



2016 Community Greenhouse Gas Inventory and Business-As-Usual Emissions Forecast to 2035

Date: January 2018

INTRODUCTION

This memo summarizes the results of the City of Milwaukie's 2016 Community Greenhouse Gas (GHG) Emissions Inventory. A community emissions inventory considers many sources of emissions generated by the activities of residents, businesses, and government operations within Milwaukie's city limits, including:

- **Building energy** use by residential, commercial, and industrial buildings and facilities represents a large source of community emissions. These emissions come from "tailpipes" during combustion of natural gas and fuels to generate electricity for use in Milwaukie.
- **Transportation**, and particularly on-road vehicle transportation, of passengers and freight also represents a large fraction of community emissions. Like building energy, transportation emissions are generated at the tailpipe as well as upstream during production of fuels.
- **Refrigerants** are lost from transportation and building cooling systems. Refrigerants are powerful global warming gases; therefore, relatively small losses have a large climate impact.
- **Solid waste** disposal in landfills produces methane, most of which is collected and used for energy, but a fraction leaks out to the atmosphere having a negative climate impact.
- **Water & wastewater** energy use during treatment of drinking water and energy use and process emissions during treatment wastewater post use.
- **City Operations** generate emissions for energy use in City-owned facilities and vehicles while providing services to the Milwaukie community.

The 2016 inventory will be used to inform development of Milwaukie's Climate Action Plan and will be updated periodically to track community progress towards its climate and energy goals.

This memo also provides a 2035 Business-As-Usual Emissions Forecast, which estimates future emissions based on population growth and existing state and federal policy and programs to determine the scale of additional GHG reductions required to meet Milwaukie's climate goals.

2016 COMMUNITY GREENHOUSE GAS (GHG) EMISSIONS INVENTORY

In 2016, Milwaukie generated 262,574 MT CO₂e¹ of local, sector-based emissions. For sense of scale, this quantity of emissions is equivalent to the carbon sequestered annually by 300,000 acres of average U.S. forest – a land area about 200 times the size of the City of Milwaukie.

Milwaukie's sector-based emissions² are similar in many ways to other communities around Oregon. These emissions shown in Figure 1 come primarily from combustion of natural gas and electricity use in buildings (green segments) as well as gasoline and diesel combustion in vehicles to move people and goods (magenta segment). Relatively small sources of emissions come from City government operations, landfill disposal of

¹ Metric tons of carbon dioxide equivalent (MT CO₂e) is the conventional unit for reporting greenhouse gas emissions.

² Sector-based emissions inventories (or in-geographic boundary inventories) include local emissions, within the City's boundaries, from energy use by homes, businesses, and vehicles as well as emissions from landfilling solid waste and wastewater treatment.



CITY OF MILWAUKIE Climate Action Plan

community solid waste, treatment of water and wastewater, and refrigerant gas loss from buildings and vehicles. See Sector-Based Emissions Figure to the right.

One area of note is that Milwaukie's industrial sector represents a larger fraction of sector-based emissions compared to other Oregon communities of similar size.

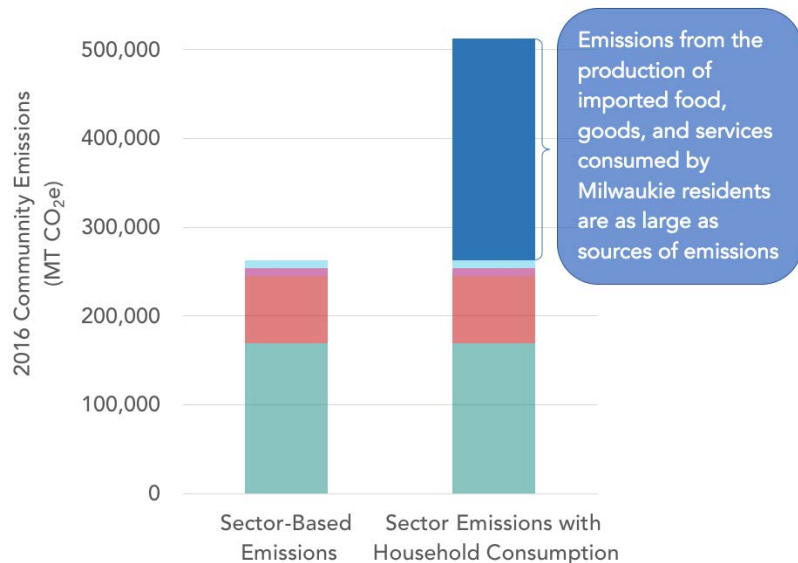
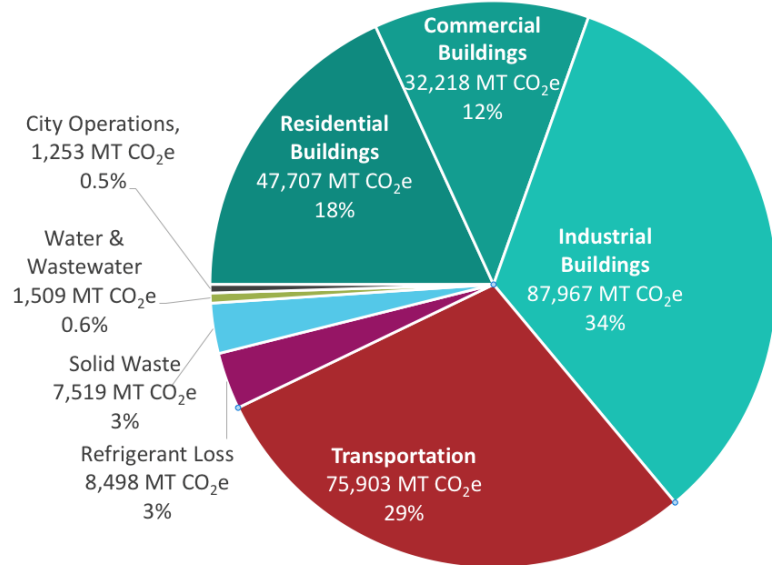
EMISSIONS FROM IMPORTED GOODS, FOOD, AND ENERGY

In addition to accounting for sector-based emissions, Milwaukie's Community GHG Inventory also considers emissions that are generated outside of the community during the production of goods, food, energy and services that are consumed by residents of Milwaukie. These emissions total 257,175 MT CO₂e. The figure below compares the scale of sector-based emissions versus emissions from household consumption and upstream fuels production³. ***The scale of the emissions from household consumption is almost equal to sector-based emissions generated locally, which supports the need to address these emissions during the community climate action planning process.***

Households consumption of imported goods, food, and services is a significant source of community emissions. Within this category, emissions from the production of meat, furniture, clothing, and vehicles; home construction; and services consumed by Milwaukie residents that are produced outside of the City, such as health care and education. While household consumption represents a significant source of emissions – these emissions are imported and therefore the community has less control over the energy sources and efficiency of production. That said – the community does control demand for various types of products which presents mitigation opportunities.

Milwaukie Sector-Based Greenhouse Gas Emissions

262,574 MT CO₂e
12.7 MT CO₂e per capita

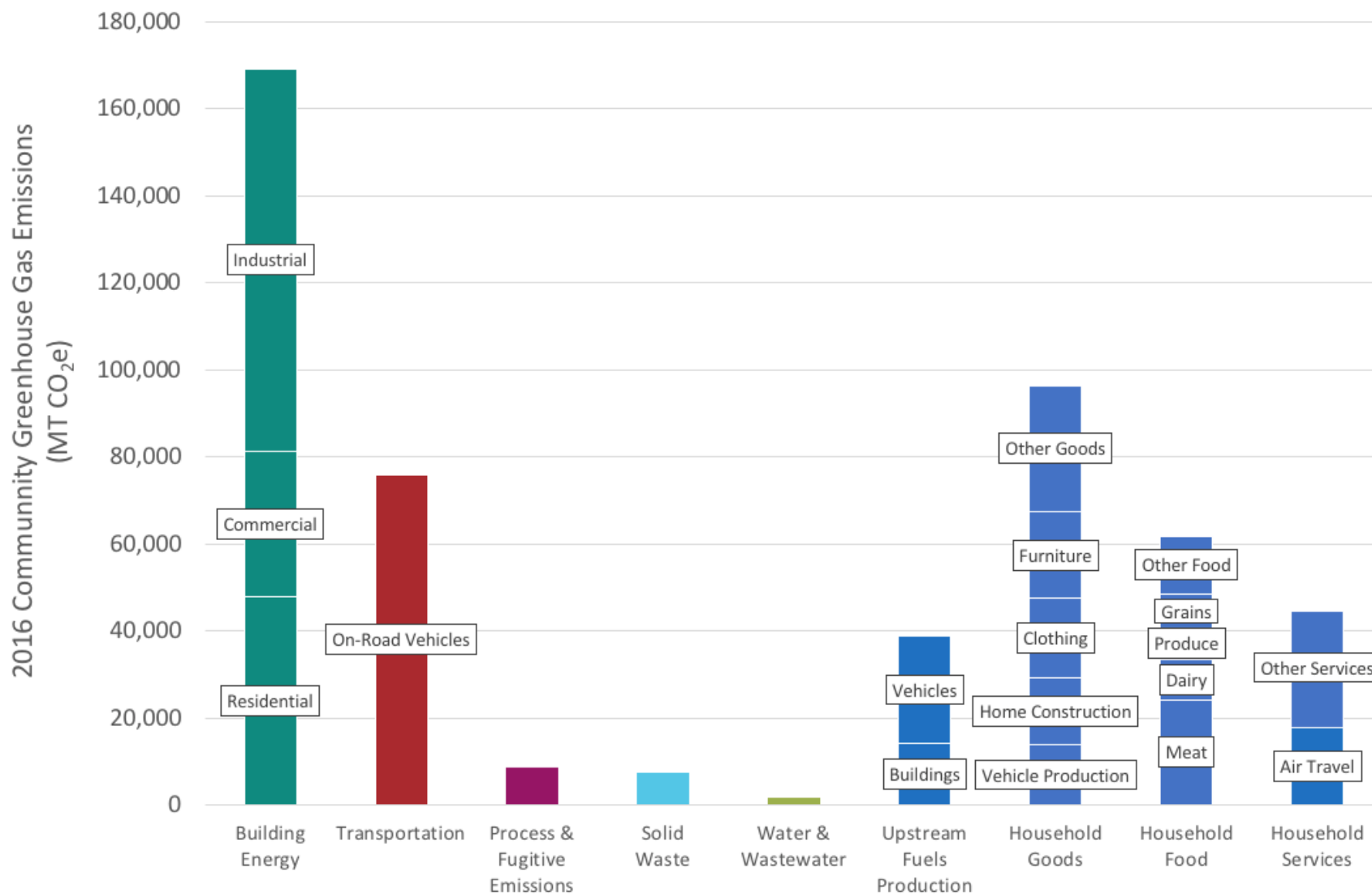


³ Sector-based emissions account for “tailpipe” emissions from the combustion of fuels. There are also “upstream” emissions that account for the energy and process emissions during extraction and refinement of fuels.



Milwaukie Sector-Based Greenhouse Gas Emissions with Household Consumption and Upstream Fuels Production

512,435 MT CO₂e





REDUCTION IN COMMUNITY EMISSIONS FROM EXISTING POLICY

In order to effectively plan for community GHG mitigation actions, it is useful to consider a business-as-usual emissions forecast which takes into account long-term emissions trends based on existing local, state, and federal policies and programs, utility projections, and population growth. The figure below shows two business-as-usual emissions scenarios. The red line represents 2016 community emissions rates and increases them by projected population increases. The stacked areas show the emissions reductions expected from existing regional, state, and federal policies. Policies considered include:

- Oregon's Renewable Portfolio Standard (RPS)
- Federal vehicle fuel economy standards (CAFE)
- Oregon SB263 (for food waste recovery)
- Montreal Protocol on refrigerants
- Energy Trust of Oregon's cost-effective energy efficiency

These policies are forecast to reduce emissions 16% compared to 2016 community emissions by 2035. The figure below shows that additional climate actions need to be identified and implemented in order to stay on track to meeting the State of Oregon's 2050 climate goal.

