

Mariposa County

Community and Municipal-Operations 2010 Baseline Greenhouse Gas Emissions Inventories

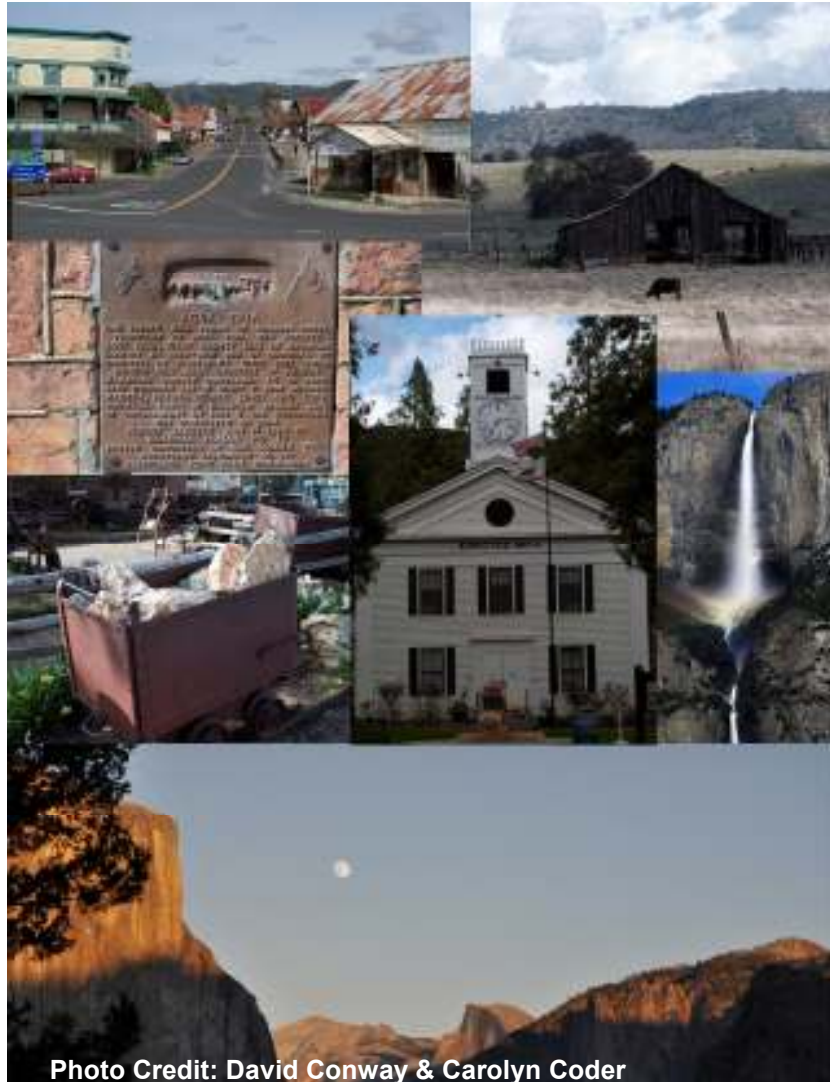


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Final Report

Produced by Sierra Business Council
Supported by Pacific Gas and Electric Company
In Collaboration with Mariposa County and
ICLEI-Local Governments for Sustainability USA
April 2014



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Pacific Gas and Electric Company provides a range of comprehensive climate planning assistance to local governments, from providing energy usage data and assistance with greenhouse gas inventories, to training and guidance on the development and implementation of climate action plans.

This program is funded by California utility customers and administered by PG&E under the auspices of the California Public Utilities Commission.

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This report was prepared for Mariposa County by the Sierra Business Council in partnership with PG&E. The authors would like to thank Mariposa County staff for providing much of the insight and local information necessary for the completion of this report. The authors would also like to recognize PG&E for their administrative support of the inventory, made possible through the use of Public Goods Charge funding, as well as thank ICLEI for providing training and technical support.

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List of Acronyms

AB	Assembly Bill
ACS	American Community Survey
ARB	California Air Resources Board
Avg	Average
BOD ₅	Biochemical Oxygen Demand
CA	California
CCAR	California Climate Action Registry
CEC	California Energy Commission
CEQA	California Environmental Quality Act
CEMS	Climate and Energy Management Suite
CH ₄	Methane
CO ₂	Carbon Dioxide
CO _{2e}	Carbon Dioxide Equivalent
DA	Direct Access
EF	Emissions Factor
eGRID	U.S. EPA's Emissions & Generation Information Database
EIA	United States Energy Information Administration
EMFAC	California ARB's Mobile Source Emissions Inventory On-Road Motor Vehicles Emissions Factor
EPA	United States Environmental Protection Agency
FOD	First-Order Decay
Gal	Gallon
GHG	Greenhouse Gas
GP	General Plan
GWP	Global Warming Potential
GWh	Gigawatt-hour(s)
HC	Household Consumption
HFC-134a	Hydrofluorocarbon-134a
ICLEI	ICLEI – Local Governments for Sustainability USA
IE	Included Elsewhere
IPCC	Intergovernmental Panel on Climate Change
HFC	Hydroflouorocarbon
kg	Kilogram(s)
kWh	Kilowatt-hour(s)
KOA	Kampground of America
lb(s)	Pounds
LDPCSD	Lake Don Pedro Community Service District
LGOP	Local Government Operations Protocol
LPG	Liquefied Petroleum Gas (Propane)
LS-1	PG&E Designation for Streetlights Owned and Operated by PG&E

MCF	Methane Conversion Factor
MCPW	Mariposa County Public Works
MG	Million Gallons
MGD	Million Gallons per Day
MMBtu	Million British Thermal Units
MPG	Miles per Gallon
MPO	Metropolitan Planning Organization
MPUD	Mariposa Public Utility District
MTCO _{2e}	Metric Tons of Carbon Dioxide Equivalent
N	Nitrogen
NA	Not Applicable
NASA	National Aeronautic and Space Administration
NE	Not Estimated
Nit/Denit	Nitrification / Denitrification
N ₂ O	Nitrous Oxide
NO	Not Occurring
NOAA	National Oceanic and Atmospheric Administration
NO _x	Oxides of Nitrogen
NPS	National Park Service
OPR	California Office of Planning and Research
PG&E	Pacific Gas & Electric Company
R-12	Dichlorodifluoromethane (Freon-12)
R-134a	Tetrafluoroethane (HFC-134a)
RTP	Regional Transportation Plan
RPS	Renewable Portfolio Standard
SB	Senate Bill
SBC	Sierra Business Council
SCS	Sustainable Community Strategy
SEEC	Statewide Energy Efficiency Collaborative
SF ₆	Sulfur Hexafluoride
SI	Significant Influence
SUV	Sport Utility Vehicle
T&D	Transmission and Distribution
TOG	Total Organic Gasses
US	United States
USCP	United States Community Protocol
VMT	Vehicle Miles Traveled
WARM	U.S. EPA's waste reduction model
WECC	Western Electricity Coordinating Council
WWTP	Wastewater Treatment Plant
YARTS	Yosemite Area Regional Transportation System
YNP	Yosemite National Park

Executive Summary

This report documents the results of Mariposa County's 2010 baseline greenhouse gas (GHG) emissions inventories for community-wide activities and sources, and the municipal operations of Mariposa County. The executive summary presents a general overview of the GHG emissions attributed to community activities and sources within Mariposa County and Mariposa County's municipal operations in 2010. More detailed discussion of each inventory is provided in the Community Emissions Inventory Results and Municipal-Operations Inventory Results sections respectively.

With the support of Pacific Gas and Electric Company (PG&E), and guidance from Mariposa County staff and ICLEI – Local Governments for Sustainability USA (ICLEI, formerly known as the International Council for Local Environmental Initiatives), the Sierra Business Council (SBC) conducted all emissions estimations within this report following the protocols recommended by the State of California: Local Government Operations Protocol (LGOP) and the U.S. Community Protocol (USCP). More information on the boundaries used to define the emissions inventoried and the protocols used in the development of the inventories is provided in the Inventory Methodology section of this report.

This report is intended to guide local GHG emissions reduction efforts, provide a baseline against which the County will be able to compare future performance and for use in demonstrating progress in reducing emissions. Through these efforts and others Mariposa County can achieve benefits beyond reducing emissions, including saving community members' and tax payers' money and improving Mariposa County's economic vitality and ultimately increasing the quality of life for residents and other community members.

Community-Wide Inventory Emissions Summary

In 2010, Mariposa County's residents and businesses emitted an estimated 219,847 metric tons of carbon dioxide equivalent (CO₂e) as reported in the community-wide inventory. Greenhouse gas emissions are commonly aggregated and reported in terms of carbon dioxide equivalent units, or CO₂e. This standard is based on the Global Warming Potential (GWP) of each gas, which is a measure of the amount of warming a GHG may cause over a 100-year time horizon, measured against the amount of warming caused by carbon dioxide. Converting all emissions to carbon dioxide equivalent (CO₂e) units allows for the consideration of different GHGs in comparable terms. For example, methane (CH₄) is twenty-five times more powerful than carbon dioxide (CO₂) in its warming effect over 100 years; so one metric ton of methane emissions is equal to twenty-five metric tons of carbon dioxide equivalents.

As recommended by the USCP, the Local Government Significant Influence framework was used to determine the emissions included in the community-wide inventory. This framework includes emissions sources and activities for

Mariposa County 2010 GHG Emissions Inventory

which Mariposa County has the greatest ability to influence through outreach, education, incentive, or regulatory programs and policies.

Figure ES-1 summarizes the community-wide GHG emissions, which Mariposa County has the greatest potential to influence. As can be seen in Figure ES-1, the largest contributor to community emissions in the inventory is the Transportation Sector, with 138,208 metric tons of CO₂e, which includes all on-road passenger, freight, and public transit vehicles traveling on public roads within Mariposa County, as well as off-road vehicles and mobile equipment. Residential Energy Use, with 36,651 metric tons of CO₂e, is the next largest contributor to Mariposa County's community GHG emissions.

Figure ES-1: 2010 Community GHG Emissions Summary (Metric Tons CO₂e)

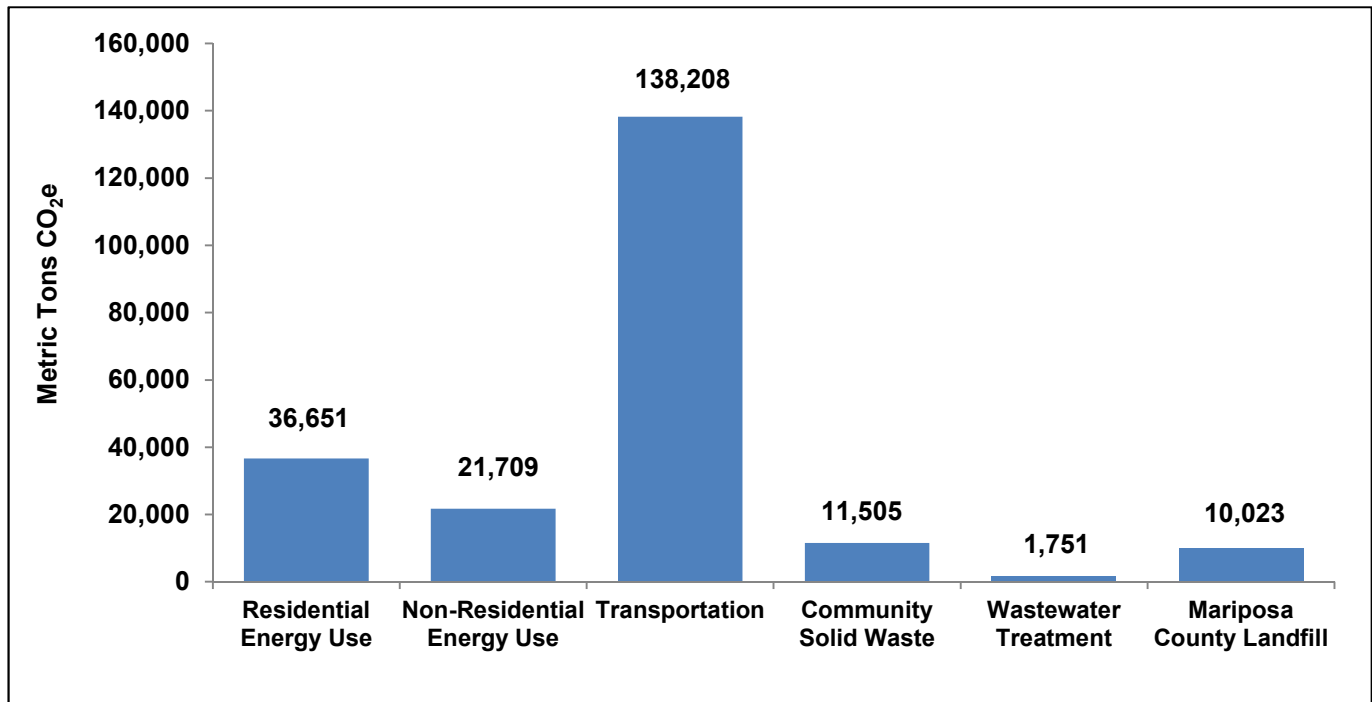


Table ES-1 presents the community GHG emissions in more detail and includes Information Items that are not included in the community GHG emissions total, though are reported here for additional context. Information Items are GHG emissions that are reported separately from the community total either to avoid overlap with other reported emissions or excluded from GHG inventories by USCP guidance.

For the community-wide inventory, Information Items include the estimated electricity and transmission and distribution losses used specifically for wastewater and potable water management which could not be disaggregated from the electricity use included in the Non-Residential Energy Use Sector, the emissions associated with the collection and transportation of solid waste generated by the community which could not be disaggregated from the Transportation Sector, and biogenic CO₂ emissions from the combustion of wood or other non-fossil based fuels. Based on guidance in the USCP, biogenic CO₂ emissions are not included in the community emissions total because the same CO₂ would be produced if the wood or other organic material were left to decompose naturally.

Table ES-1: 2010 Community GHG Emissions Summary (Metric Tons CO₂e)

Sector	Metric Tons CO ₂ e
Residential Energy Use	
Electricity Use	14,756
Stationary Combustion	20,107
Transmission and Distribution (T&D) Losses	1,788
Total Residential Energy Use	36,651
Non-Residential Energy Use	
Electricity Use	8,032
Stationary Combustion	12,704
Transmission and Distribution Losses	973
Total Non-Residential Energy Use	21,709
Transportation	
On-Road Transportation	138,132
Off-Road Vehicles and Mobile Equipment	76
Total Transportation	138,208
Community Solid Waste	
Community Generated Solid Waste (Sent to Landfills with Landfill Gas Capture)	108
Community Generated Solid Waste (Sent to Landfills without Landfill Gas Capture)	11,397
Total Community Generated Solid Waste	11,505
Wastewater Treatment	
Wastewater Conventional Treatment Process Nitrous Oxide (N ₂ O) Emissions	7
Wastewater Conventional Effluent Fugitive N ₂ O Emissions	120
Wastewater Lagoon Treatment Process Methane (CH ₄) Emissions	216
Wastewater Lagoon Effluent Fugitive N ₂ O Emissions	12
Septic Systems Fugitive CH ₄ Emissions	1,396
Total Wastewater Treatment	1,751
Other Emissions Sources within the Community	
Mariposa County Landfill Fugitive CH ₄ Emissions	10,023
Total Other Emissions Sources within the Community	10,023
Total Community Emissions	219,847
Information Items	
Electricity Use and T&D Losses Associated with Potable Water	396
Electricity Use and T&D Losses Associated with Wastewater	578
Collection and Transportation of Community Solid Waste	248
Biogenic CO ₂ Emissions	33,197

Municipal-Operations Inventory Emissions Summary

In 2010, Mariposa County’s municipal operations emitted an estimated 13,982 metric tons of CO₂e within the municipal-operations inventory. Within this report, municipal operations refer specifically to Mariposa County’s operations and not to other public agencies’ operations. As recommended by the LGOP, the Operational Control framework was used to determine the emissions included in the municipal-operations inventory. The Operational Control framework includes emissions for which Mariposa County has full authority to introduce and implement operational policies. The municipal-operations inventory also includes two sectors for which Mariposa County has less control: emissions from employee-generated solid waste and emissions from employees’ personal commutes to work. Including these optional sources is recommended strongly by the LGOP even though Mariposa County does not have full operational control.

Figure ES-2 summarizes the municipal operations GHG emissions by sector. As shown, the largest source of emissions within the municipal-operations inventory in 2010 was the Mariposa County Landfill. The second largest source was the Vehicle Fleet, which includes all County vehicles and mobile equipment.

Figure ES-2: 2010 Municipal Operations GHG Emissions Summary (Metric Tons CO₂e)

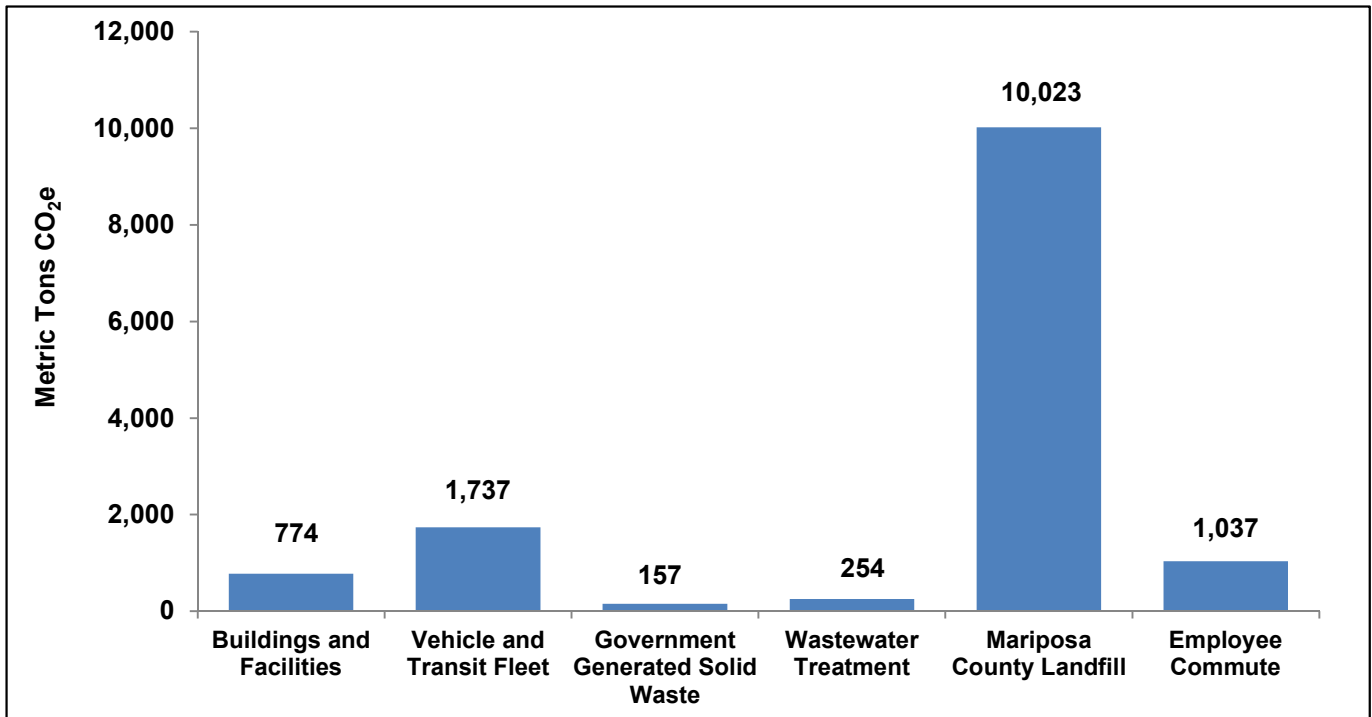


Table ES-2 presents the municipal operations GHG emissions in more detail as well as additional Information Items that are not included in Figure ES-2. Information Items are GHG emissions that are reported separately from the municipal-operations total to avoid overlap with other reported emissions or excluded from GHG inventories by LGOP guidance. The Information Items presented in Table ES-2 include: R-12 refrigerants (ozone depleting substances currently being phased out worldwide) used in vehicle fleet air conditioning and PG&E owned and maintained streetlights paid for by Mariposa County (designated LS-1).

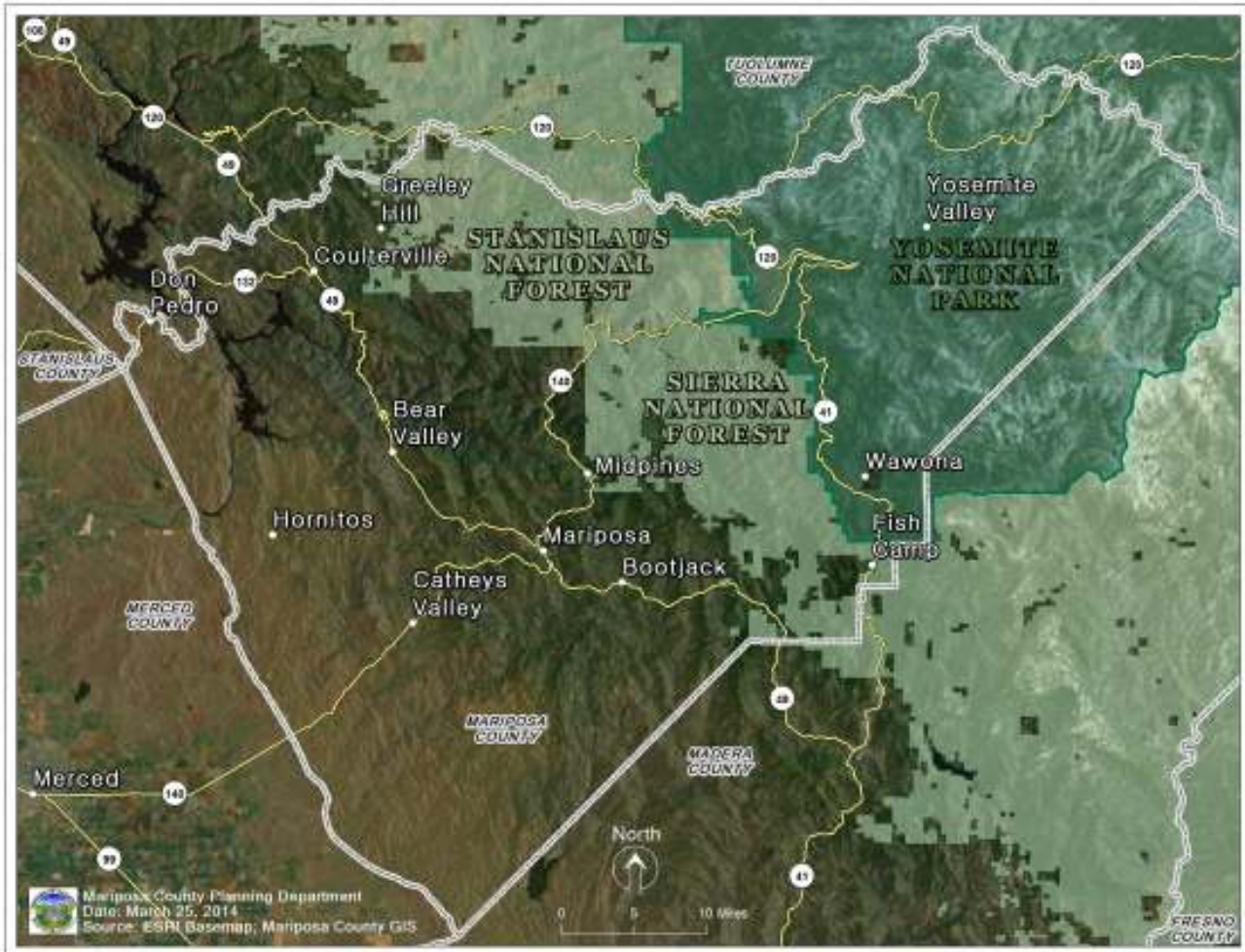
Table ES-2: 2010 Municipal Operations GHG Emissions Summary (Metric Tons CO₂e)

Sector	Metric Tons CO ₂ e
Buildings and Facilities	
Electricity Use	556
Stationary Combustion	152
Transmission and Distribution Losses	67
Total Buildings and Facilities	774
Vehicle and Transit Fleet	
On-Road Vehicle Fleet - Gasoline	1,303
On-Road Vehicle Fleet - Diesel	91
Off-Road Equipment - Gasoline and Diesel	191
Transit Fleet - Gasoline	56
Vehicle Fleet - Leaked Refrigerants (R-134a)	96
Total Vehicle Fleet	1,737
Government-Generated Solid Waste	
Government-Generated Solid Waste	157
Total Government-Generated Solid Waste	157
Wastewater Treatment	
MCPW Conventional Treatment Process N ₂ O Emissions	1
MCPW Lagoon Treatment Process CH ₄ Emissions	216
MCPW Conventional Effluent Fugitive N ₂ O Emissions	20
MCPW Lagoon Effluent Fugitive N ₂ O Emissions	12
Septic Systems Fugitive CH ₄ Emissions	5
Total Wastewater Treatment	254
Solid Waste Management	
Mariposa County Landfill Fugitive CH ₄ Emissions	10,023
Total Solid Waste Management	10,023
Employee Commute	
Employee Commute Emissions	1,037
Total Employee Commute	1,037
Total Municipal Operations Emissions	13,982
Information Items	
Ozone Depleting Substances (R-12)	106
LS-1 Street Lighting	10

Introduction

Mariposa County was one of California's original counties from the time of Statehood in 1850. Home of Yosemite National Park, Mariposa County is a rural community located in the foothills of the central Sierra Nevada mountain range covering approximately 1,463 square miles. With no incorporated cities and no stoplights, Mariposa County can be characterized by its rural character, beautiful scenery, and access to world-class recreation. In 2010, Mariposa County's population was 18,277 with community employment of 8,470. Historically, Mariposa County's economy has been resource-based, with agriculture, mining, and logging being major components. A popular year-round vacation destination, Mariposa County's economy now relies heavily on the tourism industry. There are four million annual visitors to Yosemite National Park, which is also the County's largest employer. Every day, Mariposa County plays host to a variety of activities crucial to a properly functioning and robust community; burning fuel for transportation, collecting and treating waste, lighting, heating and cooling buildings. All of these activities contribute either directly or indirectly to the addition of carbon dioxide and other greenhouse gases (GHGs) into the environment.

Figure 1: Mariposa County - 2012 Jurisdictional Boundary



Source: Mariposa County Staff

Mariposa County 2010 GHG Emissions Inventory

In California, governments, businesses, and the general public are placing increasing focus on quantifying and reducing GHG emissions. Additionally, California's regulatory environment is shifting towards establishing policies relating to GHG emissions reductions. Specific regulatory policies and goals are discussed in more detail in the California Policy section that follows. Due to these drivers, and other motivations including economic challenges facing the county and a limited planning budget for advanced planning purposes, Mariposa County authorized the Sierra Business Council, with the support of PG&E, to conduct baseline inventories of GHG emissions resulting from both community activities and Mariposa County's municipal operations in 2010. This report documents the findings and methodologies of the 2010 baseline community-wide and municipal-operations inventories.

Mariposa County Existing Programs and Policies

Mariposa County has already implemented programs that have or will lead to ancillary benefits in the form of energy conservation and greenhouse gas mitigation. Mariposa County initiatives toward meeting resource and energy efficiency goals include the following:

- Mariposa County's General Plan (GP), adopted in 2006, and Catheys Valley Community Plan, adopted in December 2012, include consideration of climate change adaptation planning. The Catheys Valley Community Plan includes detailed goals for climate planning in that community.
- Implementation of current Title 24 building permit standards, including the California Green Buildings Standard Code, the Solar Photovoltaic Systems Article from the Electrical Code, and the California Energy Code.
- Mariposa County Board of Supervisors adopted the GP to include development considerations that cluster commercial and service development in planning areas (towns and communities), encourage and allow home businesses, preserve large tracts of agricultural land and to continue to participate in the Williamson Act program. These development planning efforts overlap with transportation planning efforts that have the potential to reduce vehicle miles traveled within the county.
- Transportation planning efforts include implementation of Mariposa County's Transit Plan and the Bicycle, Pedestrian, and Equestrian Facilities Plan, and participation in the popular Yosemite Area Regional Transportation System (YARTS). Additionally, the county is committed to completing a multi-year community transportation planning study to evaluate and implement context-sensitive methods for reducing vehicle miles traveled within the county.
- Waste management programs include an Automated In-Vessel Composting Facility at the County Landfill (since 2006), composting of green waste and a sorter to increase recycling, operation of e-waste, sharps, and recycling center at the County Landfill, Materials Recovery Facility fines, operation of four transfer stations throughout the county, and partnership with the National Park Service (NPS) on landfill activities, including composting.
- Mariposa County Departments of Transportation Planning, Building, and Public Works-Solid Waste have formed cooperative partnerships with the NPS, US Forest Service, the local Air Pollution Control District, YARTS, and other regional and local stakeholders on joint planning efforts to improve resource efficiency efforts.

Pacific Gas and Electric (PG&E) Company-Sponsored Inventory Project

This project was made possible by PG&E's Government and Community Partnerships Program with funding from California utility customers under the auspices of the California Public Utilities Commission. The Government and Community Partnerships Program assists local governments by providing easy-to-understand information, technical expertise, and financial resources to support local climate action planning. The Government and Community Partnerships Program is designed to help local governments and communities achieve GHG reduction goals while simultaneously reducing energy costs and improving air quality.

Climate Change Background

Naturally occurring gases, including carbon dioxide, dispersed in the atmosphere determine the Earth's climate by trapping solar radiation. This phenomenon is known as the greenhouse effect. Abundant scientific evidence shows that human activities are increasing the concentration of GHGs and changing the global climate. The most significant contributor is the burning of fossil fuels for transportation, electricity generation and other purposes, which introduces large amounts of carbon dioxide and other GHGs into the atmosphere. Collectively, these gases intensify the natural greenhouse effect, causing global average surface temperatures and temperatures in the lower atmosphere to rise.

The Intergovernmental Panel on Climate Change (IPCC) is the scientific body charged with bringing together the work of thousands of climate scientists. The IPCC's Fourth Assessment Report states: "warming of the climate system is unequivocal."¹ Furthermore, the report finds that "most of the observed increase in global average temperatures since the mid-20th century is very likely due to the observed increase in anthropogenic GHG concentrations."

Analysis released in January 2011 by the National Aeronautics and Space Administration (NASA)'s Goddard Institute for Space Studies shows that global average surface temperatures in 2010 "tied" 2005 as the warmest on record (the difference is smaller than the uncertainty in comparing the temperatures of recent years).² The next warmest years, also with very close average temperatures, are 1998, 2002, 2003, 2006, 2007, and 2009. The period from January 2000 to December 2009 is the warmest decade on record, followed by the 1990's, then the 1980's respectively. The steady uptick in average temperatures will likely have significant negative impacts on California's environment and economy if action is not taken to greatly reduce GHG emissions.

Reducing fossil fuel use in the community has many benefits in addition to reducing greenhouse gas emissions. Retrofitting homes and businesses to be more efficient creates local jobs, reduces energy costs, improves air quality, and in combination with increased opportunities for walking and bicycling improves community members' health. In addition, money not spent on energy is more likely to be spent at local businesses, improving the local economy.

¹IPCC, 2007: Climate Change 2007: Synthesis Report. Contribution of Working Groups I, II and III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change [Core Writing Team, Pachauri, R.K and Reisinger, A. (eds.)]. IPCC, Geneva, Switzerland, 104 pp.

² Goddard Institute for Space Studies, "Research Finds 2010 Tied for Warmest Year on Record," 2011, 18 Jan. 2011, <<http://www.nasa.gov/topics/earth/features/2010-warmest-year.html>>.

Regional and Local Impacts

Mariposa County, like all communities in the Sierra Nevada, faces unique challenges associated with climate change in the region. Because rising global temperatures intensify the water cycle, the likelihood of increased occurrences and duration of droughts as well as increased frequency and altered timing of flooding will increase risks to people, ecosystems, and infrastructure. Potential impacts on water resources include reduced snowpack, delayed snow accumulation and changes in rain and snowfall patterns, earlier snow melting, and ultimately shortages in runoff and water supply. Extended droughts may increase soil erosion and increase risk of catastrophic wildfires. With rapid change, introduction of new diseases, altered species composition, and loss of critical habitat is likely. Since local economies in the Sierra Nevada rely so heavily on these natural resources for tourism, recreation, forestry, agriculture and other industries; climate change has the potential to negatively affect economic activity in Mariposa County, and ultimately impact quality of life for community members.

California Policy

California has been a leader in developing policies that aim to reduce GHG emissions, and these policies are some of the drivers behind the completion of GHG inventories at the local level. Three of these policies are described here.

State Emissions Reduction Targets

California passed the Global Warming Solutions Act - Assembly Bill (AB) 32 in 2006, which charged the California Air Resources Board (ARB) with implementing comprehensive regulatory, reporting and market mechanisms to achieve quantifiable reductions in GHG emissions statewide. AB 32 requires statewide GHG emissions to be reduced to 1990 levels by 2020. This reduction will be accomplished through a comprehensive suite of actions, the most visible of which is an enforceable statewide cap on GHG emissions that went into effect in 2012. Additionally, Executive Order S-3-05 establishes a long-range target of 80% below 1990 levels by 2050. The Executive Order is binding only on State agencies, and has no force of law for local governments; however, the signing of S-3-05 sent a clear signal to the California Legislature on the long-range goal for California.

The AB 32 Scoping Plan provides guidance on how local governments can help the State reach these goals; specifically the Plan suggests that local governments establish an emissions reduction goal of 15 percent below “current” levels by 2020.³ Mariposa County’s GHG emissions inventory is intended to enable the County to develop effective GHG reduction policies in line with these state goals and programs and track emissions reduction progress.

Senate Bill 375 and Metropolitan Planning Organizations

Senate Bill (SB) 375, signed in September 2008, aligns regional transportation planning efforts, regional GHG reduction targets and land use planning and housing allocation efforts. SB 375 requires each Metropolitan Planning Organization (MPO) to adopt a Sustainable Community Strategy (SCS) as part of the MPO’s Regional Transportation Plan (RTP) that

³ The AB 32 Scoping Plan is available at: <http://www.arb.ca.gov/cc/scopingplan/scopingplan.htm>

sets land use allocation and transportation investments necessary to meet GHG emissions reduction targets for the region. Mariposa County does not lie within an MPO and therefore does not have any requirements under SB 375.

California Environmental Quality Act

Another policy driver for climate action planning in California is Senate Bill (SB) 97, which established that GHG emissions and their impacts are appropriate subjects for analysis under the California Environmental Quality Act (CEQA). This law, passed in 2007, directed the State’s Office of Planning and Research (OPR) to develop CEQA guidelines on the mitigation of GHG emissions for agencies, such that they may follow appropriate standards on calculating GHG emissions from projects, determine potential significance, and implement mitigation measures if necessary and feasible. In addition to establishing the 2050 reduction target described above, Governor Schwarzenegger’s Executive Order S-3-05 reinforces these goals and sets a schedule for the reporting of both the measured impacts of climate change upon California’s natural environment and the emissions reduction efforts undertaken by a myriad of state, regional, and local groups.

Energy-Efficiency and Renewable Energy Standards

California’s Renewable Portfolio Standard (RPS) requires investor-owned utilities, electric service providers and community choice aggregators to increase procurement from eligible renewable energy resources to 33 percent of total procurement by 2020.

California’s Building Energy Efficiency Standards (California Code of Regulations, Title 24, Part 6) were recently updated by the California Energy Commission (CEC) to require new buildings to become even more energy-efficient than under the current code. The new 2013 standards, which become effective in July 2014, will increase the efficiency of new construction by 20 percent for residential uses and 25 percent for nonresidential uses, compared to the 2008 Title 24 standards currently in effect.

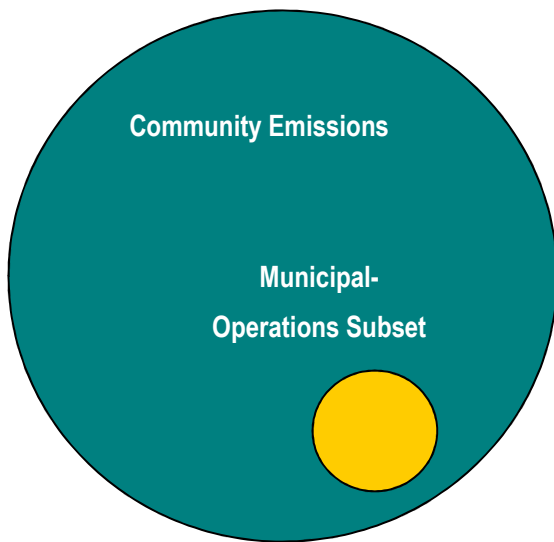
Inventory Methodology

This section provides information on the protocols and specific inventory methodologies used in the development of the community-wide and municipal-operations greenhouse gas (GHG) emissions inventories.

Understanding a Greenhouse Gas Emissions Inventory

The first step toward achieving tangible GHG emissions reductions requires identifying baseline levels and sources of emissions in the community. As local governments have continued to join the climate protection movement, the need for a standardized approach to quantify GHG emissions has proven essential.

Figure 2: Municipal-Operations Inventory as a Subset of the Community-Wide Inventory



Standard processes of accounting for emissions have been developed to which these inventories adhere. This inventory uses the approach and methods provided by the U.S. Community Protocol (USCP) and the Local Government Operations Protocol (LGOP), both of which are described below.⁴

Note that the municipal-operations inventory is a subset of the community inventory. For example, data on non-residential energy use by the community includes energy consumed by county buildings, and community vehicle miles traveled estimates include miles driven by municipal fleet vehicles. This relationship is illustrated in Figure 2.

U.S. Community Protocol

The USCP was released by ICLEI - Local Governments for Sustainability USA in October 2012, and represents a new national standard in guidance to help U.S. local governments develop effective community GHG emissions inventories. It establishes reporting requirements for all community GHG emissions inventories, provides detailed accounting guidance for quantifying GHG emissions associated with a range of emissions sources and community activities, and provides reporting frameworks to help local governments customize their community GHG emissions inventory reports based on their local goals and capacities. The State of California Governor's Office of Planning and Research (OPR) recommends that California local governments follow the USCP when undertaking their greenhouse gas emissions inventories. The USCP was used to inventory Mariposa County's community emissions.

⁴Local Government Operations Protocol (LGOP). <http://www.icleiusa.org/programs/climate/ghg-protocol/ghg-protocol>
U.S. Community Protocol for Accounting and Reporting Greenhouse Gas Emissions. <http://www.icleiusa.org/tools/ghg-protocol/community-protocol>.

Local Government Operations Protocol

In 2008, ICLEI - Local Governments for Sustainability USA, California Air Resources Board (ARB), and the California Climate Action Registry (CCAR) released the LGOP to serve as the national standard for quantifying and reporting GHG emissions from local government (or municipal) operations. The purpose of the LGOP is to provide the principles, approach, methodology, and procedures needed to develop a municipal-operations GHG emissions inventory. The LGOP was used to inventory Mariposa County’s municipal-operations emissions.

Greenhouse Gas Emissions

The USCP and LGOP recommend assessing emissions from the six internationally recognized GHGs regulated under the Kyoto Protocol and listed in Table 1. The municipal-operations inventory included analysis of emissions of each of these gases, although no perfluorocarbons or sulfur hexafluoride (SF₆) emissions were found. The community-wide inventory only included analysis of carbon dioxide, methane and nitrous oxide emissions. While emissions of hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride are potentially present within Mariposa County, they were not included in the community-wide inventory because of the difficulty in obtaining data on these emissions at a community scale.

Greenhouse gas emissions are commonly aggregated and reported in terms of equivalent carbon dioxide units, or CO₂e. This standard is based on the Global Warming Potential (GWP) of each gas, which is a measure of the amount of warming a GHG may cause over a 100 year time horizon, measured against the amount of warming caused by carbon dioxide. Converting all emissions to carbon dioxide equivalent units allows for the consideration of different GHGs in comparable terms. For example, methane is twenty-five times more powerful than carbon dioxide in its warming effect over 100 years; so one metric ton of methane emissions is equal to twenty-five metric tons of carbon dioxide equivalents. Table 1 presents the GWPs of the commonly occurring GHGs according to the Intergovernmental Panel on Climate Change’s 4th Assessment Report.⁵

Table 1: Greenhouse Gases

Greenhouse Gas	Chemical Formula	Global Warming Potential
Carbon Dioxide	CO₂	1
Methane	CH₄	25
Nitrous Oxide	N₂O	298
Hydrofluorocarbons	Various	38-12,200
Perfluorocarbons	Various	9,500-18,200
Sulfur Hexafluoride	SF₆	32,600

⁵ http://www.ipcc.ch/publications_and_data/ar4/wg1/en/ch2s2-10-2.html

Quantifying Greenhouse Gas Emissions

Establishing a Base Year

The inventory process requires the selection of a base year in order to compare baseline emissions against current and future emissions inventories. Mariposa County's baseline GHG emissions inventories used 2010 for the base year; 2010 was selected because it is one of the earliest years for which relatively comprehensive data is available. The emissions quantified in this report will serve as the baseline emissions for the development of emissions forecasts and as a comparison to future emissions inventories to track progress in emissions reductions.

Establishing Boundaries

Setting an organizational boundary for GHG emissions accounting and reporting is an important step in the inventory process. The organizational boundary for an inventory determines which aspects of municipal operations and community activities are included in the emissions inventory and which aspects are excluded.

Community-Wide Inventory Boundaries

Under the USCP, there are three available reporting frameworks; Local Government Significant Influence, Community-Wide Activities, and Household Consumption. The USCP recommends the Local Government Significant Influence framework because this framework emphasizes policy relevance, highlighting emissions sources and activities that the local government has the greatest opportunity to address. The Local Government Significant Influence framework also includes all five of the Basic Emissions Generating Activities required by the USCP to be protocol compliant: 1) Use of Electricity by the Community, 2) Use of Fuel in Residential and Commercial Stationary Combustion Equipment, 3) On-Road Passenger and Freight Motor Vehicle Travel, 4) Use of Energy in Potable Water and Wastewater Treatment and Distribution and 5) Generation of Solid Waste by the Community. For these reasons, the community-wide inventory was conducted according to the Local Government Significant Influence framework. In order to provide as complete a picture as possible of all of the direct GHG emissions produced within the community, this report also presents other large GHG sources within the community.

Several potential emissions sources were omitted from this inventory because of data limitations or uncertainty in the emissions calculation methodologies. These omitted emissions include leaked refrigerants and fire suppressants in the community, emissions associated with the cultivation of agriculture and livestock, emissions from forest fires and forest management activities. Emissions from agricultural activities are associated with intensive agricultural operations and while agricultural land in Mariposa County may be significant, the emissions associated with Mariposa's low intensity agriculture are likely not significant.

Municipal-Operations Inventory Boundaries

Under the LGOP, two frameworks can be used for reporting emissions at the municipal operations level: operational control or financial control. A local government has operational control over an emissions source if it has full authority to introduce and implement policies or programs that impact the emissions source. A local government has financial control if the emissions source is fully consolidated in financial accounts. The LGOP strongly encourages local governments to utilize operational control as the organizational boundary for a municipal-operations emissions inventory. Operational control is believed to most accurately represent the emissions sources that local governments can directly influence, and this boundary is consistent with other environmental and air quality reporting program requirements. For this reason, the municipal-operations inventory was conducted according to the operational control framework.

Quantification Methods

All of the emissions in this report were quantified using calculation-based methodologies. Calculation-based methodologies calculate emissions using activity data and emissions factors, in accordance with the following basic equation: $Activity\ Data \times Emissions\ Factor = Emissions$. Activity data refers to the relevant measurement of energy use or other GHG-generating processes such as fuel consumption by fuel type (e.g. gallons), metered annual electricity consumption (e.g. kilowatt hours) and annual vehicle miles traveled (VMT). Standard emissions factors were used to convert activity data into the associated emissions. Emissions factors are typically expressed in terms of emissions per unit of activity data (e.g. lbs CO₂/kWh of electricity). Please refer to the appendices provided for a detailed listing of the activity data and emissions factors used in development of these inventories.

Evaluating Emissions

There are several important concepts involved in the analysis of emissions arising from many different sources and chemical/mechanical processes throughout the community. There are four main emissions types discussed throughout this report.

- **Stationary or mobile combustion:** These are emissions resulting from on-site combustion of fuels (propane, diesel, gasoline, etc.) to generate heat, electricity, or to power vehicles and mobile equipment.
- **Purchased electricity:** These are emissions produced by the combustion of fuels by utilities or other facilities outside of the operational control of Mariposa County or community members.
- **Fugitive emissions:** These are emissions that result from the unintentional release of GHGs into the atmosphere (leaked refrigerants, methane from waste decomposition, etc.).
- **Process emissions:** These are emissions from physical or chemical processing (e.g., wastewater treatment).

Sources and Activities

Communities contribute to greenhouse gas emissions in many ways. Two central categorizations of emissions are used in the community inventory: 1) GHG emissions that are produced by “sources” located within the community boundary, and 2) GHG emissions produced as a consequence of community “activities” that may be produced outside of the community boundary.

Table 2: Source vs. Activity

Source	Activity
<p>Any physical process inside the jurisdictional boundary that releases GHG emissions into the atmosphere (for example, propane combusted at homes and business)</p>	<p>The use of energy, materials, and/or services by members of the community that result in the creation of GHG emissions that may be outside of the community boundaries (for example, electricity used at homes and business)</p>

By reporting both GHG emissions sources and activities, local governments can develop and promote a deeper understanding of GHG emissions associated with their communities. A purely source-based emissions inventory could be summed to estimate total emissions released within the community’s jurisdictional boundary. In contrast, a purely activity-based emissions inventory could provide perspective on the efficiency of the community, even when the associated emissions occur outside the jurisdictional boundary. Sometimes an emissions category could be considered a source and an activity; for example, fuel use for heating is both a source of emissions within the community as well as a community activity. In cases when emissions are both a source and an activity, the emissions are considered a source. The division of emissions into sources and activities replaces the scopes framework that is used in municipal operations inventories, because the scopes framework does not have a clear application to community inventories.

Emissions by Scope

For the municipal-operations inventory, emissions are categorized by scope, rather than by sources and activities. The scopes framework identifies three emissions scopes for municipal operations emissions:

- **Scope 1:** All direct stationary combustion, fugitive, and process emissions from a facility or piece of equipment operated by the local government. Examples include tailpipe emissions from local government vehicles, and emissions from a furnace in a local government building.
- **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 boundary of local government, but that rely upon emissions-producing processes often located outside of the organizational boundary.
- **Scope 3:** All other indirect or embodied emissions not covered in Scope 2 that occur as a result of activity within the organizational boundary. Examples include emissions associated with the disposal of solid waste generated by the local government and the emissions associated with employees’ personal commute to work.

Mariposa County 2010 GHG Emissions Inventory

The LGOP requires reporting of all Scope 1 and Scope 2 emissions within the local government's operational or financial control. Using the scopes framework helps prevent double counting of emissions, specifically where one jurisdiction's Scope 2 emissions from electricity use could potentially be another jurisdiction's Scope 1 emissions from the stationary combustion of fuels to produce electricity. For this reason, scopes can be, with caution, summed within a jurisdiction, though should not be summed across jurisdictions. In addition to the categories in the scopes framework, emissions sources may also be highlighted as Information Items.

Information Items

Information items are emissions sources that are reported separately to avoid overlap with other reported emissions or that are purposely excluded by protocol guidance from emissions totals reported in GHG inventories. Information Items can provide a more complete picture of emissions.

A common source of emissions that is categorized as an Information Item is carbon dioxide emitted in the combustion of biogenic fuels. Local governments, industrial facilities, and community members will often burn fuels that are of biogenic origin (wood, landfill gas, organic solid waste, biofuels, etc.) to generate heat or electricity. Carbon dioxide emissions from the combustion of biogenic fuels are not included in Scope 1 emissions, in accordance with established international principles. Methane (CH₄) and nitrous oxide (N₂O) emissions from biogenic fuels are considered Scope 1 stationary combustion emissions and are included in the stationary combustion sections for the appropriate facilities.

These principles indicate that biogenic fuels, if left to decompose in the natural environment, would release CO₂ into the atmosphere, where it would then enter back into the natural carbon cycle. Therefore, when wood or another biogenic fuel is combusted, the resulting CO₂ emissions are akin to natural emissions and should therefore not be considered as human activity-generated emissions. The CH₄ and N₂O emissions, however, would not have occurred naturally and are therefore included as Scope 1 emissions. Because there is continued debate over the true effect of biogenic fuels, the carbon dioxide emissions from the combustion of biogenic fuels are included as information items.

Ozone-depleting substances, used as refrigerants, are another common source of emissions categorized as Information Items. Ozone-depleting substances are regulated under the Montreal Accord and are therefore not considered GHG emissions under the Kyoto Protocol. One of the most common ozone-depleting substances in use as a refrigerant, R-12, is reported as an Information Item because the emissions still have global warming potential and in the future will be replaced by non-ozone depleting refrigerants that will have to be reported as GHG emissions in future inventories. Information items quantified for this report include:

- **Community-Wide Inventory**
 - Emissions from electricity use associated with water and wastewater management that are already included in Residential and Non-Residential Energy Use Sectors.
 - Emissions from the transportation and collection of community generated solid waste, which are included in the Transportation Sector.
 - Biogenic emissions generated from burning wood in residences.

Mariposa County 2010 GHG Emissions Inventory

- **Municipal Operations Inventory**

- Ozone depleting substances used as refrigerants (most notably R-12).
- PG&E owned and operated lighting paid for by Mariposa County (designated LS-1 by PG&E).

Included Sources and Activities

Tables 3 and 4 document all of the emissions sources and activities included in the community-wide and municipal-operations inventories. For a full list of all potential emissions sources please refer to Appendix A for the community-wide inventory and Appendix G for the municipal-operations inventory.

Table 3: Sources and Activities Included in Mariposa County Community Inventory

Sector	Source	Activity	Information Items
Residential Energy Use	Stationary Fuel Combustion (e.g. propane) in the Community	Electricity Use in the Community and Associated Transmission and Distribution Losses	Biogenic Fuel Combustion (e.g. wood heating) in the Community
Non-Residential Energy Use	Stationary Fuel Combustion (e.g. propane) in the Community	Electricity Use and Transmission and Distribution Losses	Biogenic Fuel Combustion (e.g. wood heating) in the Community
Transportation	Fuel Use in On-Road Passenger and Freight Vehicles and Off-Road Vehicles and Other Mobile Equipment in the Community		
Community-Generated Solid Waste		Future Emissions from the Decomposition of Solid Waste Produced by the Community	Collection and Transportation of Solid Waste Produced by the Community
Wastewater Treatment	Emissions from Wastewater Treatment Facilities in the Community		Electricity Use Associated with Potable Water & Wastewater Management
Other Emissions Sources in the Community	Emissions from Solid Waste Facilities in the Community		

Table 4: Sources Included in Mariposa County Municipal Operations GHG Inventory

Sector	Scope 1	Scope 2	Scope 3	Information Items
Buildings and Facilities	Propane and Diesel Fuel Use	Electricity Use	Transmission and Distribution Losses	PG&E LS-1 Lighting
Vehicle Fleet	Gasoline and Diesel Fuel Use and HFC-134a Refrigerant			R-12 Refrigerant
Government Generated Solid Waste			Future Emissions from the Decomposition of Waste	
Wastewater Treatment	Emissions from Wastewater Treatment Facilities			
Solid Waste Management	Emissions from Solid Waste Facilities			
Employee Commute			Gasoline and Diesel Fuel Use	

Significance Thresholds

Within any inventory, there will be emissions sources that fall within Scope 1 or Scope 2 and are minimal in magnitude or difficult to accurately measure. Within the context of community-wide and municipal-operations inventories, emissions from leaked refrigerants and backup generators are common sources of these types of emissions. For these less-than-significant emissions sources, the LGOP specifies that up to 5 (five) percent of total emissions can be reported using methodologies that deviate from the recommended methodologies in the LGOP. In the context of registering emissions with an independent registry (such as the Climate Action Registry), emissions that fall under this significance threshold are called *de minimis*. For Mariposa County municipal-operations inventory, emissions from leaked refrigerants used in building air conditioning units was excluded as *de minimis*. For the community-wide inventory, emissions from leaked refrigerants and fire suppressants used in the community were excluded as *de minimis*.

Project Resources

This report was made possible by the expertise and resources provided by the Statewide Energy Efficiency Collaborative (SEEC) and ICLEI – Local Government for Sustainability USA.

Statewide Energy Efficiency Collaborative

The Statewide Energy Efficiency Collaborative (SEEC) provides support to cities and counties to help them reduce GHG emissions and save energy. SEEC is an alliance between three statewide non-profit organizations and California's four Investor-Owned Utilities. SEEC provides education and tools at no cost to representatives of local governments within California, as well as state and regional government agencies, districts and school districts. This inventory leveraged the expertise and tools provided by SEEC and ICLEI.

All SEEC tools are available at no cost to California local governments and their representatives at www.californiaSEEC.org. The following tools should be saved as resources and supplemental information to this report:

- The “Master Data Workbooks” that contains most or all of the raw data (including emails), data sources, emissions, notes on inclusions and exclusions, and reporting tools
- Detailed instruction documents to assist with data collection, emissions calculations, and inventory reporting

ClearPath California

To facilitate efforts to measure GHG emissions as a first step towards reducing them, ICLEI, on behalf of SEEC, developed the ClearPath California Climate and Energy Management Suite (CEMS) in order to provide a no-cost, easy-to-use online tool for California local governments to calculate, monitor, and forecast community-wide and municipal-operations GHG emissions. CEMS was developed to assist in the preparation of USCP and LGOP compliant GHG inventories.

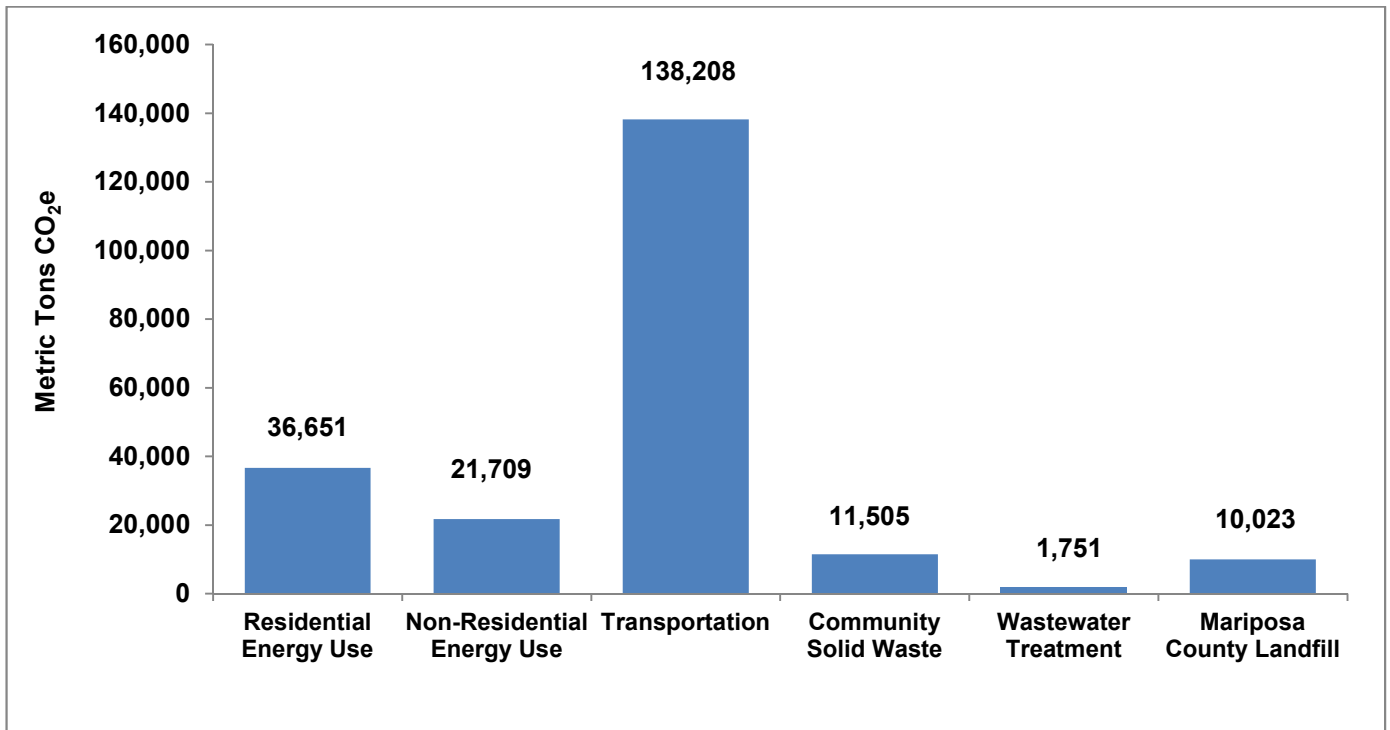
Community Emissions Inventory Results

The community-wide inventory includes estimates of Mariposa County’s greenhouse gas (GHG) emissions resulting from community sources and activities throughout Mariposa County as a whole in 2010. The community-wide inventory was conducted under the Local Government Significant Influence framework of the U.S. Community Protocol (USCP). This framework is designed to highlight emissions sources and activities where Mariposa County has the greatest influence through education, outreach, incentive, or regulatory policies and programs to impact these emissions. For more information on the Local Government Significant Influence framework and specific inventory methods please refer to the Inventory Methodology section of this report and the USCP.

Emissions Summary

In 2010, Mariposa County’s residents and businesses emitted an estimated 219,847 metric tons of CO₂e within the community-wide inventory. As can be seen in Figure 3, the largest contributor to community emissions in the inventory is the Transportation Sector, which includes all on-road passenger, freight and public transit vehicles traveling within Mariposa County as well as off-road vehicles and mobile equipment with 138,208 metric tons of CO₂e. Residential Energy Use, with 36,651 metric tons of CO₂e emissions, is the second largest contributor.

Figure 3: 2010 Community GHG Emissions Summary (Metric Tons CO₂e)



Mariposa County 2010 GHG Emissions Inventory

Table 5 presents the community GHG emissions in more detail and includes additional Information Items that are not included in the community GHG emissions total though are reported here for additional context. Information Items are emissions that are either excluded from GHG inventories to prevent double counting with another sector or by USCP guidance.

For the community-wide inventory, Information Items include the estimated electricity used specifically for wastewater or potable water management which could not be disaggregated from the electricity use included in the non-residential energy use, the emissions associated with the collection and transportation of solid waste generated within the county which could not be disaggregated from the transportation emissions, and biogenic CO₂ emissions from the combustion of wood or other non-fossil based fuels. Biogenic CO₂ is not included in GHG emissions inventories because the same CO₂ would be produced if the wood or other organic material were left to decompose naturally.

Fugitive emissions in 2010 from the Mariposa County Landfill, located within the jurisdiction and operated by Mariposa County Public Works, are reported as a source of emissions within the community in 2010. It should be noted that though the emissions are released in 2010, they are the result of the solid waste deposited at the landfill since it began landfilling around 1970 and are not indicative of activities in the community in 2010.

Table 5: 2010 Community GHG Emissions Summary (Metric Tons CO₂e)

Sector	Metric Tons CO ₂ e
Residential Energy Use	
Electricity Use	14,756
Stationary Combustion	20,107
Transmission and Distribution Losses	1,788
Total Residential Energy Use	36,651
Non-Residential Energy Use	
Electricity Use	8,032
Stationary Combustion	12,704
Transmission and Distribution Losses	973
Total Non-Residential Energy Use	21,709
Transportation	
On-Road Transportation	138,132
Off-Road Vehicles and Mobile Equipment	76
Total Transportation	138,208
Community Solid Waste	
Community-Generated Solid Waste (Sent to Landfills with Landfill Gas Capture)	108
Community-Generated Solid Waste (Sent to Landfills without Landfill Gas Capture)	11,397
Total Community Solid Waste	11,505
Wastewater Treatment	
Wastewater Conventional Treatment Process N ₂ O Emissions	7
Wastewater Conventional Treatment Fugitive N ₂ O Emissions	120
Wastewater Lagoon Treatment Process CH ₄ Emissions	216
Wastewater Lagoon Treatment Fugitive N ₂ O Emissions	12
Septic Systems Fugitive CH ₄ Emissions	1,396
Total Wastewater Treatment	1,751
Other Emissions Sources within the Community	
Mariposa County Landfill Fugitive CH ₄ Emissions	10,023
Total Other Emissions Sources within the Community	10,023
Total Community Emissions	219,847
Information Items	
Electricity Use and T&D Losses Associated with Potable Water	396
Electricity Use and T&D Losses Associated with Wastewater	578
Collection and Transportation of Community Solid Waste	248
Biogenic CO ₂ Emissions	33,197

Emissions by Source and Activity

Figure 4 presents the community-wide GHG emissions as sources and activities and includes the other emissions sources within the community that are not directly tied to community activities. Community GHG emissions categorized as sources are emissions that are produced within the community boundaries. Community GHG emissions categorized as activities are emissions that may be produced within or outside of the community boundaries due to activities of community members. The most common example of a community activity is electricity use, where the electricity is consumed within the community though the emissions are produced at power plants spread throughout the region.

Figure 4: 2010 Community GHG Emissions by Source and Activity (Metric Tons CO₂e)

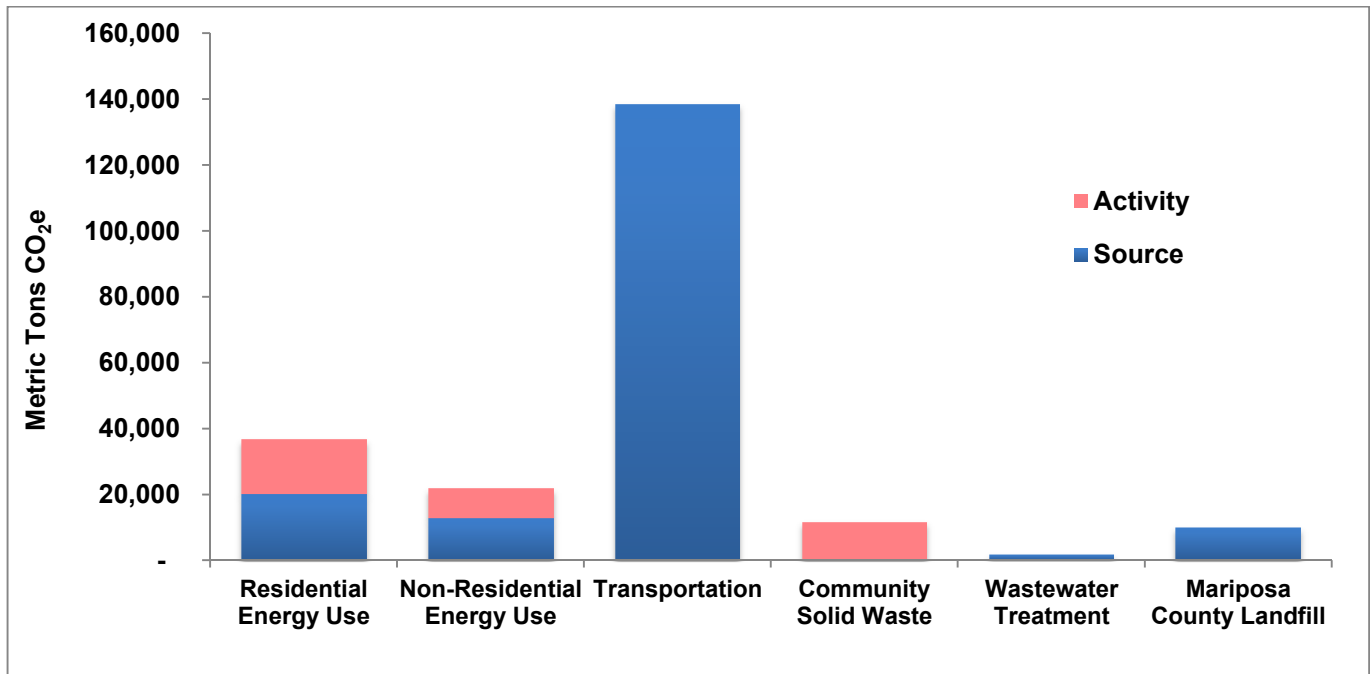


Table 6 presents the community-wide emissions broken into community activities and community sources. Other emissions sources within the community boundary not directly tied to community activities in 2010 and Information Items are also presented for additional context, though are not included in the community GHG emissions total.

Table 6: 2010 Community GHG Emissions by Source and Activity (Metric Tons CO₂e)

Community Emissions	Metric Tons CO ₂ e
Community Activities	
Residential Electricity Use	16,544
Non-Residential Electricity Use	9,005
Community-Generated Solid Waste	11,505
Total Community Activities	37,054
Community Sources	
Residential Stationary Combustion	20,107
Non-Residential Stationary Combustion	12,704
On-Road Transportation in the Community	138,132
Off-Road Vehicles and Mobile Equipment	76
Wastewater Process Emissions	1,751
Mariposa County Landfill Fugitive CH ₄ Emissions	10,023
Total Community Sources	182,793
Total Community Emissions	219,847
Information Items	
Electricity Use and T&D Losses Associated with Potable Water	396
Electricity Use and T&D Losses Associated with Wastewater	578
Collection and Transportation of Community Solid Waste	248
Biogenic CO ₂ Emissions	33,197

Residential Energy Use

Mariposa County’s residential energy use generated an estimated 36,651 metric tons of CO₂e in 2010. These emissions were calculated using 2010 electricity data provided by PG&E and the California Energy Commission, and estimates of non-utility fuel use based on U.S. Census Bureau data and average California per-household fuel use by fuel type. Direct access electricity, provided by the California Energy Commission, is electricity purchased directly from a competitive energy service provider, but that is still distributed through PG&E transmissions and distribution (T&D) lines. Propane, kerosene, and wood are commonly used in residences as fuel for home heating, water heating, and cooking. Biogenic emissions from wood combustion (33,197 metric tons of CO₂e) are reported as an Information Item. Residential Energy Use emissions include emissions associated with electricity lost through transmission and distribution (T&D) losses, which is calculated as 8.21 percent (the regional grid loss factor reported by U.S. Environmental Protection Agency) of electricity use. Any reduction in electricity use will also reduce T&D loss emissions.

Mariposa County 2010 GHG Emissions Inventory

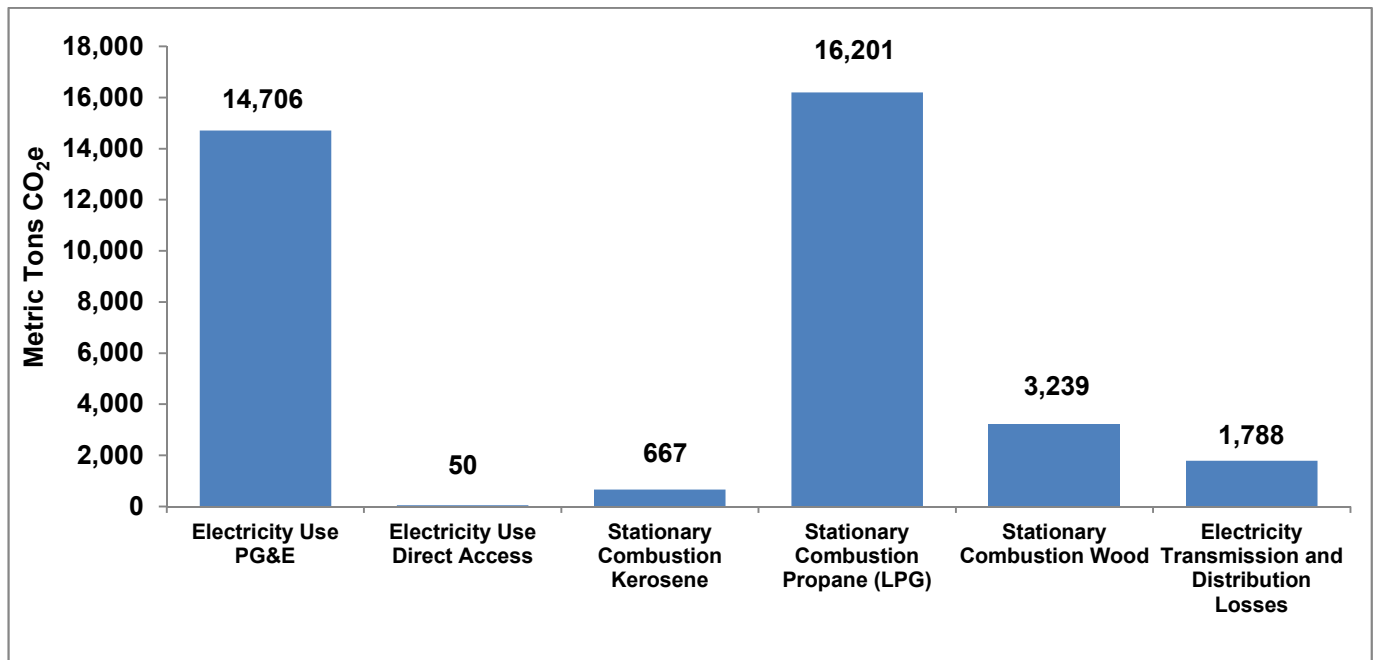
Appendix B provides detailed residential energy use activity data, emissions factors and calculation methods. Table 7 and Figure 5 illustrate the breakdown of residential energy use GHG emissions.

Data on fuel used specifically for residential emergency generators and other equipment, such as lawnmowers, was not available. Emissions resulting from this fuel use are included in the off-road equipment emissions estimates in the Transportation Sector. GHG emissions associated with residential transportation, solid waste, and wastewater are accounted for in the transportation, community solid waste, and wastewater treatment emissions totals, respectively.

Table 7: 2010 Residential Energy Use Emissions Summary (Metric Tons CO₂e)

Residential Energy Use	Metric Tons CO ₂ e
Electricity Use – PG&E	14,706
Electricity Use – Direct Access	50
Stationary Combustion – Kerosene	667
Stationary Combustion – Propane (LPG)	16,201
Stationary Combustion – Wood	3,239
Electricity Transmission and Distribution (T&D) Losses	1,788
Total Residential Energy Use	36,651
Information Items	
Stationary Combustion – Wood (Biogenic CO ₂)	33,197

Figure 5: 2010 Residential Energy Use Emissions Summary (Metric Tons CO₂e)



Non-Residential Energy Use

Mariposa County's non-residential energy use generated an estimated 21,709 metric tons of CO₂e in 2010. These emissions were calculated using 2010 electricity data provided by PG&E and the California Energy Commission. The PG&E electricity emissions include all electricity use within the jurisdictional boundary associated with potable water management and wastewater treatment. Under guidance from the USCP and to provide additional context on the water-energy connection, electricity use associated with the management of potable water consumed by the community and wastewater produced by the community were reported as Information Items. Appendix C provides detailed non-residential energy use activity data, emissions factors and calculation methods. Table 8 and Figure 6 illustrate the breakdown of the non-residential energy use GHG emissions.

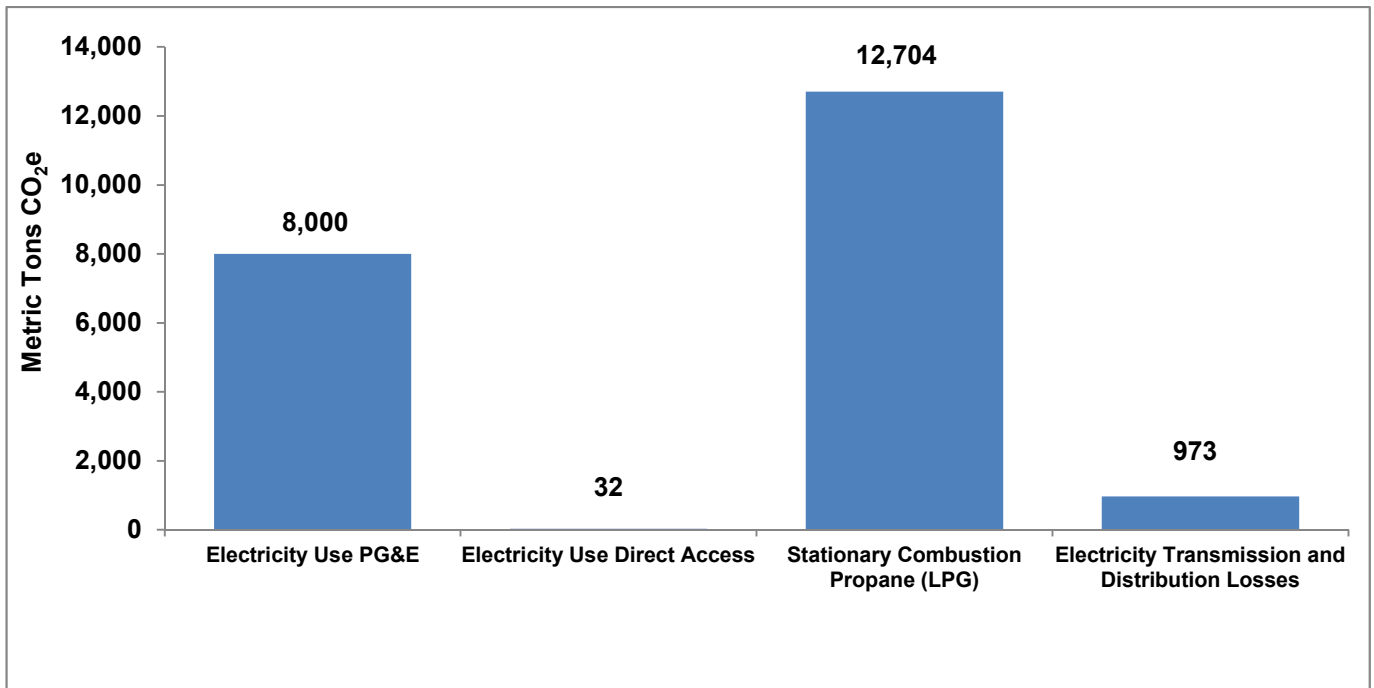
Non-residential propane usage was roughly estimated using the ratio of non-residential natural gas usage to electricity usage in Amador County, the most similar county to Mariposa where comprehensive natural gas and electricity data was available for comparison. Propane usage data was unavailable from propane suppliers in Mariposa County; therefore, in order to provide a more complete picture of emissions within Mariposa County, a rough estimation of propane usage was needed. SBC does not recommend the use of the propane emissions numbers for policy purposes until a more accurate accounting of propane usage can be completed. As a potentially significant source of emissions within Mariposa County, it is recommended that county staff work with propane providers in the county to develop a more accurate accounting of propane usage for future inventories.

Small-scale non-residential, non-utility fuel use data was not available and therefore could not be included in this inventory, but any emissions associated with non-residential mobile equipment, such as generators, forklifts and grounds equipment was included in the off-road equipment emissions estimates in the Transportation Sector. GHG emissions associated with non-residential transportation, solid waste, and wastewater are accounted for in the transportation, community solid waste, and wastewater treatment emissions totals, respectively.

Table 8: 2010 Non-Residential Energy Use Emissions Summary (Metric Tons CO₂e)

Non-Residential Energy Use	Metric Tons CO ₂ e
Electricity Use – PG&E	8,000
Electricity Use – Direct Access	32
Stationary Combustion – Propane (LPG)	12,704
Electricity Transmission and Distribution Losses	973
Total Non-Residential Energy Use	21,709
Information Items	
Electricity Use Associated with Potable Water	353
Electricity Use Associated with Wastewater	515
Electricity T&D losses Associated with Potable Water	43
Electricity T&D losses Associated with Wastewater	63

Figure 6: 2010 Non-Residential Energy Use Emissions Summary (Metric Tons CO₂e)



Transportation

Mariposa County’s community members and visitors generated an estimated 138,132 metric tons of CO₂e in 2010 and was the largest contributor to the community greenhouse gas emissions. The transportation analysis included emissions from all vehicle use, for all fuel types, within Mariposa County’s boundaries, including traffic on local roads, State highways and Yosemite National Park maintained roads within Mariposa County, as well as emissions from the use of off-road vehicles and equipment within the county. The annual vehicle miles traveled associated with Mariposa County’s community transportation were estimated using Caltrans Highway Performance Monitoring Public Roads Data. Table 9 presents information on vehicle miles traveled in 2010 as reported by Caltrans. Appendix D provides detailed transportation activity data, emissions factors and calculation methods.

Table 9: 2010 Vehicle Miles Traveled (VMT) by Jurisdiction Maintaining Roadways

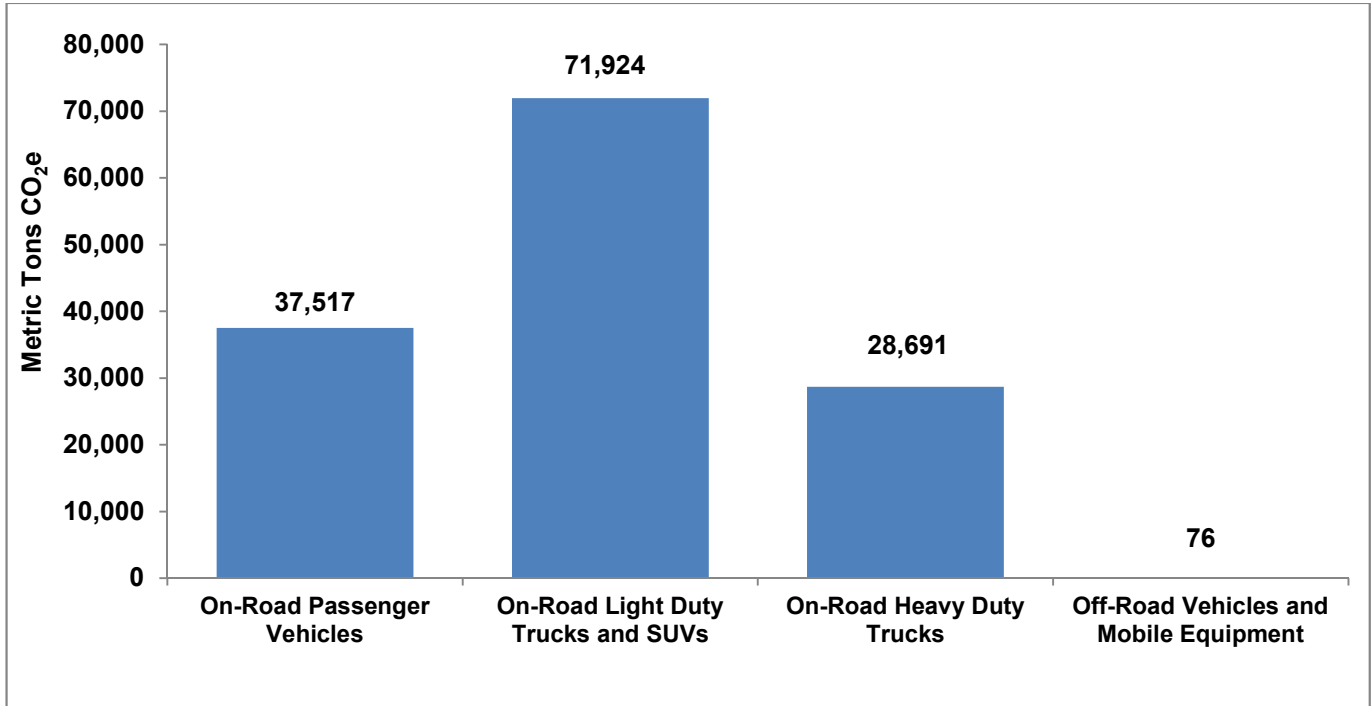
Caltrans HPMS Jurisdiction Maintaining Roadway	Maintained Miles	Annual Vehicle Miles Traveled (VMT)	% VMT
Bureau of Indian Affairs	1	21,900	<1%
County	560.41	49,796,950	19%
National Park Service	157.56	78,763,350	29%
State Highways	117.11	138,601,450	52%
U.S. Forest Service	27.23	299,300	<1%
Total Caltrans HPMS	863.31	267,482,949	100%

Table 10 and Figure 7 illustrate the breakdown of transportation GHG emissions by vehicle type. On-road transportation emissions include all vehicle travel on publically maintained roadways within Mariposa County. Off-road vehicles and mobile equipment emissions include all off-road vehicles and equipment operating within Mariposa County including but not limited to tractors, lawn movers and backup generators.

Table 10: 2010 Transportation Emissions Summary (Metric Tons CO₂e)

Transportation	Metric Tons CO ₂ e
On-Road Passenger Vehicles	37,517
On-Road Light Duty Trucks and SUVs	71,924
On-Road Heavy Duty Trucks	28,691
Off-Road Vehicles and Mobile Equipment	76
Total Transportation	138,132

Figure 7: 2010 Transportation Emissions Summary (Metric Tons CO₂e)



Community Solid Waste

Mariposa County’s community solid waste emissions are estimated to be 21,528 metric tons of CO₂e in 2010. Community solid waste emissions for Mariposa County come in two forms: activity emissions from community-generated solid waste and source emissions from the Mariposa County Landfill. Community solid waste emissions are an estimate of methane generation from the anaerobic decomposition of organic wastes (such as paper, food scraps, plant debris, wood, etc.) that are deposited in a landfill. Community-generated solid waste emissions account for the future emissions from solid waste generated by the community in 2010. The majority of solid waste generated within Mariposa County is deposited at the Mariposa County Landfill, which does not have a landfill gas capture system. The Mariposa County Public Works also operates a composting facility at the landfill, which diverts green waste and other organic material from the landfill, reducing potential future methane emissions at the Mariposa County Landfill. This analysis was unable to quantify the benefits of the composting facility. Additionally, a small portion of solid waste generated in Mariposa County was sent to landfills outside of Mariposa County, which employ landfill gas capture systems.

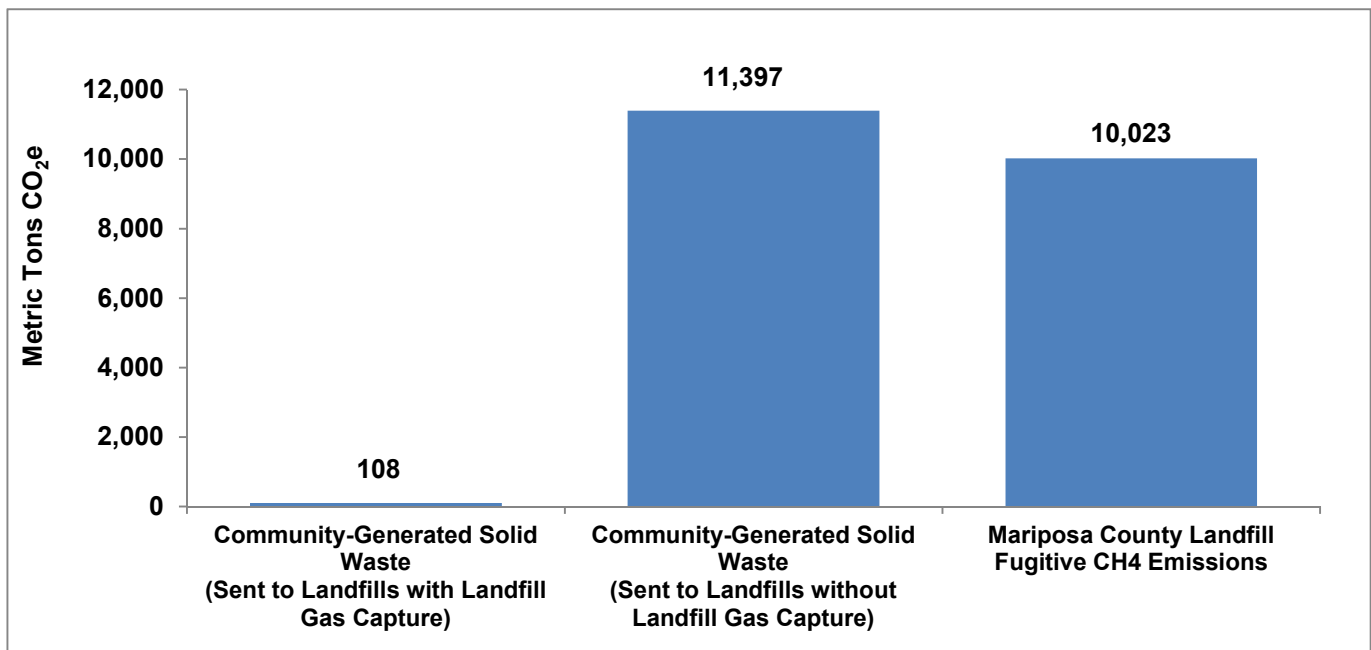
Fugitive emissions from the Mariposa County Landfill within the jurisdiction in 2010 are reported as a separate line item because emissions from this source are the result of the solid waste deposited at the landfill since it began landfilling operations around 1970 and is not indicative of community activities in 2010. Additionally, simplified emissions estimates for the collection and transportation of community generated solid waste are provided as an Information Item. These emissions are reported here to provide additional context, though are not included in the community emissions totals because of the overlap with the community transportation emissions. Table 11 and Figure 8 detail

community solid waste emissions. Appendix E provides detailed community solid waste activity data, emissions factors and calculation methods.

Table 11: 2010 Community Solid Waste Emissions Summary (Metric Tons CO₂e)

Community Solid Waste	Metric Tons CO ₂ e
Community-Generated Solid Waste (Sent to Landfills with Landfill Gas Capture)	108
Community-Generated Solid Waste (Sent to Landfills without Landfill Gas Capture)	11,397
Mariposa County Landfill Fugitive CH ₄ Emissions	10,023
Total Community Solid Waste	21,528
Information Items	
Collection and Transportation of Community Solid Waste	248

Figure 8: 2010 Community Solid Waste Emissions Summary (Metric Tons CO₂e)



Wastewater Treatment

This section includes process and fugitive emissions from wastewater treatment facilities within Mariposa County. Mariposa County’s wastewater treatment generated an estimated 1,751 metric tons of CO₂e in 2010. Wastewater process and fugitive emissions were calculated using site-specific operating processes and either nutrient loads or 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.

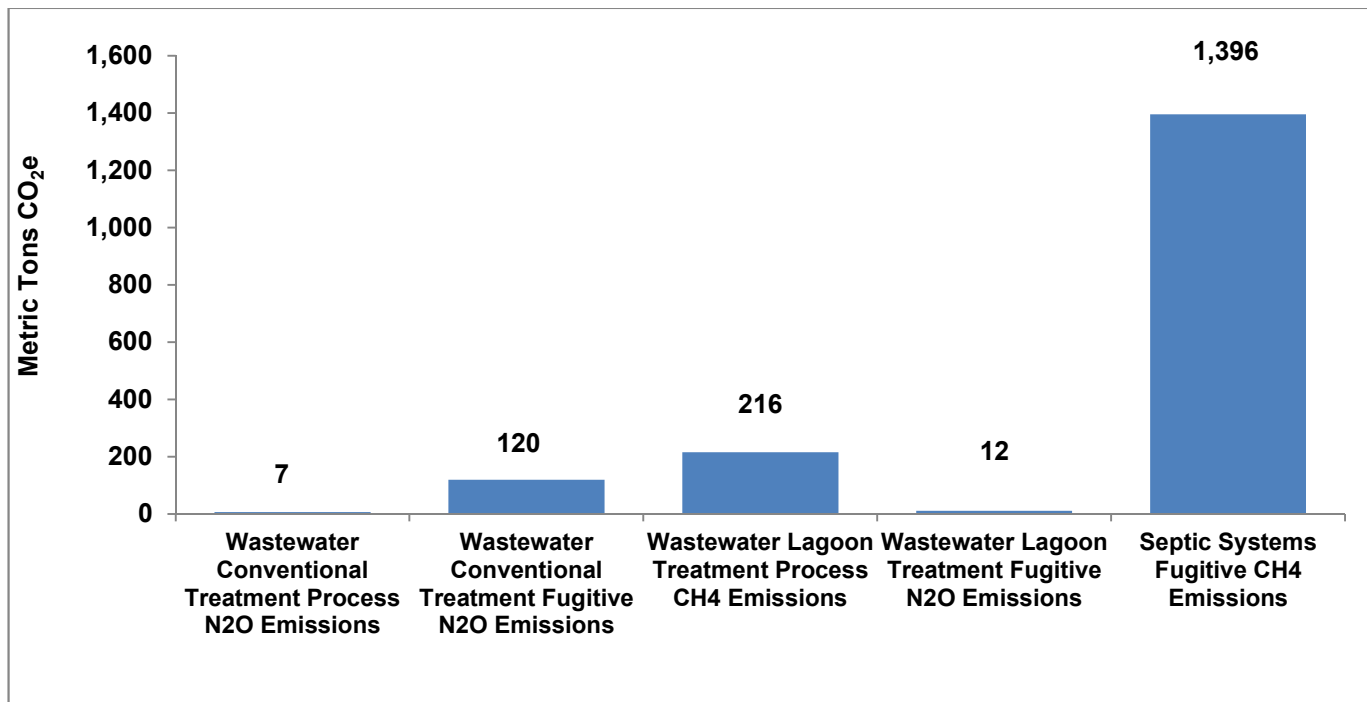
Mariposa County 2010 GHG Emissions Inventory

In 2010, there were five major conventional wastewater treatment plant operators serving Mariposa County that treated approximately 283 million gallons of wastewater. They were Mariposa County Public Works, Mariposa Public Utility District, Yosemite National Park, Tenaya Lodge and the KOA campground. Additionally, there were three treatment lagoon facilities operated by Mariposa County Public Works. The rest of Mariposa County residents were assumed to be served by septic systems. None of the conventional Wastewater Treatment Plants (WWTPs) used nitrification/denitrification processes, nor was there any significant industrial discharge into the systems. All conventional plants treated the wastewater aerobically. The anaerobic lagoons treating approximately 15 million gallons of wastewater had no primary treatment, and no industrial discharge into them. Table 12 and Figure 9 detail wastewater treatment process and fugitive emissions. Appendix F provides detailed wastewater treatment activity data, site-specific operating processes, emissions factors and calculation methods.

Table 12: 2010 Wastewater Treatment Emissions Summary (Metric Tons CO₂e)

Wastewater Treatment	Metric Tons CO ₂ e
Wastewater Conventional Treatment Process N ₂ O Emissions	7
Wastewater Conventional Treatment Fugitive N ₂ O Emissions	120
Wastewater Lagoon Treatment Process CH ₄ Emissions	216
Wastewater Lagoon Treatment Fugitive N ₂ O Emissions	12
Septic Systems Fugitive CH ₄ Emissions	1,396
Total Wastewater Treatment	1,751

Figure 9: 2010 Wastewater Treatment Emissions Summary (Metric Tons CO₂e)



Mariposa County Emissions Efficiency Metrics

Per capita (GHG emissions per resident) and per service population (population + employment) emissions can be useful metrics for measuring progress in reducing GHGs and for comparing one community’s emissions with neighboring cities or counties and against regional and national averages.⁶ Though, due to differences in emissions inventory methods and boundaries, it can be difficult to get a directly comparable per capita emissions number, and one must be cognizant of this margin of error when comparing figures. All efforts were made to estimate a community emissions total and emissions efficiency metrics that will be comparable to other communities operating under the Significant Influence framework of the USCP.

Table 13 presents community emissions efficiency metrics calculated as part of this inventory. This metric only includes emissions directly tied to community activities: residential and non-residential energy use, on-road and off-road transportation, community solid waste, process and fugitive emissions from wastewater treatment, and transmission and distribution losses associated with community electricity use.

Table 13: 2010 Mariposa County Community GHG Emissions Efficiency Metrics

Community Emissions Efficiency Metrics	
Estimated 2010 Population	18,277
Estimated 2010 Households	7,692
Estimated 2010 Employment	8,470
Estimated 2010 Service Population (Employment + Population)	26,747
Community GHG Emissions (Metric Tons CO ₂ e)	219,847
GHG Emissions / Service Population (Metric Tons CO ₂ e)	8.2
GHG Emissions / Resident (Metric Tons CO ₂ e)	12.0
GHG Emissions / Household (Metric Tons CO ₂ e)	28.6

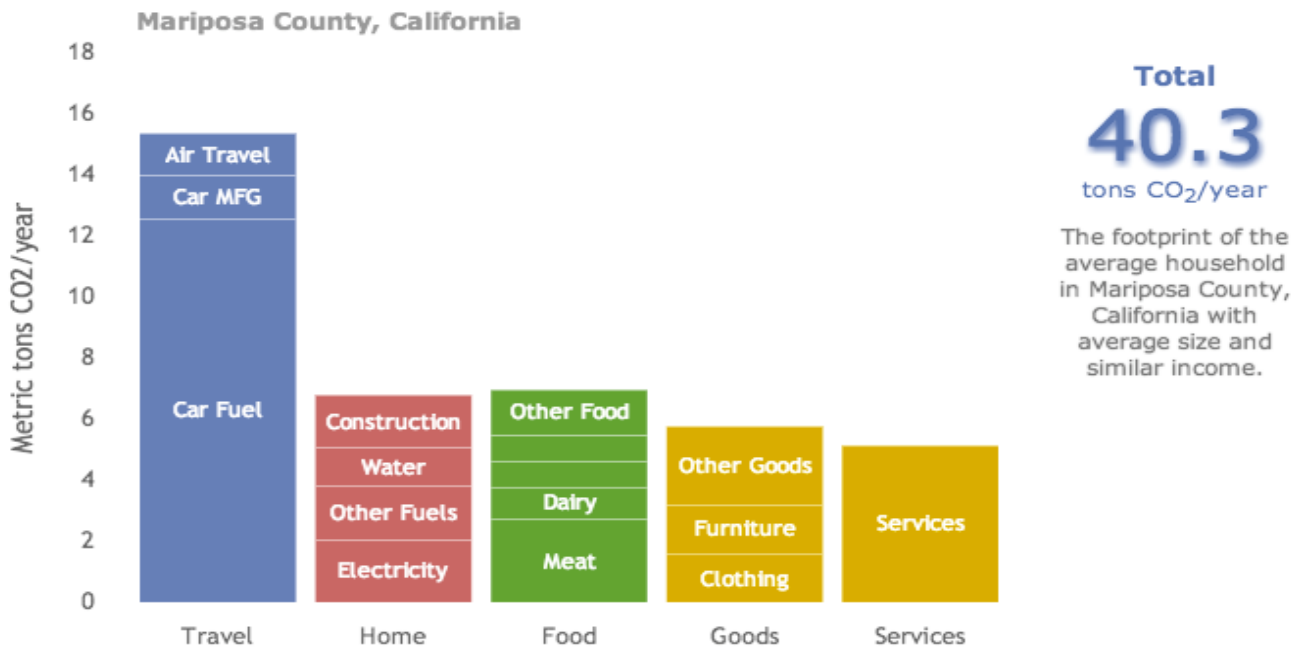
⁶ Per capita CO₂e emissions were 24.3 metric tons per year for the United States and 13.0 metric tons per year for California. World Resources Institute: http://www.laedc.org/sclc/documents/Global_AB32Challenge.pdf.

Cool California Household Consumption GHG Estimates

It is important to understand that these efficiency metrics are not the same as the carbon footprint of the average individual or household living in Mariposa County, which also includes other community activities not measured in this inventory as well as all upstream emissions from the consumption of goods and services by community members. Upstream emissions are emissions associated with all life-cycle stages of a product (including extraction, production, distribution, and disposal. For comparison purposes, Figure 10 presents the results of a household consumption GHG Inventory (carbon footprint) for Mariposa County residents produced by Cool California and available at www.coolcalifornia.org. This Cool California carbon footprint reports higher emissions per household in Mariposa County than the efficiency metrics calculated in this inventory.

Additionally, Cool California allows residents and businesses within Mariposa County to develop a simplified consumption-based GHG Inventory to calculate their individual carbon footprints and to learn ways to reduce their personal carbon footprints while saving money in the process.

Figure 10: Cool California Household Consumption GHG Estimate (Metric Tons CO₂e)⁷



⁷ Household consumption estimate developed using Cool California Calculator. Available at: www.coolcalifornia.org/calculator

Municipal Operations Inventory Results

This section presents a detailed analysis of emissions resulting from municipal operations specific to Mariposa County's operations and does not include emissions from other public agencies within Mariposa County. As described in the Inventory Methodology section of this report, the municipal-operations emissions inventory is a subset of the community-wide emissions inventory and all emissions reported here are also included in the aggregated totals reported within the community-wide emissions inventory. The municipal-operations emissions included in this inventory were determined using the operational control framework discussed in the Inventory Methodology section. The operational control framework includes emissions sources and activities for which the County has the full authority to introduce and implement operating policies. The municipal-operations inventory also includes two additional emissions sectors for which Mariposa County has less control: emissions from employee-generated solid waste and emissions from employees' personal commutes to work. Including these optional emissions is recommended strongly by the LGOP even though Mariposa County does not have full operational control.

Emissions Summary

In 2010, Mariposa County's municipal operations generated 13,982 metric tons of CO₂e within the municipal-operations inventory. Figure 11 summarizes the municipal-operations GHG emissions. As shown, the Mariposa County Landfill was the largest source of emissions within the municipal-operations inventory in 2010. The landfill, operated by Mariposa County Public Works, is included in the municipal-operations inventory. The landfill does not have a landfill-gas capture system; therefore the estimated emissions are significantly higher than the anticipated emissions from a landfill with comparable size using a comprehensive landfill gas capture system. The Mariposa County Public Works also operates a composting facility at the landfill, which diverts green waste and other organic material from the landfill, reducing potential future methane emissions at the Mariposa County Landfill. This analysis was unable to quantify the benefits of the composting facility. Since the majority of local governments do not operate landfills, it is important to be careful when comparing the emissions reported here to other local governments of a similar size. Without the landfill emissions, the total municipal-operations emissions would be 3,959 metric tons of CO₂e. The vehicle fleet, which includes all county vehicles and mobile equipment, was the second largest source.

Figure 11: 2010 Municipal Operations GHG Emissions Summary (Metric Tons CO₂e)

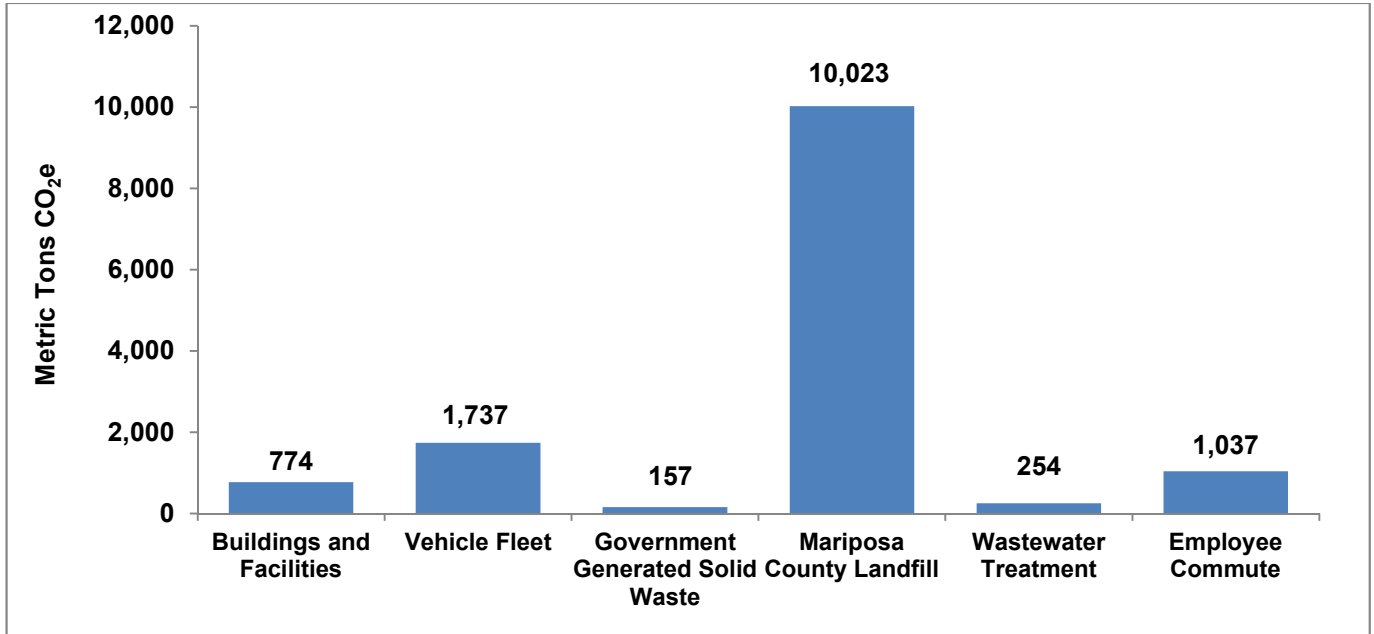


Table 14 presents the municipal operations GHG emissions with more detail as well as additional Information Items that are not included in Figure 11. Information Items are emissions that are excluded from GHG inventories to prevent emissions overlap or by LGOP guidance. The Information Items presented in Table 14 include leaked R-12 refrigerants (ozone depleting substances currently being phased out worldwide) used in pre-1995 vehicles for air conditioning and PG&E owned and operated streetlights paid for by Mariposa County (designated by PG&E as LS-1).

Table 14: 2010 Municipal Operations GHG Emissions Summary (Metric Tons CO₂e)

Municipal Operations Sectors	Metric Tons CO ₂ e
Buildings and Facilities	
Electricity Use	556
Stationary Combustion	152
Transmission and Distribution Losses	67
Total Building and Facilities	774
Vehicle Fleet	
On-Road Vehicle Fleet - Gasoline	1,303
On-Road Vehicle Fleet - Diesel	91
Off-Road Equipment - Gasoline and Diesel	191
Transit Fleet - Gasoline	56
Vehicle Fleet - Leaked Refrigerants (R-134a)	96
Total Vehicle Fleet	1,737
Government-Generated Solid Waste	
Government-Generated Solid Waste	157
Total Government-Generated Solid Waste	157
Wastewater Treatment Facilities	
MCPW Conventional Treatment Process N ₂ O Emissions	1
MCPW Lagoon Treatment Process CH ₄ Emissions	216
MCPW Conventional Effluent Fugitive N ₂ O Emissions	20
MCPW Lagoon Effluent Fugitive N ₂ O Emissions	12
Septic Systems Fugitive CH ₄ Emissions	5
Total Wastewater Treatment Facilities	254
Solid Waste Disposal Facilities	
Mariposa County Landfill Fugitive CH ₄ Emissions	10,023
Total Solid Waste Disposal Facilities	10,023
Employee Commute	
Employee Commute Emissions	1,037
Total Employee Commute	1,037
Total Municipal Operations Emissions	13,982
Information Items	
Ozone Depleting Substances (R-12)	106
PG&E Owned and Operated Street Lighting (LS-1)	10

Emissions Sources and Activities

Identifying the major emissions sources and activities can help target reduction strategies that will have the greatest effect on emissions. Table 15 presents the municipal-operations emissions by source / activity.

Table 15: 2010 Municipal Operations GHG Emissions by Source / Activity (Metric Tons CO₂e)

Source / Activity	Metric Tons CO ₂ e
Mariposa County Landfill Emissions	10,023
Gasoline	1,360
Employee Commute	1,037
Electricity Use	556
Diesel	281
Wastewater Treatment Emissions	254
Government Generated Solid Waste	157
Propane (LPG)	152
Refrigerants	96
Electricity Transmission and Distribution Losses	67
Municipal Operations Total	13,982

Buildings and Facilities

The Buildings and Facilities Sector includes the electricity use and stationary fuel consumption at Mariposa County’s buildings and other facilities including public lighting, water transport infrastructure, airports, solid waste management, and wastewater treatment facilities. This consumption is associated with the majority of GHG emissions from facilities. In addition, fire suppression, air conditioning, and refrigeration equipment in buildings can emit hydrofluorocarbons (HFCs) and other GHGs when these systems leak refrigerants or fire suppressants during normal operation or maintenance. Due to the difficulty in collecting data on county facilities and limited significance to the municipal-operations inventory total, these fugitive emissions from leaked refrigerants and fire suppressants were not estimated. Refer to Appendix G for detailed activity data, emissions factors and calculation methods used in the Buildings and Facilities Sector. Table 16 lists the major Mariposa County buildings and facilities and their associated emissions.

Table 16: 2010 Buildings and Facilities Energy Use Emissions Summary (Metric Tons CO₂e)

Buildings and Facilities Energy Use Emissions	Metric Tons CO₂e
Public Works	85
County Jail	78
Wastewater Treatment Facilities	60
Fire Department	54
Solid Waste Facilities	54
Hall of Records	48
Parks and Recreation	47
Potable Water Transport Infrastructure	39
Mariposa County Library	27
Government Center	26
Court House	21
Probation Department	20
Airport	20
Museum and History Center	15
Animal Control	10
Public Lighting	9
Remaining Minor Facilities and Offices	94
Transmission & Distribution Losses	67
Buildings and Facilities Energy Use Emissions Total	774

Additionally, it is helpful to identify the largest sources and activities of emissions within each sector to help target reduction strategies. Table 17 presents the municipal buildings and facilities emissions by source.

Table 17: 2010 Buildings and Facilities Emissions by Source / Activity (Metric Tons CO₂e)

Source / Activity	Metric Tons CO₂e
Electricity Use	556
Propane (LPG)	152
Electricity Transmission and Distribution Losses	67
Buildings and Facilities Total	774

Vehicle Fleet

The vehicles and mobile equipment used in the County of Mariposa’s daily operations burn gasoline and diesel fuel resulting in the emissions of GHGs. In addition, vehicles with air conditioning use refrigerants that can leak from the vehicles during normal operation and maintenance. In 2010, Mariposa County operated a vehicle fleet with 285 vehicles; including 76 police vehicles, 47 fire vehicles and a host of off-road equipment including water tankers, backhoes, sweepers, and road graders. The fleet performed essential services, from police and fire service, to supporting public works, engineers, and sewer / water treatment. Mariposa County’s 2010 Vehicle Fleet Sector emissions are estimated to have totaled 1,737 metric tons of CO₂e. Refer to Appendix H for detailed activity data, emissions factors and calculation methods used in the Vehicle Fleet Sector. Table 18 presents the Mariposa County vehicle fleet emissions by department. As to be expected, the Sheriff’s Department and the Roads Department were the two largest contributors to vehicle fleet emissions

Table 18: 2010 Vehicle Fleet Emissions Summary (Metric Tons CO₂e)

Department	Metric Tons CO ₂ e
Sheriff	707
Roads	419
Fire Department	136
Facilities	118
Social Services	85
Transit Fleet	56
Probation	25
Fleet	24
Building / Assessor	18
Public Works / Solid Waste	17
Health Department	15
Other Departments	20
Vehicle Fleet Leaked Refrigerants (R-134a)	96
Vehicle Fleet Total	1,737

Additionally, it is helpful to identify the largest sources and activities of emissions within each sector to help target reduction strategies. Table 19 presents the vehicle fleet emissions by source. It should be noted that the building department and assessor are separate departments, but are reported together here for ease of reporting. The largest source, by wide margin, was emissions from gasoline fuel use.

Table 19: 2010 Vehicle Fleet Emissions by Source / Activity (Metric Tons CO₂e)

Source / Activity	Metric Tons CO ₂ e
Gasoline	1,360
Diesel	281
Leaked Refrigerants	96
Vehicle Fleet Total	1,737

Government Generated Solid Waste

Government operations generate solid waste during normal operations, much of which is eventually sent to a landfill. Typical sources of waste in municipal operations include paper and food waste from offices and facilities, construction waste from public works, and plant debris from the Facilities Maintenance Division of Mariposa County Public Works. Organic materials in government-generated solid waste (including paper, food scraps, plant debris, wood waste, etc.) generate methane as they decompose in the anaerobic environment of a landfill. Emissions from the Government-Generated Solid Waste Sector are an estimate of methane generation that will result from the anaerobic decomposition of the organic portion of waste sent to landfills in 2010. Solid waste tonnage data from 2010 was unavailable, so data was estimated using current (2014) records on the number, size, and frequency of pickups by the local waste hauler. It was assumed that the pickup schedule has not changed since 2010. It is important to note that although these emissions are attributed to the inventory in the year in which the waste is generated, the emissions themselves will occur over the 100+ year timeframe that the waste will decompose, and are therefore categorized as Scope 3 emissions.

Mariposa County’s 2010 Government-Generated Solid Waste Sector emissions are estimated to be 157 metric tons of CO₂e. Table 20 presents the Mariposa County solid waste emissions by department. The majority of Mariposa County buildings and facilities do not have their own waste bins and instead have their waste hauled by Public Works facilities staff to the Public Works Yard where it is then picked up by the local waste hauler. Refer to Appendix I for detailed activity data, emissions factors and calculation methods used in the Government Generated Solid Waste Sector.

Table 20: 2010 Government-Generated Solid Waste Emissions Summary (Metric Tons CO₂e)

Department	Metric Tons CO ₂ e
Public Works*	84
Sheriff’s Department	38
Human & Community Services	18
County Jail	9
Fire Department	5
Other Minor Departments	3
Government-Generated Solid Waste Total	157

*Includes waste generated at the majority of Mariposa County facilities, which is collected by Public Works staff.

Wastewater Treatment

In 2010, the Mariposa County Public Works (MCPW) operated one conventional wastewater treatment plant (Don Pedro) and three wastewater treatment lagoons (Yosemite West, Mariposa Pines, and Coulterville). Don Pedro did not use any nitrification/denitrification processes to reduce Nitrous Oxide (N₂O) levels, but did use an aerated process to treat the wastewater effluent. The three wastewater treatment lagoons used primarily anaerobic treatment processes with no primary treatment. In addition, several Mariposa County buildings and facilities are served by septic systems. Wastewater treatment facility emissions from electricity use and the associated transmission and distribution losses are included in the Buildings and Facilities Sector. Wastewater treatment process and fugitive emissions are calculated using the same methodologies for both the community-wide and municipal-operations inventories.

Refer to Appendix J for detailed activity data, emissions factors and calculation methods used in the Wastewater Treatment Sector. Table 21 presents the Mariposa County wastewater treatment process and fugitive emissions by source.

Table 21: 2010 Wastewater Treatment Emissions Summary (Metric Tons CO₂e)

Source	Metric Tons CO ₂ e
MCPW Conventional Treatment Process N ₂ O Emissions	1
MCPW Lagoon Treatment Process CH ₄ Emissions	216
MCPW Conventional Effluent Fugitive N ₂ O Emissions	20
MCPW Lagoon Effluent Fugitive N ₂ O Emissions	12
Septic Systems Fugitive CH ₄ Emissions	5
Wastewater Treatment Total	254

Solid Waste Facilities

The most prominent source of greenhouse gas emissions from solid waste facilities is fugitive methane (CH₄) released by the anaerobic decomposition of organic waste over time in landfills. In 2010, Mariposa County operated the Mariposa County Landfill, the largest source of emissions within the municipal-operations inventory. The scale of these emissions from landfills depends significantly upon the size and type of the landfill, local soil and climatic conditions, and the presence of a landfill gas collection system. Due to local geologic conditions the Mariposa County Landfill cannot use a landfill gas collection system and therefore has estimated emissions significantly higher than other landfills of a similar size using landfill gas collection systems. It is important to note that the methane emissions are produced by waste that was deposited in the landfill since it began operation, assumed to be 1970 for the Mariposa County Landfill. Additionally, Mariposa County Public Works also operates a composting facility at the landfill, which diverts green waste and other organic material from the landfill, reducing potential future methane emissions at the Mariposa County Landfill. This analysis was unable to quantify the benefits of the composting facility.

Solid waste facility emissions from electricity use are included in the Buildings and Facilities Sector. Refer to Appendix K for detailed activity data, emissions factors and calculation methods used in the Solid Waste Facility Sector. Table 22 presents the solid waste facility fugitive emissions by source.

Table 22: 2010 Solid Waste Management Emissions Summary (Metric Tons CO₂e)

Source	Metric Tons CO ₂ e
Mariposa County Landfill Fugitive CH ₄ Emissions	10,023
Solid Waste Facility Total	10,023

Employee Commute

Although employees’ personal commute is not under the direct operational control of Mariposa County, there are a variety of tools and resources available to influence employees’ commute patterns. For this reason, a survey was administered to Mariposa County employees to collect the data needed (including vehicle miles traveled, fuel type, vehicle type, and fuel efficiency of vehicles) to estimate emissions. The survey results from 153 respondents were extrapolated to the 429 employees of Mariposa County in 2010. Refer to Appendix L for detailed activity data, emissions factors, and calculation methods used in the Employee Commute Sector. Employee commute emissions are categorized as Scope 3 emissions. Table 23 presents the emissions from the Employee Commute Sector.

Table 23: 2010 Employee Commute Emissions Summary (Metric Tons CO₂e)

Source / Activity	Metric Tons CO ₂ e
Employee Commute - Gasoline	1,017
Employee Commute – Diesel	20
Employee Commute Total	1,037

Conclusion & Next Steps

The data presented in this report is intended to provide valuable information that Mariposa County can use to inform future planning efforts, identify cost saving opportunities, and identify climate action planning priorities. This analysis found that in the base year 2010, the community as a whole was responsible for emitting 219,847 metric tons of CO₂e. The municipal operations of Mariposa County, a subset of the community inventory, generated 13,982 metric tons of CO₂e. County staff should continue to update these inventories as additional data become available. Additional key findings from this analysis include:

- The largest source of community GHG emissions originates from community transportation (138,208 metric tons of CO₂e). Significant emissions (36,651 metric tons of CO₂e) also originate from residential energy use. There are significant opportunities for reducing GHG emissions as well as reducing energy and transportation costs in these sectors.
- The largest source of municipal operations GHG emissions originates from the Mariposa County Landfill (10,023 metric tons of CO₂e). Significant emissions also originate from vehicle fleet (1,737 metric tons of CO₂e) and employee commute (1,037 metric tons of CO₂e). Opportunities to reduce GHG emissions from the County's municipal operations may include procurement of more fuel-efficient vehicles, implementation of employee commute programs, energy efficiency projects or the procurement of non-carbon based electricity.

As Mariposa County moves forward with emissions reduction strategies and uses this data to inform planning efforts, the County should identify the emissions reduction benefits of climate and sustainability strategies that could be implemented in the future including: energy efficiency, renewable energy, vehicle fuel efficiency, alternative transportation, vehicle trip reduction, land use and transit planning, waste reduction, and other strategies. Through these efforts and others Mariposa County can achieve benefits beyond reducing emissions, including saving community members' and tax payers' money and improving Mariposa County's economic vitality and ultimately increasing the quality of life for residents and other community members.

GHG Inventories' Role in Emissions Reduction Framework

In response to the problem of climate change, many communities in the United States are taking responsibility for addressing emissions at the local level. Since many of the major sources of GHG emissions are directly or indirectly controlled through local policies, local governments have a strong role to play in reducing GHG emissions within their boundaries. Through proactive measures around land use patterns, transportation demand management, energy efficiency, green building, waste diversion, and more, local governments can more effectively reduce emissions in their communities. Benefits of reducing greenhouse gas emissions include increased cost savings and cleaner air. In addition, because local governments are primarily responsible for the provision of emergency services in response to natural

disasters, reducing greenhouse gases now is an important tool in mitigating the risks of future natural disasters as climate change will increase the occurrence of natural disasters in the future.

ICLEI – Local Governments for Sustainability (ICLEI) is an association for local governments to share knowledge and successful strategies toward increasing local sustainability.⁸ ICLEI provides a framework and methodology for local governments to identify and reduce GHG emissions, organized along Five Milestones (shown in Figure 13):

Figure 12: The Five Milestones of Identifying and Reducing Greenhouse Gas Emissions



1. Conduct an inventory of local GHG emissions
2. Conduct a GHG emissions forecast and establish a 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 GHG emissions in Mariposa County.

Potential Next Steps

There are several potential next steps that SBC recommends Mariposa County undertake to continue efforts to reduce GHG emissions, reduce community and municipal energy and transportation costs, and improve local air quality and the health of community members.

- Continue to track electricity and fuel use and the associated costs so that cost-effective energy saving measures can be implemented
- Benchmark municipal buildings and facilities to help track energy use and target energy efficiency projects
- Re-inventory GHG emissions every three to five years to track progress
- Develop climate action or energy action plans to assist in the development of GHG reduction strategies

⁸ 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> & <http://www.icleiusa.org>

Community-Wide Inventory Appendices

Appendix A - Community Inventory Details – ICLEI Scoping Tool

Table A-1 provides a summary of the emissions sources and activities that are included in the community inventory, the framework under which the emissions are included as well as those potential sources that are excluded and the reason for the exclusion. For emissions that are included, there are three main reporting frameworks under the USCP: Significant Influence (SI), Community Activities (CA) and Household Consumption (HC). For excluded emissions, there are four main reasons: Included Elsewhere (IE), Not Estimated (NE), Not Applicable (NA) or Not Occurring (NO).

Table A-1: Summary of Included and Excluded Community Emissions

Emissions Type		Source or Activity?	Required Activities	Included under reporting frameworks:			Excluded (IE, NA, NO, or NE)	Explanatory Notes	Emissions (MTCO ₂ e)
				SI	CA	HC			
Built Environment									
Use of fuel in residential and commercial stationary combustion equipment		Source AND Activity	X	SI					32,811
Industrial stationary combustion sources		Source					NO	No industrial facilities	
Electricity	Power generation in the community	Source					NO	No fossil-fuel based power generation	
	Use of electricity by the community	Activity	X	SI					22,788
District Heating/Cooling	District heating/cooling facilities in the community	Source					NO	No district heating / cooling	
	Use of district heating/cooling by the community	Activity					NO	No district heating / cooling	
Industrial process emissions in the community		Source					NO	No industrial facilities	
Refrigerant leakage in the community		Source					NE	Deemed Insignificant	

Emissions Type		Source or Activity?	Required Activities	Included under reporting frameworks:			Excluded (IE, NA, NO, or NE)	Explanatory Notes	Emissions (MTCO ₂ e)
				SI	CA	HC			
Transportation and Other Mobile Sources									
On-road Passenger Vehicles	On-road passenger vehicles operating within the community boundary	Source	X	SI					138,132
	On-road passenger vehicle travel associated with community land uses	Activity					NE	No land use based model available	
On-road Freight Vehicles	On-road freight and service vehicles operating within the community boundary	Source	X				IE	Included in on-road passenger vehicles	
	On-road freight and service vehicle travel associated with community land uses	Activity					NE	No land use based model available	
On-road transit vehicles operating within the community boundary		Source					IE	Included in on-road passenger vehicles	
Transit Rail	Transit rail vehicles operating within the community boundary	Source					NO	No transit rail	
	Use of transit rail travel by the community	Activity					NE	Minimal use, outside of County only	
Inter-city passenger rail vehicles operating within the community boundary		Source					NO	No passenger rail	
Freight rail vehicles operating within the community boundary		Source					NO	No freight rail	
Marine	Marine vessels operating within the community boundary	Source					IE	Included in off-road surface vehicles	
	Use of ferries by the community	Activity					NE	Minimal use, outside of County only	
Off-road surface vehicles and other mobile equipment operating within the community boundary		Source		SI					76
Use of air travel by the community		Activity					NE	Minimal use, outside of County only	
Solid Waste									
Solid Waste	Operation of solid waste disposal facilities in the community	Source		SI					10,023
	Generation and disposal of solid waste by the community	Activity	X	SI					11,505
	Collection and Transportation of Community-Generated Solid Waste	Activity		SI			Information Item	Included in on-road passenger vehicles	248

Emissions Type	Source or Activity?	Required Activities	Included under reporting frameworks:			Excluded (IE, NA, NO, or NE)	Explanatory Notes	Emissions (MTCO _{2e})	
			SI	CA	HC				
Water and Wastewater									
Potable Water - Energy Use	Operation of water delivery facilities in the community	Source					IE	Included in non-residential energy use	
	Use of energy associated with use of potable water by the community	Activity	X	SI			Information Item	Included in non-residential energy use	396
Use of energy associated with generation of wastewater by the community		Activity	X	SI			Information Item	Included in non-residential energy use	578
Centralized Wastewater Systems - Process Emissions	Process emissions from operation of wastewater treatment facilities located in the community	Source		SI					355
	Process emissions associated with generation of wastewater by the community	Activity					IE	All facilities located in the community	
Use of septic systems in the community		Source AND activity		SI					1,396
Agriculture									
Domesticated animal production		Source					NE	Low-intensity agriculture	
Manure decomposition and treatment		Source					NE	Low-intensity agriculture	
Upstream Impacts of Community-Wide Activities									
Upstream impacts of fuels used in stationary applications by the community		Activity					NE	Not estimated due to uncertainty	
Upstream and transmission and distribution (T&D) impacts of purchased electricity used by the community		Activity		SI					2,761
Upstream impacts of fuels used for transportation in trips associated with the community		Activity					NE	Not estimated due to uncertainty	
Upstream impacts of fuels used by water and wastewater facilities for water used and wastewater generated within the community boundary		Activity					NE	Not estimated due to uncertainty	
Upstream impacts of select materials (concrete, food, paper, carpets, etc.) used by the whole community		Activity					NE	Not estimated due to uncertainty	
Independent Consumption-Based Accounting									
Household Consumption (e.g., gas & electricity, transportation, and the purchase of all other food, goods and services by all households in the community)		Activity					NE	Not estimated due to uncertainty	
Government Consumption (e.g., gas & electricity, transportation, and the purchase of all other food, goods and services by all governments in the community)		Activity					NE	Not estimated due to uncertainty	
Life cycle emissions of community businesses (e.g., gas & electricity, transportation, and the purchase of all other food, goods and services by all businesses in the community)		Activity					NE	Not estimated due to uncertainty	

Appendix B - Residential Energy Use Sector Notes

Table B-1: Residential Activity Data Inputs

Activity / Source	Value	Units	Data Source
Electricity Consumption - PG&E	72,445,910	kWh	Pacific Gas and Electric
Electricity Consumption - Direct Access	166,991	kWh	California Energy Commission
Electricity Transmission & Distribution Losses	5,961,519	kWh	U.S. Environmental Protection Agency
Propane (LPG) Consumption	2,769,921	Gallons	Energy Information Administration and U.S. Census Bureau
Fuel Oil / Kerosene Consumption	65,241	Gallons	Energy Information Administration and U.S. Census Bureau
Wood for Home Heating Consumption	353,908	MMBtu	Energy Information Administration and U.S. Census Bureau

Table B-2: Residential GHG Calculation Methods and Emissions Factors

Activity / Source	USCP Method	CO ₂	CH ₄	N ₂ O	Emissions Factor Source
Electricity – PG&E	BE.2.1	445 lbs/MWh	28.94 lbs/GWh	6.17 lbs/GWh	2010 Pacific Gas and Electric (CO ₂) 2009 U.S. EPA eGRID WECC California (CH ₄ and N ₂ O)
Electricity – Direct Access	BE.2.1	658.68 lbs/MWh	28.94 lbs/GWh	6.17 lbs/GWh	2009 U.S. EPA eGRID WECC California (CO ₂ , CH ₄ and N ₂ O)
Electricity - T&D Losses	BE.4.1	658.68 lbs/MWh	28.94 lbs/GWh	6.17 lbs/GWh	2009 U.S. EPA eGRID WECC California (CO ₂ , CH ₄ and N ₂ O)
Propane (LPG)	BE.1.2	5.79 kg/Gallon	0.001 kg/Gallon	0.0001 kg/Gallon	USCP Appendix C - Table B.1 LPG and Table B.4 Residential LPG
Fuel Oil/Kerosene	BE.1.2	10.15 kg/Gallon	0.0015 kg/Gallon	0.0001 kg/Gallon	USCP Appendix C - Table B.1 Kerosene and Table B.4 Residential Kerosene
Wood	BE.1.2	93.80 kg/MMBtu	0.316 kg/MMBtu	0.0042 kg/MMBtu	USCP Appendix C - Table B.2 Wood and Wood Residuals and Table B.3 Biomass Fuels Solid Residential

Methods:

Utility-Derived Data

Utility-provided activity data is shown in Table B-1. Electricity and natural gas consumption data was collected from Pacific Gas and Electric Company (PG&E) for facilities within Mariposa County. The data provided by PG&E was categorized as residential, commercial or industrial use where possible. The residential electricity data was entered into the Climate and Energy Management Suite website where the GHG emissions were calculated using PG&E's reported grid emissions factors for electricity. The calculation methods from the USCP and emissions factors are shown in Table B-2.

Table B-3: Residential Non-Utility Home Heating Fuel Use Calculations

Fuel Type	Propane	Fuel Oil / Kerosene	Wood	Data Source
California Fuel Use	8,273	305	1,628	Energy Information Administration (EIA) State Energy Data System (SEDS) 2010 California Residential Energy Use Estimates
Units	Thousand Barrels	Thousand Barrels	Thousand Cords	
# of California Households	393,137	35,932	218,319	U.S. Census Bureau, 2010 American Community Survey (ACS) 1-year estimates Table B25040. California Households using Non-Utility Fuels for Home Heating
Per Household Fuel Use	883.83	356.51	149.14	
Units	Gallons	Gallons	MMBtu	
Community Households	3,134	183	2,373	U.S. Census Bureau, 2010 American Community Survey (ACS) 5-year estimates. Table DP04. Community Households using Non-Utility Fuels for Home Heating
Estimated Fuel Use	2,769,921	65,241	353,908	
Units	Gallons	Gallons	MMBtu	

Non-Utility Derived Data

Non-utility activity data is shown in Table B-1. Propane, fuel oil / kerosene and wood used for home heating were estimated using Energy Information Administration (EIA) and U.S. Census Bureau American Community Survey (ACS) data. The EIA State Energy Data System 2010 California residential energy use estimates and the U.S. Census Bureau 2010 ACS 1-year estimates of California households using non-utility fuels for home heating was used to calculate California per household fuel use in 2010. This per household fuel use factor was applied to U.S. Census Bureau 2010 ACS 5-year estimates of Mariposa County households using non-utility fuels for home heating. Table B-3 above shows the data used in these calculations. Activity data was then entered into the Climate and Energy Management Suite using the calculation methods and emissions factors shown in Table B-2.

Table B-4: Direct Access Electricity Usage

Direct Access Calculator							
County	Sector	Year	Utility		Direct Access		Total
			Million kWh	%	Million kWh	%	
Mariposa County	Residential	2010	72.36	64.41	0.17	60.98	72.53
Mariposa County	Non-Residential	2010	39.98	35.59	0.11	39.02	40.09
Total (Million kWh)			112.34		0.27		112.62
Total %			99.76%		0.24%		100.00%
Direct Access Estimate by Local Government							
Sector	PG&E Total kWh	% DA Usage	DA kWh	Calculations to Estimate Proportion			
Residential	72,445,910	0.23%	166,991	0.23%	99.77%		
Non-Residential	39,402,407	0.27%	105,177	0.27%	99.73%		

Direct Access Electricity Data

Direct access activity data is shown in Table B-1. Direct access electricity is energy supplied by a competitive energy service provider other than a utility, but uses a utility's transmission lines to distribute the energy. Direct access electricity was either provided by PG&E or, when confidentiality laws would not allow data release, was estimated from county-level direct access electricity data provided by the California Energy Commission (CEC). The direct access calculator provided by ICLEI, Table B-4, was used to estimate direct access electricity usage within Mariposa County. The total direct access electricity consumption for Mariposa County was used to determine the ratio of direct-access electricity use to utility-provided electricity use for Residential and Non-Residential Energy Use Sectors. This ratio was applied to the utility-provided electricity use within Mariposa County to determine an estimate of the direct-access electricity consumed within Mariposa County. The calculated direct access totals for Mariposa County were entered into the Climate and Energy Management Suite where the GHG emissions were calculated using the U.S. Environmental Protection Agency's (EPA) Emissions & Generation Resource Integrated Database (eGRID) 2009 WECC California sub region grid average emissions factors.

Electricity Transmission and Distribution Losses Data

Electricity transmission and distribution (T&D) losses activity data is shown in Table B-1. T&D Losses were calculated for the combined residential electricity total, PG&E and direct access electricity combined, using the EPA eGRID 2009 Western region grid loss factor of 8.21%. The calculated T&D losses were entered into the Climate and Energy Management Suite where the GHG emissions were calculated using the EPA eGRID 2009 WECC California sub-region grid average emissions factors.

Appendix C - Non-Residential Sector Notes

Table C-1: Non-Residential Activity Data Inputs

Activity / Source	Value	Units	Data Source
Electricity Consumption - PG&E	39,402,407	kWh	Pacific Gas and Electric
Electricity Consumption - Direct Access	105,177	kWh	California Energy Commission
Electricity Transmission & Distribution Losses	3,243,573	kWh	U.S. Environmental Protection Agency
Propane (LPG) Consumption	199,829	MMBtu	Sierra Business Council Estimation

Table C-2: Non-Residential GHG Calculation Methods and Emissions Factors

Activity / Source	USCP Method	CO ₂	CH ₄	N ₂ O	Emissions Factor Source
Electricity - PG&E	BE.2.1	445 lbs/MWh	28.94 lbs/GWh	6.17 lbs/GWh	2010 Pacific Gas and Electric (CO ₂) and 2009 EPA eGRID WECC California (CH ₄ and N ₂ O)
Electricity - Direct Access	BE.2.1	658.68 lbs/MWh	28.94 lbs/GWh	6.17 lbs/GWh	2009 EPA eGRID WECC California (CO ₂ , CH ₄ and N ₂ O)
Electricity - T&D Losses	BE.4.1	658.68 lbs/MWh	28.94 lbs/GWh	6.17 lbs/GWh	2009 EPA eGRID WECC California (CO ₂ , CH ₄ and N ₂ O)
Propane (LPG)	N/A	62.98 kg/MMBtu	0.001 kg/Gallon	0.0001 kg/Gallon	USCP Appendix C - Table B.1 LPG and Table B.4 Residential LPG

Methods:

Utility-Derived Data

Utility-provided activity data is shown in Table C-1. Electricity consumption data was collected from Pacific Gas and Electric Company (PG&E) for all facilities within Mariposa County. The data provided by PG&E was categorized as residential, commercial or industrial use where possible. There was no industrial electricity use categorized as industrial by PG&E in 2010. Activity data for commercial electricity use (categorized as non-residential energy use in this report), shown in Table C-1, was entered into the Climate and Energy Management Suite where the GHG emissions were calculated using PG&E's reported grid emissions factors for electricity. The calculation methods from the USCP and emissions factors are shown in Table C-2.

Table C-3: Direct Access Electricity Usage

Direct Access Calculator							
County	Sector	Year	Utility		Direct Access		Total
			Million kWh	%	Million kWh	%	
Mariposa County	Residential	2010	72.36	64.41	0.17	60.98	72.53
Mariposa County	Non-Residential	2010	39.98	35.59	0.11	39.02	40.09
Total (Million kWh)			112.34		0.27		112.62
Total %			99.76%		0.24%		100.00%
Direct Access Estimate by Local Government							
Sector	PG&E Total kWh	% DA Usage	DA kWh	Calculations to Estimate Proportion			
Residential	72,445,910	0.23%	166,991	0.23%	99.77%		
Non-Residential	39,402,407	0.27%	105,177	0.27%	99.73%		

Direct Access Electricity Data

Direct access activity data is shown in Table C-1. Direct access electricity is energy supplied by a competitive energy service provider other than a utility, but uses a utility's transmission lines to distribute the energy. Direct access electricity was either provided by PG&E or, when confidentiality laws would not allow data release, was estimated from county-level direct access electricity data provided by the California Energy Commission (CEC). The direct access calculator provided by ICLEI, Table C-3, was used to estimate direct access electricity usage within Mariposa County. The total direct access electricity consumption for Mariposa County was used to determine the ratio of direct-access electricity use to utility-provided electricity use for Residential and Non-Residential Energy Use Sectors. This ratio was applied to utility-provided electricity use within Mariposa County to determine an estimate of the direct-access electricity consumed within Mariposa County. The calculated direct access totals for Mariposa County were entered into the Climate and Energy Management Suite where the GHG emissions were calculated using the EPA eGRID WECC California grid average emissions factors.

Electricity Transmission and Distribution Losses Data

Electricity transmission and distribution (T&D) losses activity data is shown in Table C-1. T&D Losses were calculated for the combined non-residential electricity total, PG&E and direct access electricity combined, using the EPA eGRID 2009 Western region grid loss factor of 8.21%. The calculated T&D losses were entered into the Climate and Energy Management Suite where the GHG emissions were calculated using the EPA eGRID 2009 WECC California sub region grid average emissions factors.

Table C-4: Community Potable Water Electricity Use Activity Data

Water System	Process	Electricity Use (kWh/Yr)	Water Production (MG/Yr)	Energy Intensity (kWh/MG)	Population Served	Gallons per Capita per day	Data Source
Mariposa Public Utility District (MPUD)	Surface Water Conveyance	85,088	110.3	771	1,808	167	MPUD
	Ground Water Extraction	29,895	11.7	2,553	192	167	
	Treatment	101,813	110.3	923	1,808	167	
	Distribution	74,958	122.0	614	2,000	167	
Mariposa County Public Works – Yosemite West	Ground Water Extraction	56,754	Not Available	Not Available	300	Not Available	PG&E, population from EPA
	Distribution	108,252	Not Available	Not Available		Not Available	
Lake Don Pedro Community Services District (LDPCSD)	Surface Water Conveyance	212,282	85.7	2,478	2,103	116	LDPCSD
	Ground Water Extraction	6,342	3.0	2,107		116	
	Treatment	80,607	88.7	909		116	
	Distribution	87,040	88.7	982		116	
McClure Boat Club	Surface Water	21,995	8.46	2,600	298	78	McClure Boat Club, population from EPA
Fish Camp & Mariposa Pines	Ground Water	44,296	11.94	3,708	415	79	Fish Camp & Mariposa Pines, EPA
Private Wells	Ground Water	202,930	375.8	540	10,296	100	USCP, population from Dept of Finance
Other Groundwater	Ground Water	176,222	51.8	3,401	1,080	131	Pop-weighted EI and Gal/Capita/Day - Fish Camp/ Mariposa Pines; population -EPA
Yosemite National Park YNP	Residents	220,296	65.15	3,381	1,785	100	kWh & non-res MG/Yr – YNP; pop-EPA and YNP; Gal/Capita/Day-resident, USCP
	Non-residents (Full Time Equivalent)	231,394	167.76	1,379	16,774	27	

Table C-5: Community Potable Water GHG Calculation Methods and Emissions Factors

Activity / Source	USCP Method	CO ₂	CH ₄	N ₂ O	Emissions Factor Source
Electricity – PG&E	WW.14	445 lbs/MWh	28.94 lbs/GWh	6.17 lbs/GWh	2010 Pacific Gas and Electric (CO ₂) 2009 EPA eGRID WECC California (CH ₄ and N ₂ O)
Electricity - T&D Losses	BE.4.1	658.68 lbs/MWh	28.94 lbs/GWh	6.17 lbs/GWh	2009 EPA eGRID WECC California (CO ₂ , CH ₄ and N ₂ O)

Community Potable Water Electricity Use

Mariposa County's potable water electricity use activity data is shown in Table C-4. Data on the electricity use, water production and population served was collected from water agencies serving the County's residents and businesses. Values with bolding were calculated from data provided by wastewater agencies or using the average of other similar systems within Mariposa County. Since the potable water treatment and delivery infrastructure lies primarily within the county limits, this electricity use is included in the non-residential sector's electricity usage. Because of this overlap community potable water electricity use emissions are reported as an Information Item and not added to the community total. The electricity use was entered into the Climate and Energy Management Suite where the GHG emissions were calculated using PG&E's reported grid emissions factors for electricity. T&D losses were calculated by applying the EPA eGRID Western region grid loss factor of 8.21% to the total electricity use and then entered into the Climate and Energy Management Suite where the GHG emissions were calculated using the EPA eGRID WECC California sub region grid average emissions factors.

Table C-6: Community Wastewater Electricity Use Activity Data

Wastewater System	Process	Electricity Use (kWh)	Wastewater Treated (MG/Yr)	Energy Intensity (kWh/MG)	Population Served	Gallons per Capita per day	Data Source
Mariposa County Public Works	Coulterville Lagoon	10,931	5.858	1,866	230	70	Mariposa County PG&E, US Census, Dept of Finance E-8 Report,
	Mariposa Pines Lagoon	48,095	1.533	31,373	55	77	
	Mariposa Pines Collection	7,272	1.533	4,744	55	77	
	Yosemite West Lagoon	102,701	7.626	13,467	263	80	
	Yosemite West Collection	8,324	7.626	263	263	80	
	Don Pedro WWTP	86,160	8.696	9,908	1,077	22	
	Don Pedro Collection	33,851	8.696	3,893	1,077	22	
Mariposa Public Utility District (MPUD)	WWTP	199,440	62.050	3,214	2,000	85	MPUD, US Census, Dept of Finance E-8 Report,
Yosemite National Park	El Portal (Residents)	371,185	38.685	9,595	1,635	65	kWh –YNP: population – YNP &US Census: Gal/Capita -. Weighted avg of MCPW & MPUD.
	Wawona (Residents)	65,755	3.549	18,527	150	65	
	El Portal (Non-Residents)	1,193,947	124.434	9,595	14,371	24	
	Wawona (Non-Residents)	401,885	21.691	18,527	1,998	30	
Tenaya Lodge	Non-residents	15,684	6.273	2,500	496	35	EI – USCP, Tenaya Lodge
KOA	Non-residents	1,494	0.597	2,500	114	14	EI – USCP, KOA

Table C-7: Community Wastewater GHG Calculation Methods and Emissions Factors

Activity / Source	USCP Method	CO ₂	CH ₄	N ₂ O	Emissions Factor Source
Electricity – PG&E	WW.15	445 lbs/MWh	28.94 lbs/GWh	6.17 lbs/GWh	2010 Pacific Gas and Electric (CO ₂) 2009 EPA eGRID WECC California (CH ₄ and N ₂ O)
Electricity - T&D Losses	BE.4.1	658.68 lbs/MWh	28.94 lbs/GWh	6.17 lbs/GWh	2009 EPA eGRID WECC California (CO ₂ , CH ₄ and N ₂ O)

Community Wastewater Electricity Use

Community-generated wastewater electricity use activity data is shown in Table C-6. Data on electricity use, wastewater treated and population served was collected from wastewater agencies serving the County’s residents and businesses. Values with bolding were calculated from data provided by wastewater agencies or using the average of other similar systems within Mariposa County. Since the wastewater collection and treatment infrastructure lies primarily within the county limits, this electricity use is likely included in the non-residential sector’s electricity usage. Because of this overlap community wastewater treatment electricity use emissions are reported as an Information Item and not added to the

community total. The electricity use was entered into the Climate and Energy Management Suite where the GHG emissions were calculated using PG&E's reported grid emissions factors for electricity. T&D losses were calculated by applying the EPA eGRID Western region grid loss factor of 8.21% to the total electricity use and then entered into the Climate and Energy Management Suite where the GHG emissions were calculated using the EPA eGRID WECC California sub region grid average emissions factors.

Appendix D - Transportation Sector Notes

Table D-1: Transportation Activity Data Inputs

Activity / Source	Type	Value	Units	Data Source
Mariposa County Vehicle Miles Traveled by Jurisdiction Maintaining Roadway	Bureau of Indian Affairs	21,900	Miles / Year	2010 Caltrans Highway Performance Monitoring System Public Road Data
	County	49,796,950	Miles / Year	
	National Park Service	78,763,350	Miles / Year	
	State Highways	138,601,450	Miles / Year	
	U.S. Forest Service	299,300	Miles / Year	
County Vehicle Breakdown	Passenger Car - Gasoline	37.56	Percent	CARB EMFAC2011 Web Based County Emissions Inventory
	Light Truck - Gasoline	48.79	Percent	
	Heavy Truck - Gasoline	5.99	Percent	
	Passenger Car - Diesel	0.23	Percent	
	Light Truck - Diesel	0.01	Percent	
	Heavy Truck - Diesel	7.41	Percent	
Off-road Equipment	CO ₂	70.363	Metric Tons	CARB OFFROAD2007
	CH ₄	0.084	Metric Tons	
	N ₂ O	0.010	Metric Tons	

Table D-2: Transportation GHG Calculation Methods and Emissions Factors

Activity / Source	USCP Method	CO ₂	CH ₄	N ₂ O	Emissions Factor Source
Passenger Car - Gasoline	TR.1.B	362.96 g/mile	0.0515 g/mile	0.0235 g/mile	California ARB EMFAC2011 Web Based County Emissions Inventory and California ARB EMFAC2011 LDV Module
Light Truck - Gasoline	TR.1.B	533.41 g/mile	0.0761 g/mile	0.0527 g/mile	
Heavy Truck - Gasoline	TR.1.B	948.40 g/mile	0.0799 g/mile	0.1120 g/mile	
Passenger Car - Diesel	TR.1.B	344.35 g/mile	0.0484 g/mile	0.0113 g/mile	
Light Truck - Diesel	TR.1.B	336.62 g/mile	0.0850 g/mile	0.0111 g/mile	
Heavy Truck - Diesel	TR.1.B	645.59 g/mile	0.0156 g/mile	0.0212 g/mile	
Off-road Equipment	TR.8	Varies	Varies	Varies	California ARB OFFROAD2007

Methods:

On-Road Vehicles

Since the actual fuel consumption data is not available at the county level, on-road transportation emissions for Mariposa County are estimated using vehicle-miles traveled (VMT) estimates coupled with county-level vehicle type and fuel percentages. On-road transportation activity data is shown in Table D-1. Activity data was entered into the Climate and Energy Management Suite where county-level fuel and vehicle-type-specific emissions factors and calculation methods from the USCP, shown in Table D-2, were applied to calculate the GHG emissions associated with community on-road transportation. The methodology for collecting and conditioning this data is as follows:

Vehicle Miles Traveled Estimates

Data on VMT was collected from Caltrans Highway Performance Monitoring System 2010 California Public Road Data for all publically maintained roads in Mariposa County in daily vehicle miles of travel. This VMT estimate was then multiplied by 365 to calculate the annual VMT for Mariposa County.

Fuel / Vehicle Type Breakdown and Emissions Calculations

Since the Caltrans Public Road Data does not provide VMT by fuel and vehicle type, local fuel and vehicle type percentages were extracted from the California ARB's Mobile Source Emissions Inventory On-Road Motor Vehicles Emissions Factor (EMFAC2011) model, which provides this information by county. The EMFAC2011 model was run for year 2010 for Mariposa County; daily VMT from this model was summed by fuel and vehicle classification (Passenger Car, Light-Duty Truck and Heavy-Duty Truck) to calculate local vehicle percentages by fuel and vehicle type. These percentages were applied to the jurisdiction-specific annual VMT figures, resulting in final VMT figures by fuel and vehicle type. The EMFAC2011 reports CO₂, CH₄ and N₂O emissions factors for 51 different vehicle type and fuel combinations for every county in California, informed by California Department of Motor Vehicles registrations, the Smog Check program and many other data sources. Average CO₂ emissions factors were calculated for gasoline and diesel passenger vehicles, light trucks and heavy trucks. The local vehicle and fuel specific average CH₄ and N₂O emissions factors were calculated from EMFAC 2011 web based model and the LDV sub module. CH₄ emissions for Passenger Cars, Light Trucks and Motorcycles were calculated from County EMFAC 2011 - LDV Module reported methane total exhaust (CH₄_Totex). CH₄ emissions for Heavy Trucks were calculated from County EMFAC 2011 Web Based Emissions Inventory reported total organic gases total exhaust (TOG_Totex) multiplied by 0.0408, the estimated average fraction of TOG that is comprised of CH₄, based on guidance from ARB. N₂O emissions for gasoline-fueled vehicles were calculated from County EMFAC 2011 Web Based Emissions Inventory reported nitrogen oxides total exhaust (NO_x_Totex) multiplied by 0.0416, the average fraction of NO_x emissions that are, or react into, N₂O, based on guidance from ARB. N₂O emissions for diesel fueled vehicles were calculated from County EMFAC 2011 Web Based Emissions Inventory reported Fuel Use multiplied by 0.3316 grams per gallon, based on guidance from ARB.

Off-Road Emissions

Off-road emissions were estimated with standard procedures using California ARB's OFFROAD2007 modeling program. OFFROAD2007 produces emissions for various off-road, fuel-consuming machines at the county level. The data produced by OFFROAD2007 is daily usage emissions in short tons. The final data was multiplied by 365 in order to produce annual emissions and divided by 1.1023 to convert from short tons to metric tons. The final data was entered into the Climate and Energy Management Suite as annual emissions of CO₂, CH₄, and N₂O, in metric tons.

Appendix E - Solid Waste Sector Notes

Table E-1: Solid Waste Activity Data Inputs

Landfill	2010 Tons Waste Deposited	Landfill Gas Capture?	Distance to Facility (Miles)	Transport Fuel	Data Source
Altamont Landfill & Resource Recovery	3.1	Yes	119.0	Diesel	Tonnage data collected from CalRecycle Disposal Reporting System.
American Avenue Disposal Site	12.7	Yes	72.3	Diesel	
Avenal Regional Landfill	22.1	No	131.0	Diesel	
Foothill Sanitary Landfill	0.6	Yes	86.6	Diesel	Landfill gas capture data from EPA GHG MRR database.
Forward Landfill, Inc.	16.8	Yes	97.7	Diesel	
Highway 59 Disposal Site	401.3	Yes	45.1	Diesel	Distance to facility data using center of the town of Mariposa using Google maps.
Mariposa County Sanitary Landfill	11,549	No	2.6	Diesel	
North County Landfill & Recycling Center	4.1	Yes	120.0	Diesel	
Total Tonnage Landfilled <i>without</i> LF capture	11,571	No	49.18	Diesel	Weighted Average for Mariposa County and Avenal Regional
Total Tonnage Landfilled <i>with</i> LG capture	439	Yes	2.85	Diesel	Weighted Average for all other landfills

Table E-2: Solid Waste GHG Calculation Methods and Emissions Factors

Activity / Source	USCP Method	Type	Percent by Weight	Emissions Factor (metric tons CH ₄ / wet short ton waste)	Emissions Factor Source
Community Solid Waste Characterization	SW.4	Newspaper	1.40%	0.043	CalRecycle California 2008 Statewide Waste Characterization Study,
		Office Paper	4.90%	0.203	
		Corrugated Cardboard	5.20%	0.120	
		Magazines/Third Class Mail	5.90%	0.049	
		Food Scraps	15.50%	0.078	USCP Appendix E (Page 34) & U.S. EPA Waste Reduction Model (WARM)
		Grass	1.90%	0.038	
		Leaves	1.90%	0.013	
		Branches	3.30%	0.062	
		Dimensional Lumber	14.50%	0.062	
		All other (Non-Organic)	45.5%	0	
Collection and Transportation of Solid Waste	SW.6	Solid Waste Collection	N/A	0.020 MT CO ₂ e / wet short ton	USCP Appendix E (page 29)
		Solid Waste Transportation	N/A	0.00014 MT CO ₂ e / wet short ton / mile	USCP Appendix E (page 29)
Solid Waste Landfill	SW.1.1	First Order Decay Model	N/A	Varies	California ARB

Table E-3: Solid Waste Facility First Order Decay Model Data Inputs

Landfill	Characteristics	Value	Units	Data Source
Mariposa County Sanitary Landfill	Year opened / closed	1970 / present		Greg Ollivier, Mariposa County Solid Waste Manager
	Rainfall	33	Inches / Year	NOAA
	Associated k value	0.038		U.S. EPA

Methods:***Community-Generated Solid Waste***

Solid waste generated within a jurisdiction in the inventory year and transferred to landfills for disposal will have associated emissions that need to be included in an inventory. Emissions occur at the landfill site(s) over the entire period of waste decomposition, estimated to be 100 years. The tonnage of waste generated by Mariposa County residents and businesses and then landfilled was collected from the California Integrated Waste Management Board (CalRecycle). Waste characterization percentages from the CalRecycle *California 2008 Statewide Waste Characterization Study* were applied to the tonnage of community-generated waste landfilled in 2010 (see Table E-2). The community waste tonnage, shown in Table E-1, was entered into the Climate and Energy Management Suite where GHG emissions were calculated based on standard emissions factors and calculation methods from the USCP, shown in Table E-2, developed by U.S. EPA using organic content and methane generating potential for each waste type. Emissions were adjusted based on the presence of landfill gas capture systems.

Solid Waste Collection and Transportation

A variety of emissions are associated with solid waste management services including emissions resulting from collection, processing, and storage of solid waste generated by residents and businesses. Collection and Transportation emissions are included in transportation sector emissions, but they are also reported with the waste sector as an indicator, as described above. It is important to acknowledge the benefits of recycling and composting programs that lower waste volumes and lower emissions. When incoming organic waste is diverted, landfill emissions are reduced and upstream emissions from materials manufacturing are reduced when recycled materials displace virgin materials.

Solid waste collection emissions include emissions from the trucks used to collect municipal solid waste within the community and transport the waste to the regional landfills serving Mariposa County. The tonnage of waste collected and the distance to the regional landfill, determined based on the distance from the center of the community to the regional landfill, were entered into the Climate and Energy Management Suite to calculate GHG emissions using default CO₂e emissions per ton-mile (the emissions produced to transport one ton of waste one mile).

Solid Waste Facilities Located in the Community

The California ARB First Order Decay (FOD) model was used to estimate emissions from the Mariposa County Landfill. Inputs to the FOD model are shown in Table E-3. Based on guidance from Mariposa County staff it was assumed the Mariposa County Sanitary Landfill accepted and stored solid waste between 1970 to the present. The

facility has no landfill gas capture system. Solid waste landfilled from 1995 to 2010 at the Mariposa County Landfill was collected from CalRecycle Solid Waste Information System. Waste landfilled from 1970 to 1995 was estimated using the U.S. average pounds per person per day solid waste landfilled adjusted by the ratio of Mariposa County average pounds per person per day to the U.S. average from 1995 to 2010.

Appendix F - Wastewater Sector Notes

Table F-1: Wastewater Treatment Activity Data Inputs

Wastewater Facility	Population Served	Wastewater Treated (MGD)	Nit/Denit Process (Yes / No)	Industrial Discharges (Yes / No)	Nitrogen Load (kg/day)	Aerobic or Anaerobic	Data Source
MCPW Don Pedro	1,077	0.02382	No	No	NA	Aerobic	Facility Operators
MPUD	2,000	0.17	No	No	25.738	Aerobic	
Tenaya	496	0.02	No	No	NA	Aerobic	
KOA Campground	114	0.0016	No	No	NA	Aerobic	
Yosemite NP	3,634	0.52	No	No	78.14	Aerobic	
MCPW Lagoons	548	0.04	No	No	NA	Anaerobic	
Private Septic Systems	12,867						Remaining population

Table F-2: Wastewater Treatment GHG Calculation Methods and Emissions Factors

Activity / Source	USCP Method	CH ₄	N ₂ O	Emissions Factor Source
Septic Systems (population based)	WW.11(alt)	0.6 kg CH ₄ / kg BOD ₅	N/A	USCP App F page 52.
Lagoons (population based) - no primary treatment	WW.6(alt)	0.6 kg CH ₄ / kg BOD ₅	N/A	USCP App F page 39
Central Plants - no nitrification / denitrification process (population based)	WW.8	N/A	3.2 g N ₂ O / person / year	USCP App F page 43
Effluent (population based)	WW.12(alt)	N/A	0.026 kg N / person / day	USCP App F page 56
Effluent (N known)	WW.12	N/A	0.005 kg N ₂ O / kg sewage N	USCP App F page 54

Table F-3: Wastewater Treatment GHG Emissions Calculation Formulas

USCP Method	Emissions Calculation Formula
WW.6(alt)	Metric Tons CH ₄ = Population x F _{ind-com} (Industrial Discharge Factor) x BOD ₅ load (0.09 kg / person / day) x Bo (0.6 kg CH ₄ / kg BOD ₅) x MCF _a (0.8 Methane Correction Factor) x 365 days / year x 10 ⁻³
WW.8	Metric Tons N ₂ O = Population X EF (3.2 g N ₂ O / person / year) x 10 ⁻⁶
WW.11(alt)	Metric Tons CH ₄ = Population x BOD ₅ load (0.09 kg / person / day) x Bo (0.6 kg CH ₄ / kg BOD ₅) x MCF _s (0.22 Methane Correction Factor) x 365 days / year x 10 ⁻³
WW.12	Metric Tons N ₂ O = N load (kg / day) x EF _{effluent} (0.005 kg N ₂ O / kg N discharged to river / stream) x 365 days / year x 44/28 (N ₂ O / N) x 10 ⁻³
WW.12(alt)	Metric Tons N ₂ O = Population x F _{ind-com} (Industrial Discharge Factor) x [N load (0.026 kg N / person / day - (kg N / kg BOD ₅ (0.05 for aerobic systems or 0.005 for anaerobic or lagoon systems) x 0.09 kg BOD ₅ / person / day)] x EF _{effluent} (0.005 kg N discharged to river / stream) x 365 days / year x 44/28 (N ₂ O / N) x 10 ⁻³

Methods:

Wastewater Treatment Facility Process and Fugitive Emissions

Wastewater treatment process emissions account for a small part of total community-based GHG emissions. Wastewater can be treated using either: conventional wastewater treatment plants, lagoons, or septic systems. There are two emissions associated with these processes: methane (CH₄) and nitrous oxide (N₂O). Calculating the makeup and amount of emissions depends on the processes involved and the management practices employed.

In 2010, there were five major conventional treatment plant operators serving Mariposa County that treated approximately 283 million gallons of wastewater. They were Mariposa County Public Works, Mariposa Public Utility District, Yosemite National Park, Tenaya Lodge and the KOA campground. Additionally, there were three treatment lagoon facilities operated by Mariposa County Public Works. The rest of the County residents were assumed to have been served by septic systems. None of the conventional wastewater treatment plants (WWTPs) used nitrification or denitrification processes, nor was there any significant industrial discharge into any of the systems. All of the conventional plants treated wastewater aerobically. The anaerobic lagoons treating approximately 15 million gallons of wastewater had no primary treatment, and no industrial discharge into them. The WWTP characteristics shown in Table F-1 were collected from wastewater agency and county staff. The wastewater treatment activity data was entered into the Climate and Energy Management Suite where GHG emissions were calculated using the standard methods and emissions factors from the USCP shown in Table F-2 and formulas shown in Table F-3.

Wastewater Uncertainties

According to the latest EPA national inventory of greenhouse gas emissions considerable uncertainty exists within any of the EPA/IPCC-based methodologies used to estimate wastewater process and fugitive emissions. EPA states that population-based methane emissions could be underestimated by 37% or over-estimated by 47% while nitrous oxide emissions could be underestimated by 76% or over-estimated by 93%. Emissions estimates based on direct source measurements have higher accuracy and less uncertainty. This extreme degree of uncertainty exists because these methodologies were originally developed for international countrywide inventories that were mainly population-based. By necessity, these methodologies were generalized “top-down” approaches that sought to provide emissions estimates for countries where detailed information would be impractical to obtain. Although these methodologies had the advantage of being relatively simple to calculate, the trade-off was a compromised level of accuracy. Nevertheless, the methodologies in this Appendix reflect the evolution of knowledge since the development of the LGOP.

In this inventory, the two largest wastewater treatment plants’ emissions were calculated using direct source measurement, which has higher accuracy and less uncertainty. For the smaller facilities, population-based calculation methods were used do to the lack of direct source measurement. The emissions from theses facilities have higher uncertainty and caution should be exercised in drawing conclusions or establishing policy on these facilities until direct source measurement data is available.

Municipal-Operations Inventory Appendices

Appendix G - Buildings and Facilities Sector Notes

Table G-1: Buildings and Facilities Activity Data Inputs

Facility Name	Activity / Source	Value	Units	Data Source
Public Works	Electricity – PG&E	121,845	kWh	Pacific Gas and Electric
	Propane (LPG)	10,206	Gallons	Mariposa County
Fire Department	Electricity – PG&E	144,258	kWh	Pacific Gas and Electric
	Propane (LPG)	4,248	Gallons	Mariposa County
County Jail	Electricity – PG&E	381,880	kWh	Pacific Gas and Electric
Wastewater Treatment	Electricity – PG&E	297,334	kWh	Pacific Gas and Electric
Other Minor Facilities & Offices	Electricity – PG&E	453,000	kWh	Pacific Gas and Electric
	Propane (LPG)	315	Gallons	Mariposa County
Solid Waste Facilities	Electricity – PG&E	269,882	kWh	Pacific Gas and Electric
Hall of Records	Electricity – PG&E	77,240	kWh	Pacific Gas and Electric
	Propane (LPG)	5,412	Gallons	Mariposa County
Parks and Recreation	Electricity – PG&E	172,894	kWh	Pacific Gas and Electric
	Propane (LPG)	2,077	Gallons	Mariposa County
Potable Water Transport	Electricity – PG&E	194,464	kWh	Pacific Gas and Electric
Mariposa County Library	Electricity – PG&E	97,857	kWh	Pacific Gas and Electric
	Propane (LPG)	1,254	Gallons	Mariposa County
Government Center	Electricity – PG&E	126,720	kWh	Pacific Gas and Electric
Court House	Electricity – PG&E	101,840	kWh	Pacific Gas and Electric
Probation Department	Electricity – PG&E	44,523	kWh	Pacific Gas and Electric
	Propane (LPG)	1,807	Gallons	Mariposa County
Airport	Electricity – PG&E	100,464	kWh	Pacific Gas and Electric
Museum and History Center	Electricity – PG&E	60,200	kWh	Pacific Gas and Electric
	Propane (LPG)	547	Gallons	Mariposa County
Animal Control	Electricity – PG&E	50,430	kWh	Pacific Gas and Electric
Public Lighting	Electricity – PG&E	43,411	kWh	Pacific Gas and Electric
Transmission & Distribution Losses	Electricity – PG&E	224,810	kWh	Pacific Gas and Electric

Table G-2: Buildings and Facilities GHG Calculation Methods and Emissions Factors

Activity / Source	LGOP Method	CO ₂	CH ₄	N ₂ O	Emissions Factor Source
Electricity – PG&E	6.1.1	445 lbs/MWh	28.94 lbs/GWh	6.17 lbs/GWh	2010 Pacific Gas and Electric (CO ₂) and 2009 EPA eGRID WECC California (CH ₄ and N ₂ O)
Electricity - T&D Losses	6.2.6	658.68 lbs/MWh	28.94 lbs/GWh	6.17 lbs/GWh	2009 EPA eGRID WECC California (CO ₂ , CH ₄ and N ₂ O)
Propane (LPG)	6.1.1	5.79 kg/gallon	0.011 kg/MMBtu	0.0006 kg/MMBtu	LGOP Appendix G - Table G.1 (CO ₂) and Table G.3 (CH ₄ and N ₂ O)

Methods:

2010 buildings and facilities electricity consumption data, shown in Table G-1, was collected from Pacific Gas and Electric Company (PG&E). Propane use was estimated using propane purchase records provided Mariposa County Facilities Maintenance Department and the average 2010 Commercial price per gallon reported by the Energy Information Administration for the west coast region. The activity data was entered into the Climate and Energy Management Suite where GHG emissions were calculated using the calculation methods from the LGOP and emissions factors shown in Table G-2.

Refrigerants used in Mariposa County’s building HVAC and refrigeration equipment were not estimated because of unavailability of data and the likelihood that these emissions are less than significant.

Table G-3: Public Lighting Activity Data Inputs Details

Facility Name	Activity / Source	Value	Units	Data Source
Streetlights	Electricity – PG&E	10,000	kWh	Pacific Gas and Electric
Park Lighting	Electricity – PG&E	32,511	kWh	Pacific Gas and Electric
Other Outdoor Lighting	Electricity – PG&E	900	kWh	Pacific Gas and Electric
LS-1 PG&E Owned and Operated (Information Item)	Electricity – PG&E	48,694	kWh	Pacific Gas and Electric

Public lighting electricity usage data, shown in Table G-3, was collected from PG&E. Activity data was entered into the Climate and Energy Management Suite where GHG emissions were calculated using the calculation methods from the LGOP and emissions factors shown in Table G-2. PG&E designated LS-1 lighting was included as an Information Item. LS-1 designated streetlights are owned, operated, maintained and directly paid for by PG&E, but are indirectly paid for by Mariposa County through their general rate case with PG&E.

Table G-4: Water Delivery Activity Data Inputs Details

Facility Name	Activity / Source	Value	Units	Data Source
Yosemite West Water System	Electricity – PG&E	165,006	kWh	Pacific Gas and Electric
Other Water Transport Infrastructure	Electricity – PG&E	29,458	kWh	Pacific Gas and Electric

Water delivery electricity data, shown in Table G-4, was collected from PG&E. Activity data was entered into the Climate and Energy Management Suite where GHG emissions were calculated using the calculation methods from the LGOP and emissions factors show in Table G-2.

Table G-5: Wastewater Treatment Facilities Activity Data Inputs Details

Facility Name	Activity / Source	Value	Units	Data Source
Yosemite West Sewer Plant	Electricity – PG&E	102,701	kWh	Pacific Gas and Electric
Yosemite West Booster Pumps	Electricity – PG&E	8,324	kWh	Pacific Gas and Electric
Hites Cove/Mariposa Pines Wastewater Treatment	Electricity – PG&E	48,095	kWh	Pacific Gas and Electric
Hites Cove/Mariposa Pines Booster Station	Electricity – PG&E	7,272	kWh	Pacific Gas and Electric
Don Pedro Treatment Plant Sewer Lifts	Electricity – PG&E	33,851	kWh	Pacific Gas and Electric
Don Pedro Treatment Plant	Electricity – PG&E	86,160	kWh	Pacific Gas and Electric
Coulterville Wastewater Treatment Plant	Electricity – PG&E	10,931	kWh	Pacific Gas and Electric

Wastewater treatment facilities electricity usage data, shown in Table G-5, was collected from PG&E. Activity data was entered into the Climate and Energy Management Suite where GHG emissions were calculated using the calculation methods from the LGOP and emissions factors show in Table G-2.

Table G-6: Solid Waste Management Facilities Activity Data Inputs Details

Facility Name	Activity / Source	Value	Units	Data Source
Mariposa County Landfill	Electricity – PG&E	268,165	kWh	Pacific Gas and Electric
Transfer Stations	Electricity – PG&E	1,717	kWh	Pacific Gas and Electric

Solid waste management facilities electricity data, shown in Table G-6, was collected from PG&E. Activity data was entered into the Climate and Energy Management Suite where GHG emissions were calculated using the calculation methods from the LGOP and emissions factors show in Table G-2.

Appendix H - Vehicle Fleet and Mobile Equipment Sector Notes

Table H-1: Vehicle Fleet and Mobile Equipment Activity Data Inputs

Facility Name	Activity / Source	Value	Units	Data Source
Sheriff's Department	On-Road Gasoline	76,683	Gallons	Mariposa County Fleet Manager
	On-Road Diesel	2,491	Gallons	
Fire Department	On-Road Gasoline	10,709	Gallons	
	On-Road Diesel	992	Gallons	
	Mobile Equipment Diesel	2,872	Gallons	
	Mobile Equipment Gasoline	34	Gallons	
Roads	On-Road Gasoline	24,240	Gallons	
	On-Road Diesel	4,929	Gallons	
	Mobile Equipment Diesel	14,248	Gallons	
	Mobile Equipment Gasoline	43	Gallons	
Facilities	On-Road Gasoline	13,038	Gallons	
Social Services	On-Road Gasoline	9,494	Gallons	
Transit Fleet	On-Road Gasoline	6,172	Gallons	
Probation	On-Road Gasoline	2,821	Gallons	
Fleet	On-Road Gasoline	857	Gallons	
	On-Road Diesel	629	Gallons	
	Mobile Equipment Diesel	987	Gallons	
Building / Assessor	On-Road Gasoline	1,958	Gallons	
Public Works / Solid Waste	On-Road Gasoline	1,541	Gallons	
	Mobile Equipment Diesel	318	Gallons	
Health Department	On-Road Gasoline	1,616	Gallons	
Other Departments	On-Road Gasoline	2,298	Gallons	
All Departments	Refrigerant Leakage (R-134a)	0.0668	Metric Tons	
All Departments	Refrigerant Leakage (R-12)	0.0098	Metric Tons	

Table H-2: Vehicle Fleet and Mobile Equipment GHG Calculation Methods and Emissions Factors

Activity / Source	LGOP Method	CO ₂	CH ₄	N ₂ O	Emissions Factor Source
On-Road Passenger Vehicles - Gasoline	7.1.1.1 and 7.1.3.3	8.78 kg / gallon	0.02780 g / mile	0.02940 g / mile	LGOP Appendix G - Table G.11 (CO ₂) and Table G.15 (CH ₄ and N ₂ O)
On-Road Light Trucks - Gasoline	7.1.1.1 and 7.1.3.3	8.78 kg / gallon	0.03146 g / mile	0.04331 g / mile	LGOP Appendix G - Table G.11 (CO ₂) and Table G.15 (CH ₄ and N ₂ O)
On-Road Heavy Duty Trucks - Gasoline	7.1.1.1 and 7.1.3.3	8.78 kg / gallon	0.12351 g / mile	0.10310 g / mile	LGOP Appendix G - Table G.11 (CO ₂) and Table G.15 (CH ₄ and N ₂ O)
On-Road Passenger Vehicles - Diesel	7.1.1.1 and 7.1.3.3	10.21 kg / gallon	0.0005 g / mile	0.0010 g / mile	LGOP Appendix G - Table G.11 (CO ₂) and Table G.15 (CH ₄ and N ₂ O)
On-Road Light Trucks - Diesel	7.1.1.1 and 7.1.3.3	10.21 kg / gallon	0.00099 g / mile	0.00149 g / mile	LGOP Appendix G - Table G.11 (CO ₂) and Table G.15 (CH ₄ and N ₂ O)
On-Road Heavy Duty Trucks - Diesel	7.1.1.1 and 7.1.3.3	10.21 kg / gallon	0.0051 g / mile	0.0048 g / mile	LGOP Appendix G - Table G.11 (CO ₂) and Table G.15 (CH ₄ and N ₂ O)
Off-Road Equipment - Gasoline	7.2	8.78 kg / gallon	0.22 g / gallon	0.50 g / gallon	LGOP Appendix G - Table G.11 (CO ₂) and Table G.14 (CH ₄ and N ₂ O)
Off-Road Equipment - Diesel	7.2	10.21 kg / gallon	0.26 g / gallon	0.58 g / gallon	LGOP Appendix G - Table G.11 (CO ₂) and Table G.14 (CH ₄ and N ₂ O)
Refrigerants	7.4	N/A	N/A	N/A	LGOP

Methods:

Detailed vehicle fleet information was collected from the County of Mariposa fleet manager. The County provided the fuel and vehicle miles traveled records for Fiscal Year 09-10 and Fiscal Year 10-11, which were averaged together to estimate 2010 usage. It should be noted that the Building / Assessor are separate departments, but are combined here for ease of reporting. Activity data, shown in Table H-1, was entered into the Climate and Energy Management Suite where GHG emissions were calculated using the standard methods and emissions factors outlined in the LGOP and shown in Table H-2.

The fugitive emissions from vehicle air conditioning refrigerants were estimated using the alternate approach, which may overestimate emissions. Given the make and year of the vehicles, the refrigerant was presumed to be R-134a if the vehicle was a 1995 model or newer. The majority of automakers changed from R-12 to R-134a as the refrigerant of choice in their cars in that year. The full-charge volume of refrigerant estimated by the alternate approach is the upper bound of the range approved for the equipment type. This alternate approach estimates refrigerant leakage at the highest potential during normal use and maintenance and likely is higher than if refrigerant use was tracked directly.

Appendix I - Government-Generated Solid Waste Sector Notes

Table I-1: Government-Generated Solid Waste Activity Data Inputs

Facility Name	Activity / Source	Value	Units	Data Source
Public Works	Solid Waste	64.8	Tons	Total Waste Services
Sheriff's Department	Solid Waste	28.9	Tons	Total Waste Services
Human & Community Services	Solid Waste	13.9	Tons	Total Waste Services
County Jail	Solid Waste	6.9	Tons	Total Waste Services
Fire Department	Solid Waste	3.5	Tons	Total Waste Services
Other Departments	Solid Waste	2.3	Tons	Total Waste Services

Table I-2: Government-Generated Solid Waste GHG Calculation Methods and Emissions Factors

Activity / Source	LGOP Method	Type	Percent by Weight	Emissions Factor (metric tons CH ₄ / wet short ton waste)	Emissions Factor Source
Government-Generated Waste Characterization	12.2.2	Newspaper	1.40%	0.043	CalRecycle California 1999 Statewide Public Administration Waste Characterization Study; USCP Appendix E (Page 34) & U.S. EPA Waste Reduction Model (WARM)
		Office Paper	4.90%	0.203	
		Corrugated Cardboard	5.20%	0.120	
		Magazines/Third Class Mail	5.90%	0.049	
		Food Scraps	15.50%	0.078	
		Grass	1.90%	0.038	
		Leaves	1.90%	0.013	
		Branches	3.30%	0.062	
		Dimensional Lumber	14.50%	0.062	
		All other (Non-Organic)	45.5%	0	

Methods:

The government-generated solid waste activity data was collected from Total Waste Services and County Staff in the form of the number, size and collection schedule of bins collected in 2014. Because data for 2010 was unavailable, 2014 was used as a proxy year. The Public Works Department collects waste from the majority of Mariposa County facilities and transports waste to the corp yard where the waste is collected by Total Waste. Bins were assumed to be full. The tonnage of solid waste, shown in Table I-1, was calculated using a conversion factor of 89 lbs per cubic yard, provided by the California Integrated Waste Management Board (CalRecycle) and specifically tailored to public administration waste. Solid waste generated within Mariposa County in 2010 was transferred to the Mariposa County Landfill for disposal.

The solid waste tonnage activity data was entered into the Climate and Energy Management Suite where GHG emissions were calculated using CalRecycle's public administration specific waste characterization shown in Table I-1 coupled with standard emissions factors adopted by the California Air Resources Board, the California Climate Action Registry, ICLEI - Local Governments for Sustainability and The Climate Registry and shown in Table I-2.

Appendix J - Wastewater Treatment Sector Notes

Table J-1: Wastewater Treatment Activity Data Inputs

Wastewater Facility	Population Served	Wastewater Treated (MGD)	Nit/Denit Process (Yes / No)	Industrial Discharges (Yes / No)	Aerobic or Anaerobic	Data Source
MCPW Don Pedro	1,077	0.02382	No	No	Aerobic	Facility Operators
MCPW Lagoons	548	0.04	No	No	Anaerobic	
Septic Systems	48.1	N/A	N/A	No	Anaerobic	County Staff

Table J-2: Wastewater Treatment GHG Calculation Methods and Emissions Factors

Activity / Source	USCP Method	CH ₄	N ₂ O	Emissions Factor Source
Lagoons (population based) - no primary treatment	WW.6 (alt)	0.6 kg CH ₄ / kg BOD ₅	N/A	USCP App F page 39
Conventional Plant - no nitrification / denitrification process (population based)	WW.8	N/A	3.2 g N ₂ O / person / year	USCP App F page 43
Septic Systems (population based)	WW.11 (alt)	0.6 kg CH ₄ / kg BOD ₅	N/A	USCP App F page 52.
Effluent (population based)	WW.12 (alt)	N/A	0.026 kg N / person / day	USCP App F page 56

Table J-3: Wastewater Treatment GHG Emissions Calculation Formulas

USCP Method	Emissions Calculation Formula
WW.6(alt)	Metric Tons CH ₄ = Population x F _{ind-com} (Industrial Discharge Factor) x BOD ₅ load (0.09 kg / person / day) x Bo (0.6 kg CH ₄ / kg BOD ₅) x MCF _a (0.8 Anaerobic Methane Correction Factor) x 365.25 days / year x 10 ⁻³
WW.8	Metric Tons N ₂ O = Population X EF (3.2 g N ₂ O / person / year) x 10 ⁻⁶
WW.11(alt)	Metric Tons CH ₄ = Population x BOD ₅ load (0.09 kg / person / day) x Bo (0.6 kg CH ₄ / kg BOD ₅) x MCF _s (0.22 Methane Correction Factor for Septic) x 365.25 days / year x 10 ⁻³
WW.12	Metric Tons N ₂ O = N load (kg / day) x EF _{effluent} (0.005 kg N ₂ O / kg N discharged to river / stream) x 365.25 days / year x 44/28 (N ₂ O / N) x 10 ⁻³

Methods:

Wastewater Treatment Facility Process and Fugitive Emissions

Wastewater treatment facility electricity and fuel use is reported in the Buildings and Facilities sector. Wastewater process emissions associated with wastewater facilities operated by Mariposa County were calculated using the same methods as the community-wide GHG inventory. Wastewater can be treated using either: conventional plants (with or without nitrification / denitrification processes and with or without anaerobic digesters), lagoons, or septic systems. There are two emissions associated with these processes: methane (CH₄) and nitrous oxide (N₂O). Calculating the makeup and amount of emissions depends on the processes involved and the management practices employed.

In 2010, Mariposa County operated four wastewater treatment plants (WWTPs). One conventional plant, Don Pedro WWTP, and three treatment lagoon facilities. Additionally, several County facilities are served by septic systems. Don Pedro did not use a nitrification/denitrification process, nor was there any significant industrial discharge into the systems. Don Pedro treated the wastewater aerobically. The anaerobic lagoons had no primary treatment, and no industrial discharge into them. The WWTP characteristics shown in Table J-1 were collected from county staff. The wastewater treatment activity data was entered into the Climate and Energy Management Suite where GHG emissions were calculated using the standard methods and emissions factors from the USCP shown in Table J-2 and formulas shown in Table J-3.

Wastewater Uncertainties

According to the latest EPA national inventory of greenhouse gas emissions considerable uncertainty exists within any of the EPA/IPCC-based methodologies used to estimate wastewater process and fugitive emissions. EPA states that population-based methane emissions could be underestimated by 37% or over-estimated by 47% while nitrous oxide emissions could be underestimated by 76% or over-estimated by 93%. Emissions estimates based on direct source measurements have higher accuracy and less uncertainty. This extreme degree of uncertainty exists because these methodologies were originally developed for international countrywide inventories that were mainly population-based. By necessity, these methodologies were generalized “top-down” approaches that sought to provide emissions estimates for countries where detailed information would be impractical to obtain. Although these methodologies had the advantage of being relatively simple to calculate, the trade-off was a compromised level of accuracy. Nevertheless, the methodologies in this Appendix reflect the evolution of knowledge since the development of the LGOP.

In this inventory, emission from the wastewater treatment plants operated by Mariposa County were calculated using population-based calculation methods do to the lack of direct source measurement. The emissions from these facilities have higher uncertainty and caution should be exercised in drawing conclusions or establishing policy on these facilities until direct source measurement data is available and the inventory can be updated.

Appendix K - Solid Waste Management Sector Notes

Table K-1: Solid Waste Management Activity Data Inputs

Activity / Source	Type	Value	Units	Data Source
Mariposa County Sanitary Landfill	Year opened / closed	1970 / present		Greg Ollivier, Mariposa County Solid Waste Manager
	Rainfall	33	Inches / year	NOAA
	Associated k value	0.038		U.S. EPA

Table K-2: Solid Waste GHG Calculation Methods and Emissions Factors

Activity / Source	LGOP Method	CO ₂	CH ₄	N ₂ O	Emissions Factor Source
Solid Waste Management	9.3.1	N/A	Varies	N/A	California ARB First Order Decay Model

Methods:

The California ARB First Order Decay (FOD) model was used to estimate emissions from the Mariposa County Landfill. Inputs to the FOD model are shown in Table E-3. Based on guidance from Mariposa County staff it was assumed the Mariposa County Sanitary Landfill accepted and stored solid waste between 1970 to the present. The facility has no landfill gas capture system. Solid waste landfilled from 1995 to 2010 at the Mariposa County Landfill was collected from CalRecycle Solid Waste Information System. Waste landfilled from 1970 to 1995 was estimated using the U.S. average pounds per person per day solid waste landfilled adjusted by the ratio of Mariposa County average pounds per person per day to the U.S. average from 1995 to 2010.

Appendix L - Employee Commute Sector Notes

Table L-1: Employee Commute Activity Data Inputs

Vehicle Type	Fuel Type	Vehicle Miles Traveled	Average Miles Per Gallon	Data Source
Passenger Vehicles	Gasoline	1,652,867	27	Employee Commute Survey
	Diesel	21,029	40	Employee Commute Survey
Light Trucks	Gasoline	859,396	17	Employee Commute Survey
	Diesel	26,693	18	Employee Commute Survey

Table L-2: Employee Commute GHG Calculation Methods and Emissions Factors

Activity / Source	LGOP Method	CO ₂	CH ₄	N ₂ O	Emissions Factor Source
Passenger Vehicles - Gasoline	12.2.1	8.78 kg / gallon	0.02780 g / mile	0.02940 g / mile	LGOP Appendix G - Table G.11 (CO ₂) and Table G.15 (CH ₄ and N ₂ O)
Light Trucks - Gasoline	12.2.1	8.78 kg / gallon	0.03146 g / mile	0.04331 g / mile	LGOP Appendix G - Table G.11 (CO ₂) and Table G.15 (CH ₄ and N ₂ O)
Passenger Vehicles - Diesel	12.2.1	10.21 kg / gallon	0.0005 g / mile	0.0010 g / mile	LGOP Appendix G - Table G.11 (CO ₂) and Table G.15 (CH ₄ and N ₂ O)
Light Trucks - Diesel	12.2.1	10.21 kg / gallon	0.00099 g / mile	0.00149 g / mile	LGOP Appendix G - Table G.11 (CO ₂) and Table G.15 (CH ₄ and N ₂ O)

Methods:

Employee commute emissions were calculated by first conducting a survey of current employees regarding commute distance, mode and frequency. Vehicle miles traveled (VMT) and average miles per gallon (MPG) were estimated from the survey data and extrapolated to the number of employees in 2010. The VMT activity data, shown in Table L-1, was then entered into the Climate and Energy Management Suite where GHG emissions were calculated using the methods from the LGOP and emissions factors shown in Table L-2. The calculated average MPG for each vehicle and fuel type was used to convert VMT to fuel use for the CO₂ emissions calculations.