Appendix C:
Greenhouse Gas Inventory

Executive Summary

While the City of Whitefish has engaged in efforts to reduce energy use, costs, and greenhouse gas emissions, such as committing to uphold the Paris Agreement, the City had no comprehensive understanding of the scope of emissions produced by its operations. To this end, the City conducted an inventory of its greenhouse gas emissions to guide future efforts and better understand the challenges and opportunities it faces. This report highlights the findings of the greenhouse gas emissions inventory and provides an emissions baseline against which the City's progress in reducing emissions can be measured.

This inventory measures only greenhouse gas emissions resulting from City government activities. It does not include community-wide emissions by residents, businesses, vehicles, and other sources.

The emissions inventory found that the City of Whitefish's operations were responsible for emitting 1,760 metric tons of carbon dioxide equivalent (CO_2e) in 2016. The following chart shows City emissions by sector.

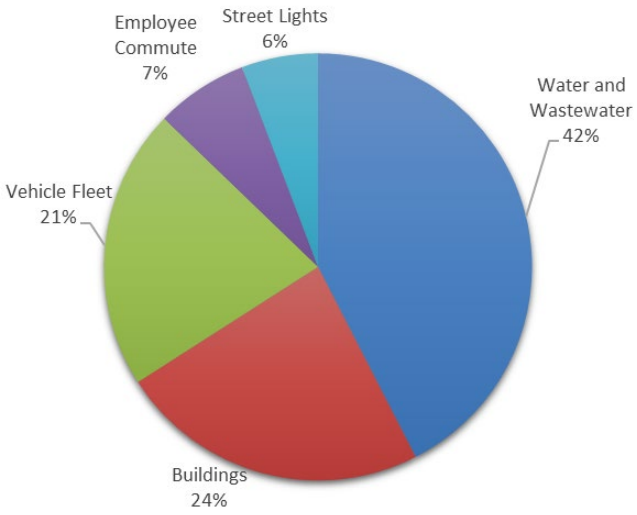


Figure 1: Government Operations
Greenhouse Gas Emissions by Sector

These results suggest that energy use in City buildings and at the water and wastewater treatment plants represents the greatest opportunity for Whitefish to reduce emissions from government operations. Water and wastewater treatment facilities contributed the most emissions, accounting for 42% percent of total government operations emissions. Additionally, with the City building a new wastewater treatment facility, the energy use and consequential emissions are expected to more than double by 2020. The City of Whitefish also has considerable opportunity to influence energy use through internal programs and policies.

The City also conducted a "business as usual" emissions forecast which seeks to understand future emissions trends in the absence of any new local effort to reduce those emissions. The results from the 2025 emissions forecast demonstrate that under a business-as-usual scenario, emissions will grow significantly. The jump in emissions stems largely from the new wastewater treatment plant expected to come online in 2021.

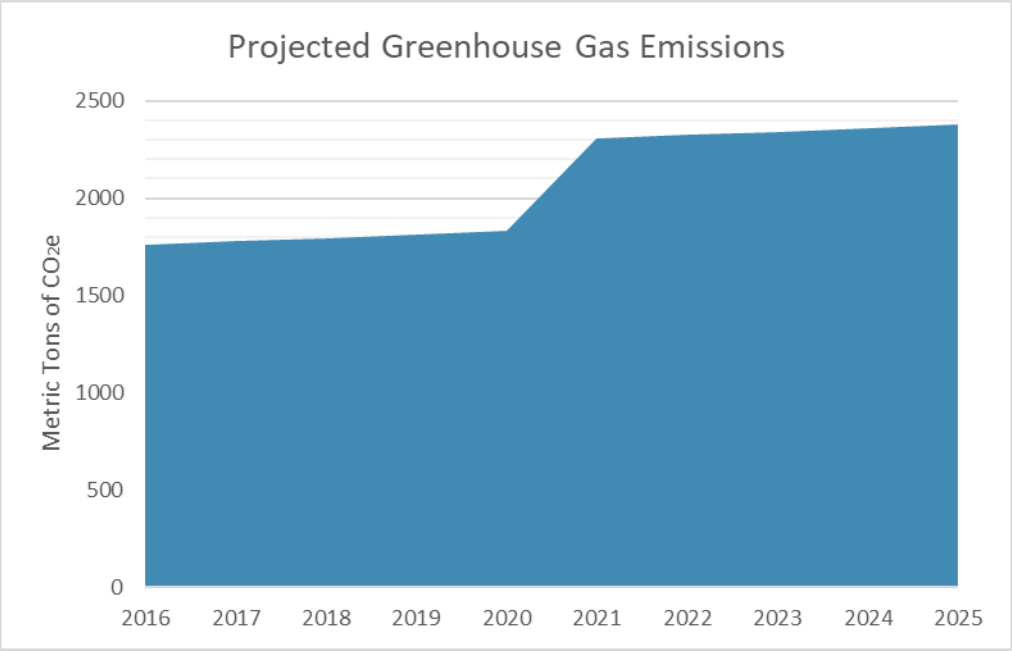


Figure 2: Projected Emissions Under a Business as Usual Scenario

Based on ICLEI methodology and guidance, the City of Whitefish is documenting emissions-reducing projects that have been implemented since 2016, and Whitefish will quantify the emissions benefits of these measures to demonstrate progress made to date.

Beyond projects already implemented or underway, Whitefish will consider additional emission reduction strategies for inclusion in its Climate Action Plan. The City will quantify potential emission reductions from these projects as well as the other benefits of potential climate and sustainability strategies that could be implemented, including efforts to promote energy efficiency, renewable energy, vehicle fuel efficiency, alternative transportation, vehicle trip reduction, land use and transit planning, waste reduction and other strategies. Through these and other efforts, the City of Whitefish can save money, increase its economic vitality, and improve quality of life for its citizens. Whitefish City staff will continue to update this inventory as additional data become available and use these studies to measure Whitefish's progress in reducing its contribution toward the global and local issue of a changing climate.

Introduction

The City of Whitefish recognizes that greenhouse gas emissions from human activity are catalyzing profound changes in climate and weather, the consequences of which pose substantial risks to the future health, wellbeing, and prosperity of our community. In response, the City has taken action to understand the sources of its emissions through the completion of a greenhouse gas emissions inventory. The results of that study are included in this report. Whitefish has multiple opportunities to benefit by acting quickly to reduce greenhouse gas emissions, both through local government operations and by inspiring action throughout the community. The detailed findings of this report provide a profile of emissions sources by the City, information that is key to guiding reduction efforts. This inventory is also useful in that it establishes a benchmark or emissions baseline that the City can later use to evaluate the success of its efforts and compare greenhouse gas emission levels over time.

The City of Whitefish recognizes the impacts that climate change will have on the local community. These impacts include economic impacts related to tourism in Glacier National Park and at Whitefish Mountain Resort, health impacts from wildfire smoke and the availability of water, and lifestyle impacts related to outdoor recreation. On June 19, 2017, the City of Whitefish endorsed the Paris Climate Agreement, committing to reduce greenhouse gas emissions to 26% below 2016 emission levels by 2025. Additionally, on December 5, 2016, the Whitefish City Council directed staff and a citizen committee to develop a comprehensive policy for the City to lead by example in reducing emissions. This inventory supports the long-term efforts of Whitefish to reduce emissions and to develop local solutions to the challenges posed by climate change here at home.

Presented here are estimates of greenhouse gas emissions resulting from the City's government operations in 2016. These data will provide a baseline against which the City will be able to compare future performance and demonstrate progress in reducing emissions.

Whitefish Climate Action Plan

In 2017, the Whitefish Mayor and City Council appointed a Climate Action Plan Committee to address the growing problem of climate change. The goals of this plan are to drive greenhouse gas emissions downward by offsetting energy use with energy conservation measures and cleaner fuel choices, reduce vehicle-miles-traveled through planning and building effective, intermodal transportation options, and investing in renewable energy technologies. The Council also directed the Committee to recommend actions for the City to prepare for project climate impacts, such as longer, drier wildfire seasons. The Council approved the Climate Action Plan in April 2018.

ICLEI Climate Mitigation Program

The City of Whitefish along with more than 1,200 local governments, including over 600 in the United States, has joined ICLEI – Local Governments for Sustainability, an association for local governments to share knowledge and successful strategies toward increasing local sustainability.[1] ICLEI USA, the US branch of ICLEI, provides a framework and methodology for local governments to identify and reduce greenhouse gas emissions, organized along five milestones:

1. Conduct an inventory and forecast of local greenhouse gas emissions.
2. Establish a greenhouse gas emissions reduction target.
3. Develop a climate action plan for achieving the emissions reduction target.
4. Implement the climate action plan.
5. Monitor and report on progress.

This report represents the completion of ICLEI's Climate Mitigation Milestone One and provides a foundation for future work to reduce greenhouse gas emissions in Whitefish.

Sustainability and Climate Change Mitigation Activities in Whitefish

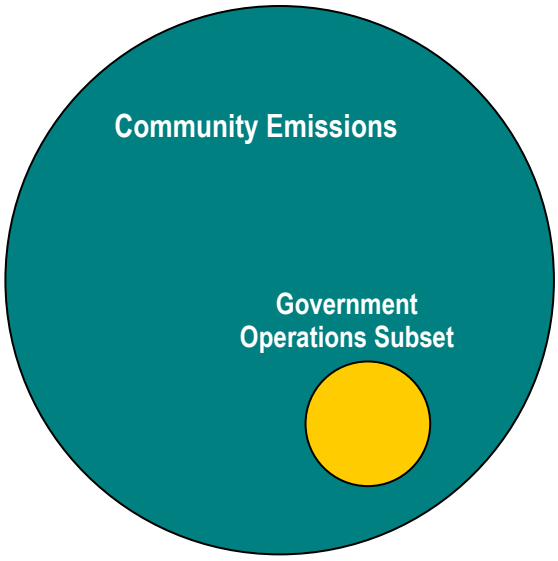
The City of Whitefish initiated its environmental sustainability activities with City policies designed to reduce energy use, conserve water, and develop local clean power projects. In 2017 the City of Whitefish Climate Action Plan Committee completed an energy audit and retrofit of the City-owned Emergency Services Building to improve energy efficiency and reduce Whitefish's energy consumption. The City has also begun to retrofit street lights to use LED bulbs. And it has commissioned an initial feasibility study on developing a solar farm at the wastewater treatment plan. The City Council approved the Climate Action Plan in April 2018, and other energy conservation and adaptation measures are underway.

[1] ICLEI was formerly known as the International Council for Local Environmental Initiatives, but the name has been changed to ICLEI – Local Governments for Sustainability. <http://www.iclei.org> and http://www.icleiusa.org

Inventory Methodology

Understanding a Greenhouse Gas Emissions Inventory

The first step toward achieving tangible greenhouse gas emission reductions requires identifying baseline levels and sources of emissions. As local governments have continued to join the climate protection movement, the need for a standardized approach to quantify greenhouse gas emissions has proven essential. Standard processes of accounting for emissions have been developed to which our inventory adheres. Whitefish staff used the Local Government Operations Protocol (LGOP) to inventory greenhouse gas emissions from City of Whitefish operations and activities. The government operations inventory is a subset of the community inventory; for example, data on commercial energy use by the community includes energy consumed by municipal buildings, and community vehicle-miles-traveled estimates include miles driven by municipal fleet vehicles. The government operations inventory is in this way a subset of the community-scale inventory. By analyzing emissions in this manner, Whitefish's local government can understand its own impact within the community and lead by example to reduce its impact on climate change.



Community Emissions Protocol

The International Local Government Greenhouse Gas Emissions Analysis Protocol (IEAP), developed by ICLEI, provides guidelines for local governments in quantifying greenhouse gas emissions from both their internal operations and from the whole community within their geopolitical boundaries. However, in this specific inventory, community emissions were not considered. Though there is an established greenhouse gas emissions inventory protocol developed by ICLEI for all local governments worldwide, ICLEI USA is currently developing a Community Protocol supplement for the US which is similar in many respects to the LGOP described below. [2] In future inventories, Whitefish will use the new Community Protocol supplement.

Local Government Operations Protocol

In 2008, ICLEI, the California Air Resources Board (CARB), and the California Climate Action Registry (CCAR) released the LGOP to serve as a national appendix to the IEAP.[3] The LGOP serves as the national standard for quantifying and reporting greenhouse emissions from local government operations. The purpose of the LGOP is to provide the principles, approach, methodology, and procedures needed to develop a local government operations

[2] International Local Government Greenhouse Gas Emissions Analysis Protocol (IEAP). ICLEI. http://archive.iclei.org/fileadmin/user_upload/documents/Global/Progams/CCP/Standards/IEAP_October2010_color.pdf

[3] Local Government Operations Protocol (LGOP). https://www.arb.ca.gov/cc/protocols/localgov/pubs/lgo_protocol_v1_1_2010-05-03.pdf

greenhouse gas emissions inventory. Whitefish staff used this protocol to conduct the City of Whitefish emissions inventory, including use of the Northwest subregional emissions factor to determine electricity-related emissions. Subregional emission factors are calculated using the Emissions & Generation Resource Integrated Database (eGRID) maintained by two federal agencies.

The eGRID is a comprehensive inventory of environmental attributes of electric power systems calculated at the subregional level. The preeminent source of air emission data for the electric power sector, eGRID is based on available plant-specific data for all US electricity generating plants that provide power to the electric grid and report data to the US government. eGRID uses data from the Energy Information Administration (EIA) Forms EIA-860 and EIA-923 and EPA's Clean Air Markets Program Data. Emission data from EPA are carefully integrated with generation data from EIA to produce useful values like pounds of emissions per megawatt-hour of electricity generation (lb/MWh), which allows direct comparison of the environmental attributes of electricity generation. eGRID also provides aggregated data by state, US total, and by three different sets of electric grid boundaries (balancing authority area, NERC region, and eGRID subregion). In accordance with the LGOP, the City of Whitefish used the location-based eGRID subregion emissions factor from the Northwest Power Pool (NWPP) to calculate the emissions from electricity use.

One of the most popular recent uses of eGRID is to determine the indirect greenhouse gas emissions from electricity purchases and avoided greenhouse gas emissions from projects and programs that reduce the demand for grid-supplied electricity. For example, the California Air Resources Board, Climate Registry, Climate Action Reserve, and Greenhouse Gas Protocol cite eGRID for use in estimating scope-2 greenhouse gas emissions from electricity purchases in the United States. Most carbon footprint calculators that are applicable to the United States use eGRID data.[4]

Whitefish and Flathead County are fortunate to be served by Flathead Electric Cooperative, which sources most of its power from Bonneville Power Administration. Most of that electricity is generated by large federally-operated hydropower dams in the Pacific Northwest. BPA markets and provides low-cost, low-carbon electricity primarily for rural electric cooperatives and other public utilities in the region, although it also buys and sells electricity in the larger regional market, including Canada, to match real-time supply and demand. BPA provides about 28 percent of the electricity used in the Pacific Northwest, selling wholesale electricity in eight western states: Washington, Oregon, Idaho, Montana, Wyoming, Utah, Nevada, and California.

Emissions Factors

The LGOP protocol provides two options to determine electricity-related emissions.[5] The two options available to Whitefish were to use: 1) The Northwest subregional power pool emissions factor, as described above, or 2) A utility-specific emission factor that has been verified by a third party. These methods are also referred to in emissions reporting as location-based and market-based methods, respectively. Neither option is perfect, and both have advantages and

[4] Environmental Protection Agency - Emissions & Generation Resource Integrated Database (eGRID) Questions and Answers https://www.epa.gov/energy/emissions-generation-resource-integrated-database-egrid

[5] Local Government Operations Protocol (LGOP). https://www.arb.ca.gov/cc/protocols/localgov/pubs/lgo_protocol_v1_1_2010-05-03.pdf , Page 39

disadvantages. The Climate Action Plan Committee selected the subregional grid method, recognizing that this approach overestimates the direct emissions attributable to City of Whitefish operations. Factors in this decision include:

- The City's initial greenhouse gas inventory serves most importantly as a benchmark to measure future progress in conserving energy. When FEC's current contract with BPA expires in the next decade, FEC's future power may be supplied from different sources, which would make future inventory comparisons difficult. FEC's future relationship with BPA could be affected by regional population growth, other regional energy trends, and persistent policy proposals to privatize the BPA grid or charge market-based rather than cost-based rates. The Northwest Power Pool grid factor, on the other hand, is regularly updated and provides a consistent yardstick specific to this region for measuring progress on energy conservation.

- Regional utilities and wholesale providers like BPA operate within an increasingly integrated grid, especially during periods of peaks and troughs in production and demand. To the extent that Whitefish can reduce its reliance on BPA power through energy efficiency or generation of local renewable energy, BPA's hydropower can be made available to other places in the region that currently rely on coal- or gas-fired power generation. For example, in March 2018 BPA signed a contract to provide surplus hydropower to Portland General Electric to replace coal-fired power and avoid construction of natural gas plants.[6] Although the direct carbon footprint of FEC's electricity portfolio is low, there are tangible climate benefits if Whitefish reduces its electricity consumption.

- The sub-regional method was recommended by ICLEI and used in the plans developed by Missoula, Helena, and Ashland, Oregon. These are the community plans that the Whitefish CAP Committee consulted most closely while drafting the Whitefish Climate Action Plan. Like Whitefish, Ashland's city-owned electric utility receives most of its power from BPA. But since the Ashland utility contracts for power delivery rather than producing its own, Ashland opted for the regional approach as the best fit. We also considered Multnomah County's decision to use the location-based method and NWPP emissions factor: "The location-based accounting method provides a consistent accounting method for all utility service areas within a region to calculate the average carbon consequences of *using or not using* a kilowatt-hour of electricity." (Italics in original.)[7] The inventory reports that accompany Helena's and Missoula's plans indicate that the regional approach serves to underestimate the City's carbon footprint, while Ashland's and Multnomah County's reports indicate that the regional approach serves to overestimate the City's emissions. It should be noted that the emissions factor for the Northwest Power Pool subregional grid is 1/3 less than the national average.

- Flathead Electric Cooperative does not have a third-party verified emissions factor. While BPA is not a utility, the California Air Resources Board reports an emissions factor for BPA's wholesale electricity as an asset-

[6] Portland General Electric, "New agreements will deliver clean BPA power to PGE customers," March 7, 2018. https://www.portlandgeneral.com/our-company/news-room/news-releases/2018/03-07-2018-new-agreements-will-deliver-clean-bpa-power

[7] Multnomah County Greenhouse Gas Inventory, FY 2014, p. 17, https://multco.us/file/62267/download.

controlling supplier.[8] However, BPA's emission factor is an imperfect fit because FEC acquires power from other sources, the amount available from BPA is capped, and a market-based method may not work for FEC's future power supply contracts.

For the purposes of this inventory, we used an emission factor of **665.75 lbs CO_2/MWh, 12.6 CH_4 lbs/GWh, and 10.38 N_2O lbs/GWh**, consistent with the NWPP subregion of eGRID 2012.

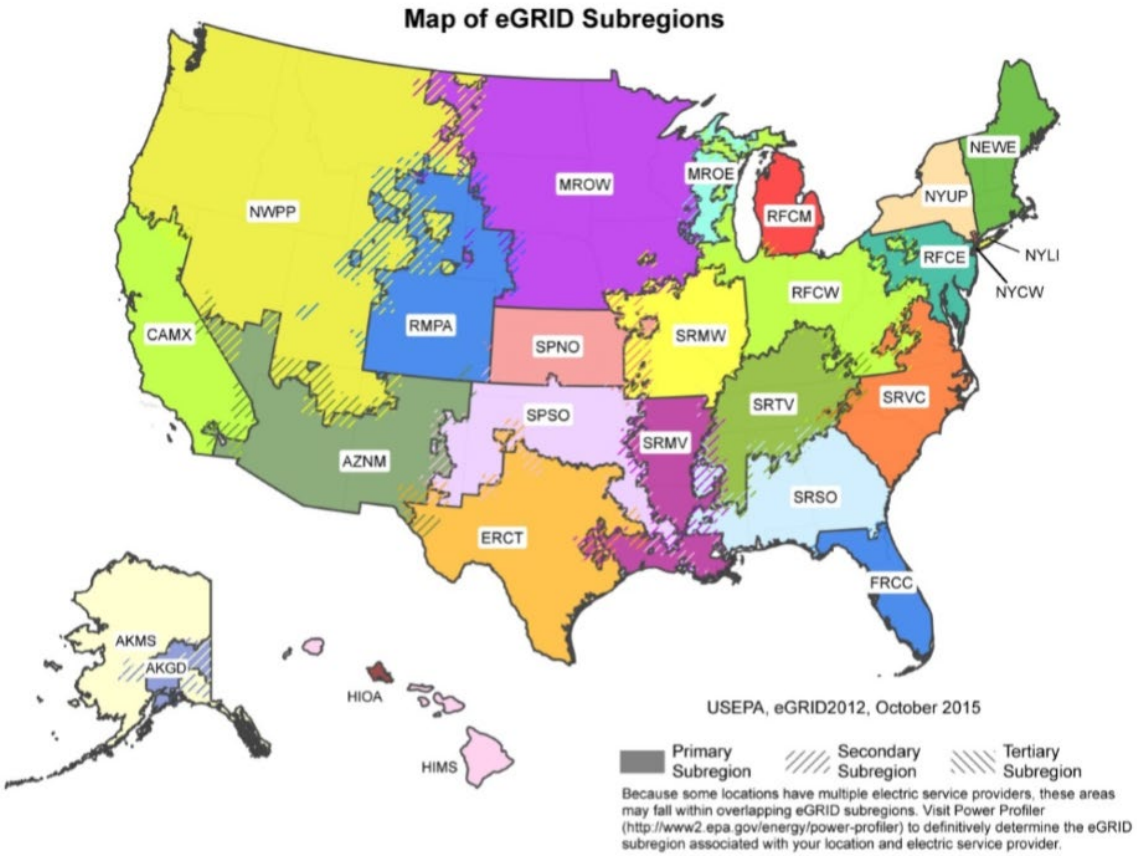


Figure 3: Map of eGRID Subregions

Market-Based Inventory

Though this inventory was conducted using the location-based methodology for the Northwest Power Pool subregion, for comparison's sake we have also conducted a skeleton inventory using the market-based approach. This information is presented in the results section of this document.

[8] California Air Resources Board, Mandatory GHG Reporting - Asset Controlling Supplier, https://ww2.arb.ca.gov/mrr-acs.

Quantifying Greenhouse Gas Emissions

Establishing a Base Year

A primary aspect of the greenhouse gas emissions inventory process is the requirement to select a base year with which to compare current emissions. After considering the amount and types of data available for each of several recent years, and to clearly align these efforts with landmark local commitments such as signing on to the Paris Agreement, Whitefish's greenhouse gas emissions inventory uses as its base year.

At the time of the initial inventories, eGRID 2014 had not been released and eGRID 2012 was the most recent emission factor available. In an effort to keep the data consistent, the same emissions factor was used in 2016 as well. Future inventories will use the most recent emission factor available 2016 in order to recognize how the energy mix is changing over time.

Establishing Boundaries

Government: Operational Boundaries

According to the LGOP, a government can use two approaches to define its organizational boundary for reporting greenhouse gas emissions: 1) activities and operations that the jurisdiction controls operationally; and 2) activities and operations that the jurisdiction controls financially. Staff estimated Whitefish's local government emissions based on activities and facilities for which the City maintains operational control.

Emission Types

The IEAP and LGOP recommend assessing emissions from the six internationally recognized greenhouse gases regulated under the Kyoto Protocol as listed in Table 1. We chose to calculate Carbon Dioxide (CO_2), Methane (CH_4), and Nitrous Oxide (N_2O). Greenhouse gas emissions are commonly aggregated and reported in terms of equivalent carbon dioxide units, or CO_2e. This standard is based on the Global Warming Potential of each gas, which is a measure of the amount of warming a greenhouse gas may cause, measured against the amount of warming caused by carbon dioxide. Converting all emissions to equivalent carbon dioxide units allows for the consideration of different greenhouse gases in comparable terms. For example, methane is twenty-one times more powerful than carbon dioxide on a per weight basis in its capacity to trap heat, so one metric ton of methane emissions is equal to 21 metric tons of carbon dioxide equivalents. See Table 1 for the Global Warming Potentials of the commonly occurring greenhouse gases.

Table 1: Greenhouse Gases

Greenhouse Gas	Chemical Formula	Global Warming Potential
Carbon Dioxide	CO_2	1
Methane	CH_4	21
Nitrous Oxide	N_2O	310
Hydrofluorocarbons	Various	43-11,700
Perfluorocarbons	Various	6,500-9,000
Sulfur Hexafluoride	SF_6	23,900

Quantification Methods

Greenhouse gas emissions can be quantified in two ways:

- Measurement-based methodologies refer to the direct measurement of greenhouse gas emissions (from a monitoring system) emitted from a flue of a power plant, wastewater treatment plant, landfill, or industrial facility.
- Calculation-based methodologies calculate emissions using activity data and emission factors. To calculate emissions accordingly, the basic equation is used: *Activity Data x Emission Factor = Emissions*

The latter was used for this inventory. Activity data refer to the relevant measurement of energy use or other greenhouse gas-generating processes such as fuel consumption by fuel type, metered annual electricity consumption, and annual vehicle miles traveled. See the Other Materials section for a detailed listing of the activity data used in composing this inventory.

Known emission factors are used to convert energy usage or other activity data into associated quantities of emissions. Emissions factors are usually expressed in terms of emissions per unit of activity data (for example, lbs CO_2/kWh of electricity). Table 2 demonstrates an example of common emission calculations that use this formula. See Other Materials for details on the emissions factors used in this inventory.

Table 2: Basic Greenhouse Gas Emissions Calculations

Activity Data	Emissions Factor	Emissions
Electricity Consumption (kWh)	CO2 emitted/kWh	CO2 emitted
Natural Gas Consumption (therms)	CO2 emitted/therm	CO2 emitted
Gasoline/Diesel Consumption (gallons)	CO2 emitted /gallon	CO2 emitted
Vehicle Miles Traveled	CH4, N2O emitted/mile	CH4, N20 emitted

Clean Air and Climate Protection 2009 (CACP 2009) Software

To facilitate community efforts to reduce greenhouse gas emissions, ICLEI developed the Clean Air and Climate Protection 2009 (CACP 2009) software package in partnership with the National Association of Clean Air Agencies

(NACAA) and the US Environmental Protection Agency (EPA). CACP 2009 is designed for compatibility with the LGOP and determines emissions by combining activity data (energy consumption, waste generation, etc.) with verified emission factors.

The CACP software has been and continues to be used by over 600 US local governments to reduce their greenhouse gas emissions. However, it is worth noting that, although the software provides governments with a sophisticated and useful tool, calculating emissions from energy use with precision is difficult. Calculating greenhouse gas emissions depends upon numerous assumptions, and it is limited by the quantity and quality of available data. With this in mind, it is useful to think of any specific number generated by the CACP 2009 software as an approximation of reality, rather than an exact value.

Evaluating Greenhouse Gas Emissions

Greenhouse Gas Emissions by Scope

Emissions sources are categorized as direct or indirect emissions – Scope 1, Scope 2, or Scope 3. The prevention of double counting for major categories, such as electricity use and waste disposal, is one of the most important reasons for using the scopes framework for reporting greenhouse gas emissions at the local level.

The Scopes framework identifies three scopes for government operations emissions:

- **Scope 1:** Direct emissions from sources within a local government's organizational boundaries that the local government owns or controls.
- **Scope 2:** Indirect emissions associated with the consumption of purchased or acquired electricity, steam, heating, and cooling. Scope 2 emissions occur as a result of activities that take place within the organizational boundaries of the reporting entity, but that occur at sources owned or controlled by another entity.
- **Scope 3:** All other indirect emissions not covered in Scope 2, such as emissions from up-stream and downstream activities that occur as a result of activities within the operational boundaries of the local government, emissions resulting from the extraction of and production of purchased materials and fuels, contracted services, and waste disposal.

Scope 1 and Scope 2 sources are the most essential components of a local government greenhouse gas analysis because these sources are usually significant in scale and are directly under the control of local governments. Local governments typically have indirect control over Scope 3 emissions. For example, solid waste generated from government operations is included as Scope 3 because of the unique circumstances in which emissions are generated – emissions from waste are generated over time as the waste decomposes and not directly in the base year.

Greenhouse Gas Emissions by Sector

In addition to categorizing greenhouse gas emissions by scope, this inventory examines emissions by sector. Many local governments find a sector-based analysis more relevant to policy making and project management, as it assists in formulating sector-specific greenhouse gas reduction measures and climate action plan components. This inventory evaluates community and government emissions from buildings, streetlights, vehicle fleet, employee commute, and water/wastewater treatment.

Government Operations Emissions Inventory Results

Greenhouse Gas Emissions by Scope

Table 3: Government Operations Emissions by Scope

Total Emissions				
	Metric Tons CO_2e	Metric Tons CO_2	Metric Tons CH_4	Metric Tons N_2O
SCOPE 1	808.5994183	720.0221838	0.04558401	0.29341488
SCOPE 2	828.624432	824.4039789	0.0156026889	0.01285364371
SCOPE 3	123.6688974	121.7794246	0.0060543517	0.00583259758
Total	1760.892748	1666.205587	0.06724105055	0.3121011213

Including all scopes, The City of Whitefish local government emitted approximately 1,760 metric tons[9] of CO_2e in the year 2016. Many inventories report only Scope 1 and Scope 2 emissions; for Whitefish this represents 1,636 metric tons of CO_2e.

Greenhouse Gas Emissions by Sector & Source

Greenhouse gas emissions from local government operations are produced by a variety of source types, which are categorized into the sectors below.

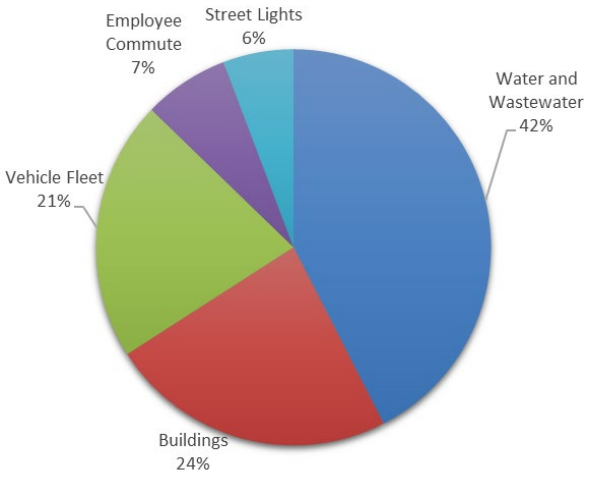


Figure 4: Government Operations Greenhouse Gas Emissions by Sector

[9] All emissions estimated using ICLEI's CACP 2009 Software.

Table 4: Detailed Government Operations Greenhouse Gas Emissions by Sector

Sector	Emissions Source	Equiv CO_2 (metric tons)	Equiv CO_2 (%)
Buildings			
	Electricity	212.6808779	12.07
	Natural Gas	200.6763777	11.39
Subtotal Buildings		413.3572556	23.46
Streetlights	Electricity	101.7493133	5.77
Vehicle Fleet			
	Gasoline	236.158769	13.41
	Diesel	138.5282488	7.87
Subtotal Vehicle Fleet		374.6870178	21.27
Employee Commute			
	Gasoline	123.6686357	7.02
	Diesel	0.000261739	<1
Subtotal Employee Commute		123.6688974	7.02
Water/Sewage			
Waste Water Treatment Plant			
	Electricity	308.0550046	17.49
	Natural Gas	54.79131392	3.11
	Effluent	78.6074979	4.46
	Fugitive Emissions	8.96147775	<1
Water Treatment Plant			
	Electricity	204.5621796	11.61
	Natural Gas	90.8757332	5.16
Subtotal Water/Sewage		747.4302636	42.44
Grand Total		1760.892748	**100**

Local Government Emissions Forecast

To illustrate the potential emissions growth based on projected trends in energy use, driving habits, job growth, and population growth from the baseline year going forward, the City of Whitefish conducted an emissions forecast for the year 2025. Under a business-as-usual scenario, Whitefish's local government emissions will grow by approximately 35.17% percent by the year 2025, from 1,760 to 2,379 metric tons CO_2e. The majority of this change is due to the new wastewater treatment plant that will be coming online in 2021.

Market-Based Inventory

This inventory was conducted using the location-based methodology for the Northwest Power Pool subregion. However, for comparison's sake we have also conducted a skeleton inventory using the market-based approach. For a discussion of the two methods and the reasons why the location-based method was selected, see the Emissions Factors heading in the Inventory Methodology section of this document.

Although a utility-based emissions factor, verified by an accredited third party, is not available for Flathead Electric Cooperative, a reasonable proxy is the emissions factor for BPA as an asset-controlling supplier. As shown in the following table, the emissions factor for BPA is significantly lower than the eGRID factor for the Northwestern Power Pool. However, energy conservation in Whitefish effectively returns electricity to the grid for distribution elsewhere in the western energy market.

Emissions Factor for eGRID 2012 NWPP	**Emissions Factor for BPA 2016 ACS[10]**
669.23 CO_2e lbs/MWh	**42.99 CO_2e lbs/MWh**

Resource Mix

The electric-generation mix for the Northwestern Power Pool (NWPP) subregion is dominated by hydropower but also includes a substantial fossil fuel component. BPA's power portfolio is more than 80 percent hydro and about 10 percent nuclear. Virtually all of FEC's electricity is provided by BPA.

The following table compares the sources of energy in the NWPP and in the FEC service area specifically. [11] [12]

Table 6: Comparison of Energy Sources for NWPP and FEC

	Coal	Gas	Other fossil	Nuclear	Hydro	Biomass	Wind	Solar	Geo-thermal
2012 eGRID NWPP	24.504%	10.659%	0.48%	3.245%	52.218%	1.098%	7.026%	0.004%	0.6476%
2016 FEC Energy Mix	0.2%	0.1%	0%	10.8%	83%	2.1%	1%	-	-

[10] ACS Emission Factors for Data Years 2012-2016, Bonneville Power Administration 2016 Data, Posted 12/13/2015
[11] eGRID 2012 Summary Tables, Table 5: eGRID2012 Subregion Resource Mix – Environmental Protection Agency
[12] Flathead CY16 Consolidated Resource Mix by Generation Type – Flathead Electric Cooperative

Results of Market-Based Inventory

Using the market-based approach, greenhouse gas emissions for the City of Whitefish government operations in 2016 total 992 metric tons of CO2e, compared to 1760 metric tons under the location-based method.

Figure 5 shows emissions by sector for City of Whitefish operations in 2016 using the market-based calculation method.

Figure 6 compares City of Whitefish government operations emissions for 2016 under the two methods, location-based and market-based.

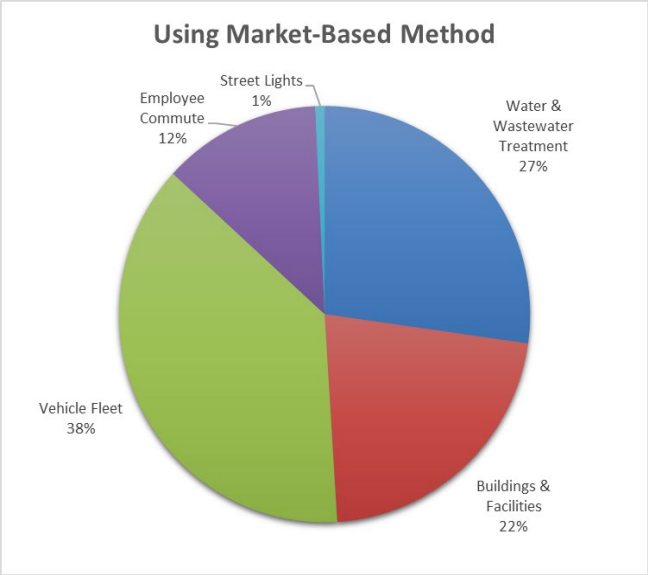


Figure 5: Government Operations Greenhouse Gas Emissions by Sector Under Market-Based Method

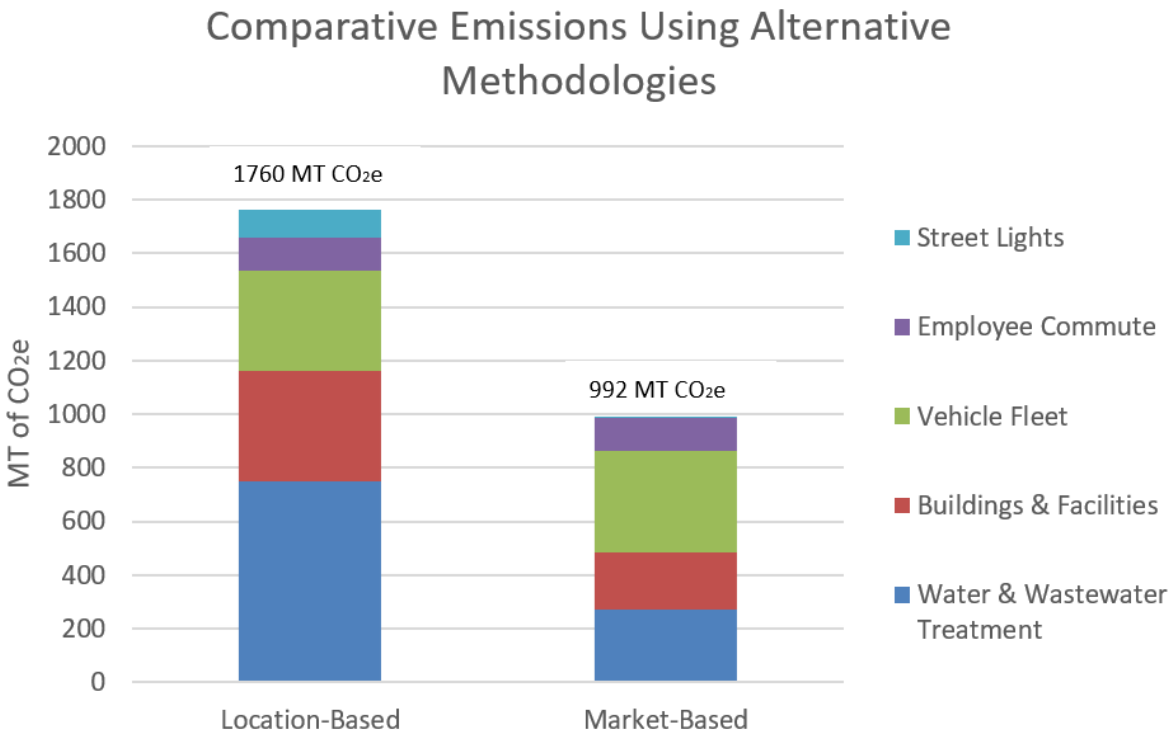


Figure 6: Comparison of City of Whitefish Emissions Under Location-Based and Market-Based Methods

Conclusion

The inventory results included here provide a greenhouse gas emissions baseline that Whitefish will use to inform the next steps of the Whitefish Climate Action Plan. Guided by ICLEI's Five Milestone Process for Climate Mitigation, Whitefish will evaluate and set greenhouse gas emissions reduction targets for local government operations and the community. In selecting this target, it will be important to strike a balance between scientific necessity, ambition, and what is realistically achievable. By establishing a challenging yet feasible target, Whitefish can demonstrate its goal to do its part toward addressing greenhouse gas emissions. The Climate Action Plan Committee will survey greenhouse gas reduction targets of neighboring cities and counties as well as similarly-sized cities across the US, larger-scale agreements such as the US Conference of Mayors Climate Protection Agreement, state targets, and others. The Climate Planning Team will present recommended targets to elected leadership for approval and, if accepted, formal adoption.

Creating, Implementing, and Evaluating a Climate Action Plan

The steps of studying greenhouse gas emissions and setting goals to guide Whitefish efforts lead to the development and ongoing implementation of a Climate Action Plan. The City of Whitefish Climate Action Plan will highlight the major initiatives Whitefish has already implemented and add to these initiatives to meet greenhouse gas emissions reduction targets. Whitefish will select actions for inclusion in the Climate Action Plan that will not only comprehensively reduce energy costs and greenhouse gas emissions but also reduce the community's vulnerability to climate change (climate adaptation). ICLEI has a program and support resources to help interested communities understand their vulnerabilities and identify actions to increase resilience (Climate Resilient Communities™ program).

The implementation of projects is, of course, the most important part of this process. By laying the groundwork through the greenhouse gas emissions inventory, reduction target, and climate action planning process, Whitefish will have the ability to select and prioritize the very best emissions reduction measures. Finally, by periodically updating inventories, creating new baselines, and adding new initiatives to the Climate Action Plan, the City will be able to track and report our progress in protecting the climate and demonstrate reductions in emissions.

Additional Materials

Detailed Government Operations Greenhouse Gas Emissions Inventory in 2016

Sector	Metric Tons CO_2e	Metric Tons CO_2	Metric Tons CH_4	Metric Tons N_2O
Buildings and Facilities	413.3572556	411.6898032	0.02287420158	0.0036765013
Vehicle Fleet	374.6870178	374.6870178	0	0
Street Lights and Traffic Signals	101.7493133	101.231071	0.0019159016	0.00157833799
Water and Wastewater Treatment Facilities	747.4302636	656.8182707	0.03639659571	0.3010136844
Employee Commute	123.6688974	121.7794246	0.006054351654	0.00583259758

City of Whitefish Employee Commute Survey

The City of Whitefish is conducting an inventory of its energy use and consequential greenhouse gas emissions. This inventory is the first step in developing a Climate Action Plan, which will recommend ways to mitigate these emissions.

To accurately account for fuel use from City operations, we need to collect information about commuting by City employees.

Please email this survey to Rachel Sussman at rsussman@cityofwhitefish.org by February 28, 2017.

Note: Many of these answers will require estimates.

How many days per week do you commute to your job with the City of Whitefish? Click here to enter text.

How many miles is this commute (roundtrip)? Click here to enter text.

Please enter your best estimate of the **percentage** of the time you make this commute by the following methods:

Click to enter %. Passenger Car

☐Gasoline (includes hybrids) or ☐Diesel

Click to enter %. Light truck

☐Gasoline (includes hybrids) or ☐Diesel

Click to enter %. Bus

Click to enter %. Bicycle/Walk

Click to enter %. No commute (worked at home)

Click to enter %. Other (please specify): Click here to enter text.

Contact Information (optional)

Name: Click here to enter text.

Email: Click here to enter text.

Thank you for your help. If you have any questions, please contact Rachel Sussman (rsussman@cityofwhitefish.org)