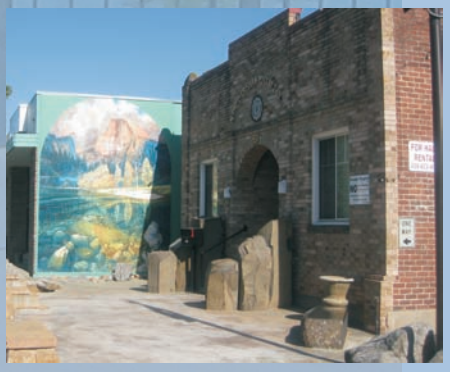
CITY OF MANTECA

CLIMATE ACTION PLAN



Adopted October 15, 2013

Michael Brandman Associates

RESOLUTION NO. R2013-191

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF MANTECA MAKING FINDINGS AND RECOMMENDING THE CITY COUNCIL APPROVE GENERAL PLAN AMENDMENT NO. GPA-13-96-01 FOR THE MANTECA GENERAL PLAN AIR QUALITY ELEMENT UPDATE & CLIMATE ACTION PLAN (CAP)

WHEREAS, the Manteca City Council at their public hearing of October 15, 2013 considered a General Plan Amendment, for an update to the Manteca General Plan Air Quality Element Updated and Climate Action Plan (CAP) ; and,

WHEREAS, as part of the City's participation in the Smart Valley Places COMPACT the City has committed through an established work program to updating the Manteca General Plan Air Quality Element and preparing a Climate Action Plan (CAP); and,

WHEREAS, Smart Valley Places has been established as a direct partnership among cities and other local and regional partners with the purpose to locally define and implement a regional plan for sustainable development for the San Joaquin Valley; and,

WHEREAS, the Smart Valley Places COMPACT provides for governance by an Executive Committee of City Managers appointed and empowered by their respective City Councils to provide policy guidance and administrative oversight for Smart Valley Places network related contracts, agreements, grant applications and awards, resource allocations, evaluation of projects and programs, a multi-city Planners Steering Committee, and any other network business; and,

WHEREAS, the California Partnership for the San Joaquin Valley and the CSU Fresno Foundation are designated to act as the initial regional lead and fiscal agents for grant applications from and funding awards to the Smart Valley Places COMPACT cities under terms defined in a contractual agreement approved by the Smart Valley Places COMPACT Executive Committee; and,

WHEREAS, the City of Manteca intends to locally incorporate the shared planning principles of the Valley region and to work collaboratively with other Valley cities to locally define and mutually implement a regional plan for sustainable development for the San Joaquin Valley as outlined in the Smart Valley Places COMPACT; and,

WHEREAS, the Valley's shared planning principles are appropriately represented by the Smart Growth Principles adopted and established as the benchmark for achieving a San Joaquin Valley Blueprint, the six major initiatives of the California Partnership for the San Joaquin Valley Strategic Action Proposal, and the HUD-EPA-DOT Livability Principles; and,

WHEREAS, a direct partnership among Valley cities is the best and most effective way to create and coordinate a pool of resources, templates, and best practices, and use the local land use and zoning authority required that will lead to the practical and measurable implementation of shared planning principles for long-term San Joaquin Valley viability; and,

WHEREAS, the San Joaquin Valley (Valley) is recognized as integral to the continued growth and sustainability of California, and the Valley's cities which will be the focus for successfully accommodating future growth and implementing sustainability face significant and daunting economic, revitalization, affordable housing, social, environmental, public health, natural and fiscal resource, and other challenges; and,

WHEREAS, the Valley region has assessed shared challenges and identified shared planning principles for continued economic growth and urban development, preservation of the rich agricultural land base and water resources, improved education and health, broader prosperity, and to enable implementation of the essential elements of long-term success; and,

WHEREAS, the Climate Action Plan will help to ensure that the build-out of the Manteca General Plan 2023 will not conflict with Assembly Bill (AB) 32 – the Global Solutions Act of 2006; and,

WHEREAS, the City conducted public workshops to receive public input on the Climate Action Plan, those workshops were held on May 9, 2012 and April 9, 2013;

WHEREAS, staff distributed the Draft Climate Action Plan for 30-day review beginning on March 12, 2013 and ending on April 11, 2013; and,

WHEREAS, an Initial Study/Negative Declaration was prepared and circulated through the State Clearinghouse SCH# 2013082070 for the Update to the Manteca General Plan Air Quality Element & Climate Action Plan (CAP) and was prepared and considered by the Planning Commission in compliance with the provision of the California Environmental Quality Act (CEQA); and,

WHEREAS, Title 17, Section 17.49.050.B.3 of the Manteca Municipal Zoning Ordinance mandates the transmittal of a recommendation to the City Council shall be by Resolution; and,

WHEREAS, at the duly noticed and regularly scheduled meeting of the Planning Commission the Update to Manteca General Plan Air Quality Element, Climate Action Plan and Initial Study/Negative Declaration were considered, and it was the decision of the Planning Commission to recommend approval to the City Council.

NOW, THEREFORE, BE IT RESOLVED AND ORDERED that based upon the evidence in the Staff Report, Public Testimony, and Project File, the City Council recognizes the appropriateness of the Initial Study/Negative Declaration and hereby adopts the Negative Declaration for the Manteca General Plan Air Quality Element Update & CAP based on the following findings:

1. The City Council has reviewed the information contained in the Initial Study/ Negative Declaration for the Manteca General Plan Air Quality Element Update & CAP Project.
2. The Initial Study/ Negative Declaration represents the independent judgment of the City.

BE IT FURTHER RESOLVED AND ORDERED that the Manteca City Council recognizes the appropriateness of the Manteca General Plan Air Quality Element Update & Climate Action Plan and hereby approves the project based on the following findings:

1. The adoption of a Climate Action Plan (CAP) and Update to the Manteca General Plan Air Quality Element are required as part of the City's commitment under the work program for the Smart Valley Place Grant.
2. The update to the Manteca General Plan Air Quality Element and Climate Action Plan (CAP) has included policies and programs that promote HUD-EPA-DOT Livability Principles and Smart Growth Principles of the San Joaquin Valley Blueprint.
3. The update to the Manteca General Plan Air Quality Element and Climate Action Plan (CAP) demonstrate the City of Manteca's commitment to comply with provisions outlined in Assembly Bill (AB) 32 - the Global Solutions Act of 2006.
4. It is further found that update of the Manteca General Plan Air Quality Element and establishment of the Climate Action Plan (CAP) are supported by the following existing General Plan Air Quality goals and policies:
    - Goal AQ-1: Improve Air Quality by:
        - Achieving and maintaining ambient air quality standards established by the U.S. Environmental Protection Agency,

the California Air Resources Board, and the San Joaquin Air Pollution Control District;

- Minimizing public exposure to toxic or hazardous air pollutants; and
- Minimizing public exposure to pollutant that create a public nuisance, such as a unpleasant odors.

- Goal AQ-2: Integrate air quality planning with land use and transportation planning process in order to reduce vehicle miles traveled in the City by commuters.
- Goal AQ-4: Reduce air emissions through energy conservation.
- Policy AQ-P-1: Cooperate with other agencies to develop a consistent and coordinated approach to reduction of air pollution and management of hazardous air pollutants.

5. It is found that update of the Manteca General Plan Air Quality Element and establishment of the Climate Action Plan (CAP) are supported by the additional goals and policies that will be incorporated as part of the update:

    - Goal AQ-5: Reduce greenhouse gases from activities within the City by amounts needed to demonstrate consistency with State of California greenhouse gas reduction targets.
    - Policy AQ-P-11: Prepare and maintain a Climate Action Plan and community greenhouse gas emission inventory for sectors with the potential for control or influence by the City that demonstrates consistency with State of California targets.
    - Policy AQ-P-12: Development projects shall incorporate the applicable strategies of the City of Manteca Climate Action Plan as needed to demonstrate consistency with CAP reduction targets and AB 32.

DATED: October 15, 2013

ROLL CALL:

AYES: Councilmembers DeBrum, Harris, Hernandez, Moorhead and Weatherford

NOES: None

ABSENT: None

ABSTAIN: None

WILLIE W. WEATHERFORD
MAYOR

ATTEST:

JOANN TILTON, MMC
CITY CLERK

FINAL DRAFT
Climate Action Plan
City of Manteca, California

Prepared for:

City of Manteca
1001 W. Center Street
Manteca, California 95337
209.456.8522

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Contact: Dave Mitchell

Michael Brandman Associates

Adopted October 15, 2013

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SECTION 1: EXECUTIVE SUMMARY

The City of Manteca (City) has prepared a Climate Action Plan as its primary strategy for ensuring that the buildout of the General Plan 2023 supports the goals of Assembly Bill (AB) 32—the Global Warming Solutions Act of 2006. AB 32 requires California to reduce statewide greenhouse gas emissions to 1990 levels by the year 2020. This Climate Action Plan (CAP) is designed to reduce community-related and City operations related greenhouse gas emissions to a degree that would not hinder or delay implementation of AB 32.

The California Air Resources Board (ARB) adopted the State's strategy for achieving AB 32 targets in its Climate Change Scoping Plan (Scoping Plan) in 2008. The Scoping Plan includes a greenhouse gas reduction goal for local governments of 15 percent below today's levels by 2020 to ensure that their municipal and community-wide emissions match the State's reduction target. The CAP includes strategies that will achieve this target.

AB 32, the Scoping Plan, and supporting actions by local government such as the CAP put California in a leadership role for global action needed to address climate change. Taking action with other regions and nations to help mitigate the impacts of climate change will help slow temperature rise and its related adverse effects.

1.1 - Purpose

The purpose of this CAP is to:

- Outline a course of action for the City government and the community of Manteca to reduce per capita greenhouse gas emissions by amounts required to show consistency with AB 32 goals for the year 2020 and adapt to effects of climate change, and
- Provide clear guidance to City staff regarding when and how to implement key provisions of the CAP.
- Provide a streamlined mechanism for projects that are consistent with the CAP to demonstrate that they would not contribute significant greenhouse gas impacts.

1.2 - Climate Action Plan Requirements

The following is a summary of the measures and strategies included in the CAP to show consistency with AB 32 goals for the year 2020. The CAP requires the City of Manteca to take the following actions to reduce greenhouse gases from Government Operations:

- Improve the energy efficiency of any new and existing government buildings and facilities when investments provide an adequate return on investment and funding is available.
- Purchase new fleet vehicles and equipment that achieve the maximum feasible fuel economy or that utilize renewable fuels and meet work requirements as existing fleet vehicles reach the end of their usable life.
- Implement building-related water conservation measures at new and remodeled government facilities.
- Implement landscape water conservation measures at new and remodeled government facilities.
- Promote recycling, reuse, and diversion programs at government facilities.
- Implement urban forestry practices on city-maintained trees to enhance greenhouse gas sequestration.
- Utilize methane capture at wastewater treatment plants and landfills where feasible and under City control.

The CAP requires development projects constructed in the City of Manteca to achieve greenhouse gas emissions by taking the following actions:

- Comply with the applicable land use, sustainable development, and resource conservation policies of the City of Manteca General Plan.
- Construct project transportation infrastructure that supports walking, bicycling, and transit use.
- Implement transportation demand management programs in projects with large numbers of employees.
- Design and construct project buildings to exceed Title 24 Energy Efficiency Standards by at least 10 percent.
- Implement project buildings including water conservation measures that meet or exceed the California Green Building Code standards 20 percent requirement.
- Install project landscaping that meets or exceeds water conservation standards of the City's adopted landscaping ordinance 20 percent reduction requirement.
- Develop programs to exceed state recycling and diversion targets by at least 10 percent.

More detailed descriptions of these measures are provided in Section 4: Reduction Strategies.

1.3 - Greenhouse Gas Inventory Results

The first step in developing the CAP was to identify the greenhouse gas emission sources that are the within the control or influence of the City of Manteca in emission inventories. Emission inventories are accounting systems used to compile information on the types and quantities of emissions generated in a geographic area at a specified time. Emission inventories allow sources to be ranked by importance and tracked over time. This is critical for developing a control strategy and for measuring progress toward achieving targets.

The CAP includes a Government Operations Inventory that includes emission sources directly owned and operated by the City and a Community Inventory that includes all emission sources within the City of Manteca.

1.3.1 - Government Operations Inventory

Local government operations emissions are presented in Table 1. The results indicate that the largest source of emissions is from the City's vehicle fleet used to provide public services to the residents of Manteca. The next two largest sources are wastewater facilities and water delivery, which generate emissions primarily related to electricity consumption from pumping water. Building and facilities emissions are related to electricity and natural gas consumption for cooling, lighting, and heating.

Table 1: City of Manteca Government Operations Greenhouse Gas Emissions Inventory

Sector	Metric Tons (CO_2e)	Percent of Sector Emissions
Vehicle Fleet	2,358	32.2
Wastewater Facilities	1,738	23.7
Water Delivery Facilities	1,017	13.9
Employee Commute	983	13.4
Buildings and Facilities	613	8.4
Public Lighting	564	7.7
Government Generated Waste	49	0.7
Totals	**7,321**	**100.0**

Note:
CO_2e = carbon dioxide equivalents
Source: City of Manteca 2005 Government Operations Greenhouse Gas Inventory.

1.3.2 - Community Inventory

The Community Inventory accounts for the emissions from all sources within the control or influence of the City of Manteca. Emissions from motor vehicles occur within the City of Manteca geographic area; however, a portion of these emissions is not within the control or influence of the City. Some trips pass through the City on freeways crossing the community. Emissions from those trips are not included in the inventory. For trips that begin in the City but end in a different jurisdiction, half the emissions are included in the inventory. Conversely, for trips that begin outside the City but end within the City, half the emissions are included in the inventory.

The inventories include estimates for two baseline years and two future years. The year 2005 is provided to account for the change in emissions from statewide greenhouse gas regulations adopted since that time. The year 2010 represents the most recent year with complete activity data. The year 2020 is required to demonstrate consistency with state targets adopted for AB 32. The year 2035 is provided to show emissions in the Senate Bill (SB) 375 regional target year. The year 1990 was not chosen as an inventory year because the form of the targets (reductions from 2020) does not require a 1990 inventory, and because the data needed to generate a 1990 inventory is incomplete and in a form different from more recent inventories, thereby making comparison inappropriate.

Exhibit 3Table 2 displays the emissions by sector for 2005, 2010, 2020, and 2035 and the totals for each year. The future year inventories for 2020 and 2035 are referred to as "business as usual" inventories. The business as usual inventories reflect the effects of growth projected by the growth rates in the 2023 General Plan without the application of controls[1] that would reduce emissions in the future. The results of the inventories show that substantial growth in emissions would occur in the

[1] Controls are regulations enacted to implement AB 32, General Plan policies, and CAP reduction measures.

City without the application of controls. The emissions would increase from 400,346 metric tons of carbon dioxide equivalent ($MTCO_2e$) in 2005 to 742,186 $MTCO_2e$ in 2035 for an increase of 85 percent in 30 years. In terms of emissions per person or "per capita emissions," the inventory shows emissions of 6.9 $MTCO_2e$ per person in 2005 and a decrease to 6.3 $MTCO_2e$ per person by 2035.

Table 2: City of Manteca Community Baseline and Future Year Inventories

Sector	Emissions ($MTCO_2e$/year)			
	2005	2010	2020	2035
Motor vehicles	214,075	210,901	275,507	368,297
Electricity - residential	44,108	47,343	61,212	83,668
Electricity - commercial	25,014	31,146	35,646	49,327
Natural gas - residential	45,527	50,466	65,249	89,186
Natural gas - commercial	9,856	11,818	13,526	18,717
Waste	42,305	30,454	21,586	29,505
Ozone depleting substance (ODS) substitutes*	19,461	26,741	75,711	103,486
Total	400,346	408,869	548,437	742,186
Per capita emissions	6.9	6.1	6.3	6.3

Notes:
$MTCO_2e$ = metric tons of carbon dioxide equivalents
Per capita emissions are estimated by dividing the total emissions by the population estimates from Table 5.
* Ozone depleting substances (ODS) are gases that cause chemical destruction of the ozone in the stratosphere (a layer of air in the upper atmosphere). High global warming potential gases are being introduced as substitutes to comply international treaties protecting the ozone layer.
Source: Michael Brandman Associates 2013.

1.4 - Emission Reduction Target Inventory

The next step in the CAP process is to identify the amount of reductions required to demonstrate consistency with the goals of AB 32 and the target set by the state for the year 2020. Achieving the state target of reducing emissions to 1990 levels by 2020 will require a reduction in per capita emissions of 21.7 percent. Applying that percentage reduction to the City's 2020 business as usual emission inventory results in a target of 429,693 $MTCO_2e$ per year or a per capita emission rate of 4.91 $MTCO_2e$ per person per year. The City will achieve the target through a combination of compliance with state greenhouse gas regulations and with local reductions described in the CAP. Table 3 shows that substantial reductions will be achieved by the state regulations already adopted for this purpose. State regulations will reduce emissions by 19.5 percent. The City will require an additional 2.2 percent reduction from local measures to achieve the target.

Table 3: City of Manteca 2020 Target Emissions Inventory

Inventory	Community ($MTCO_2e$/Yr)	Per Capita ($MTCO_2e$/Person/Yr)
2020 Business as Usual	548,437	6.27
2020 Adjusted for State Regulations	441,668	5.05
2020 Community Target	429,693	4.91
2020 Local Reductions Required	12,014	0.14
Local Reductions Proposed	12,289	0.14
2020 Target Achieved	Yes	Yes

Note:
$MTCO_2e$/Yr = metric tons of carbon dioxide equivalents per year
Source: Michael Brandman Associates 2013 (see Appendix B for calculations).

No target inventory has been prepared for 2035. SB 375 only applies to light duty passenger car and light truck travel. Regional targets identified for San Joaquin County only apply to emissions from that portion of mobile source emissions. ARB is expected to adopt statewide targets for 2035 and possibly for 2050 and to update the Scoping Plan with strategies that would achieve those targets. Until the ARB has adopted targets for those years, it is not possible for communities to demonstrate consistency for those years. The current CAP targets set the City on a trajectory to achieve reductions through 2020 and beyond. Future updates to the CAP can add later target years and additional strategies needed to achieve those targets.

1.5 - Climate Action Plan Strategy

This CAP identifies policies within the City of Manteca General Plan that would decrease the City's emissions of greenhouse gases. This CAP also lists Implementation Strategies that add more details and specific actions to the General Plan policies and clarify how the reductions would occur. This CAP demonstrates that the General Plan policies and CAP strategies would reduce emissions to the reduction target. The CAP includes strategies in the following categories:

- Land use: higher-density, mixed-use, transit-oriented, pedestrian-oriented, and compact development
- Transportation: transit facilities, pedestrian connections, bicycle infrastructure, traffic calming, use of low emission vehicles, transportation demand management, end-of-trip facilities, and parking measures
- Energy conservation
- Water conservation
- Waste reduction and recycling
- Regional cooperation

The strategies in the categories listed above will be implemented as new projects are built in compliance with General Plan policies, development standards, conditions of approval, and CEQA mitigation measures. Existing residences and businesses will be subject to statewide greenhouse gas regulations and to existing and new citywide and regional educational and incentive programs for energy and water conservation, and waste reduction and recycling. Construction of transportation infrastructure supportive of walking, bicycling, and transit use will be accomplished not only in new development areas but also in existing areas when facilities are upgraded or rebuilt. Creating new and redeveloped high-density, pedestrian- and transit-oriented development provides destinations for the entire community that are supportive of alternative transportation modes. The CAP builds on the City's history of implementing innovative and effective environmental and conservation programs to achieve its objectives.

In order to ensure that the CAP strategies are implemented on schedule and targets are achieved, the CAP sets out an implementation and monitoring framework. The CAP recognizes that technologies to reduce greenhouse gases and regulatory efforts related to climate change are rapidly evolving and provides flexibility to adapt to changing circumstances.

Cities with Climate Action Plans that are consistent with the state and regional AB 32 and SB 375 reduction targets can use their CAP as the basis for determining if projects would result in significant climate change impacts under CEQA. The City of Manteca CAP contains the elements necessary to fulfill this function.

The strategies proposed in the CAP are expected to achieve local reductions that are adequate to achieve the City's 2020 target. Reductions from all local strategies total 11,990 $MTCO_2e$ per year, resulting in 2020 per capita emissions 4.91 $MTCO_2e$ per person, including the benefits of state regulations.

SECTION 2: INTRODUCTION

2.1 - City of Manteca

The City of Manteca, incorporated May 28, 1918, is located in the "heartland" of California, with historical roots as an important agricultural center. For much of the early 20th century, the Manteca area has been predominantly an agricultural area due to the excellent soil, mild climate, and access to clean water. While agriculture still plays an important role in Manteca's economy, the City's economic base has become more diversified with the development of industries and the influx of Bay Area workers seeking affordable housing (excerpt from the City of Manteca General Plan 2023).

The City is located in San Joaquin County at the north end of the San Joaquin Valley, as shown in Exhibit 1. As shown in the aerial in Exhibit 2, the City has a relatively compact center with traditional main street development along East Yosemite Avenue and North Main Street. New residential growth areas are located primarily on the northern and southern periphery of the City. New industrial and warehouse development is primarily located on the west side of the City and within the Spreckels Park Development. Older industrial development is located south of traditional main-street development near State Route 120 (SR-120). Major regional commercial development is found near the SR-120 and SR-99 interchange and along theSR-120 corridor. The City has an urban agriculture interface around the outskirts of most of the City with the exception of the City of Lathrop, which is adjacent to the west of the City. The City's proximity to the Bay Area and the City of Stockton has a strong influence on the economy of the City.

As recommended in the Local Government Operations Protocol, Table 4 presents a profile summary for the City of Manteca.

Table 4: City of Manteca Profile

Item	Data
Jurisdiction name	City of Manteca
Street address	1001 West Center Street
City, State, Zip	Manteca, CA 95337
County	San Joaquin
Website	www.ci.manteca.ca.us

Table 4 (cont.): City of Manteca Profile

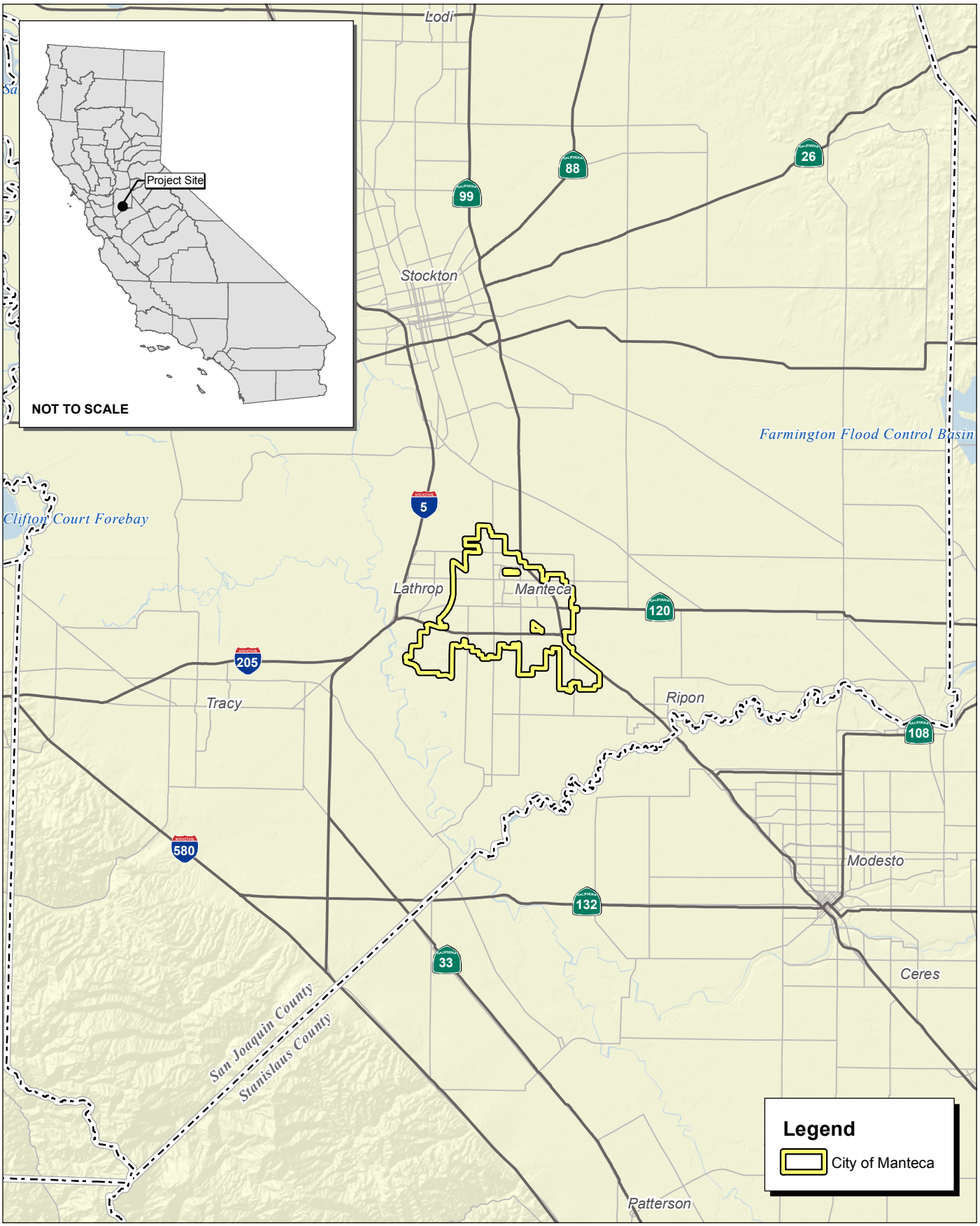
Item	Data
Size	21 square miles
Population[1]	2011: 68,265 2012: 69,815
Annual budget[2]	Fiscal Year 2011-12 $27,074,746
Employees (full time equivalent)[3]	2011: 354
Climate zone[4]	12
Annual heating degree days[5]	Base 65: 2797 Base 60: 1798 Base 57: 1303
Annual cooling degree days[6]	Base 55: 3088 Base 57: 2643 Base 60: 2041

Sources:
1 Department of Finance, 2012.
2 City of Manteca, 2012.
3 City of Manteca Comprehensive Annual Financial Report, 2011.
4 California Energy Commission, 2008.
5 Western Regional Climate Center, 2012. Heating Degree Day units are computed as the difference between the base temperature and the daily average temperature (Base Temp. - Daily Ave. Temp.). One unit is accumulated for each degree Fahrenheit the average temperature is below the base temperature. Negative numbers are discarded. Example: If the days high temperature was 65 and the low temperature was 31, the base 50 heating degree day units is 50 - ((65 + 31) ÷ 2) = 2. This is done for each day of the month and summed.
6 Western Regional Climate Center, 2012. Cooling Degree Day units are computed as the difference between the daily average temperature and the base temperature (Daily Ave. Temp. - Base Temp.). One unit is accumulated for each degree Fahrenheit the average temperature is above the base temperature. Negative numbers are discarded. Example: If the days high temperature was 95 and the low temperature was 51, the base 60 degree day units is ((95 + 51) ÷ 2) - 60 = 13. This is done for each day of the month and summed.

2.2 - Population, Employment, and Housing

Historical population, employment, and housing data and growth projections provide the basis for developing greenhouse gas emission inventories and forecasts. There are a variety of sources that report population, employment, and housing statistics, all of which differ somewhat depending on the year they were prepared, the methods used, and the purpose. The inventory was developed using the most recent data and forecasts available.

The estimates are for past years and are based on United States Census data and driver license address change methods. Projections were made based on Census counts, fertility rates, mortality, and migration.



Source: Census 2000 Data, The CaSIL, MBA GIS 2012.

NORTH

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Michael Brandman Associates

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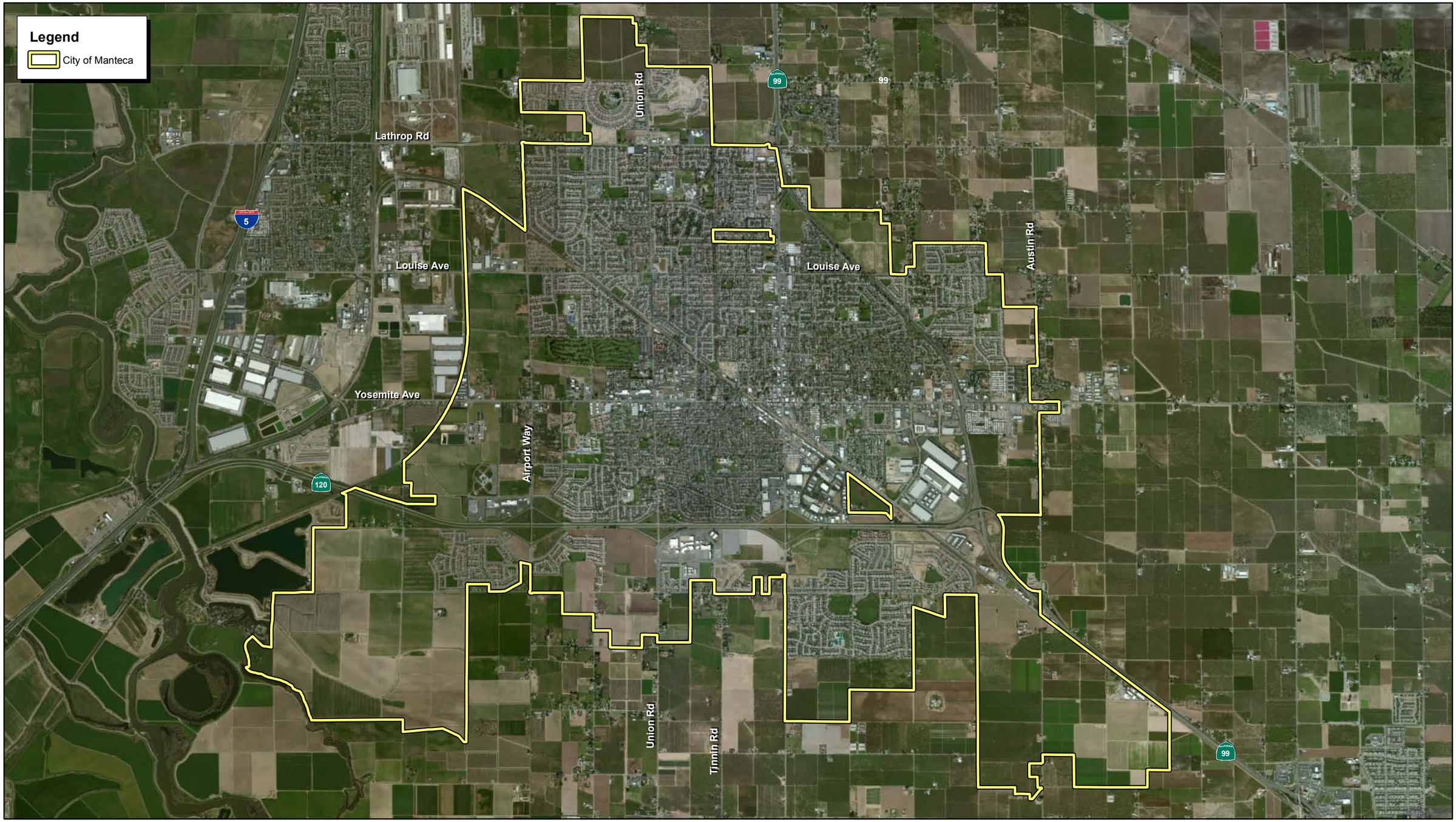
Exhibit 1
City of Manteca Location Map



Source: ESRI World Imagery.

NORTH

3,800 1,900 0 3,800 Feet

Michael Brandman Associates

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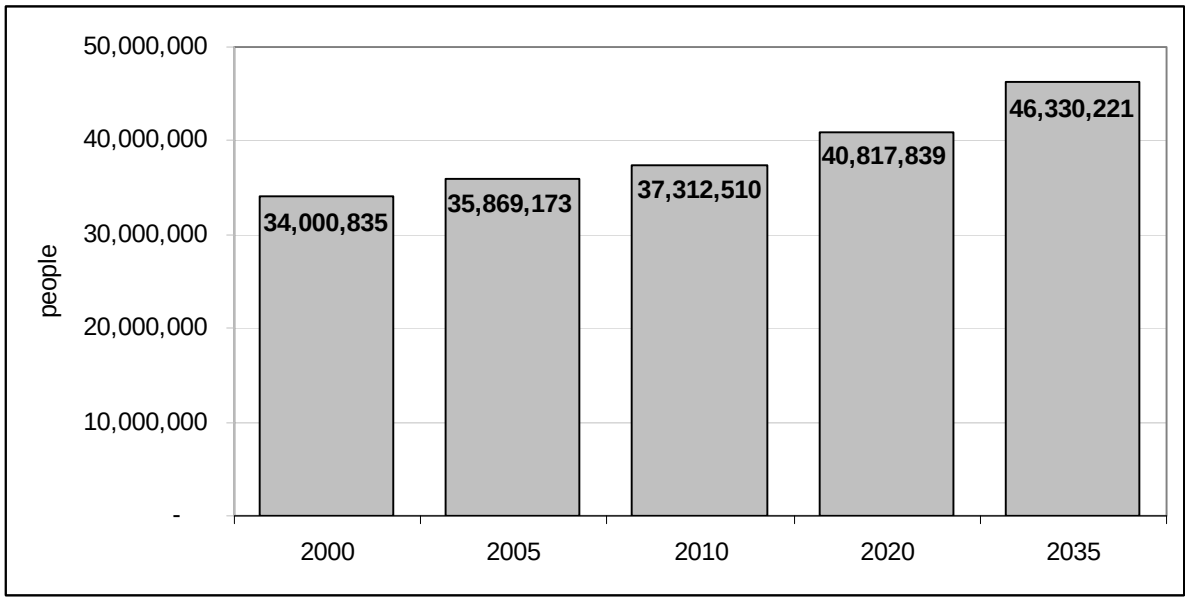
Exhibit 2
City of Manteca Aerial Map

The Department of Finance projects population in California to increase over time, as shown in Figure 1.[2] Adding nine million people to the state in the next 25 years makes achieving the State's goal of reducing emissions to 1990 levels by 2020 and to make continued reductions to reduce emissions to levels 80 percent below 1990 levels by 2050 a daunting challenge.

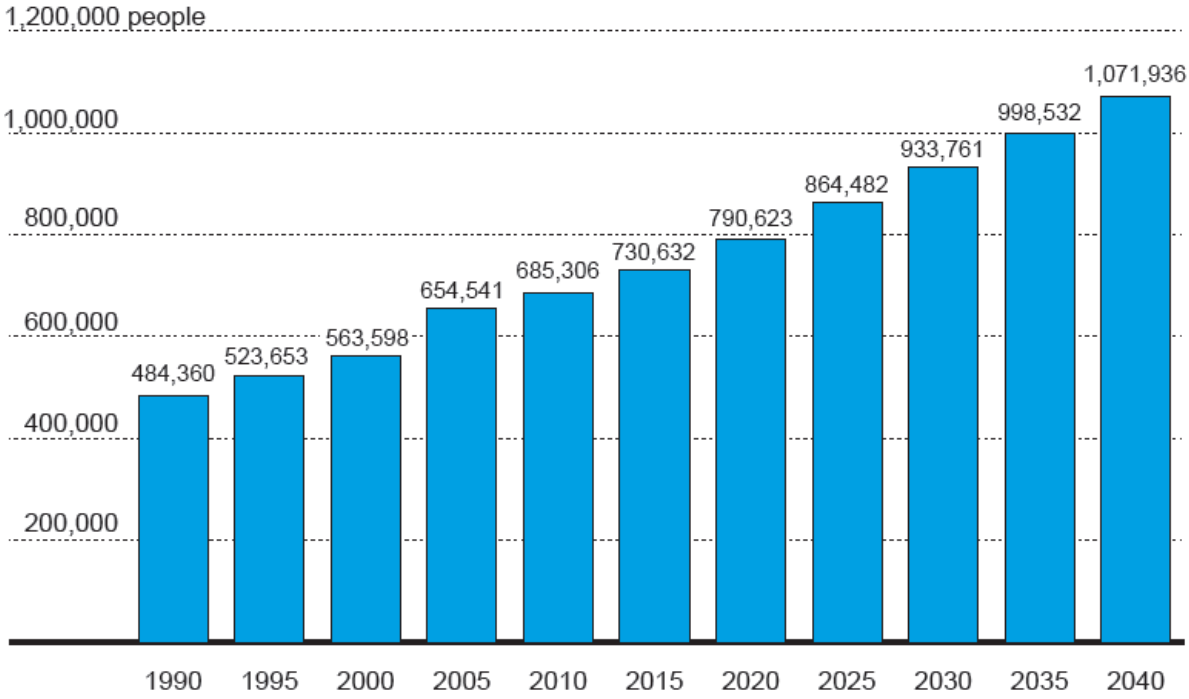
Figure 1: Population of California



The projections indicate that the interior parts of California, including San Joaquin County, will absorb a large portion of the State's growth in the future. San Joaquin County's proximity to the Bay Area and Sacramento provide a logical outlet for population and employment growth from these larger and more costly metropolitan areas. Population in San Joaquin County is projected to continue to increase at a rapid rate, as shown in Figure 2. The County population is projected to increase by 53 percent from 2005 to 2035. The City of Manteca's population is projected to increase at an even more robust rate of 100 percent in the 30 years between 2005 and 2035. Many factors will determine the City's actual population growth, including the ability of the California economy to recover, immigration rates, and birth rates. However, the City's centralized location, multimodal transportation system, and available workforce favor the return to rapid growth once the economy fully recovers. Regardless of the accuracy of the population growth projections, the relationship between population size and greenhouse gas production is proportional. However, residents living and working in newly constructed homes and buildings will tend to have lower per capita emissions than residents in existing homes, due to improvements in energy efficiency and conservation features in new development.

[2] Population for California for all years except for 2005 from California Department of Finance 2012; 2005 estimates from California Department of Finance 2011 (E-4).

Figure 2: Population of San Joaquin County



Population, employment, and housing trends for the City from various sources are displayed in Table 5. Manteca's projected population is based on a growth rate of about 3 percent per year compared to the statewide growth rate of 1.2 percent per year. This is consistent with predictions that California's growth will be focused inland. Rapid growth provides opportunities and challenges. If the forecasts hold true, the City of Manteca will have the opportunity to add new development equal to the amount of existing development in 25 years. The City will essentially be remade into a new urban area with increased employment opportunities and new housing choices. On the other hand, the growth will present challenges in terms of public services and environmental impacts including increased greenhouse gas emissions. The City can overcome these challenges and reduce impacts with good planning, investment in infrastructure that accommodates growth as efficiently as possible, and development projects that include conservation and sustainability features.

Table 5: City of Manteca Population, Employment, and Housing

Factor	Source	2000	2005	2010	2020	2030	2035
Population	SJCOG 2011	**49,258**	**58,368***	**67,477**	**87,471**	**107,164***	**117,010**
	SJCOG 2004	49,258	57,499	66,210	85,605	108,719	120,276*
	2010 Census	49,258	58,177*	67,096	NA	NA	NA
Employment	SJCOG 2011	11,905	13,364*	14,823	17,815	20,442*	21,756
	SJCOG 2004	11,905	12,809	13,737	15,722	18,053	19,219*

Table 5 (cont.): City of Manteca Population, Employment, and Housing

Factor	Source	2000	2005	2010	2020	2030	2035
Housing	SJCOG 2004	16,937	18,864	20,839	24,986	29,391	31,594*
	2010 Census	16,937	20,035*	23,132	NA	NA	NA

Notes:
Items in bold font are used in the greenhouse gas community inventories
* = Interpolated or projected linearly; NA = not available
2010 Census = California Department of Finance 2011
SJCOG 2011 = San Joaquin Valley Council of Governments 2011 (uses 2000 census data; used in the City of Manteca Circulation Element Update prepared in 2010)
SJCOG 2004 = San Joaquin Valley Council of Governments 2004 (uses 2000 census data; used in the 2010 City of Manteca Housing Element).

2.3 - Climate Change Background

2.3.1 - Climate Change

Climate change is a change in the average weather of the earth that is measured by alterations in wind patterns, storms, precipitation, and temperature. These changes are assessed using historical records of temperature changes occurring in the past, such as during previous ice ages. Many of the concerns regarding climate change use this data to extrapolate a level of statistical significance specifically focusing on temperature records from the last 150 years (the Industrial Age) that differ from previous climate changes in rate and magnitude.

The United Nations Intergovernmental Panel on Climate Change constructed several greenhouse gas emission trajectories needed to stabilize global temperatures and climate change impacts. The Intergovernmental Panel on Climate Change predicted that global mean temperature change from 1990 to 2100, given six scenarios, could range from 1.1 degrees Celsius (°C) to 6.4°C. Regardless of analytical methodology, global average temperatures and sea levels are expected to rise under all scenarios (Intergovernmental Panel on Climate Change 2007a).

2.3.2 - Climate Change Consequences

In California, climate change may result in consequences such as the following:

- A reduction in the quality and supply of water to the State from the Sierra snowpack. If heat-trapping emissions continue unabated, more precipitation will fall as rain instead of snow, and the snow that does fall will melt earlier, reducing the Sierra Nevada spring snowpack by as much as 70 to 90 percent. This can lead to challenges in securing adequate water supplies. It can also lead to a potential reduction in hydropower.
- Exacerbation of air quality problems. If temperatures rise to the medium warming range, there could be 75 to 85 percent more days with weather conducive to ozone formation in Los

Angeles and the San Joaquin Valley, relative to today's conditions. This is more than twice the increase expected if rising temperatures remain in the lower warming range.

- Increased risk of large wildfires. If rain increases as temperatures rise, wildfires in the grasslands and chaparral ecosystems of southern California are estimated to increase by approximately 30 percent toward the end of the 21st century because more winter rain will stimulate the growth of more plant "fuel" available to burn in the fall. In contrast, a hotter, drier climate could promote up to 90 percent more northern California fires by the end of the century by drying out and increasing the flammability of forest vegetation.
- Reductions in the quality and quantity of certain agricultural products. The crops and products likely to be adversely affected include wine grapes, fruit, nuts, and milk.
- A rise in sea levels resulting in the displacement of coastal businesses and residences. During the past century, sea levels along California's coast have risen about seven inches. If heat-trapping emissions continue unabated and temperatures rise into the higher anticipated warming range, sea level is expected to rise an additional 22 to 35 inches by the end of the century. Elevations of this magnitude would inundate coastal areas with salt water, accelerate coastal erosion, threaten vital levees and inland water systems, and disrupt wetlands and natural habitats.
- Damage to marine ecosystems and the natural environment.
- An increase in infections, disease, asthma, and other health-related problems.
- A decrease in the health and productivity of California's forests. [3]

2.3.3 - Greenhouse Gases

Gases that trap heat in the atmosphere are referred to as greenhouse gases. The effect is analogous to the way a greenhouse retains heat. As shown in Figure 3, the energy influx is maintained by three main factors: the amount of energy coming in, which depends on the earth's distance from the sun and solar activity; the albedo (the ability of the earth's surface to reflect light); and the chemical composition of the atmosphere. The presence of greenhouse gases in the atmosphere regulates the earth's temperature.

The chemical composition of the atmosphere changes over time. Natural processes and human activities emit greenhouse gases. As shown in Figure 4, carbon dioxide concentrations in the atmosphere have increased over time. The global atmospheric concentration of carbon dioxide (CO_2) data in Figure 4 prior to 1958 is from ice core measurements and post-1958 data are from the Mauna Loa, Hawaii site.

[3] California Natural Resources Agency 2009; Moser et al. 2009.

Figure 3: The Greenhouse Effect

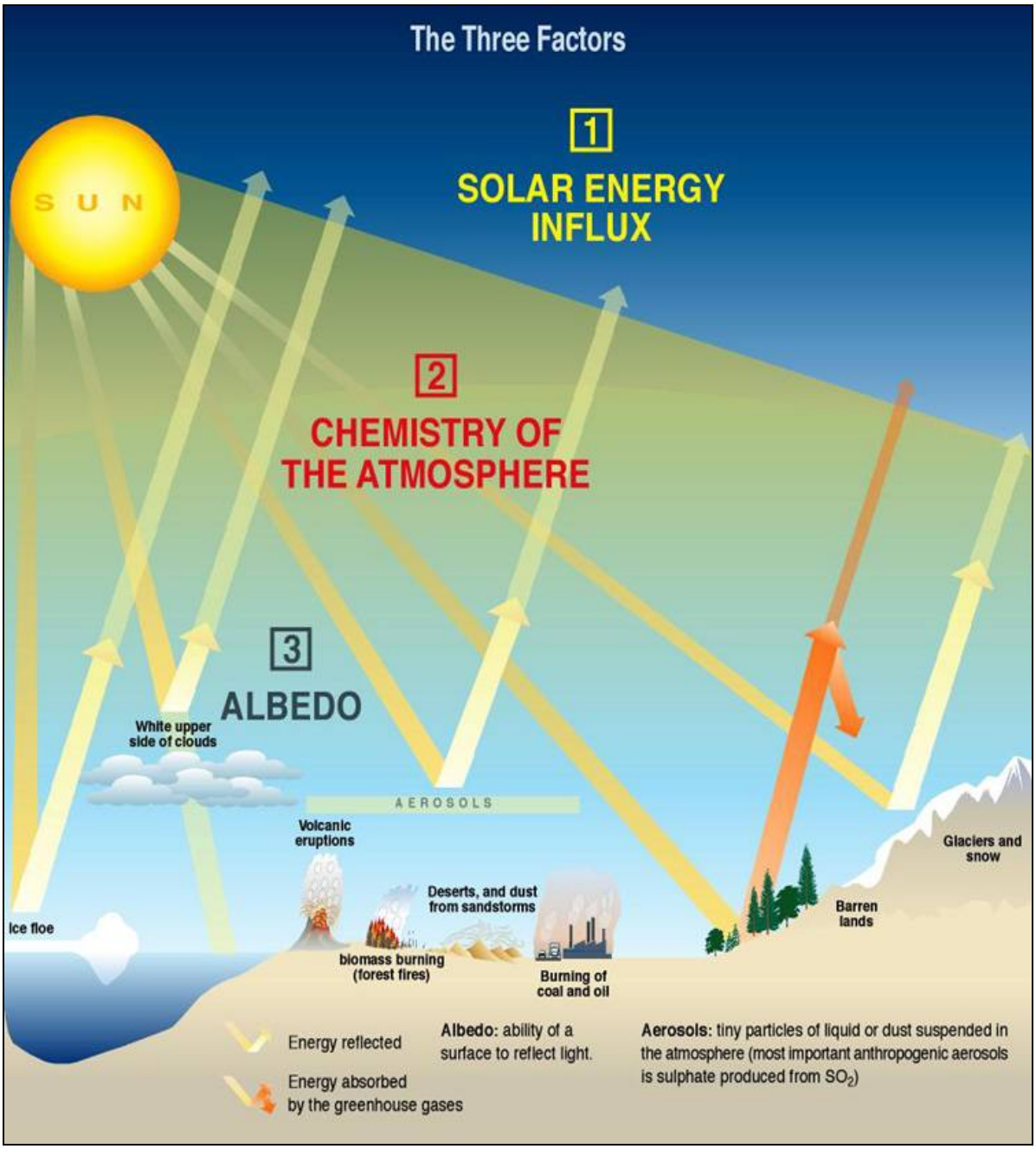
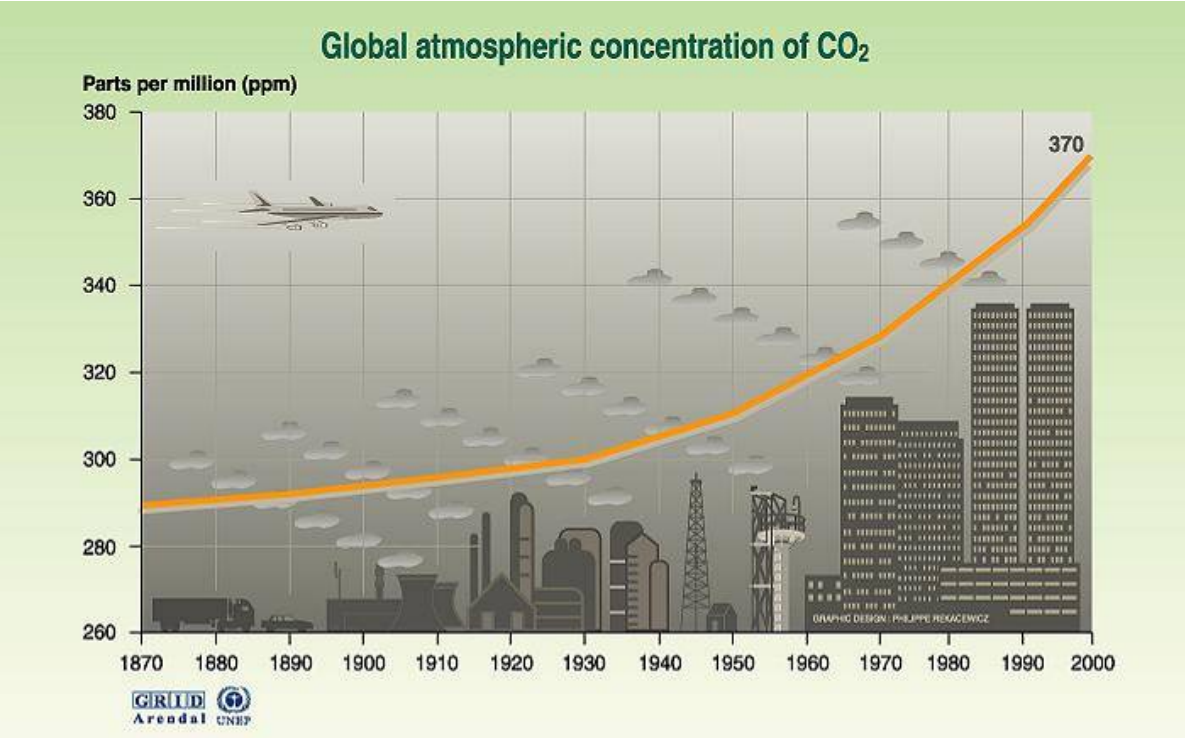


Figure 4: Global Atmospheric Concentration of CO_2



Greenhouse gases have varying global warming potential and atmospheric lifetimes. Carbon dioxide, the reference gas for global warming potential, has a global warming potential of 1. The calculation of the carbon dioxide equivalent (CO_2e) is a consistent methodology for comparing emissions, since it normalizes various emissions to a consistent metric. Methane's warming potential of 21 indicates that methane has a 21 times greater warming affect than carbon dioxide on a molecule per molecule basis. A carbon dioxide equivalent is the mass emissions of an individual greenhouse gas multiplied by its global warming potential. Emissions are typically shown in metric tons of carbon dioxide equivalents ($MTCO_2e$) or a million times that, million metric tons of carbon dioxide equivalents ($MMTCO_2e$). Global warming potentials are shown in Table 6.

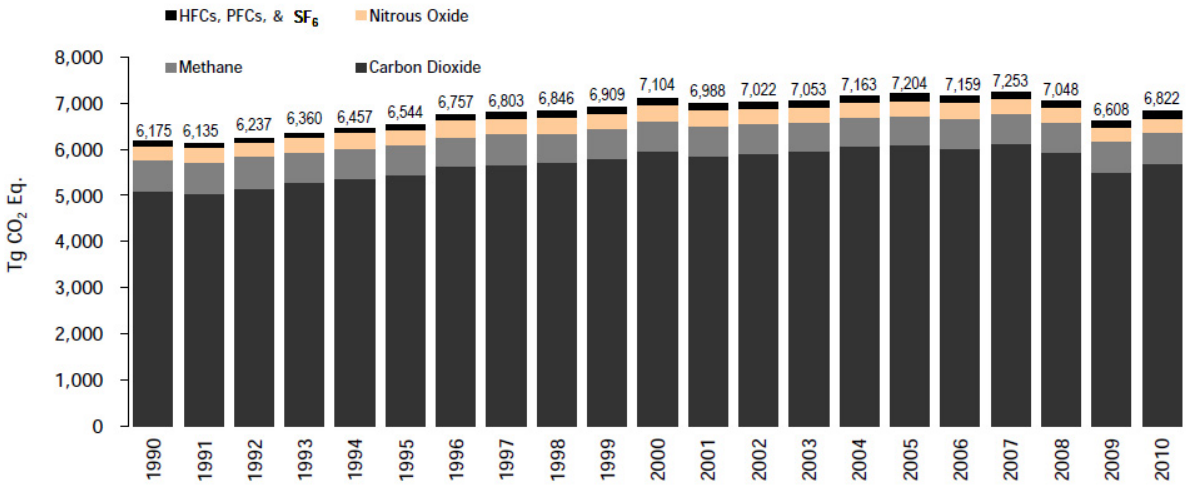
Table 6: Global Warming Potentials

Greenhouse Gas	Global Warming Potential
Carbon dioxide (CO_2)	1
Methane (CH_4)	21
Nitrous oxide (N_2O)	310
Source: Intergovernmental Panel on Climate Change 2007a.	

2.3.4 - United States, California, and County Emissions

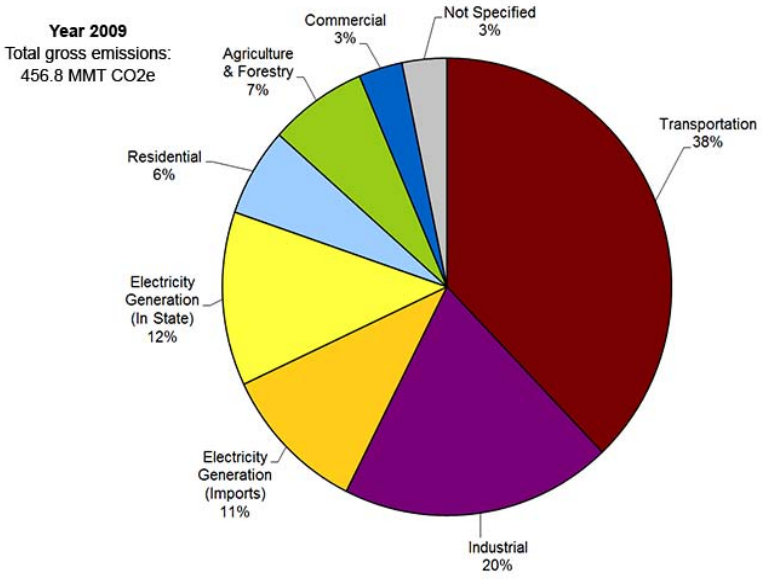
Emissions worldwide were approximately 49,000 $MMTCO_2e$ in 2004 (Intergovernmental Panel on Climate Change, 2007b). As shown in Figure 5, emissions in the United States in 2009 were approximately 6,608 $MMTCO_2e$ (1 teragram [Tg] is equal to 1 MMT). Carbon dioxide is the main contributor to emissions in the United States (water vapor is also a contributor but is not regulated).

Figure 5: United States Greenhouse Gas Emissions Trends



As shown in Figure 6, greenhouse gas emissions in California in 2009 were approximately 456.8 $MMTCO_2e$ (California Air Resources Board 2012).

Figure 6: California Greenhouse Gas Emissions in 2009



Greenhouse gas emissions estimations and projections for San Joaquin County are shown in Table 7. Emissions only for *unincorporated* San Joaquin County for 2007 are shown in Table 8; therefore, the emissions exclude the City of Manteca. The methodology used to estimate the emissions from the two inventories differ; therefore, the emissions cannot be compared directly.

Table 7: San Joaquin County Greenhouse Gas Emissions

Sector	Emissions ($MTCO_2e$/year)		
	2005	2020	2035
Residential Energy	847,951	1,023,046	1,242,806
Commercial/Industrial Energy	1,580,839	1,837,260	2,024,966
Transportation	2,935,472	3,354,270	4,178,765
Solid Waste	214,727	272,437	345,673
Wastewater	147,023	186,538	236,682
Agriculture	837,876	813,089	757,990
Total	6,563,888	7,486,640	8,786,882

Notes:
$MTCO_2e$ = metric tons of carbon dioxide equivalents; to convert to million $MTCO_2e$, divide the emissions by 1,000,000.
Source: San Joaquin Council of Governments 2012 (Appendix A of the Transit-Oriented Development Plan Public Review Draft).

Table 8: Unincorporated San Joaquin County Greenhouse Gas Emissions

Sector	Emissions ($MTCO_2e$) 2007
Residential Energy	262,588
Commercial/Industrial Energy	568,943
Transportation	3,005,613
Solid Waste	41,067
Wastewater	2,784
Agriculture	95,1024
Total	4,832,019

Note:
$MTCO_2e$ = metric tons of carbon dioxide equivalents
Source: San Joaquin County 2009.

2.3.5 - International Regulations

The United States participated in the United Nations Framework Convention on Climate Change (UNFCCC) signed on March 21, 1994. The first international agreement to regulate greenhouse gas emissions under the UNFCCC was the Kyoto Protocol. The United States signed the Kyoto Protocol; however, Congress has not ratified the Protocol and the United States is not bound by the Protocol's

commitments. The primary objection to the Protocol in the United States was that it exempted most of the world's emissions from compliance and would harm the economy.

2.3.6 - United States Environmental Protection Agency

The United States Environmental Protection Agency (EPA) is responsible for implementing federal policy to address global climate change. The federal government's early efforts have focused on public-private partnerships to reduce greenhouse gas intensity through energy efficiency, renewable energy, methane and other non-CO_2 gases, agricultural practices, and implementation of technologies to achieve greenhouse gas reductions.

The EPA is required to regulate carbon dioxide and other greenhouse gases as pollutants under Section 202(a)(1) of the federal Clean Air Act. The first step in implementing its authority was the Mandatory Reporting Rule that required inventory data collection commencing on January 1, 2010 with first reports due March 2011. Effective January 2, 2011, the EPA requires new and existing sources of greenhouse gas emissions of 75,000 tons per year to obtain a permit under the New Source Review Prevention of Significant Deterioration and Title V Operating Permit Program.

2.3.7 - California Regulatory Context

California has adopted a variety of regulations aimed at reducing the State's greenhouse gas emissions. While state actions alone cannot stop climate change, the adoption and implementation of this legislation demonstrates California's leadership in addressing this challenge. Key legislation pertaining to the State's reduction targets are described below.

Executive Order S-3-05. California Governor Arnold Schwarzenegger announced on June 1, 2005, through Executive Order S 3-05, the following reduction targets for greenhouse gas emissions:

- By 2010, reduce greenhouse gas emissions to 2000 levels;
- By 2020, reduce greenhouse gas emissions to 1990 levels; and
- By 2050, reduce greenhouse gas emissions to 80 percent below 1990 levels.

The State achieved the first goal of reducing emissions to 2000 levels by 2010. Total greenhouse gas emissions were reduced by 2.9 percent during that period, even though population increased by 10.9 percent in the same period (ARB 2013).

Senate Bill (SB) 375. SB 375 aligns regional transportation planning efforts, regional greenhouse gas reduction targets, and affordable housing allocations. Metropolitan Planning Organizations (MPO) are required to adopt a Sustainable Communities Strategy, which allocates land uses in the Metropolitan Planning Organization's Regional Transportation Plan. Qualified projects consistent with an approved Sustainable Communities Strategy or Alternative Planning Strategy and categorized as "transit priority projects" would receive incentives under new provisions of CEQA.

The initial results of the MPO scenario analysis for San Joaquin County indicated that a reduction in passenger vehicle CO_2 per capita of 23.3 percent by 2020 and 30.1 percent by 2035 could be achieved. These numbers are subject to changes that are due to model validation, calibration, and ongoing local coordination efforts. The MPO growth scenario focuses on increasing residential densities from approximately 4 units per acre to nearly 7 units per acre. The scenario discourages growth in agricultural and sensitive habitat areas, focuses growth in infill areas within or adjacent to existing city limits, spheres of influence, or existing urbanized areas, with emphasis on the urban core (ARB 2013).

AB 32. The California State Legislature enacted AB 32, the California Global Warming Solutions Act of 2006. AB 32 requires that greenhouse gases emitted in California be reduced to 1990 levels by the year 2020. Greenhouse gases as defined under AB 32 include carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride. The California Air Resources Board (ARB) is the state agency charged with monitoring and regulating sources of greenhouse gases. The ARB approved the Climate Change Scoping Plan in December 2008 (California Air Resources Board 2008). The Scoping Plan contains measures designed to reduce the State's emissions to 1990 levels by the year 2020.

Other State Regulations

AB 1493 (Pavley). The Pavley Bill enacted in 2002 requires the maximum feasible and cost-effective reduction of greenhouse gases from automobiles and light-duty trucks. In 2004, ARB approved the "Pavley I" regulations that applied to new passenger vehicles beginning with model year 2009 through 2016. Pavley I is expected to reduce greenhouse gas emissions from regulated vehicles by 30 percent from 2002 levels by 2016. Pavley II was incorporated into Amendments to the Low-Emission Vehicle Program referred to as LEV III. The amendments, effective August 7, 2012, apply to vehicles for model years 2017 through 2025. The regulation will reduce greenhouse gases from new cars by 34 percent from 2016 levels by 2025.

The State has adopted several other major regulations that will provide substantial reductions in greenhouse gases. Title 24, Part 6 California's Energy Efficiency Standards for Residential and Nonresidential Buildings were first established in 1978 to reduce California's energy consumption. The California Energy Commission revises Title 24 about every three years to incorporate cost-effective energy efficiency technological advancements into the construction of new buildings. California's Green Building Standard Code (CalGreen) was adopted in 2010 and went into effect January 2011. CalGreen is a mandatory green building code that sets minimum environmental standards for new buildings including standards for volatile organic compound (VOC) emitting materials, water conservation, and construction waste recycling.

The ARB has adopted numerous regulations on sources of greenhouse gases since the approval of the Climate Change Scoping Plan. Some of the more notable regulations include the Low Carbon Fuel Standard and regulations affecting vehicle efficiency such as the Tire Pressure Program, Low Friction

Oil, and Heavy Duty Vehicle Aerodynamic Efficiency Standards. Also important are ARB regulations that apply to high global warming potential consumer products and refrigerants.

As shown in Table 9, the Scoping Plan contains a variety of measures that will reduce emissions generated in the City.

Table 9: Select Scoping Plan Reductions in California

Category	Emissions in 2020 ($MMTCO_2e$)	Scoping Plan Measure	Reductions in 2020	
			$MMTCO_2e$	Percent
On-road motor vehicles: passenger vehicles	127.0	Pavley	26.1	20.6
		Tire Pressure Program	0.6	0.5
		Low Carbon Fuel Standard	15.0	11.8
		Advanced Clean Cars	3.8	3.0
		Low Friction Oil	2.8	2.2
		Subtotal	**48.3**	**38.0**
On-road motor vehicles: heavy-duty trucks	42.1	Heavy-duty vehicle (Aerodynamic efficiency)	0.9	2.1
Ozone-depleting substance substitutes	36.1	Limit High GWP Use in Consumer Products	0.2	0.6
		Motor Vehicle Air Conditioning	0.2	0.6
		High GWP Refrigerant Management Program for Stationary Sources	5.8	16.1
		Subtotal	**6.2**	**17.2**
Waste	8.5	Landfill Methane Control Measure	1.5	17.6
Electric power	110.4	Renewable Electricity Standard	11.4	10.3
		Renewables Portfolio Standards	12.0	10.9
		Subtotal	**23.4**	**21.2**

Notes:
$MMTCO_2e$ = million metric tons of carbon dioxide equivalents; GWP = global warming potential
This table does not present all of the Scoping Plan reductions.
Source of Scoping Plan Measure and Reductions: California Air Resources Board 2012.
Source of emissions in 2020: California Air Resources Board 2010.
Source of percent reduction: reductions divided by emissions and multiplied by 100.

CEQA Guidelines 15183.5 Tiering and Streamlining the Analysis of Greenhouse Gas Emissions

The Climate Action Plan is intended to take advantage of the streamlining opportunities offered by SB 97 enacted in 2007 and implemented by the Office of Planning and Research (OPR) with amendments to the CEQA Guidelines effective March 2010 that are listed below.

Section 15183.5. Tiering and Streamlining the Analysis of Greenhouse Gas Emissions.

(a) Lead agencies may analyze and mitigate the significant effects of greenhouse gas emissions at a programmatic level, such as in a general plan, a long range development plan, or a separate plan to reduce greenhouse gas emissions. Later project-specific environmental documents may tier from and/or incorporate by reference that existing programmatic review. Project-specific environmental documents may rely on an EIR containing a programmatic analysis of greenhouse gas emissions as provided in section 15152 (tiering), 15167 (staged EIRs) 15168 (program EIRs), 15175-15179.5 (Master EIRs), 15182 (EIRs Prepared for Specific Plans), and 15183 (EIRs Prepared for General Plans, Community Plans, or Zoning).

(b) Plans for the Reduction of Greenhouse Gas Emissions. Public agencies may choose to analyze and mitigate significant greenhouse gas emissions in a plan for the reduction of greenhouse gas emissions or similar document. A plan to reduce greenhouse gas emissions may be used in a cumulative impacts analysis as set forth below. Pursuant to sections 15064(h)(3) and 15130(d), a lead agency may determine that a project's incremental contribution to a cumulative effect is not cumulatively considerable if the project complies with the requirements in a previously adopted plan or mitigation program under specified circumstances.

    (1) Plan Elements. A plan for the reduction of greenhouse gas emissions should:
        (A) Quantify greenhouse gas emissions, both existing and projected over a specified time period, resulting from activities within a defined geographic area;
        (B) Establish a level, based on substantial evidence, below which the contribution to greenhouse gas emissions from activities covered by the plan would not be cumulatively considerable;
        (C) Identify and analyze the greenhouse gas emissions resulting from specific actions or categories of actions anticipated within the geographic area;
        (D) Specify measures or a group of measures, including performance standards, that substantial evidence demonstrates, if implemented on a project-by-project basis, would collectively achieve the specified emissions level;
        (E) Establish a mechanism to monitor the plan's progress toward achieving the level and to require amendment if the plan is not achieving specified levels;
        (F) Be adopted in a public process following environmental review.
    (2) Use with Later Activities. A plan for the reduction of greenhouse gas emissions, once adopted following certification of an EIR or adoption of an environmental

> document, may be used in the cumulative impacts analysis of later projects. An environmental document that relies on a greenhouse gas reduction plan for a cumulative impacts analysis must identify those requirements specified in the plan that apply to the project, and, if those requirements are not otherwise binding and enforceable, incorporate those requirements as mitigation measures applicable to the project. If there is substantial evidence that the effects of a particular project may be cumulatively considerable notwithstanding the project's compliance with the specified requirements in the plan for the reduction of greenhouse gas emissions, an EIR must be prepared for the project.

This CAP includes emission inventory, an analysis of the impacts of growth projected by the General Plan, reduction targets based on substantial evidence, and a mechanism to monitor progress as described in the following sections.

SECTION 3: GREENHOUSE GAS INVENTORIES

3.1 - About the Inventories

Emission inventories are compilations of emissions generated by sources in a geographic area at a given time. Emission inventories identify the contribution of each type or category of emissions to the total inventory of pollutants of interest. Emission inventories help to rank sources by size to determine those that are most important to control. Inventories are required to determine existing conditions and to forecast emissions in future years to account for the effects of growth.

Several emission inventory concepts are important for climate action planning described below.

- **Baseline Inventory.** The starting point for the emission inventory is referred to as the Baseline Inventory. The baseline is usually the most recent year with complete data for emission sources in the inventory, but can also be past years with regulatory significance.
- **Growth Rates.** Inventory forecasts require application of growth rates to the baseline inventory to estimate future emissions. Growth rates are often identified as a percent growth per year. Rates used for greenhouse gas inventories are usually tied to growth rates used for other purposes such as population forecasts, and economic forecasts generated for the General Plan or Regional Transportation Plan. Inventories can be projected for future years with straight line projections using the growth rate. Intermediate years can be estimated by interpolating between years with data available.
- **Business as Usual.** In order to separately account for the benefits of regulations, strategies, and programs on future emissions, inventories are developed that only reflect growth with no controls. These are also referred to as a business as usual inventories. Business as usual inventories show the magnitude of the problem in the future if no action is taken and highlight the importance of growth.
- **Adjusted Business as Usual Inventory.** Emission reductions achieved by regulations, programs, and measures that are implemented by other agencies are applied to the business as usual inventory for each source category to create the adjusted business as usual inventory. This inventory identifies the base from which reductions are needed from local strategies and measures to demonstrate consistency with the targets contained in AB 32.
- **Target Inventories.** Target inventories show the final emissions after application of all reductions by the target year or years. Target inventories demonstrate that the CAP strategies will achieve the targets.

3.1.1 - Municipal Government Operations and Community Inventories

The City of Manteca greenhouse gas inventory contains greenhouse gas emissions from the municipal government operations and the community. Emissions are reported as a quantity over time, such as in tons per year. This inventory does not report concentrations of pollutants in the air, which is a measure of the total amount of a pollutant, typically measured in parts per million, parts per billion, or micrograms per cubic meter ($\mu g/m^3$) of air.

This inventory only estimates greenhouse gases and does not contain an estimate of criteria air pollutants (ozone, particulate matter, carbon monoxide, nitrogen dioxide, sulfur dioxide, and lead), nor does it contain an inventory of toxic air pollutants (diesel particulate matter, benzene, etc.).

The inventory incorporates two entities: the community and government operations. The community emissions refer to emissions *within* the City, such as emissions from motor vehicle use and from generating electricity to power buildings within the City. The government inventory consists of emissions within the control of the government, such as electricity to power City Hall and city fleet vehicle emissions.

The community inventory estimates emissions for the years 2005, 2010, 2020, and 2035. The government inventory estimates emissions for the year 2005. The year 2005 was selected because it was prior to the adoption of Assembly Bill (AB) 32; thus, reductions from regulations pertaining to AB 32 are not shown. Year 2010 was selected because it is the most recent year for which data is available.

Emissions for 2020 and 2035 were projected for two scenarios: business as usual and with regulations. The regulation scenario incorporates planned regulations that will go into effect by 2020, such as the Pavley fuel efficiency regulations, which will reduce emissions from new passenger motor vehicles. Business as usual refers to the emissions that do not take into account regulations or any measures of which the City is planning to reduce emissions.

Inventories consider a wide range of human activities. Estimating the amount of greenhouse gases generated by these activities requires using a multiplicity of data sources and a diverse set of methodologies. Emission inventories are by nature the reflection of the best available data and the most applicable methods at the time of their compilation. As data grows and understanding develops, the inventories can be updated and improved. Emissions calculated for this inventory reflect current best estimates; in some cases, however, estimates are based on assumptions and incomplete data. Therefore, this inventory contains uncertainties.

3.2 - Government Operations Inventory

The City of Manteca Government Operations Greenhouse Gas Inventory was prepared by the Great Valley Center; the report is contained in Appendix A. The report provides a detailed breakdown and description of the emissions generated by City operations. The following is a brief summary of the inventory report.

Golf Courses

The main source of emissions from golf courses is from fertilizer use. The Manteca Park Golf Course is located at 305 North Union Road, and covers 101 acres (Manteca 2011). The golf course is owned and operated by the City; therefore, any potential emissions would be attributed to the government operations inventory.

Wastewater

The City of Manteca Wastewater Quality Control Facility is a publicly owned treatment works facility that is designed to handle 9.87 million gallons per day with the potential for an expansion to 17.5 million gallons per day. Since the facility is owned and operated by the City, the emissions are attributed to the government operations inventory and are also included in the community inventory.

3.2.1 - Results

In 2005, City of Manteca's greenhouse gas emissions from government operations totaled 7,321 metric tons of CO_2e. As illustrated in Figure 17 and Table 5, the Vehicle Fleet sector produces the most greenhouse gas emissions in the City of Manteca at 32.2 percent, followed by the Wastewater Facilities sector at 23.7 percent. As shown in Figure 2 and Table 3, Electricity and Gasoline are the sources with the greatest percentage of emissions (45.9 percent and 26.6 percent, respectively).

The City operated a vehicle fleet with approximately 285 vehicles and 60 pieces of equipment in 2005. The Police Department operated the largest portion of the fleet with 29.8 percent, followed by the Parks Department and Solid Waste Department, each with approximately 14.2 percent of the fleet. Other vehicles were used by the Fire Department and Administration.

The operation of wastewater treatment facilities generates greenhouse gas emissions related to electricity consumption and the onsite combustion of fuels such as natural gas and diesel. The emissions are directly related to the volume of wastewater processed by the facility and the efficiency of the treatment process.

Water delivery generates emissions primarily due to operation of electric pumps used to transport water throughout the system. Water delivery is the third-largest source of emissions with 1,017 metric tons of CO_2e per year in 2005.

Buildings and facilities are important sources of emissions due to consumption of electricity and fuels such as natural gas for air conditioning, lighting, heating and other equipment. In addition, fire suppression, air conditioning, and refrigeration equipment in buildings can emit hydrofluorocarbons (HFCs) and other greenhouse gases when these systems leak refrigerants or fire suppressants.

Table 10: City of Manteca Government Operations Greenhouse Gas Emissions Inventory

Sector	Metric Tons (CO_2e)	Percent of Sector Emissions	Energy Cost ($)
Vehicle Fleet	2,358	32.2	591,944
Wastewater Facilities	1,738	23.7	637,410
Water Delivery Facilities	1,017	13.9	561,141
Employee Commute	983	13.4	-
Buildings and Facilities	613	8.4	325,926
Public Lighting	564	7.7	276,290
Government Generated Waste	49	0.7	8,412
Totals	**7,321**	**100.0**	**$2,401,123**
Source: City of Manteca 2005 Government Operations Greenhouse Gas Inventory (Appendix A).			

Figure 7: Government Operations CO_2e Emissions by Sector in 2005

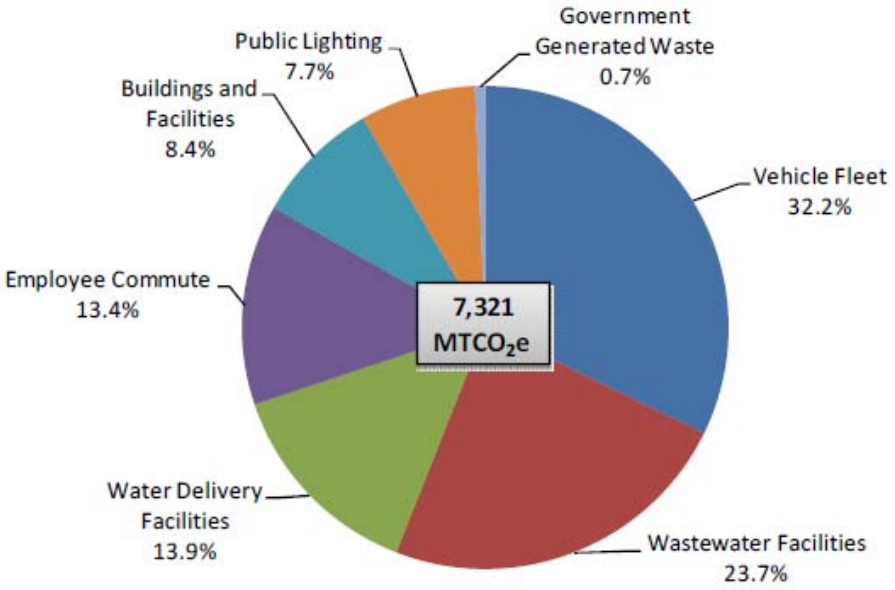
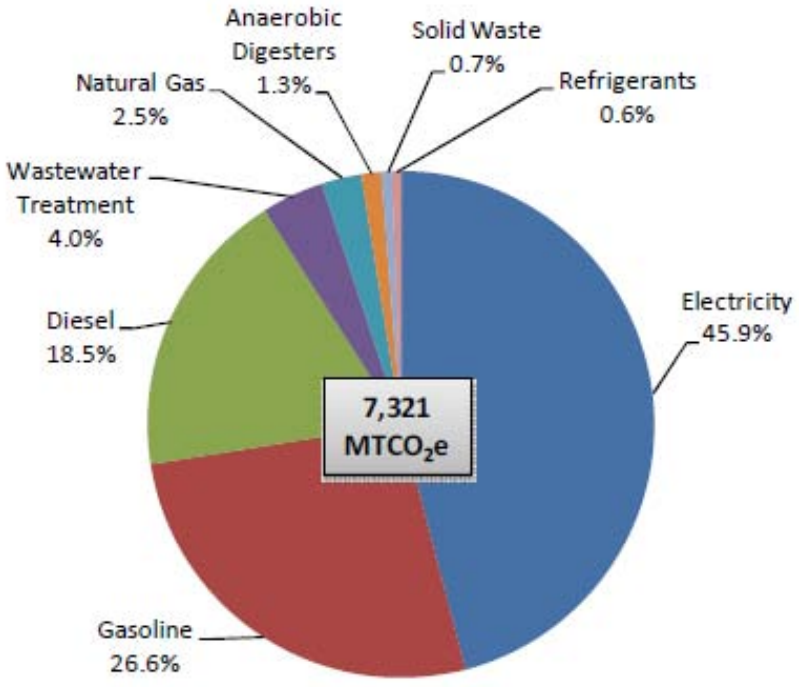


Table 11: City of Manteca Government Operations Greenhouse Gas Emissions Inventory by Source

Source	Metric Tons (CO_2e)	Percent of Sector	Quantity	Units	Cost ($)
Electricity	3,361	45.9	15,023,038	kilowatt-hours	1,756,361
Gasoline	1,947	26.6	217,484	U.S. gallons	293,813
Diesel	1,353	18.5	132,433	U.S. gallons	298,131
Wastewater Treatment	289	4.0	1	metric tons N_2O	—
Natural Gas	186	2.5	35,004	therms	44,406
Anaerobic Digesters	95	1.3	5	metric tons CH_4	—
Solid Waste	49	0.7	210	short tons	8,412
Refrigeration	41	0.6	41	kilograms	—
Totals	**7,321**	**100.0**		**—**	**$2,401,123**
Source: City of Manteca 2005 Government Operations Greenhouse Gas Inventory (Appendix A) .					

Figure 8: Government Operations CO_2e Emissions by Source in 2005



The City will reduce the operations inventory through compliance with state regulations that apply to the vehicles, buildings, and facilities operated by the City's purchasing and funding decisions for new and remodeled equipment and facilities. New vehicles purchased to replace vehicles at the end of their useful life will be more efficient than those currently operated. New buildings will be built to

higher regulatory standards or greater that will make he new buildings much more efficient than older buildings. Retrofits of and replacement of lighting, air conditioning, and other energy efficiency upgrades such as insulation and water-saving fixtures will reduce emissions from existing buildings and facilities.

3.3 - Community Inventory

3.3.1 - Methodology

Michael Brandman Associates prepared the community inventory using the methods described below and the spreadsheets in Appendix B.1.

There are several different resources to assist in preparation of community inventories, though there is no guidance published by a regulatory agency at this time. In July 2012, ICLEI, Local Governments for Sustainability, released a public comment draft of *U.S. Community Protocol for Accounting and Reporting of Greenhouse Gas Emissions* (ICLEI 2012). The California Association of Environmental Professionals Climate Change Committee has published two papers on the preparation of community inventories (AEP 2011 and AEP 2012). Some of the information in those papers was used in preparing this inventory.

The Statewide Energy Efficiency Collaborative (SEEC) is an alliance formed to support local government efforts to reduce greenhouse gas emissions and save energy. The SEEC provides online software, the SEEC Apps Software Community Inventory Tool, which estimates community emissions. Use of the SEEC software could allow comparison of emissions between jurisdictions, as the same methodology is used; however, the tool does not allow altercation of select emission factors. It can be beneficial to change emission factors to increase the accuracy of the estimates. Nevertheless, 2005 and 2010 emissions were estimated using the SEEC software to compare the emissions as generated by Michael Brandman Associates. Only the years 2005 and 2010 were estimated, since projections using the model are simply based on percent increases. The waste emissions as generated by the SEEC tool were used in this inventory. The model output is contained in Appendix B.5.

Programs, Policies, and Measures Included in Business as Usual Emissions

The business as usual 2005 scenario includes reductions achieved through compliance with the versions of Title 24 energy efficiency requirements in effect prior to that date. New development will be required to comply with increasingly stringent versions of State Title 24 energy efficiency requirements. Title 24 is updated about every three years to incorporate additional improvements in energy efficiency and technological advancements. Business as usual includes the version of Title 24 in place in 2005 but not those adopted since that time.

Sources Included in Inventory

On-Road Vehicles

On-road vehicles include gasoline and diesel passenger vehicles, light-duty trucks (and sports utility vehicles), and heavy-duty vehicles traveling within the City. Vehicle miles traveled (VMT) data was estimated by Kittelson & Associates, Inc./Dowling (see memorandum in Appendix B.2). The VMT includes miles traveled on local city roads and portions of SR-99 and SR-120 within the City. The VMT was converted to emissions using emission factors from EMFAC2011 for 2005, 2010, 2020, and 2035.

Electricity: Residential and Commercial

Electricity refers to the indirect emissions associated with generating electricity to be used in the City. Pacific Gas & Electricity (PG&E) provided electricity data for 2005 and 2010 for residential and commercial categories. Note that industrial electricity usage was not reported, due to Rule 15/15 constraints discussed below.

PG&E provided emissions factors for the years 2003 through 2009 (see Appendix B.3). The emission factors vary from year to year for two main reasons. First, the amount of available hydroelectricity varies and secondly, when the demand for electricity is greater, such as during the summer when people are using air conditioning, PG&E meets the demand with fossil fuel generation, which has greater emissions compared with renewable energy (PG&E 2011). An average of the emission factors between 2005 and 2009 is used for both 2005 and 2010 and is 0.559 pound of carbon dioxide per kilowatt-hour.

Electricity for residential uses for 2020 and 2035 was projected from 2010 electricity use by assuming that household growth (refer to Table 5) was equal to an increase in residential electricity. Electricity for commercial was projected from 2010 use using projected growth in employment.

Natural Gas: Residential and Commercial

Greenhouse gases are emitted when natural gas is burned. Natural gas is used to heat the inside of buildings, power dryers, heat water, and for kitchen stoves. PG&E provided usage data for 2005 and 2010 for residential and commercial uses. Note that PG&E was unable to provide data for industrial uses because of Rule 15/15 constraints adopted to protect the privacy of individual customers as discussed later in this document. PG&E also provided the emission factor of 11.7 pounds of carbon dioxide per therm.

Residential natural gas usage was assumed to grow at the same rate as the number of housing units. Growth in commercial correlates to an increase in employment.

Waste

Waste generated by residents, employees, and visitors in the City are sent to landfills outside of the City[4] where the waste generates emissions through decomposition processes. The California Department of Resources Recycling and Recovery (2012) maintains records of waste generated by the City on an annual basis. The waste generated by the City for 2005 and 2010 was used to estimate emissions for those years. For 2005 and 2010, it was assumed that the Foothill Sanitary Landfill, one landfill that accepts city waste, did not have a gas collection system, as this was required to be installed in 2011. The collection system was under contract negotiations between the County of San Joaquin and the installation contractor in 2011; however, no record of completion has been located. Emissions for all other landfills assume a gas collection system. 2020 and 2035 estimates include reductions for a gas collection system at all landfills. The waste in tons was converted to emissions using ICLEI recommended procedures.

Ozone-Depleting Substance Substitutes

In some cases, high global warming potential gases have been substituted for ozone depleting substances (ODS) in refrigeration and manufacturing processes. ODS are being phased out pursuant to the Montreal Protocol because they are gases that cause chemical destruction of the ozone in the stratosphere (a layer of air in the upper atmosphere). Ozone in the stratosphere is good because it absorbs ultraviolet radiation, which can cause skin cancer, cataracts, and other health problems in humans. Stratospheric ozone is not to be confused with ozone in the troposphere (the layer of air that we breathe), which is an air pollutant that causes health effects.

ODS substitutes can be released into the atmosphere when they leak out of refrigeration and air conditioning equipment contained in stationary and mobile applications. ODS substitutes are also used in solvent cleaning, foam production, sterilization, fire suppressants, and aerosols.

Two of the ODS substitute types that are experiencing a rapid increase in use, hydrofluorocarbons (HFCs) and perfluorocarbons (PFCs), have very high global warming potentials. The global warming potential is the potential of a gas or aerosol to trap heat in the atmosphere compared with the reference gas, carbon dioxide, which has a global warming potential of 1.

ODS substitutes are estimated for the City by apportioning California emissions based on population. Estimates and projections for California for 2005 and 2020 are available. Emissions for 2010 are interpolated from 2008 and 2009 data. Emission projections for 2035 are based on per capita emissions in 2020.

[4] The Forward Landfill is located at 9999 S. Austin Road (CalRecycle 2012). The address is listed as in Manteca; however, upon review of the City's General Plan map (Manteca 2011), the landfill is not within the city boundary, as it is north of French Camp Road. The current owner of the landfill is Forward Inc./Allied Waste North America. In 2010, the emissions for the landfill were 127,054 $MTCO_2e$ (EPA 2012).

Sources Not Included in Inventory

Trains

A train track runs southeast to northwest through the middle of the City. Review of aerial photographs indicates that there is one rail spur located at SR-99 and SR-120, which serves the heavy industrial land uses near DuPont Court. Data is currently not available regarding the number of trains that serve this area. Therefore, the emissions are not estimated.

Passenger Trains

There is an Altamont Commuter Express (ACE) Rail station at 17800 Shideler Parkway, near Yosemite Avenue. The station is technically in Lathrop, but it is at the border of Lathrop and Manteca. The parking lot for the train station is located in Lathrop. The train traverses on the border of Lathrop and Manteca. Currently, six ACE trains pass through the station Monday through Friday (ACE 2012). The emissions from the passenger train are not estimated in this analysis because the source of these emissions should be accounted for regionally, not on a local basis.

Industrial Electricity and Natural Gas

The 15/15 Rule was adopted by the California Public Utilities Commission (CPUC) in the Direct Access Proceeding (CPUC Decision 97-10-031) to protect customer confidentiality. The 15/15 Rule requires that any aggregated information provided by the utilities must be made up of at least 15 customers, and a single customer's load must be less than 15 percent of an assigned category. If the number of customers in the complied data is below 15, or if a single customer's load is more than 15 percent of the total data, categories must be combined before the information is released. The 15/15 Rule further requires that if it is triggered for a second time after the data has been screened once already using the 15/15 Rule, the customer is dropped from the information provided. This rule prevented industrial data from being released. Therefore, industrial electricity and natural gas data are not included in this inventory. New industrial buildings are required to comply with state energy efficiency requirements. Large industrial users of natural gas and other fuels are subject to the State's Cap and Trade Regulation. Emission reductions from industrial sources fall under the responsibility of the State. Therefore, the absence of these sources in the inventory does not affect the CAP.

Agriculture

The City of Manteca 2023 General Plan lists approximately 3,960 acres of agricultural land use that is "proposed developable land use." The urban reserve land use for the agriculture land use is 1,726 acres, which is 9.7 percent of the total acreage identified in the General Plan (17,860 acres). There could be emissions from crop burning or application of fertilizer and pesticides.

The San Joaquin Valley Air Pollution Control District has adopted Rule 4103 – Open Burning, which phases out all agricultural burning except for very limited circumstances; therefore, this source is minor and decreasing over time. In addition, greenhouse gases are emitted in animal ruminant digestive systems and through manure decomposition. There are no dairies within the Manteca city limits. The lands in the city limits that are still in agriculture are designated for urban development

and would be eliminated as a source from the inventory as the land becomes fallow or is developed. Therefore, emissions from agriculture were not estimated.

Off-Road Vehicles and Equipment

Off-road equipment includes construction and mining equipment, generators, industrial equipment, lawn and garden equipment, and recreational equipment (off-road vehicles and all terrain vehicles). These emissions were estimated and are included in Appendix B.1; however, they are not included in the inventory because they consist of less than 0.02 percent of the total emissions.

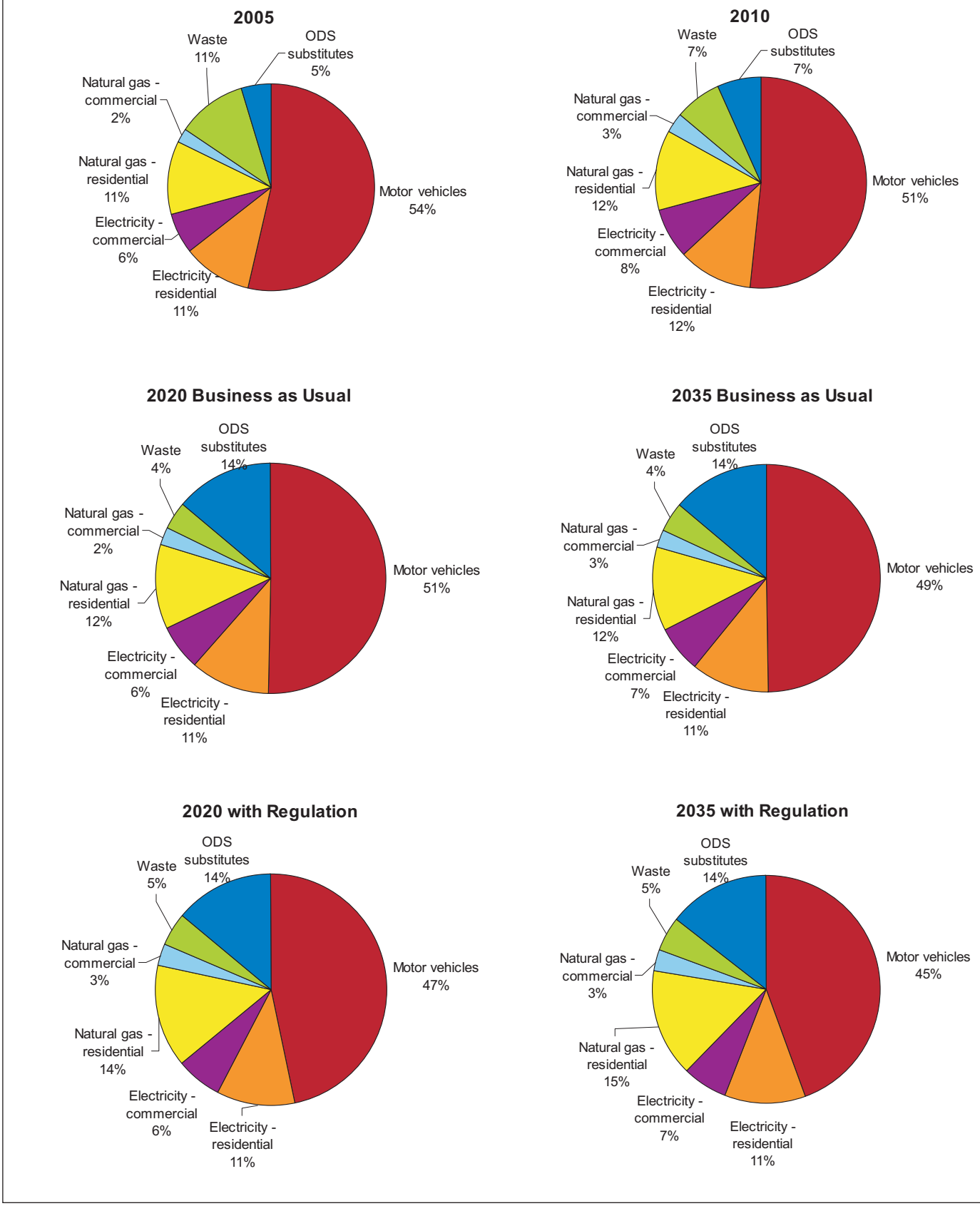
3.3.2 - Business as Usual Results

The community business as usual inventory is presented in Table 12 and in Exhibit 3. These emissions do not take into account reductions from regulations enacted by the state to comply with AB 32. Exhibit 3 displays the community business as usual emissions in a series of pie charts, to show the overall percentage for each scenario year.

Table 12: City of Manteca Community Business as Usual Emissions

Sector	Emissions ($MTCO_2e$/year)			
	2005	2010	2020	2035
Motor vehicles	214,075	210,901	275,507	368,297
Electricity— residential	44,108	47,343	61,212	83,668
Electricity—commercial	25,014	31,146	35,646	49,327
Natural gas—residential	45,527	50,466	65,249	89,186
Natural gas—commercial	9,856	11,818	13,526	18,717
Waste	42,305	30,454	21,586	29,505
Ozone depleting substance (ODS) substitutes	19,461	26,741	75,711	103,486
Total	400,346	408,869	548,437	742,186

Note:
$MTCO_2e$ = metric tons of carbon dioxide equivalents
Source: Michael Brandman Associates 2013.

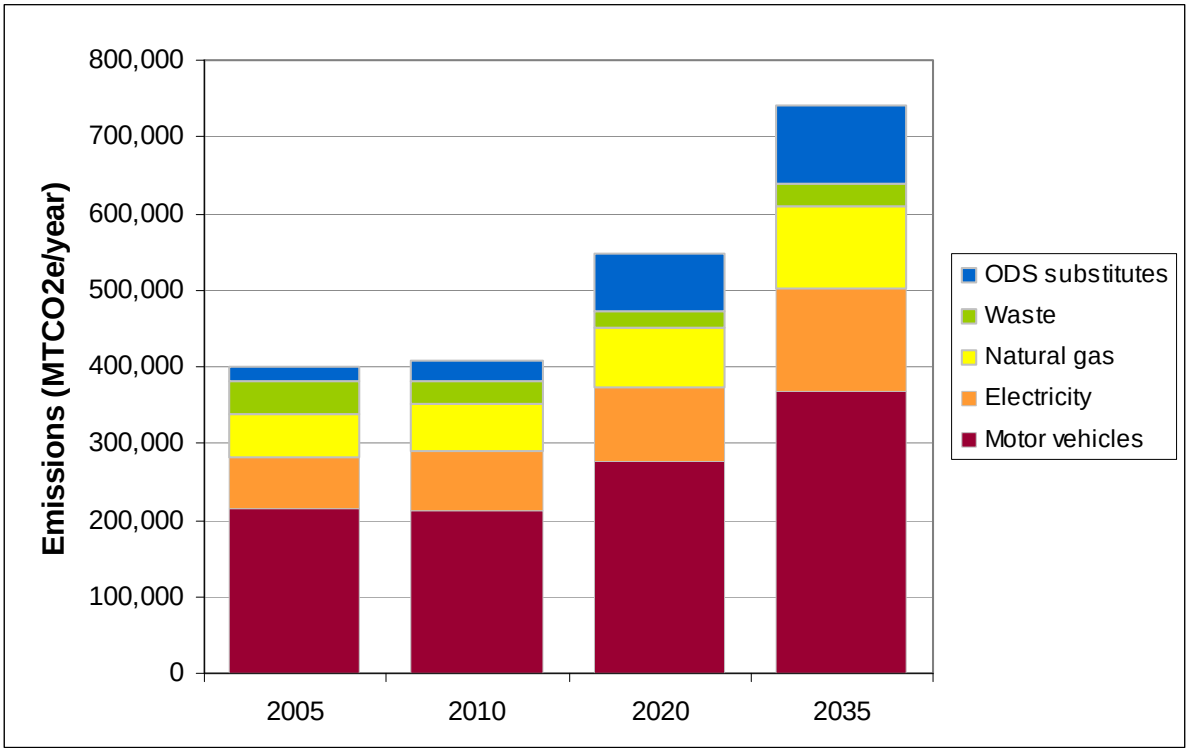


Source: Michael Brandman Associates, 2012.

Michael Brandman Associates

Exhibit 3
Community Greenhouse Gas Emissions

Figure 9: Community Business as Usual Inventory



3.3.3 - Impact of State Emissions Reductions Measures

The State has enacted a number of regulations pursuant to the requirements in AB 32 that would reduce emissions within the City, as discussed below.

Methodology

Motor Vehicles

The ARB has adopted many of the Scoping Plan measures for mobile sources as regulations. Only the measures that have been adopted or put into practice are included in this assessment (California Air Resources Board 2012). The following regulations are included:

- Pavley and Low Carbon Fuel Standard (LCFS): EMFAC2011 emission factors that include Pavley I and the LCFS were used to estimate the impact of those regulations. In this way, the reductions from those measures are more specific than simply applying the statewide reduction estimates because the reductions in EMFAC take into account the variations between vehicle classes. The Pavley I Vehicle Standards apply to passenger cars and light-duty trucks for model years 2009 to 2016.
- Low Emission Vehicle (LEV) III Standards: The LEV III standards amend the exhaust and evaporative emission standards for passenger cars and light- and medium-duty trucks. The

standards provide requirements for model years 2017 to 2025. The regulation applies to both criteria pollutant and greenhouse gas emissions. The standard drops greenhouse gas emission to 166 grams per mile, a reduction of 34 percent compared with 2016 levels. LEV III implements the Pavley II standards described in the Scoping Plan.

- Tire Pressure Program: This regulation is categorized under vehicle efficiency measures in the Scoping Plan. This regulation applies to automotive service providers performing or offering to perform automotive maintenance or repair services in California. This applies to passenger cars, light-duty trucks, medium-duty vehicles, and light heavy-duty trucks with gross vehicle weight ratings of less than or equal to 10,000 pounds (California Air Resources Board 2009). As shown in Table 9, this measure is anticipated to reduce emissions by 0.5 percent for those vehicle types.
- Low Friction Oil: ARB indicates that this measure has been achieved in practice. It is assumed that this measure would apply to the same vehicle types as in the tire pressure program. As shown in Table 9, this measure is anticipated to reduce emissions by 2.2 percent.
- Aerodynamic efficiency: This regulation improves the fuel efficiency of heavy-duty tractors that pull 53-foot or longer box-type trailers. Fuel efficiency is improved through improvements in tractor and trailer aerodynamics and the use of low rolling-resistance tires. As shown in Table 9, this measure would reduce emissions by 2.1 percent from heavy-duty vehicles.

Electricity

The State's strategy for reducing electricity-related greenhouse gases targets electric power utilities on the production side and energy efficiency on the consumer side. Two regulations are in place to reduce emissions from this source. The Renewable Portfolio Standard requires electric utilities to provide an increasing share of their energy from renewable sources with 33 percent required by 2020. Title 24 Energy Efficiency Standards for Residential and Non-Residential Buildings requires new structures to meet increasingly stringent energy efficiency standards.

Renewable Portfolio Standard. The electricity emission factor was decreased to account for the renewable energy regulations, which require 33 percent renewable energy by the year 2020. The average renewable energy use for 2005–2009 for PG&E was calculated as 12.6 percent (California Public Utilities Commission 2012). Therefore, an additional 20.4 percent increase in renewables is needed for the utility to comply with the regulation.

Title 24 Building Energy Efficiency Standards.

Building energy efficiency standards are designed to ensure that new and existing buildings achieve energy efficiency and preserve outdoor and indoor environmental quality. These standards are contained in the California Code of Regulations Title 24, Part 6. The California Energy Commission

(CEC) is required by state law to update energy efficiency standards about every 3 years. The 2013 Standards will result in 25 percent less energy used for lighting, heating, cooling, ventilation, and water heating than the 2008 Standards that went into effect in 2010 (CEC 2012).

The reductions from Title 24 are applied to the energy consumption related emissions for new development and remodeling projects at existing buildings subject to the regulations. The benefits of the standards accrue as buildings subject to the standards are constructed to meet the standard applicable at the time. PG&E provided actual electricity and natural gas usage for 2008 through 2010, which reflect the benefits of all development subject to previous versions of the Title 24 standards. New development built after 2010 would provide additional reductions as buildings are constructed to comply with the standards.

Natural Gas

Title 24 will also provide reductions in natural gas usage required for water heating and space heating. The CEC estimates that the 2008 and 2013 standards will reduce emissions from residential and non-residential natural gas use by over 25 percent by 2020.

Refrigerants

The average percent reduction from the Scoping Plan measures shown in Table 9 is applied to the emissions. The State has adopted several refrigerant management regulations that are anticipated to achieve substantial reductions.

Results

The predicted effect of state measures on community emissions is shown in Table 13. The emissions with incorporation of select regulations are shown in Table 14. The emissions per person and per service population (persons and employees) are shown in Table 15. Graphical representations of the emissions are shown in Figure 10 and Exhibit 3.

Table 13: Predicted Effect of State Measures on Community Emissions

Source Group	State Measures	Emissions ($MTCO_2e$/year)	
		2020	2035
Motor vehicles	Pavley and Low Carbon Fuel Standard	-60,117	-97,910
	Low Emission Vehicle Program III	-4,125	-51,887
	Tire Pressure Program	-745	-880
	Low Friction Oil	-3,261	-3,854
	Aerodynamic Efficiency	-1,321	-1,886

Table 13 (cont.): Predicted Effect of State Measures on Community Emissions

Source Group	State Measures	Emissions ($MTCO_2e$/year)	
		2020	2035
Electricity - residential	Renewable Portfolio Standards	-12,489	-17,071
	Title 24 Energy Efficiency Standards	-2,594	-4,333
Electricity – commercial	Renewable Portfolio Standards	-7,273	-10,065
	Title 24 Energy Efficiency Standards	-153	-2,128
Natural Gas-Residential	Title 24 Energy Efficiency Standards	-1,382	-2,249
Natural Gas-Commercial	Title 24 Energy Efficiency Standards	-248	-828
Ozone depleting substance substitutes	Limit High GWP Use in Consumer Products; Motor Vehicle Air Conditioning; High GWP Refrigerant Management Program for Stationary Sources	-13,022	-17,800
Total		**-106,730**	**-210,891**
Source: Michael Brandman Associates 2013 (see Appendix B).			

Table 14: City of Manteca Community Emissions with State Measure Reductions

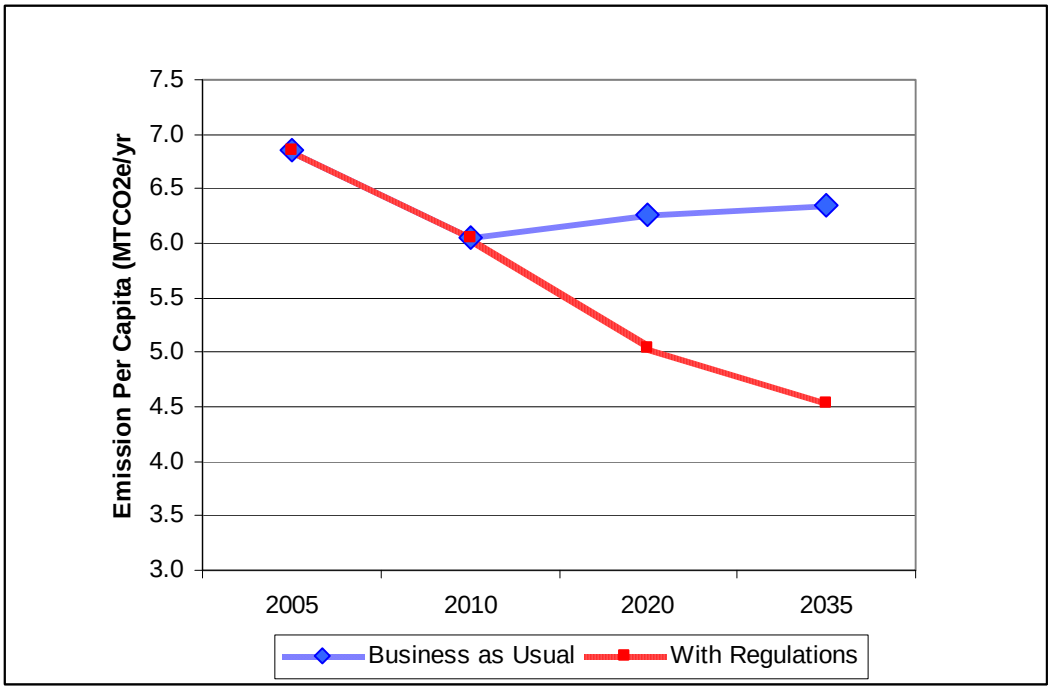
Source	Emissions ($MTCO_2e$)	
	2020	2035
Motor vehicles	205,938	211,880
Electricity—residential	46,129	62,264
Electricity—commercial	28,220	15,730
Natural gas—residential	63,867	86,937
Natural gas—commercial	13,278	17,889
Waste	21,586	29,505
Ozone depleting substance substitutes	62,689	85,686
Total	441,707	531,295
Note: $MTCO_2e$ = metric tons of carbon dioxide equivalents Source: Michael Brandman Associates 2013 (see Appendix B).		

Table 15: City of Manteca Community Emissions (per capita and per service population)

Year	Emissions ($MTCO_2e$/year/person)		Emissions ($MTCO_2e$/year/service population)	
	Without State Measures	With State Measures	Without State Measures	With State Measures
2005	6.9	—	5.6	—
2010	6.1	—	5.0	—
2020	6.3	5.0	5.2	4.2
2035	6.3	4.5	5.3	3.8

Source of per capita emissions: Emissions (without State measures from Table 12 and with State measures from Table 14) divided by City of Manteca population (Table 5).
Source of service population emissions: Emissions divided by the City of Manteca service population (population plus employment, from Table 5).

Figure 10: Manteca per Capita Greenhouse Gas Emissions Trends



3.4 - City of Manteca Greenhouse Gas Reduction Targets

The previous section provides the emission forecast for Manteca for 2020 and 2035 accounting for projected growth and adopted state measures that reduce greenhouse gases. The next step is to identify the amount of reductions that would be required by the City of Manteca in addition to the state measures to achieve consistency with targets adopted by the State. The State has only adopted emission targets for 2020. Regional targets adopted by ARB for SB 375 only apply to light-duty passenger cars and trucks. ARB has not adopted final SB 375 targets for the San Joaquin Valley.

California Executive Order S-3-05 includes a goal for statewide emissions to be reduced to 80 percent below 1990 levels by 2050; however, no plan has been prepared to achieve this goal. The City of Manteca CAP provides a target for 2020. Emissions for 2035 and 2050 are provided for informational purposes only. Targets for later years will be revisited in future revisions to the CAP. No separate targets are proposed for Government Operations; however, the measures applicable to government sources will achieve reductions that contribute to the overall community targets.

3.4.1 - Reduction Target Approach

There is no single approach to CAP target setting applicable to all jurisdictions. There are no regulations that specify a target for local jurisdictions. CEQA Guidelines Section 15181.2 states that plans that will be used for future project approvals must "establish a level, based on substantial evidence, below which the contribution to greenhouse gas emissions from activities covered by the plan would not be cumulatively considerable."

The City examined reduction target approaches being considered by other local agencies around the State. The approaches vary with the starting point for determining reduction targets and the basis of comparison. The basic concept is that a jurisdiction would provide reductions for the source categories over which it has jurisdiction that are at least as great as the reductions required to meet the State's goal of reducing emissions to 1990 levels by 2020. The authority to control emissions from many of these sources is shared by multiple jurisdictions. In those cases, it is appropriate to allocate a portion of the reduction target to each jurisdiction. For example, the State's fuel and vehicle efficiency regulations will reduce mobile source emissions, but the County can also provide smaller but important mobile source reductions through land use patterns and transportation system designs that reduce vehicle trips and miles traveled.

Consistency with AB 32 Targets

The State of California AB 32 target for greenhouse gas reductions is to achieve 1990 emission levels by 2020. ARB developed the 1990 emission inventory to identify the target emissions (427 $MMTCO_2e$ per year) and forecasted emissions for the 2020 target year to determine the reductions required to reach the target. ARB's most recent projection for 2020 business as usual emissions is 545 $MMTCO_2e$ per year. Therefore, reducing emissions to 1990 levels will require a reduction of 118 $MMTCO_2e$ per year or 21.65 percent from business as usual (BAU) by 2020. The CAP identifies reductions from sources within its ability to control or influence that exceed 21.65 percent of the City's 2020 BAU inventory.

Targets Based on Per Capita Emissions

One commonly used metric for assessing greenhouse gases in CAPs is with per capita rates. Using per capita rates creates a yardstick for measuring progress that can be applied to slow- and fast-growing communities. The ARB estimates that per capita emissions in California in 2020 will be 13.35 $MTCO_2e$ per person per year prior to accounting for regulations in place to reduce emissions by 2020. To achieve the AB 32 target of achieving 1990 levels by 2020 requires statewide per capita

emissions to decrease to 10.46 $MTCO_2e$ per person or a 21.7 percent reduction by 2020. Manteca's 2020 per capita emission rate prior to controls is projected to be 6.27 $MTCO_2e$ per person. A 21.7 percent reduction in per capita emissions would require a reduction in emissions to 4.91 $MTCO_2e$ per person. Implementation of state regulations in Manteca will reduce per capita emissions to 5.0 $MTCO_2e$ per person. Therefore, additional reductions from local measures of 0.09 $MTCO_2e$ per person must be achieved to reach the target. This amounts to a citywide reduction of 12,014 $MTCO_2$ per year. Using the 21.7 percent reduction in per capita emissions as a target for Manteca provides a reasonable measure of consistency with AB 32.

Two other approaches were examined, but not chosen for use in the CAP. The ARB Scoping Plan includes reductions of 5 $MMTCO_2e$ from local land use changes. The 5 $MMTCO_2e$ reduction amount was based on a 2020 BAU inventory of 596 $MMTCO_2e$ and reductions of 174 $MMTCO_2e$ to achieve 1990 emission levels. In percentage terms, a 0.84 percent reduction contribution was required from land use changes to achieve the target. Manteca's 2020 BAU inventory is 548,437 $MTCO_2e$; therefore, a 0.84 percent reduction amounts to 4,607 $MTCO_2e$. The CAP reductions will exceed this amount providing the city's share of land use related emission reductions.

The ARB Scoping Plan also suggests a local government reduction of 15 percent from current emissions by 2020. The per capita emissions in Manteca in 2010, the most current inventory year, were 6.1 $MTCO_2e$ per person per year. A 15 percent reduction by 2020 from current emissions (2010) would require per capita emissions at or below 5.1 $MTCO_2e$ per person per year. Relying only on reductions from statewide measures achieves per capita emissions of 5.0 $MTCO_2e$ per person per year. Therefore, the CAP reductions will exceed the amount required by this target.

As described above, the target inventory is 21.7 percent below the 2020 BAU inventory or 429,693 $MTCO_2e$ per year. The 2020 target is shown in terms of per capita and community emission inventories and reductions required to achieve the target in Table 16.

Table 16: City of Manteca 2020 Target Emissions Inventory

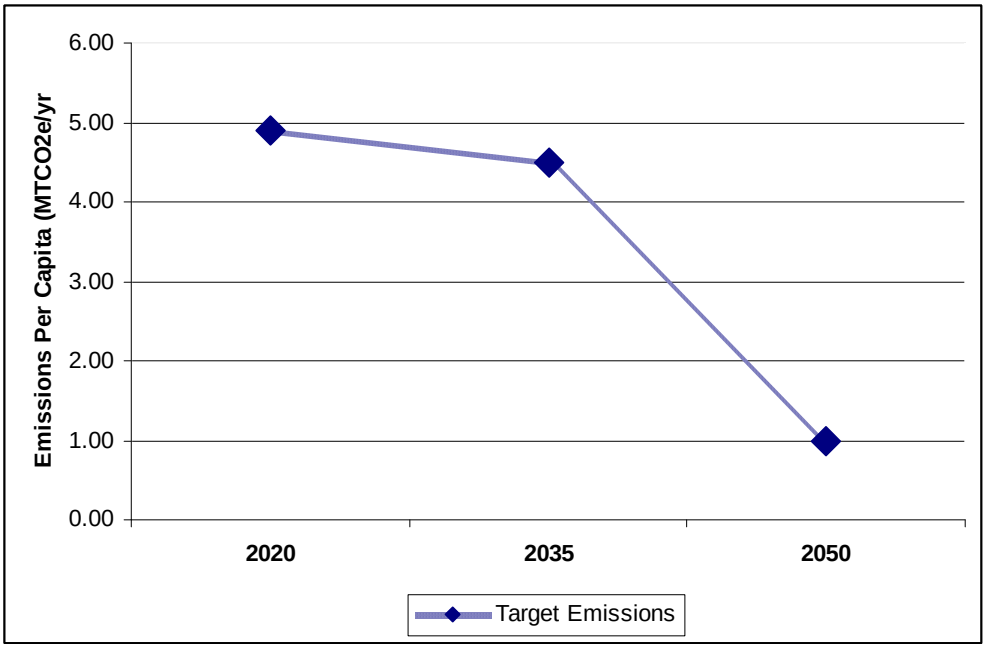
Inventory	Community Emissions ($MTCO_2e$)	Per Capita Emissions ($MTCO_2e$/Person)
2020 BAU	548,437	6.27
2020 Adjusted	441,707	5.05
2020 Target	429,693	4.91
2020 Local Reductions Required	12,014	0.14
2020 Local Reductions Proposed	12,289	0.14
Target Achieved?	Yes	Yes
Source: Michael Brandman Associates 2013 (Appendix B).		

3.4.2 - Targets Beyond 2020

The ARB Climate Change Scoping Plan states, "the 2020 goal was established to be an aggressive, but achievable, mid-term target, and the 2050 greenhouse gas emissions reduction goal represents the level some scientists believe is necessary to reach levels that will stabilize climate." The year 2020 AB 32 goal corresponds with the mid-term target established by Executive Order S-3-05, which aims to reduce California's fair-share contribution of greenhouse gases in 2050 to levels that will stabilize the climate. The goal of the Executive Order of reducing emissions by 80 percent below 1990 levels by the year 2050 is not addressed in this analysis. To obtain the 2050 goal, substantial emission reductions would need to occur in California, such as a nearly complete conversion to alternative energy generation, conversion to electric and/or zero emission motor vehicles, and substantial changes to land use patterns and transportation. The objective of this CAP is to provide Manteca's contribution to achieving the initial target and to provide the framework for future reductions as technology advances and later targets are set by the State.

Figure 11 shows the emissions that would be required in 2050 to achieve the goal identified in Executive Order S-3-05 for 2050. The State's per capita emissions were 14.35 $MTCO_2e$ per person in 1990. A level 80 percent below 1990 levels would require emission of 1.67 $MTCO_2e$ per person. Applying this amount of relative reduction to the City of Manteca would require a reduction from the 2020 target of 4.91 $MTCO_2e$ per person to 0.99 $MTCO_2$ per person. Measures required to achieve emission reductions of this magnitude would be speculative.

Figure 11: Manteca Per Capita Emissions Required for Consistency with a 2050 Target



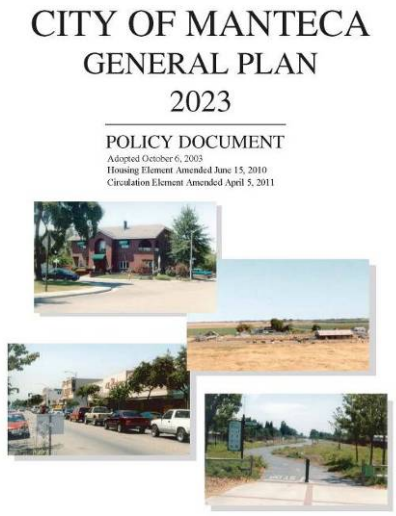
3.4.3 - Reductions Required from Local Measures

Achieving the City's 2020 target for community greenhouse gas emissions will require a 2.18 percent emission reduction beyond those provided by statewide measures. This equates to a reduction of 12,014 $MTCO_2$ per year in 2020 from local measures. The reductions will be primarily achieved from new development but also will be achieved from existing development. Section 4 details the City's strategy for achieving these reductions.

SECTION 4: REDUCTION STRATEGIES

The City of Manteca has identified strategies and actions needed to achieve reductions consistent with State of California targets for greenhouse gas emissions. The strategies are divided into two major categories: General Plan Implementation and Energy Efficiency and Conservation.

General Plan Implementation. The first category relates to land use and transportation strategies implemented through the General Plan. These are long-term strategies for developing the City of Manteca in a way that minimizes motor vehicle use and encourages walking, bicycling, and transit use. All projects are required to demonstrate consistency with the General Plan; therefore, as development occurs, each project must comply with policies that apply to its circumstances. The City's General Plan 2023 contains numerous goals, policies, and implementation measures that promote sustainable development practices that will result in reduced greenhouse gas emissions in new growth and redevelopment areas. The CAP identifies specific actions that the City will take through the project approval process to incorporate the General Plan's policies into projects.



Energy Efficiency and Conservation. The second category is energy efficiency and conservation. These include strategies to improve the energy efficiency in new and existing buildings and structures and strategies to reduce energy use by conserving water, and reducing waste. Another energy strategy involves encouraging the use of low carbon fuels, renewable fuels, and self-generation with zero emission technologies like photovoltaic (PV) solar power systems.

All of the reduction strategies contained in the CAP are supported through education and outreach programs to increase public awareness of the benefits and opportunities provided. In addition, land use strategies that apply to new development can provide destinations and infrastructure that benefit the entire community by improving connections to the existing community and by providing destinations that encourage walking, bicycling, and transit use. Energy efficiency strategies provide savings in terms of fuel consumption that help pay the cost of improvements. Outreach and education on the savings can help spur voluntary actions.

4.1 - Strategy Development Process

The CAP strategy builds upon the City of Manteca's past and ongoing efforts to create a more sustainable community. Achieving greenhouse gas reductions is straightforward. Most greenhouse gas emissions in the emission inventory are created by using carbon-based fuels that release carbon dioxide (CO_2) when combusted. Reducing the use of carbon-based fuels such as gasoline, diesel, and natural gas will reduce greenhouse gas emissions. The reductions can be achieved by changing to

low carbon or no carbon energy sources and by increasing efficiency of the vehicles, devices, and structures that use the fuel.

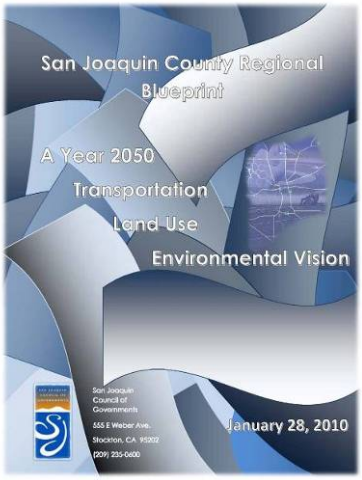
The difficult part of moving from carbon-based fuels is the use of these fuels is nearly universal and moving to alternatives requires investment in new technologies that often have some disadvantages in terms of cost or performance. Increasing energy efficiency is difficult, primarily because of the cost of investing in the more efficient technology. For example, energy efficient windows and high efficiency air conditioning units cost more than conventional windows and less efficient air conditioning units. However, increased efficiency results in energy savings that can offset the costs in many cases.

For some technologies, the cost of the low carbon solution is competitive with the high carbon alternative. For example, the cost of natural gas is currently lower than diesel in terms of dollars per mile when used as a truck or bus fuel and will save the operator money expended for fuel during the life of the vehicle to compensate for the higher cost of the vehicle. Solar PV panels have a high initial cost but no fuel costs, resulting in pay back after 8 to 10 years, depending on the cost per kilowatt of the system and availability of subsidies.

4.1.1 - Strategy Selection Criteria

The strategies were selected on the following criteria:

1. The strategies should achieve multiple objectives and provide multiple benefits in addition to greenhouse gas reductions whenever possible.
2. The strategies applicable to new development must be consistent and supportive of the relevant General Plan goals and policies.
3. Strategies should be feasible and cost-effective.
4. Strategies should be self-implementing to the extent possible and utilize or build upon existing programs and activities.
5. Strategies must be tailored for each type of development.
6. Strategies should not duplicate State programs and regulations that reduce greenhouse gas emissions, but may exceed or compliment the State programs and regulations where appropriate.



4.1.2 - Relationship to the San Joaquin County Regional Blueprint

The City of Manteca participated in the development of the San Joaquin County Regional Blueprint, a Year 2050 Transportation Land

Use Environmental Vision adopted January 28, 2010. The Regional Blueprint Vision is a long-range vision that accounts for the interactions between land use, transportation, and the environment. It provides a foundation for developing strategies to meet future transportation, housing, economic development, and environmental needs. The strategies in the CAP are consistent with the Regional Blueprint Vision and provide additional support for its goals. The relevant Regional Vision Guiding Principles are described below.

- **Sustainable Planning & Growth.** New growth patterns that meet the needs of the present, without compromising the ability of future generations to meet their own needs, within well-defined cities and communities is an important principle in accommodating population growth.
- **Housing Choices.** A variety of housing options on a regional scale, while respecting the values and preferences of individual communities, creates opportunities for meeting the housing needs of families, individuals, seniors, and persons with special needs.
- **Transportation & Mobility Options.** Efficient land use that supports diverse and comprehensive transportation options is primary to this principle which: 1) connects existing internal and external regional networks for ease of use and allows for efficient movement of goods and services, including agricultural products; 2) enhances air passenger transportation; 3) considers transit-themed neighborhood developments; 4) creates mobility choices, while maintaining the existing regional transportation infrastructure; and, 5) improves public use of transit options through increased reliability, safety, convenience, and aesthetics.
- **Preservation of the Environment**. Overall quality of life is better when there is clean air to breathe, clean water to drink, and a place to experience the outdoors in settings such as parks, open space, species and habitat preserves, rivers and the San Joaquin Delta.

4.1.3 - CAP Strategy Categories

The CAP strategies have been categorized as follows:

- Land use and Transportation
- Transportation Facilities Strategies
- Transportation Demand Strategies
- Energy Conservation Strategies for New and Existing Buildings
- Waste Diversion and Recycling and Energy Recovery
- Strategies for Existing Development
- Municipal Strategies

4.2 - Land Use and Transportation Strategies

As described in the previous section, the City's emission inventory is dominated by motor vehicle emissions. The City has control over the emissions from its government fleet vehicles through its purchasing decisions, but no control over the emissions from other vehicles that operate and pass through the City. However, the City's authority over land use provides opportunities to influence the amount people drive and their choice of travel mode. In planning circles, this is called the land use, transportation, air quality connection.

Land use transportation strategies are directly related to the General Plan land use and circulation plans and policies that provide the City's vision of future development in the planning area that reduce vehicle trips and miles traveled. The City's General Plan 2023 includes many land use and transportation policies that when implemented result in lower greenhouse gas emissions. These strategies are implemented through the promotion of smart growth, jobs/housing balance, transit-oriented development, and infill development through that application of land use designations, and zoning, and the use of public-private partnerships to encourage action.

The following are land use strategies having goals and policies in the General Plan that achieve reductions but that will also achieve reductions for the CAP when implemented by individual projects.

4.2.1 - Land Use Strategies

Development that is more dense and compact places people closer to destinations that can be accessed by walking or bicycling, and they increase the potential for high-quality transit service.

Compact Development

The General Plan provides for similar percentages of higher density development in new growth areas compared to existing development. However, development trends have shown that more projects can be expected to propose higher density single family and multifamily development than was constructed in the past. In addition, the General Plan land use designations provide density ranges that allow for higher average densities than experienced in the past without changing the General Plan. Higher density development tends to produce fewer vehicle trips per dwelling unit and more intense commercial development increases opportunities for walking, bicycling, and transit use for some trips. Although higher density is a prerequisite for achieving compact development, the design of the new projects is critical for maximizing reductions from being more compact related to walking, bicycling, and transit use. Approved but undeveloped subdivisions would comply with existing General Plan designations; however, market forces could result in requests for revisions to these subdivisions that would increase development density. The following General Plan policies encourage compact development.

General Plan Policies

Policy Number	General Plan Policy
Goal CD-1	Retain the compact and cohesive community form of the City.
CD-P-1	Retain the existing central city core as the geographical center of the City.
PF-P-1	Facilitate development in the in-fill areas by extending infrastructure.
Program H-I-4	GROWTH MANAGEMENT PROGRAM The City shall retain the Growth Management Ordinance annual residential growth cap of 3.9 percent of existing housing stock, but modify the GMO to allow infill development at the density of the underlying zoning, and to provide exclusions for infill development (a concept approved by the City Council in 2000) and affordable housing from the 3.9 percent cap. In order to be consistent with Government Code Section 65589.7(c), the City shall also adopt procedures in its Growth Management Ordinance to exempt affordable (i.e., lower-income) units from the sewer allocation process and associated fees. The point rating system shall be modified to represent current development goals. Additionally, the City shall annually monitor the progress of the growth management ordinance and, if necessary, modify the implementation of the rating system.
Goal LU-8	To reinforce strong urban design, quality development and a compact city form.
LU-P-49	The City shall give priority to in-fill development and new development contiguous to existing developed areas, whenever practical.
LU-P-50	The City shall encourage and direct growth that supports the downtown as the geographic, civic, cultural, and economic center of Manteca.

Compact Development Strategies (CD)

Achieving more compact development requires actions by both the City and developers. The City provides the framework with land use designations that allows developers to propose compact development projects at appropriate locations within the City and that comply with the applicable rules governing development of the site. Developers propose projects consistent with General Plan policies, development standards and can provide designs that maximize or minimize the pedestrian orientation of the development and provide the financial resources to make projects a reality.

CD-1 The City shall encourage projects consistent with the development densities allowed by the General Plan and are contiguous to existing development meet compact development criteria.

CD-2 The City shall encourage projects that are at or near the maximum densities allowed by the General Plan and zoning designations to achieve more compact development.

CD-3 The City shall propose higher densities during plan updates and work with developers proposing projects requiring General Plan Amendments to design projects with higher densities where appropriate.

Emission Reduction Potential

Studies on the impact of density indicate that a doubling residential density across a metropolitan area may lower vehicle miles traveled by 1.5 to 30.0 percent (CAPCOA Measure LUT-1). Although the City of Manteca would be expected to increase residential density over the next 20 years, the amount of the increase would be limited by market forces and constraints within the existing General Plan land use designations. However, reductions achieved on a project-by-project basis would gradually trend to lower overall VMT.

4.2.2 - Mixed-Use Development

Mixed-use projects provide opportunities for walking between uses for some vehicle trips. Trips are reduced when visitors can park once at the development and obtain services, shopping, or go to a restaurant during a single trip. There are a variety of mixed-use development types with different mixes of uses and designs. Infill projects that provide residential development close to existing commercial development or vice versa can produce many of the same mixed-use benefits if done in a walkable environment. Providing second units on residential lots increases overall development density and promotes more compact development that brings more people closer to commercial development.

General Plan Policies

Policy Number	General Plan Policy
Goal H-2	To promote mixed-use, infill, and downtown development in the city of Manteca.
Policy H-P-15	The City shall apply incentives and other inducements as may be available to encourage the development of infill parcels for residential use in mixed-use developments. The city shall consider the modification of setbacks, height limitations, coverage ratios, parking requirements, and other development regulations in the Zoning Ordinance to facilitate and encourage the use of infill sites for residential and commercial mixed-use, or multi-family residential use.
Policy H-P-16	The City shall encourage vertical and horizontal mixed use development opportunities within appropriate zoning designations in the downtown.
Policy H-P-17	The City shall provide regulatory and financial incentives for infill development.
Policy H-P-18	The City shall encourage the construction of second units.
Program H-I-8	ZONING ORDINANCE AMENDMENTS The City shall make the following amendments to the Zoning Ordinance and Zoning Map to encourage infill and higher-density development in the downtown: • Add a Commercial Mixed Use Zone (CMU) that permits multi-family residential uses "by right" as a part of a mixed-use development. • Infill parcels will be allowed to develop entirely with multi-family residential uses.

CAP Strategies: Mixed Use Development (MUD)

MUD-1 The City shall encourage mixed-use development by ensuring that new growth areas designate mixed-use areas at optimal locations.

MUD-2 The City shall encourage mixed use residential developments that either allow for sufficient population to support commercial development within the project or are constructed in an area with an existing variety of commercial development within walking distance and is already supported by surrounding residential development.

MUD-3 The City shall encourage master planned areas to designate areas within the plan suitable for mixed-use development.

MUD-4 The City shall encourage downtown infill and redevelopment projects that provide housing in suitable sites to increase activity that would support commercial businesses.

Emission Reduction Potential

Mixed-use development can provide reductions ranging from 9 to 30 percent, depending on the mix of uses within the project and the associated pedestrian environment. Mixed-use development that is also infill can reduce emissions by 3 to 30 percent (CAPCOA Measure LUT-2 [see Appendix C]). Mixed-use development in the City of Manteca would be expected to achieve emission reductions on the low end of this range, due to the suburban development pattern of most of the community.

4.2.3 - Pedestrian Oriented Development

Providing pedestrian-friendly infrastructure such as sidewalks, paths, and direct connections to neighboring uses such as shopping, schools, libraries, and parks increase the potential for people to make trips on foot instead of making a car trip. This strategy is consistent with the Complete Streets concept that aims to make streets safe for walking and bicycling.

General Plan Policies

Policy Number	General Plan Policy
Goal C-2	Provide complete streets designed to serve a broad spectrum of travel modes, including automobiles, public transit, walking, and bicycling.
Goal C-4	Support the development of a Downtown area that is highly accessible to all modes of travel, focusing primarily on pedestrians, bicyclists, and transit riders.
Goal CD-10	Establish a pedestrian and bicycle friendly environment in neighborhoods and commercial and office land use areas.
CD-P-37	Commercial centers should provide for convenient, attractive pedestrian access from street fronts and from adjacent commercial, office, and residential land uses.
CD-P-38	Commercial centers should provide for convenient, attractive pedestrian access within the center with dedicated pedestrian ways between all buildings and pedestrian spaces such as plazas, courtyards, and terraces at natural gathering areas within the site.
CD-P-39	Integrating the pedestrian elements (walkways, plazas, and terraces) with the buildings will enhance the pedestrian experience. The pedestrian relationship to buildings should be comfortable, convenient, and protected from extremes of sun and wind.
CD-P-40	Outdoor plazas or other common areas that provide space for special landscaping, public art, food service, outdoor retail sales, or seating areas for patrons are encouraged in retail settings appropriate to such pedestrian activity. The plaza or other common area shall

Policy Number	General Plan Policy
	be appropriately scaled to the retail use and shall be directly connected to the primary walkway.
CD-P-41	Buildings adjoining public spaces, including pedestrian ways shall be designed to allow the sun to reach sidewalks and plazas in the winter.
CD-P-42	Building configurations that provide "outdoor rooms," courtyards, paseos, and promenades are encouraged.
CD-P-43	Where practical, and in compliance with ADA standards, common areas that provide seating should be separated from the primary walkway by informal barriers, such as planters, bollards, fountains, low fences and/or changes in elevation.

CAP Strategies: Pedestrian Oriented Development (POD)

POD-1 During the review of subdivision maps and site plans, the City shall ensure that project designs provide internal and external pedestrian connections where appropriate.

POD-2 The City shall require sidewalks and/or pedestrian paths in all residential projects. The sidewalks should be wide enough to allow side-by-side walking and room for passing to increase comfort and convenience for walkers (5 to 6 feet).

POD-3 The City shall require all commercial projects to design parking lots to allow safe and comfortable walking routes between businesses within the development. This can be accomplished using pavement treatments and markings, sidewalks, landscaping, signage, and orientation of the buildings.

POD-4 The City shall require new subdivisions to provide pedestrian direct access points to frequently visited destinations adjacent to or within walking distance from the project.

POD-5 The City shall discourage subdivision designs that include lengthy block walls with no pedestrian or bicycle access that require excessive travel distances between nearby or adjacent uses.

Emission Reduction Potential

Pedestrian Oriented Development can reduce emissions by 6.7 to 20.0 percent. Factors influencing walking for making trips include completeness of sidewalks and pedestrian paths, the safety of the walking route from passing traffic, and providing visual interest along the route. Distance to potential walking destinations is the most important factor. Most people will not choose to walk distances greater than one-half mile (CAPCOA Measure LUT-4 [see Appendix C]).

4.2.4 - Transit Oriented Development

Although limited transit service is now available in Manteca, long-term development trends for increasing density and mixes of uses can lead to improved transit service in those areas of the City over time. Higher densities when combined with pedestrian orientation encourage transit use. A key factor is that both ends of the transit trip must be walkable and have the potential to serve reasonably large numbers of transit riders.

The applicable General Plan policies are provide in the following table.

General Plan Policies

Policy Number	General Plan Policy
AQ-P-2	Develop a land use plan that will help to reduce the need for trips and will facilitate the common use of public transportation, walking, bicycles, and alternative fuel vehicles.
AQ-I-4	Encourage mixed-use development that is conveniently accessible by pedestrians and public transit.
AQ-I-6	Locate higher intensity development such as multi-family housing, institutional uses, services, employment centers, and retail along existing and proposed transit corridors.
AQ-I-7	Locate public facilities in areas easily served by current and planned public transportation.

CAP Strategies: Transit Oriented Development (TOD)

TOD-1 The City shall encourage transit-oriented development in areas designated for high-density and mixed-use development.

TOD-2 The City shall encourage transit-oriented development in areas with 0.25 mile of planned or existing multimodal transit facilities.

Emission Reduction Potential

Transit Oriented Development can reduce emissions by 0.5 to 24.6 percent. Factors influencing the effectiveness include the type of transit serving the site, the frequency of service, the development density of the site, and the pedestrian connections and environment (CAPCOA Measure LUT-5 [see Appendix C]). The City of Manteca would be expected to achieve reductions to the low end of this range. Transit service is relatively limited and development densities community wide would not tend to support frequent service.

4.3 - Transportation Facilities Strategies

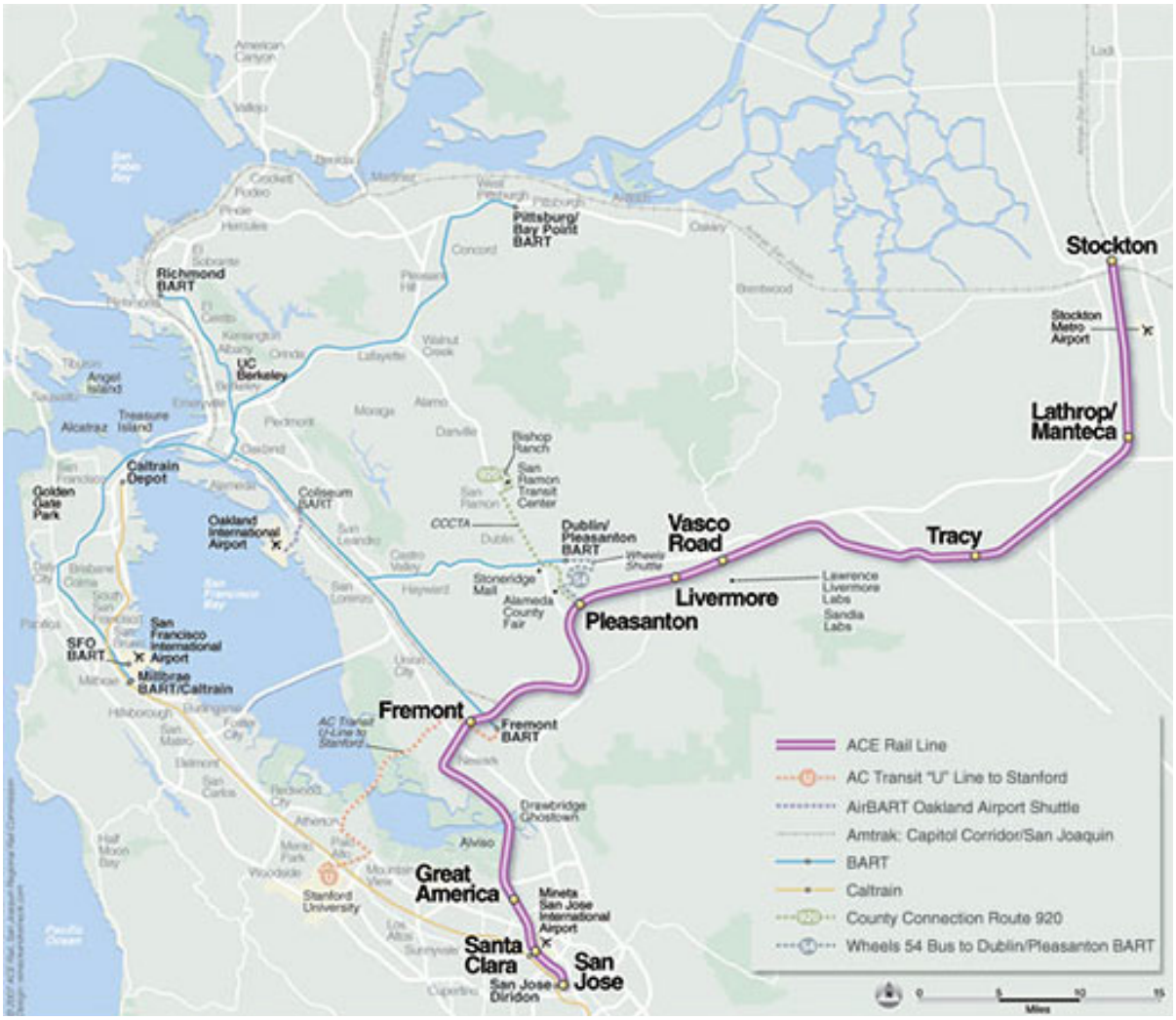
The following are strategies related to transportation infrastructure and facilities that encourage the use of alternative modes of transportation such as walking, bicycling, and transit use. This strategy would be implemented through support for and funding of transit, bicycle, and pedestrian

connections, through transit and trail planning, and with regional cooperation among relevant agencies.

4.3.1 - Transit Facilities

Transit facilities include bus stops, bus turnouts, multimodal transfer centers, and information kiosks. These facilities increase the comfort and convenience of using transit and minimize impacts on traffic flow from buses stopping for riders and re-entering traffic. Overall increases in transit service through the addition of new buses, new routes, and more frequent stops can also provide increased transit mode share. Transit facility improvements are often provided by development projects in new growth areas as conditions of approval and mitigation measures. The improvements can also be provided as retrofits on existing streets and upgrades to existing transit stops using transportation funding. The Altamont Commuter Express (ACE) train serves Manteca to the destinations shown in Figure 12.

Figure 12: Altamont Commuter Express Route



General Plan Policies

Policy Number	General Plan Policy
Goal C-11	Maintain a coordinated, efficient bus service that provides both an effective alternative to automobile use and serves members of the community that cannot drive.
Goal C-12	Support and encourage regional transit connections that link Manteca to other cities.
C-I-4	The City shall develop a pedestrian, bicycle, and transit improvement plan for the Downtown area to facilitate implementation of level of service policy C-P-3 d. This plan will develop a list of multi-modal improvements in the Downtown area to increase the viability and encourage the use of non-auto modes.
C-I-6	When planning roadway facilities, incorporate the concept of complete streets. Complete streets include design elements for all modes that use streets, including autos, transit, pedestrians, and bicycles. Complete streets shall be developed in a context-sensitive manner. For example, it may be more appropriate to provide a Class I bike path, as opposed to bike lanes along a major arterial. Pedestrian districts like Downtown.
C-P-43	The City shall identify and implement means of enhancing the opportunities for residents to commute from residential neighborhoods to the ACE station or other transit facilities that may develop in the City.
C-P-44	Establish a plan of primary locations where the transit systems will connect to the major bikeways and pedestrian ways and primary public parking areas.
C-P-48	The City shall design future roadways to accommodate transit facilities, as appropriate. These design elements would include installation of transit stops adjacent to intersections and provision of bus bays and sheltered stops.
C-I-34	The City shall periodically review transit needs in the city and adjust bus routes to accommodate changing land use and transit demand patterns. The City shall also periodically coordinate with the San Joaquin Regional Transit District to assess the demand for regional transit services.
C-I-35	The City shall explore the opportunities for, and encourage the development of, a multi-modal bus/train/bike/auto facility in the downtown area.
C-I-36	The City shall explore a transit connections study that would identify improvements to connections and access to the existing ACE station and the planned multi-modal downtown transit facility.
C-I-37	The City's standard plans shall be updated to include the option for bus bays at intersections of major streets.
C-I-38	The City shall consider alternatives to conventional bus systems, such as smaller shuttle buses that connect neighborhood centers to local activity centers.
C-I-39	The City should explore with the Manteca School District opportunities for joint-use public transit that would provide both student transportation and local transit service.
C-P-41	The City shall encourage the expansion of interstate bus service in the Manteca area.
C-P-42	The City shall encourage commuter and regional passenger rail service that will benefit the businesses and residents of Manteca. Examples include Amtrak, the Altamont Commuter Express (ACE), and high speed rail.
C-P-43	The City shall identify and implement means of enhancing the opportunities for residents to commute from residential neighborhoods to the ACE station or other transit facilities that may develop in the City.
C-P-44	Establish a plan of primary locations where the transit systems will connect to the major bikeways and pedestrian ways and primary public parking areas.

CAP Strategy: Transit Infrastructure (TI)

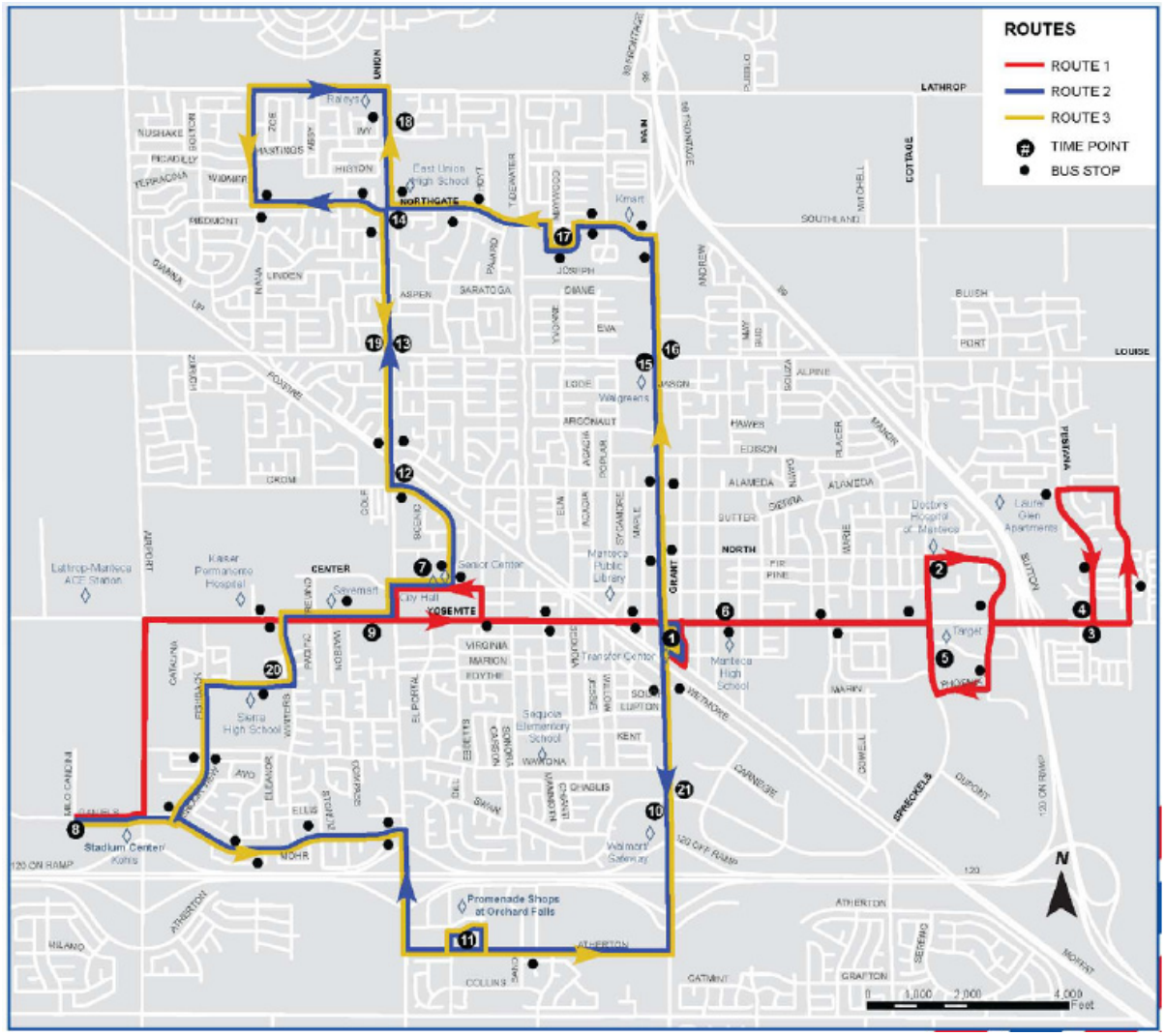
TI-1 The City shall consult with the transit providers during development review and when preparing transit plans regarding the location of potential transit infrastructure such as bus stops, turnouts, and kiosks to support current and potential service.

TI-2 The City shall encourage transit providers to utilize hybrid buses and alternative fuel buses on routes serving Manteca.

Emission Reduction Potential

Reductions from transit support facilities were not quantified in the CAPCOA report. Reductions are included as part of overall service enhancements. The City of Manteca currently provides transit service to most areas of the City as shown in Figure 13.

Figure 13: City of Manteca Transit System Map



4.3.2 - Pedestrian Infrastructure

Adequate pedestrian infrastructure connecting frequently accessed destinations is critical to an increase in walking trips. Pedestrian infrastructure should be incorporated into project designs for new development, but also can be retrofitted in existing neighborhoods with barriers to walking such as lack of sidewalks or dangerous crossings.

Policy Number	General Plan Policy
Goal CD-10	Establish a pedestrian and bicycle friendly environment in neighborhoods and commercial and office land use areas.
CD-P-37	Commercial centers should provide for convenient, attractive pedestrian access from street fronts and from adjacent commercial, office, and residential land uses.
CD-P-38	Commercial centers should provide for convenient, attractive pedestrian access within the center with dedicated pedestrian ways between all buildings and pedestrian spaces such as plazas, courtyards, and terraces at natural gathering areas within the site.
CD-P-39	Integrating the pedestrian elements (walkways, plazas, and terraces) with the buildings will enhance the pedestrian experience. The pedestrian relationship to buildings should be comfortable, convenient, and protected from extremes of sun and wind.
CD-P-40	Outdoor plazas or other common areas that provide space for special landscaping, public art, food service, outdoor retail sales, or seating areas for patrons are encouraged in retail settings appropriate to such pedestrian activity. The plaza or other common area shall be appropriately scaled to the retail use and shall be directly connected to the primary walkway.
CD-P-41	Buildings adjoining public spaces, including pedestrian ways shall be designed to allow the sun to reach sidewalks and plazas in the winter.
CD-P-42	Building configurations that provide “outdoor rooms,” courtyards, paseos, and promenades are encouraged.
CD-P-43	Where practical, and in compliance with ADA standards, common areas that provide seating should be separated from the primary walkway by informal barriers, such as planters, bollards, fountains, low fences and/or changes in elevation.
C-I-29	The City shall develop a Pedestrian Master Plan, which encompasses all areas envisioned for development by this General Plan. The Pedestrian Master Plan will identify existing deficiencies and establish standards for future pedestrian facilities, including sidewalks, crosswalks, and pedestrian pathways.
C-I-30	The City shall develop an ADA Transition Plan. This plan shall identify deficiencies related to ADA access and identify an implementation strategy to bring the deficient facilities up to the applicable standards.
C-I-31	Update the standard plans to include landscape separated sidewalks where appropriate and feasible.
C-I-32	Provide for pedestrian access in the Downtown area, along Yosemite Avenue, Main Street, and in other high-use areas by: • Constructing wide sidewalks where feasible to accommodate increased pedestrian use. • Providing improved crosswalks, landscaping, buffers between sidewalks and vehicle travel lanes, enhanced pedestrian lighting. • Improving the walking environment by providing benches, allowing for café seating, and constructing monument elements and other public art. • Providing improvements that enhance pedestrian safety and convenience, such as bulb-outs extending into intersections and at crosswalks to reduce walking distances and provide a safe peninsula for pedestrians.

Policy Number	General Plan Policy
C-I-33	Provide for enhanced pedestrian environments in new subdivisions by: • Providing bulb-outs at intersections (to be identified by the City) to reduce crossing distances and calm traffic. • Providing marked (and signalized, if appropriate) mid-block crossings near schools, parks, or other neighborhood attractions. A landscaped median refuge island, raised/textured sidewalk, or other design features may also be provided. • Providing landscape buffer separated sidewalks.

CAP Strategy: Pedestrian Infrastructure (PI)

PI-1 The City shall ensure that all projects comply with the General Plan policies regarding pedestrian infrastructure during the development review process.

Emission Reduction Potential

Areas with good pedestrian connection and access can reduce emissions by up to 2 percent by increasing walking (CAPCOA Measure SDT-1).

4.3.3 - Bicycle Infrastructure

Bicycle infrastructure including separate bicycle paths and bicycle lanes on roadways can increase the safety of cyclists and encourage the use of this travel mode. Bicycle paths designed to provide more direct connections shorten travel distances and maximize safety. Bicycle lanes are less costly and can more easily connect multiple destinations for cyclists.

General Plan Policies

Policy Number	General Plan Policy
C-P-20	The creation or continuance of traffic, bicycle, and pedestrian hazards shall be discouraged in new development, infill development, and redevelopment areas.
C-I-12	Maintain a program of identification and surveillance of high traffic, bicycle, and pedestrian collision locations, with emphasis on early detection and correction of conditions that could potentially constitute safety hazards.
C-P-29	Through regular updates to the City's Bicycle Master Plan, the City shall establish a safe and convenient network of identified bicycle routes connecting residential areas with recreation, shopping, and employment areas within the city. The City shall also strive to develop connections with existing and planned regional routes shown in the San Joaquin County Bicycle Master Plan.
C-P-30	Provide adequate bicycle parking facilities at commercial, business/professional, and light industrial uses.
C-P-31	The City shall strive to expand the existing network of off-street bicycle facilities as shown in the City's Bicycle Master Plan to accommodate cyclists who prefer to travel on dedicated trails. Further, the City shall strive to develop a "city-loop" Class I bike

Policy Number	General Plan Policy
	path that links Austin Road, Atherton Drive, Airport Way and a route along or near Lathrop Road to the Tidewater bike path and its extensions. The City shall also strive to develop an off-street bicycle trail extension between the Tidewater Bike Trail near the intersection of Moffat Boulevard and Industrial Park Drive to the proposed regional route between Manteca and Ripon.
C-P-32	The City shall strive to provide on-street Class II bike lanes along major collector and arterial streets whenever feasible.
C-P-33	Bicycle travel through residential streets shall be facilitated as much as possible without the use of Class II bike lanes. In general, residential streets have sufficiently low volumes as to not require bike lanes and the narrower street cross section will assist in calming traffic.
C-P-34	The City shall extend the existing Class I bicycle route north of Lathrop Road along the former Tidewater Southern Railway right-of-way, and any branch or connecting link where right-of-way is available.
C-P-35	Improve safety conditions, efficiency, and comfort for bicyclists and pedestrians by providing shade trees and controlling traffic speeds by implementing narrow lanes on appropriate streets.
C-I-22	The City shall update its Bicycle Master Plan to include all areas envisioned for development by this General Plan. The Bicycle Master Plan will establish future bicycle routes and provide standards for bicycle facilities, including bicycle paths and bicycle lanes.
C-I-24	Increase bicycle safety by: • Providing bicycle paths and lanes that promote bicycle travel. • Sweeping and repairing bicycle lanes and paths on a continuing, regular basis. • Ensuring that bikeways are delineated and signed in accordance with AASHTO standards and lighting is provided, where feasible. • Ensuring that all new and improved streets have bicycle safe drainage grates and are free of hazards such as uneven pavement and gravel.
C-I-25	Add bike lanes whenever possible in conjunction with road reconstruction or re-striping projects and subdivision development and related off-site improvements.
C-I-26	Update the City Standard Plans to include bike lanes on collector and arterial streets, as defined by the Bicycle Master Plan.
C-I-27	Encourage resident and visitor use of the bike trail system by preparing a map of the pedestrian and bike paths.
C-I-28	Update the standard plans to specify a set of roadways with narrower lanes (less than 12 feet) to calm traffic and increase pedestrian and bicycle comfort. These narrow lane standards shall be applied to appropriate streets (e.g., they shall not be applied to outside lanes on major truck routes).

CAP Strategy: Bicycle Infrastructure (BI)

BI-1 The City shall review all projects to ensure they comply with relevant General Plan policies and the Bicycle Master Plan.

BI-2 Require developers to contribute fair share funding to the construction of planned bike lanes on roads with frontage on the project site.

BI-3 The City shall identify opportunities for constructing bike lanes on roads connecting other neighboring cities for inclusion in the Bicycle Master Plan (examples include Austin Road and Jack Tone Road).

Reduction Potential

The 2003 City of Manteca Bicycle Master Plan reported that 0.7 percent of home based work trips were made by bicycle in the 2000 Census. Bicycle mode shares of 10 to 25 percent have been achieved in California college towns. The escalating cost of motorized transportation appears to be resulting in increased use of bicycling for daily trips and recreational bicycling has never been higher around the state. These trends provide an indication that bicycling can increase substantially from its current level. A doubling of bicycle commuting to 1.4 percent would result in a reduction in VMT and commensurate reductions in greenhouse gases of about 0.25 percent, accounting for shorter average trips (2 miles) likely to be replaced by cycling.

4.3.4 - Traffic Calming Features

Design features and strategies to reduce vehicle speeds and reduce conflicts with pedestrians encourage more walking. Slower speeds encouraged by traffic calming can also improve safety and increase bicycling. Providing on-street parking, or street trees and landscaping to separate vehicles from pedestrians improve walkability.

General Plan Policies

Policy Number	General Plan Policy
C-P-11	Signals, roundabouts, traffic circles and other traffic management techniques shall be applied at residential and collector street intersections with collector and arterial streets in order to allow bicyclists and pedestrians to travel conveniently and safely from one neighborhood to another.
C-I-28	Update the standard plans to specify a set of roadways with narrower lanes (less than 12 feet) to calm traffic and increase pedestrian and bicycle comfort. These narrow lane standards shall be applied to appropriate streets (e.g., they shall not be applied to outside lanes on major truck routes).

Policy Number	General Plan Policy
C-I-32	Provide for pedestrian access in the Downtown area, along Yosemite Avenue, Main Street, and in other high-use areas by: Constructing wide sidewalks where feasible to accommodate increased pedestrian use. • Providing improved crosswalks, landscaping, buffers between sidewalks and vehicle travel lanes, enhanced pedestrian lighting. • Improving the walking environment by providing benches, allowing for café seating, and constructing monument elements and other public art. • Providing improvements that enhance pedestrian safety and convenience, such as bulb-outs extending into intersections and at crosswalks to reduce walking distances and provide a safe peninsula for pedestrians.
C-I-33	Provide for enhanced pedestrian environments in new subdivisions by: • Providing bulb-outs at intersections (to be identified by the City) to reduce crossing distances and calm traffic. • Providing marked (and signalized, if appropriate) mid-block crossings near schools, parks, or other neighborhood attractions. A landscaped median refuge island, raised/textured sidewalk, or other design features may also be provided. • Providing landscape buffer separated sidewalks.

CAP Strategies: Traffic Calming (TC)

TC-1 The City shall review all projects requiring street improvements to collectors and arterials to identify opportunities to install traffic calming improvements at intersections impacted by the project and requiring upgrades.

TC-2 The City shall review all projects to ensure compliance with the "Complete Streets" requirements regarding traffic calming and pedestrian improvements.

Reduction Potential

Traffic calming can reduce emissions by 0.25 to 1 percent by increasing walking and bicycling (CAPCOA Measure SDT-2).

4.4 - Transportation Demand Strategies

These strategies provide programs and facilities that encourage employees to use alternative modes for commute trips.

4.4.1 - Transportation Demand Management

Transportation Demand Management (TDM) refers to measures designed to reduce the demand for transportation facilities that are usually implemented at employment sites and event centers. These include programs targeting employee commute trips at the worksite such as vanpools, and incentives for alternative transportation and government-operated programs such as rideshare matching and outreach and incentives. Event center TDM measures involve the use of shuttles, encouraging carpooling, and staggering arrival and departure times to reduce congestion.

Large existing and new employers are required by existing regulations to implement TDM programs. The San Joaquin Valley Air Pollution Control District has adopted Rule 9410 Employer Based Trip Reduction requires employers with over 100 employees to implement trip reduction programs. The rule targets employee commute trips and requires large employers to implement measures that reduce VMT by increasing transit use, carpooling, vanpooling, bicycling, or other measures to reduce trips. The SJVAPCD estimates that the rule will reduce mobile source criteria pollutants by approximately 1.6 percent by 2023 (SJVAPCD 2009).

General Plan Policies

Policy Number	General Plan Policy
C-P-54	The City shall provide information about transit services, ridesharing, van-pools, and other transportation alternatives to single occupant vehicles at City Hall, the library, and on the City website.
C-P-55	The City shall encourage employers to provide alternative mode subsidies, bicycle facilities, alternative work schedules, ridesharing, telecommuting, and work-at-home programs employee education and preferential parking for carpools/vanpools.
C-P-56	Partner with SJCOG on the Commute Connection program, which is the regional rideshare program operated by SJCOG. The City shall work with SJCOG to ensure that appropriate businesses and land use development projects participate in the program.
C-P-45	Encourage programs that provide ridesharing and vanpool opportunities and other alternative modes of transportation for Manteca residents.
C-P-46	The City shall promote the development of park-and-ride facilities near I-5, SR 120, and SR 99.

CAP Strategies: Transportation Demand Management (TDM)

TDM-1 Notify developers of large commercial and industrial developments of the requirements of SJVAPCD Rule 9410 to implement TDM programs that reduce commute trips.

TDM-2 Require a TDM program as a condition of approval of new projects meeting Rule 9410 applicability requirements to inform developers and support rule compliance.

Reduction Potential

Transportation Demand Management measures are designed to reduce employee trips. Emission reductions range from 0.07 percent to as high as 20 percent. Overall reductions in greenhouse gas emissions would be similar to the 1.6 percent reduction in criteria pollutant emissions achieved by Rule 9410. Locations with the best combination of transit and pedestrian orientation including high-frequency transit service would achieve the highest reduction (CAPCOA Measure TRT-1 through TRT-15).

4.4.2 - End-of-Trip Facilities

End-of-trip facilities include items such as showers and lockers for people who bicycle to work, secure bike parking, onsite services such as dry cleaning pick-up and cafeterias, and break rooms to reduce trips for errands and lunch. These are measures intended to increase the convenience and reduce potential negatives associated with bicycling to work and to eliminate the need for some trips during the workday.

General Plan Policies

Policy Number	General Plan Policy
C-P-3	At the discretion of City staff, certain locations may be allowed to fall below the City's LOS standard under the following circumstances: d. In the Downtown area the City cannot maintain the vehicular LOS D standard because of the historic nature of development and limited street right-of-way. However, it is the City's goal to maintain high quality access and mobility in the area with a priority toward non-auto modes. Therefore, the City shall require that new discretionary land use action within the Downtown area, which generate net new PM peak hour auto trips, to participate in enhancing access and mobility for transit, bicycle, and pedestrian modes. These enhancements may include, but are not limited to: • Improving bicycle facilities to include attractive and secure bicycle parking, installation of bike lockers in appropriate locations, and provision of bicycle lanes along appropriate roadways.

CAP Strategy: Trip End Facilities (TEF)

TEF-1 The City shall provide developers of projects with the potential for employing more than 100 persons at a single work site with information on end-of-trip facilities appropriate for the type of business and size of the project that will assist in their compliance with SJVAPCD Rule 9410.

As projects get larger, the feasibility and value of providing end-of-trip facilities increases because more employees are available to take advantage of the facilities. Extensive information is available on TDM from the Victoria Transportation Policy Institute's TDM Encyclopedia at http://www.vtpi.org/tdm /tdm12.htm. Example facilities include:

- Employee lockers and lockers to encourage walking and bicycling to work
- Secure bike parking areas
- Breakrooms/Lunchrooms
- Rideshare/Transit Information Boards

Reduction Potential

End-of-trip facilities can reduce emissions when part of a TDM programs. This measure would require implementing multiple items at an employment site or multi-family development to achieve the highest reductions. CAPCOA does not provide separate reductions for end-of-trip facilities (CAPCOA Measures TRT-5).

4.4.3 - Parking Measures

Providing limited parking is one of the most effective transportation measures. Use of parking structures and paid parking provide a strong incentive to use alternative modes and to take advantage of carpools and vanpools. This measure would only apply in higher-density development areas and downtown and mixed-use projects specifically designed for this strategy.

General Plan Policies

Policy Number	General Plan Policy
CD-I-1	The City shall implement an urban design plan for the Central Business District (CBD). The plan should be designed to achieve the following objectives: • Establish an overall parking strategy for the CBD in order to provide a more unified and aesthetically desirable complex of parking lots, including an overall strategy for landscaping and screening such areas.

CAP Strategy: Parking (P)

P-1 The City shall encourage shared parking, structured parking, and the placement of parking lots at locations where they enhance the pedestrian environment such as behind buildings in the Central Business District and mixed-use areas.

Reduction Potential

Parking measures are highly effective at reducing vehicle trips and increasing average vehicle ridership. Parking measures can achieve reductions from 0.1 percent to as high as 19 percent, depending on the availability of other transportation options, the distance to transit, the quality of transit, and the cost of parking (CAPCOA Measure TRT-14).

4.4.4 - Electric Vehicle Charging Stations

Infrastructure to charge electric vehicles while at work or other destination would allow longer distance commuters and other drivers to use electric vehicles without concern for running out of charge on the return trip. Quick-charge technologies are in development that can partially charge a car battery in 15 minutes. Once quick-charging stations are widely available, the range impediment of electric vehicles will be much less important.

The interim solution to battery range is hybrid vehicles that can run on electricity or conventional fuels. Plug-in hybrids have larger battery packs that allow vehicles to travel greater distances under battery power prior to use of the gasoline engine.

General Plan Policies

No General Plan policies regarding electric vehicle charging have been adopted. Home charging can be added as retrofits to existing garages in homes with adequate electrical capacity and wiring. The types of chargers and voltage requirements are not highly standardized. Electric car purchasers will be in the best position to determine the appropriate charging option for their particular vehicle and parking situation.

CAP Strategy: Electric Vehicles (EV)

EV-1 The City shall encourage and support the installation of electric charging facilities funded as a public-private partnership in City-operated parking facilities when grant funding is available.

4.5 - Energy Conservation Strategies for New and Existing Buildings

Improving energy efficiency in new and existing buildings and facilities provides one of the most cost-effective strategies for reducing greenhouse gases. The energy savings from improved energy efficiency can often pay for the cost of the upgrades and retrofits over time. These strategies are implemented through the promotion of energy- and water-efficient buildings (e.g., LEED buildings and/or exceeding Title 24 standards) through green building ordinances, project timing prioritization, and other implementing tools.

4.5.1 - Energy Efficiency in New Buildings

New projects can exceed Title 24 Energy Efficiency Standards for new residential and non-residential buildings. The amount of reductions in energy use can be related to voluntary tier levels contained in Title 24 or through use of outside certifying programs such as LEED, EnergyStar or Greenpoint Rating systems. It should be noted that meeting LEED standards does not necessarily mean that a project would comply with Title 24, so additional measures may still be required for some projects to meet regulatory requirements.

General Plan Policies

Policy Number	General Plan Policy
Goal CD-9	Establish a durable sustainable community that utilizes resources efficiently.
CD-P-32	New buildings shall be designed to be responsive to the local climate in a manner that provides shelter from sun and rain for pedestrians.
CD-P-33	Passive solar design features are encouraged whenever possible. Design of buildings should consider energy-efficient concepts such as natural heating and/or cooling, sun and wind exposure and orientation, and other solar energy opportunities.

Policy Number	General Plan Policy
CD-P-34	Solar collectors, if used, shall be oriented away from public view or designed as an integral element of the roof structure.
CD-P-35	Architectural elements that contribute to a building's character, aid in climate control, and enhance pedestrian scale are encouraged. Examples include canopies, roof overhangs, projections or recessions of stories, balconies, reveals, and awnings.
CD-P-36	Encourage the creation of an urban forest comprised of street trees, residential lot trees, and trees in non-residential parking lots and other public open space.
Goal RC-4	Encourage private development to explore and apply non-traditional energy sources such as co-generation, wind, and solar to reduce dependence on traditional energy sources.
Goal RC-5	Promote energy efficiency in new development and in building design.
RC-P-6	Comply with construction and design standards that promote energy conservation.
RC-I-6	The City shall implement development standards that promote energy conservation and the use of solar energy techniques for heating and cooling, including building orientation, street and lot layout, landscape placement, and protection of solar access.
RC-I-7	Implement construction standards which promote energy conservation including window placement, building eaves, and roof overhangs.
RC-I-8	The City shall enforce Title 24 energy requirements (Building Code, California Code of Regulations (CCR)) which define construction standards that promote energy conservation.
RC-I-9	Develop a public education program to increase public participation in energy conservation.
RC-I-10	Encourage large energy users to use an energy conservation plan as part of the project review and approval process, and develop a program to monitor compliance with and effectiveness of that plan.
RC-I-11	Cooperate with other agencies and jurisdictions to expand energy conservation programs.

CAP Strategy: Energy Efficient New Buildings (ENB)

ENB-1 The City shall require developers to exceed Title 24 energy efficiency standards by at least 10 percent. The City recognizes that it may not be feasible for all buildings and structures to exceed Title 24 by this amount because of the form or function of the building. Projects that cannot meet the reduction level may provide solar panels or other non-building-related energy efficiency measures such as exterior lighting or water savings.

Reduction Potential

Energy conservation measures reduce emissions proportionately with the percentage improvement in energy efficiency. Buildings that are 10 percent more efficient than required by regulation would achieve a 10-percent reduction in emissions from electrical generation. New Title 24 standards go

into effect in 2014 that may make achieving 10 percent beyond the standard more difficult but possible for many structures.

4.5.2 - Energy Efficiency in Existing Buildings

Older buildings that were constructed prior to the adoption of Title 24 or that were constructed when early versions of Title 24 were in place provide significant opportunities for cost-effective energy retrofits. Most energy retrofit programs are voluntary incentive based programs. The State of California and the federal government have from time to time offered tax credits and deductions for energy retrofits. Public utilities also offer energy efficiency rebates for projects such as whole-house fans, insulation, weatherization, and other actions that reduce energy consumption in residential and commercial buildings. Some jurisdictions have proposed mandatory retrofits at time of sale; however, those programs are currently considered by many to be infeasible because of the loss of equity experienced by many homeowners during the recent recession.

General Plan Policies

Policy Number	General Plan Policy
RC-I-9	Develop a public education program to increase public participation in energy conservation.
RC-I-10	Encourage large energy users to use an energy conservation plan as part of the project review and approval process, and develop a program to monitor compliance with and effectiveness of that plan.
RC-I-11	Cooperate with other agencies and jurisdictions to expand energy conservation programs.
PF-P-30	Cooperate with and encourage efforts to expand the opportunities for electric power service in the City.
PF-I-15	The City will support energy conservation measures and innovative uses of solar energy, heat recovery, and co-generation in all structural and industrial processes.

CAP Strategy: Energy Efficient Existing Buildings (EEB)

The City shall continue to encourage residents and businesses to participate in voluntary energy efficiency programs. Up-front costs are a major barrier for improving energy efficiency in new buildings. Programs that provide funding for this purpose can help to increase the number of energy retrofits of existing buildings.

EEB-1 The City shall investigate bond financing mechanisms such as Property Assessed Clean Energy Program (PACE) and similar programs that would fund energy retrofits.

EEB-2 The City shall work with energy providers and the State to improve awareness of rebates and tax incentives available to Manteca residents and businesses.

Reduction Potential

The reductions potential for individual houses and buildings will depend on the age of the structure and construction techniques used for the project. Reductions for electricity and natural gas usage by over 25 percent are feasible for whole-house retrofits and upgrades, including insulation, duct sealing, water heaters, HVAC units, windows, roofing, and doors.

4.5.3 - Self Generation using Solar Panels and Solar Hot Water Systems

The City of Manteca's location and climate is excellent for solar electric generation and hot water systems with an average of 262 sunny days per year. Residential and commercial projects can include solar-ready roofs to allow future installation of solar panels or provide solar panels at the time of construction. Solar panel technology is becoming increasingly efficient in terms of power production and costs have declined substantially in recent years. Not all locations and project settings are conducive to solar power production, and cost-effectiveness is currently dependent on the receipt of incentives in most cases. Sites with the potential for other structures or trees shading the panel location greatly reduce feasibility. The projects also often require net metering where surplus power generated by the panels is sold to the utility and power is purchased from the grid during periods of low production or high usage. The utilities are only required to accept a limited amount of solar PV-distributed generation into their systems. If limits are exceeded and net metering is not allowed, the systems become less feasible.

Solar hot water systems have been used for residential water heating for many years and are especially popular for residences with swimming pools to extend the days per year when the pool can be used.

General Plan Policies

Policy Number	General Plan Policy
RC-I-12	Investigate alternative energy sources including co-generation, active solar energy, and wind generation.

CAP Strategy: Solar Generation (SG)

Photovoltaic electricity generation by homes and businesses is becoming increasingly common as the State of California pursues its "California Solar Initiative" and former Governor Schwarzenegger's "Million Solar Roofs" vision. Rapid increases in rates of solar installation have been encouraged by tax incentives and rebates that have been available to subsidize some of the cost of the systems. Programs where the solar panel companies lease systems to homeowners and businesses at lease rates that guarantee savings on utility bills have eliminated the barrier of high initial installation costs for many people. Some residential developers offer solar panels as options on new homes.

SG-1 The City shall encourage development projects to provide solar power as part of their strategy to reduce greenhouse gas emissions.

Reduction Potential

Photovoltaic panels in new construction and existing residences can offset 100 percent of the annual electricity use when net metering is allowed. The amount achieved is dependent on roof orientation, unobstructed space available for panel installation, lack of shade from trees or other structures near the home and funding available to purchase the panels. Businesses with large amounts of roof space or large parking lots can install panels subject to the same limitations that apply to residential projects. Solar hot water systems can also offset some or all of the natural gas consumption used for producing hot water.

4.5.4 - Water Conservation Strategies

Water pumping and transport consumes a large amount of energy in California. Measures to reduce water consumption through improved efficiency in plumbing fixtures and landscaping can result in substantial savings compared to past practices. In some cases, it may be feasible to go beyond the water efficiency standards in the California Green Building Code and the Model Water Landscape Efficiency Ordinance with new construction. Water reuse and recycling through non-potable "purple pipe" systems may reduce energy consumption for water transport. Water users that implement these measures or purchase buildings and homes that include these features will benefit from savings in their water bills.

General Plan Policies

Policy Number	General Plan Policy
Goal RC-1	Minimize the consumption of water to reasonable levels consistent with a high level of amenities and quality of life for City residents and visitors.
Goal RC-2	Maximize the beneficial uses of water by recycling water for irrigation and other non-potable uses.
RC-P-1	The City shall continue to implement water conservation standards for all commercial and industrial development, and for all existing and new residential development.
RC-P-2	The City shall explore potential uses of treated wastewater when such opportunities become available.
RC-P-4	The City shall require water conservation in both City operations and private development to minimize the need for the development of new water sources.
RC-I-1	Continue to implement standards for water conserving landscape practices, including the use of drought tolerant plants, for both public and private projects.
RC-I-2	Continue efforts to increase public participation in water conservation.
RC-I-3	Require large commercial and industrial water users to submit a use and conservation plan as part of the project entitlement review and approval process, and develop a program to monitor compliance with and effectiveness of that plan.
RC-I-4	Cooperate with other agencies and jurisdictions to expand water conservation programs, and to develop methods of water reuse.

Policy Number	General Plan Policy
RC-I-5	Actively pursue the use of treated wastewater in irrigation and industrial applications, including development of appropriate infrastructure.
PF-P-11	The City will develop and implement water conservation measures as necessary elements of the water system.
PF-I-4	The City shall retain a water conservation ordinance requiring the installation of low-flush toilets, low-flow showerheads, and similar features in all new development.
PF-I-7	The City will encourage the use of recycled water for landscape irrigation where feasible, within the parameters of State and County Health Codes and standards.
PF-I-11	The City will investigate methods of improving the quality of the effluent from the City plant and will investigate options for reuse of treated wastewater. The recycled wastewater will be used for irrigation of public recreation lands, restoration of wetland areas, and irrigation of landscaped areas
PF-I-12	The City will promote reduced wastewater system demand through efficient water use by: • Requiring water conserving design and equipment in new construction, • Encouraging retrofitting with water conserving devices, • Designing wastewater systems to minimize inflow and infiltration to the extent economically feasible; and • Maintaining a citywide map of all sewer collection system components and monitoring the condition of the system on a regular basis.

CAP Strategy: Water Conservation (WC)

The City adopted the state model for AB 1881 Model Water Efficient Landscape Ordinance as Zoning Code Section 17.48.070(C). All items listed in the Model Water Efficient Landscape Ordinance referenced as "shall be required," "shall have," "must," "are required," etc . . . are required as conditions for project completion.

WC-1 The City shall continue to implement water conservation measures to comply with the Model Water Efficient Landscape requirements that implement the Water Conservation in Landscaping Act of 2006 (Assembly Bill 1881, Laird).

Reduction Potential

Water conservation will achieve emission reductions equivalent to the percentage of water pumping and treatment that is avoided. Water recycling consumes additional energy from treatment; however, treatment is often required to meet water quality regulations and so the energy use in that case would occur anyway. Achieving the State's goal of 20-percent reduction in water consumption by 2020 would result in a 20 percent reduction in greenhouse gas emissions from the electricity sector water pumping.

4.6 - Waste Diversion and Recycling and Energy Recovery

Programs and actions that promote recycling and diversion of waste from landfills can reduce energy consumed in the transport and handling of the waste material and can reduce the greenhouse gases that are emitted during the decomposition of organic waste.

4.6.1 - Meet or Exceed State Waste Management Requirements

The State of California has adopted increasingly stringent mandates for the percentage of solid waste that can be disposed in landfills. Programs that require or encourage further reductions in waste beyond mandates will result in greenhouse gas reductions from this source.

4.6.2 - Landfill Methane Capture

Certain landfills are mandated to install methane capture systems. Methane is a powerful greenhouse gas that is 21 times more effective than carbon dioxide in retaining heat in the atmosphere. The methane can be flared, producing mainly carbon dioxide or used in combustion devices to generate heat or power that can be used for productive purposes displacing the use of fossil fuels.

General Plan Policies

Policy Number	General Plan Policy
Goal PF-11	Provide for the implementation and enforcement of the provisions for the Source Reduction and Recycling Element, as mandated by the State.
PF-P-31	The City will implement and enforce the provisions of its Source Reduction and Recycling Element.
PF-P-32	The City shall support the continued use of the Lovelace Transfer Station on Lovelace Road, between Union Road and Airport Way, for the processing and shipping of solid waste materials.

CAP Strategies: Waste (W)

W-1 The City shall require new multifamily and commercial development projects to provide adequate locations to segregate recyclable materials.

W-2 The City shall support recycling events and programs.

W-3 The City shall encourage the composting of greenwaste.

Reduction Potential

Waste reduction and recycling provide emission reductions from (1) lower transport emissions for trips to the landfill and (2) lower methane emissions from the decomposition of organic matter in the landfill; and energy savings from (1) using recycled materials compared with mining and (2) processing virgin materials into products.

4.6.3 - Wastewater

Wastewater treatment can produce methane emissions that are a powerful greenhouse gas, but it also provides a valuable renewable energy source when scrubbed of harmful components. Tertiary treatment of wastewater can allow it to be used for safely watering landscaped areas such as highway medians, parks, and golf courses using so-called "purple pipe" systems. Tertiary treatment systems can use substantial amounts of energy, so energy savings from less water pumping must be balanced with the energy costs of treating the water and pumping to where it is used. Wastewater treatment plants with anaerobic digesters can capture the methane produced during the treatment process for productive use.

CAP Strategies: Wastewater (WW)

WW-1 The City shall support the use of recycled water for appropriate uses consistent with State standards when benefits outweigh system costs.

4.6.4 - Community Involvement and Outreach

Many of the strategies listed above will be more effective if there is community involvement and outreach to engage the citizens. This strategy requires public awareness of the measures available for them to take effective action at reducing their energy use and carbon footprint.

Regional Cooperation

Measures and programs that reduce greenhouse gas emissions are often operated at the regional level. Many modes of transportation operate at the regional level, because people travel throughout the region. The regional roadway network managed by the San Joaquin County Council of Governments and the Altamont Corridor Express (ACE) Train are two examples. Regional cooperation provides a venue for sharing knowledge and resources to help address a variety of issues, including climate change and greenhouse gas emissions.

CAP Strategies: Community Involvement and Outreach (CIO)

CIO-1 The City shall include energy conservation awareness in its events, publications, and community programs where consistent with content and purpose.

CIO-2 The City shall continue to participate in regional initiatives to reduce greenhouse gas emissions.

4.7 - Municipal Strategies

The City of Manteca has opportunities to reduce greenhouse gas emissions generated at city-owned facilities and from city operations. The strategies considered for the City include measures intended to improve energy efficiency in buildings and equipment owned by the City, alternative fuels for city vehicles and equipment, and water conservation.

- Improve energy efficiency in city operations
- New city buildings exceed Title 24 energy efficiency standards
- Install renewable energy systems on city facilities
- City operated transportation demand management for city employees
- Purchase green vehicles for city fleets
- Enhance reduction, recycling, and reuse efforts at city facilities
- Implement water efficient landscaping in city parks and facilities
- Use recycled water in city parks and facilities

4.7.1 - Municipal Building Energy Efficiency (MBE)

The City's buildings make up a substantial portion of the government emission inventory. Reductions can be achieved when new buildings are constructed or remodeled. As systems approach the end of their useful life, the City can replace the heating, ventilation, and cooling systems with more efficient systems and install energy management systems in facilities. Some specific measures for municipal building efficiency include:

MBE-1 Install high-efficiency heating, ventilation, and cooling equipment when building new buildings and replacing obsolete units.

MBE-2 Install high efficiency lighting fixtures in new and remodeled city buildings.

MBE-3 Design and construct new City buildings to achieve energy efficiencies equivalent to those required for Low Energy and Efficient Design Standards (LEED) certification.

MBE-4 Install energy management systems in new and remodeled city buildings.

4.7.2 - Energy Savings from Traffic and Street Lighting

The City will replace lighting fixtures with more efficient LED or other technology whenever possible. According to a report prepared by PG&E, Phase II LED luminaires provided power savings of 36 percent compared with high-pressure sodium luminaires, and the newer Phase III LED luminaires provided 52 percent savings (PG&E 2008).

4.7.3 - Low-Emission City Fleet Vehicles (LEV)

The City operates vehicles used by the police for maintenance and other purposes. Most vehicles in the City fleet are powered by gasoline and diesel fuels. The City will replace vehicles with the lowest-emission technology that fulfills the work requirements and that is cost-effective, as the current fleet reaches the end of its useful life. The City anticipates that most vehicles in its vehicle fleet will be replaced by the 2020 CAP target date.

The City was the first in California to field hydraulic hybrid residential garbage trucks. The two trucks currently in operation are a "Runwise" system that completely replaces the conventional drive

train with one that optimizes the hydraulic energy. This system is more expensive (about $100,000 per truck). This system has proven very effective during tests and use in Miami/Dade County and other areas. They report fuel savings of 40-50 percent together with greatly extended brake life. The City expects to save 2,000 – 3,000 gallons per year per truck and save $7,000 - $10,000 per year in fuel costs for each truck. The City also anticipates several thousand dollars worth of labor and material savings from reduced brake replacement. Other hybrid trucks may be purchased as the current fleet is replaced.

LEV-1 The City shall purchase the most energy-efficient vehicles available that meet work requirements and are cost-effective, while considering initial cost and long-term savings in fuel and maintenance.

4.7.4 - Green Purchasing (GP)

The City makes purchases typical for city government operations such as vehicles, computers, paper, and materials required to maintain the City's infrastructure. Specific actions to enhance the City's purchasing include:

GP-1 Purchase equipment certified under the Energy Star program whenever cost-effective versions are available that meet all operational requirements.

GP-2 Purchase materials with high-recycled content whenever products are available that meet operational requirements and do not result in additional maintenance or excessive costs.

4.7.5 - Municipal Water Conservation (MWC)

The City has implemented water saving measures at most public parks, and other landscaped areas maintained by the City. The following actions will further improve the City's water conservation efforts:

MWC-1 The City will use recycled water in public landscaped areas when feasible.

MWC-2 The City will install higher efficiency irrigation systems, precision sprinklers, moisture sensors, and drip irrigation where the landscaping permits these systems and budget allows.

MWC-3 The City will replace existing water-intensive landscape installations (e.g., turf in medians) with more water-efficient alternatives where feasible.

4.7.6 - Urban Forestry (UF)

Trees provide shade that can reduce the urban heat island effect caused when pavement and other open surfaces absorb solar radiation and re-radiate heat to the surrounding environment. The shade can reduce energy required for cooling. Trees also store carbon as they grow, in a process referred to

as sequestration. Emission reductions from urban forestry projects must consider the life cycle emissions such as tree maintenance and the ultimate disposition of trees at the end of their lives to ensure that they produce a net decrease in greenhouse gas emissions.

The City maintains trees in parks and other publicly owned landscaped areas. These areas may provide an opportunity for new tree planting or replacement of tree species that possess a low potential to store carbon, with tree species that possess higher carbon storage potential. Guidance for managing urban forests is available from a number of sources. The Climate Action Reserve, Urban Forest Project Reporting Protocol (CAR 2008) provides criteria for generating greenhouse gas emission offsets with tree planting along with procedures for project monitoring. ICLEI's Urban Forestry Toolkit for Local Governments provides a series of fact sheets and case studies that communities can use to design an effective urban forestry program (ICLEI 2006).

General Plan Policies

Policy Number	General Plan Policy
CD-P-29	The City shall establish a street tree program for residential neighborhoods.
CD-P-30	Neighborhoods in new growth areas shall incorporate the following characteristics: • The edges of the neighborhood shall be identifiable by use of landscaped areas along major streets or natural features, such as permanent open space. Primary arterial streets may be used to define the boundaries of neighborhoods. The street system shall be designed to discourage high-volume and high-speed traffic through the neighborhood.

The following urban forestry measures are proposed for the City:

UF-1 The City of Manteca will review its current urban forestry management practices and tree selection criteria to identify potential improvements in greenhouse gas sequestration and implement cost-effective practices suitable for local climate and conditions.

UF-2 The City of Manteca will consider the following goals and actions when revising its urban forestry program:

- Increase public and private tree plantings citywide
- Use canopy shade trees along new major roadways and in new developments
- Retrofit existing developed area major roadways with canopy shade trees
- Enhanced canopy tree installation with each new single-family dwelling
- Enhanced canopy tree installation with each new commercial/industrial development site
- Proactive protection/enforcement of existing mature and new canopy shade trees

4.8 - Strategies for Existing Development

The CAP strategies described above are implemented in two ways. New development projects are proposed and constructed consistent with the General Plan and CAP. Existing residents and businesses comply with regulations that apply to everyone and participate in new and existing programs and measures. The strategies that apply directly and indirectly to existing development are shown in Table 17.

Table 17: Strategies for Existing Development

Strategy	How It Applies
Measures That Apply to Existing Development	
Transportation Demand Management (TDM)	TDM is implemented at existing and new businesses and can also reduce trips from new and existing housing that where employees live.
Expanded Transit Service	Improved transit service will encourage increased ridership from new and existing development.
Improved Transit Stations	Transit stations service a wider community area that includes new and existing development.
Traffic Calming Retrofits	Traffic calming designs can be retrofitted on existing roads or built in new development.
Complete Streets Program	Complete streets connect existing and new areas.
Parking Management	Parking management at new and existing employment centers encourages trip reductions from all residential development
Energy Retrofits	Educational and incentive programs encourage existing residents and business owners to install energy retrofits providing large benefits in older structures.
Bicycle and Pedestrian Improvements on Existing Roads	Bicycle paths and lanes can be retrofitted on existing roads and sidewalks and pedestrian paths can connect existing neighborhoods with appropriate destinations.
Bicycle Parking Facilities	Bicycle parking can be added to existing businesses if needed to satisfy demand by employees and customers.
Water Conservation Programs	Educational and incentive programs encourage existing residents and businesses to conserve water.
Recycled Water Use in Existing Parks	Recycled water can be piped to any area retrofitted or initially developed with a “purple pipe” system to distribute recycled water.
Recycling Programs	Operational programs such as recycling apply to all residents and businesses in the City.
Electric Vehicle Charging	Charging stations can be installed in existing development as a retrofit or in new development.
Neighborhood Electric Vehicles	Feasibility in existing neighborhoods will depend on the street design and safety considerations.

Table 17 (cont.): Strategies for Existing Development

Strategy	How It Applies
Measures That Apply to New Development but Indirectly Benefit Existing Development	
Transit and Pedestrian Oriented Development	Transit and pedestrian oriented development provides destinations that encourage transit use from existing development and walking once people arrive.
Mixed Use Development	Mixed-use development creates a more walkable environment conducive to transit use for trips from existing development.
Compact Development	Making the City more compact shortens average trip lengths for residents and creates more opportunities for transit.
Traffic Flow Improvements	Transportation improvements that reduce congestion and improve flow can reduce emissions from both existing and new development.

4.9 - Emission Reductions from Local Measures

The City of Manteca will need to achieve greenhouse gas emission reductions of 12,014 $MTCO_2e$ per year by the year 2020. Most of the reductions will be achieved by new development projects incorporating measures that reduce vehicle trips and miles traveled and encourage energy efficiency beyond state standards. Emission reductions will also be achieved through transportation infrastructure improvements and energy retrofits in areas of the City that are already developed. Programs that save water and reduce waste are also expected to provide energy savings and lower waste decomposition emissions. The calculations to support reductions from local measures are provided in Appendix B. A summary of the reductions anticipated from local measures is presented in Table 18.

Table 18: Summary of Reductions from Local Measures

Sector	Emissions Reductions ($MTCO_2e$)
Transportation New Development	2,093
Transportation Existing Development	1,500
Energy Efficiency New Development (Electricity)	1,926
Energy Efficiency Retrofits (Electricity)	1,570
Energy Efficiency New Development (Natural Gas)	1,247
Energy Efficiency Retrofits (Natural Gas)	934
Water Conservation Energy Savings (Electricity)	428
Solid Waste Diversion and Recycling	2,590
Total	**12,289**
Source of reduction estimates: Michael Brandman Associates (Appendix B).	

4.9.1 - Reductions from New Development

Reductions from new development are estimated using assumptions regarding the type and form of development that will occur from the 2010 base year to the 2020 target year. Reductions from new development will be achieved primarily from designs and features that reduce trips and VMT and from improved energy efficiency related to building water use. Reduction estimates for each measure are provided in Appendix B.6.

The reductions estimated for land use and transportation strategies are expressed in terms of percent reduction in light- and medium-duty vehicle miles traveled. The reductions are achieved by increasing the number of vehicle trips replaced by walking, bicycling, and transit use. Transportation demand strategies that increase average vehicle ridership such as vanpools and carpools reduce trips by making each vehicle trip more efficient. Other TDM measures reduce the need to travel by providing onsite facilities and opportunities to work at home that allow employees to avoid a trip.

The effectiveness of the strategies is directly dependent on the degree to which the various measures are implemented. For example, the increase in development density is dependent on developers proposing projects that are denser than the current average in the City. The land use and transportation strategies promote these concepts.

Many of the measures have synergistic impacts but also are subject to caps in reductions to avoid double counting. The California Air Pollution Control Officers Association's (CAPCOA's) Quantifying Greenhouse Gas Mitigation Measures provides reduction estimates for many measures that can be implemented by development projects (CAPCOA 2010). The CAPCOA document includes maximum reductions that can be expected from implementing multiple measures. Transportation measures in a suburban center or suburban neighborhood can achieve a maximum of 10 to 15 percent reduction in VMT. Reductions from energy conservation measures must account for the fraction of the building's energy use are affected by the measure. For example, measures to increase insulation reduce energy used for space heating and cooling, but not from lighting and water heating. The following describes the reductions achieved through General Plan Implementation.

Reductions from General Plan Implementation

All projects must demonstrate consistency with the General Plan. Consistency is defined as compliance with the policies applicable to the type of development proposed. The General Plan designates land throughout the City for specific types and density of development. Projects built consistent with the current land use designation may achieve reductions by developing higher than the average land-use density as of 2005 but that are still within the density range allowed by the General Plan. General Plan amendments that increase density are considered consistent with the CAP. General Plan amendments to other designations must be assessed to determine if the change has positive or negative impacts compared with the existing designation.

Compact Development

Reductions from compact development are dependent upon the extent which the City of Manteca increases overall development density, achieves infill of vacant lands within the existing footprint of the City, and the redevelopment of sites at greater intensity than the present use. Ensuring development is contiguous and adjacent with existing development will help make the community more compact as the City grows.

Mixed Use

Reductions from developing mixed-use projects and neighborhoods are dependent on design and density of the project, the types of uses that are included in the project, and the transportation options available at the site. Projects that are predominantly of a single use with a small amount of other uses supporting the project will have a small decrease in travel and VMT. Projects that have a wide range of commercial uses and a substantial number of residences within walking distance will achieve greater reductions.

Transit Oriented Development

Projects built near transit routes and that provide reasonable access for pedestrians and bicyclists will achieve higher-than-average transit ridership. The level and type of transit service are factors that affect transit ridership. Manteca is expected to have a small increase in transit service and ridership, due to the lack of high-density employment centers and suburban character.

Pedestrian Oriented Development

The City of Manteca has a walkable downtown that includes many pedestrian oriented features. The residential neighborhoods vary widely in pedestrian orientation. New development will emphasize pedestrian connections to frequently accessed destinations that will enhance pedestrian orientation over time.

Pedestrian Infrastructure

All new development will include pedestrian infrastructure consistent with the Complete Streets concepts to enhance walkability. The amount of walking at any given project site is dependent on the density and mix of uses within walking distance. The City's mixed-use zoning encourages projects that will have higher levels of pedestrian travel compared with business as usual.

Bicycle Infrastructure

The presence of complete and safe bicycle infrastructure is critical for increasing bicycle mode share. The new development areas in the City will include bike lanes and paths where appropriate, and existing areas will be retrofitted to the extent possible to remove unsafe areas. Manteca is compact enough for most destinations to be accessible by bike. A substantial increase in bicycling is possible with implementation of the General Plan.

Transportation Demand Management

Employers with large numbers of employees can achieve significant reductions in commute trips with the implementation of transportation demand management (TDM) programs that include measures such as carpooling, vanpooling, transit subsidies, flexible schedules, and many other options. Facilities at the employment site such as secure bicycle parking, showers and lockers, preferential carpool parking, and onsite lunchrooms and access to services can increase the use of alternative modes and avoid trips during the day.

Energy Efficiency

New development that exceeds Title 24 will result in emission reductions beyond those achieved by regulation. As new versions of Title 24 are adopted, it will be increasingly difficult to exceed the standard; however, technological advancements will continue to provide opportunities for increased efficiency in the future.

Water Conservation

Water conservation regulations have also become increasingly stringent over time, as new standards covering indoor water fixtures and outdoor watering for landscaping have gone into effect. Reductions in energy use due to water conservation are based on compliance with the Model Water Ordinance regulation.

Recycling, Reuse, and Diversion

The State has adopted increasingly stringent requirements for cities for diverting waste from the local landfills. The reductions accrue from reduced transportation of material to the landfill, energy savings from using recycled materials, and reductions in methane emissions from landfills.

Wastewater

Minimizing water consumption for indoor uses at residences and business reduces water that must treated at the wastewater treatment facility serving the City. Sewage treatment plants produce methane as a byproduct of anaerobic decomposition of the waste. Systems that capture the methane for beneficial use can reduce greenhouse gas emission.

SECTION 5: IMPLEMENTATION, MONITORING, AND FUNDING

California Government Code Section 65400 requires the City to prepare and submit an annual report on the status of the General Plan and progress in its implementation to the City Council, the Governor's Office of Planning and Research, and the Department of Housing and Community Development. This suggests that the CAP be designed so that it can be monitored, updated, and its effectiveness measured on an annual basis towards meeting a target for reduction of greenhouse gas emissions through buildout of the General Plan 2030.

The following is a list of city departments with responsibilities for CAP implementation and a brief description of their divisions and functions:

- The Finance Department is responsible for providing a variety of services to other departments and the public. The Department consists of Finance Administration, Accounting, Payroll, Purchasing, Financial Planning, and Utility Billing.
- The Community Development Department is responsible for the following divisions and programs: Building Safety Division, Planning Division, and Economic Development.
- The Public Works Department is responsible for the Building Maintenance, Solid Waste, Street Maintenance Services, Vehicle Maintenance, and Water functions.

Projects must implement best practices that fit with the location and the use. The best practices must be context-sensitive. For example, many design features that are appropriate for a high-density, mixed-use neighborhood are not appropriate for a low-density, single-family neighborhood. The City is planning for entire community, so the reductions are averaged across the entire area to achieve an overall goal. Some areas will provide reductions below the goal and others will achieve over the goal, but on average, the City will achieve the needed reductions.

Projects proposed by developers will be required to incorporate increasingly more effective energy efficiency features into their designs. The package of energy features must achieve efficiency beyond that required by Title 24 by at least 10 percent. Title 24 is updated about every 3 years, and the requirements become increasingly stringent over time. The State's ultimate goal is for new development to achieve net zero energy consumption through a combination of energy efficiency and onsite generation with solar or other source.

As part of the annual report to the City Council on progress in implementing the General Plan, staff will report on benchmarks achieved that implement goals, objectives, and policies having air quality, climate change, and sustainability benefits. The City will use its Geographic Information System to provide up-to-date land use and development data and tracking for other metrics or quantitative measures of success. Appropriate benchmarks and the means to track them will be developed within

12 months of adoption of the CAP and will be adjusted over time to respond to changing conditions and lessons learned. The following benchmarks are proposed:

5.1.1 - Land Use Benchmarks

- Summary of building permits for new construction issued during the previous year
- The amount of residential development approved in new subdivisions and parcel maps
- The average density of new development approved during the previous year
- Progress in improving the jobs/housing balance in the City
- Inventory of vacant land by designation including change from previous year

Transportation and Circulation Benchmarks

- SB 375 Sustainable Communities Strategies implementation status report
- Transit ridership statistics
- Transit route expansions and changes to service frequency
- New lane miles of roads built by functional classification
- Progress in implementing congestion relief projects
- TDM program participation
- SJVAPCD grant program cost-effectiveness calculations
- Updates in vehicle miles traveled used by SJCOG in making Transportation Conformity findings for transportation plans

Energy Conservation Benchmarks

- Compile results of Title 24 Compliance Reports to show amount achieved over standards
- Status report on achieving landfill recycling and diversion targets
- Progress achieved on water conservation programs and projects
- Progress achieved on water reuse projects

5.1.2 - Climate Action Plan Implementation

The CAP will require city staff to take a series of actions to ensure that the policies and implementation measures are accomplished in a timely manner. The following actions should be initiated within the first year after adoption of the CAP:

First Year Actions

- Assign a staff CAP Coordinator.
- Set up a CAP Implementation Committee made up of City Staff members from each Department with responsibilities for providing specific information under their purview:
  - Building Safety Division – building statistics, energy reports
  - Planning Division – subdivision data

  - Public Works – TDM program data
  - Fleet Manager – low emission vehicle purchases
  - Finance Department – capital improvements/energy retrofits/budget
  - I.T. Department – Geographic Information Systems - tracking and mapping land use changes/prepare new reports as needed
  - Public Works Department - Solid Waste – recycling and waste diversion statistics
  - Other – to be determined

- Participate in SB 375 Regional Targets process with SJCOG.
- Coordinate with transit agencies on transit issues.
- Compile first progress report as a section/chapter of the Annual General Plan Implementation Report.
- Identify program improvements and new programs that the City can pursue.
- Obtain technical assistance from the Air District to assist the City in developing uniform monitoring and reporting procedures and incorporate existing air district TDM related programs.
- Review the City's urban forestry programs and regulations for potential changes to relevant development-related code sections (Title 12, 16, and 17).
- Develop a mechanism to cover the costs of implementing the monitoring and reporting.

Long-Term Actions

Long-term milestones (approximately every 5 years) include the following actions:

- Review land use and transportation data collected from the previous 5 years for comparison with regional transportation goals.
- Analyze completed projects to determine if the CAP targets are being achieved and propose revisions or additional programs if needed.
- Update the CAP to reflect changes in state regulations and address any new GHG targets adopted for later years.

CAP Funding Sources

This subsection describes potential funding sources and strategies that would cover costs related to the CAP measures. Implementation will require a combination of possible strategic public funding by the City, regional government agencies, and state and federal governments to provide capital projects, incentives, outreach/education, and new regulations necessary to achieve CAP objectives. Funding sources are not identified for all actions. However, state and regional grants are available to assist

with funding the more expensive strategies. The City can partner with private companies. The City can also partner with the County and other jurisdictions for joint programs. Many of the measures could be self-financing if properly designed and implemented.

The vast majority of reductions from the CAP strategy are obtained through conditions on new development. Although energy efficiency improvements can increase construction costs, these improvements result in savings from reduced energy costs to homeowners and building owners. The City is sensitive to actions that increase the initial costs of development and has chosen a moderate goal that would limit costs.

The other main source of reductions in the CAP is from implementing the City's General Plan land-use strategy. The City believes that the land-use strategy will result in lower costs from more efficient provision of infrastructure and services to the new development. The land-use strategy is also consistent with regional transportation initiatives that reduce vehicle travel and reduce long-term transportation infrastructure investment needs.

The City may apply for grants to replace existing conventional traffic lights with energy-saving LED fixtures. All utilities manage incentive programs that provide rebates and assistance to consumers purchasing energy efficiency upgrades for homes and businesses. These programs are expected to continue in the future.

SECTION 6: CLIMATE CHANGE ADAPTATION

Despite efforts to reduce greenhouse gas emissions, greenhouse gases can remain in the atmosphere for hundreds of years. Therefore, it is probable that climate change impacts will still be observed. The impacts vary dependant upon the region. In California, climate change may result in a decreased water supply, sea level rise, and increased wildfires, to name a few. In order to manage these impacts, the City's vulnerability to these impacts is assessed and strategies have been developed to adapt to the projected changes.

Climate change adaptation refers to efforts that respond to the impacts of climate change, such as adjustments in natural or human systems to actual or expected climate changes to minimize harm or take advantage of opportunities.

Goal: Protect City of Manteca residents and resources from negative climate change impacts.

Determining potential future impacts from climate change is an evolving process. The 2009 California Climate Adaptation Strategy provides a proactive foundation for an ongoing adaptation process within California for the sectors with the greatest risks. The document provides strategies for state and local governments to adapt to climate change (CNRA 2009). By incorporating applicable strategies as CAP Implementation Strategies, the City is taking a proactive approach to ensure that impacts to the City are minimized.

The following represent the main risks from climate change that could be experienced in the City of Manteca. The General Plan policies that would decrease the risks to the City are presented, as well as new CAP implementation strategies that would further reduce risks and protect City residents and resources from potential impacts from climate change.

6.1 - Wildfires

The City of Manteca is surrounded by irrigated agricultural lands that are not subject to wildfire to any great extent. Fallow farmland and vacant land with weedy growth can become a fire hazard if not maintained.

6.2 - Water

One of the potential impacts of climate change is a loss of natural snowpack, particularly the Sierra Nevada snowpack. Snowmelt provides an annual average of 15 million acre-feet of water, released between April and July each year (Department of Water Resources 2008). The California Department of Water Resources projects that the Sierra snowpack will experience a 25 to 40 percent reduction from its historic average by 2050. Climate change is also anticipated to bring warmer storms that result in less snowfall at lower elevations, reducing the total snowpack.

Changes in precipitation patterns are expected to cause increased flooding. For the purposes of federal flood insurance, the Federal Emergency Management Agency (FEMA) has traditionally used the 100-year flood event, which refers to the level of flood flows that has a 1-percent chance of being exceeded in any single year. As California's hydrology changes, what is currently considered a 100-year flood may strike more often, leaving many communities at greater risk. Moreover, as peak flows and precipitation change over time, climate change calls into question assumptions of "stationarity" that is used in flood-related statistical analyses such as the 100-year flood.

The California Department of Water Resources (2008) recommends that local governments implement land use policies that decrease flood risk. These following recommendations are included as CAP implementation policies where applicable and feasible.

- Local land use agencies should update General Plans to address increased flood risks posed by climate change. General Plans should consider an appropriate risk tolerance and planning horizon for each locality.
- Local governments should site new development outside of undeveloped floodplains unless the floodplain has at least a sustainable, 200-year level of flood protection.
- Local governments should use low-impact development techniques to infiltrate and store runoff.
- Local governments should include flood-resistant design requirements in local building codes. State, federal, and local agencies should develop conjunctive use management plans that integrate floodplain management, groundwater banking, and surface storage. Such plans could help facilitate system reoperation and provide a framework for the development of local projects that are beneficial across regions.
- Local land use agencies should adopt ordinances that protect the natural functioning of groundwater recharge areas.

As precipitation falls in the form of rain rather than snow with greater storm intensity, high-frequency flood events are projected to increase. There is currently no known literature that suggests an increase in flooding from climate change in the Manteca area; however, it is possible that there could be changing weather patterns that would result in heavy downpours of rain in the area, which could cause flooding. In addition, the potential for increased wildfires resulting from climate change could increase floods following fire. The City of Manteca General Plan contains the following policies, which would reduce flooding impacts.

General Plan Policies

Policy Number	General Plan Policy
Goal S-3	Prevent loss of lives, injury, and property damage due to flooding.
Goal S-4	Pursue flood control solutions that minimize environmental impacts.
S-P-7	Regulate all uses and development in areas subject to potential flooding through zoning and other land use regulations.
S-P-8	Cooperate with other agencies in the pursuit of a regional approach to flood issues.
S-P-9	Combine flood control, recreation, water quality, and open space functions where feasible.
S-P-10	Combine flood control, recreation, water quality, and open space functions where feasible.
S-P-11	Ensure that the impacts of potential flooding are adequately analyzed when considering areas for future urban expansion.
S-P-12	New residential development, including mobile homes, shall be constructed so that the lowest floor is at least one foot above the 100-year flood level.
S-P-13	Non-residential development shall be anchored and flood-proofed in accord with Federal Emergency Management Agency (FEMA) standards to prevent damage or causing damage due to a 100-year flood or, alternatively, elevated to at least one foot above the 100-year flood level.
S-P-14	When improvements to existing developments are made costing at least 50 percent of the current market value of the structure before improvements, the structure shall be brought into compliance with FEMA standards.
S-I-4	The City shall continue to participate in the National Flood Insurance Program. To this end, the City shall ensure that local regulations are in full compliance with standards adopted by the Federal Emergency Management Agency (FEMA). The City shall adopt and implement local flood management development standards.
S-I-5	Provide flood warning and forecasting information to City residents.
S-I-6	Discourage large continuous paved areas unless provided with engineered drainage facilities.
S-I-7	Discourage large continuous paved areas unless provided with engineered drainage facilities.
S-I-8	New development shall be required to maintain natural stream courses and adjacent habitat and combine flood control, recreation, water quality, and open space functions.

6.3 - Agriculture

The City of Manteca has a strong agricultural heritage and agriculture economic sector. The City has lands that are in agricultural production pending development, but with the buildout of the General Plan will be removed from production. Therefore, impacts to agricultural due to climate change are not a significant issue that requires action by the City.

6.4 - Emergency Preparedness

In the event of a wildfire, flood, or some other emergency, the City has taken steps to include emergency management procedures. The General Plan contains the following policies that would ensure that the City is well prepared for an emergency:

General Plan Policies

Policy Number	General Plan Policy
Goal S-6	Ensure that City emergency procedures are adequate in the event of potential natural or man-made disasters.
S-P-18	The City shall maintain and periodically update the City's Emergency Plan.
S-I-14	The City shall conduct periodic emergency response exercises to test the effectiveness of City emergency response procedures.
S-I-15	The City shall review County and State emergency response procedures that must be coordinated with City procedures.

6.5 - Other

Other climate change impacts include sea level rise and energy supply disruptions. Sea level rise would not impact Manteca, as the City is located 38 feet above sea level. According to Moser et al. (2009), sea levels are likely to increase by up to 35 inches by the year 2100, depending on the magnitude of climate warming.

Climate change could increase extreme conditions such as heat waves. Higher temperatures could increase the frequency, duration, and intensity of conditions favorable to ozone formation by 75 to 85 percent (California Energy Commission 2006). More severe heat could result in a greater risk of people suffering from death from dehydration, heat stroke/exhaustion, heart attack, stroke, and respiratory distress. Most development includes the installation of air conditioning units, which would help to prevent severe, heat-related illness but which results in additional energy use. Increased heat could cause energy demand increases and possible supply disruptions. Energy efficiency measures as discussed in the Climate Action Strategies section would help to offset increased energy usage and decrease potential heat related health risks.

SECTION 7: GLOSSARY OF TERMS AND ACRONYMS

AB	Assembly Bill
ARB	California Air Resources Board: a part of the California Environmental Protection Agency, an organization that reports directly to the Governor's Office in the Executive Branch of California State government. The mission of the ARB is to promote and protect public health, welfare, and ecological resources through the effective and efficient reduction of air pollutants while recognizing and considering the effects on the economy of the State.
CEQA	California Environmental Quality Act: a California statute passed in 1970 to institute a statewide policy of environmental protection.
BAU	Business as usual: emissions that are expected to occur in a future year in the absence of emission reduction regulations and controls.
CO_2	Carbon dioxide: A naturally occurring gas and a by-product of burning fossil fuels and biomass other industrial processes. It is the reference gas against which other greenhouse gases are measured and therefore has a global warming potential of 1.
Climate Change	The statistically significant variation either in the mean state of the climate or in its variability, persisting for an extended period (typically decades or longer).
EPA	United States Environmental Protection Agency. The mission of the EPA is to protect human health and to safeguard the natural environment—air, water and land—upon which life depends.
Greenhouse gas	A gas that absorbs infrared radiation in the atmosphere. Greenhouse gases as defined by AB 32 include carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride.
$MTCO_2e$	Metric tons of carbon dioxide equivalents: a measure of greenhouse gas emissions
$MMTCO_2e$	Million metric tons of carbon dioxide equivalents: a measure of greenhouse gas emissions
ODS	Ozone depleting substances: compounds that contributes to stratospheric ozone depletion. ODS include chlorofluorocarbons (CFCs), hydrochlorofluorocarbons (HCFCs), halons, methyl bromide, carbon tetrachloride, hydrobromofluorocarbons, chlorobromomethane, and methyl chloroform. ODS are generally very stable in the troposphere and only degrade under intense ultraviolet light in the stratosphere. When they break down, they release chlorine or bromine atoms, which then deplete ozone.
SB	Senate Bill

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Erika Durrer.....Senior Planner

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8.4 - Photograph References

Photographs provided by Dave Mitchell except for:

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