Chapter 6

Green Funding Trends, Constraints and Opportunities

Introduction

The purpose of Chapter 6**,** *"Green Funding Trends, Constraints and Opportunities,"* is to gain an understanding of existing and future "green-funding" trends and opportunities that have formed or will likely form as a result of the passage and implementation of greenhouse gas reduction legislation. This section will catalog and describe federal, state, and local policies and programs that reveal existing or probable future funding sources to implement said actions. This section will also list strategies that will be needed by the City of Merced to position the City to be eligible for and to benefit from these funding sources. Such strategies may include the adoption of master planning documents; the adoption of fee programs; and the ability to provide matching funds for Project improvements.

This assessment is presented as follows:

- Chapter Findings
- A Catalog of Climate Change Related Laws and Programs

Chapter Findings

1. There are multiple grant and loan programs through federal, state and regional programs that can fund greenhouse gas emission reduction programs.
2. In addition to grants, financial incentives from the State of California are available to assist local governments and communities to implement greenhouse gas emission reduction efforts. The form of the incentives are varied, and include rebates, reduced upfront costs, tax exempt status, subsidies, low interest loans and funding sources.

Catalog of Climate Change Related Programs

STATE OF CALIFORNIA FUNDING AND PROGRAM OPPORTUNTIES

Financial incentives from the State of California are available to assist local governments and communities to implement greenhouse gas emission reduction efforts. The form of the incentives are varied, and include rebates, reduced upfront costs, tax exempt status, subsidies, low interest loans and funding sources. The presentation below is a catalog and description of "Green Funding Trends,

Constraints and Opportunities," and is organized into five groups based on common goals and themes. The goal of each group is identified below:

- The "Open Space Group"
- The "Building Efficiency Group"
- The "Green Jobs Group"
- The "Alternative Transportation"
- The "Motor Vehicle, Small Engines and Equipment Group"

Through recently funded grants from the Sustainability Community Planning Grants from the California Strategic Growth Council, the following California communities will be preparing Climate Action Plans; Concord, Stockton, San Mateo, Yuba County, Kings County and Western Riverside County.

FEDERAL-RELATED FUNDING AND PROGRAM OPPORTUNTIES

The Federal Government provides many opportunities for states and local governments to engage in sustainable energy practices to reduce greenhouse gas emissions. While many federal agencies are involved in this effort, these agencies are engaged in notable programs:

- Environmental Protection Agency
- Department of Energy
- Department of Agriculture
- Department of Transportation

These state and federal funding and program opportunities to reduce greenhouse gas emissions are summarized in Tables 6-1 and 6-2 respectively; a detailed description of these and other opportunities are presented in Appendices B and C respectively.

Table 6-1: State of California Green Funding & Program Opportunities					
Program Name	**Originating Regulation**	**Status**	**Agency**	**Funding**	**Other Resources**
Urban Greening for Sustainable Communities Program	Proposition 84	Voluntary	California Strategic Growth Council	Bond	25% of funds can be used for preparation of comprehensive greening plan
Urban Greening Plans	Proposition 84	Voluntary	California Strategic Growth Council	Bond	
Energy Partnership Program		Voluntary	California Energy Commission	Low Interest Loans	Max. $20,000 grant for project consultant fees
Energy Efficiency and Conservation Block Grant Program		Voluntary	California Energy Commission	Grant	
Hybrid Truck and Bus Voucher Incentive Project	Assembly Bill 118	Voluntary	California Air Resources Board	Voucher	
Zero-Emission Vehicle and Plug-In Hybrid Light-Duty (Clean Vehicle) Rebate Project	Assembly Bill 118	Voluntary	California Air Resources Board	Rebate	
Lawn and Garden Equipment Replacement Project	Assembly Bill 118	Voluntary	California Air Resources Board	Voucher or Rebate	
Zero-Emission Agricultural UTB Rebate Project	Assembly Bill 118	Voluntary	California Air Resources Board	Rebate	

Table 6-1: State of California Green Funding & Program Opportunities					
Program Name	**Originating Regulation**	**Status**	**Agency**	**Funding**	**Other Resources**
Advanced Technology Demonstration Projects	Assembly Bill 118	Voluntary	California Air Resources Board	Grant	
Goods Movement Emissions Reduction Program	Proposition 1B	Voluntary	California Air Resources Board	Grants/ Incentives	
Carl Moyer Memorial Air Quality Standards Attainment Program		Voluntary	California Air Resources Board	Grants	
Sales Tax Exemption for Alternative Energy Manufacturing Equipment	Senate Bill 71	Voluntary	California Alternative Energy and Advanced Transportation Financing Authority (CAEATFA)	Tax Exemption	
Property Tax Exclusion for Solar Energy Systems	California Revenue and Taxation Code/ Assembly Bill 1451	Voluntary	California State Board of Equalization	Tax Exclusion	
REMOVE II Program		Voluntary	San Joaquin Valley Air Pollution Control District	Grants/ Incentives	
Savings By Design		Voluntary	California Public Utilities Commission	Grants/ Incentives	Design services, project consultation

Table 6-1: State of California Green Funding & Program Opportunities					
Program Name	**Originating Regulation**	**Status**	**Agency**	**Funding**	**Other Resources**
California Communities Lease Finance Program (CaLease)	Joint Exercise of Powers Act	Voluntary	California Statewide Communities Development Authority	Low-Cost, Tax-Exempt Financing	
California First		Voluntary	California Statewide Communities Development Authority	Property Assessed Clean Energy (PACE) Financing (Renewable Funding)	
Commercial/ Industrial Lighting Program		Voluntary	Merced Irrigation District	Rebate	
Solar Incentive Program		Voluntary	Merced Irrigation District	Rebate/ Incentives	
Commercial New Construction Program		Voluntary	Merced Irrigation District	Rebate	
Customized Commercial/ Light Industrial Retrofit Pro-		Voluntary	Merced Irrigation District	Incentives	

Table 6-2: Federal Green Funding & Program Opportunities					
Program Name	**Originating Regulation**	**Status**	**Agency**	**Funding**	**Other Resources**
Energy Efficiency Community Block Grant	American Reinvestment and Recovery Act	Voluntary	IRS	Grants	
The State and Action Climate Partner Network		Voluntary	EPA	No Funding	
It All Adds Up to Cleaner Air		Voluntary	US Dept. of Transportation	No Funding	Offers free material: commercials, brochures, billboards
Energy and Climate Change: Programs, Tools & Resources…	Clean Air Act	Voluntary	EPA	No Funding	EMS: Environmental Management System
Partnership for Sustainable Communities		Voluntary	EPA, USDOH & UD, USDOT	No Funding	
Climate Leaders		Voluntary	EPA	No Funding	
Environmentally Preferable Purchase		Voluntary	EPA	No Funding	Small Businesses
Green Communities		Voluntary	EPA	No Funding	
Cap and Trade Program(s)	Clean Air Act	Voluntary	EPA	Grants	
Lugar Practical Energy and Climate Plan	Cap and Trade	Voluntary	Senator Dick Lugar	No Funding	

Table 6-2: Federal Green Funding & Program Opportunities					
Program Name	**Originating Regulation**	**Status**	**Agency**	**Funding**	**Other Resources**
Home Start Energy Retrofit Act of 2010		Voluntary	House of Reps.	Rebate	$23 per American, over 2010-2015 year
Water System Adaptation Partnership Act of 2009	HR 2969	Voluntary	House of Reps.	Grants	

Chapter 7

Co-Beneficial Goals, Activities and Benefits

Introduction

The purpose of Chapter 7, "Co-Beneficial Goals, Activities and Benefits," is to define and increase the awareness of activities in which the City has been or could be engaged in, that either pre-existed the concern of Climate Change or whose origin was based in a different need, but which also has the effect of reducing greenhouse gas emissions. For example, while a primary purpose of water conservation is to extend a communities' water supply, certain methods of water conservation could reduce greenhouse gas emissions, for example, through reduced energy demand and therefore reduced emissions for pumped water.

This assessment is presented as follows:

- Chapter Findings
- A catalog and description of a broad-range of actions that do, or could have a positive effect on the reduction of greenhouse gas emissions.

Chapter Findings

1. There are several laws outside of AB32 that local governments must already comply with, and which have a secondary effect of reducing greenhouse gas emissions. For example:
    - SB97 regarding CEQA; and
    - the requirement under SB x 7 to reduced per capita water consumption by 20% by 2020;

2. Originating at the state level, the AB32 Scoping Plan requires reductions in greenhouse emissions that will indirectly affect local communities', for example, the Green-Fuel Standard and Green Building Code.

3. Many "green" programs existed prior to AB32 and can be tapped for both their primary purpose and to reduce greenhouse gas emissions, for example Urban Forest Programs.

Catalog of Co-Beneficial Laws and Programs

This catalog and description of GHG reducing actions is organized into five groups based on common goals and themes. The goal of each group is identified below:

- The "Water Conservation Legislation Group" contains laws recently passed by the state that pertain to increasing water conservation, but may have many benefits beyond those goals including energy conservation or financial gains.
- The "Business and Job Creation Legislation Group" contains laws recently passed that promote growth and stability in the local economy, but also are tied to the green economic sector.

> At the same time that climate change and energy issues present numerous economic challenges, they also create new economic development opportunities, including: (a) A growing number of companies are embracing environmental policies, and investors are pumping hundreds of billions of dollars into cleaner and renewable energies; (b) The emerging green economy is driving invention, innovation, and the imagination o engineers; and (c) Many companies now perceive that going green improves their bottom line.
>
> The *Climate Prosperity Project* – an initiative involving the International Economic Development Council (IEDC) to help economic development professionals in the United States and abroad develop regional "climate prosperity" strategies – identifies three key areas of economic development opportunity: (a) Energy Cost Savings for Businesses; (b) New Market Opportunities; and (c) Workforce Development (APA, 2010a)

- The "Regulatory Tools Group" contains laws recently passed that work to promote greenhouse gas reducing opportunities, or ensure that new greenhouse gas reduction laws and plans are not in conflict with previous legislation.
- The "Incentives Group" contains opportunities for monetary assistance in areas that are not typically considered greenhouse gas related.
- The "Community Development Group" contains programs and activities not typically implemented for the reduction of greenhouse gases that could be incorporated into the City's plans for development.

Within the discussion of each "group" are two informational categories titled *Co-benefit* and *Ranking*. Co-benefits relay all the possibly shared goals or benefits the item may have. Ranking classifies the item as either *Required* or *Voluntary*. A summary presentation (Table 7-1) of the GHG reducing actions follows; a detailed description of each item is presented in Appendix D.

Table 7-1: Programs with Co-Benefits to Greenhouse Gas Emission Reduction Efforts					
Program Name	**Originating Regulation**	**Status**	**Agency**	**Funding**	**Other Resources**
1. Water Conservation	SB 7	Required	California Department of Water Resources	No Funding-	
2. Water Conservation in Landscaping	AB 1881	Required	California Department of Water Resources	No Funding-	Model Ordinance Available
3. Contractual Assessments: Water Efficiency Improvements	AB 474	Voluntary		No Funding-	
4. Common Interest Developments: Water-Efficient Landscapes	AB 1061	Required		No Funding-	
5. CA Plumbing Code Ch 16 – Grey Water	2006 American National Standard Uniform Plumbing Code	Voluntary	International Association of Plumbing and Mechanical Officials	No Funding-	Design, standards and maintenance resource
6. Urban Water Management Planning	AB 1465	Required	CUWC	No Funding-	
7. Energy Consumption Data Disclosure	AB 531 AB 1103	Required	CEC	No Funding-	EPA Energy Star portfolio
8. Net Energy Metering	AB 510	Voluntary		No Funding-	Payment for energy contributions to grid for consumers
9. Renewable energy Resources	AB 1031	Voluntary	CA Public Utilities Commission	No Funding-	Reduced energy cost/ payments for universities
10. Green Building Standards	AB 210 California Building Standards Law	Voluntary		No Funding-	

Table 7-1: Programs with Co-Benefits to Greenhouse Gas Emission Reduction Efforts					
Program Name	**Originating Regulation**	**Status**	**Agency**	**Funding**	**Other Resources**
11. Local government: organization	SB 215 Cortese-Knox-Hertzberg Act	Voluntary		No Funding-	
12. Sales and use taxes: motor vehicle fuel tax: diesel fuel tax	ABX8 6 Sales and Use Tax Law	Required	Cal-Transit	No Funding-	
13. Highway Safety, Traffic Reduction, Air Quality, and Port Security Bond Act of 2006	AB 672	Voluntary	CA Transportation commission	Y	Reimbursement available
14. Solar Thermal and Photovoltaic Powerplant Siting	SBX8 34 US-Prop 1B	Voluntary	ERCDCDFG CESA	No Funding-	Quickens approval process
15. California Farmland Conservancy Program		Voluntary	CSCP	Grants	
16. Smart Rebates	AB 1465	Voluntary	CUWC	Rebates	
17. Reuse Assistance Grant Program		Voluntary	CalRecycle	Grants	
18. California Urban Water Conservation Council		Voluntary	CUWC	No Funding-	Best management practices, prof assistance
19. CA Low Impact Development		Voluntary	CA-EPA WRCB	No Funding-	Prof Assistance, tools

Table 7-1: Programs with Co-Benefits to Greenhouse Gas Emission Reduction Efforts					
Program Name	**Originating Regulation**	**Status**	**Agency**	**Funding**	**Other Resources**
20. Green Roof Programs		Voluntary	US-EPA	No Funding-	Prof assistance
21. Urban Forest Programs		Voluntary		No Funding-	Model programs available
22. Urban Forester Certification Program		Voluntary	CA Urban Forest Council	No Funding-	Prof assistance
23. i-Tree		Voluntary	USDA- Forest Service	No Funding	Assess monetary returns and maintenance costs
24. Youth Involvement Grants		Voluntary	Multiple	Grants	
25. Community Garden Grants		Voluntary	Multiple	Grants	Model programs available

Chapter 8

2008 Greenhouse Gas Emission Baseline Inventory

Introduction

The purpose of the 2008 Greenhouse Gas Emission Baseline Inventory Chapter is to allow estimate and track the greenhouse gas (GHG) emissions from energy and waste related activities at the "Community-wide" scale and those resulting directly from "Local Government" operations. In our analysis, the local government operation is a subset of the community inventory. Both the community and local government inventories will provide a basis for forecasting emission, finding an obtainable reduction target, and implementing projects for emission reduction.

This assessment is presented as follows:

- Summary of Findings and Conclusions
- Inventory Methodology
- 2008 GHG Emission Estimates

The summary provides a description of GHG emissions that emit from various sectors within the community, including those from local government operations. The methodology section describes how the 2008 baseline year GHG emission inventory was prepared, and introduces background information and key terms needed to better understand the inventory. The section on emission estimates describes the input and results of the emission inventory.

The City of Merced 2008 GHG Emission Inventory has multiple purposes: (a) to establish a standard reporting procedure that can be replicated; (b) to guide to City staff and City Council to direct future emission targets and program implementation; (c) to identify those emission sources and amounts that have the greatest emission-reduction potential; and (d) to provide a baseline against which to compare future changes in emissions, thereby demonstrating the effectiveness of various GHG reduction strategies.

The baseline year of 2008 was selected because it was the most recent year having the most complete data set available for analysis.

UNDERSTANDING CATEGORIES AND SECTIONS

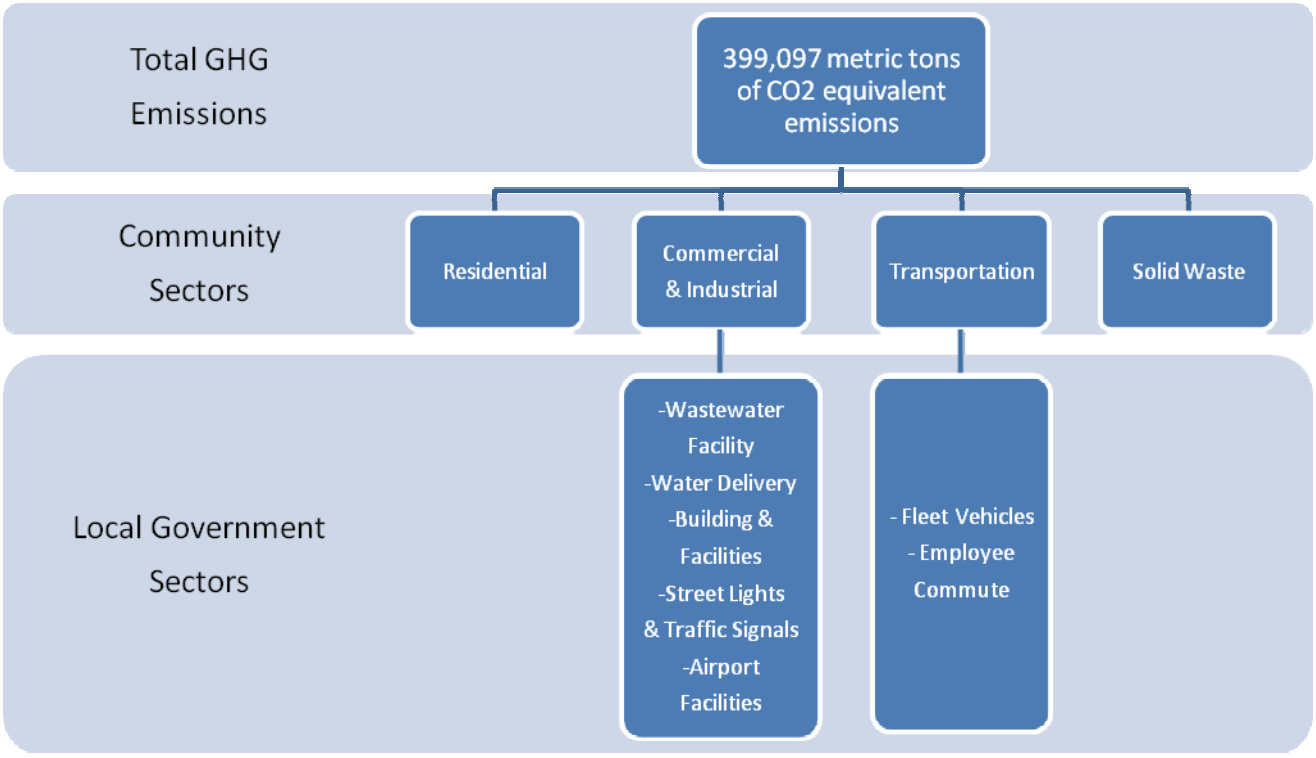
Using the software and Local Government Operation Protocol, "Community" and "Local Government" categories were created to assist with the data analysis. Within these categories, a variety of emission sectors exist.

The "Community" category consists of four sectors: (1) Residential; (2) Commercial/Industrial; (3) Transportation; and (4) Solid Waste.

The "Local Government" category consists of seven sectors: (1) Wastewater Facilities; (2) Water Delivery Facilities; (3) Building and Facilities; (4) Street Lights and Traffic Signals; (5) Fleet Vehicles; (6) Employee Commute; and (7) Airport Facilities.

Although presented separately, "Local Government" is a subset of "Community" and represents a more detailed analysis of the emissions. This allows the City of Merced to be able to focus on areas that it can have immediate impact on. This relationship is depicted in Figure 8.1 below:

Figure 8.1: Relationship of "Community" and "Local Government" Sectors



Chapter Findings

1. The "Community" sector, which is includes "Local Government" emissions, emitted approximately 399,097 metric tons of CO2 equivalent emissions in 2008. The "Local Government" sector, a subcomponent of the "Community," emitted approximately 17,655 metric tons of GHG emissions in 2008, which represents approximately 4% of the emissions produced by the "Community," a ratio that is normal for many cities and counties.

2. GHG emissions from residential uses amounted to about 104,457 metric tons of CO2e, which represents about 26% of the total Community emissions.

2. The commercial and industrial GHG emissions for the baseline year of 2008 amounted to 147,974 metric tons of CO2e, which represent about 36% of the overall Community emissions for the City of Merced.

3. Transportation-related GHG emissions, estimated at 145,563 metric tons of CO2e, amounts to 36% of the overall Community emissions.

5. GHG Emissions from waste-related emissions amounted to 10,335 metric tons of CO2e which represents 3% of the total emissions for the Community.

Figure 8.1 depicts the relationship between the "Community" and "Local Government" Emissions. Figure 8.2 and Figure 8.3 depict the amount of emissions from the various sectors within the "Community" and "Local Government" categories.

Figure 8.1 "Community" vs. "Local Government"

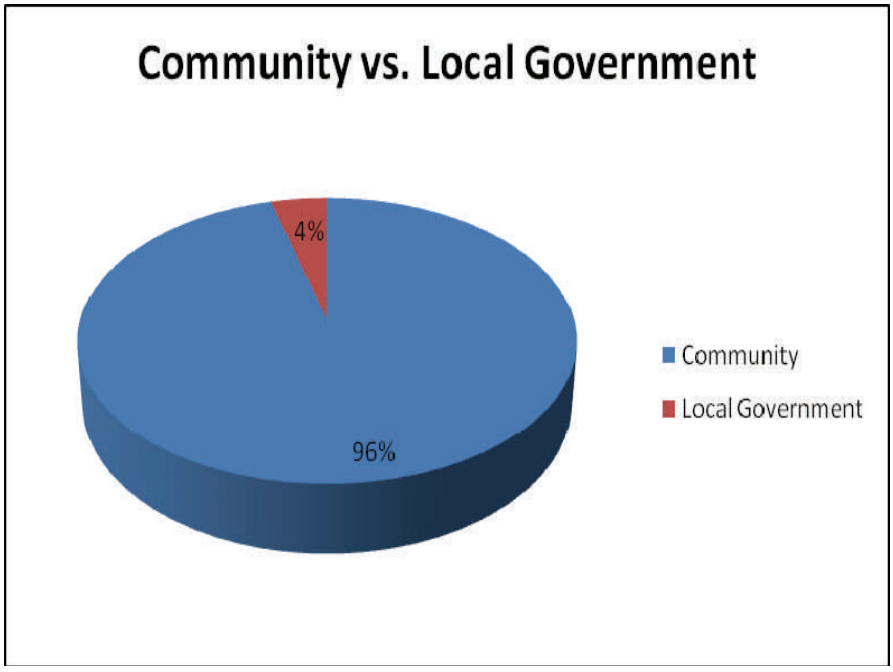


Figure 8.2 “Community” Emissions

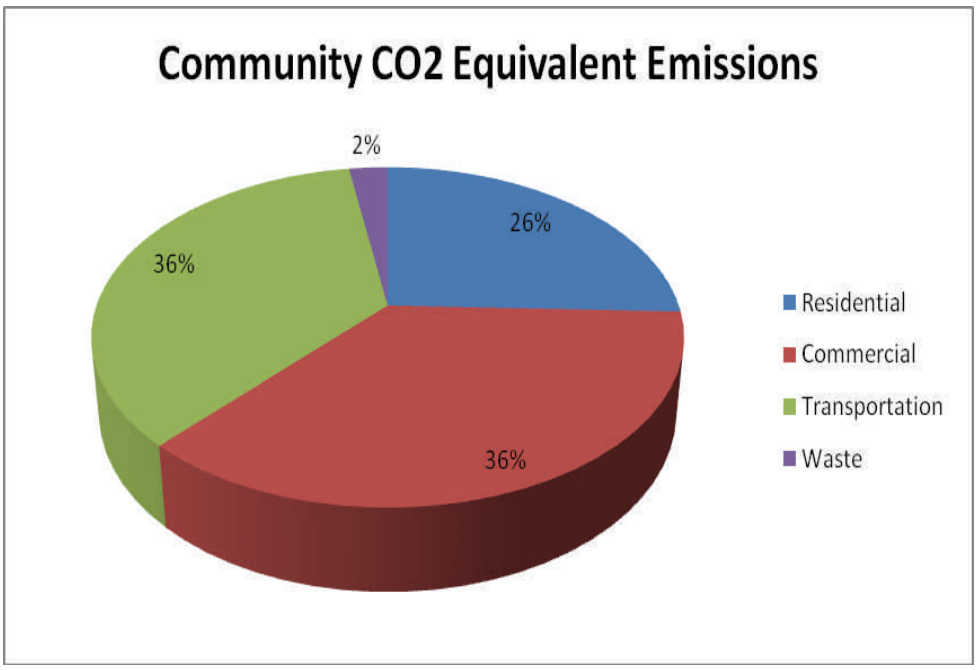
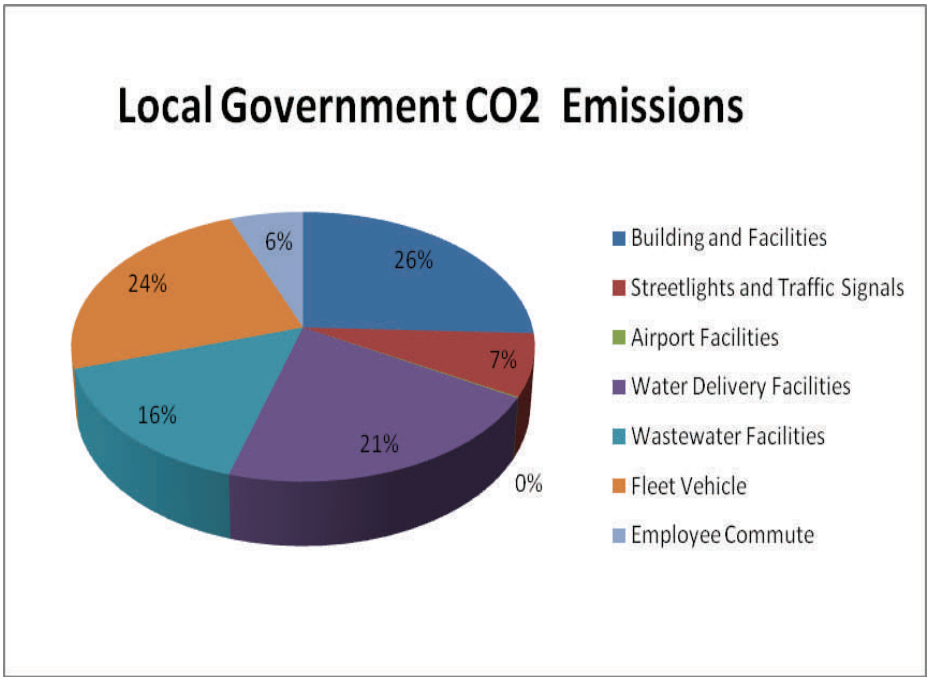


Figure 8.3 “Local Government” Emissions



INVENTORY METHODOLOGY

This Section describes the basic terminology and methodology utilized in developing this inventory to provide a more clear understanding of how the results were calculated and reported.

TERMINOLOGY

Carbon Dioxide Equivalents

The main greenhouse gases discussed in this chapter are carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O). There are other gases such as chlorofluorocarbons (CFCs) and hyrdochlorofluorocarbons (HCFCs) that are taken into account but do not have as large as an impact as the other gases. Greenhouse gases are continuously removed from and emitted into our atmosphere through natural activities such as respiration by animals or plants; however, our main concern is with the extra of all greenhouse gases being released into our atmosphere by equipment and other tools humans use to operate society.

In order to measure these extra gases, all gases can be expressed in CO_2 equivalent terms. This allows us to quantify our CO_2 emissions in one number rather than 12 different gases separately. GHG totals are expressed in metric tons, and in terms of carbon dioxide equivalents (CO_2e). To determine the CO_2 equivalent amounts for non- CO_2 gases, a multiplying factor called the Global Warming Potential is used.

Global Warming Potential

Global Warming Potential (GWP) represents a measurement of the heat trapping ability of each GHG relative to that of CO_2. For carbon dioxide itself, emissions in tons of CO_2 and tons of CO_2e are identical. According to the Local Government Operation Protocol, the GWP of methane is 21 because one metric ton of methane has 21 times more ability to trap heat in the atmosphere than one metric ton of carbon dioxide. Note, however, that there is a minuscule amount of CH4 emitted into the atmosphere compared to CO_2.

How much is a Metric Ton of Carbon Dioxide (CO2)?

1 metric ton = 2,205 pounds. One pound of CO2 can fill 120 party balloons. That means that one metric ton of CO2 could fill more than 250,000 party balloons.

Outside Generation

The City of Merced does not have any commercial scale power plants or natural gas generators within its City limits, therefore most energy consumed in the City is produced outside of the community and imported into Merced. Although these emissions are not directly emitted within Merced, the inventory includes them since the demand for said energy originated in Merced.

Carbon Footprint

An emissions inventory incorporates emissions directly caused by actions taken within community. A carbon footprint, on the other hand, encompasses greenhouse gas emissions from the entire life cycle of a product or service. This could include the emissions from raising beef for sale at the supermarket or the fuel consumption associated with residents‟ flights out" of the Merced Airport for vacation. This emission inventory does not estimate the community's carbon footprint.

EMISSION INVENTORY STRUCTURE AND TOOLSET

This section describes the structure of the inventory and the tools used to examine our available data. The City of Merced chose the International Council for Local Environmental Initiatives (ICLEI) to assist with this GHG Emission Inventory. ICLEI's Clean Air and Climate Protection (CACP) Software was used to organize and analyze the given data set.

ICLEI Membership and GHG Emission Software

The City of Merced became a member of the International Council for Local Environmental Initiatives (ICLEI) in March 2010. Membership provided the City with a number of informational sources and access to GHG estimation software. The ICLEI software and protocol was used to organize the data and to generate information for the City of Merced 2008 GHG emission inventory. This inventory is prepared using ICLEI Protocol Version 1.0 (2008) and CACP 2009-Version 2.2 Software. This software is set up to specifically follow the ICLEI Protocol requirements, organization, and desired outputs. The software is able to estimate emissions derived from energy consumption and waste generation within a community and local government. Also the CACP software determines emissions using specific emission factors according to the type of fuel used. Emissions are aggregated and reported in terms of carbon dioxide equivalents or CO2e.

The amount of GHG emissions was examined for both "Community" and "Local Government" categories, consistent with the format of the emission software. Although presented separately, "Local Government" emissions are also a subset of "Community" emissions to avoid duplication, which would overestimate the GHG totals. The software allows data input and output of reports that comply with Local Government Operations Protocol (LGOP).

Local Government Operation Protocol (LGOP)

California local governments that have taken an active role in reducing GHG emissions, have expressed a need for a set of methodologies and data sources to inventory the GHG emissions from their government operations and to quantify the emissions impact of local government policies and programs. The California Air Resources Board (CARB) has partnered with the Climate Action Reserve (CAR), The Climate Registry (TCR), and ICLEI to develop the Local Government Operations Protocol (LGOP) for GHG assessment. The LGOP provides guidance on how to inventory GHG emissions resulting from government buildings and facilities, government fleet vehicles, wastewater treatment and potable water treatment facilities, landfill facilities, and other operations.

The City of Merced followed the Local Government Operation Protocol (LGOP) and used the International Council for Local Environmental Initiatives (ICLEI) to assist with the data organization, entry, and analysis in order to create a GHG Emission Inventory.

Emission Scopes

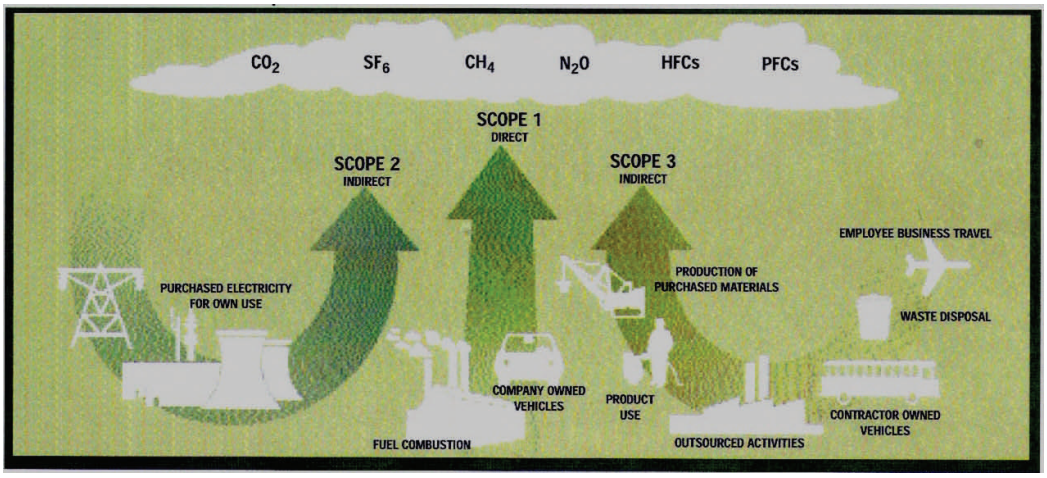
For local government operations, LGOP categorizes emissions according to what degree of control local governments have over the emissions sources. These categorizations (developed by the World Resources Institute and the World Business Council for Sustainable Development) are called *emissions scopes.* The scopes framework helps local governments to (a) determine which emissions should be inventoried; (b) organize emissions by degree of control and therefore the potential for reduction of these emissions; and (c) avoid "double counting" of emissions. There are three levels of "Emission Scopes" described below:

- *Scope 1:* Direct GHG Emissions. A direct emission source is an "on-site" source of emissions such as fuel in a vehicle engine. It also includes heating of buildings with natural gas or other on-premise fuels, like propane.

- *Scope 2:* Indirect GHG Emissions. Indirect emissions can be defined as emissions produced off -site, specifically electricity consumption. Electric utility that produces electric power within City limits would be considered a Scope 1 source. Scope 2 can also include acquired steam, as occurs in some jurisdictions and complexes.

- *Scope 3:* Includes all other indirect emissions not covered in Scope 2, such as employee commutes and waste disposal outside of City Limits.

Figure 8.4: Emission Scopes



The existing ICLEI inventory Protocol applies only to the "Local Government" category, and further to just the Scope 1 and 2 emissions. There is no adopted protocol for the "Community" category, or Scope 3 emissions. It is recommended that the "Community" analysis follow the ICLEI Protocol, to the extent possible. It is similarly recommended that Scope 3 emissions be included for refuse and employee commute. Emission scopes for each emission source not already described above are listed in the *GHG Emission Estimate* section of this report.

ICLEI, in conjunction with CARB and other stakeholders, are working toward creating protocols for the "Community" and Scope 3 type emissions (adoption may occur as early as December 2010). The proposed Scope 3 protocol will look at GHG emission activities it took to produce something that

was consumed later in the City and what happens to it after the main use. Scope 3 protocol will affect future updates and is far reaching.

Emission and Data Sources

Each sector of the community and local government categories has "emission sources" and corresponding "scopes" and "data sources." For example, the residential sector within the community category has three potential emission sources: electricity, natural gas and wood-burning. The use of fossil fuels in vehicles, heating, and the generation of electricity represents the largest emission sources of the inventory. The inventories primary data source came from PG&E and MID records for electricity consumption; PG&E also provided natural gas consumption data. The data from each utility was labeled and entered as separate items in the software. This allows output reports, tables, and figures to show data separately or combined. Emission and data sources not covered by PG&E and MID are listed in the *GHG Emission Estimate* section of this report.

Data not included in the Emission Inventory

This inventory is the first effort of the City of Merced to estimate GHG emissions. While the City of Merced attempted to include at least 95% of all emissions, such effort is challenging due to unavailable or insufficient data to provide an accurate analysis. Therefore, emissions from the following emission sources were omitted from the inventory:

- Fugitive and Processed Emissions
- Industrial Specific Processes
- Equipment at landfill to manage wastes
- Mobile source refrigerants
- Off-Road Equipment
- Residential Wood Burning

As more data become available, future adjustments and projections to the City of Merced GHG Emission Inventory will occur.

2008 GHG EMISSION ESTIMATES

INTRODUCTION

This section describes what emission data was collected for the different emission source-types within the "Community" and "Local Government" categories. By reporting the detailed GHG emissions of various sectors allows the City and the community to concentrate reduction efforts in high emission sectors and to track changes in emissions through time. The "2008 GHG Emission Estimate" Section begins by providing an overview of the inventory results. A more detailed presentation of the emission estimates from the "Community" and "Local Government" categories are provided after this summary. Note that City Staff prepared the "Local Government" sector emission inventory to be more detailed than the "Community" sector, because local governments have more control over their own operations than activities in the community, and is therefore the area in which the City will most likely be able to directly affect emission reductions.

COMMUNITY EMISSION SECTOR ANALYSIS

The Community Analysis includes the GHG emissions of the City of Merced as whole, including the local government operations. It describes general emission sources which can assist community individuals and groups to initiate actions that will result in future GHG emission reductions.

This inventory utilized the ICLEI-provided CACP Version 2.2 software, which includes the following emission sectors: residential; commercial and industrial; transportation (on-road and off-road); and waste (trash and garbage). Note that the "Community" category includes just those lands that are within the City Limits of Merced.

Table 8-1 shows the 2008 GHG emission estimates for various sources of GHG emissions within the "Community" category. Also see Figure 8-2,

Table 8-1: YR 2008 Community CO2 Equivalents Emissions

Sectors	Metric Tons	%
Residential	104,457	25.58
Commercial/Industrial	147,974	36.23
Transportation	145,563	35.64
Solid Waste	10,335	2.53
Totals	408,329	100

Residential Emissions

In Table 8.1, GHG emissions for Residential Emissions amounted to about 104,457 metric tons of CO2e, which represents about 26% of the total Community emissions.

All Residential sector emissions are the result of electricity and the on-site combustion of natural gas utilized throughout all residential uses in the City including single-family homes, duplexes, apartments, townhomes and condominiums. Data was provided by PG&E and MID

Emission Source 1: PG&E and MID provided electricity use data; PG&E provided data for natural gas. PG&E provided data separated into "City," which is the local government energy consumption and "Non-Government" which represented the rest of the community. The numbers were totaled and entered in as "Community." The emission factor provided by PG&E was used to analyze data from MID.

Emission Source 2: Information on wood burning (scope 1) was not readily available from PG&E or the San Joaquin Air Pollution Control District.

Commercial and Industrial Emissions

The commercial and industrial GHG emissions for the baseline year of 2008 amounted to 147,974 metric tons of CO2e, which represent about 36% of the overall Community emissions for the City of Merced.

This sector includes emissions from both commercial and industrial buildings. The emissions included are the result of electricity and the on-site combustion of natural gas from the operation of businesses as well as public agencies within the City of Merced.

Emission Source 1: Commercial and industrial emissions are essentially associated with use of electricity and natural gas to power and heat buildings. PG&E and MID aggregate their energy use data for the commercial and industrial sectors into one "commercial" sector. The data is stored as a single figure because PG&E's 15/15 rule protects the confidentiality of their customers through such aggregation.

Emission Source 2: With respect to powering commercial and industrial processes, it should be noted that emissions associated with individual processes were not calculated for most sources, because facility-specific information is not available and is often considered a confidential trade secret.

Transportation

Table 8.1 shows that transportation GHG emissions amount to 36% of the overall Community emissions which was about 145,563 metric tons of CO2e. Only the on-road emissions were included in this section due to the inefficient data that Merced could obtain on "off-road" emissions.

Emission Source 1: On-Road Emissions includes the vehicle-miles traveled (VMT) (scope 1) on local roads and State highways/freeways. The local road VMT for Merced Communities can be found in Caltrans Highway Performance Monitoring System Data Reports. We did not use the VMT calculator provided because it was a large over estimation. Instead, the VMT data for State Highways within Merced City Limits was taken from Caltrans Public Road Data Report – 2008. Merced has no Interstate Highway, so the two Caltrans source documents described above were able to provide the needed transportation "on-road" data for Merced-City Limits.

Emission Source 2: Off-Road Emissions were not included in this GHG emission inventory because these numbers are difficult to collect and verify. This is an area where future updates can expand beyond this inventory, including reviewing and evaluating possible computer downloads of off-road models.

Off-road equipment includes: recreational boats and vehicles, industrial equipment, airport ground support, military, rail operation, lawn mowers, power hand tools, construction equipment, and agriculture.

Solid Waste

The waste emissions amounted to only 10,335 metric tons of CO2e which represents only 3% of the total emissions for the Community category of the City of Merced.

The landfill utilized by the City of Merced for waste disposal is not in located in the City Limits, nor owned by the City. Waste originating from the 'Community" and "Local Government" is placed in the landfill and is calculated in this sector; however, such assessment does not include waste emissions from other communities. Emissions from City waste collection trucks are included in the "vehicle fleet" sector, not the "solid waste" sector.

Emission Source 1: Solid waste emission (scope 3) is mainly the methane produced from the decay of the organic material from the solid waste. The total emissions of waste was generated by the ICLEI software based on tons of trash by categories, including paper products, food waste, plant debris and wood or textiles are taken to landfill during 2008.

Waste share percentages are from the California 2008 Statewide Waste Characterization Study by the California Integrated Waste Management Board Table ES-3.

Emission Source 2: The County of Merced Highway 59 disposal site has on-site equipment to collect certain "products" of the landfill, such as brine water, but the emissions of the equipment will require further review in the next update to this inventory.

Process and Fugitive Emissions

Process and Fugitive emissions were not included in this GHG Emission Inventory. This section includes emissions that consist of Hydrocarbons (HFCs), chlorofluorocarbons (CFC), and sulfur hexafluoride (SF6) from various sources. These emissions are typically lost during a process of production and cannot be physically controlled. The process and fugitive emissions were not accounted for in this inventory due to limited data. These types of emissions are very difficult to measure and are minor sources. Estimations for this sector would not have been accurate enough to include in the report.

COMMUNITY EMISSION SOURCE ANALYSIS

Community by Source

Data in Table 8-2 is sorted by source which will allow for analysis of specific and raw materials so that the Community can examine ways to reduce emission by source. By viewing the data by sources allows the residents, businesses, property owners and other government agencies to target resources and manage reductions in specific areas. The use of gasoline and electricity are the communities' largest sources of emissions.

Table 8-2: Community Emissions by Source	
Source	**CO2 e (Metric tons)**
Carbon Dioxide	35
Diesel	44,516
Electricity	182,362
Food Waste	298
Gasoline	230,530
Methane	76
Natural Gas	87,527
Nitrous Oxide	728
Paper Products	588
Plant Debris	77
Wood or Textiles	139

LOCAL GOVERNMENT EMISSION SECTOR ANALYSIS

The City of Merced's local government operations can play a key role in reducing GHG by implementing policies within the City. Local government has the ability to reduce energy consumption in buildings and facilities, fuel consumption in fleet vehicles and equipment and even reduce the amount of solid waste sent to our landfills. Although the local government is only a small portion of the community, it can still have a large impact on the reduction of GHG of the City as a whole. This GHG emission inventory quantifies the emission of the local government operations which will help the City of Merced policy-makers and stakeholders make decisions in the best options for reduction of these GHG emissions.

Table 8-3 summarizes the results of the emission inventory by sector. Also see Figure 8-3 in the introduction section of this Emission Inventory.

Table 8-3: YR 2008 Local Government CO2 Equivalents Emissions		
Sectors	**Metric Tons**	**%**
Building and Facilities	4,536	25.69
Streetlights and Traffic Signals	1,316	7.45
Airport Facilities	19	0.11
Water Delivery Facilities	3,750	21.24
Wastewater Facilities	2,761	15.64
Fleet Vehicle	4,234	23.98
Employee Commute	1,039	5.89
Totals	**17,655**	**100%**

Buildings and Facilities
Table 8.3 shows GHG emissions from government buildings and facilities amounting to 4,536 metric tons of CO2e which represents about 25% of the total Local Government emissions.

Emission source 1: The data for electricity consumption for buildings and facilities is supplied by PG&E and MID.

Emissions source 2: The natural gas is supplied by PG&E. Both PG&E and MID were able to provide data for the City of Merced utility accounts, including usage and dollar amounts for the year 2008.

Streetlights and Traffic Signals
As seen in Table 8.3 electricity consumption of City owned street lights and traffic signals amounted to 1,316 metric tons of CO2e, which is almost 8% of the total Merced City Government emission inventory.

Emission source 1: The electricity consumption for streetlights and traffic signals is based on electrical data supplied by PG&E and MID. Since they provided only city-payable accounts, the streetlights paid by PG&E are not included in this category. It reflects only what the City of Merced pays for. Electricity for this combined category is from both PG&E and MID.

Vehicle Fleet
Table 8.3 shows that the Vehicle Fleet produced 4,234 metric tons of CO2e, which represents about 24% of the total City Government emissions.

In the baseline inventory year 2008, the City's vehicle fleet consumed approximately 144,732.52 gallons of gasoline, 250,410.38 gallons of diesel, and 3,926.70 gallons of CNG, which equates to approximately 4,234 metric tons of CO2 equivalents.

Emission Source 1: Mobile combustion emissions are calculated for vehicles in various City Departments that the City of Merced owns and operates. This can include police, fire, refuse, water and sewer maintenance, etc. For inventory purposes, all vehicles in the fleet are reported in this category. For example, water department maintenance trucks are reported here and not in the water delivery category. Fuel consumption quantities were provided by the City's Public Works Division.

Emission Source 2: Refrigerants from vehicle air conditioning units were not included in this inventory due to lack of data.

Employee Commute
In Table 8.3, GHG emissions for employee commuting amounted to about 1,039 metric tons of CO2e in 2008, which amounts to 6% of the overall government emissions. The GHG emissions resulting from employee commutes were pre-calculated based off of employee information supplied by the City of Merced

Emission Source 1: Data of number of employees and the City they reside in were obtained to calculate the average commute traveled. The estimation only includes round-trips with no consideration

to lunch travel, carpool travel, stops or sick days; however, it does consider 10% vacation days with the Merced Civic Center as a base point.

Wastewater Facilities

In Table 8.3, GHG emissions for Wastewater amounted to about 2,761 metric tons of CO2e in 2008, which amounts to 15% of the overall government emissions.

The population of the City of Merced served by the Waste Water Treatment System in 2008 was 81,000 people. The WWTP serves residential, commercial, industrial, and other categories connected to sanitary sewers, such as the zoo, schools, Merced College, and the University of California, Merced. However, the City of Merced has financial and operational control of the WWTP. Sources of emissions included in this inventory include:

Emission Source 1: Electric and gas services utilized by the Wastewater Treatment Plant.

Emission Source 2: The N_2O results from removing the nitrates. The CH_4 results from the process of plant digesters and are burned by flaming the gas. The N_2O and CH_4 emissions at the plant were provided by WWTP report data. It was calculated based off a built in calculation that takes into account Merced's population.

Emission Source 3: A standby diesel backup generator at the WWTP is included in the inventory as a direct emission source.

Airport Facilities

The Merced Regional Airport was a small contributor the GHG emissions and emitted approximately 19 metric tons of CO2 equivalents. This only accounts for 0.11% of the Local Government inventory.

Only the facilities and buildings whose utilities are paid for by the City of Merced are included in this section. The other facilities and buildings are reported into separate sectors as the General Protocol and ICLEI software requires this approach. Since the operation and financial control for the airport are different for various buildings and structures it has to be reported separately. For example, the fuel and hanger used by an aircraft that are not owned by Merced and, therefore, not included. Only the airport terminal building would be applicable.

Leased building spaces that pay their own utility bills are not included in the inventory. In addition, the Hangar Café pays its own gas and electric when occupied by a tenant, otherwise, the airport administration pays when the building is vacant. All aircrafts going in and out of airport are not owned or operated by the City of Merced and, therefore, are not included in the report.

Emission source 1: The data for electricity and gas consumption for buildings and facilities is supplied by PG&E and MID.

Water Delivery Facilities

In Table 8.3, GHG emissions for Wastewater amounted to about 3,750 metric tons of CO2e in 2008, which amounts to about 16% of the overall government emissions. Emissions occur from electricity used to pump water at the City's Water Wells, which includes standby power sources.

Emission Source 1: Well sites and pump electric energy consumption was provided by PG&E and MID. These numbers had to be individually separated from a set of data supplied by MID and PG&E

Emission Source 2: Standby diesel backup generators at the well-site are included in the inventory as a direct emission source.

Process and Fugitive Emissions

Fugitive emissions are not included in this report. Process and fugitive emissions consist of Hydrocarbons (HFCs), chlorofluorocarbons (CFC), and sulfur hexafluoride (SF6) from various sources. These emissions are typically lost during a process of production and cannot be physically controlled. For example, air conditioning units, condensers and even fire suppressants will leak and need recharging. The process and fugitive emissions were not accounted for in this inventory due to limited data. These types of emissions are very difficult to measure and are minor sources. Estimations for this sector would not have been accurate enough to include in the report.