

GHG Inventory – Bases for calculations

Carbon Emissions Footprint Calculator for Cities™

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The workbook is provided to facilitate future updates to Ouray and San Miguel's Greenhouse Gas (GHG) Emissions Inventory. This inventory was completed for 2010 based on ICLEI/WRI protocols and the Demand-Centered Hybrid Life Cycle Analysis methodology (Ramaswami et al., 2008 - see Resource 3). EcoAction Partners uses the workbook to update our regional GHG Emissions Inventory annually.

General data:

Census Population – obtained annually from the Colorado DOLA website

Visitor Population

- SMC visitor values are calculated using the Telluride & Mountain Village Wastewater Treatment Plant BOD data.
- Ouray County visitor estimates are obtained from the visitor centers in Ridgway & Ouray

of Households, SF of commercial & residential buildings – these values are not used in overall GHG emissions calculations, but are collected for other benchmarking purposes. The Ouray County & San Miguel County Assessors offices provide this data.

Energy (blue):

Residential & Commercial Building Energy Use:

Electricity

- SMPA provides data annually per community for residential, commercial & irrigation (provided in 1st quarter for previous year). Data is categorized as non-renewable sales, Green Blocks sales, SMPA community solar farm production, & net-metered system production.
- Tri-State emissions factor - provided to SMPA annually based on Tri-State's total mix of electricity sources (provided late in year for the previous year, thus GHG Inventory value is a year behind when presented to governments, but gets updated during the following year.)

Natural Gas

- Black Hills Energy Corporation (previously SourceGas) provides data annually – per community for residential, commercial & irrigation (provided in 1st quarter for previous year).
- Emissions factor – In 2010, Source Gas provided this factor and in 2017, Black Hills Energy Corporation provided the BHE value. Inventories from this transition onward utilize this Black Hills emissions factor.

Propane

- based on initial 2010 estimate from regional propane companies, who are not obligated to release information and have not provided data since.
- Emissions factor – LGOP default factor from 2010

Government Energy Use:

Government electricity & natural gas use – provided annually by governments: utility bill data, Green Blocks purchases, renewable system production, REC purchases

Water / Wastewater Treatment Electricity & Natural Gas - provided annually by governments from utility bills

Transit (red):

Vehicle Transportation:

Transportation tail-pipe emissions are calculated using total Vehicle Miles Traveled (VMT), which is derived using two different methods - vehicle registration and average daily traffic. VMT is divided by average regional vehicle fleet fuel economy to calculate fuel consumption, which is used to determine GHG emissions from surface transportation. The Colorado Department of Public Health and Environment (CDPHE) conducts on-road vehicle surveys to characterize the Colorado vehicle mix (95% gasoline, 5% diesel).

Vehicle Registration Method:

- # Vehicles registered in San Miguel & Ouray Counties updated annually
- Vehicle Miles Travelled (VMT) estimate per vehicle / year, per EPA – 12,000

Average Daily Traffic Method:

- Average Daily traffic counts of Vehicle Miles Travelled (VMT) per county per Colorado Department of Transportation (CDOT) studies (2009), based on 342 working days/year

Gasoline (95% per CDPHE)

- 20.1 average MPG per CDPHE (2010)

Diesel (5% per CDPHE)

- 6.3 average MPG per CDPHE (2010)

Airline Transport:

- Annual aircraft fuel (jet fuel and aviation gasoline) used is provided annually from the Telluride Airport and the Montrose Regional Airport (65% of passengers travel to OC & SMC).
- Emissions factors used are from the Department of Energy (DOE).
- Total number of enplanements (passengers) is also tracked to obtain emissions/person.

Emissions values for all fuels are sourced from The Carbon Registry, local government protocol, September 2008.

Materials and embodied energy (transboundary reporting):

This section will count all the GHG emissions associated with producing and transporting key materials to OC & SMC, including food, cement, and fuel. Just like electricity, these materials are produced outside the boundaries of the community but are essential to community life. WRI and ICLEI are continuously updating their guidelines on how to include these trans-boundary emissions, termed "Scope 3 Emissions."

Food:

This calculation was originally based on 2005 BLS Economic Census data for 2009\$ for average annual household dollars spent on food. Recently, due to the relatively large percentage of households in the region that are not fully occupied year-round, and the annual influx of visitors that contribute to our regional food carbon footprint, all GHG Inventories (2010-2016) were converted in 2017 to use the average food carbon footprint for annual mtCO₂e/person found in industry studies published online. This carbon footprint value is used with the regional visitor data (vs census) to calculate our annual food-related emissions.

Waste & Recycling: calculated using EPA WARM methodology

- We have 2 main waste haulers for the region.
- Bruin provides annually updated data for volumes of waste and recycling collected throughout the region.
- Waste Management provided total data in 2010 for collection in Montrose, Delta, San Miguel & Ouray Counties, but has not provided updated data since.
- The Sneffels Waste Diversion Planning Project was completed in December 2016 by EcoAction Partners. It includes an analysis of total volume of waste and recycling. This is the most accurate regional information currently available. Thus OC & SMC total waste data is based on this study.
- Values from the study are used with WARM* emissions data to calculate annual waste & recycling emissions.

**Waste Reduction Model (WARM) was created by the U.S. Environmental Protection Agency (EPA) to help solid waste planners and organizations estimate greenhouse gas (GHG) emission reductions from several different waste management practices.*

Cement:

- Total cement consumed in Colorado in 2007 is multiplied by % of state census population located in OC & SMC.

Fuel Production:

- The fuel production emissions factor represents emissions from the production and shipping of fuels. Also known as Wells-to-Pumps, W2P, or WTP Emissions
- The emissions factor for Gasoline, Diesel, & Jet Fuel is multiplied by the total gallons of each fuel used in the region to obtain overall annual emissions.
- WTP Emissions values for all fuels are sourced from the 2017 GREET WTP analysis.

Water & Wastewater Treatment Emissions:

Regional governments provide annual gallons of water treated at each plant. These values are utilized with annual census & visitor data, using ICLEI Protocol for Fugitive Emissions from Wastewater equations (10.2, 10.8 and 10.10)* to calculate annual emissions associated with water and wastewater treatment.

*See ICLEI Local Government Operations Protocol v 1.0 for more information