Town of Mountain Village Memo: Comparing 2018 and 2019 Community GHG Emissions

June 2020

INTRODUCTION

The Town of Mountain Village (Mountain Village/Town) first began participating in regional greenhouse gas (GHG) emissions analyses in 2010 with the help of a local non-profit, EcoAction Partners (EAP). In 2018, EAP created a Mountain Village specific community-wide GHG emissions inventory. To complete the Town's 2019 community GHG inventory, the Town enlisted the help of Lotus Engineering and Sustainability, LLC (Lotus). This memo describes similarities and differences between the 2018 and 2019 inventories.

CALCULATION METHODOLOGY DIFFERENCES

CALCULATION TOOLS

Similarities

Both the 2018 inventory (completed by EAP) and the 2019 inventory (completed by Lotus) were completed using the Global Protocol for Community-Scale Greenhouse Gas Emissions Inventories (GPC) Protocol, which was created by ICLEI, WRI and C40 Cities Climate Leadership Group.

Differences

The 2018 inventory used a data management and input workbook developed by ICLEI/WRI, which has been adapted in recent years to become compliant with the GPC, while for the 2019 inventory Lotus created a customized data management and emission calculation spreadsheet developed in-house to perform calculations.

ALLOCATING SHARED RESOURCES

Similarities

The complete the 2018 inventory, as well as prior year's inventories, EAP consulted with representatives from Mountain Village, San Miguel County, Telluride, and Telluride Ski & Golf (TSG) to decide how to allocate the shared resources within San Miguel County and the Telluride-Mountain Village area. These resources include regional airports, the wastewater treatment plant, gondola, TSG utilities, festivals, and transit services. Many of the same assumptions from the 2018 inventory were carried over to the 2019 inventory and include: regional airport flight emissions and natural gas and electricity distribution between residential and commercial buildings.

Differences

A few of the 2018 assumptions were not carried over to the 2019 inventory. These include assumptions around wastewater, on-road transportation, and waste. Localized data was available for these sources and was preferred over regional estimates.

Emission Sources

Similarities and Differences

Both inventories included these emission sources: electricity consumption, natural gas consumption, government energy use, renewable energy generation, on-road vehicle miles traveled, aviation fuel consumed, tons of waste landfilled, and wastewater generation and treatment (Table 1). However, select sources were included in the 2019 inventory but not in the 2018 inventory, including: stationary diesel consumption, fugitive emissions, transit, electric vehicles, off-road transportation, and avoided emissions from recycling. Likewise, the 2018 inventory included consumption-based sources that were not included in 2019: food, well-to-pump, cement, and emission savings from carbon sequestration and the farm-to-community program.

Table 1. Data used in the Community GHG Inventories completed in 2018 and in 2019.

Data	2018 Inventory?	2019 Inventory?
Electricity Consumption	Yes	Yes
Natural Gas Consumption	Yes	Yes
Stationary Diesel Consumption	No	Yes
Government Energy Use	Yes	Yes
Renewable Energy Generation	Yes	Yes
Fugitive Emissions from Coal and Oil & Gas	No	Yes
On-Road Vehicles	Yes	Yes
Transit	No	Yes
Electric Vehicle Miles Traveled	No	Yes
Aviation Electricity and Fuel Consumed	Yes	Yes
Off-Road Transportation	No	Yes
Food	Yes	No
Tons of Waste Landfilled	Yes	Yes
Tons of Waste Recycled	No	Yes
Wastewater Treatment	Yes	Yes
Well-to-Pump emissions	Yes	No
Cement	Yes	No
Carbon Sequestration	Yes	No
Farm-To-Community Program	Yes	No

Calculation Methodologies

Similarities

Several sectors were calculated using the same methodology and include stationary energy use and emissions savings from renewable energy generation (community solar and Green Blocks).

Differences

On-Road Transportation

Different calculation methodologies were used for the following sectors: transportation (including on-road and aviation), waste, and wastewater. When calculating emissions from transportation, the 2018 inventory did so using total vehicle registrations and vehicle miles traveled (VMT) on the county level. EAP assumed the EPA average VMT estimate for passenger vehicles (12,000 miles per car per year) as well as the Colorado Department of Public Health and Environment's (CDPHE) vehicle mix for Colorado (95 percent gasoline, 5 percent diesel). The total emissions were calculated on the county level and portioned to Mountain Village based on population. In 2019, Lotus calculated transportation emissions using Town-level VMT data broken out by CDPHE vehicle types and data on the number and type of vehicles registered in San Miguel County from Colorado Department of Revenue. Registered vehicles were assigned to Mountain Village based on population. GHG emissions from on-road vehicles were the product of the gallons of fuel consumed and the fuel emission factors. Fuel emission factors were provided by The Climate Registry.[1]

Transit

The 2019 inventory includes transit emissions such as the Gondola, Dial-a-Ride, and hotel shuttle services, which were not included in the 2018 inventory. For aviation, rather than using gallons of fuel used at Montrose and Telluride Regional Airports, in 2019 data were collected on flights from Telluride Regional Airport and Montrose Regional Airport. One-way flight distances were calculated using webflyer.com's Mileage Calculator.[2] Round-trip flight distances were then estimated, and categorized as short-, medium- or long-haul flights, as described by the US EPA's Business Travel and Employee Commuting report.[3] Total mileage per flight type was multiplied by its corresponding emission factor. Finally, after discussion with the Town of Mountain Village, it was determined that 50 percent of Telluride Regional Airport's emissions were to be attributed to Mountain Village, and 65 percent of Montrose Regional Airport's emissions were to be attributed to Mountain Village. This distribution of emissions was also used in 2018.

Waste

The 2018 inventory used the EPA WARM emission factors and waste characterization in combination with regional data collected in the Sneffels Waste Diversion Planning Project, including total volume of waste collected regionally. The 2019 inventory uses emission factors from ICLEI's Community Protocol in addition to waste characterization found in the San Miguel Waste Characterization Report and recycling characterization from the 2013 US EPA Advanced Sustainable Materials Management Report. Tons of waste/recycling were multiplied by the waste/recycling characterization and emission factor and summed to get emissions from landfilled waste and avoided emissions from recycling.

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[1] See Local Government Operations Protocol May 2019: https://www.theclimateregistry.org/wp-content/uploads/2019/05/The-Climate-Registry-2019-Default-Emission-Factor-Document.pdf.

[2] See: http://www.webflyer.com/travel/mileage_calculator/.

[3] See: Table 8 Business Travel and Employee Commuting: https://www.epa.gov/sites/production/files/2018-03/documents/emission-factors_mar_2018_0.pdf.

Wastewater

In the 2018 inventory wastewater emissions were calculated using ICLEI's Protocol for Wastewater Treatment Facilities. These equations calculate stationary methane (CH_4) emissions from incomplete combustion of digester gas, process nitrous oxide (N_2O) emissions from wastewater treatment without nitrification/denitrification, and process N_2O emissions from effluent discharge. Visitor counts and resident population were added together, and gallons of water treated were input into the equations. The 2019 inventory uses the same protocol to calculate process N_2O emissions for wastewater treatment plants without nitrification and denitrification and fugitive N_2O emissions from effluent discharge. The Telluride regional wastewater treatment plant does not flare or collect methane through anaerobic processes; thus Lotus did not calculate methane emissions from wastewater treatment. Process nitrous oxide (N_2O) emissions from wastewater treatment without nitrification/denitrification and fugitive emissions were calculated using site-specific operating processes and the population served by the facility, and standard emissions factors. The electricity and fuel use at wastewater treatment facilities is included in the non-residential energy use emissions total.

EMISSION VALUES COMPARISON

ABSOLUTE EMISSION TOTALS

For 2018, emissions for Mountain Village are estimated to be 99,600 metric tons of carbon dioxide equivalents (mt CO_2e). Emissions in 2019 are estimated to be 72,398 mt CO_2e. See Table 2.

Table 2. Mountain Village Emissions in 2018 and 2019 (mt CO_2e). Parentheses denote emission savings.

Data	2018 Value (mt CO_2e)	2019 Value (mt CO_2e)
Electricity Consumption	38,286	39,570
Natural Gas Consumption	23,466	27,277
Stationary Diesel Consumption	N/A	0
Government Energy Use	1,594	Included in commercial building energy use estimates
Renewable Energy Generation	(1,763)	(1,880)
Fugitive Emissions from Coal and Oil & Gas	N/A	890
On-Road Vehicles (not including Electric Vehicles)	6,972	2,204
Transit	N/A	1,002
Electric Vehicles	N/A	30
Aviation Electricity and Fuel Consumed	9,960	129
Off-Road Transportation	N/A	N/A
Food	6,972	N/A
Waste Landfilled	4,980	1,530
Waste Recycled	N/A	(1,089)
Wastewater Treatment	2,988	86
Cement	597.6	N/A
Well-to-pump Emissions	3,984	N/A
Carbon Sequestration	(312)	N/A

Farm-To-Community Program	(6)	N/A
Total	**99,600**	**72,398**

Emission Contributions

Due to trends in activity data that were collected as well as the above-mentioned calculation methodology differences, community emissions were estimated to be 27 percent lower in 2019 than was calculated in the 2018 inventory. In both years, energy use in buildings comprised the largest share of emissions (see Figure 1 and Figure 2). However, the proportion of emissions from energy use in 2018 was smaller than found in 2019, largely due to the differing calculation methodologies, as well as the omission of consumption-based emissions sources from the 2019 inventory. When comparing only emissions from the sources that appeared in both inventories, emissions are estimated to be nearly 20 percent lower in 2019 as compared to 2018.

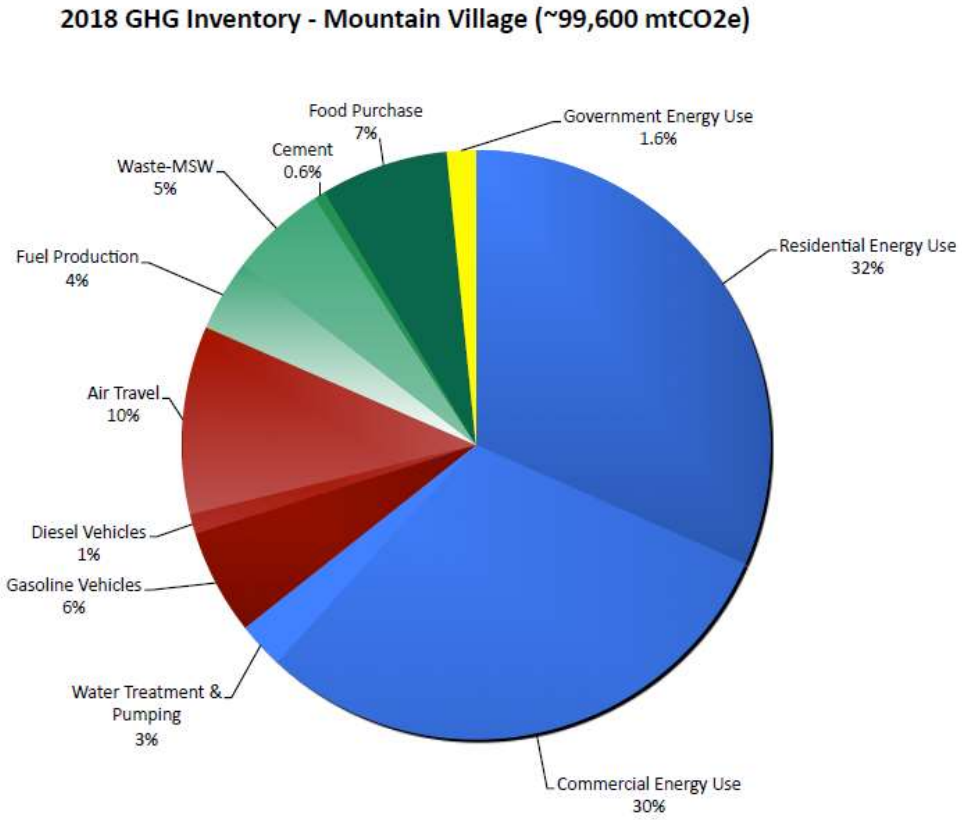

Figure 1. 2018 emissions by subsector as estimated by EcoAction Partners.

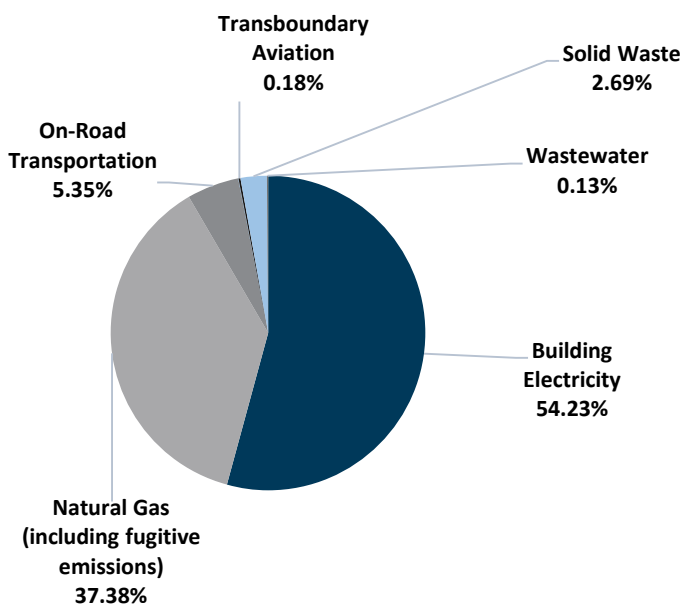

Figure 2: 2019 Town of Mountain Village GHG emissions by source.

In 2018, the sources with the highest emissions were:

- Electricity consumption (38%);
- Natural gas consumption (24%); and
- Air travel (10%).

In 2019, the sources with the highest emissions were:

- Electricity consumption (55%);
- Natural gas consumption (38%);
- On-road transportation (including transit, 4%).

CONCLUSION

Emissions in Mountain Village were estimated to be lower in 2019 than in 2018. The 2018 and 2019 inventories were completed using different data sources and calculations and these differences are likely to be the primary cause of the emissions reductions. Key differences between the two inventories include:

- Sectors and sources included:
  - The 2018 inventory included consumption sources such as food and cement which were not included in 2019.
  - The 2019 inventory included emissions from transit, electric vehicles and fugitive emissions which were not included in 2018.
- Emissions from the wastewater treatment sector and the aviation subsector were calculated using different methodologies, resulting in a large decrease in both wastewater treatment and aviation emissions in 2019.
- Different emission factors were used in 2019 to calculate emissions from waste, on-road diesel and gasoline-powered vehicles.
- SMPA's emission factor for electricity consumption increased from 2018 to 2019.