



City of Missoula Greenhouse Gas Emissions Municipal Inventory

The City of Missoula municipal greenhouse gas emissions inventory is used to measure progress towards the goal of carbon neutrality in city operations by 2025. In addition to measuring progress, this report helps the City of Missoula make informed decisions on where to focus climate action strategies. The data provided in this report is based on operational carbon emissions from the City of Missoula facilities and activities, and does not include community greenhouse gas emissions.

Municipal Target:
Carbon Neutral by 2025

Community Target:
Carbon Neutral by 2050

Municipal Interim Goal #1:
10% Reduction from 2008 baseline by 2015

Municipal Interim Goal #2:
30% reduction from 2008 baseline by 2017

Municipal Interim Goal #3:
50% reduction by 2020

Q: How will the City achieve carbon neutrality (aka zero greenhouse gas emissions)?

A: A combination of conservation and reduction measures, plus carbon offset purchases.

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Forward & Acknowledgments

Mayor John Engen

The City of Missoula is committed to reducing its carbon footprint to ensure a clean and healthy future for all. We continually strive towards low-impact and efficient internal operations, and work with community partners to provide services, infrastructure, and support to help our residents, businesses, and institutions reduce their environmental impact. The 2013 Conservation and Climate Action Plan provides the roadmap to get our municipal operations to the ambitious goal of carbon neutrality by 2025. This updated municipal greenhouse gas inventory provides the necessary data to help us review where we are at in that roadmap, and where we need to prioritize and focus our efforts.

Since the 2017 municipal inventory, the city has acquired the local water utility and purchased a new building to house the Missoula Police Department, as well as faced the challenges of the COVID pandemic. These (and other) activities and changes have significantly impacted the municipal level carbon emissions as reflected in this updated inventory, which includes data from the 2020 fiscal year and includes solid waste emissions for the first time.

We thank our departmental and community partners for their assistance in obtaining and providing the necessary data to track how we are progressing on this journey. We have much work left to do, and this inventory is key in helping city staff and leadership understand where we are and where we need to go.

Sincerely,



John Engen, Mayor

Acknowledgments:

City Departments:

Tracy Cosgrove (Art Museum)
Scot Cowell (Facilities and Fleet)
Katie Emery (Public Works)
Wendy Gay (Wastewater)
Cathy Janney (Fire Department)
Chase Jones (Climate Action)
Matt Lawson (Facilities and Fleet)
Brenda Maes (Missoula Water)
Corena Maurer (Parks and Rec)
Sara Malo (Garden City Compost)
Ashley McDonald (Financial Services)
Jodi Pilgrim (Parking Commission)
Ashley Strayer (Cemetery)
Denise Tribble (Missoula Water)

Energy:

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NorthWestern Energy
Shell Energy North America (US), L.P.

Solid Waste:

Republic Services

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Missoula Energy & Climate Team

Introduction

Leigh Ratterman, City of Missoula, Climate Action Specialist

Charlotte Psick, City of Missoula, Climate Action Program Coordinator

The City of Missoula conducted its first greenhouse gas emissions inventory in 2008 to be used as a baseline for future inventories. Along with this effort, the city built a task force comprised of city staff, small business owners and other community stakeholders to create emissions reduction goals for municipal operations. With this dedicated work, the Conservation & Climate Action Plan (CCAP) was created to guide the city's mission to reduce energy and fuel consumption, reduce emissions, practice fiscal responsibility, and be good stewards of natural resources, environment, economy, quality of life, and community.

In order to tackle these goals, the city has collected data through regular greenhouse gas inventories in order to assess current emissions as compared to the baseline data. The City chose to use ClearPath, an advanced carbon calculator, which has provided detailed and consistent methodology for interpreting the data. These inventories help inform city priorities and decisions throughout our municipality, and the work that the City seeks to accomplish.

With a goal of 50% greenhouse gas emission reduction when compared with the 2008 baseline, 2020 was established as the last interim goal for our municipal emissions. Currently, we are not on track to meet that goal, and due to reasons outlined in this report, you'll see that we have created a new baseline from which to work forward. We enthusiastically look forward to working with our fellow city departments to reduce our carbon footprint and build a healthy and sustainable Missoula.

We appreciate and thank all those who have assisted with data collection and review of this report.

Thank you,

Leigh and Charlotte



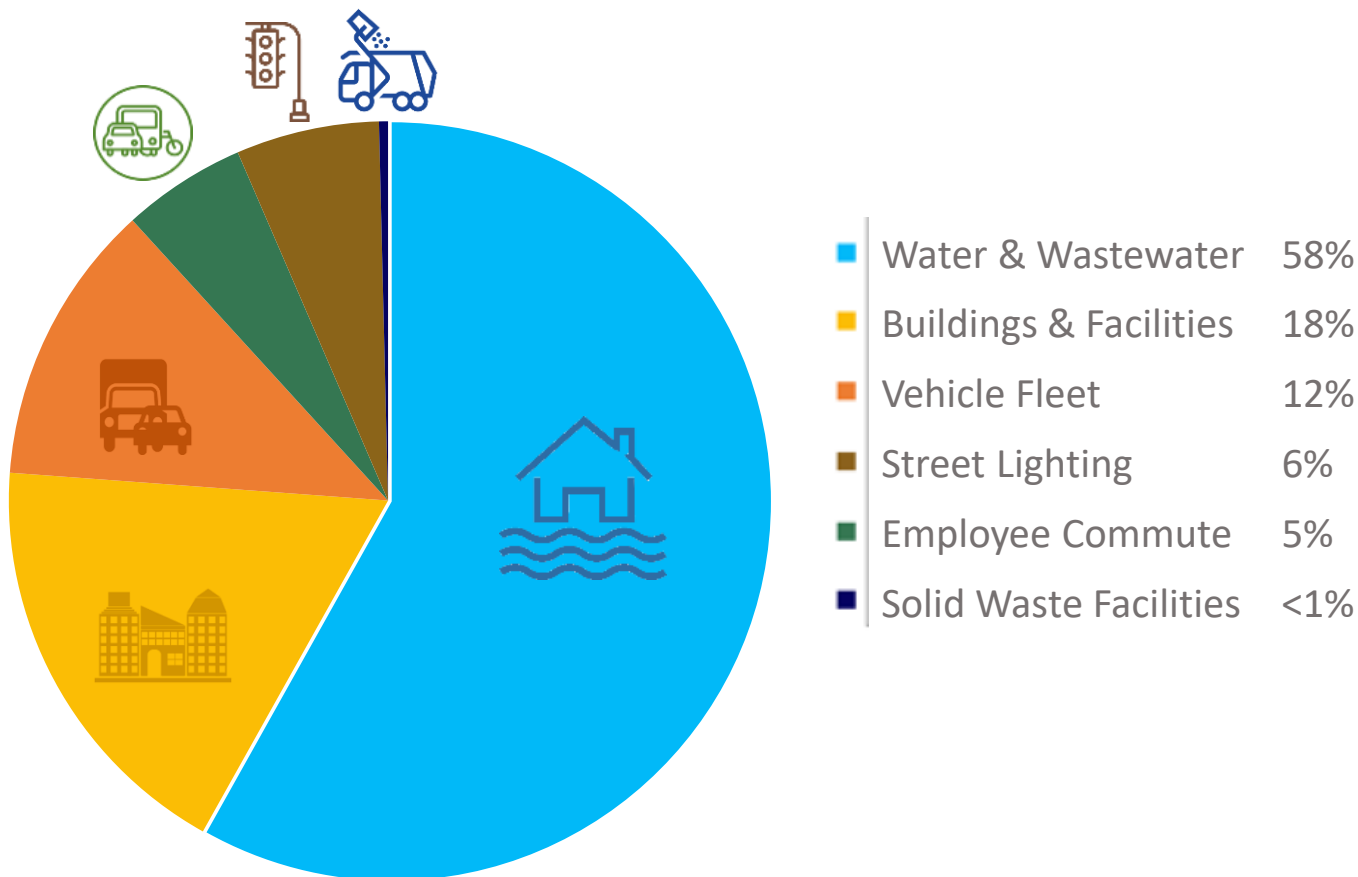
Executive Summary

The City of Missoula Municipal greenhouse gas emissions inventory measures the collective carbon footprint for all city operations. By utilizing the ICLEI ClearPath tool, the carbon emissions were calculated for each sector from raw data that was collected from utility billing and departmental reporting. Updated data accounting for the emissions associated with Northwestern Energy's specific mix of energy sources gives us a more accurate look at our emissions output and serves as a baseline for all future inventories.

The total City of Missoula municipal carbon footprint is currently 18,562 MT CO₂e (metric tons of carbon dioxide equivalent) per year.

Municipal Emissions by Sector

(percentages are rounded to nearest whole number)





1. Water & Wastewater Treatment Facilities, 58%

This sector accounts for all electricity and natural gas usage by water and wastewater facilities and operations owned by the City of Missoula (excluding fleet vehicles).

2. Buildings & Facilities, 18%

This sector accounts for electricity and natural gas usage of all City of Missoula owned, operated and occupied buildings and facilities, excluding water and wastewater buildings.

3. Vehicle Fleet, 12%

This sector accounts for varying types of vehicles and equipment used in city operations. Examples of data gathered include annual miles traveled, fuel type and consumption.

4. Street Lighting, 6%

This sector accounts for all the electrical street lights and traffic signals within the City of Missoula boundary.

5. Employee Commute, 5%

This sector accounts for the various ways a city employee travels to and from work. Annual miles traveled, number of passengers and fuel type are a few examples of the type of data collected.

6. Solid Waste Facilities, <1%

This sector accounts for the generation of solid waste from city operations. The City of Missoula does not have any financial or operational control of the landfill.

Methodology

Boundary Definition

The municipal inventory focuses wholly on municipal operations including buildings and facilities, equipment and fleet, and employee commute.

Protocol Adherence

This inventory adheres to the 2010 Local Government Operations Protocol for the quantification and reporting of greenhouse gas emissions inventories.

Data Collection

Data for the inventory was collected by the City of Missoula, with data analysis of utility billing (from NorthWestern Energy, Missoula Electric Co-op and Republic Services), detailed vehicle fleet reporting, and an employee commute survey.

Emissions Calculators

This inventory utilizes ICLEI USA ClearPath government emissions calculators. The tool offers a clear and complete set of resources to perform a US Government Protocol compliant greenhouse gas emissions inventory. (See appendix for list of greenhouse gases measured.)

Inventory Scope



Scope 1: Direct emissions from operations



Scope 2: Indirect emissions from purchased energy

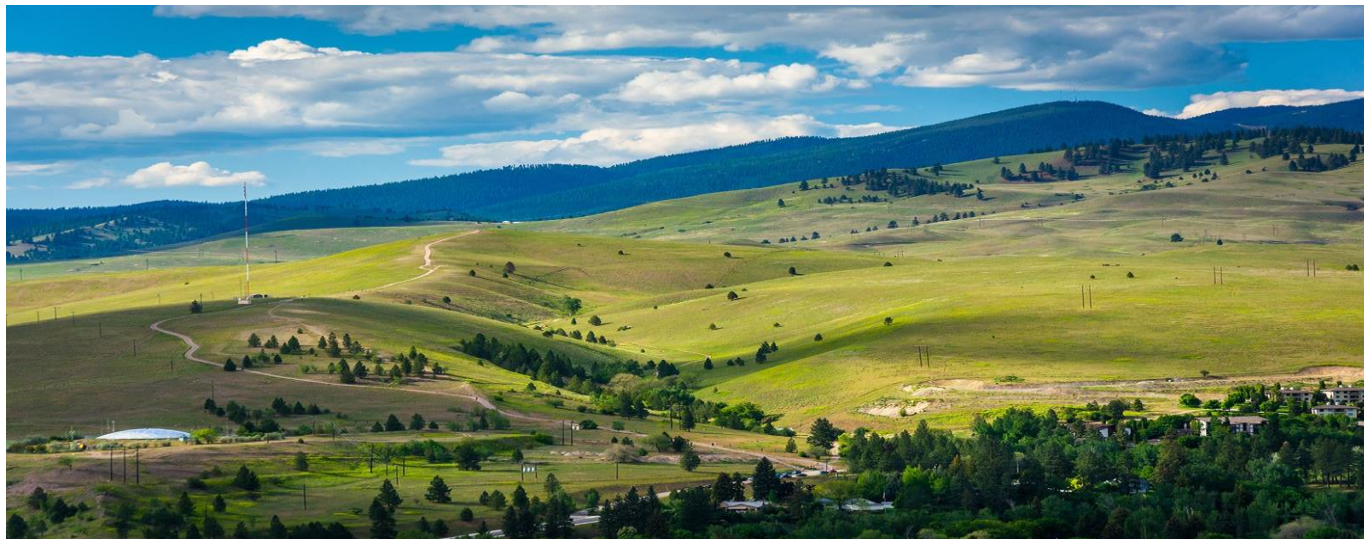


Scope 3: All other emissions associated with a company's activities

Sectors

Data was collected by the sector categories as listed on page 6, and includes largely Scope 1 and Scope 2 emissions, with the exception of employee commute (Scope 3) . Additional categories such as process emissions and fugitive emissions were deemed outside the scope of this inventory because data was not readily available, but may be included in future iterations.

Within each sector, inventory records detail specific energy consumption data. A full list of inventory records by sector is available in the appendix.



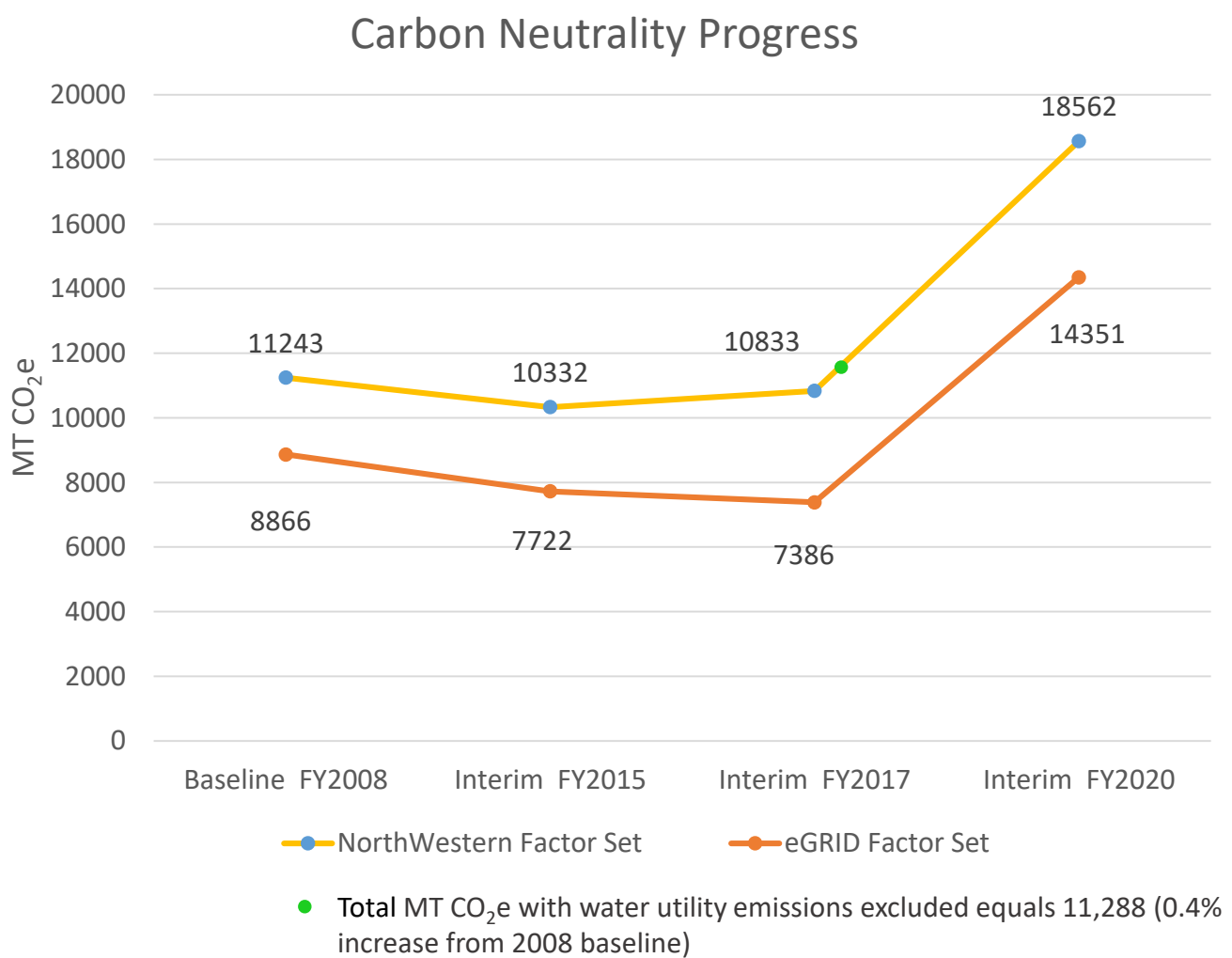
Emissions Factors

Emissions factors are used in greenhouse gas inventories to convert from the quantity of a fuel consumed (e.g. electricity, natural gas, gasoline) to the associated greenhouse gas emissions. For the electricity emissions factor, past City of Missoula greenhouse gas inventories used a northwest regional emissions factor provided by the EPA's Emissions and Generation Resource Integrated Database (eGRID). For this inventory, we were able to obtain an emissions factor specific to our electric utility, NorthWestern Energy, allowing for a more accurate representation of the emissions associated with the City's electricity consumption. NorthWestern Energy's emissions factor is significantly higher than the regional eGRID emissions factor, which contributes to the large increase in overall emissions compared to past inventories. For the purposes of comparison, we also used NorthWestern Energy emissions factors to update past inventories (see graph on page 9).

Other emissions factors used in this inventory included transportation fuels (from the EPA) and waste (from The Climate Registry).



Goal: Carbon Neutrality by 2025



What Happened?

While the City has not achieved the drastic greenhouse gas reductions needed to meet its interim goal, a lot has changed in the past three years to account for such a sharp increase in greenhouse gas emissions, including:

- **Mountain Water** (now Missoula Water) acquired by the City in June 2017. While these emissions have been accounted for in past community-based greenhouse gas inventories, this is the first time we see it in the municipal inventory (accounting for approx. 87% of emissions increase from 2017-2020).
- The City hired 124 **new employees** (including acquisition of **Mountain Water employees**) going from 531 in 2017 to 655 in 2020 (accounting for <1% of emissions increase from 2017-2020).
- The City purchased a new police station **building**, has updated and expanded other buildings and parks, and expanded **infrastructure** such as lighting (accounting for approx. 10% of emissions increase from 2017-2020).
- Emissions from the City's contribution of materials to the **landfill** has been included in this inventory for the first time (accounting for <1% of emissions increase from 2017-2020).

How do we compare? Following are a few examples of city municipal emissions data, although direct comparisons are difficult due to lack of standardized data points, different methods of calculation, and a wide variety of municipally-owned and operated facilities and utilities. For example, some communities own and operate a landfill, but do not own and operate their water utility. As such, methane emissions from landfill operations would be much higher than the City of Missoula's, while water emissions would be much lower.

Tacoma, Washington
Population: 212,8690 (2019)
Municipal employees: 3,500 (2016)
Municipal Emissions: 72,486 MT CO₂e (2016)

CO₂e across all categories for current inventory

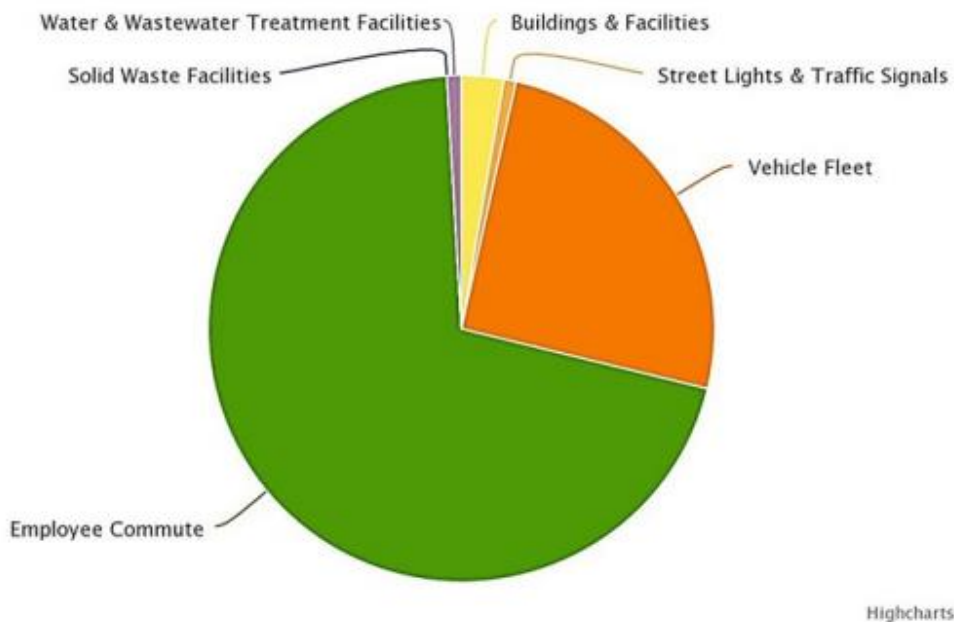


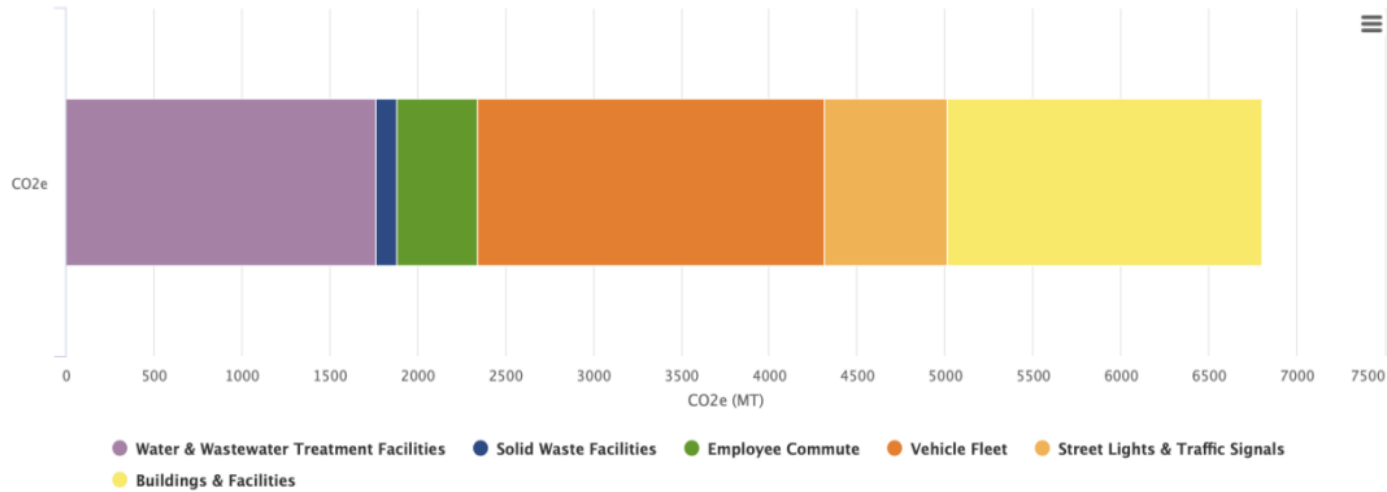
Figure 4: Government Operation proportional GHG estimated emissions in 2016.

Helena, MT
Population: 33,124 (2019)
Municipal employees: 356 FTE (2019)
Municipal Emissions: 7,500 MT CO₂e (2019)

Inventory By Sector

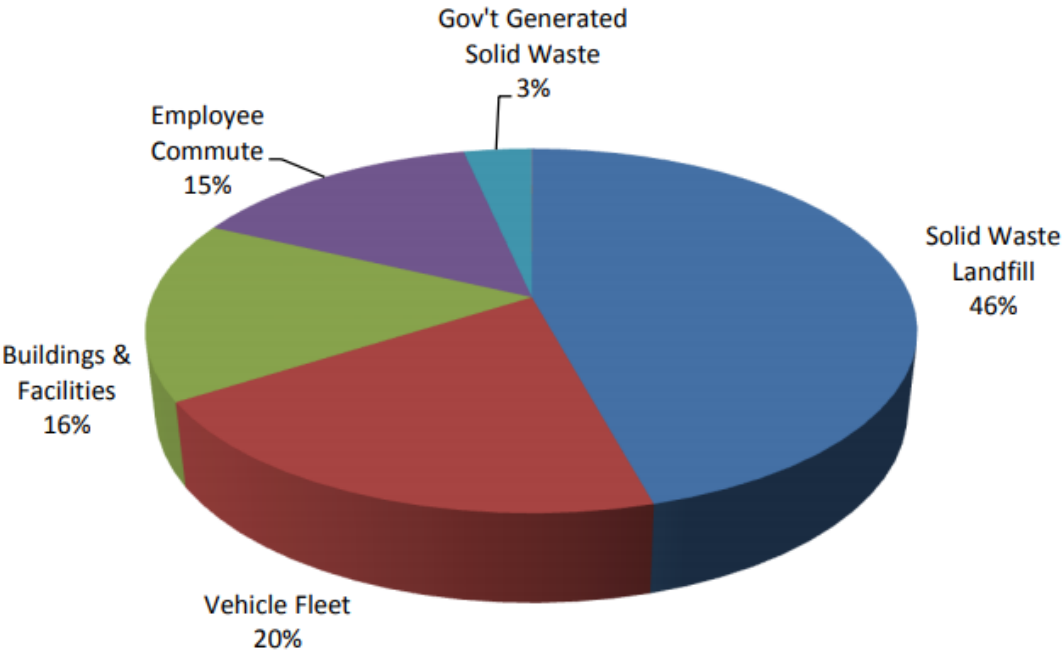
CO₂e by sector for the selected inventory year.

Sector	CO ₂ e
Buildings & Facilities	1,787
Street Lights & Traffic Signals	700
Vehicle Fleet	1,975
Employee Commute	455
Solid Waste Facilities	124
Water & Wastewater Treatment Facilities	1,760



Mountain View, CA
Population: 81,656 (2019)
Municipal employees: 568 FTE (2014)
Municipal Emissions: 8,700 MT CO₂e (2018)

Figure 1: 2018 Government Operations GHG Emissions Inventory (8,700 MT CO₂e)



Water & Wastewater Treatment Facilities



57%

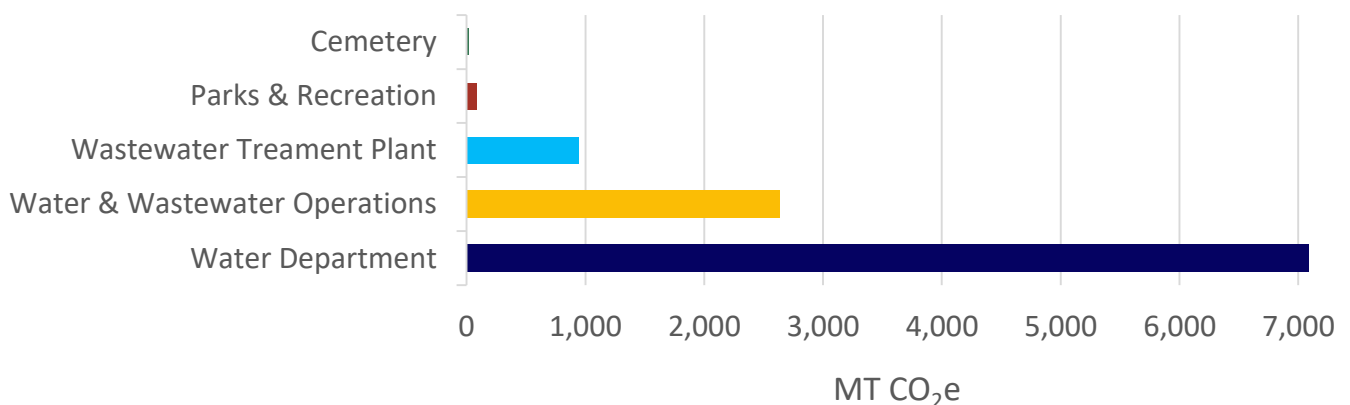
This sector encompasses the water department (including lifts and pumps), wastewater treatment plant, and stand-alone electricity/natural gas powered water systems accounts for the Cemetery and Parks & Recreation. The emissions in this sector are produced by:

- electricity
- natural gas
- combustion of digester gas
- incomplete combustion of digester gas.



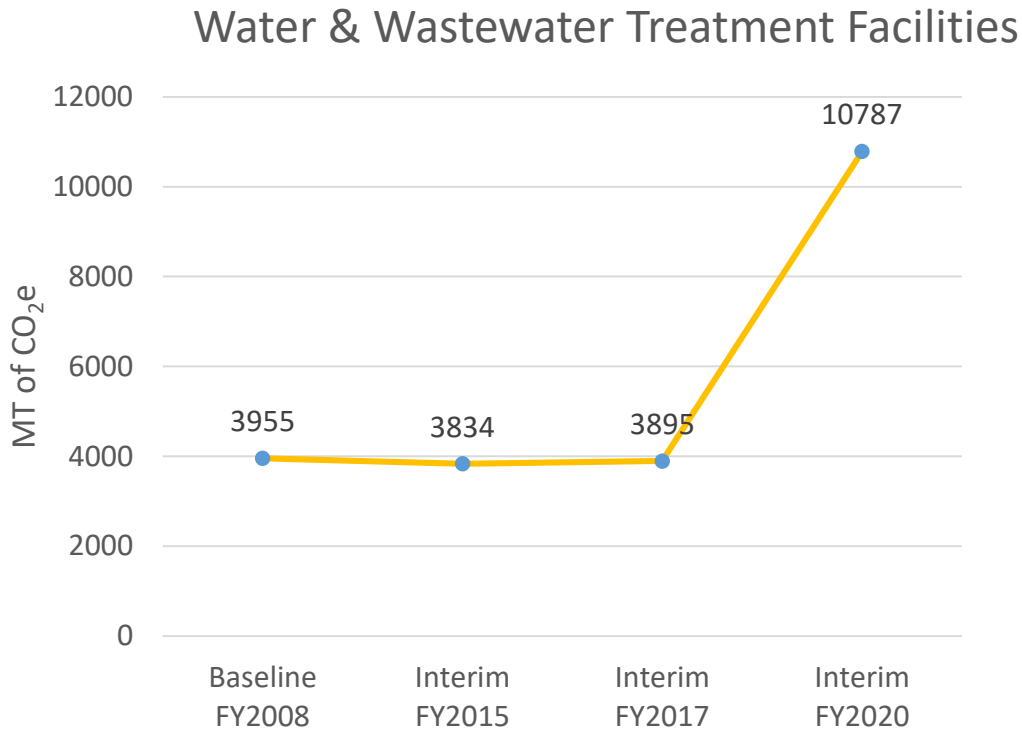
Water & Wastewater Treatment Facilities is the largest contributor to municipal carbon emissions, with **10,787 MT CO₂e**.

MT CO₂e, by Source



Goal: Carbon Neutrality by 2025

Are we on track?

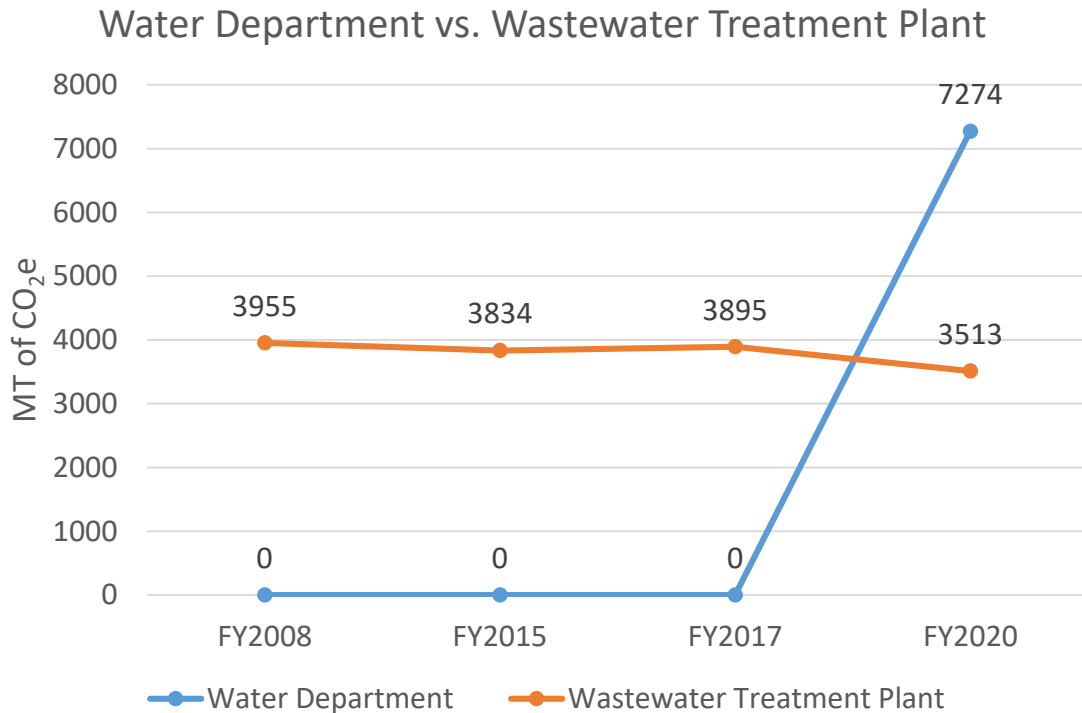


What happened?

The sharp increase illustrated in this graph is due to the acquisition of the water utility in 2017 (see page 9). The emissions associated with water and wastewater operations is heavily influenced by population growth and efficiency of equipment. Now that the City owns and operates the water utility, it is committed to reducing the associated emissions.

Goal: Carbon Neutrality by 2025

Are we on track?



Reduction Efforts

- ✓ The Wastewater Treatment Plant has installed a cogeneration unit to generate electricity and thermal energy from the biogas that is produced during plant processes. This system produces over 24% of the plant's electricity, and almost all of the plant's heat.
- ✓ The Water and Wastewater Treatment Facilities are considering additional opportunities to add renewable energy.
- ✓ The City and its partners are looking at areas of inefficiency and potential upgrades to the City's water pumps and lift stations.

Buildings & Facilities

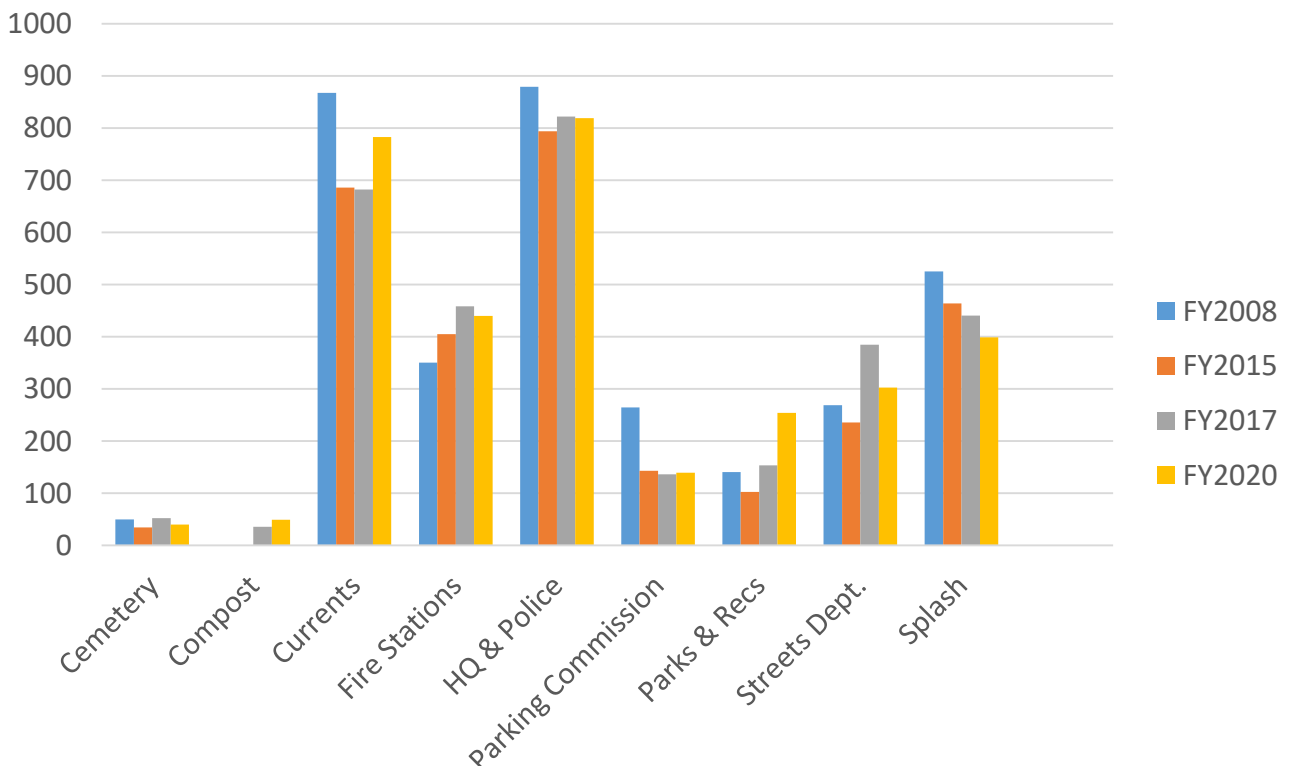


18%

The emissions in this sector are produced by the electricity and natural gas usage of city owned, operated and/or occupied buildings & facilities.

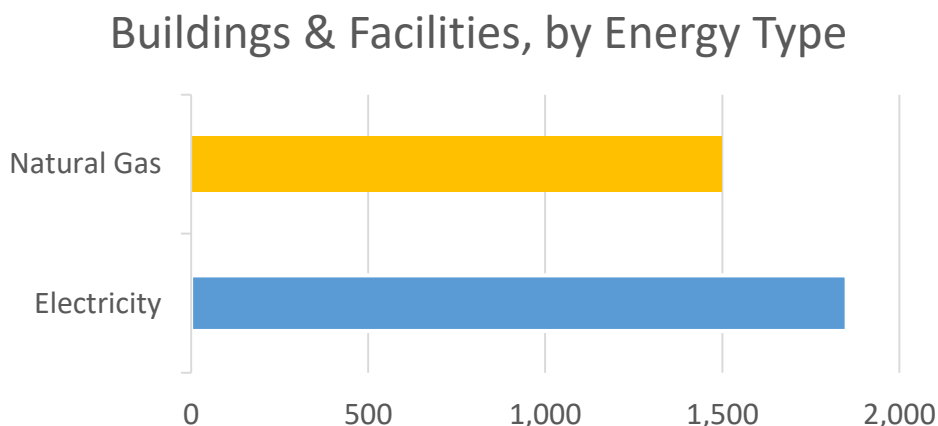
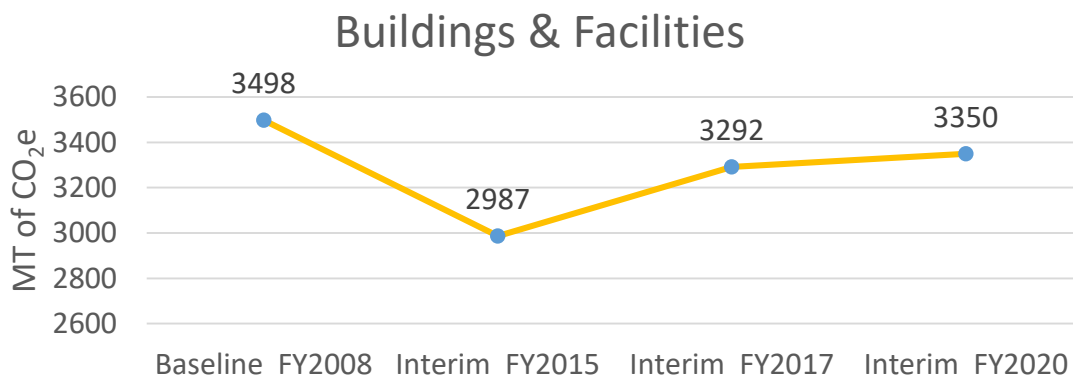
Buildings & facilities is the second largest contributor to the government's emission with **3,350 MT CO₂e**. Of the generated emissions, 62% is the result of electricity, and 38% is the result of natural gas.

Buildings & Facilities Comparisons



Goal: Carbon Neutrality by 2025

Are we on track?



Reduction Efforts

- ✓ The City is currently working with a local contractor to complete an Energy Performance Contract to identify and implement opportunities for energy conservation and renewable energy efforts throughout existing city buildings and facilities.
- ✓ The City is involved in efforts to encourage green building education and practices in all city-funded projects.
- ✓ In June 2020 the City of Missoula, Missoula County, and NorthWestern Energy entered into a Memorandum of Understanding to work towards a goal of 100% clean electricity by 2030.

Vehicle Fleet



12%

The vehicle fleet sector accounts for the third largest portion of the city government's emissions, emitting **2,239 MT of CO₂e**.

On Road Vehicles: Off Road Vehicles:

Passenger Cars

SUV

Light Duty Truck

Heavy Duty Truck

Small Utility Vehicle

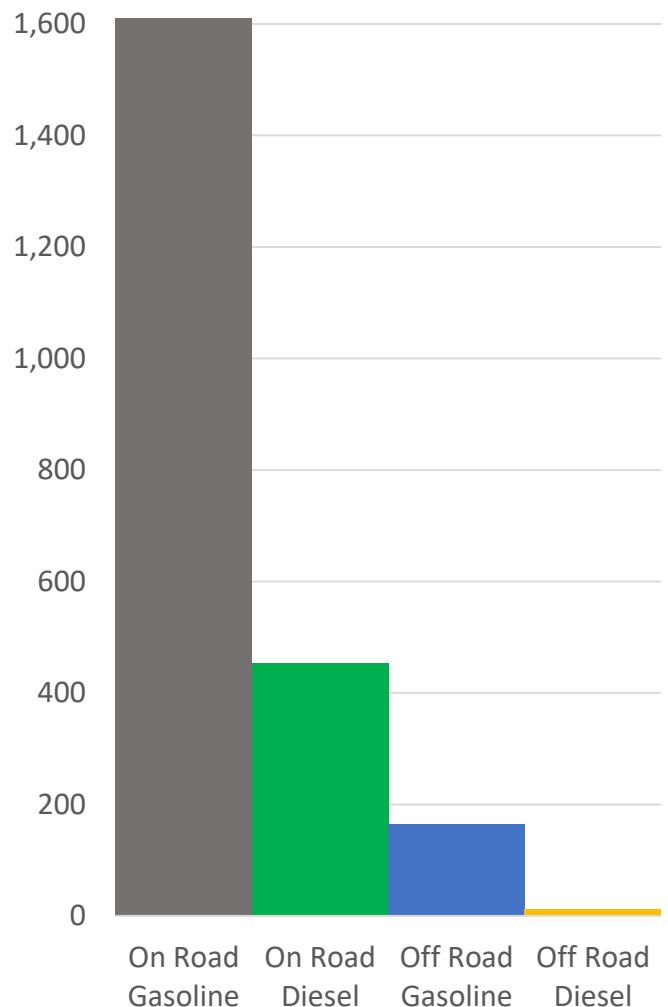
Large Utility Vehicle

ATV/UTV

Construction Equipment

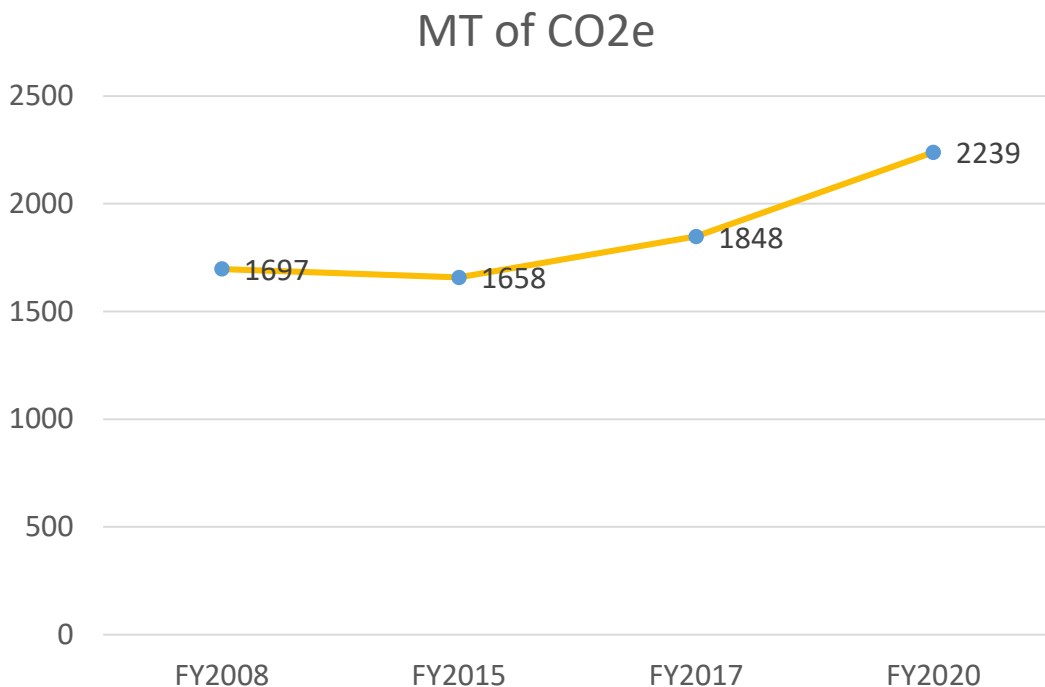


Vehicle Fleet Emissions, by Source



Goal: Carbon Neutrality by 2025

Are we on track?



What happened? The City's fleet has expanded with the acquisition of the water utility, in which vehicles are used to track water usage and maintain equipment throughout Missoula. The City has also expanded its employee work force, and more people are using city vehicles to perform their work duties.

Reduction Efforts

- ✓ The City is looking for opportunities to electrify its fleet, and provide associated electrical vehicle charging stations at city facilities.
- ✓ The City is working on strategies to track data in order to ensure correct fleet vehicle numbers, as well as strategies to ensure uniform purchasing processes.

Street Lighting

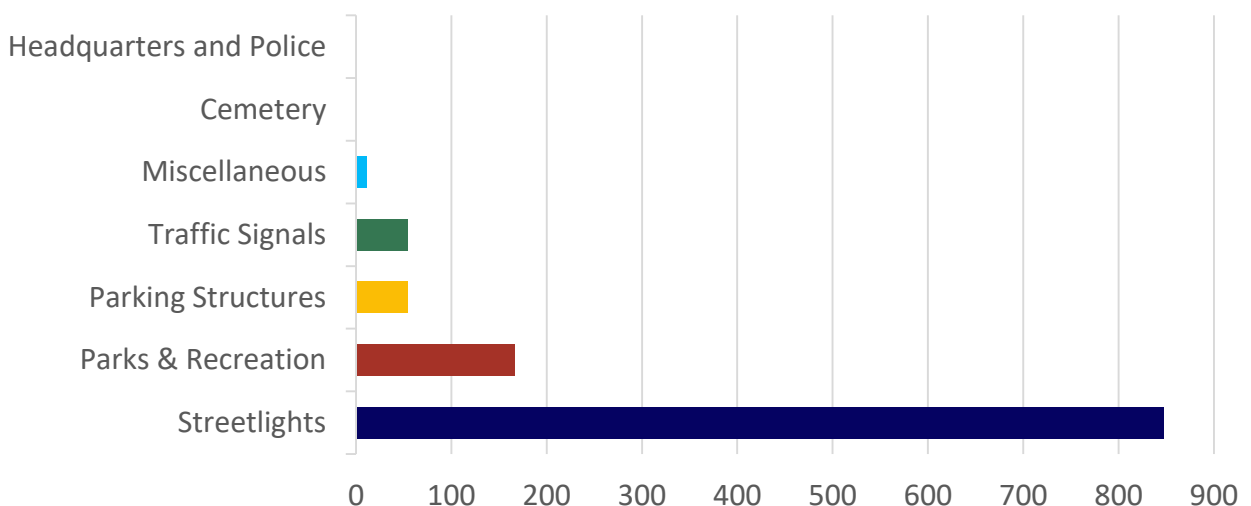


6%

Accounting for emissions produced by electricity and natural gas usage for city-owned street lights & traffic signals, this sector is the second smallest contributor to municipal emissions footprint, with **1,133 MT CO₂e**. By location, Streetlights (75%) and Parks & Recreation (14%) contribute to 89% of the generated emissions.

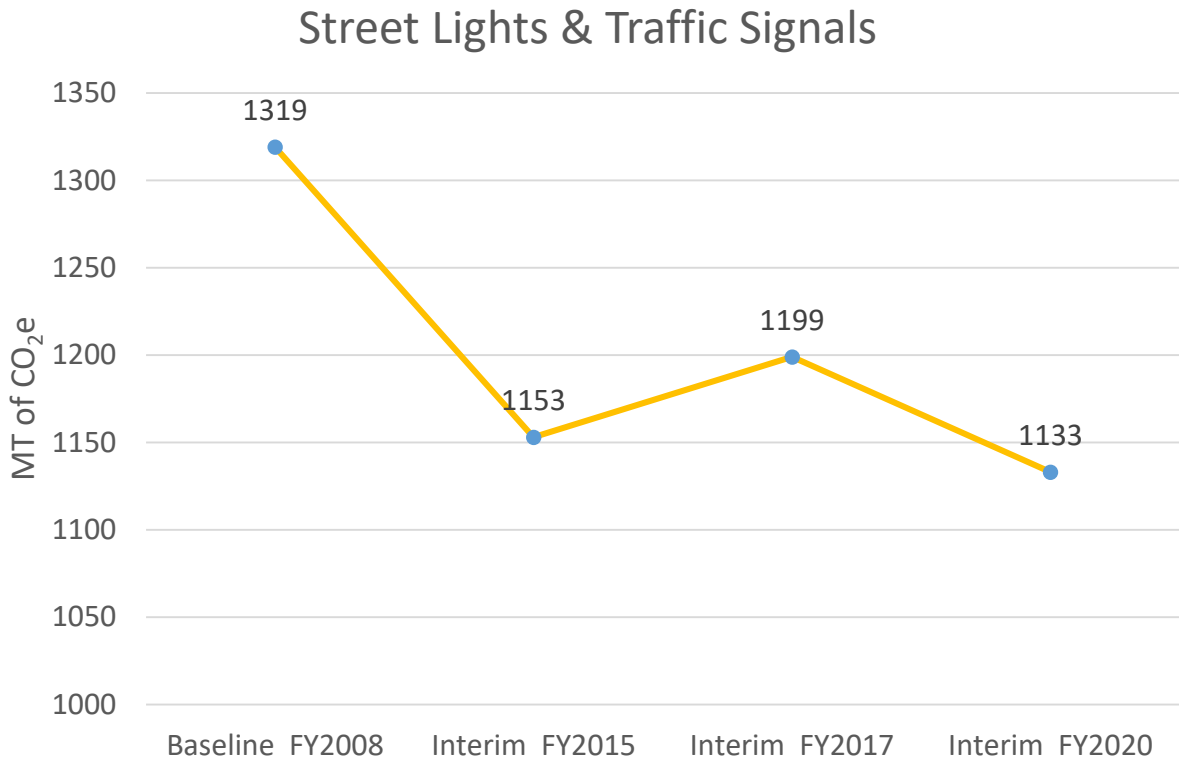
NorthWestern Energy owns and maintains the majority of streetlights in the City. The Signals, Streetlights & Communication Shop for the City maintains the decorative City-owned streetlights, any various other traffic, school and pedestrian signals throughout the city.

MT of CO₂e, by Location



Goal: Carbon Neutrality by 2025

Are we on track?



Reduction Efforts

- ✓ The City adopted a dark skies ordinance in November 2016 which includes energy conservation measures
- ✓ The City and NorthWestern Energy continue to upgrade lighting equipment with LED technology which uses nearly half the energy and lasts 2-3 times longer than existing lighting technology.

Employee Commute



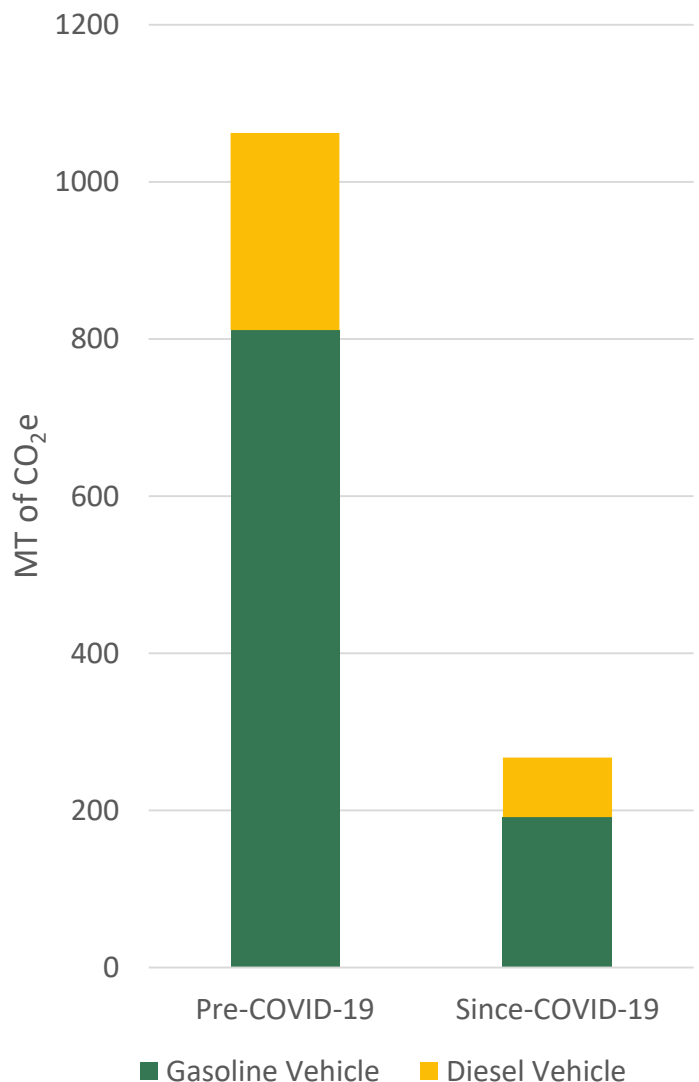
7%

The employee commute sector accounts for the fourth largest portion of municipal emissions, emitting **1,329 MT CO₂e**.

In order to calculate employee commute data, a survey was administered to city staff. This survey resulted in a response rate of 17.59% (155 out of 655 employees responded) and data was scaled up to represent a 100% response rate.

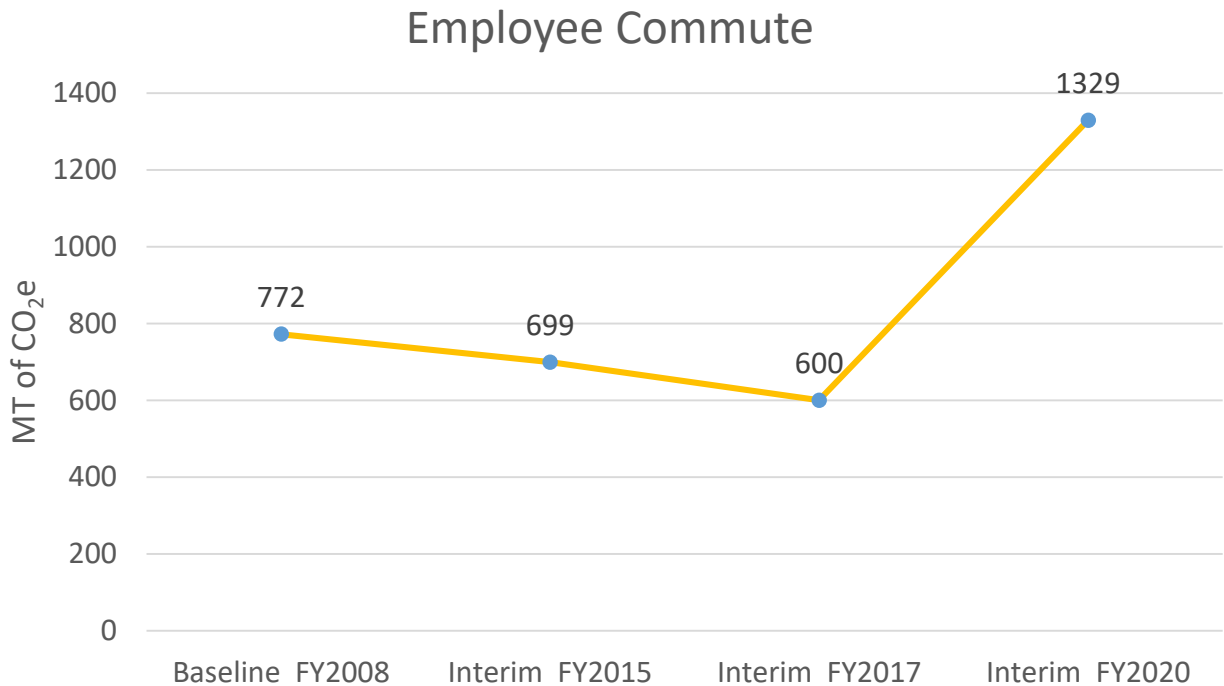
The COVID-19 pandemic hit near the end of fiscal year 2020, which resulted in a drastic decline in employee commutes as staff was directed to work from home.

Employee Commute, by
COVID-19



Goal: Carbon Neutrality by 2025

Are we on track?



What happened? The City has expanded its employee work force from 531 employees in 2017 to 655 employees in 2020.

Reduction Efforts

- ✓ A new telecommuting policy will continue to help reduce carbon emissions and allow for better tracking for future inventories
- ✓ The city encourages alternative commuting options like walking, biking, busing, and rideshare through Missoula in Motion

Solid Waste Facilities

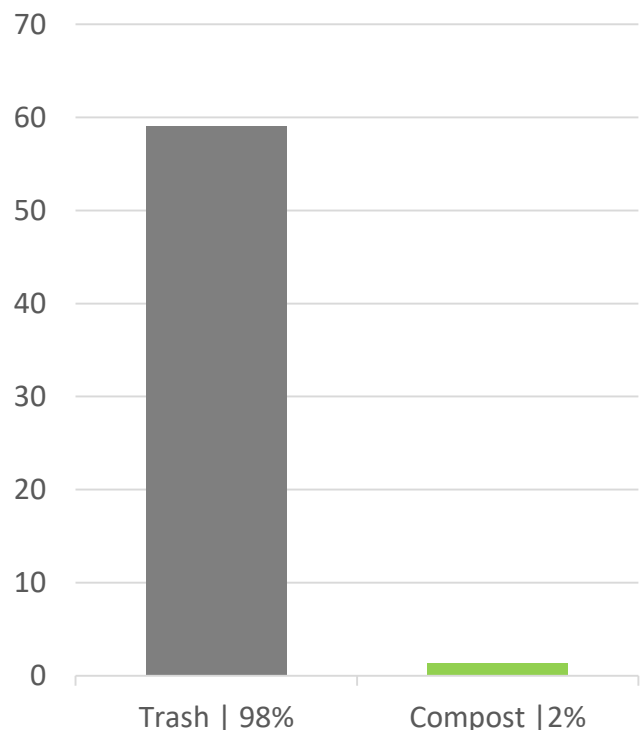


<1%

Data for the waste sector was collected through analysis of the monthly municipal invoices from Republic Services. This data represents the emissions of deposited waste (**generated from city employees**) into the landfill and local compost facility. Emissions from collection and transportation of recyclable material is outside the scope of this inventory. Solid waste contributed to **71 MT CO₂e** tons of emissions in 2020.

This emissions calculation does not include consumption-based emissions, such as mining, production, and transportation of goods and food since those emissions happen largely outside of the City of Missoula.

Solid Waste Facilities
Emissions by Source

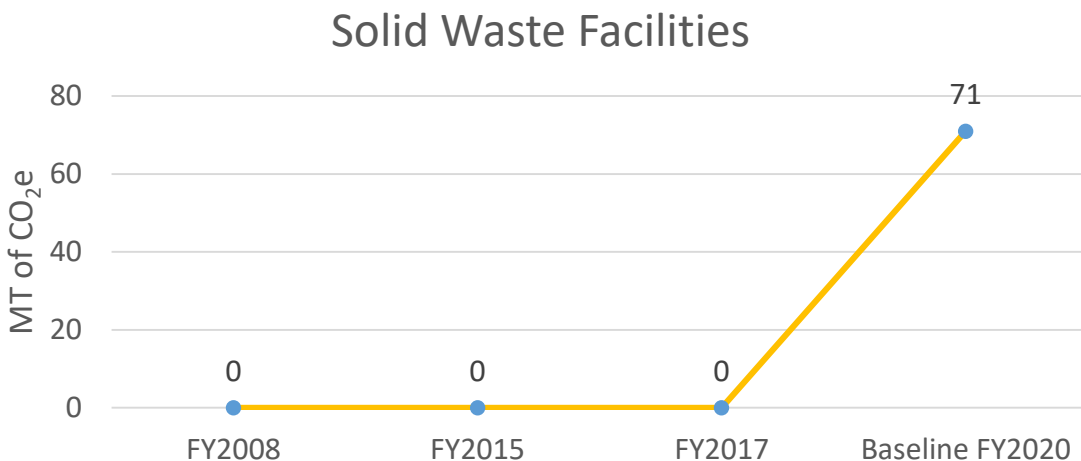


ZERObyFIFTY

Missoula's Pathway To Zero Waste

Goal: Carbon Neutrality by 2025

Are we on track?



What happened? This is the first year that the City of Missoula is including solid waste data into the municipal inventory. This will serve as a baseline to our future work on Zero by Fifty plan.

Reduction Efforts

- ✓ The City commissioned a waste composition study in 2020 to look at municipal and community waste, and is working to identify current waste and landfill diversion practices in city buildings and operations
- ✓ The City is working to reduce construction and building demolition waste in city-funded projects, which is a significant amount of the material going to the landfill from the Missoula community (see Figure 1)

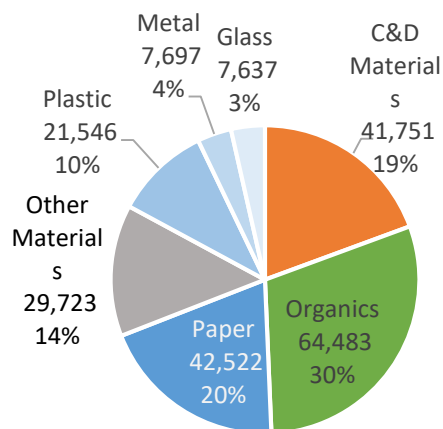


Figure 1

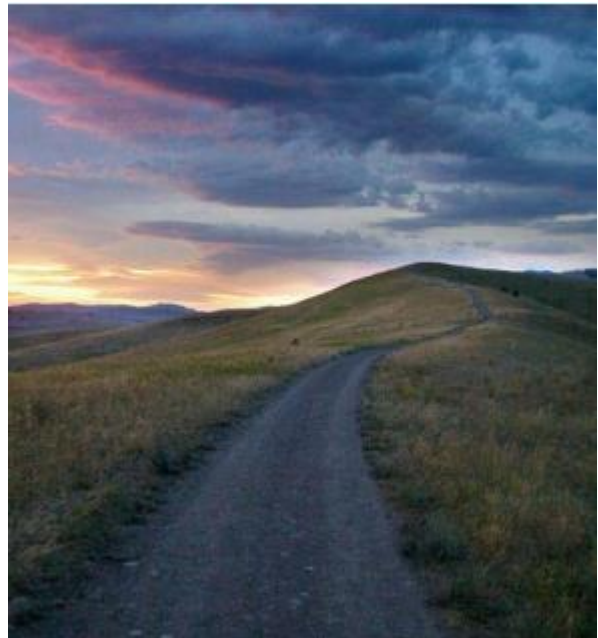
Moving Forward

This inventory shows that the City of Missoula's emissions have increased substantially in the last three years, and do not currently reflect a trajectory toward the goal of carbon neutrality by 2025. The picture is more complex than it may first appear. The acquisition of the water utility, in particular, had a significant impact on this increase that does not reflect an increase in emissions, just an increase in emissions within the City's control. The City is committed to analyzing and prioritizing efficiency of the water system, which will likely result in significant emissions reduction.

From efficiency upgrades in city facilities to LED streetlighting to the 100% Clean Electricity Initiative, the city has numerous efforts underway to reduce its carbon footprint.

While substantial efforts demonstrate the City's commitment, it's clear that much more will be needed to achieve carbon neutrality.

We hope that this inventory will inspire us to redouble our efforts, with the creativity and commitment that characterizes Missoula's city government. We look forward to reporting on that progress in the next municipal inventory, which will be conducted for fiscal year 2023.





Appendix

a. Overall Emissions

Sector	MT of CO ₂ e	Percentage of Overall Total
Water & Wastewater Treatment Facilities	10787.0976	58.11%
Buildings & Facilities	3350.6349	18.05%
Vehicle Fleet	2239.29045	12.06%
Street Lights & Traffic Signals	1133.8868	6.11%
Employee Commute	980.217	5.28%
Solid Waste Facilities	71.174	0.38%

Appendix

b. Water & Wastewater Treatment Facilities Emissions

Inventory Record	MT of CO ₂ e	Percentage of Sector Total
Water Department Lifts & Pumps – Electric	7092.8	65.75%
Water & Wastewater Treatment Plant Operations – Electric	2538.6	23.53%
Wastewater Treatment Plant SHELL – Natural Gas	572.98	5.31%
Wastewater Treatment Plant Lifts & Pumps – Electric	270.99	2.51%
Water & Wastewater Treatment Plant Operations – Natural Gas	103.07	0.96%
Parks & Recreation Water Use – Electric	90.616	0.84%
Wastewater Treatment Plant MEC – Electric	70.960	0.66%
Wastewater Treatment Plant Flared Biogas	24.464	0.23%
Cemetery Water Use – Electric	16.964	0.16%
Wastewater Treatment Plant Boiler Biogas	4.5539	0.04%
Wastewater Treatment Plant Fugitive Emissions	1.0997	0.01%

Note: Due to some data anomalies, data collected for Water Department Lifts & Pumps – Electric and Gas includes calendar year 2020 (1.1.2020 – 12.31.2020) rather than fiscal year 2020 (6.1.2019 – 5.31.2020). All other data points in this report are collected from fiscal year 2020.

Appendix

c. Buildings & Facilities Emissions

Inventory Record	MT of CO ₂ e	Percentage of Sector Total
Headquarters and Police – Electric	590.37	17.62%
Currents – Natural Gas	500.03	14.92%
Currents – Electric	282.39	8.43%
Fire Stations – Electric	266.42	7.95%
Splash – Natural Gas	243.87	7.28%
Headquarters and Police – Natural Gas	228.71	6.83%
Fire Stations – Natural Gas	173.38	5.17%
Streets & Maintenance Department – Natural Gas	158.69	4.74%
Splash – Electric	154.77	4.62%
Parks & Recreation Department - Electric	145.81	4.35%
Streets & Maintenance Department – Electric	143.92	4.30%
Parking Structures - Electric	121.91	3.64%
Parks & Recreation Department – Natural Gas	77.764	2.32%
Missoula Art Museum – Electric	63.286	1.89%
Missoula Art Museum – Natural Gas	62	1.85%
Cemetery – Electric	32.077	0.96%
Parks & Recreation Assets (Combined Irrigation and Lighting Accounts) - Electric	30.286	0.90%
Compost – Natural Gas	29.439	0.88%
Compost – Electric	20.095	0.60%
Parking Structures – Natural Gas	17.408	0.52%
Cemetery – Natural Gas	8.0099	0.24%

Appendix

d. Vehicle Fleet Emissions

Inventory Record	MT of CO ₂ e	Percentage of Sector Total
Light-Duty Truck – Gasoline	874.15	39.04%
Passenger Car – Gasoline	579.93	25.90%
Heavy-Duty Truck – Diesel	445.35	19.89%
Heavy-Duty Truck – Gasoline	155.51	6.94%
Small Utility – Diesel	82.868	3.70%
Construction – Diesel	74.092	3.31%
ATV/UTV – Gasoline	10.925	0.49%
ATV/UTV – Diesel	7.9238	0.35%
Light-Duty Truck – Diesel	7.7161	0.34%
Large Utility – Gasoline	0.41508	0.02%
Large Utility – Diesel	0.41047	0.02%

*Based on the provided data, several categories values could not be calculated, due to missing fuel consumption and/or VMT. Some entries were tracked in hours/fuel usage and were added into their appropriate sections.

Appendix

f. Employee Commute Emissions

Inventory Record	MT of CO ₂ e	Percentage of Sector Total
Pre-COVID-19 Employee Commute - Gasoline	811.569	61.04%
Pre-COVID-19 Employee Commute - Diesel	250.55	18.86%
Since COVID-19 Employee Commute - Gasoline	191.42179	14.40%
Since COVID-19 Employee Commute - Diesel	75.873	5.71%

g. Street Lights & Traffic Signals Emissions

Inventory Record	MT of CO ₂ e	Percentage of Sector Total
Streetlights - Lighting	847.16	74.71%
Parks & Recreation - Lighting	165.79	14.62%
Traffic Signals - Lighting	53.642	4.76%
Parking Structures - Lighting	53.915	4.75%
Miscellaneous - Lighting	10.848	0.96%
Headquarters and Police - Lighting	1.0152	0.09%
Cemetery - Lighting	1.5166	0.13%

Appendix

h. Solid Waste Facilities Emissions

Inventory Record	MT of CO ₂ e	Percentage of Sector Total
Missoula FY20 Solid Waste	71.174	100%

Note:

NOTE: City parks were removed from this calculation, as the generation of waste was likely due to the community using the facilities, rather than from city employees or operations. If all accounts were included in the inventory, the emissions would increase from 60 MT of CO₂e to 77 MT of CO₂e.

i. FY20 NorthWestern Energy & eGRID Electricity Factor Set

Greenhouse Gas	lbs/Unit
CO ₂	1058.22 lbs/MWh
CH ₄	68 lbs/GWh
N ₂ O	10 lbs/GWh

*NorthWestern Energy provided a 2018 Environment, Social and Governance (ESG) factors data sheet. CO₂e was provided as 0.48 MT/MWh, and was converted to 1058.22 lbs/MWh. CH₄ was not included in the ESG, which is not typically calculated by utilities. This value was used from the eGRID 2019 NWPP regional data (0.068 lbs/MWh) and converted (x1000) to lbs/GWh (see below's eGRID 2019 NWPP regional data). NOX, instead of N₂O was provided on the ESG, thus the eGRID 2019 NWPP N₂O value was used (0.010 lbs/MWh) and converted (x1000) to lbs/GWh.

Appendix

j. NorthWestern Energy Resource Mix

Resource	% of Mix
Coal	24.85
Petroleum Coke	6.80
Waste Coal	5.03
Natural Gas	5.13
Hydroelectric	42.36
Wind	15.83

k. eGRID 2019 NWPP Region Factor Set Emissions Rates

Greenhouse Gas	lbs/Unit
CO ₂	715.24 lbs/MWh
CH ₄	68 lbs/GWh
N ₂ O	10 lbs/GWh

Appendix

I. eGRID 2019 NWPP Region Resource Mix

Resource	% of Mix
Coal	22.98
Oil	0.19
Gas	19.86
Nuclear	3.14
Hydro	42.34
Biomass	1.16
Wind	7.98
Solar	1.42
Geo thermal	0.59
Other Fossil	0.22
Other Unknown	0.12

Appendix

m. FY20 Waste Characterization Factor Set

Material Type	% of Material
Municipal Solid Waste	48.6
Newspaper	1
Office Paper	3.2
Corrugated Cardboard	4.4
Magazines/Third Class Mail	3.2
Food Scraps	24.1
Grass	3.6
Leaves	1.8
Branches	1.8
Dimensional Lumber	8.3

n. Not Included in Inventory

The following item was not included in the inventory because activity data was not readily available: fugitive emissions.

Appendix

m. Resources & Links

eGRID: <https://www.epa.gov/egrid/data-explorer>

NorthWestern Energy ESG: <https://www.northwesternenergy.com/docs/default-source/documents/investor/northwestern-energy-eei---esg-worksheet-2018.pdf>

ICLEI ClearPath: <http://icleiusa.org/clearpath>

The Climate Registry: <https://www.theclimateregistry.org/wp-content/uploads/2019/05/The-Climate-Registry-2019-Default-Emission-Factor-Document.pdf>

Tacoma, Washington Greenhouse Gas Emissions Report:
<https://cms.cityoftacoma.org/sustainability/CityofTacoma-GreenhouseGasEmissionsUpdateReport2016.pdf>

Helena, MT Sustainability Report:
https://www.helenamt.gov/fileadmin/user_upload/Commission/Citizen Conservation Board Documents/Helena Sustainability Report 2020.pdf

Mountain View, CA Municipal Greenhouse Gas Emissions Report:
<https://www.mountainview.gov/civicax/filebank/blobdload.aspx?BlobID=32292>

n. Images

Image 1 – City of Missoula Logo (title page):

<https://www.ci.missoula.mt.us/>

Image 2 - Clean Air Photo (pg. 4):

<https://www.wzzm13.com/article/entertainment/television/programs/the-exchange/clean-air-action-day/69-61590b84-eb55-4e1f-acad-73e81ff9645d>

Image 3 - Water & Wastewater Logo (pg.5):

<https://www.onlinewebfonts.com/icon/359033>

Image 4 - Buildings & Facilities Logo (pg. 5):

<https://icon-icons.com/icon/building-city/84640>

Image 5 - Vehicle Fleet Logo (pg. 5):

<https://alpinetransmissions.wordpress.com/car-truck-icon/>

Appendix

n. Images Cont.

Image 6 - Street Light Logo (pg.5):

<https://www.pngrepo.com/svg/180028/traffic-light-business>

Image 7 - Employee Commute Logo (pg. 5):

<https://transitscreen.com/category/real-estate/>

Image 8 - Solid Waste Facilities Logo (pg. 5):

<https://www.visualpharm.com/free-icons/garbage%20truck-595b40b75ba036ed117d602a>

Image 9 - Parking Garage Solar Panels (pg. 6): <https://livability.com/topics/love-where-you-live/seven-parking-garages-you-and-your-car-will-love>

Image 10 – Missoula Surrounding Area (pg. 8):

<https://www.ci.missoula.mt.us/185/Open-Space>

Image 11 - Sustainability Logo (pg. 8) :

<https://sec.ucd.ie/environmental-sustainability-facts-on-carbon-footprinting-water-footprinting-energy-efficiency-and-waste/>

Image 12 - Water & Wastewater Treatment Facility (pg. 14):

<https://www.ci.missoula.mt.us/562/Wastewater-Division>

Image 13 – Vehicle Fleet (pg. 19):

<https://www.ci.missoula.mt.us/>

Image 14 - Zero by Fifty Logo (pg. 25):

<https://www.zerobyfiftymissoula.com/>

Image 15 – Mountain Top (pg. 27):

<http://www.ci.missoula.mt.us/ArchiveCenter/ViewFile/Item/6389>

Image 16 – CO2 (pg. 28):

<https://geographical.co.uk/nature/climate/item/3759-geo-explainer-carbon-emissions>