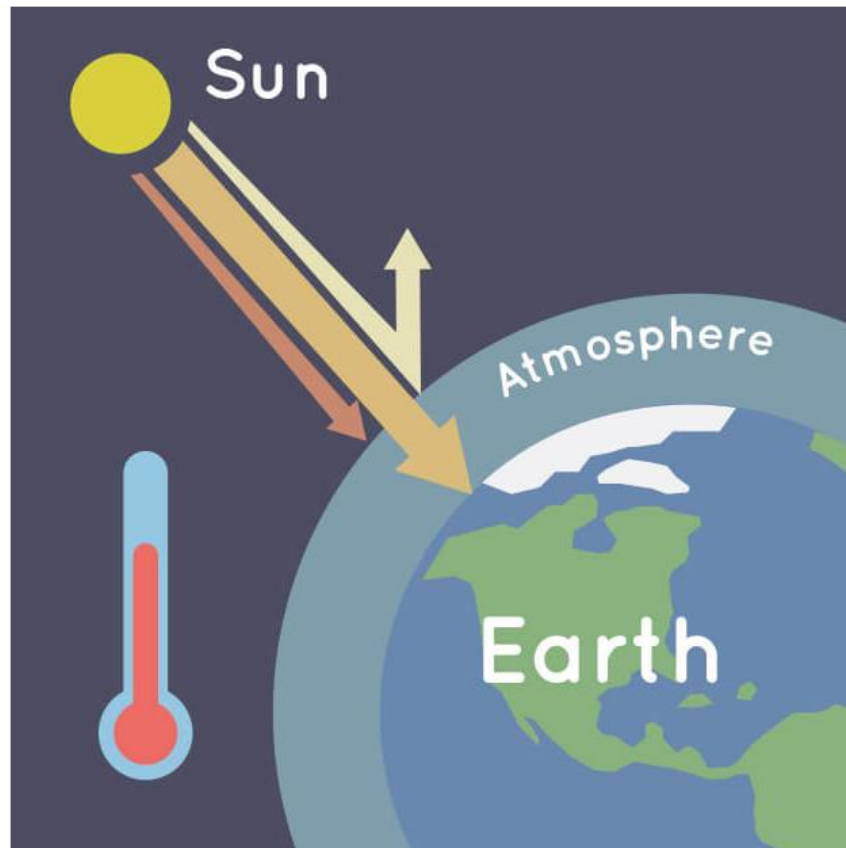


## 2022 Kalamazoo Community Greenhouse Gas Inventory

### 1. What we're up against

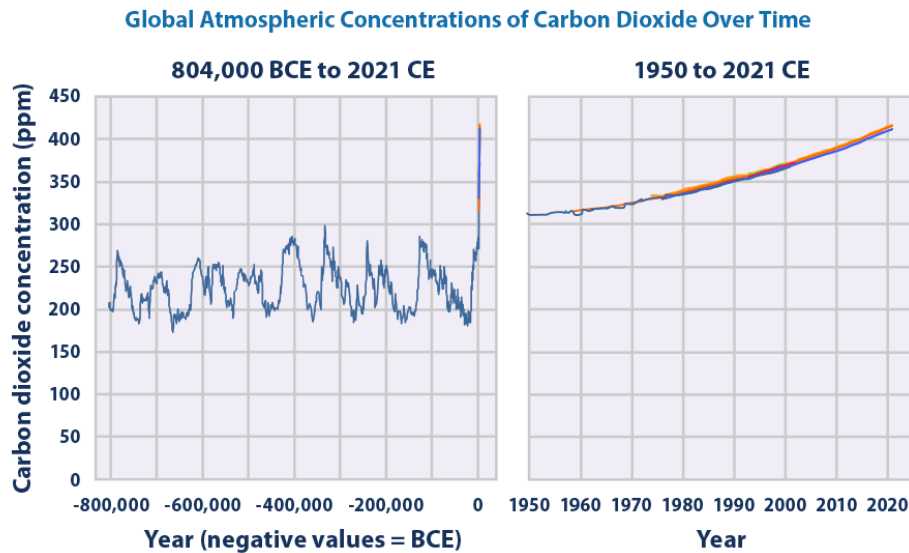
- a. Greenhouse gases are effective at trapping heat in our atmosphere. Without these gases the Earth would be too cold for life. However, too much of these gases in the atmosphere can lead to an increase in global temperature and this can change rainfall patterns, disrupt ecosystems, and negatively impact agriculture.



*Earth's atmosphere traps some of the Sun's heat, preventing it from escaping back into space at night. Credit: NASA/JPL-Caltech*

- b. The amount of greenhouse gases in the atmosphere has increased since the Industrial Revolution. Widespread burning of fossil fuels releases unprecedented amounts of greenhouse gases like carbon dioxide, methane, and nitrous oxide into our atmosphere. Methane is also released into our atmosphere through agricultural practices and the decay of organic materials in landfills.

It's true that greenhouse gases change over time, but the levels we are currently seeing in the atmosphere are unprecedented in relation to the data we've collected. The graph below shows the changes in atmospheric carbon dioxide over the last 800,000 years, and the steady increase since the 1950's.



Data source: Compilation of eight underlying datasets. See [www.epa.gov/climate-indicators](http://www.epa.gov/climate-indicators) for specific information.

For more information, visit U.S. EPA's "Climate Change Indicators in the United States" at [www.epa.gov/climate-indicators](http://www.epa.gov/climate-indicators).

- c. Acknowledging the threat posed by increasing amounts of greenhouse gases in our atmosphere, the Kalamazoo City Commission declared a climate emergency in 2019. As a result of this declaration, city staff drafted a Community Sustainability Plan that guides the city towards carbon neutrality by 2050. The City Commission also required two baseline reports be completed, one report on the emissions that result directly from City activities, and one report of the total emissions produced within the city limits.
  - d. The baseline report on the greenhouse gas emissions of the community of Kalamazoo's activities was completed with the assistance of the International Council for Local Environmental Initiatives (ICLEI) and their ClearPath software. This program calculated the CO<sub>2</sub>e emissions data.
- 2. Why Cities Matter**
- a. Cities play an important role in tackling climate change. Cities are hubs of human activity- where people live, work, and play. These activities often result in greenhouse gas emissions and understanding how these emissions are produced can guide our attempts to mitigate negative impacts on the natural world.
- 3. About Kalamazoo**
- a. The City of Kalamazoo is the county seat of Kalamazoo County, Michigan and home to over 72,000 people. The population density of Kalamazoo is 2,981

persons per square mile. The city itself encompasses an area covering 24.69 square miles, totaling roughly 4% of the land area of Kalamazoo County.

- b. Kalamazoo is home to three higher learning institutions- Kalamazoo Valley Community College, Kalamazoo College, and Western Michigan University. Kalamazoo Valley Community College's enrollment in 2022 was 9,143, Western Michigan University's enrollment for 2022 was 17,835<sup>1</sup> and Kalamazoo College enrollment was 1,378 students<sup>2</sup>.

#### **4. About this Report**

- a. In the Spring of 2022, the City of Kalamazoo adopted its first Community Sustainability Plan. The following May, the city hired its first Sustainability Planner to oversee the implementation of the plan. This report is an attempt by that planner to document the Kalamazoo community's greenhouse gas emissions.

#### **5. Aims of the Report**

- a. This report establishes a baseline for greenhouse gas emissions which can be used to gauge progress towards net zero for the community of Kalamazoo. This report can also demonstrate to the citizens of Kalamazoo where their own behaviors, focus, and actions can be directed if they hope to decrease greenhouse gas emissions.

#### **6. About the Data**

- a. There are multiple greenhouse gases. These gases have different capabilities when trapping heat. Methane, for example, is 28 times more potent than carbon dioxide. To make sense of these numbers, greenhouse gases are presented as carbon dioxide equivalent, or CO<sub>2</sub>e. Emissions labeled as CO<sub>2</sub>e include more than just carbon dioxide. CO<sub>2</sub>e is a standard unit of measurement that accounts for the different abilities of these gases to trap heat.
- b. Data Sources- Data for this report was provided by Consumer's Energy, the City of Kalamazoo's Department of Public Services, Google Environmental Insight Explorer, Consumer's Energy provided the City's utility data for 2022, including all gas and electric use. The City of Kalamazoo's Public Services department provided data on gallons of gasoline and diesel fuel used by the city's fleet, as well as the amount of leaves composted, estimated amount of controlled combustion disposal of organic woody debris, and tonnage of biosolids sent to landfills.

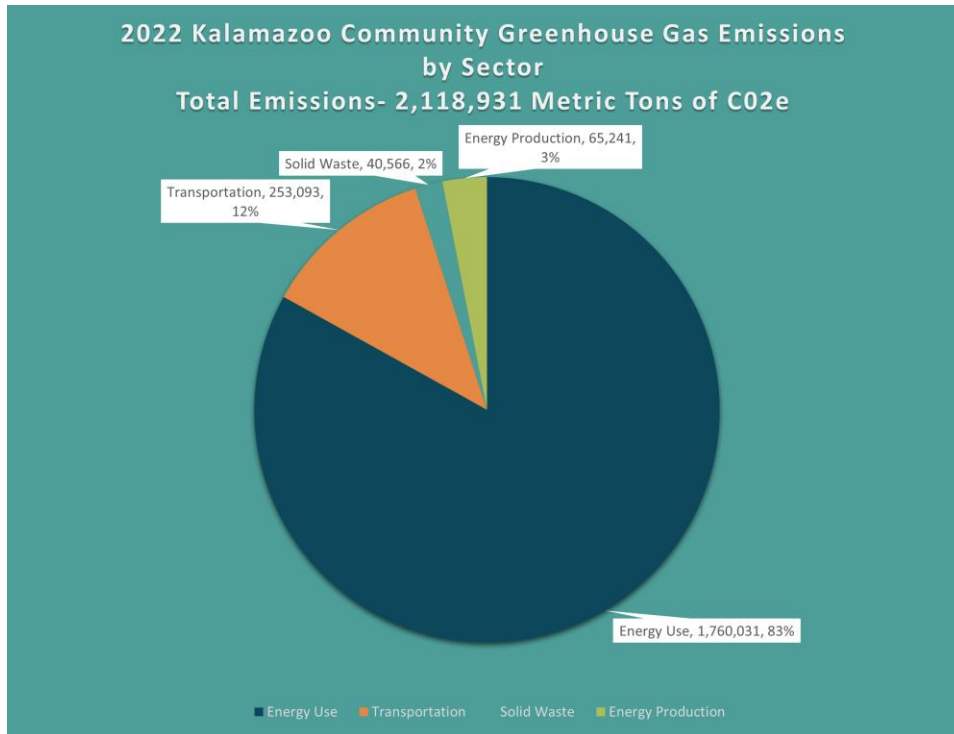
#### **7. The Numbers**

- a. Based on an analysis of emissions related to energy use, transportation, and solid waste, the Kalamazoo community emitted **2,118,931 metric tons of CO<sub>2</sub>e in 2022**. The following sections will outline the data and methods used to arrive at this number.

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<sup>1</sup><https://wmich.edu/about/facts>

<sup>2</sup> <https://www.kzoo.edu/about/fast-facts/>

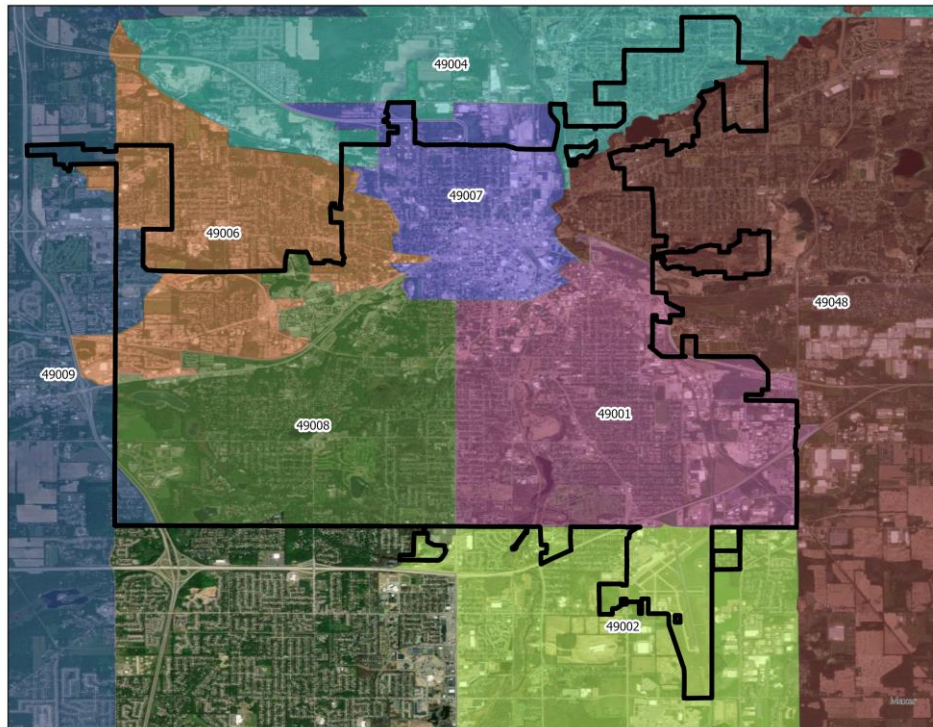


## 8. Sectors

- a. Energy Use (1,760,031 metric tons of CO<sub>2</sub>e)- Energy usage data for municipalities can be acquired through multiple sources. Google Environmental Insight Explorer (EIE) provides data based on estimates on national energy use averages that are applied to building square footage within a geographic boundary. The National Renewable Energy Laboratory offers State and Local Planning for Energy<sup>3</sup> (SLOPE) energy usage data to municipalities. Lastly, there is actual usage data provided via special request from the utility that provides electricity and natural gas. All three of these data sources were explored, and all presented unique challenges. EIE data is based off national estimates and the numbers would not be reflective of any real change enacted by the city with regards to energy efficiency or renewable energy use. The most recent SLOPE data is from 2020 and is updated every five years. A request was made to Consumer's Energy for energy usage within the city, and this data was provided, compiled by zip code. Zip code data, however, does not align with the City's boundaries. It was decided, in consultation with Kalamazoo's Environmental Concerns Committee, to use those zip codes that are most within the city's boundaries. Zip codes included in this report are 49001, 49007, and 49008. These zip codes are the densest of the zip codes located within the City's boundaries.

<sup>3</sup> <https://maps.nrel.gov/slope/data-viewer?filters=%5B%5D&layer=energy-consumption.net-electricity-and-natural-gas-consumption&geoid=G26042160&year=2020&res=city>

The map below shows local zip codes and the City of Kalamazoo's boundaries. Future reports will work towards included those zip codes not included in this report in order to get a more accurate idea of energy use emissions.



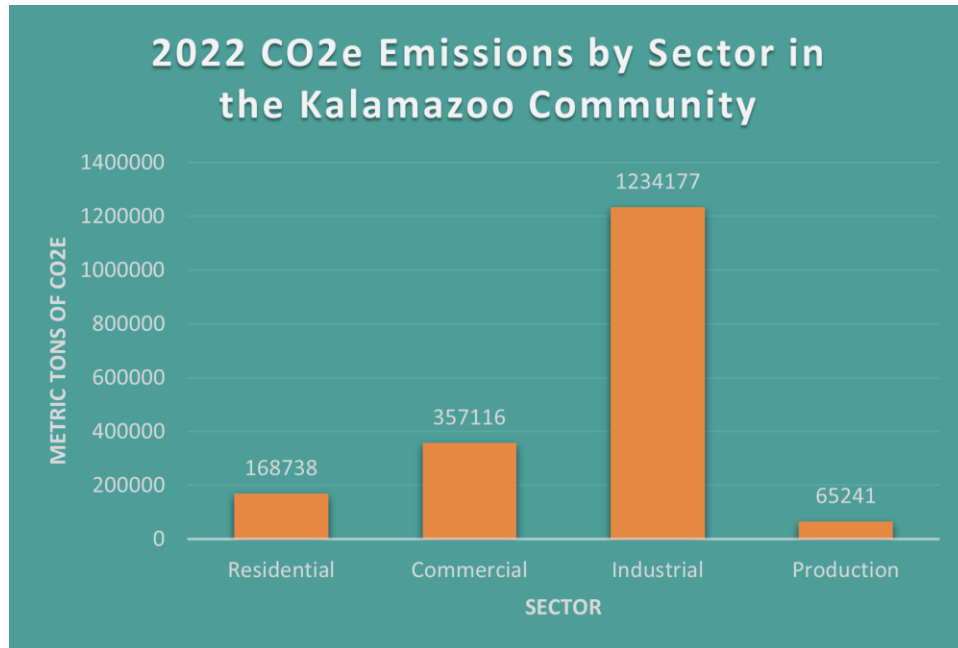
**b. Energy Use Categories.**

- i. Residential Buildings- Residents of Kalamazoo use natural gas and electricity to heat and power their homes. Residents of the three zip codes included in this report emitted a total of **168,738 metric tons of CO<sub>2</sub>e** in 2022. Households in the 49008 zip code had the highest average emissions, at 8.34 metric tons per household. 49001 was the next highest per household emitter at 8.30 metric tons of CO<sub>2</sub>e. Households in 49007 had the lowest average emissions per household, at 7.61 metric tons of CO<sub>2</sub>e emitted.
- ii. Commercial Buildings- Energy use in commercial buildings emitted **357,116 metric tons of CO<sub>2</sub>e**.
- iii. Industrial- Kalamazoo is home to many industries. We produce things like paper and pharmaceuticals. We recycle metals and other materials. Industrial energy use resulted in **1,234,177 metric tons of CO<sub>2</sub>e**.

**c. Production** (65,241 metric tons)

- i. Western Michigan University operates the Robert M. Beam Power Plant within the city limits of Kalamazoo. This power plant burns natural gas to produce power for the campus community. As part of the Greenhouse Gas Reporting Program (GHGRP), emissions from this power plant are reported annually to the Environmental Protection Agency (EPA). This

reported data is publicly available on the EPA’s FLIGHT Data Website<sup>4</sup>. According to data provided by Western Michigan University to the EPA, the Robert M. Beam Power Plant released **65,241 metric tons of CO<sub>2</sub>e** in 2022<sup>5</sup>.



d. **Transportation** (253,093 metric tons of CO<sub>2</sub>e)

- i. Automobiles- Google Environmental Insights Explorer (EIE) data reports that automobiles took 95,700,000 trips within the boundaries of Kalamazoo in 2022. Trips included in this data are in-boundary, inbound and outbound. In-boundary trips are those that begin and end within the city limits. Inbound trips are those that begin outside the city’s limits and end within the city’s limits. Outbound trips are those that begin within the city’s boundary and end beyond that limit. EIE numbers do not distinguish between vehicle fuel source, so adjustments were made based on national averages of diesel vs. gasoline use. Gas vehicle fuel use resulted in **173,429 metric tons of CO<sub>2</sub>e** and diesel use resulted in **74,026 metric tons of CO<sub>2</sub>e**.
- ii. Buses- EIE reports that 407,000 bus trips were taken, accounting for .4% of all trips within Kalamazoo. These trips covered 1,342,162 miles. EIE does not report on ridership numbers, and future reports will work closely with Kalamazoo Metro to gather ridership information, as well as specific fuel use and miles traveled, which may vary from the numbers tallied

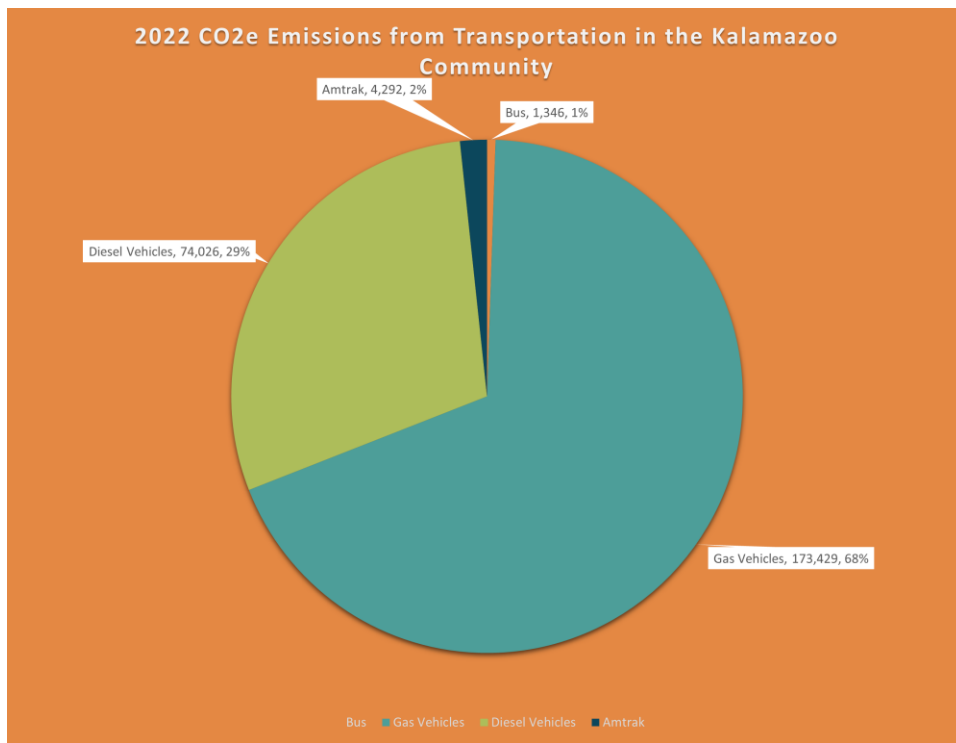
<sup>4</sup> [https://ghgdata.epa.gov/ghgp/main.do?site\\_preference=normal](https://ghgdata.epa.gov/ghgp/main.do?site_preference=normal)

<sup>5</sup> <https://ghgdata.epa.gov/ghgp/service/facilityDetail/2022?id=1003293&ds=E&et=&popup=true>

through EIE. Emissions from buses moving through Kalamazoo are **1,346 metric tons of CO<sub>2</sub>e**.

iii. Other forms of transportation

- a. Within the City of Kalamazoo there lies 37 miles of rail line. These lines are used for both passenger and freight transportation. The Amtrak lines are part of the Wolverine and Blue Water lines. Amtrak trains make four daily stops in Kalamazoo. Emissions from Amtrak trains moving through Kalamazoo is **4,292 metric tons of CO<sub>2</sub>e**.
- b. Freight data was not included in this report but could be included in future reports.
- c. Aviation- Emissions from aircraft are not included in this report. This information will be included in future reports.



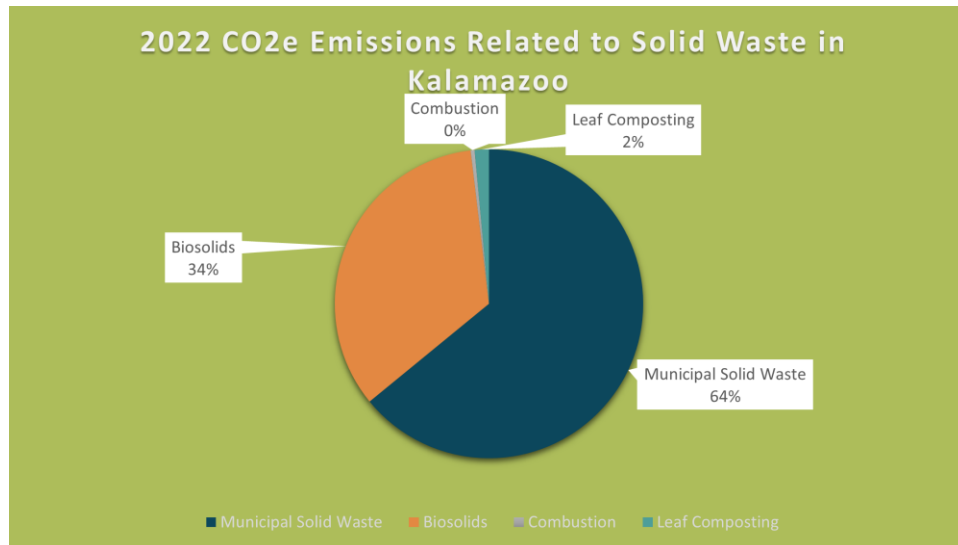
e. **Solid Waste** (40,566) metric tons of CO<sub>2</sub>e)

- i. **Municipal Solid Waste**- Municipal solid waste (MSW) emissions were estimated based on the national average of 4.9 pounds of waste produced per person. This average was applied to the 2020 United States Census population numbers for Kalamazoo: 72,873. Adjustments were then made for types of waste thrown out by people living in west Michigan. It is estimated that MSW emissions resulted in **25,995 metric tons of CO<sub>2</sub>e**.
- ii. **Biosolids**- The City of Kalamazoo treats waste for over 200,000 people in the county. Everything that you flush or send down your sink's drain moves to Kalamazoo where that water is purified and returned to the Kalamazoo River. What's not returned to the river is referred to as



biosolids and this waste is sent to a landfill. Decomposition of this waste in the landfill resulted in **13,795 metric tons of CO<sub>2</sub>e** in 2022.

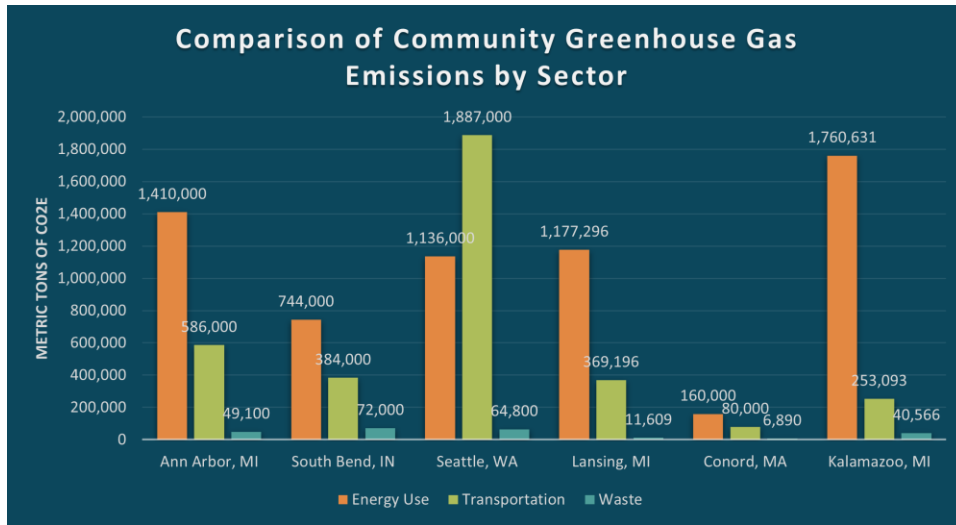
- iii. Controlled Combustion of Woody Debris- In 2022, the City of Kalamazoo disposed of woody debris through combustion. This released **167 metric tons of CO<sub>2</sub>e**.
- iv. Leaf Composting- Every fall, citizens of Kalamazoo rake their leaves to the curb and those leaves are picked up by City of Kalamazoo employees. These leaves are then composted. In 2022 composting these leaves resulted in **609 metric tons of CO<sub>2</sub>e**.



## 9. Comparison of similar cities

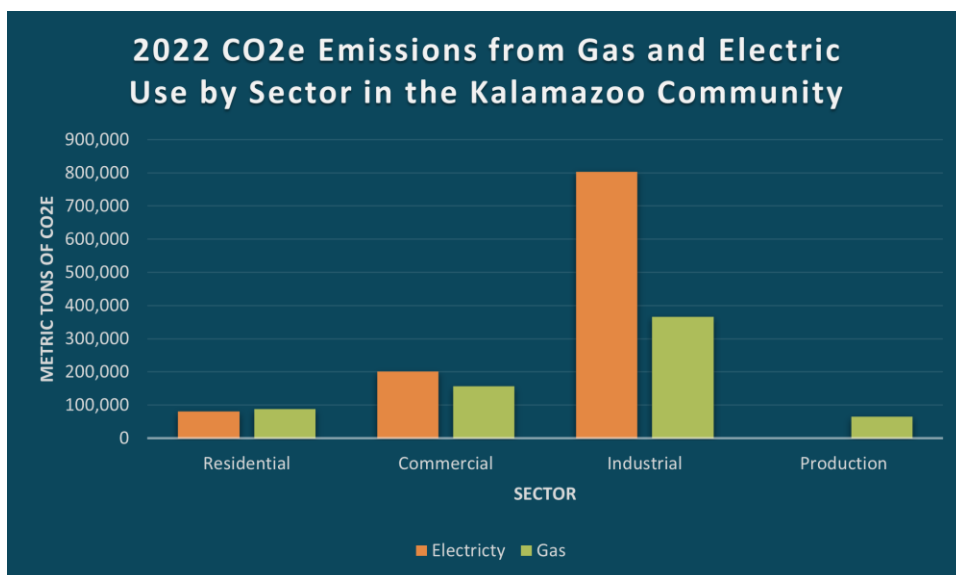
- a. Below you'll see a comparison of geographically similar cities and their emissions. Emission trends in these cities generally mirror those of Kalamazoo; energy emissions are high, followed by transportation emissions, then solid waste. One of the cities that bucks this trend is perhaps the least geographically similar. In Seattle you can see that transportation emissions are the driver of CO<sub>2</sub>e emissions, with energy use emissions taking second place. The lower energy use emissions in Seattle are a result of the hydroelectric power that is used to produce energy out there. It's not that Seattle population is using less energy, but that the energy they are using is cleaner.





## 10. As We Go Up, We Go Down

- a. While industrial energy use and the related CO<sub>2</sub>e emissions in the City of Kalamazoo are high, electrical use accounts for the majority of these emissions. Recent statewide legislation will require public utilities to produce electricity from clean and renewable sources by the year 2040. By making the electric grid greener, the City of Kalamazoo. The graph below shows what type of energy use emissions are most prevalent in the City of Kalamazoo. With electrical use being the driver of energy use emissions, this new legislation should help to cut those emissions by 2040. Coupled with an effort by the community to decarbonize, to move away from natural gas use, in the years leading up to 2040 will have an even greater impact once 2040 rolls around.



<sup>[1]</sup> <http://www.imaginekalamazoo.com/projects/sustainability/>