City of Tulare

Climate Action Plan

Public Review Draft
April 2011

Prepared for:

Prepared By:
PMC®

860 Walnut Street, Suite B
San Luis Obispo, CA 93401

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Executive Summary

This Climate Action Plan (CAP; Plan) demonstrates the City of Tulare's commitment to reducing greenhouse gas (GHG) emissions consistent with state legislation and to support the City's 2030 General Plan and Draft Environmental Impact Report (EIR). The City will reduce GHG emissions caused by City operations and facilitate reductions in the community through the goals, measures, and actions identified herein. These efforts will not only reduce emissions but also support and enhance the City's quality of life and economic prosperity.

Climate Action Plan Purpose & Scope

The City of Tulare initiated an update to the General Plan in 2005. The City Council approved the 2030 General Plan and certified the EIR in April 2008. Following review by the Tulare County Superior Court in 2009, the City has been working to expand the General Plan and EIR to address air quality and climate change among other resource issues. The City contracted with PMC in April of 2010 to prepare the CAP, including a GHG emissions inventory. The purpose of this CAP is to meet City long-term planning objectives while complying with state legislative mandates.

The CAP is the beginning of an ongoing planning process that enables the City to comply with state legislation related to GHG emissions, fulfill the requirements of the court order, and complete certification of the General Plan EIR and adoption of the General Plan. The purpose of this Plan is to identify how the City will achieve the State-recommended GHG emission reduction target of 15% from baseline by the year 2020 and to create a path to obtain 2050 state targets associated with Governor's Order S-03-05. The CAP provides goals and associated measures, also referred to as GHG reduction measures, in the sectors of energy use, water use, transportation, land use, solid waste, and agriculture. In addition, this CAP provides goals and measures for longer-term adaptation to the potential risks of climate change.

Downtown Tulare

2006 Greenhouse Gas Inventory and Forecast

In November 2010, the City of Tulare completed a GHG emissions inventory (Inventory) as part of the Climate Action Plan (CAP). The Inventory calculated GHG emissions produced from government operations and community-wide activities in 2006 including transportation, waste, agriculture, energy, and aircraft-related activities. The Inventory establishes a baseline against which future changes in emissions can be measured and provides an understanding of major sources of GHG emissions in the city.

In 2006, the City of Tulare emitted approximately 820,290 metric tons of carbon dioxide equivalent (CO_2e) within the city limits and the Planning Area. Metric tons of CO_2e is a universal way to equalize the different potencies of the six greenhouse gas emissions in one comparable unit. As shown in **Figure ES-1** and **Table ES-1**, the commercial and industrial sectors were by far the largest contributor to emissions (a combined 39%), producing approximately 320,770 metric tons of CO_2e in 2006. Emissions from the other sector were the next largest contributor, accounting for 26% of the total emissions, producing approximately 214,900 metric tons of CO_2e.

Figure ES-1: 2006 Greenhouse Gas Emissions (CO_2e) from Community-Wide Sources by Sector in the City Limits and the Planning Area

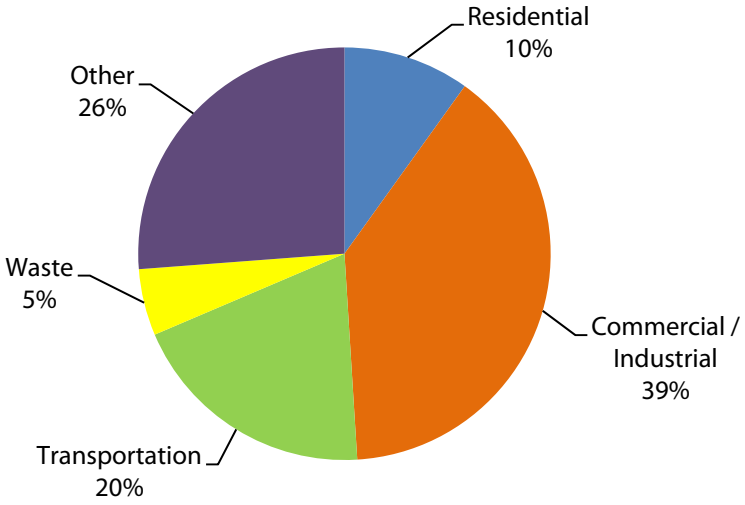


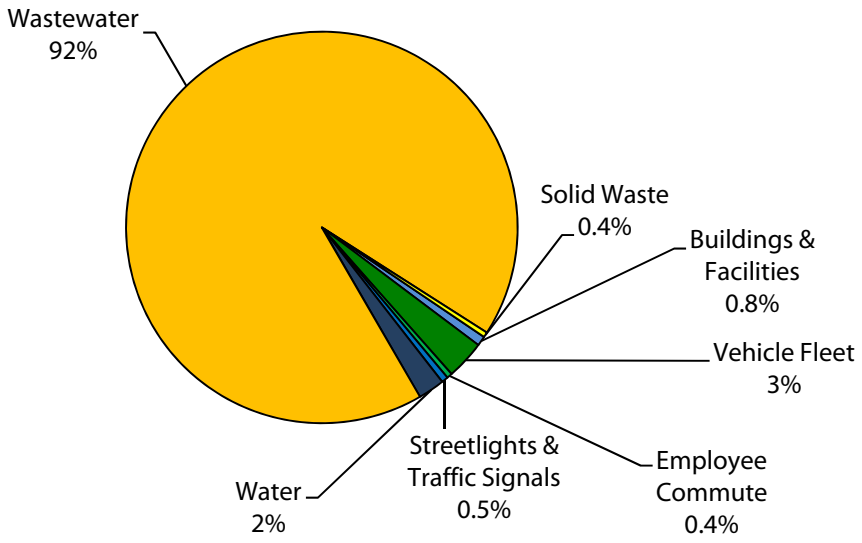
Table ES-1: Summary of Community-Wide Emissions by Sector (Metric Tons CO_2e)

Sector	Metric Tons CO2e	Percentage of Total
Residential	81,250	10%
Commercial/Industrial	320,770	40%
Transportation	160,590	20%
Waste	42,800	5%
Other	214,880	25%
Total	***820,290***	***100%***

Due to rounding, totals may not equal 100%.

Emissions from City government operations and facilities produced approximately 132,380 metric tons of GHG emissions in 2006. The City's wastewater treatment plant was the largest contributor to the City's emissions (92%), producing 122,308 metric tons of CO_2e. The second contributor was fuel consumption from the vehicle fleet (3%).

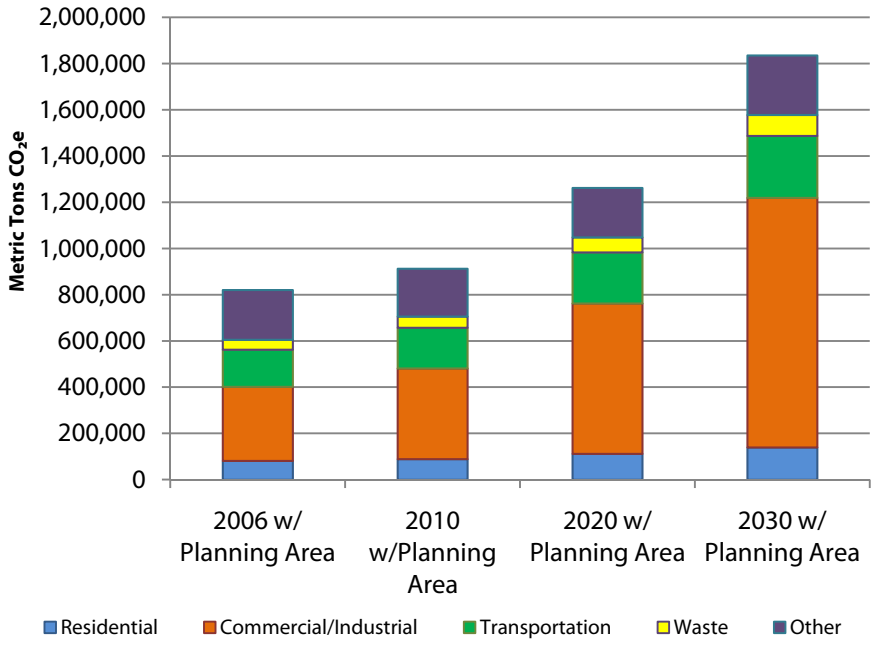
Figure ES-2: 2006 Emissions from City Operations by Sector



By 2030, community-wide emissions will increase by 124%.

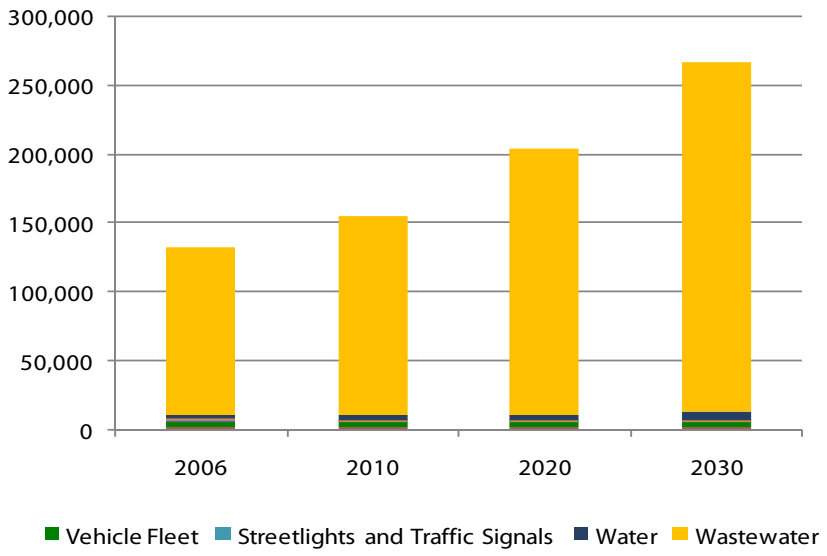
Using data from the 2006 baseline inventory, an estimate was made as to how emissions will grow by 2010, 2020, and 2030 with the city's and the planning area's expected population, household, and transportation growth. This estimate, also known as a business-as-usual (BAU) forecast or emissions projection, demonstrates how community-wide emissions will continue to grow if regulatory or technical interventions are not put in place to reduce GHG emissions. The community-wide forecast is depicted in **Figure ES-3**.

Figure ES-3: Business-as-Usual Projected Growth in Community-Wide Emissions, 2006-2030 (Metric Tons CO2e)



To illustrate the future growth of municipal emissions in 2020 and 2030, existing trends, planned expansions, and levels of service were taken into account to create a municipal BAU forecast. All improvements the City has completed since 2006 that would reduce emissions are excluded from the business-as-usual forecast. Changes in municipal emissions trends will ultimately contribute to the achievement of community-wide targets and will be credited as community-wide progress toward reduction goals, yet forecasting emissions over time helps the City to better understand the impact of municipal efforts to reduce GHG emissions. All City actions taken since the baseline year of 2006 that would impact emissions will be accounted for in **Chapter 5.**

Figure ES-4: City Government Operations Emissions Forecast by Sector – 2020 and 2030 ($MTCO_2e$)

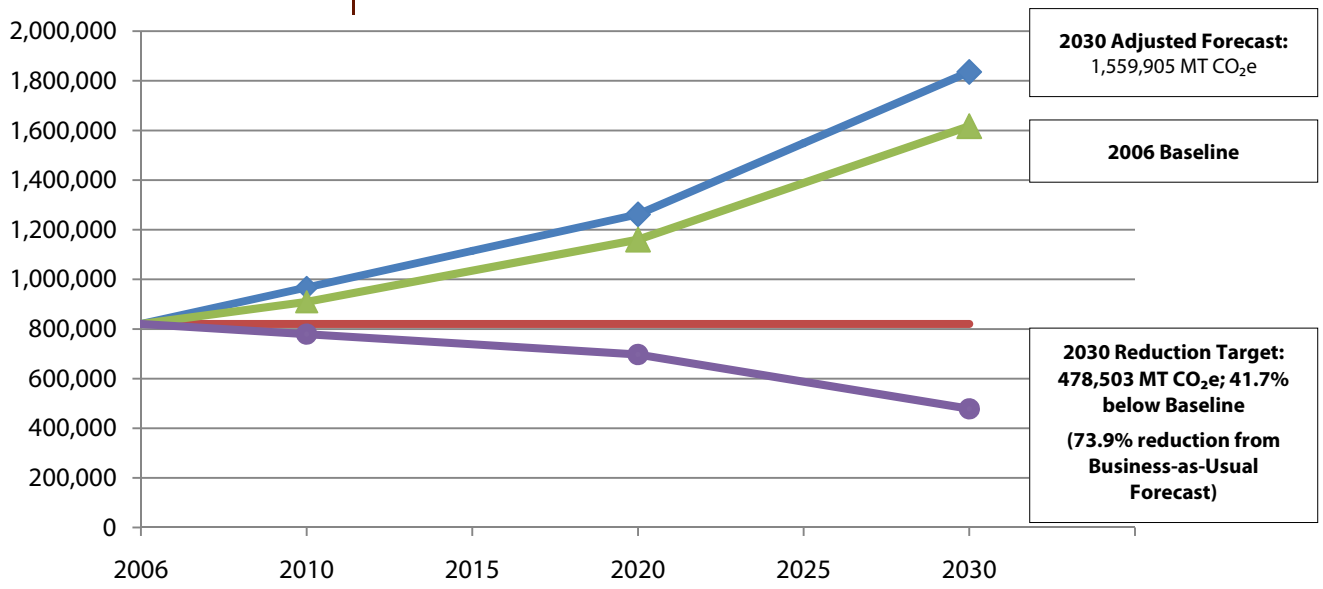


Adjusted Forecast & Reduction Target

The BAU forecast was adjusted to account for state and federal actions such as mandated fuel efficiency standards, renewable electricity standards, California's new building code, and federal vehicle efficiency standards. Accounting for these actions provides a more accurate picture of future emissions growth and the responsibility and ability of local governments versus the state to reduce greenhouse gas emissions. The state-adjusted forecast is shown in **Figure ES-5** as a green line. The figure also shows the state-recommended reduction target (purple line) of 15% below 2006 levels by 2020, and reductions continuing through 2030, showing consistency with the Governor's Executive Order S-03-05 to reduce emissions by an additional 80% by 2050. The objective of this Plan is to bridge the gap between the city's growth forecast and the state's recommended reduction targets.

Emissions will continue to increase along the business-as-usual scenario while reduction efforts are initiated. Because of this, achieving the target will require more than a 15% decrease; rather, it will require a 45% reduction from 2020 emissions levels, or business as usual. By 2030, the gap between business-as-usual growth and target reduction levels increases to 74%. Once state reductions are accounted for, the reduction necessary at the local level to achieve targets drops to 39% below the adjusted business-as-usual forecast by 2020 and 69% below the adjusted business-as-usual forecast by 2030. **Figure ES-5** below demonstrates projected increases and the total emissions reductions that will be necessary to achieve City targets.

Figure ES-5: GHG Forecast in Relation to Reduction Targets (MT CO_2e)



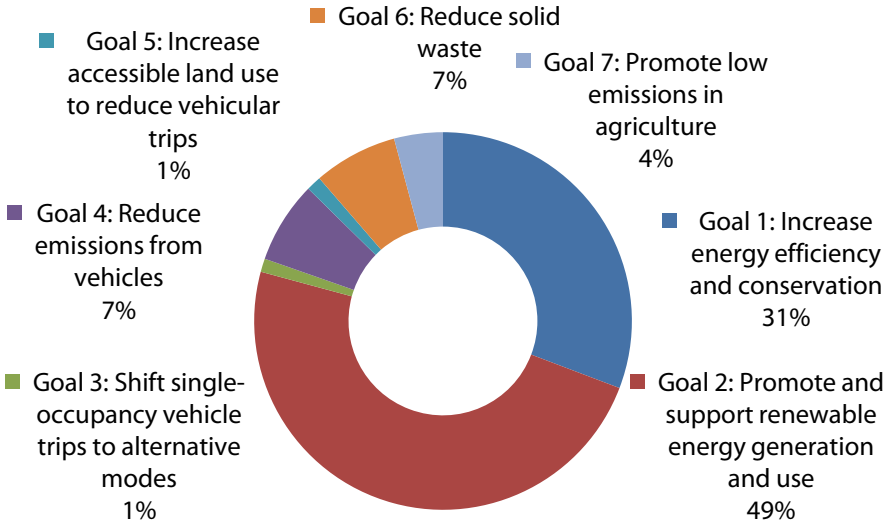
GHG Reduction Strategies

To achieve the State's mandated community-wide GHG emissions reduction target of 15% below 2006 baseline levels by 2020, the City will need to implement the a variety of GHG reduction measures. Reduction measure topics areas include energy efficiency and conservation, renewable energy, transportation, solid waste, land use, and agriculture. The GHG emissions reductions from these strategies are summarized in **Table ES-2** and **Figure ES-6**. All community-wide and municipal strategies outlined in this Plan allow the City to achieve its reduction target of 15% below baseline 2006 levels by 2020.

Table ES-2: Reduction Summary by Goal

Goal	To Date ($MTCO_2e$/yr)	2020 ($MTCO_2e$/yr)	2030 ($MTCO_2e$/yr)
Goal 1: Increase energy efficiency and conservation.	-8,180	-139,172	-216,686
Goal 2: Promote and support renewable energy generation and use.	-135,613	-218,918	-321,944
Goal 3: Shift single-occupancy vehicle trips to alternative modes.	0	-5,149	-11,712
Goal 4: Reduce emissions from vehicles.	-111	-31,667	-44,466
Goal 5: Increase accessible land use to reduce vehicular trips.	-1,668	-5,793	-11,303
Goal 6: Reduce solid waste.	0	-32,507	-57,977
Goal 7: Promote low emissions in agriculture.	0	-18,889	-7,408
Total – Local Reductions	-145,571	-452,095	-671,497
Percentage Change from 2006 Emissions	**-7%**	**-15.7%**	**87%**

Figure ES-6: 2020 Reductions by Goal



In addition to implementing strategies for reducing GHG emissions from community-wide activities, the City will implement strategies to reduce GHG emissions from City operations to contribute to the City's target of 15% below 2006 baseline levels by 2020. These actions are accounted for above with other community-wide reductions. Municipal reductions contribute 41% of all community-wide reductions in 2020. The GHG emissions reductions from municipal strategies are summarized in **Table ES-3.**

Table ES-3: Municipal Reductions by Goal

Goal	To Date ($MTCO_2e$/yr)	2020 ($MTCO_2e$/yr)	2030 ($MTCO_2e$/yr)
Goal 1: Increase energy efficiency and conservation.	-151	-425	-404
Goal 2: Promote and support renewable energy generation and use.	-135,207	-181,998	-238,070
Goal 3: Shift single-occupancy vehicle trips to alternative modes.	0	-39	-50
Goal 4: Reduce emissions from vehicles.	-111	-128	-240
Total – Local Reductions	-135,468	-182,590	-238,765
Percentage Change from 2006 Emissions	**-85%**	**-82%**	**-72 %**

IMPLEMENTATION

The Climate Action Plan concludes with an Implementation Program. The Implementation Program outlines actions with specific measures and steps. The Program also identifies responsible departments, potential costs, cost savings, and time frames for action. This tool equips the City to achieve the identified reduction targets in this Plan.

1. Introduction

This Climate Action Plan (CAP) demonstrates the City of Tulare's commitment to reducing greenhouse gas (GHG) emissions consistent with state legislation and to support the City's 2030 General Plan and Draft Environmental Impact Report (EIR). The City will reduce GHG emissions caused by City operations and facilitate reductions in the community through the goals, measures, and actions identified herein. These efforts will not only reduce emissions but also support a more competitive Tulare.

1.1 Purpose and Scope

Local governments play an important role in reducing GHG emissions. While state and federal governments retain control of the "big hitters" such as vehicle efficiency, fuel efficiency, and renewable power, local governments have influence over other, more local influences to GHG emissions such as land use, transit, recycling, water conservation, and more. In addition, these efforts have co-benefits such as lower energy bills, improved air quality, economic growth, reduced emissions, and an enhanced quality of life.

The City of Tulare initiated an update to the General Plan in 2005. The City Council approved the 2030 General Plan and certified the EIR in April 2008. Following review by the Tulare County Superior Court in 2009, the City has been working to expand the General Plan and EIR to address air quality and climate change among other resource issues. The City contracted with PMC in April of 2010 to prepare the CAP, including a GHG emissions inventory. The purpose of this CAP is to meet City long-term planning objectives while complying with state legislative mandates.

The CAP is the beginning of an ongoing planning process that enables the City to comply with state legislation related to GHG emissions, fulfill the requirements of the court order, and complete certification of the General Plan EIR and adoption of the General Plan. The purpose of this Plan is to identify how the City will achieve the State-recommended GHG emission reduction target of 15% from baseline by the year 2020 and to create a path to obtain 2050 state targets associated with Governor's Order S-03-05. The CAP provides goals and associated measures, also referred to as GHG reduction measures, in the sectors of energy use, water use, transportation, land use, solid waste, and agriculture. In addition, this CAP

City Council chambers at the LEED Gold Tulare Public Library

provides goals and measures for longer-term adaptation to the potential risks of climate change.

Specifically, this Plan:

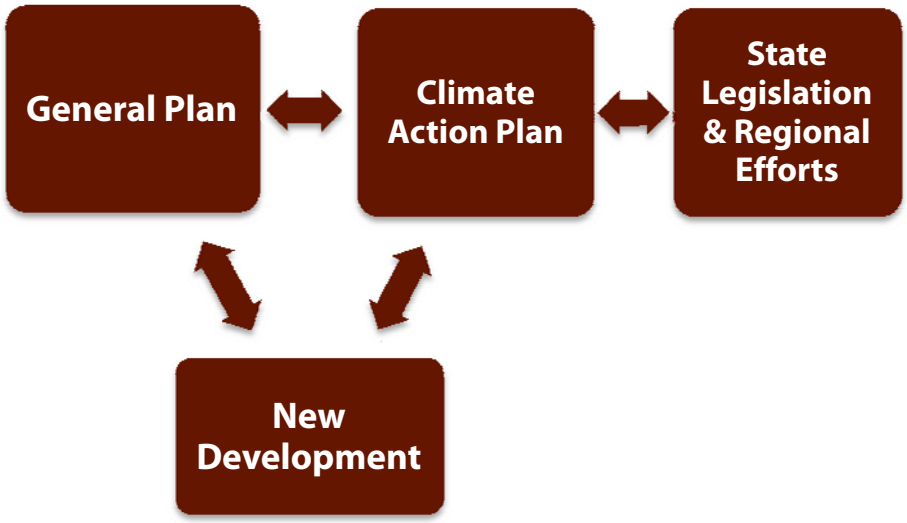
- Provides the scientific and regulatory framework for addressing climate change and greenhouse gases (GHGs) at the local level (refer to Chapter 2).
- Identifies sources of GHG emissions from sources within the City's Planning Area and estimates how these emissions may change over time (Refer to Chapter 3).
- Forecasts GHG emissions to 2020 and 2030 consistent with Global Warming Solutions Act (AB 32) (refer to Chapter 4).
- Provides an emissions reduction target consistent with AB 32 (refer to Chapter 4).
- Establishes energy use, water use, transportation, land use, solid waste, and agriculture strategies to reduce emissions from community-wide sources (refer to Chapter 5).
- Identifies existing and proposed strategies to reduce emissions from City operations and facilities (refer to Chapter 6).
- Provides methods for reducing Tulare's GHG emissions consistent with the State's goals and Public Resources Code Section 21083.3. [The California Environmental Quality Act (CEQA) Guidelines encourage the adoption of policies or programs as a means of addressing comprehensively the cumulative impacts of projects. See CEQA Guidelines, § 15064, subd. (h)(3), § 15130, subd. (d).]
- Presents an implementation program to assist with monitoring and prioritization of the reduction strategies through 2020 (refer to Chapter 7).

The CAP encompasses all current and future efforts to reduce GHG emissions contained in existing programs, policies, and regulations. As developed, the CAP may be a 'stand alone' policy and implementation document and/or be integrated into the City's 2030 General Plan as an Element or appendix. By incorporating the goals and measures of this CAP into the General Plan, Tulare is ensuring that future development and planning activities within the city conform to the objectives of the CAP's GHG reduction goals and programs.

The CAP will serve as an integral component of the planning and development process in Tulare in the coming years. As illustrated in

Figure 1-1, the CAP serves as an analytical link for the City between local development, regional efforts, and state requirements. It will also be a way for the City to determine consistency with state legislation, such as AB 32, SB 375, and SB 97, which mandate that local governments address GHG emissions in local planning and environmental documents.

Figure 1-1: Context of the Climate Action Plan in Relation to Other Planning Documents and Legislation



1.2 Public Involvement in the 2030 General Plan

Public engagement is a critical strategy to creating a document that is reflective of community-specific needs. Engaging community members early in order to identify ways the City and community can reduce GHG emissions will lead to more successful implementation of these programs and projects in the future.

The City of Tulare completed an extensive public engagement process in the development of the 2030 General Plan. The City formed the Community Advisory Committee (CAC) to guide the General Plan update and provide input to staff, the consulting team, the Planning Commission, and the City Council. The City hosted four public workshops from 2005 to 2006 to identity opportunities, actions, and a community vision. In addition, the City Council and Planning Commission held three public workshops to seek input and further evaluate issues. Staff and consultants used the five land use alternatives developed at community workshops to

develop the 2030 General Plan Land Use Diagram. Many themes that the public identified during the public engagement process are addressed in the CAP.

The General Plan provides new direction and vision to maintain a balanced community that facilitates more sustainable lifestyles. The CAP furthers the City's sustainability principles with a specific focus on strategies to reduce GHG emissions. The CAP is a tool that allows the City to look at its impact on GHG emissions, establish goals for GHG emissions reductions, and create steps to achieve the reduction targets. The CAP builds on the goals and vision of the General Plan, but translates these goals into numeric thresholds and targets for GHG emissions. The CAP will be linked to the General Plan as a stand-alone implementation item.

Issues & Opportunities from 2030 General Plan Public Input

- Centralized location
- Primary regional trucking and distribution center
- Affordable housing
- Agriculture heritage and agricultural industrial primacy
- Need for more alternative transportation and housing and jobs in close proximity
- Preference to concentrate high-density residential and commercial uses in targeted areas

1.3 IMPLEMENTATION

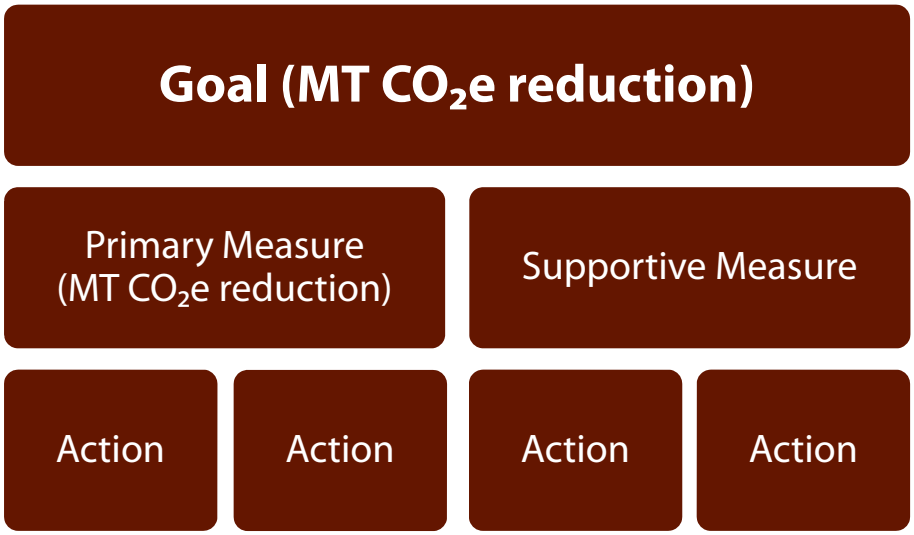
Implementation of the CAP, in coordination with the General Plan, will help Tulare to become an environmentally sustainable community while complying with state requirements to reduce GHG emissions 15% below baseline levels by 2020. To facilitate timely implementation of the CAP, each reduction measure identifies the department or agency responsible for implementation and provides public and/or private cost estimates. A full implementation and monitoring program is provided in **Chapter 7**.

1.4 Structure of the City's Approach to Reduce GHG Emissions

The City's actions to reduce GHG emissions are referred to as measures. This CAP includes primary measures and supportive measures. Primary measures are those that can be quantified and measured toward the City's reduction target. Supporting measures are those that are important or essential to implementation but not quantified or measured based on available information. Each measure is built upon several action items that highlight the implementation steps necessary to achieve the measure and ultimately the City's reduction target. Individual actions are not quantified for all measures; however, all primary measures are quantified and assessed. All measures are grouped and presented in seven goal topics.

The structure of actions, measures, and goals to achieve the City's reduction target is illustrated in **Figure 1-2** below; components that are associated with a quantifiable reduction in GHG emissions are noted with "(MT CO_2e reduction)."

Figure 1-2: City of Tulare's Climate Action Plan Goal Structure



INTRODUCTION TO CLIMATE ACTION PLAN GOALS

The CAP presents seven overarching goals to reduce GHG emissions. A brief introduction to goals and measures in both **Chapter 5** and **Chapter 6** is provided below.

Goal 1: Increase energy efficiency and conservation.	
EE 1.1	Increase energy efficiency in existing City buildings and facilities through Facility Improvement Measures and by retrofitting Edison-owned streetlights.
EE 1.2	Design new City buildings and facilities to exceed California Energy Code requirements by 15%.
EE 1.3	Increase energy efficiency in new commercial and residential development and require new residential and commercial development to achieve enhanced energy efficiency and exceed California Energy Code requirements by 15%.
EE 1.4	Reduce the urban heat island effect to cool the local climate and reduce energy consumption by maintaining current rates of public tree planting and increased shading on private property, high albedo surfaces, and cool surfaces.
EE 1.5	Achieve a 20% reduction in water use by 2020 (20X2020) to reduce energy consumed for groundwater pumping.
EE 1.6	Facilitate energy efficiency improvements within the residential building stock.
EE 1.7	Support commercial and industrial profitability and energy efficiency through programs and partnerships.
EE 1.8	Promote voluntary energy efficiency retrofits in the commercial and industrial sectors through financing and incentive programs.
EE 1.9	Require stationary equipment in new industrial development to comply with best practice energy efficiency standards.
EE 1.10	Continue to partner in regional initiatives that encourage achievement of regional energy efficiency targets.

Goal 2: Promote and support renewable energy generation and use.	
RE 2.1	Continue to utilize renewable and alternative energy sources at the wastewater treatment plant (the Tulare Water Pollution Control Facility (TWPCF)).
RE 2.2	Increase reliance on local renewable energy sources through provision of a minimum of 30% of commercial and industrial energy needs from on-site renewable energy sources by 2030.
RE 2.3	Support deployment of manure digesters at dairies to capture and convert biogas for on- and off-site electricity needs.
RE 2.4	Increase reliance on local renewable energy sources through provision of a minimum of 15% of baseline residential energy needs from on-site renewable energy sources by 2030.
RE 2.5	Support regional initiatives in expansion of the Valley's renewable energy supplies.
Goal 3: Shift single-occupancy vehicle trips to alternative modes.	
TM 3.1	Increase staff's use of alternative transit modes for work-related commutes and City business travel.
TM 3.2	Increase transportation-related bicycle trips to reduce vehicle miles traveled.
TM 3.3	Improve mobility by implementing a citywide Complete Streets ordinance and program.
TM 3.4	Expand public transit routes and provide light rail transit options.
TM 3.5	Reduce work-related vehicle miles traveled through support of transportation demand management programs.
TM 3.6	Support regional transportation management programs to shift single-occupancy vehicle trips to other modes.

Goal 4: Reduce emissions from vehicles.	
VE 4.1	Continue use of clean and alternative fuels in the City's fleet.
VE 4.2	Reduce emissions from on-road vehicle sources.
VE 4.3	Establish Tulare as a key node in local and regional commercial and industrial clean fuel infrastructure that demonstrates statewide leadership in supporting a clean heavy-duty fleet.
VE 4.4	Reduce emissions from on-road commercial and industrial transportation sources through reduced vehicle idling and efficient vehicle flow.
Goal 5: Increase accessible land use to reduce vehicular trips.	
LU 5.1	Promote accessible housing near transit and services to reduce vehicular trips.
LU 5.2	Work with partners to implement Blueprint Principles and create a regional setting that supports smart land use decisions in Tulare.
Goal 6: Reduce solid waste.	
SW 6.1	Achieve a 65% diversion of landfilled waste by 2020 and a 75% diversion by 2030 to reduce landfill emissions.
Goal 7: Promote low emissions in agriculture.	
AG 7.1	Identify strategies to promote low-emissions agricultural practice that strengthens Tulare's role as an international agricultural leader.
AG 7.2	Promote the use of digesters in local dairy operations to reduce methane emissions from dairy cattle.
AG 7.3	Support regional partnerships to promote reduced agricultural emissions and link the farming community with resources to achieve reductions in emissions.

2. Background and Existing Regulatory Framework

2.1 An Overview of Climate Change

Awareness of climate change, greenhouse gas emissions, and global warming has increased significantly in recent years. Although used interchangeably, there is a difference between the terms "climate change" and "global warming." According to the National Academy of Sciences, climate change refers to any significant, measurable change of climate lasting for an extended period. Global warming, on the other hand, is an average increase in the temperature of the atmosphere caused by increased greenhouse gas emissions. The use of the term climate change is becoming more prevalent because it encompasses all changes to the climate, not just temperature.

Climate change scientists are not certain how climate change will affect the planet over time. Although much of the attention to the topic is global in scale, it is important to realize that climate change affects every community at the local level and that there are changes that can be made to mitigate anticipated effects.

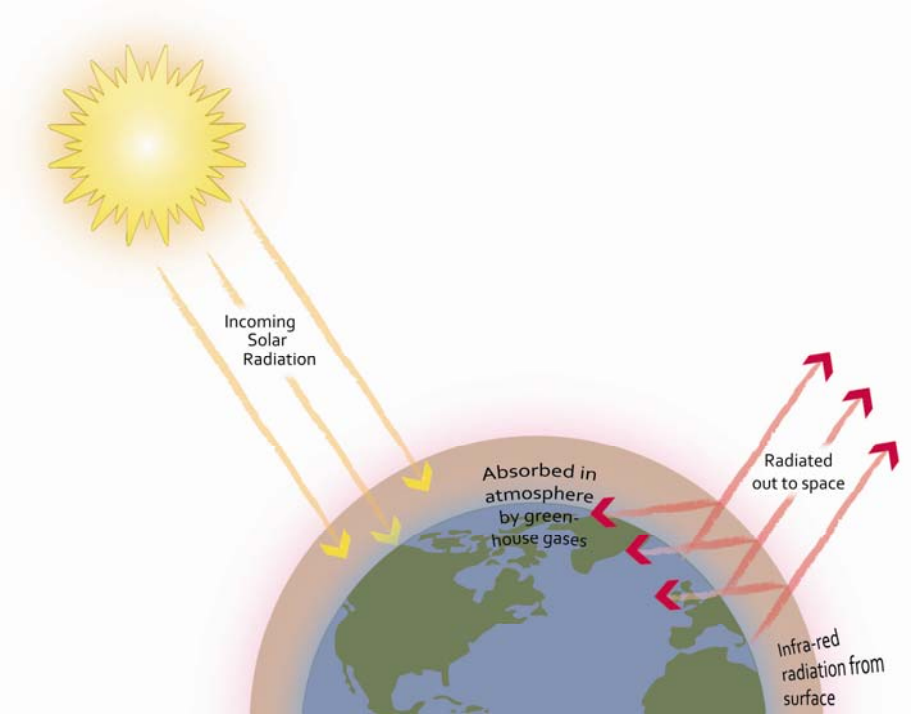
To fully understand climate change, it is important to recognize the naturally occurring "greenhouse effect" and to define the greenhouse gases (GHG) that contribute to this phenomenon.

Our planet relies on the natural greenhouse effect. This effect results when the atmosphere captures heat that radiates away from the earth toward space. By retaining heat and warming the planet's surface, life on earth is possible. Several gases in the atmosphere function as barriers and trap heat within the planet's atmosphere, including water vapor, carbon dioxide, methane, nitrous oxides, and chlorofluorocarbons. These gases function similarly to glass on a greenhouse; the glass panes of a

greenhouse allow sunlight to pass into the building but trap heat within it, preventing heat from escaping.[1] (Refer to **Figure 2-1**.)

Greenhouse gases are transparent to certain wavelengths of the sun's radiant energy, allowing them to penetrate deep into the atmosphere or all the way to the earth's surface. Clouds, ice caps, and particles in the air reflect about 30% of this radiation, but oceans and land masses absorb the rest (70% of the radiation received from the sun) before releasing it back toward space as infrared radiation. Greenhouse gases and clouds effectively prevent some of the infrared radiation from escaping; they trap the heat near the earth's surface where it warms the lower atmosphere. If this natural barrier of atmospheric gases were not present, the heat would escape into space and the earth's average global temperatures could be as much as 61 degrees Fahrenheit cooler.[2]

Figure 2-1: The Greenhouse Effect



While the greenhouse effect is a natural process, human activities have accelerated the generation of greenhouse gas emissions beyond natural levels. This overabundance of greenhouse gases has led to an unexpected warming of the earth, which has the potential to severely impact the earth's climate system.

[1] NASA 2009.

[2] NASA 2009.

2.2 CLIMATE CHANGE IMPACTS

GLOBAL IMPACTS

The Intergovernmental Panel on Climate Change's (IPCC) Fourth Assessment Report's Working Group I Summary for Policymakers synthesizes current scientific understanding of global climate change and projects future climate change using the most comprehensive set of established global climate models.[3] The report incorporates findings of the current effects of global climate change. These findings include an increase in tropical cyclone (hurricane) intensity, a loss in seasonally frozen ground in the Northern Hemisphere, and an increase in drought intensity since the 1970s.

As asserted in the IPCC Fourth Assessment Report, if trends remain unchanged, continued GHG emissions at or above current rates will induce further warming changes in the global climate system that will exceed trends observed to date and pose even greater risks than those currently witnessed.[4]

Given the scientific basis of basic climate change facts and expected trends, the challenge remains to prepare for and mitigate climate change through deliberate global and local action.

Adaptation or mitigation alone cannot avoid all of the anticipated impacts of climate change, but in coordination, these two strategies can complement each other and reduce climate change risks.[5] The burden to implement these strategies falls to governments. However, this burden also creates tremendous opportunity—acting on these strategies yields both mitigation and economic benefits.

STATE AND LOCAL IMPACTS

Research suggests that California will experience hotter and drier conditions, reductions in winter snow, and increases in winter rains, sea level rise, and an increased occurrence of extreme weather events. Such compounded impacts will affect economic systems throughout the state (**Figure 2-2**). To refrain from action is costly and risky; the California Climate Adaptation Strategy estimates that no action to address the

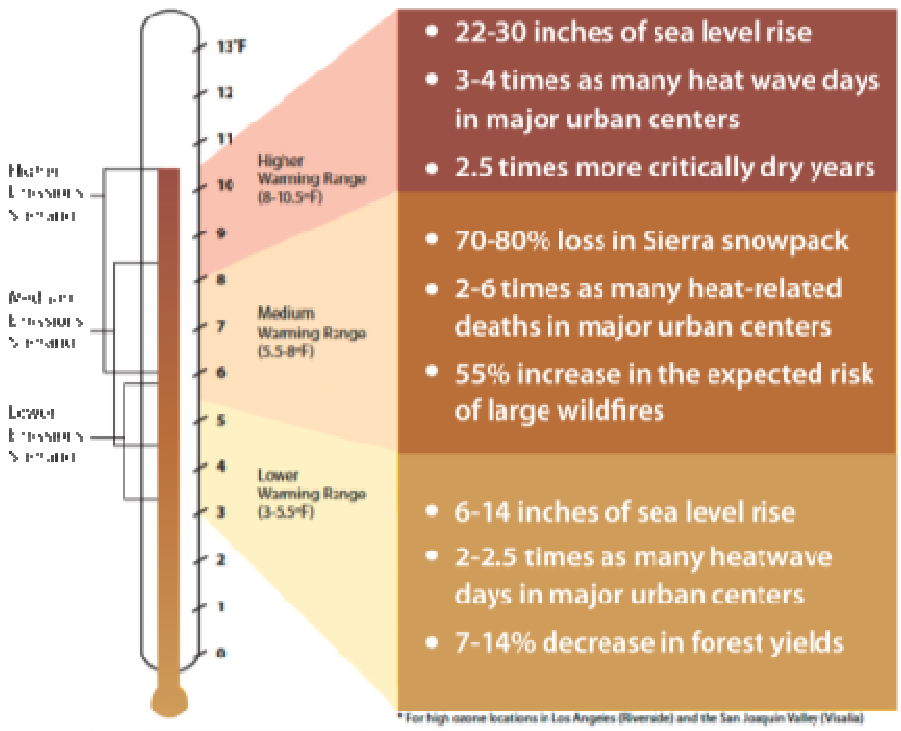
[3] IPCC 2007.

[4] IPCC 2007.

[5] Ibid.

potential impacts of climate change will lead to sector-wide losses of " 'tens of billions of dollars per year in direct costs' and 'expose trillions of dollars of assets to collateral risk.' "[6]

Figure 2-2: California Climate Change Impacts[7]



The City of Tulare continues to study hydrology patterns, water quality issues, land use, native species, and many other sectors that could be affected by climate change. While it is difficult to predict exactly how climate change will affect these community-specific issues, it is important to be aware of the general risks and to implement mitigation strategies according to local needs.

INCREASED RATE OF WILDFIRES

Wildfire risk is based on a combination of factors including precipitation, winds, temperature, and vegetation. Wildfires are likely to grow in number and size throughout the state as a result of increased temperatures induced by climate change. Even under the "medium" warming scenario predicted by the Intergovernmental Panel on Climate Change, wildfire risk

A cattle dairy in Tulare

[6] California Natural Resources Agency 2009.

[7] California Energy Commission 2006.

will likely increase by 55% in California.[8] Further, as wildfires increase in frequency and size, they will also increase in intensity.[9]

NEGATIVE IMPACTS ON WILDLIFE

As temperatures rise, species are moving north in California or to higher elevations. This change in migration disrupts the food chain and prevents some plant species from being pollinated. Water and food supplies are expected to be more variable and to shift as the seasons change on different time frames. Further, those species that are unable to migrate face the danger of extinction: "The amount of future warming expected in California may likely exceed the tolerance of endemic species (i.e., those that are native to a specific location and that only occur there) given their limited distribution and microclimate."[10]

With vegetation, reduction in soil moisture will result in early dieback of many plants, potentially leading to conflicts with animal breeding seasons and other natural processes. Many of the potential effects on wildlife are still being studied, but due to an inability to adapt to new climates, the potential for severe species loss is present.

Several potential hydrological changes associated with global climate change could also specifically influence the ecology of aquatic life in California and have several negative effects on cold-water fish. For example, if a rise in air temperature by just a few degrees Celsius occurs, this change could be enough to raise the water temperatures above the tolerance of salmon and trout in many streams, favoring instead non-native fishes such as sunfish and carp. Unsuitable summer temperatures would be particularly problematic for many of the threatened and endangered fish that spend summers in cold-water streams, either as adults or juveniles or both.

AGRICULTURE

Approximately 64% of land in city limits and the Planning Area is currently in agricultural uses.[11] Climate change is anticipated to affect agricultural growing cycles, causing longer growing seasons, greater variability in crop yields, reduced soil moisture, and reduced cold weather that may affect

[8] California Climate Change Center 2006.

[9] California Natural Resources Agency 2009.

[10] California Natural Resources Agency 2009.

[11] City of Tulare 2007.

germination and growth.[12] The California Natural Resources Agency anticipates that climate change will cause changing pest and weed ranges throughout the state and that extreme events including heat waves, droughts, and floods may further affect agricultural productivity and economic structures throughout the state.[13]

For instance, the California Natural Resources Agency projects that climate change will cause table grape yields to drop by 5–9% in Tulare County during 2030–2050 in comparison to average yields during 1995–2005.[14] In 2008, wine and table grapes were Tulare County's fourth most valuable agricultural product, yielding approximately $488,035,000 million in revenue.[15]

DETERIORATING PUBLIC HEALTH

Heat waves are expected to have a major impact on public health, as well as decreasing air quality and increasing mosquito breeding and mosquito-borne diseases. Further, climate change is expected to alter the spread and prevalence of disease vectors, in addition to leading to a possible decrease in food quality and security.[16] Vector control districts throughout the state are already evaluating how they will address the expected changes to California's climate.

According to a new report from the Air Resources Board, the warming climate will increase ozone levels in California's major air basins, leading to upwards of 6 to 30 more days per year with ozone concentrations that exceed federal clean-air standards.

Taking cost-effective measures to reduce greenhouse gas emissions and protect public health is important for local governments. The new study provides evidence of what is becoming known as the "climate penalty," where rising temperatures increase ground-level ozone and airborne health-damaging particles, despite the reductions achieved by programs targeting smog-forming emissions from cars, trucks, and industrial sources.[17] The elderly, young, and vulnerable populations most likely to be impacted by climate change are also those that often lack sufficient

[12] Farming Futures 2010.

[13] California Natural Resources Agency 2009.

[14] Ibid.

[15] Tulare County Agricultural Commissioner 2009.

[16] Ibid.

[17] Ibid.

resources to adapt. Such vulnerable demographics are likely to need assistance to respond to climate change. Social equity issues related to the unequal distribution of resources and increased costs to address community-wide health risks will need to be addressed proactively to reduce the potential for financial strain on local governments.

A DECREASING SUPPLY OF FRESH WATER

The state's water supply is already under stress and is anticipated to shrink under even the most conservative climate change scenario. Warmer average global temperatures cause more rainfall than snowfall, making the winter snowfall season shorter and accelerating the rate at which the snowpacks melt in the spring. The Sierra snowpack is estimated to experience a 25–40% reduction from its average by 2050.[18] With rain and snow events becoming less predictable and more variable, the rate of flooding could increase and California's ability to store and transport fresh water for consumption could decrease. Further, warmer weather will lead to longer growing seasons and increased agricultural demand for water.[19]

The decreasing supply of water will affect the City of Tulare's water resources. Groundwater supplies all of the City of Tulare's water needs. Groundwater is pumped from the San Joaquin Valley Kaweah Groundwater Subbasin, which is currently in a state of overdraft.[20]

INCREASED SEVERITY AND FREQUENCY OF FLOOD EVENTS

Forecasts indicate more intense rainfall events, generating more frequent or extensive runoff, and flooding may result from a changing climate. Localized flood events may increase in periods of heavy rain. As explained by the Climate Adaptation Strategy, California's water system is structured and operated to balance between water storage for dry months and flood protection during rainy seasons.[21] Although climate change is likely to lead to a drier climate overall, risks from regular, more intense rainfall events can generate more frequent and/or more severe flooding that upsets this managed balance between storage and protection.

Several areas in Tulare have been determined by the Federal Emergency Management Agency (FEMA) to fall within 100-year floodplains, including

[18] Department of Water Resources 2008.

[19] California Natural Resources Agency 2009.

[20] City of Tulare 2007.

[21] California Natural Resources Agency 2009.

areas that the General Plan may place housing within.[22] Areas within the floodplains will likely be more vulnerable to the heightened flooding threats that are anticipated to result from climate change. Additionally, erosion may increase and water quality may decrease as a result of increased rainfall amounts.

2.3 State and Federal Regulatory Framework

The State of California's elected officials have taken an aggressive stance on reducing greenhouse gas emissions. The State has developed a framework of legislation that provides a method for local and state governments to address climate change. The framework is described below.

FEDERAL DIRECTION

The federal government has yet to enact legislative targets for GHG emissions reductions. However, numerous proposals are under way at the federal level to limit emissions from power plants, impose pricing on carbon emissions, and provide federal energy legislation. The federal government also adopted California's groundbreaking vehicle efficiency standards in 2010, creating a nationwide standard through 2016. In addition, the federal government has addressed GHG emissions though the approval of the American Reinvestment and Recovery Act (ARRA), also referred to as the federal stimulus package. Through the Energy Efficiency and Conservation Block Grant (EECBG) program, a division of ARRA, the U.S. Department of Energy (DOE) is providing a total of $3.2 billion to cities and counties to reduce fossil fuel emissions; reduce total energy use; improve energy efficiency in the transportation, building, and other appropriate sectors; and create and retain jobs.[23] Using this money, jurisdictions across the United States are allocating funds to achieve reductions in greenhouse gas emissions.

CALIFORNIA'S LEGISLATIVE DIRECTION

The State of California is the 15th largest emitter in the world of greenhouse gas emissions, ultimately accounting for 2% of global emissions.[24] However, the State has been working proactively to reduce

[22] City of Tulare 2007.

[23] U.S. Department of Energy 2010.

[24] California Air Resources Board, CCAR, and ICLEI 2008.

emissions. California has a long history of proven leadership in addressing these issues that spans the last 20 years. In 1988, Assembly Bill (AB) 4420 (Sher, Chapter 1506, Statutes of 1988) designated the California Energy Commission (CEC) as the lead agency for climate change issues in California.[25] Since that time, there has been a flurry of initiatives in California to address climate change, with the majority of legislation passed between 2000 and now. These initiatives have strengthened the ability of entities in California to engage in accurate data collection and have created ambitious targets and regulations that will directly lead to reductions in greenhouse gas (GHG) emissions. Not only have California's efforts earned it a role as the leader in the United States for climate planning strategies, but the state has received world attention and accolades for its efforts. A summary of state efforts by topic is provided below in **Figure 2-3.**

How Are Greenhouse Gases Measured?

Carbon dioxide equivalent (CO_2e) is a way to equalize the different potencies of the six internationally recognized greenhouse gases (carbon dioxide, methane, nitrous oxides, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride). For example, methane (CH_4) has 21 times the potency of carbon dioxide (CO_2); therefore, 21 metric tons CO_2e could be 21 metric tons of carbon dioxide or 1 metric ton of methane.

[25] California Energy Commission 2009.

Figure 2-3: Summary of State Efforts Related to Climate Change, by Topic

Climate Change

E.O. S-3-05

2005 - Established the California Environmental Protection Agency (CalEPA) as the agency responsible for coordinating the State's effort to achieve the progressive greenhouse gas emissions reduction targets outlined in the executive order for the state.

AB 32

2006 - The landmark legislation required the California Air Resources Board (CARB) to develop regulatory and market mechanisms that will reduce greenhouse gas emissions to 1990 levels by 2020.

SB 97

2008 - Required lead agencies to analyze GHG emissions and climate change impacts under the California Environmental Quality Act (CEQA).

Transportation and Vehicles

AB 1493

2002 - Commonly referred to as the Pavley standards, AB 1493 directed CARB to create regulations that would lead to reductions in greenhouse gas emissions from passenger vehicles, light-duty trucks, and noncommercial vehicles sold in California.

E.O. S-1-07

2007 - Known as the Low Carbon Fuel Standard, Executive Order S-1-07 established a goal to reduce the carbon intensity of California's transportation fuels by 10 percent by 2020.

SB 375

2008 - Required the California Air Resources Board to establish GHG reduction targets for each Metropolitan Planning Organization (MPO) in California and directs each MPO to develop a Sustainable Communities Strategy.

Energy

Title 24

Title 24 Standards were first adopted in 1978 and established minimum energy efficiency performance standards for residential and nonresidential buildings. Since then, the standards have been continually updated to reduce California's energy consumption.

SB 1078

2002 - Established Renewable Portfolio Standards for each of the state's investor-owned utilities (IOUs) to acquire 20% of their electricity from renewable resources by 2010 and 33% by 2020.

SB 1368

2006 - Established emissions performance standards for new and existing power plants that produce energy that is sold to publicly owned and investor-owned utilites.

AB 811

2008 - Authorized all cities and counties in California to designate areas within which willing property owners could finance the installation of distributed renewable generation, as well as energy efficiency improvements through low-interest loans.

Water

SB 1881

2006 - Required cities and countiesto adopt a water-efficient landscape ordinance, limiting the amount of water used for landscaping purposes.

SB 7

2009 - Required the State to achieve a 20% reduction in per capita water use by 2020. Noncompliance by local water providers will make them ineligible for state grant or loan funding from the State.

SB 407

2010 - Required inefficient plumbing fixtures be replaced with more efficient models at the time of property sale or improvement.

Waste

AB 939

1989 - Established the goal of achieving a statewide diversion rate of 50% and requires cities and counties to divert a minimum of 50% of their waste stream for reuse or recycling.

SB 1016

2008 - Established per capita disposal rate requirements and goals for local agencies in California. Requirements are expressed in a pounds per person per day measurement.

2.4 TULARE'S EARLY ACTIONS

The City of Tulare has initiated ambitious programs that have facilitated cost savings while reducing GHG emissions and have strengthened the City's reputation as a regional energy efficiency leader.

To the greatest extent possible, this Climate Action Plan includes all programs the City has initiated since 2006 to give the City credit for all GHG emissions reductions that have resulted since the baseline inventory. All reductions achieved to date are depicted in this Plan as progress toward GHG emissions reduction targets.

Below are examples of previous or ongoing initiatives—both public and private. These initiatives provide an important foundation for actions proposed in this Plan.

CITY GOVERNMENT OPERATIONS

The City of Tulare has implemented numerous cost-saving and energy-reducing initiatives since 2006. The City of Tulare has recognized the long-term benefit of energy efficiency actions, and has initiated numerous programs to reduce energy consumption and realize impressive cost savings. The City contracted with Johnson Controls, Inc. in 2006 to implement a series of programs (Facility Improvement Measures, or FIMs) to achieve electric, gas, and water savings at public facilities. All projects were completed by the end of 2010. Select actions are provided below. For additional details, please refer to **Chapter 5.**

- The City completed construction of the Tulare Public Library in the summer of 2010. The library exceeds current Title 24 energy standards by 21.3% and is estimated to save the City $23,000 annually in utility bills. The City is in the process of LEED Gold accreditation for the library.
- City facility upgrades completed since 2006 include lighting system upgrades, HVAC replacements, window replacements, and roof replacements.
- City-owned streetlights are now retrofitted with more efficient fluorescent and light-emitting diode (LED) models.
- Alternative fuel fleet includes 31 compressed natural gas (CNG) vehicles, 3 hybrid electric and gasoline vehicles, 5 electric vehicles, 1 hybrid gas and CNG vehicle, 55 flex fuel vehicles, 18 liquefied natural gas (LNG) vehicles, and 10 hybrid LNG and diesel vehicles.
- A 30 kW solar carport with 20 car spaces shades vehicles and generates electricity at the City's wastewater treatment plant.
- Wastewater treatment plant upgrades enhance the efficiency of the system and reduce GHG emissions.
- A 1-MW soloar photovolatic power plant is under construction at the wastewater treatment plant (as of April 2011).
- Three biogas fuel cell generators create 300 kWh of electricity per day from biogas emissions from the wastewater treatment plant, providing power for wastewater treatment. A fourth 300 kW biogas fuel cell is under construction (as of April 2011).

COMMUNITY-WIDE ACTIVITIES

In addition to enhancing the efficiencies of government operations, the City has also worked proactively to implement partnerships and programs to reduce energy consumption and enhance the local quality of life. A selection of these activities is provided below.

- Valley Innovative Energy Watch (VIEW). The City has partnered with other valley governments, Southern California Edison, Southern California Gas Company, and the San Joaquin Valley Clean Energy Organization to promote energy efficiency in government buildings and through public educational events.
- California PACE Program. The City of Tulare has signed onto the statewide California PACE Program to provide financial

The Tulare Public Library

The City is participating in the Beacon Award Program

mechanisms for energy efficiency retrofits. Financing is currently available for commercial projects throughout the city.

- Tulare Affordable Solar Program. The City is providing money to finance solar systems in affordable housing projects throughout the city. Participants can leverage City funds with state programs to reduce, or possibly eliminate, the cost of installing solar systems that provide on-site electricity needs.
- Energy Efficiency Programs. Community Services Employment Training (CSET) and Proteus have completed energy efficiency retrofits to homes throughout Tulare. Since 2006, these two groups have retrofitted approximately 3,500 homes, providing weatherization services and replacing light bulbs and old appliances with energy-efficient models, in addition to other improvements.
- Community-Based Transportation Plans. The City has used CalGrant funds to complete the West Tulare Target Area Community-Based Transportation Plan to increase the number of students walking and biking to Mulcahy Middle School and Roosevelt Elementary School. A second West Pine Avenue Community-Based Transportation Plan is currently under way.
- Beacon Award: Local Leadership Toward Solving Climate Change. In February 2011, the Institute for Local Government (ILG) accepted the City for participation in its new recognition program, the Beacon Award: Local Leadership Toward Solving Climate Change. The first of its kind in California, the Beacon Award recognizes and celebrates cities and counties that reduce greenhouse gas emissions and save energy, adopt policies and programs to address climate change, and promote sustainability. The program features three award levels that call for increasing reductions in greenhouse gas emissions and energy savings in agency facilities and operations as well as in the community as a whole. This program is funded by California utility ratepayers and administered by Pacific Gas and Electric Company, San Diego Gas & Electric Company, Southern California Edison, and Southern California Gas Company under the auspices of the California Public Utilities Commission.

Preparation of the Climate Action Plan has built on the City's significant achievements in energy efficiency, energy conservation, and use of renewable energy to reduce energy demand, save money, and reduce greenhouse gas emissions.

3. Greenhouse Gas Emissions Inventory

An inventory of greenhouse gas (GHG) emissions is an important first step in the climate action planning process. It identifies major sources of greenhouse gas emissions and provides a baseline against which progress can be measured.

3.1 2006 Greenhouse Gas Emissions Inventory Background

In November 2010, the City of Tulare completed a GHG emissions inventory (Inventory) as part of the Climate Action Plan (CAP). The Inventory calculated GHG emissions produced from government operations and community-wide activities in 2006.

The City selected a baseline year of 2006 because of the availability of reliable data, for consistency with the baseline year of the General Plan (update), and to maintain consistency with California's Assembly Bill (AB) 32. A 2006 baseline year enables the City to account for its proactive programs, allowing the City's actions to form the foundation for the strategies outlined in the CAP. The Inventory is an important first step for the City to create a baseline against which it can measure future progress. The largest GHG emitters and opportunities for reduction are revealed through the Inventory, making it an integral component of the City's efforts to address GHG emissions and demonstrate progress in achieving reductions.

GHG emissions inventorying is not an exact science. There is no standard protocol for community-wide inventories, and the protocol for calculating the GHG impact of City government operations (the Local Government Operations Protocol) is continually being improved by the State. There are sources of GHG emissions (e.g., refrigerants and water reservoirs) that scientists know contribute to GHGs, but are difficult or impossible to calculate at the local level. Furthermore, it is likely that new sources of GHG will be able to be assessed in the future and that methods to calculate present emissions will change drastically as technology and science

develop. Tulare's Inventory should therefore be viewed as a study to inform policy decisions rather than a scientific measurement of GHGs.

GEOGRAPHIC SCOPE

The 2030 General Plan and Environmental Impact Report (EIR) assume expansion of the city limits to include land that is currently in the City's Planning Area. The Inventory includes all emissions from community-wide activities taking place in the city limits and the unincorporated areas identified for future annexation (also referred to as the planning area or Urban Area Boundary in the 2030 General Plan).

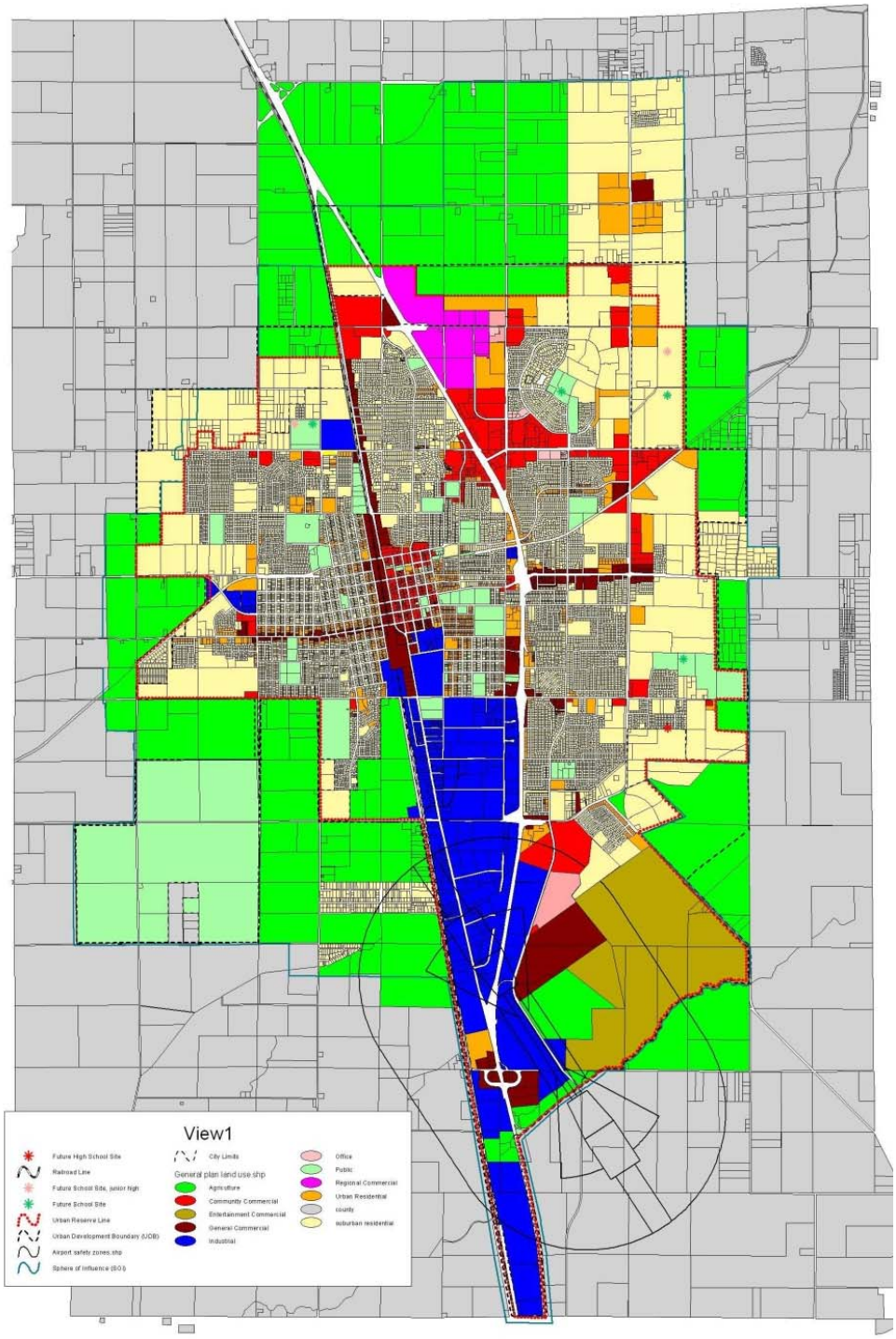
The Inventory calculates emissions within the existing Planning Area to establish a more accurate baseline emissions inventory that accounts for anticipated annexation of unincorporated areas as directed by the 2030 General Plan. This approach allows the City to accurately account for the 2030 General Plan's impact on GHG emissions.

INVENTORY STRUCTURE

The Inventory is separated into two sections: community-wide and City government operations. The community-wide section provides an assessment of activities throughout the community, and the City government operations section provides a more detailed analysis of City government's contribution to GHG emissions, including those from streetlights, building energy use, fleet vehicles, wastewater treatment, water conveyance, and more. It is important to note that the City government operations (municipal) inventory is a subset of the community inventory, meaning that all City government operations are included in the commercial/industrial, transportation, waste, or "other" categories of the community-wide inventory. The City's government operations inventory should not be added to the community analysis; rather, it should be looked at as a slice of the complete picture of local emissions trends.

Although City operations are a small contributor to the community's overall emissions levels, an inventory allows the City to track its individual facilities and vehicles, to evaluate the effectiveness of its emissions reduction efforts at a more detailed level, and to test strategies available to the community at large. Specifying municipal emissions and establishing programs for municipal emissions reductions also demonstrates the City's leadership in achieving this CAP's targets.

Figure 3-1: 1993 General Plan Land Use Map.



Chapter 3:

Greenhouse Gas Emissions Inventory

In 2006, the commercial and industrial sectors contributed 39% of community emissions. Combined, these sectors were the largest contributors to community emissions.

3.2 FINDINGS OF THE 2006 GREENHOUSE GAS EMISSIONS INVENTORY

COMMUNITY-WIDE EMISSIONS

SUMMARY

In 2006, the City of Tulare emitted approximately 820,290 metric tons of carbon dioxide equivalent (CO_2e) within the city limits and the Planning Area. As shown in **Table 3-1** and **Figure 3-3**, the commercial and industrial sectors were by far the largest contributor to emissions (a combined 39%), producing approximately 320,770 metric tons of CO_2e in 2006. Emissions from the other sector were the next largest contributor, accounting for 26% of the total emissions, producing approximately 214,900 metric tons of CO_2e. The other sector includes agricultural activities, wastewater treatment processes, and stationary combustion of fuels that are not supplied by utility companies but are permitted by the San Joaquin Valley Air Pollution Control District. The transportation sector accounted for 20% of the total emissions (160,590 metric tons of CO_2e). Residential emissions contributed 10% of total emissions (81,250 metric tons of CO_2e), and emissions from solid waste comprised 5% of the total (42,810 metric tons of CO_2e). The Community-Wide Greenhouse Gas Emissions Inventory Memo is included as **Appendix 1**.

Figure 3-2: 2006 Greenhouse Gas Emissions (CO_2e) from Community-Wide Sources by Sector in the City Limits and the Planning Area

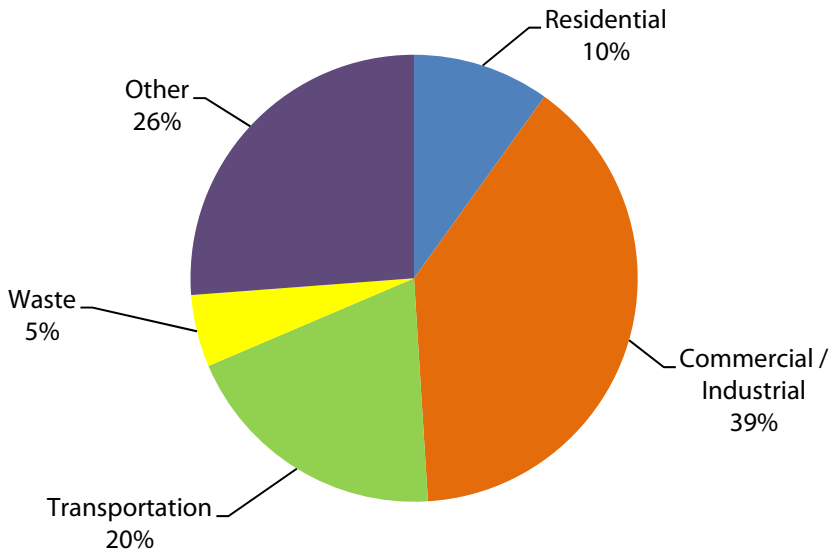


Table 3-1: Summary of Community-Wide Emissions by Sector (Metric Tons CO_2e)

Sector	Metric Tons CO_2e	Percentage of Total
Residential	81,250	10%
Commercial/ Industrial	320,770	39%
Transportation	160,590	20%
Waste	42,800	5%
Other	214,880	26%
Total	***820,290***	***100%***

Due to rounding, totals may not equal 100%.

A dairy cattle facility in Tulare's Planning Area

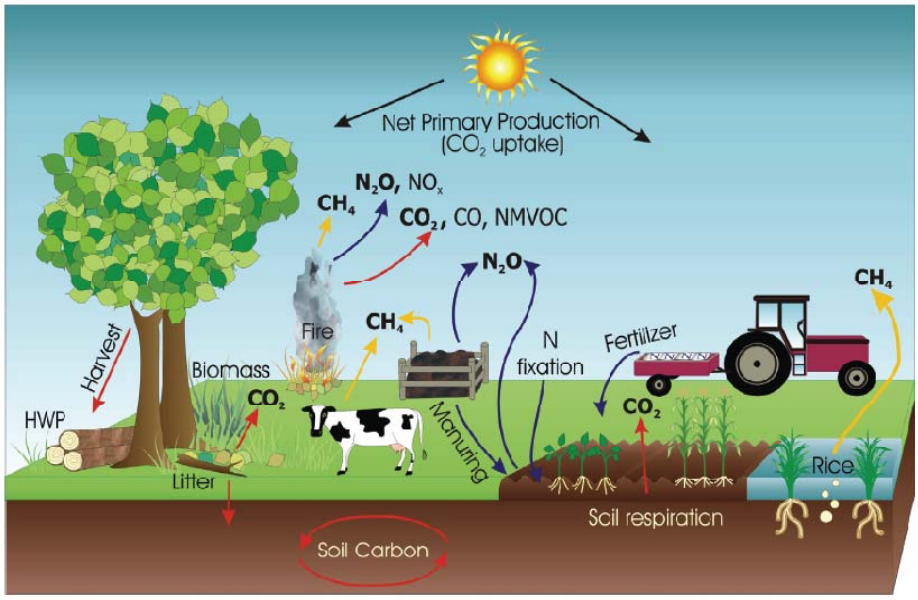
Agriculture and GHG Emissions

Agricultural emissions captured in the Inventory include:

- Enteric fermentation of cattle and other livestock
- Manure management for cattle and other livestock
- Off-road agricultural equipment
- Agricultural fertilization

Agriculture is an important cornerstone of the City of Tulare's economic heritage. The Inventory aims to accurately represent the impact of agriculture on emissions in order to highlight agricultural leadership and opportunities for profitable innovation in the Climate Action Plan.

Figure 3-3: Primary Greenhouse Gas Emissions Sources and Removals in an Agricultural System[1]



THE OTHER SECTOR: STATIONARY POINT SOURCE EMISSIONS

The City completed a best-faith effort to include point source emissions or stationary sources in the community-wide inventory. Typically, community-wide inventories exclude point source emissions due to privacy laws and a lack of regulation of all community-wide point source emissions; it is complex for a city to gauge with certainty all point source emissions within the community.

The City's other sector primarily consists of process-based emissions at the wastewater treatment plant (98% of total other sector emissions) and stationary fuel combustion of other fuels not captured in the Inventory that the San Joaquin Valley Air Pollution Control District (District) permits. The District regulates many activities that generate GHG emissions for stationary sources, some of which are captured elsewhere in the Inventory in commercial and industrial natural gas consumption. Stationary sources included in the other sector include fuel combustion of distillate oil, liquefied petroleum gas, and propane. Emissions from wastewater treatment processes contributed 98% of the other sector's emissions. Distillate oil combustion comprised 1% of the other sector's emissions, while both liquefied petroleum gas and propane each contributed less than 1%.

[1] IPCC 2006, 1.6.

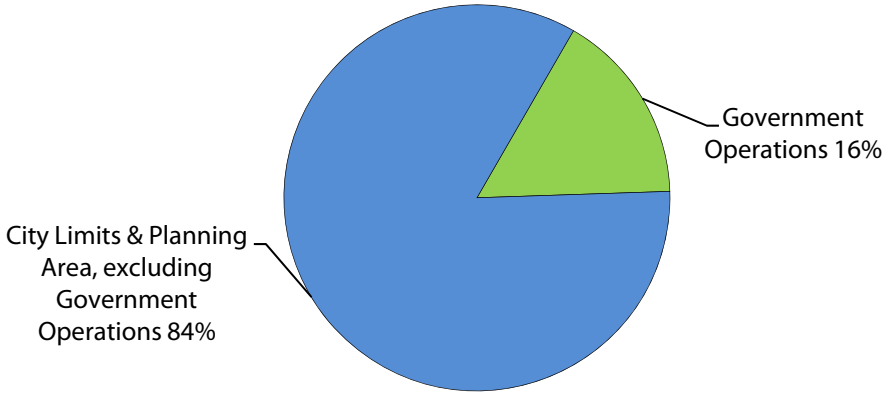
CITY GOVERNMENT OPERATIONS EMISSIONS

Emissions from City government operations and facilities produced approximately 132,380 metric tons of GHG emissions in 2006 (**Table 3-2**). City government emissions result from solid waste, energy consumption by water facilities, buildings, streetlights, and other facilities, fuel consumption by the vehicle fleet, employee commutes, and the wastewater treatment plant. The City's wastewater treatment plant was the largest contributor to the City's emissions (92%), producing 122,310 metric tons of CO_2e. The second and third largest contributors were fuel consumption from the vehicle fleet (3%) and water-related energy consumption (2%). Every other sector contributed individually less than 1.0% to City emissions; including (in order of contribution) buildings and facilities (0.8%), streetlights and traffic signals (0.5%), fuel consumption from employee commutes (0.4%), and solid waste (0.4%). The City Government Operations Greenhouse Gas Emissions Inventory is provided as **Appendix 2.**

Community emissions include stationary point source emissions that the San Joaquin Valley Air Pollution Control District permits and process-based emissions from wastewater treatment.

Government emissions are a subset of the total community-wide emissions. The methodology for estimating emissions from local government operations is consistent with the Local Government Operations Protocol developed by the California Air Resources Board (CARB), ICLEI-Local Governments for Sustainability (ICLEI), The Climate Registry (TCR), and the California Climate Action Registry (CCAR). Government operations contributed approximately 16% of total emissions in the city limits and the Planning Area (**Figure 3-4**).

Figure 3-4: City Government Portion of Community-Wide GHG Emissions in the City Limits



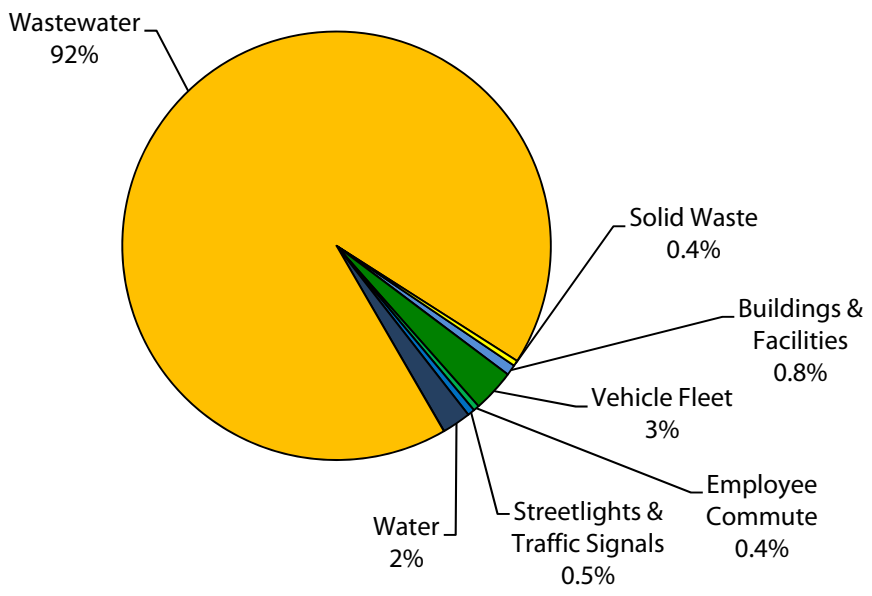
The City's wastewater treatment emissions produced 92% of emissions from City government operations and 15% of community emissions in the city limits and the Planning Area.

Table 3-2: 2006 Greenhouse Gas Emissions from City Operations

Sector	Metric Tons CO_2e	Percentage
Buildings & Facilities	1,073	0.8%
Vehicle Fleet	4,254	3%
Employee Commute	594	0.4%
Streetlights and Traffic Signals	719	0.5%
Water	2,885	2%
Wastewater	122,308	92%
Solid Waste	547	0.4%
Total	**132,380**	**100.00%**

Due to rounding, totals may not equal 100%.

Figure 3-5: 2006 Greenhouse Gas Emissions (MT CO_2e) from City Operations by Sector



4. GHG Emissions Forecasts and GHG Reduction Target

4.1 2020 and 2030 Greenhouse Gas Emissions Forecast

Emission forecasts depict what will happen if existing trends continue unchecked by the actions established in this Climate Action Plan.

COMMUNITY-WIDE FORECAST

The City modeled future emissions growth based on projected trends in energy use, driving habits, job growth, and population growth in 2020 and 2030. Forecasts allow the City to assess the effectiveness of various reduction strategies. Forecasts also provide a snapshot of how annual emissions levels will likely change under various scenarios.

The basis for all growth scenarios is a business-as-usual (BAU) projection. A BAU projection predicts how GHG emissions will increase if consumption behavior and efficiencies do not change from baseline levels, yet population, households, and vehicle miles traveled continue to increase. Under a BAU scenario, the City's emissions will grow by approximately 53.88% by the year 2020, from 820,291 to 1,262,252 metric tons CO_2e. By 2030, the City's BAU emissions are modeled to increase 123.76% to 1,835,455 metric tons CO_2e. **Table 4-1** and **Figure 4-1** show the results of the forecast.

Forecasts for 2010, 2020, and 2030 are premised on achieving 70% of growth projections established in the City's 2030 General Plan for jobs, housing, population, and infill land use acreages. **Appendix 1** provides additional details on the City's growth assumptions.

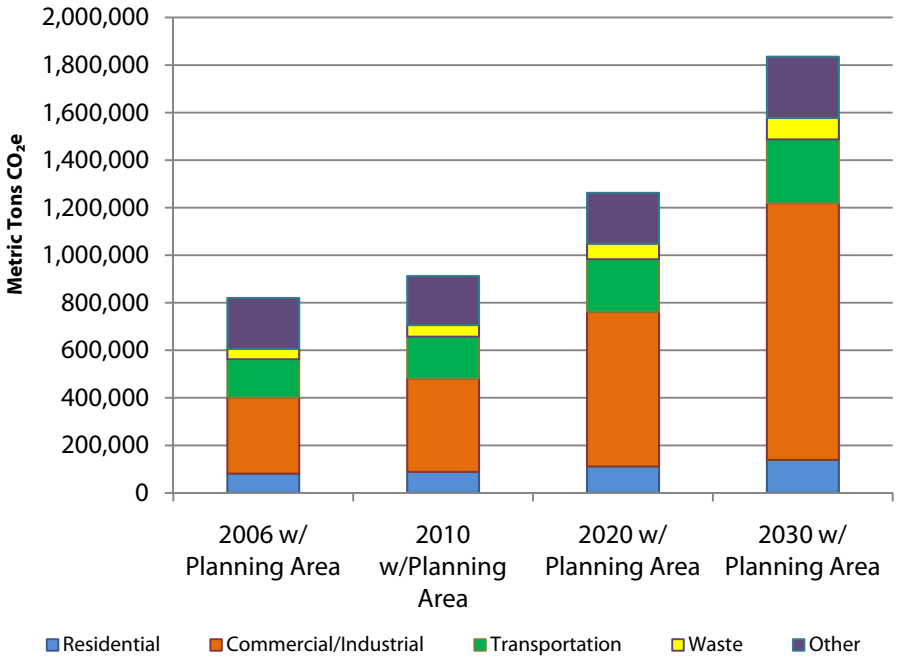
Business-as-usual emissions in the City limits and the Planning Area will grow by 123.76% by 2030 to 1.8 million MT CO_2e.

Table 4-1: Business-as-Usual Projected Growth in Community-Wide Emissions, 2006–2030 (Metric Tons CO_2e)

Sector		2006 Planning Area	2010* Planning Area	2020* Planning Area	2030* Planning Area
Residential	Electricity	41,242	45,118	56,479	70,699
	Natural Gas	40,004	43,764	54,783	68,577
Commercial/ Industrial	Electricity	139,860	171,219	283,919	470,801
	Natural Gas	180,909	221,471	367,249	608,981
Transportation	VMT	160,587	175,871	220,750	268,282
Waste	Landfilled Tons	42,809	48,168	65,438	90,513
Other	Agriculture	96,228	66,564	26,150	10,517
	Stationary Sources	118,651	140,240	187,485	247,085
Total		820,291	912,414	1,262,252	1,835,455
% Change from 2006		0.00%	11.23%	53.88%	123.76%

Due to rounding, the sum of all sector totals may vary from totals presented above

Figure 4-1: Business-as-Usual Projected Growth in Community-Wide Emissions, 2006–2030 (Metric Tons CO_2e)



The business-as-usual forecast depicted above in **Figure 4-1** excludes anticipated reductions that will occur at the statewide level, which are discussed below.

4.2 Incorporation of State Reductions for Adjusted Forecasts

Recognizing that local governments do not have full authority to reduce emissions in their communities, the City adjusted the business-as-usual forecast to include State-led or State-induced GHG reduction strategies included in the AB 32 Scoping Plan. The adjusted forecast includes all State actions that are approved, programmed, and/or adopted and that do not require additional local action. Reliance on the adjusted forecast is consistent with standard practice. The adjusted forecast provides a more accurate picture of future emissions growth and focuses the City's GHG reduction strategies toward a more accurate reduction. State-led actions that the City used to create the adjusted forecast include Assembly Bill 1493, the Low Carbon Fuel Standard, the Renewable Portfolio Standard, the Heavy-Duty Vehicle Emission Reduction Standard, and Title 24. The

adjusted forecast more clearly represents the responsibility of local governments to reduce GHG emissions once state measures have been implemented. A brief description of each of these items is provided below. The impact of these actions on the BAU forecast is shown in **Table 4-2.** The methodology for quantification of business-as-usual and adjusted forecasts is provided in **Appendix 1**.

Table 4-2: Comparison of Business-as-Usual Growth in Community-Wide Emissions with State Actions (Metric Tons CO_2e)

	2006	2010	2020	2030
	Planning Area	Planning Area	Planning Area	Planning Area
Growth Projection (MT CO_2e) (BAU Forecast)	820,291	912,414	1,262,252	1,835,455
Pavley I Reductions (MT CO_2e)	n/a	n/a	-26,334	-47,568
LCFS (MT CO_2e)	n/a	n/a	-19,522	-22,071
Heavy-Duty Vehicle Reductions (MT CO2e)	n/a	n/a	-1,278	-1,698
RPS Reductions (MT CO_2e)	n/a	-2,812	-33,699	-91,514
CALGreen 2008 Title 24 Reductions (MT CO_2e)	n/a	n/a	-32,510	-112,699
Total State Reductions (MT CO_2e)	n/a	-2,812	-113,343	-275,550
Adjusted Growth Projection (MT CO_2e)	n/a	909,602	1,148,909	1,559,905
Percentage Change with Adjusted Forecast from City Limits & Planning Area Baseline 2006	n/a	10.89%	40.06%	90.16%

With state reductions, emissions in the city limits and the Planning Area will grow by 90.16% to 1.6 million MT CO_2e by 2030.

Assembly Bill 1493 (Pavley). Signed into law in 2002, AB 1493 required carmakers to reduce GHG emissions from new passenger cars and light trucks beginning in 2011. Regulations were adopted by the California Air Resources Board (CARB). It is expected that new vehicles sold in California will result in an average of 16% less GHG emissions than current models. These standards were recently adopted by the U.S. EPA and will become national standards through 2016.

Low Carbon Fuel Standard. The State is proposing to reduce the carbon intensity of transportation fuels consumed in California through a Low Carbon Fuel Standard (LCFS) being developed by CARB. Standards would reduce the carbon intensity of California's transportation fuels by at least 10% by 2020 and 20% by 2035 as called for by Governor Schwarzenegger in Executive Order S-01-07.

Title 24 (CALGreen) – 2008 Standards. The 2008 Title 24 update went into effect on January 1, 2010. The energy reductions quantified in the forecast are the mandatory improvements over the 2005 Title 24 code that were established by the 2010 update. Although Title 24 standards apply statewide, application of these standards takes place at the local level by city agencies through project review. The revamped CALGreen standards that went into effect January 1, 2011, do not provide additional mandatory reductions in energy consumption that can be quantified as an anticipated alteration to business-as-usual trends; rather, CALGreen establishes optional tiers for enhanced energy efficiency and conservation that can be implemented at the discretion of local governments. These optional reductions are captured as a local reduction measure in **Chapter 4**, since they will only be achieved through local action.

Renewable Portfolio Standard (RPS). Established in 2002 in Senate Bill 1078, the state-mandated RPS requires investor-owned utility providers to increase the portion of energy that comes from renewable sources to 20% by 2010 and by 33% by 2020. A June 2009 report from the California Public Utilities Commission indicated that it is unlikely that the State and its investor-owned utilities will be able to reach the RPS goal of 33% by 2020; according to state assessments, the forecast assumes that energy providers will achieve 26% renewable sources by 2020 and 33% by 2030.[1]

Heavy-Duty Vehicle Emission Reduction (Aerodynamic Efficiency) Standard. CARB approved this regulation in December 2008. This measure is outlined in the AB 32 Scoping Plan. The reduction requires heavy-duty trucks and trailers to be retrofitted with the best available technology and/or CARB-approved technology to improve fuel efficiency, including devices that reduce aerodynamic drag and rolling resistance. The requirements apply to California and out-of-state registered trucks that travel to California. The cost of these retrofits would be recovered over the life of the vehicle through reduced fuel use. This measure requires in-use trucks and trailers to comply through a phase-in schedule starting in

[1] California Public Utilities Commission 2009.

2010 and achieve 100% compliance by 2014. Additionally, new 2011 and later tractors and trailers that are sold in or service California would need to be certified for aerodynamic efficiency requirements. The 2020 estimated GHG reductions could be up to 6.4 million MT CO_2e nationwide, of which about 0.93 MMT CO_2e or about 15% would occur within California. Per the reductions outlined in the AB 32 Scoping Plan, this action will reduce emissions from heavy-duty vehicles by approximately 2% by 2020, affecting all heavy-duty vehicle emissions in Tulare (approximately 25% of vehicle emissions).[2]

Trucking in Tulare

Tulare is a regional manufacturing and industrial distribution center. The City is a hot spot for statewide trucking routes.

Throughout the Central Valley, emissions from heavy-duty vehicles comprise a larger percentage of total vehicle emissions than elsewhere throughout California.

Proportion of vehicle emissions from heavy-duty trucking, by region:

- 25% in Tulare County, heavy-duty vehicles comprise 25% of vehicle emissions.
- 30% in Fresno County
- 35% in the San Joaquin Valley Air Basin
- Less than 10% on average throughout the state

Other state initiatives such as funding mechanisms and loan programs are not included in state reductions. Rather, they are included within the local reductions as appropriate because of the need for or requirement for local government implementation or contribution to the effort.

The State-led efforts described above are anticipated to decrease the BAU forecast by approximately 9.0%, or by 113,343 metric tons CO_2e, by 2020. By 2030, State-led efforts are expected to decrease BAU emissions by 15.0%, or 275,550 metric tons CO_2e. Since these reductions will occur with or without local action, they are accounted for in the adjusted GHG forecast rather than in the CAP reduction summary.

[2] California Air Resources Board 2007.

4.3 MUNICIPAL FORECASTS

Numerous factors informed municipal forecasts. Some City services are expected to expand proportional to population growth, while others are connected to the City's plans to expand or create new City services and facilities. In general, the size of municipal facilities was correlated with energy consumption and waste generation to determine rates of change. Emissions from the vehicle fleet account for planned fleet expansion and anticipated improvements in vehicle fuel efficiency.

To illustrate municipal emissions growth for the forecast years 2020 and 2030, existing trends, planned expansions, and levels of service were taken into account to create a municipal business-as-usual forecast. Municipal forecasts and reductions will be captured under the umbrella of community-wide reductions. All changes in municipal emission trends will ultimately feed into achievement of community-wide targets and are therefore credited as community-wide progress toward reduction goals.

By 2030, emissions from City government operations will increase by 101.9%.

All improvements the City has completed since 2006 that would reduce emissions are excluded from the business-as-usual forecast. Changes in municipal emissions trends will ultimately contribute to the achievement of community-wide targets and will be credited as community-wide progress toward reduction goals, yet forecasting City emissions over time helps the City to better understand the impact of municipal efforts to reduce GHG emissions. All City actions taken since the baseline year of 2006 that would impact emissions will be accounted for in **Chapter 5.**

All City actions taken since the baseline year of 2006 that would impact emissions will be accounted for in **Chapter 5.**

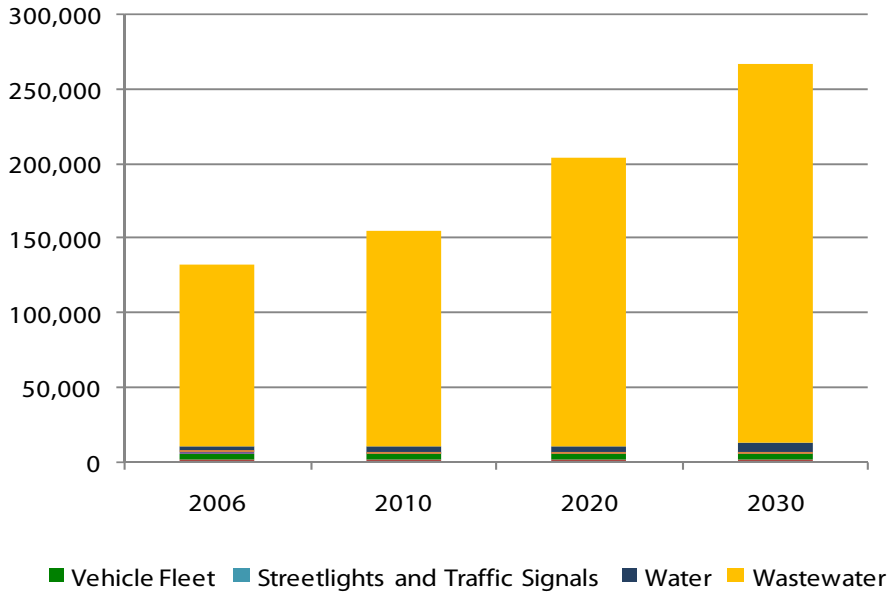
Numerous factors informed municipal forecasts. City staff provided data on planned facility expansion. In general, the size of municipal facilities was correlated with energy consumption and waste generation to determine rates of change. The size of City staff is expected to expand proportional to service population growth, which was translated into increased emissions from the employee commute. Emissions from the wastewater treatment plant are expected to grow based on the wastewater service capacity established in the General Plan Update Draft Environmental Impact Report.[3] Emissions from water delivery are expected to increase proportionally with wastewater treatment plant capacity. Emissions from the vehicle fleet in 2010 are based on proxy data for 2009 provided by the City and are assumed to remain constant through 2020 and 2030. Emissions from streetlights and traffic signals are not expected

[3] City of Tulare 2007.

to change significantly, as existing facilities and equipment are sized to meet future needs.

As shown in **Figure 4-2**, forecasts show emissions from City government operations increasing by approximately 101.9% by 2030. The majority of forecast increases in emissions result from business-as-usual growth at the wastewater treatment plant to meet service capacity established by the Draft General Plan. **Figure 4-2** depicts the business-as-usual forecast for all sectors. Excluding emissions from the wastewater treatment plant, emissions are expected to increase by 22.8% by 2030. The business-as-usual forecast assumes the impact of reduced emissions coefficients for electricity and mobile fuel combustion for consistency with the adjusted community-wide forecast that accounts for statewide actions.

Figure 4-2: City Government Operations Emissions Forecast by Sector – 2020 and 2030 (MT CO_2e)



4.4 Greenhouse Gas Emissions Reduction Target

AB 32 establishes an emissions reduction target of 15% below current baseline levels by 2020, which is consistent with the State's direction to local governments in the AB 32 Scoping Plan. Executive Order S-3-05 calls for a target reduction of 80% below 1990 levels by 2050.21 **Figure 3-5** provides a comparison of the business-as-usual forecasts for 2020 and 2030 to the 2006 baseline year and reduction targets. The chart also depicts the challenge that Tulare will face meeting its reduction target. Emissions will continue to increase along the business-as-usual scenario while reduction efforts are initiated. Because of this, achieving the target will require more than a 15% decrease; rather, it will require a 44.8% reduction from 2020 emissions levels, or business as usual. By 2030, the gap between business-as-usual growth and target reduction levels increases to 73.9%. Once state reductions are accounted for, the reduction necessary at the local level to achieve targets drops to 39.3% below the adjusted business-as-usual forecast by 2020 and 69.3% below the adjusted business-as-usual forecast by 2030. **Figure 4-3** demonstrates projected increases and the total emissions reductions that will be necessary to achieve City targets. Reduction targets and the changes in emission levels required to achieve them are detailed further in **Table 4-3**.

Table 4-3: Comparison of 2020 and 2030 Forecasts to Baseline and Reduction Targets

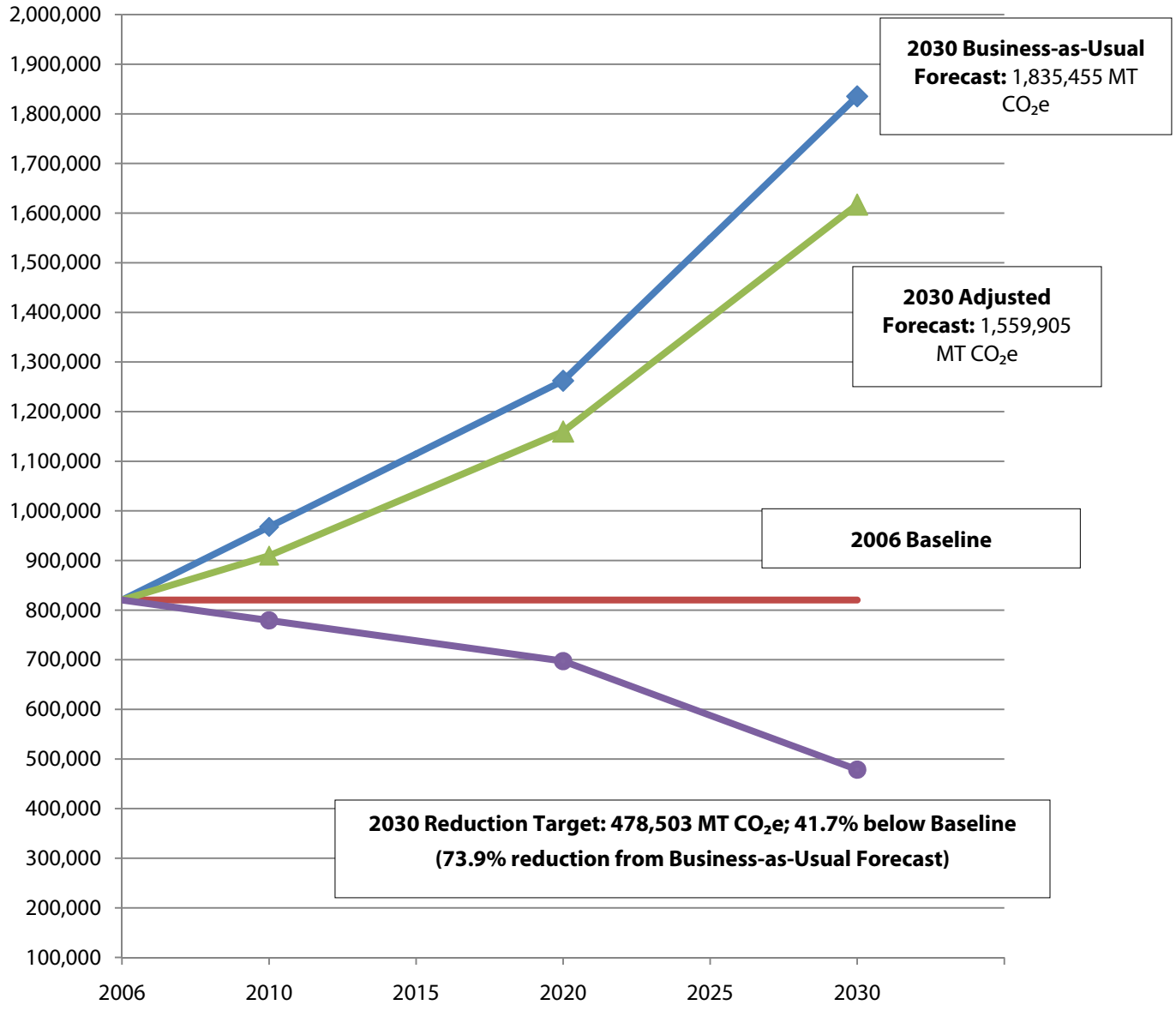
	2020	2030
Target reduction	15.00%	41.67%
Local level needed to achieve target	697,247	478,503
Local percentage reduction from BAU forecast to achieve target	-44.8%	-73.9%
Local reduction needed from BAU forecast (MT CO_2e)	565,005	1,356,952
Local reduction needed from adjusted forecast (MT CO_2e)	451,662	1,081,403
Local percentage reduction needed from adjusted BAU	-39.3%	-69.3%
Percentage contribution of state actions to targets	-5.5%	-4.6%

To achieve AB 32 targets, the City of Tulare will reduce emissions 44.8% below the forecasted business-as-usual scenario

2020 forecast aligns with Assembly Bill 32, which creates a statewide emission reduction target of 15% below 2006 levels by 2020.

2030 forecast year for consistency with the 2030 General Plan and EIR and to demonstrate progress toward the 2050 reduction target established by Executive Order S-3-05.

Figure 4-3: GHG Forecast in Relation to Reduction Targets (MT CO_2e)



5. Municipal Reduction Goals and Reduction Measures

This chapter summarizes the City's measures to reduce GHG emissions from City operations, facilities, and activities.

5.1 Summary of Measures

City (or municipal) actions have the potential to reduce GHG emissions from municipal sources by 182,590 metric tons (MT) of CO_2e by 2020. Even more importantly, the City has already achieved almost all of the emissions reductions. Of the reductions that the City has not yet achieved, most emissions reductions will result from programs that are already funded, implemented, or otherwise initiated. All reductions that the City achieved by 2010 are presented as reductions to date. The City's municipal reductions are aggregated with community-wide measures in total reductions for credit to the City's reduction targets in **Chapter 6,** where each goal summary reviews the relative contribution of both City government and community-wide reduction measures in achieving reduction targets. All municipal actions contribute toward the City's reduction target. Municipal actions presented here include all energy conserving programs (Facility Improvement Measures, or FIMs) for public facilities that Johnson Controls, Inc., completed in 2010.

The City's achievement of reduction targets is dependent on successful implementation of both municipal and community-wide measures. The City's municipal measures contribute significant momentum toward the reduction target, but alone are not sufficient to achieve the target. This chapter presents municipal measures as case studies to highlight the significant opportunity for simultaneous emissions reductions, cost savings, and enhanced operational performance. All municipal measures are closely related to community-wide measures presented in **Chapter 6** and in some cases have provided a basis to justify community-wide measures.

Table 5-1 presents the potential municipal GHG emissions reductions (MT CO_2e) for 2020 and 2030 by goal and then by sector. The reductions identify the importance of Tulare's progress to date in achieving these

Chapter 5:

Municipal Reduction Goals and Reduction Measures

The City of Tulare has already reduced emissions from City operations by 85% and eliminated 135,470 MT CO_2e.

Reductions in emissions from City government operations achieved to date equal 17% of all community emissions in 2006.

goals since the baseline year of 2006. Methodologies for the quantification of all reduction measures are presented in **Appendix 3**.

Table 5-1: Municipal Reductions by Goal

Goal	To Date ($MTCO_2e$/yr)	2020 ($MTCO_2e$/yr)	2030 ($MTCO_2e$/yr)
Goal 1: Increase energy efficiency and conservation.	-151	-425	-404
Goal 2: Promote and support renewable energy generation and use.	-135,207	-181,998	-238,070
Goal 3: Shift single-occupancy vehicle trips to alternative modes.	0	-39	-50
Goal 4: Reduce emissions from vehicles.	-111	-128	-240
Total – Local Reductions	-135,468	-182,590	-238,765
2006 Emissions	**132,381**	**132,381**	**132,381**
Adjusted Forecast with State Reductions	**154,802**	**206,365**	**275,189**
Net Emissions with State and Local Reductions	**19,334**	**23,776**	**36,424**
Percentage Change from 2006 Emissions	**-85%**	**-82%**	**-72%**

Goal 1. Increase Energy Efficiency and Conservation

MEASURE EE 1.1 EXISTING CITY FACILITIES

Increase energy efficiency in existing City buildings and facilities through Facility Improvement Measures and by retrofitting Edison-owned streetlights.

ACTIONS FOR MEASURE EE 1.1:

EE 1.1.1 Complete energy-efficient upgrades to City facilities, including energy-efficient lighting (FIM 1), streetlight upgrades (FIM 2), HVAC systems (FIM 3), replacement windows (FIM 4), and replacement roofs (FIM 5).

EE 1.1.2 Negotiate a tariff system with Southern California Edison for energy-efficient streetlights and upgrade Edison-owned streetlights.

EE 1.1.3 Utilize cost savings from energy efficiency upgrades to finance additional energy efficiency upgrades and programs, after costs of the original improvements have been recovered.

The City of Tulare has recognized the long-term benefit of energy efficiency actions through a wide-ranging program to reduce energy consumption and realize impressive cost savings. In 2006, the City contracted with Johnson Controls, Inc. to implement a series of Facility Improvement Measures (FIMs) to achieve electric, gas, and water savings at public facilities. All FIM projects were scheduled for completion by the end of 2010. The projects provide an annual cost savings of $309,439 for the City. The City has completed the following projects:

- Lighting improvements (FIM 1)
- Retrofits to City-owned streetlights (FIM 2)
- Heating, ventilation, and air conditioning (HVAC) equipment upgrades (FIM 3)
- Window replacement (FIM 4)
- Roofing upgrades (FIM 5)

Goal 1:

Increase Energy Efficiency and Conservation

EE 1.1: Existing City Facilities

GHG Reductions per Year (MT CO_2e)

To Date:	-106
2020:	-373
2030:	-345

Electricity Reductions Per Year (kWh)

To Date:	-332,855
2020:	-1,377,855
2030:	-1,377,855

Natural Gas Reductions Per Year (Therms)

To Date:	-1,691
2020:	-1,691
2030:	-1,691

Goal 1:

Increase Energy Efficiency and Conservation

The City is also working to complete retrofits to Southern California Edison (Edison) streetlights. Edison owns 4,310 streetlights in the City of Tulare. The City pays the costs of energy consumption for these streetlights. The City is working to negotiate a tariff system that would allow the City to realize the cost-saving benefits of retrofitting Edison's streetlights to more energy-efficient models. Quantified and recognized energy savings must offset the cost to the City of streetlight retrofits. The current billing system between the City and Edison does not provide flexibility to realize the benefits of retrofits. The City will continue to work with Edison to achieve a satisfactory agreement and anticipates that Edison will complete retrofits by the target years. Such retrofits will both help the City to realize energy cost savings and Edison to attain its own energy efficiency targets.

Energy-Efficient Facilities? We've Got It!

Tulare Public Library exceeds California Energy Code requirements by 21.3%.

Monetary Benefits:

- $553,057 in credits for building design from Edison
- $23,000 annual cost savings on utility bills

Community Benefits:

- New community center with coffee shop and City Council Chambers
- Catalyst for redevelopment of downtown
- Case study to inform municipal projects
- Center for community-wide energy and educational resources

Pre-library: 20 class tours per year

After opening of new library: 6 class tours per week

MEASURE EE 1.2 NEW CITY FACILITIES

Design new City buildings and facilities to exceed California Energy Code requirements by 15%.

ACTIONS FOR MEASURE EE 1.2:

EE 1.2.1 Construct new facilities to achieve CALGreen measure A.5.203.1.1.

EE 1.2.2 Utilize exemplary City facilities to educate the public about the benefits of energy-efficient design, such as the new Tulare Public Library in 2010, which exceeds current Title 24 by 21.3% and is in the process of becoming certified LEED Gold.

EE 1.2.3 Continue to design all Redevelopment Agency Projects according to Build It Green standards, which require that projects exceed Title 25 by 15%, consistent with CALGreen measure A5.203.1.1.

The California 2010 Building Green Building Standards Code (CALGreen) went into effect on January 1, 2011. Mandatory energy efficiency requirements defer to California Energy Code requirements adopted by the California Energy Commission, which are currently the adopted Title 24 Energy Efficiency Standards. The 2008 Title 24 standards went into effect January 1, 2010, and all new construction is already required to meet these minimum prescriptive standards.

CALGreen establishes two tiers of voluntary compliance. Tier 1 requires 15% greater energy efficiency than Title 24, and Tier 2 requires 30% greater energy efficiency than Title 24. Adopting Tier 1 standards will ensure that public buildings achieve quantifiable energy and GHG reductions. The measure assumes that 70% of public facilities forecast for construction between 2010 and 2020 will occur after adoption of Tier 1 energy efficiency standards and 72% between 2010 and 2030.

The City has already demonstrated a commitment to exceed minimum energy efficiency requirements using strategies that benefit the residents of the city. The new Tulare Public Library was completed in the summer of 2010 and is in the process of receiving certification of LEED Gold from the U.S. Green Building Council, the second highest rating available to new construction. Achievements of the Tulare Public Library are highlighted throughout all measures in the Climate Action Plan.

GOAL 1:

INCREASE ENERGY EFFICIENCY AND CONSERVATION

EE 1.2: New City Facilities

GHG Reductions per Year (MT CO_2e)

To Date:	-45
2020:	-52
2030:	-59

Electricity Reductions Per Year (kWh)

To Date:	0
2020:	-5,757
2030:	-12,528

Natural Gas Reductions Per Year (Therms)

To Date:	0
2020:	-998
2030:	- 2,173

For purposes of accuracy, this measure only presents energy reductions calculated from new facilities. Emissions reductions include the impact of the Library provided by Edison, but Library energy consumption by type was not available.

GOAL 2:

PROMOTE AND SUPPORT RENEWABLE ENERGY GENERATION AND USE

RE 2.1: Renewable Energy at the TWPCF

GHG Reductions per Year (MT CO_2e)

To Date:	-135,207
2020:	-181,998
2030:	-238,070

Electricity Reductions Per Year (kWh)

To Date:	-7,985,625
2020:	-16,373,325
2030:	-16,373,325

Natural Gas Reductions Per Year (Therms)

To Date:	0
2020:	-3,099,035
2030:	-7,655,356

2020 emissions reductions are equivalent to eliminating the annual electricity consumption of 35,126 California residences.

GOAL 2. PROMOTE AND SUPPORT RENEWABLE ENERGY GENERATION AND USE

MEASURE RE 2.1 RENEWABLE ENERGY AT THE TWPCF

Continue to utilize renewable and alternative energy sources at the wastewater treatment plant (the Tulare Water Pollution Control Facility (TWPCF)).

ACTIONS FOR MEASURE RE 2.1:

RE 2.1.1 Continue to operate the solar carport (FIM 9).

RE 2.1.2 Implement the 3-MW solar plant.

RE 2.1.3 Implement the full four-cell biogas fuel cell project.

RE 2.1.4 Maintain current operational standards of sewage processing.

RE 2.1.5 Utilize the TWPCF to publicize the City's leadership and for public education of the benefits and feasibility of alternative and renewable energy sources.

The City of Tulare operates the Tulare Water Pollution Control Facility (TWPCF), a wastewater treatment plant that serves all residential and nonresidential uses within the city. As a result of high concentrations of industrial and agricultural processing effluent, the wastewater treatment plant serves an equivalent service population of 500,000 people, including a residential service population of approximately 60,000.

In 2006, the wastewater treatment plant was a simple lagoon system with no methane capture. Sewage treatment results in emissions of methane and nitrous oxide. The City completed upgrades to the facility in 2007, including a nitrification/denitrification treatment processes, biogas to energy systems, methane capture, and other alternative energy pilot systems. These upgrades resulted in a reduction of methane and nitrous oxide emissions during sewage treatment.

These enhancements have been complemented with numerous alternative energy pilot projects completed with Johnson Controls. A 30-kW solar carport photovoltaic system with 20 car spaces now provides renewable energy to the wastewater treatment plant, while also shading parked vehicles. The Johnson Controls Facility Improvement Measures also included the installation of all electrical equipment necessary for the operation of the photovoltaic system.

The wastewater treatment plant is also powered by a biogas fuel cell that utilizes digester gas from wastewater treatment processes for cogeneration of electricity. Currently three fuel cells are in operation, and a fourth has been ordered. With all four fuel cells, the project will be 1.0 MW in size. Note that Southern California Edison incentives offset the total project costs, and grants facilitated the remaining purchase, including a $7 million incentive provided by Southern California Edison. Both the solar carport and biogas fuel cell project allow the City to reduce its purchase of electricity and achieve significant payback in reduced energy costs. For the City's biogas fuel system, the U.S. EPA awarded the City of Tulare a Clean Air Excellence Award in 2008.

The City is completing additional projects to generate on-site electricity for the wastewater treatment plant. The City has allocated funding from the Energy Efficiency and Conservation Block Grant (EECBG) program to install a 3-MW solar plant. As of April 2011, 1-MW of the solar plant was under construction. California Solar Initiative funding will pay for the first $2.2 million of the first 1-MW component of the plant. All energy produced by the plant will be consumed on site. As part of this project, the City is also advancing expertise in the field of renewable energy through a pilot concentrated solar technology project utilizing mirrored dishes. Contracted with UC Davis, the installing company will use this project to evaluate this solar technology and compare it with the effectiveness of the on-site solar plant.

Renewable Energy That Pays Big? We've Got It!

Biogas fuel cells and a solar carport have reduced energy consumption at the wastewater treatment plant by 35% since 2006, creating $913,466 in annual energy cost savings.

With installation of a 3-MW solar plant by 2020, the City will realize $1.2 million in annual energy cost savings.

Goal 2:

Promote and Support Renewable Energy Generation and Use

Energy efficient lights and building features at the Tulare Public Library

GOAL 3:

SHIFT SINGLE-OCCUPANCY VEHICLE TRIPS TO ALTERNATIVE MODES

TM 3.1: Alternative Travel for City Employees

GHG Reductions per Year (MT CO_2e)

To Date:	0
2020:	-39
2030:	-50

Vehicle Miles Traveled Reductions Per Year (VMT)

To Date:	0
2020:	-89,374
2030:	-123,621

GOAL 3. SHIFT SINGLE-OCCUPANCY VEHICLE TRIPS TO ALTERNATIVE MODES

MEASURE TM 3.1 ALTERNATIVE TRAVEL FOR CITY EMPLOYEES

Increase staff's use of alternative transit modes for work-related commutes and City business travel.

ACTIONS FOR MEASURE TM 3.1:

TM 3.1.1 Develop and implement City employee incentive programs to encourage the use of transportation alternatives including removal of alternative transit subsidies, provision of parking cash-out options, or reduced fee or free transit passes.

TM 3.1.2 Support the use of ridesharing and vanpools through provision of a City employee ride-matching program.

TM 3.1.3 Facilitate alternative work arrangements including compressed workweeks and flexible work schedules without negatively affecting public service.

TM 3.1.4 Support telecommuting by City staff.

TM 3.1.5 Ensure that the City's facilities and computer network support video or Web conferencing as an alternative to travel.

TM 3.1.6 Provide bicycle support facilities through minimum and voluntary CALGreen standards at all public facilities to encourage bicycle travel by City staff.

Providing incentives to City employees for carpooling or using alternative forms of transportation will reduce the number of employees making single-occupancy vehicle trips to and from work. Such actions do not necessarily require a large investment from the City. Through this measure, the City will leverage existing commuting programs of the San Joaquin Valley Air Pollution Control District while undertaking cost-effective incentives that save City staff money. By transitioning 25% of staff to a 9/80 workweek by 2030, the City will reduce the employee commute without undertaking programs that require a high financial investment.

Investing a $2/employee/day transit subsidy for interested employees will reduce the barriers to bus travel and reduce work commutes.

The City has already initiated the support of bicycle activity through bicycle support facilities at public facilities. For instance, the new Tulare Public Library provides bicycle support facilities, including bicycle racks and a public shower.

In 2010, City employees averaged an annual work commute of 1,387 miles per employee. Equipping employees to utilize alternative transit options will facilitate personal cost savings and fulfill the City's reputation of leading by example.

Goal 3:

Shift Single-Occupancy Vehicle Trips to Alternative Modes

Tulare Public Library: LEED Gold

The Tulare Public Library achieved 69 points through the LEED for New Construction v2.2, sufficient to qualify it for LEED Gold status, the second highest level of attainment. The Library is in the process of receiving LEED Gold certification.

LEED is a voluntary green building certification system developed by the U.S. Green Building Council. LEED provides a framework for third-party verification that a project achieves performance criteria in key areas that reduce energy and water consumption and enhance environmental quality and stewardship. It overlaps with many of the mandatory requirements established by CALGreen.

LEED project criteria is available online: http://www.usgbc.org/.

GOAL 4:

REDUCE EMISSIONS FROM VEHICLES

VE 4.1: Clean Fuels in City Fleet

GHG Reductions per Year (MT CO_2e)

To Date:	-111
2020:	-128
2030:	-240

Fuel Reductions Per Year (gallons)

To Date:	- 48,253
2020:	- 65,553
2030:	-8 123,181

Captures net reductions that account for increased consumption of compressed natural gas

GOAL 4. REDUCE EMISSIONS FROM VEHICLES

MEASURE VE 4.1 CLEAN FUELS IN CITY FLEET

Continue use of clean and alternative fuels in the City's fleet.

ACTIONS FOR MEASURE VE 4.1:

VE 4.1.1 Maintain and expand the City's alternative-fuel fleet (no net loss).

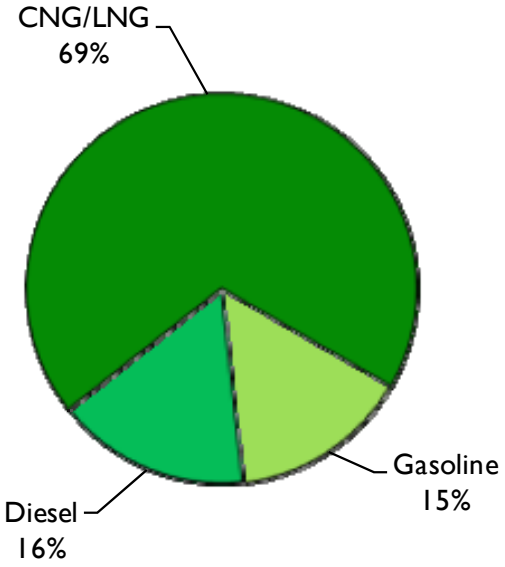
VE 4.1.2 Continue to investigate options for expanding the alternative vehicle fleet through leasing or purchase options.

VE 4.1.3 Expand the role of the Clean Air Committee to educate the community and industrial sector on cost savings and maintenance benefits of the City's alternative fleet.

Reductions in this measure represent emissions reductions that the City has already achieved through its fleet management practices and alternative fuels, and demonstrate the continued impact of these reductions by maintaining the current operational levels of the alternative-fuel fleet. The City of Tulare has demonstrated exemplary leadership in the field of alternative fuels over the past decade. In 1995, the City established a Clean Air Advisory Committee to investigate and advise City departments in issues related to air pollution, alternative-fuel vehicles, and ultra-low or zero emissions vehicles. This committee is tasked with assisting departments in the acquisition of clean fuel vehicles and has successfully navigated the City to acquire and operate a diverse array of clean fuel vehicles. Leadership is further demonstrated by City initiative in the provision of alternative fuels. The City opened the state of California's third E85 ethanol fueling station and also operates a compressed natural gas (CNG) and liquefied natural gas (LNG) fueling facility to support the City's fleet. The CNG/LNG station is also open to the public.

While clean fuel vehicles do not comprise the majority of the City's fleet, they get the most use by City staff in terms of fuel consumption. CNG and LNG fuel consumption represented 69% of the City's fuel consumption by gallon equivalents in 2006 (**Figure 5-5**) and contributed only 58% of the City's fleet emissions.

Figure 5-1: Vehicle Fleet Fuel Consumption by Fuel Type (Gallons)



Energy Efficiency? We've Got It!

Since 2006, the City has:

- Installed window replacements, roof upgrades, lighting improvements, and HVAC replacements at public facilities
- Retrofitted City-owned streetlights
- Realized $47,327 in annual cost savings from all energy efficiency upgrades

Payback for Early Actions

Since 2006, the City has realized $1,513,511 in annual energy cost savings through energy efficiency, renewable energy, and improvements to the automated water-meter reading system.

Goal 4:

Reduce Emissions from Vehicles

Tulare's Clean Fuel Fleet:

- 31 CNG vehicles
- 3 electric/gas vehicles
- 5 electric vehicles
- 1 gas/CNG vehicle
- 55 flex fuel (gas/E85 vehicles)
- 18 LNG vehicles
- 10 LNG/diesel vehicles
- 82 diesel vehicles
- 144 gasoline vehicles

Tulare's CNG/LNG Fuel Station

Goal 4:

Reduce Emissions from Vehicles

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6. Community-Wide Goals and Reduction Measures

This chapter summarizes the Climate Action Plan's measures to reduce greenhouse gas (GHG) emissions from community-wide sources within city boundaries and the Planning Area.

6.1 Summary of Measures

ATTAINMENT OF REDUCTION TARGETS

The community-wide measures have the potential to reduce GHG emissions by 452,100 metric tons (MT CO_2e) by 2020. These reductions are equivalent to a 15% change from 2006 baseline levels (refer to **Figures 6-1** and **6-2**). By 2030, the City of Tulare will achieve a reduction of 671,500 MT CO_2e, or an 8% reduction from 2006 levels.

Local implementation of all proposed measures and State-mandated efforts will allow the City to achieve its reduction target of 15% below baseline levels by 2020. The City's 2020 target is consistent with the State's Global Warming Solutions Act (AB 32). Therefore, implementation of the goals and measures in this Climate Action Plan (CAP or Plan) will place the City on a trajectory to be consistent with the State's recommended goal for local governments.

The City's 2030 reduction achievement of 8% from 2006 levels follows a trajectory toward the State's 2050 reduction target of 80% below 1990 levels by 2020. However, it is likely that the City's actual 2030 reduction achievement will be much greater due to the evolution of technical innovation, regulatory change, and the impacts of climate change through the next decade. For example, the State is expected to increase the standards of the Renewable Portfolio Standard (RPS), Assembly Bill (AB) 1493, and Low Carbon Fuel Standard (LCFS) after 2020.

Measures in the Climate Action Plan achieve a 15% reduction from 2006 baseline emissions levels and achieve the City's reduction target and consistency with the State's Global Warming Solutions Act (AB 32).

Table 6-1: Community Reductions by Goal

Goal	To Date ($MTCO_2e$/yr)	2020 ($MTCO_2e$/yr)	2030 ($MTCO_2e$/yr)
Goal 1: Increase energy efficiency and conservation.	-8,180	-139,172	-216,686
Goal 2: Promote and support renewable energy generation and use.	-135,613	-218,918	-321,944
Goal 3: Shift single-occupancy vehicle trips to alternative modes.	0	-5,149	-11,712
Goal 4: Reduce emissions from vehicles.	-111	-31,667	-44,466
Goal 5: Increase accessible land use to reduce vehicular trips.	-1,668	-5,793	-11,303
Goal 6: Reduce solid waste.	0	-32,507	-57,977
Goal 7: Promote low emissions in agriculture.	0	-18,889	-7,408
Total – Local Reductions	-145,571	-452,095	-671,497
2006 Emissions	**820,291**	**820,291**	**820,291**
Adjusted Forecast with State Reductions	**909,602**	**1,148,909**	**1,559,905**
Target Emissions Level	**785,135**	**697,247**	**478,503**
Net Emissions with State and Local Reductions	**764,031**	**696,814**	**888,408**
Percentage Change from 2006 Emissions	**-7%**	**-15%**	**8%**

Figures 6-1 and **6-2** present the potential GHG emissions reductions (MT CO_2e) for 2020 and 2030 by goal. **Figures 6-3** and **6-4** and **Table 6-2** display the proportion of 2020 and 2030 GHG reductions from each sector. The tables and figures also identify Tulare's progress in achieving these goals since the baseline year of 2006. Goal topics and measures are summarized in detail later in this chapter. Methodologies for the quantification of all reduction measures are presented in **Appendix 3**.

Figure 6-1: 2020 Reductions by Goal

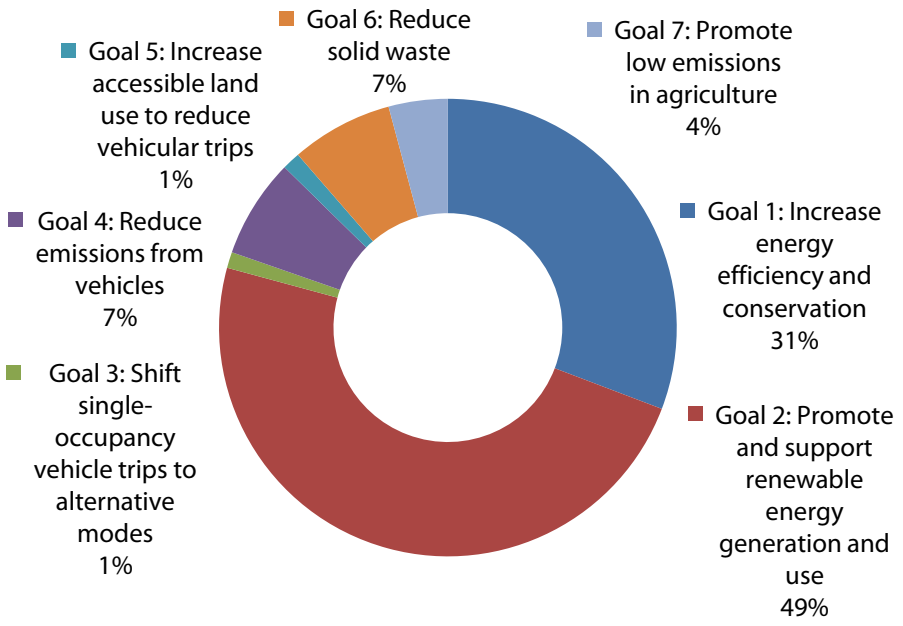
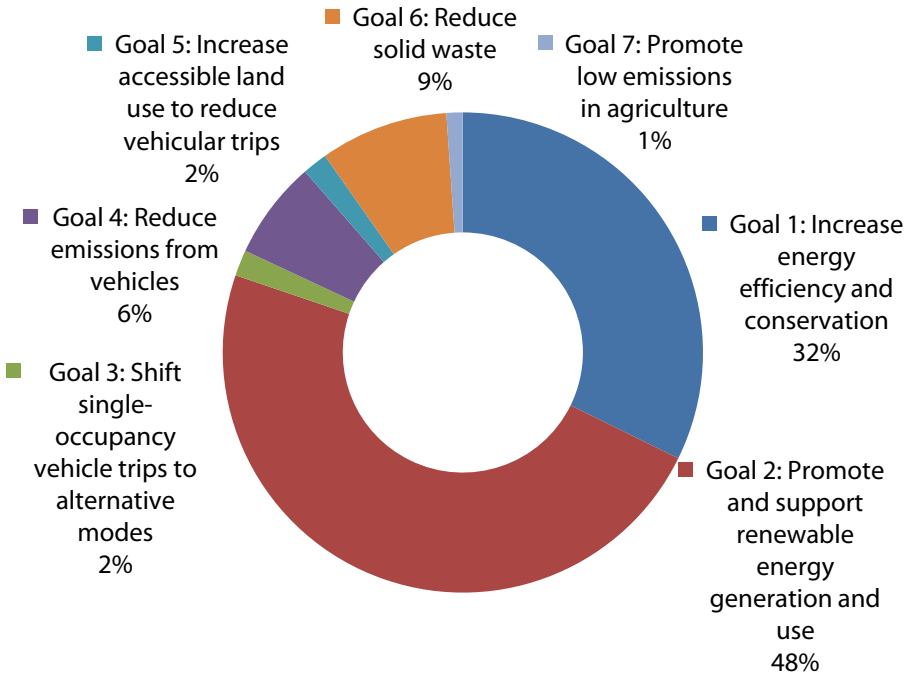


Figure 6-2: 2030 Reductions by Goal



City upgrades to wastewater treatment processing contribute 92.8% of reductions achieved to date and 40.3% of community emissions reductions by 2020.

Figure 6-3: Community Reductions by Sector

Goal	To Date ($MTCO_2e$/yr)	2020 ($MTCO_2e$/yr)	2030 ($MTCO_2e$/yr)
Residential	-3,628	-26,569	-44,699
Commercial	-4,958	-142,796	-240,975
Transportation	-1,778	-42,609	-67,482
Waste	0	-32,507	-57,977
Other – Agriculture	0	-18,889	-7,408
Other – Wastewater Treatment Processes	-135,207	-181,998	-238,070
Other – Other Stationary Sources	0	-6,727	-14,885
Total Reductions	-145,571	-452,095	-671,497

Figure 6-4: 2020 Reductions by Sector

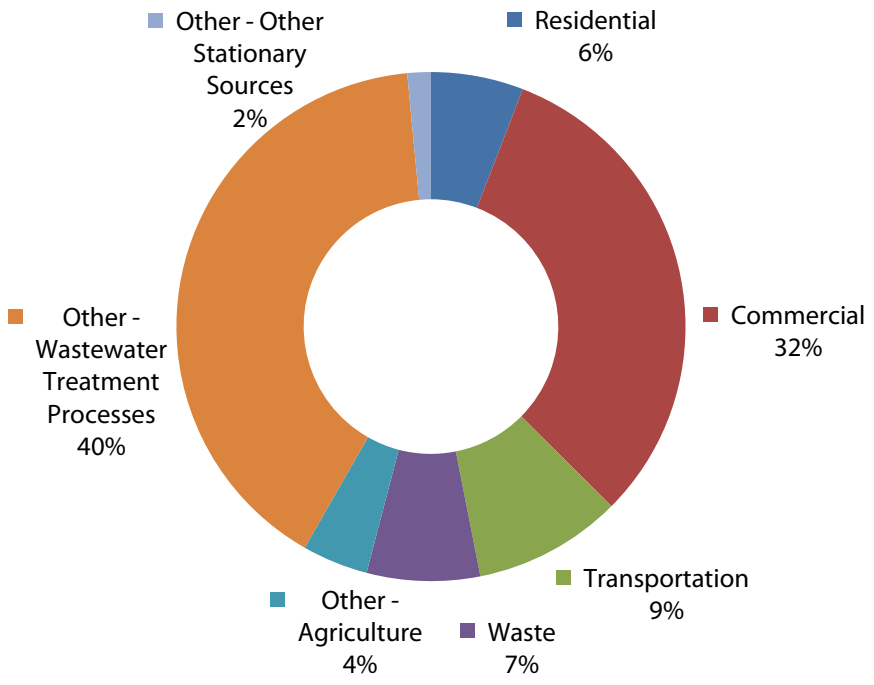
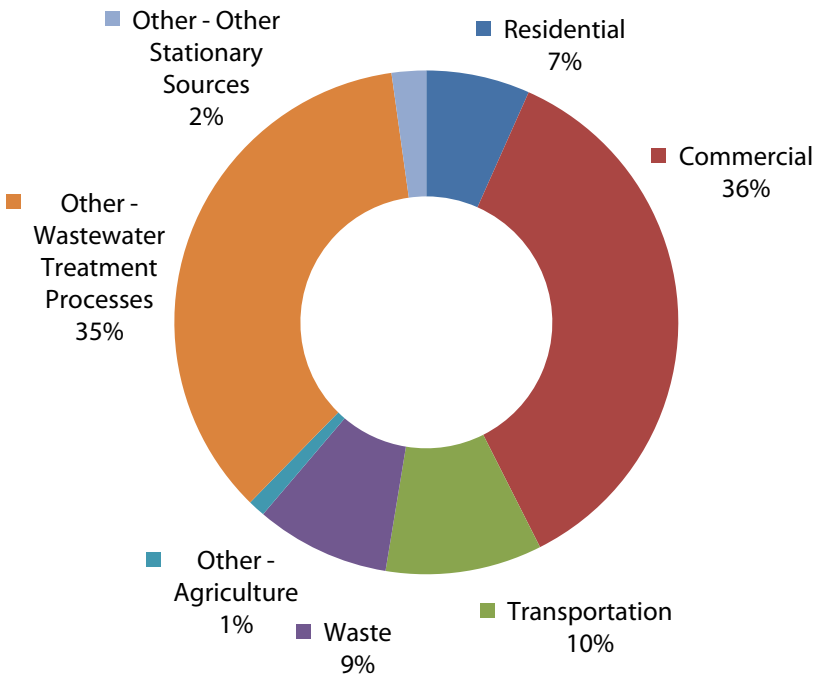


Figure 6-5: 2030 Reductions by Sector



Trees? We've Got it.

The City of Tulare has been a certified Tree City through Tree City USA for over 20 years.

A valley resource for tree planting is *An Urban Forestry Guidebook for the San Joaquin Valley.*

(http://www.greatvalley.org/artman2/publish/othergvcpub/pub_Urban_Forest_Tree.aspx)

GOAL 1:

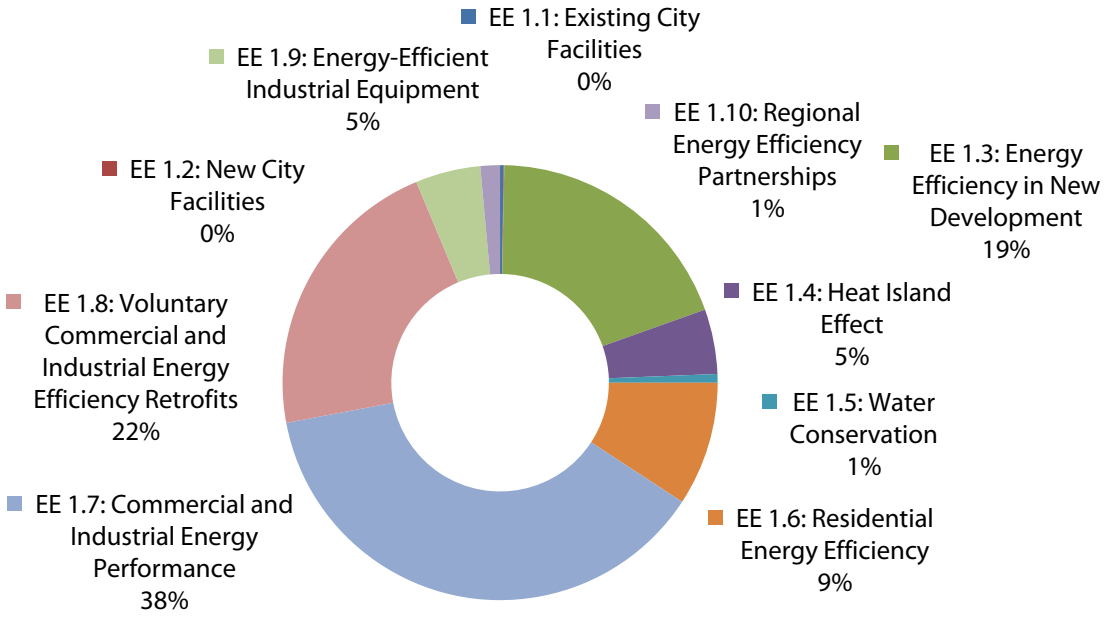
INCREASE ENERGY EFFICIENCY AND CONSERVATION

GOAL 1. INCREASE ENERGY EFFICIENCY AND CONSERVATION.

Energy consumption powers the local economy and enables a desirable quality of life. Electricity and natural gas consumption supports businesses, industrial facilities, and homes. Residents use natural gas to heat water and fuel natural gas cooking ranges. Industrial and commercial enterprises use natural gas for water heating in addition to on-site fuel combustion that supports manufacturing and industrial processes. Electricity powers appliances that are the cornerstones of daily life, from personal appliances to citywide infrastructure such as traffic signals. GHG emissions are created by the consumption of electricity and natural gas. Greater efficiencies in existing levels of energy consumption can be realized while still supporting the needs of existing and future communities. A reduction in energy consumption will reduce GHG emissions and the cost of energy bills.

The following measures target efficiencies in electricity and natural gas use in homes and nonresidential uses to reduce emissions. Total reductions include City government measures discussed in **Chapter 5,** which are credited to the City's reduction target.

Figure 6-6: 2020 Goal 1 Reductions by Measure



Energy Efficiency in New Development? We've Got It.

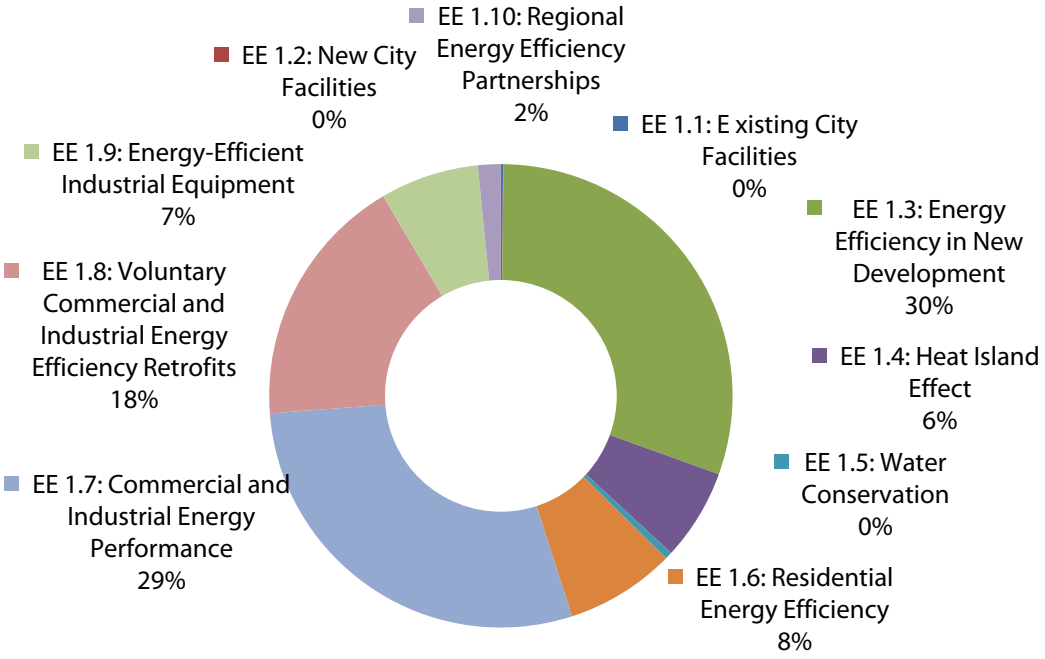
Early Leadership in the Development Community

Developers in the community have voluntarily demonstrated that green building is a profitable and marketable approach to business. The new Palm Ranch project exceeds Title 24 by 50%, and the Woodside project exceeds it by 10%.

Goal 1:

Increase Energy Efficiency and Conservation

Figure 6-7: 2030 Goal 1 Reductions by Measure



GOAL 1:

INCREASE ENERGY EFFICIENCY AND CONSERVATION

EE 1.3: Energy Efficiency in New Development

GHG Reductions per Year (MT CO_2e)

To Date:	0
2020:	-26,775
2030:	-65,676

Electricity Reductions per Year (kWh)

To Date:	0
2020:	-15,923,558
2030:	-40,028,731

Natural Gas Reductions per Year (Therms)

To Date:	0
2020:	-3,099,035
2030:	-7,655,356

MEASURE EE 1.3: ENERGY EFFICIENCY IN NEW DEVELOPMENT

Increase energy efficiency in new commercial and residential development and require new residential and commercial development to achieve enhanced energy efficiency and exceed California Energy Code requirements by 15%.

ACTIONS FOR MEASURE EE 1.3:

EE 1.3.1 Implement the minimum CALGreen standards for energy efficiency contained in 2008 Title 24 standards, effective January 1, 2010.

EE 1.3.2 By 2015, amend the building code and other codes as applicable to require new construction to meet CALGreen measures (A4.203.1 and A.5.203.1.1), as applicable.

EE 1.3.3 Work with Southern California Edison to implement smart grid technology in new development.

This measure requires phased adoption of Tier 1 CALGreen energy efficiency standards, assuming that 60% of development between 2010 and 2020 will occur after adoption of Tier 1 energy efficiency requirements and 72.5% of development will occur between 2010 and 2030.

Southern California Edison (Edison) is implementing the smart grid in Tulare through SmartConnect, a $1.6 billion program authorized by the California Public Utilities Commission (CPUC). The program consists of the installation of new smart meters for all Edison accounts. These upgrades are part of a statewide shift to update and enhance the statewide infrastructure necessary to support efficient and renewable energy consumption and maintain target service levels. At an individual scale, users will be able to use smart meters to monitor electricity consumption in real time and to better understand the relationship between electricity usage and costs. Installation of smart meters allows for integration into the statewide smart grid. Smart meters will also equip Edison and the City to more effectively manage and target electricity trends for peak and off-peak demand scenarios. Edison will complete installation of smart meters in the City of Tulare by 2012.

MEASURE EE 1.4: HEAT ISLAND EFFECT

Reduce the urban heat island effect to cool the local climate and reduce energy consumption by maintaining current rates of public tree planting and increased shading on private property, high albedo surfaces, and cool surfaces.

ACTIONS FOR MEASURE EE 1.4:

EE 1.4.1 Expand the City's street tree planting and maintenance program to target existing neighborhoods with low tree counts (General Plan Policy LU-13.15) to cool the local climate and reduce residential energy consumption. Plant 11,000 new trees by 2030 in existing neighborhoods.

EE 1.4.2 Require nonresidential development to comply with CALGreen measures for wall shading (A5.106.7) and for building orientation (A5.106.9 and A4.106.1) to promote building cooling.

EE 1.4.3 Maintain current rates of tree planting based on residential growth for new parks and public rights-of-way to cool the local climate with 10,000 new park trees by 2030.

EE 1.4.4 Require the use of high albedo material for new and renovated private and public pavements to achieve 80% of all pavement with high albedo surfaces by 2030, and require nonresidential compliance with supportive CALGreen measures.

This measure relies on a multifaceted approach to reduce the urban heat island effect through increased tree plantings, building orientation, and the use of cooler surfaces. The energy and GHG benefits of this measure result from increased shading on buildings and pavements. Increased shading helps to lower urban temperatures, thus reducing the urban heat island effect. Co-benefits of this measure include carbon sequestration, extended life of paved surfaces, improved water quality from trapping runoff, increased traffic safety, aesthetic improvements, increased real estate values, and increased sociological benefits.

THE URBAN FOREST

The City of Tulare has a history of promoting and expanding the urban forest. General Plan Policy LU-13.15 directs the City to facilitate tree planting in existing neighborhoods where trees do not currently exist. Partnership with private and nonprofit groups is essential to achieving the ambitious targets established in this measure. It is anticipated that the City

GOAL 1:

INCREASE ENERGY EFFICIENCY AND CONSERVATION

EE 1.4: Heat Island Effect

GHG Reductions per Year (MT CO_2e)

To Date:	0
2020:	-6,702
2030:	-13,784

Electricity Reductions per Year (kWh)

To Date:	-5,335
2020:	-24,484360
2030:	-55,594,665

Natural Gas Reductions per Year (Therms)

To Date:	0
2020:	0
2030:	0

GOAL 1:

INCREASE ENERGY EFFICIENCY AND CONSERVATION

Cool pavements save money.

Darker asphalt roadways require 24% more light poles than roadways with high albedo materials, increasing construction costs by approximately $30,000.

The use of cooler materials may incur no additional cost if color changes are incorporated into routine resurfacing schedules.

Ashley September/October 2008

can offset the costs of tree planting through partnerships with other valley communities working toward similar goals and with nonprofits such as the Urban Tree Foundation. The Urban Tree Foundation provides services and programs to benefit the urban forest throughout California, promoting and preserving the urban forest through education, planting, and tree care. Through such partnerships, the City can work to achieve grants targeted to expanding the urban forest.

Resources such as *An Urban Forestry Guidebook for the San Joaquin Valley* can be used for public education and implementation of tree planting programs. In addition to providing an approach to expanding the urban forest, guidebook outlines several financing options.

COOL PAVING MATERIALS AND ROOFS

The urban environment has an abundance of paved material that is often dark-colored and absorbs heat, increasing temperatures and fostering the urban heat island effect. Pavements and roofs typically constitute over 60% of urban surfaces. Increasing the reflectivity of these surfaces, the albedo, can reduce summertime temperatures, resulting in better air quality and savings from reduced air-conditioning costs. To maximize albedo, lighter-colored aggregate can be used in the pavement mix. Alternatively, asphalt pavements can be covered with high-albedo sealcoats, small rocks set in binder, or a thin layer of concrete.

Cool Roofs & Pavements? We've Got It.

Cool materials result in cooler temperatures and reduced electricity costs. The Tulare Public Library features:

- 100% concrete paving instead of asphalt, with a solar reflectance index (SRI) of 35. Paving requires lower levels of lighting than traditional asphalt.
- Cool roof with seam roofing (SRI 56) and single-ply roof metal wells (SRI 107).

MEASURE EE 1.5: WATER CONSERVATION

Achieve a 20% reduction in water use by 2020 (20X2020) to reduce energy consumed for groundwater pumping.

ACTIONS FOR MEASURE EE 1.5:

EE 1.5.1 Provide incentives to residents and business owners to reduce outdoor water use with a Turf Removal Rebate program.

EE 1.5.2 Support water reduction education by organizations such as the UC Cooperative Extension Master Gardener Program.

EE 1.5.3 Continue to facilitate indoor water conservation through promotion and distribution of low-flow toilets, showerheads, and water-reduction fixtures through Southern California Edison, Southern California Gas Company, and the Energy Upgrade California programs.

EE 1.5.4 Continue installation of smart water meters in existing accounts to facilitate development of a tiered rate system.

EE 1.5.5 Amend the City's Building Code and other codes appropriate to require water efficiency standards in new residential and nonresidential development as established by mandatory and Tier 1 CALGreen measures.

The City of Tulare provides water service to residents and businesses within the city. Deep wells throughout the community provide all water supplies from groundwater storage. Water is pumped directly into the City's water distribution infrastructure to provide for all of the City's water users.

Energy used to pump and transmit water is captured in the City's municipal operations inventory and was the third largest contributor to municipal GHG emissions. This measure quantifies the reduction in energy use that results from reduced water conveyance activity. It assumes the reduction in water use established by the State of California's 20x2020 Water Conservation Plan, which directed state agencies to develop a plan to reduce statewide per capita urban water use by 20% by 2020.

The City is working to monitor water consumption, increase billing efficiency, and prepare for a tiered-rate water system that charges consumers based on water use. The City has installed water meters throughout the city. The City recently implemented a program to improve

GOAL 1:

INCREASE ENERGY EFFICIENCY AND CONSERVATION

EE 1.5: Water Conservation

GHG Reductions per Year (MT CO_2e)

To Date:	0
2020:	-903
2030:	-1,085

Electricity Reductions per Year (kWh)

To Date:	0
2020:	-3,127,051
2030:	-4,119,750

Natural Gas Reductions per Year (Therms)

To Date:	0
2020:	0
2030:	0

GOAL 1:

INCREASE ENERGY EFFICIENCY AND CONSERVATION

existing water meters, install additional water meters, and establish automated meter readings systems were established for previously unmetered accounts. The intent of the improvements was to improve the accuracy of the water meters and enhance the City's ability to effectively complete water billing each billing cycle. The City contracted with Johnson Controls for installation of 5,347 1-inch water meters to services that were not previously metered. Johnson Controls completed this project in conjunction with several other energy-conserving programs, or Facility Improvement Measures, that are discussed in greater detail in **Chapter 5**. There are now 16,756 water meters in the city. While these meters do directly translate into energy or water consumption reductions, meters position the City to implement tiered water rates, a primary strategy for reducing water use. These actions also position the City for compliance with state requirements through the Urban Water Management Plan. [1]

Water-Wise Cost Savings? We've Got It.

The City of Tulare has installed over 5,000 water meters throughout the city and improved water management systems.

The result? Annual cost savings for the City of $255,718.

Since 2006, the City has distributed 500 low-flow showerheads. Low-flow showerhead rebates and credits are available from the Gas Company and Edison. Additional credits and incentives will be available through Energy Upgrade California.

Energy Upgrade California. What's in it for Tulare?

Homeowners and renters of detached single-family homes are eligible for up to $4,000 in incentives to achieve a 40% reduction in home energy consumption through qualified energy-saving home upgrade projects. Refer to **Measure EE 1.6** on **page 6-13** for more information.

Additional program details are available online: https://energyupgradeca.org/county/tulare/overview.

[1] Ashley 2008.

MEASURE EE 1.6: RESIDENTIAL ENERGY EFFICIENCY

Facilitate energy efficiency improvements within the residential building stock.

ACTIONS FOR MEASURE EE 1.6:

EE 1.6.1 Utilize the statewide framework of Energy Upgrade California to centralize energy efficiency resources and financing for the community, remove barriers to participation in existing programs such as the Energy Program and the AB 811 program, and facilitate a localized approach to residential energy use.

EE 1.6.2 Coordinate with local utility providers and other partners to use public education and marketing tools to promote energy efficiency.

EE 1.6.3 Implement the Energy Program in partnership with Southern California Edison and Proteus Inc., and continue to support Edison's efforts to reduce residential energy consumption through initiatives including appliance recycling, single-family rebate, multi-family rebate, residential upstream lighting, and the Low Income Program.

EE 1.6.4 Establish point-of-sale residential energy efficiency audit and retrofit requirements for all homes purchased or transferred through a Residential Energy Conservation Ordinance (RECO).

EE 1.6.5 Conduct a community-wide residential energy efficiency audit and use it to:

1) Direct energy efficiency program resources

2) Target resources to address gaps and ensure retrofit targets are met

EE 1.6.6 Continue to support implementation of the second phase of the statewide AB 811 program, the California PACE Program.

Existing, older buildings are often a major contributor to a city's GHG emissions, especially for buildings built before California's Building Code became more stringent in the early 1990s. As houses age, their appliances, water heaters, HVAC units, windows, and insulation often become outdated or decrease in efficiency. Approximately 77% of Tulare's housing stock was constructed before the 1990 standards went into effect.

GOAL 1:

INCREASE ENERGY EFFICIENCY AND CONSERVATION

EE 1.6: Residential Energy Efficiency

GHG Reductions per Year (MT CO_2e)

To Date:	-3,462
2020:	-12,819
2030:	-16,615

Electricity Reductions per Year (kWh)

To Date:	-10,277,981
2020:	-31,194,709
2030:	-43,499,453

Natural Gas Reductions per Year (Therms)

To Date:	-93,144
2020:	-1,094,380
2030:	-1,596,940

Goal 1:

Increase Energy Efficiency and Conservation

Energy Efficiency Programs? We've Got It.

To date, Tulare energy efficiency programs have achieved the following results:

- 3,045 free low-income home upgrades through the Energy Program from 2006 to 2010, resulting in an average annual cost savings of $780 per home
- 126 free low-income home upgrades completed by Caliornia Services Employment Training (CSET)

This measure also builds on Tulare's strong record of energy efficiency programs to date. Tulare is a member of the Valley Innovative Energy Watch (the VIEW), the Partnership for the San Joaquin Valley, and the San Joaquin Valley Clean Energy Organization (SJVCEO). These entities have implemented several outreach and energy reduction initiatives. The City participates in these initiatives together with other governments and utility providers. The City is also collaborating with Proteus Inc. and Edison for implementation of the Energy Program. As Energy Upgrade California is developed, it is anticipated that existing initiatives will fall under this larger umbrella for energy efficiency action.

Local utility providers and partnerships offer numerous energy efficiency programs to residents and businesses. The newly established Energy Upgrade California program consolidates these overlapping efforts (including the existing Energy Program) through collaboration with state agencies to provide a single, one-stop resource for energy efficiency information, opportunities, and financing. The program will leverage grant funds the State of California received from the American Recovery and Reinvestment Act (ARRA) to provide additional incentives and benefits for program participants. Energy Upgrade California will support localized approaches to energy efficiency. The City will also benefit from the efficiencies of coordinated program outreach, incentives, and a simplified contractor and participant qualification process.

A Residential Energy Conservation Ordinance (RECO) will apply to all homes purchased or transferred in the City to improve the energy and water efficiency of the building stock. The RECO will establish mandatory minimum energy efficiency standards for a range of building systems and features, including water heaters, attic insulation, exterior door weather stripping, and common area lighting (for multi-unit buildings). Lastly, this measure also quantifies the energy savings benefits that will be realized through Edison's implementation of the SmartConnect project, which includes the installation of smart meters at all existing properties by 2012. Additional discussion on the SmartConnect program can be found on **page 6-8**.

MEASURE EE 1.7: COMMERCIAL AND INDUSTRIAL ENERGY PERFORMANCE

Support commercial and industrial profitability and energy efficiency through programs and partnerships.

ACTIONS FOR MEASURE EE 1.7:

EE 1.7.1 Amend Chapter 5.04 of the Municipal Code to require all nonresidential buildings to complete annual energy performance reports as a condition of approval for business licenses, phased in for mandatory participation by 2018.

EE 1.7.2 Work with Southern California Edison for smart grid implementation in existing commercial development.

EE 1.7.3 Investigate barriers to innovative industrial energy efficiency practices for the industrial food-processing sector, including heat recovery and combined heating technologies, and respond as appropriate with code updates and partnership energy efficiency programs.

There is often a decision gap between energy uses and efficiency options. Feedback is critical to improved decision making by connecting decisions with outcomes. According to the American Council for an Energy Efficient Economy,[2] achieving energy efficiency targets requires self-motivated action. This measure establishes an Energy Performance Ordinance to close the decision gap between energy consumption and available opportunities for energy efficiency. This approach will create motivation for energy efficiency upgrades. The Energy Performance Ordinance creates motivation by requiring all individuals with a business license to identify simple opportunities for cost savings and to benchmark energy performance.

This measure also quantifies the impact of the Edison smart grid. Edison is installing smart meters that will allow users to monitor electricity consumption in real time and to better understand the relationship between electricity usage and costs.

The City will phase in the Energy Performance Ordinance, with voluntary participation until 2018. The ordinance will require all individuals with operating business licenses that occupy a building space to assess their

[2] 2010.

GOAL 1:

INCREASE ENERGY EFFICIENCY AND CONSERVATION

EE 1.7: Commercial and Industrial Energy Performance

GHG Reductions per Year (MT CO_2e)

To Date:	0
2020:	-52,631
2030:	-62,335

Electricity Reductions per Year (kWh)

To Date:	0
2020:	-58,958,835
2030:	-78,338,551

Natural Gas Reductions per Year (Therms)

To Date:	0
2020:	-6,978,788
2030:	-8,145,391

2020 emissions reductions are equivalent to eliminating the annual electricity consumption of 10,158 California residences.

Goal 1:

Increase Energy Efficiency and Conservation

Tulare's diverse economic base includes intensive industrial and manufacturing processes that are dependent on high amounts of energy. Industrial commercial and industrial land uses contributed 46% of city and Planning Area GHG emissions in 2006.

These businesses are a vital foundation of Tulare's success and economic well-being.

building's energy use and share the results with prospective buyers, tenants, and the City. The ordinance does not require energy efficiency actions, but merely positions owners and tenants to make better-informed decisions by closing the gap between knowledge and available energy efficiency cost-saving opportunities. This measure captures the anticipated benefit of voluntary energy efficiency actions that building owners and tenants will voluntarily undertake as a result of energy performance reporting, consistent with average statewide trends. Building owners and tenants would report energy consumption annually through a variety of free options that the City will determine. One reporting possibility includes the Energy Star Portfolio Manager, a free, online tool offered by the U.S. Environmental Protection Agency that compares a building's energy use to comparable buildings to benchmark energy use. Building owners would also have to share benchmarking scores with the City as well as with prospective buyers, tenants, and lenders. All businesses occupying greater than 5,000 square feet would be required to submit biannual energy audits that include a list of all retrofit measures available to the tenant or owner and an estimate of approximate energy savings and avoided costs that could be achieved through retrofits.

California Assembly Bill 1103 also requires that all owner-occupied nonresidential buildings report energy consumption in a manner that is compatible with the Energy Star Portfolio Manager and that owners or operators disclose benchmarking data and ratings to prospective buyers. Any business in the city reporting under AB 1103 could use reports that are generated for Assembly Bill 1103 to comply with the City's ordinance.

Industrial uses in Downtown Tulare

MEASURE EE 1.8: VOLUNTARY COMMERCIAL AND INDUSTRIAL ENERGY EFFICIENCY RETROFITS

Promote voluntary energy efficiency retrofits in the commercial and industrial sectors through financing and incentive programs.

ACTIONS FOR MEASURE EE 1.8:

EE 1.8.1 Partner with Southern California Edison to encourage participation by food processors, dairies, and other industrial agriculture operations in Southern California Edison programs, including the Energy Management Solutions Program, Industrial Energy Efficiency Program, energy audits, Savings by Design Program, Nonresidential Upstream Lighting, and Agricultural Energy Efficiency Program.

EE 1.8.2 Utilize the statewide framework of Energy Upgrade California to centralize energy efficiency resources and financing for the nonresidential sectors in coordination with the San Joaquin Valley Clean Energy Organization, local utility providers, and other partners.

EE 1.8.3 Develop a "Green Business" program with the Chamber of Commerce for commercial and industrial businesses to promote energy efficiency measures that reduce operating costs and enhance revenues.

EE 1.8.4 Promote the Direct Install Program with the VIEW and the San Joaquin Valley Clean Energy Organization to provide free energy efficiency audits, products, and installation through Southern California Edison.

EE 1.8.5 Continue to support implementation of the second phase of the statewide AB 811 program, the California PACE Program, to facilitate energy efficiency improvements in the industrial dairy processing sector.

Through this measure, the City will promote voluntary programs to equip local businesses to realize significant cost and operational savings through energy conservation and efficiency improvements. By enabling local businesses to increase their efficiencies and enhance profitability, the City is working to retain and improve its position as a regional economic leader that continues to attract new and beneficial businesses.

Energy Upgrade California will tentatively target commercial buildings in addition to the current residential scope of the program. It is anticipated that this program will offer enhanced coordination of financing incentives and a centralized, regional approach to outreach. Until the commercial

GOAL 1:

INCREASE ENERGY EFFICIENCY AND CONSERVATION

EE 1.8: Voluntary Commercial and Industrial Energy Efficiency Retrofits

GHG Reductions per Year (MT CO_2e)

To Date:	-4,536
2020:	-30,162
2030:	-38,432

Electricity Reductions per Year (kWh)

To Date:	-38,065,541
2020:	-76,010,602
2030:	-69,853,050

Natural Gas Reductions per Year (Therms)

To Date:	0
2020:	-1,479,137
2030:	-1,972,183

2020 emissions reductions are equivalent to eliminating the annual electricity use of 5,821 California residences.

Goal 1:

Increase Energy Efficiency and Conservation

Leadership for Nonresidential Energy Efficiency? We've Got It.

Gazoo Energy Group and the Pacific Housing & Finance Agency awarded the City the first Leadership Award on April 6, 2010, for participation in the California PACE Program and the City's commitment to energy and water efficiency.

component of this program is finalized, the City will continue to implement and promote the second phase of the AB 811/PACE Program for commercial and industrial properties. This finance mechanism provides a means for commercial property owners to finance energy efficiency improvements by attaching a lien to the property.

To implement this measure, the City recognizes that partnership with local utility providers and the private business sector is essential. The City will work through existing partnerships to better understand and target the needs of the nonresidential building sector. This will be necessary to develop an effective approach that benefits local businesses. Due to privacy laws, the City is currently unable to determine the distribution of energy consumption within the nonresidential sector and will be challenged to develop the most efficient approach that will benefit businesses.

This measure also includes formation of a Green Business program. This program can be an initiative that the City encourages the Tulare Chamber of Commerce to implement as a forum for businesses to share energy efficiency lessons and cost savings opportunities. The City will support and encourage the Tulare Chamber to develop a curriculum for participants and help them to develop and implement a business action plan to enhance competitiveness through energy efficiency.

Businesses and shoppers in Downtown Tulare

MEASURE EE 1.9: ENERGY-EFFICIENT INDUSTRIAL EQUIPMENT

Require stationary equipment in new industrial development to comply with best practice energy efficiency standards.

ACTIONS FOR MEASURE EE 1.9:

EE 1.9.1 Require all new boilers installed for agricultural industrial uses to provide thermal efficiency of 89% or greater, consistent with adopted San Joaquin Valley Air Pollution Control District (SJVAPCD) best performance standards.

EE 1.9.2 Where practicable, require electric motors instead of internal combustion engines to meet or exceed a 95% efficiency engine standard, consistent with adopted San Joaquin Valley Air Pollution Control District (SJVAPCD) best performance standards.

EE 1.9.3 Require new reciprocating engines to achieve an operating efficiency of 60% or greater.

The City will update regulations for industrial uses to require new stationary engines to comply with best performance standards. These emissions sources consist of large pieces of equipment that the San Joaquin Valley Air Pollution Control District permits, including distillate reciprocating engines, natural gas reciprocating engines, and liquefied petroleum gas boiler engines. These activities provide power for a variety of industrial and commercial processes including agricultural processing, telecommunications operations, government and institutional equipment, dairy manufacturing, energy transmission, fertilizer production, and trucking operations.

Best performance standards yield higher operating efficiencies with less comparative GHG emissions than standard equipment. Due to data limitations for facility-scale equipment, this measure assumes the average baseline operating efficiencies for equipment, consistent with regional and statewide trends that the San Joaquin Valley Air Pollution Control District (SJVAPCD) has documented[3] and the California Energy Commission has reported.[4] This measure also refers to SJVAPCD's adopted best performance standards, which currently include standards for boilers. Projects that comply with SJVAPCD's standards for stationary equipment

[3] 2009.

[4] 2002.

GOAL 1:

INCREASE ENERGY EFFICIENCY AND CONSERVATION

EE 1.9: Energy-Efficient Industrial Equipment

GHG Reductions per Year (MT CO_2e)

To Date:	-38,065,541
2020:	-6,726.80
2030:	-14,885.49

Electricity Reductions per Year (kWh)

To Date:	0
2020:	0
2030:	0

Natural Gas Reductions per Year (Therms)

To Date:	0
2020:	-88,703
2030:	-211,314

may qualify for a less than significant impact on global climate change; however, qualification for this determination is dependent on full compliance with all standards outlined by the District, not all of which are included in this Climate Action Plan.

A strong, diversified economic base? We've Got It.

The County of Tulare's agricultural economy is a nationwide leader in terms of the values of its livestock, crops, and products. With a diverse portfolio of crops and products, the county's economy has demonstrated a robust longevity.

#1 county in the United States for value of livestock, poultry, and their products

#2 county in the United States for total value of agricultural products sold

#4 in the United States for value of crops

Total gross production value in the county was $5,018,022,800 in 2008.

USDA 2002

MEASURE EE 1.10: REGIONAL ENERGY EFFICIENCY PARTNERSHIPS

Continue to partner in regional initiatives that encourage achievement of regional energy efficiency targets.

ACTIONS FOR MEASURE EE 1.10:

EE 1.10.1 Continue participation in the VIEW Partnership and related initiatives of the San Joaquin Valley Clean Energy Organization to promote community-wide energy efficiency.

EE 1.10.2 Pursue funding in collaboration with other Valley communities through the San Joaquin Valley Partnership to implement programs with regional benefit.

EE 1.10.3 Continue to support and facilitate implementation of the Tulare County Regional Blueprint.

EE 1.10.4 Implement and support the San Joaquin Valley Air Pollution Control District's thresholds for energy use by residential and nonresidential uses.

The City has worked proactively through numerous regional initiatives to promote energy efficiency. For instance, the City has contributed to the efforts of the Valley Innovative Energy Watch (VIEW) in partnership with the City of Hanford, the City of Woodlake, the City of Lindsay, the City of Visalia, the City of Porterville, Kings County, Tulare County, the San Joaquin Valley Clean Energy Organization, Southern California Edison, and the Southern California Gas Company. In the fall of 2009, VIEW held an educational exhibit at the Visalia Home Expo through the Southern California Edison Mobile Education Unit. Over 2,500 attendees came through the coach to learn about energy efficiency and cost savings for homes and businesses. VIEW also held LED holiday exchanges in partnership with CSET in Hanford, Lindsay, Porterville, Tulare, Woodlake, and Visalia and in Kings County. In total, residents exchanged over 700 old inefficient holiday strands for new energy-efficient LED lights.

This measure assumes the impact of public education that the City will achieve through regional outreach efforts. Regional education efforts, including the Sacramento region's Spare the Air program, demonstrate that education and outreach can induce behavioral changes in energy consumption.

GOAL 1:

INCREASE ENERGY EFFICIENCY AND CONSERVATION

EE 1.10: Regional Energy Efficiency Partnerships

GHG Reductions per Year (MT CO_2e)

To Date:	0
2020:	-2,027
2030:	-3,468

Electricity Reductions per Year (kWh)

To Date:	0
2020:	-3,632,097
2030:	-6,267,679

Natural Gas Reductions per Year (Therms)

To Date:	0
2020:	-201,328
2030:	-365,824

Goal 2:

Promote and Support Renewable Energy Generation and Use

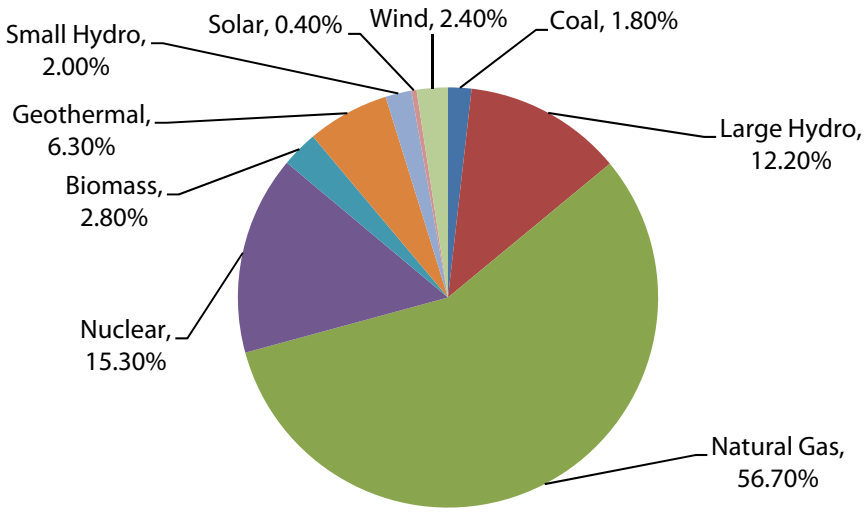
Goal 2. Promote and support renewable energy generation and use.

Energy conservation and efficiency improvements are the first step to try to reduce energy consumption trends. Yet, only so much energy consumption can be eliminated. A minimum level of energy is necessary to support a functioning built environment. The intent of this goal is to shift a portion of energy consumption away from traditional electricity and natural gas (i.e., fossil fuels) to renewable energy sources.

The City's Greenhouse Gas Inventory captured GHG emissions that result from residential and nonresidential natural gas and electricity use. These GHG emissions result in two ways:

- Combustion of natural gas within the City of Tulare through on-site activities such as water heating or natural gas cooking ranges.
- Combustion of a variety of fuels to produce electricity that is consumed in the City of Tulare, regardless of its origin.

Figure 6-8: California's Electricity Sources by Fuel Type



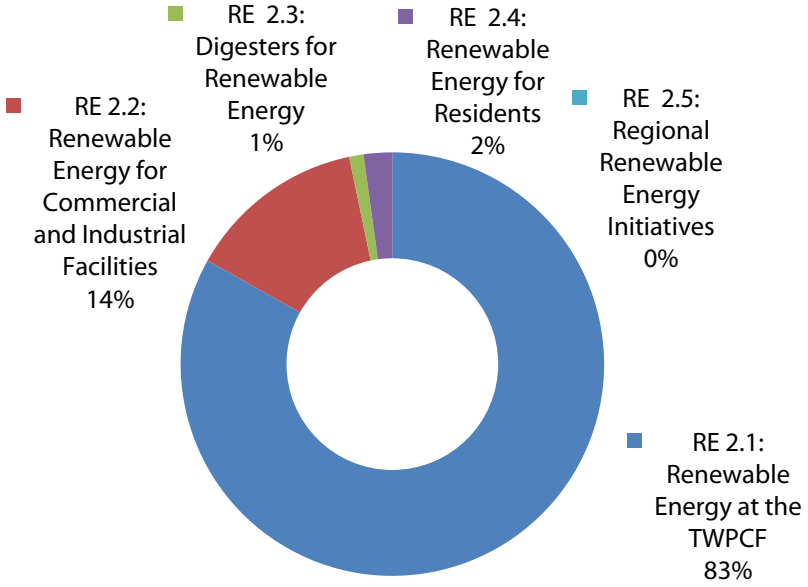
California Energy Commission 2009

Both natural gas and electricity can be offset with renewable sources of energy that are profitable, yield cost savings to users, and spur local

energy independence. Through this goal, the City will reduce GHG emissions from traditional electricity production and natural gas by promoting the production of local, on-site renewable energy for both residential and nonresidential uses. Through these measures, the City will continue to lead the region by example through its innovative use of alternative and renewable energy sources that save money.

The City of Tulare contributed the greatest proportion of reductions in this goal through upgrades to the Tulare Water Pollution Control Facility in Measure RE 2.1. Measure RE 2.1 yields 83% of Goal 2 reductions in 2020 (**Figure 6-9**) and 74% in 2030 (**Figure 6-10**). This measure is described with other City government actions in **Chapter 5**, which consist largely of programs, or Facility Improvement Measures (FIMs), that Johnson Controls completed in 2010. Nevertheless, all City government measures contribute to the community-wide reduction target. Additional descriptions of community measures follow.

Figure 6-9: 2020 Goal 2 Reductions by Measure



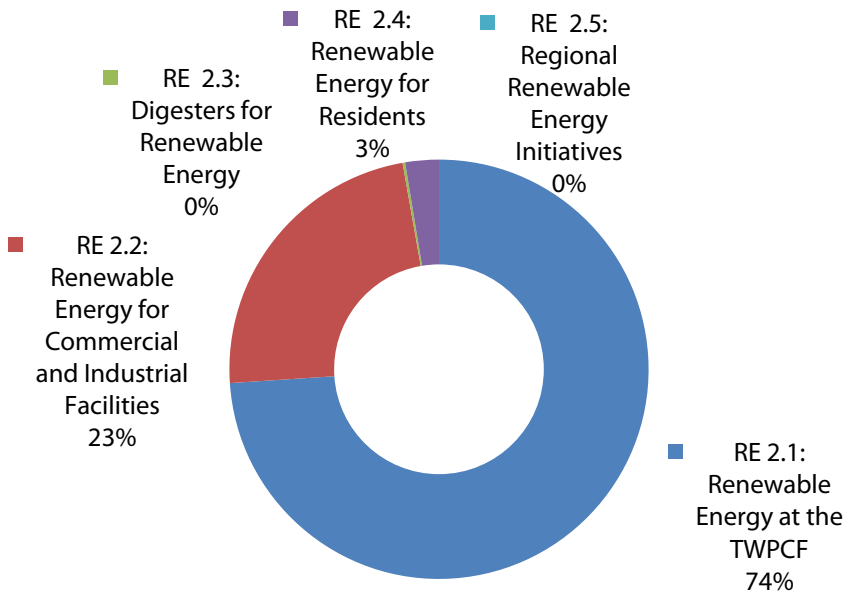
Goal 2:

Promote and Support Renewable Energy Generation and Use

Goal 2:

Promote and Support Renewable Energy Generation and Use

Figure 6-10: 2030 Goal 2 Reductions by Measure



Renewable Energy? We've Got It.

- The City of Tulare the 16th largest on-site green power generator in the United States, producing 9,500,000 annual kWhs of energy from three biogas fuel cells at the City's wastewater treatment plant.

Additional green power honors:

- The U.S. EPA awarded the City of Tulare with a Clean Air Excellence Award in 2008 for the biogas fuel cell project at the wastewater treatment plant.

The City of Tulare is installing a solar dish plant at the wastewater treatment plant

MEASURE RE 2.2: RENEWABLE ENERGY FOR COMMERCIAL AND INDUSTRIAL FACILITIES

Increase reliance on local renewable energy sources through provision of a minimum of 30% of commercial and industrial energy needs from on-site renewable energy sources by 2030.

ACTIONS FOR MEASURE RE 2.2:

RE 2.2.1 Develop a renewable energy strategy that encourages installation of solar energy systems through streamlined permit procedures, optional CALGreen Tier 1 measures, adoption of incentives, fee waivers, or a municipal finance district program that provides a low-risk option for property owners to invest in on-site renewable energy installations.

RE 2.2.2 Continue to participate in the second phase of the statewide AB 811 program, the California PACE Program, to achieve the provision of renewable energy.

RE 2.2.3 Encourage participation in Energy Star programs and best practices for commercial and industrial buildings.

RE 2.2.4 By 2019, require new commercial and industrial land uses greater than 5,000 square feet in size to utilize on-site renewable energy systems to offset a minimum of 30% of the projected building energy use or to pay an in-lieu fee or similar offset fund to be established by the City. Renewable energy systems may include energy generated by solar, wind, geothermal, water, or bio-based energy capture systems.

RE 2.2.5 Encourage private development of a community solar group buy program.

Commercial and industrial energy consumption comprised nearly half of all emissions in the city and Planning Area in 2006. The intent of this measure is to reduce GHG emissions related to commercial energy use by facilitating the development of small-scale distributed renewable energy production, assuming that 30% of baseline energy use will be replaced with renewable energy produced on site by 2030. Renewable energy installations are expected to increase dramatically due to innovative financing strategies like AB 811 and lower costs of renewable energy equipment. The City is well suited for on-site solar installations with its climate.

GOAL 2:

PROMOTE AND SUPPORT RENEWABLE ENERGY GENERATION AND USE

RE 2.2: Renewable Energy for Commercial and Industrial Facilities

GHG Reductions per Year (MT CO_2e)

To Date:	-246
2020:	-29,736
2030:	-74,897

Electricity Reductions per Year (kWh)

To Date:	-853,054
2020:	-112,856,930
2030:	-308,198,644

Natural Gas Reductions per Year (Therms)

To Date:	0
2020:	0
2030:	0

2020 emissions reductions are equivalent to eliminating the annual electricity use of 5,739 California residences.

Goal 2:

Promote and Support Renewable Energy Generation and Use

The City of Tulare is the 16th largest on-site green power generator in the United States and is the only entity in the San Joaquin Valley to make it to the U.S. EPA's Top 20 On-Site Generation list.

U.S. EPA 2010

Group solar programs are another strategy to reduce initial investment costs required to purchase renewable power or to install renewable energy facilities. By aggregating consumer demand through a representative organization or local credit union, participants can achieve enhanced economies of scale and access to more financing models than would be available to a single consumer. This strategy would require coordination with an entity that could assume the responsibility of managing such an endeavor; the cost of administration could be offset through a small fee distributed to all program participants. Potential partners to implement this measure include local credit unions, CSET, Proteus, and the San Joaquin Valley Clean Energy Organization.

- The U.S. EPA awarded the City of Tulare a Certificate of Partnership in the U.S. EPA's Green Power Partnership for its commitment to reduce the risk of climate change through green power purchasing.
- The City's wastewater treatment plant is acting as a testing ground for new solar technology; researchers will be testing concentrated solar dish technology side by side with the plant's solar photovoltaic plant.

The City of Tulare's on-site green power accomplishments can be viewed on the U.S. EPA's website: http://www.epa.gov/greenpower/toplists/top20onsite.htm

MEASURE RE 2.3: DIGESTERS FOR RENEWABLE ENERGY

Support deployment of manure digesters at dairies to capture and convert biogas for on- and off-site electricity needs.

ACTIONS FOR MEASURE RE 2.3:

RE 2.3.1 Promote streamlined review of manure digesters with the San Joaquin Valley Air Pollution Control District and the Central Valley Water Quality Control Board.

RE 2.3.2 Encourage the pursuit of funding and technical resources for manure digester projects through the U.S. EPA AgStar Program, renewable funding opportunities, and other grant programs

RE 2.3.3 Work through local and regional partnerships to position Tulare as a leader in innovative agricultural bioenergy projects and to reduce operational costs for local dairies and other confined animal facilities.

RE 2.3.4 Monitor statewide programs to support the development of pilot bioenergy that could reduce emissions and reduce operational costs for the dairy industry.

RE 2.3.5 Update development standards to allow digesters and other renewable facilities by right in agricultural and industrial land uses.

RE 2.3.6 Work with SJVAPCD to identify other additional barriers to the use of digesters and possible regulatory incentives that can be developed at the local level.

The AB 32 Scoping Plan recognizes digesters as an important renewable energy strategy, and specifically designates the potential for digesters in the Central Valley. Dairy digesters capture biogas from enclosed manure ponds, which is then combusted in engines and turned into energy. The Central Valley Regional Water Quality Control Board adopted a Dairy Digester Final Program Environmental Impact Report (PEIR) in November 2010[5]for anaerobic digestion facilities to streamline environmental review of dairy digesters and reduce costs and application timelines.

[5] Central Valley Regional Water Quality Control Board 2010b.

GOAL 2:

PROMOTE AND SUPPORT RENEWABLE ENERGY GENERATION AND USE

RE 2.3: Digesters for Renewable Energy

GHG Reductions per Year (MT CO_2e)*

To Date:	0
2020:	-2,410
2030:	-639

Electricity Reductions per Year (kWh)

To Date:	0
2020:	-9,145,440
2030:	-2,627,971

Natural Gas Reductions per Year (Therms)

To Date:	0
2020:	0
2030:	0

**This Climate Action Plan does not take credit for the two operating in the city, the Lourenco and Hilarides dairies, which were in operation before the baseline year. The impact of these digesters is captured in the business-as-usual forecast.*

GOAL 2:

PROMOTE AND SUPPORT RENEWABLE ENERGY GENERATION AND USE

RE 2.4: Renewable Energy for Residents

GHG Reductions per Year (MT CO_2e)

To Date:	-159
2020:	-4,774
2030:	-8,338

Electricity Reductions per Year (kWh)

To Date:	0
2020:	-14,535,918
2030:	-26,909,337

Natural Gas Reductions per Year (Therms)

To Date:	0
2020:	0
2030:	0

MEASURE RE 2.4: RENEWABLE ENERGY FOR RESIDENTS

Increase reliance on local renewable energy sources through provision of a minimum of 15% of baseline residential energy needs from on-site renewable energy sources by 2030.

ACTIONS FOR MEASURE RE 2.4:

RE 2.4.1 Implement the Tulare Affordable Solar Program (TASP).

RE 2.4.2 Investigate additional funding sources for the TASP to provide funding mechanisms targeted to the City's affordable housing stock.

RE 2.4.3 Identify barriers to use of on-site renewable energy for residential uses.

RE 2.4.4 Develop a renewable energy strategy that encourages installation of solar energy systems through streamlined permit procedures, optional CALGreen Tier 1 measures, adoption of incentives, fee waivers, or a municipal finance district program that provides a low-risk option for property owners to invest in on-site renewable energy installations. (See also RE 2.2.1.)

RE 2.4.5 Continue to participate in the second phase of the statewide AB 811 program, the California PACE Program.

RE 2.4.6 Identify partners and encourage private sector initiatives to sponsor residential community solar projects or solar group buy efforts.

This measure reduces energy use in the residential sector through the development of small-scale distributed renewable energy production for homes. CALGreen Tier 1 measures support implementation of this measure through voluntary standards that provide guidelines for residential renewable energy systems. New regulations established by the Homebuyer Solar Option further support reductions under this measure, by requiring all new developers of subdivisions to offer solar systems to customers or to pay into an offset system that the California Energy Commission will establish. The City would use the structure of the Homebuyer Solar Option to require developers of multi-family projects to offer solar systems for new multi-family projects.

To address financial barriers and encourage equity in access to renewable energy resources, the City of Tulare has initiated an innovative program to

fund solar facilities for the affordable building stock. The Tulare Affordable Solar Program leverages City money with the CPUC-funded Single-Family Affordable Solar Homes (SASH) Program and the California Solar Initiative. Initially, it will fund a minimum of 22 homes in one of the city's affordable housing projects, the Gail Estates Subdivision. By combining these funding sources, the City expects to cover the entire funding gap for installation of solar. All City funds will be loaned out to participants, and repayment proceeds will go into a revolving loan fund to be utilized for solar by future homeowners. Further, if the solar system is operated for a minimum of 5 years, the loan amount will be forgiven. A total of $55,000 is available, with up to $5,000 available per loan.

Single family homes alongside a public park

Goal 2:

Promote and Support Renewable Energy Generation and Use

GOAL 2:

PROMOTE AND SUPPORT RENEWABLE ENERGY GENERATION AND USE

RE 2.5: Regional Renewable Energy Initiatives

Supportive Measure Captured in the Adjusted Forecast

Residents in Tulare installed 43 residential solar systems through the California Solar Initiative, at an average size of 6.93 kW/installation.

California Solar Initiative 2011

MEASURE RE 2.5: REGIONAL RENEWABLE ENERGY INITIATIVES

Support regional initiatives in expansion of the Valley's renewable energy supplies.

ACTIONS FOR MEASURE RE 2.5:

RE 2.5.1 Implement programs in collaboration with the San Joaquin Valley Clean Energy Organization to aid the region in serving as a demonstration of the 25X25 Initiative to increase use of renewable energy.

RE 2.5.2 Continue to support and facilitate implementation of the Tulare County Regional Blueprint.

RE 2.5.3 Continue participation in the San Joaquin Valley Clean Cities Coalition.

This measure is supportive of other renewable energy measures outlined in the Climate Action Plan, but recognizes that regional endeavors to promote renewable energy are an integral component of local renewable energy program. The City has worked closely with the San Joaquin Valley Clean Energy Organization (SJVCEO), other local jurisdictions, utility providers, and other entities to catalyze renewable energy projects and assess strategies for success in the Valley. Already, the region has made significant strides in the field of renewable energy. Regional partnership holds the potential to provide economies of scale and to establish a competitive clean energy center that attracts jobs and investment.

SJVCEO received a grant through the 25X25 Initiative to develop an online inventory of renewable energy projects that are constructed, in process, or being planned throughout the region. The 25X25 Initiative aims to achieve 25% of energy from renewable resources by the year 2025.

Through its work, SJVCEO is working to growing clean and renewable energy in our Valley. The City of Tulare will continue to support such endeavors as a strategy to inform local strategies and reduce emissions within the city.

Goal 3. Shift single-occupancy vehicle trips to alternative modes.

Transportation is often the largest contributor of GHGs within a community and one of the most complex sectors to address. Economic considerations, political will, and other factors complicate actions to optimize land use and transportation options. Goal 3 measures address both the City's transportation challenges and assets to establish a strategy that enhances daily lifestyle transportation options while reducing the impact of transportation on GHG emissions.

The distribution of land uses throughout a community shape transportation choices; in order to take part in the tasks of daily living, each day people must make choices about transportation that have direct impacts on GHG emissions. Likewise, transportation options and accessibility in turn shape daily lifestyle choices.

As shown in **Figure 6-10**, in 2020 Complete Streets programs under Measure TM 3.3 will contribute the largest proportion of emissions reductions under Goal 3 (46% of Goal 3 reductions). **Figure 6-10** shows that with the operation of a light rail line between Tulare and the City of Visalia by 2030, public transit will yield the highest reduction (38% of Goal 3 reductions). These measures are discussed in further detail below.

Goal 3:

Shift single-occupancy vehicle trips to alternative modes

The Tulare Public Library models the benefits of a centrally-located project that is integrated with multi-modal transportation networks, including bicycle paths and bus routes.

A map of the Tulare Public Library

Goal 3:

Shift single-occupancy vehicle trips to alternative modes

Figure 6-11: 2020 Goal 3 Reductions by Measure

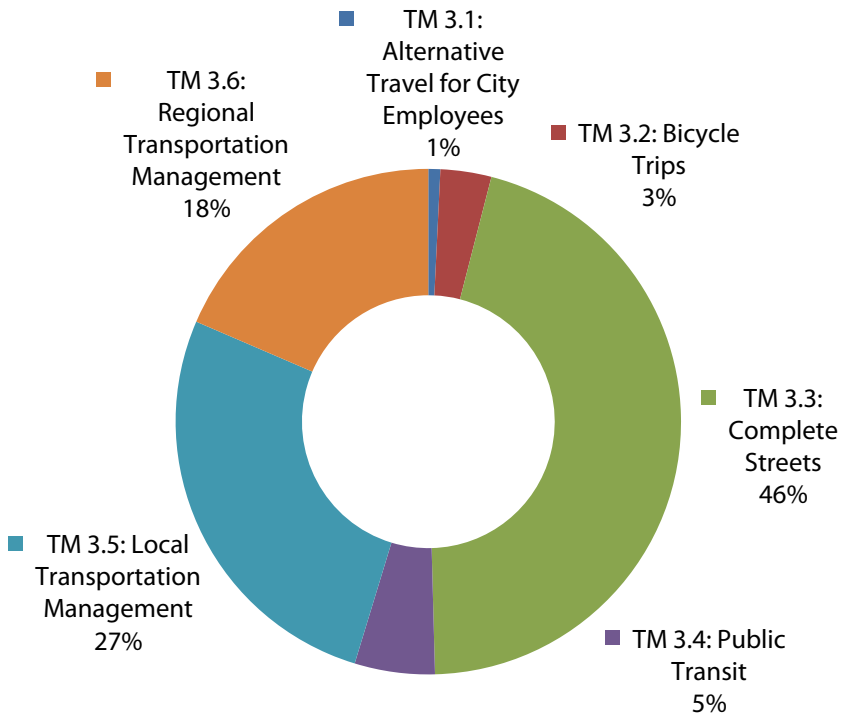
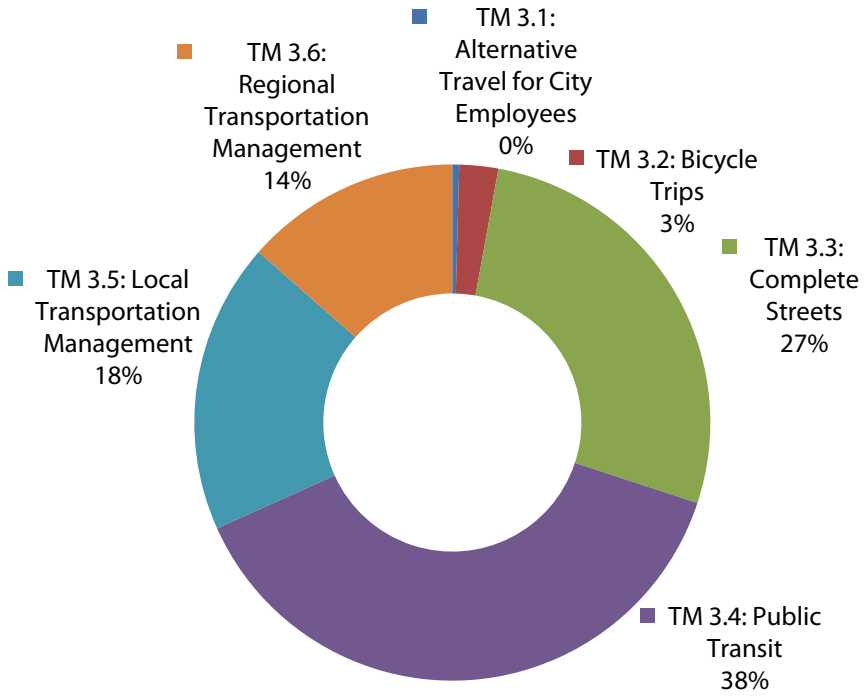


Figure 6-12: 2030 Goal 3 Reductions by Measure



MEASURE TM 3.2: BICYCLE TRIPS

Increase transportation-related bicycle trips to reduce vehicle miles traveled.

ACTIONS FOR MEASURE TM 3.2:

TM 3.2.1 Provide bicycle support facilities, such as showers, lockers, and bicycle racks, at all new public facilities.

TM 3.2.2 Implement the Tulare County 2010 Regional Bicycle and Transportation Plan within the city.

TM 3.2.3 Update the allowance of Zoning Code Section 10.92.050 (M) for "lots with 40 or more spaces [to] substitute a bicycle rack, providing space for at least five bicycles at a ratio of one bicycle rack for each 40 spaces" to require bicycle parking at a ratio of 1 bicycle space per every 20 vehicle spaces with support facilities at all new commercial, industrial, public/quasi-public, parks and recreation, and multi-family residential uses, or for the expansions of any of these existing uses over 10%.

TM 3.2.4 Investigate and address barriers to bicycle use.

TM 3.2.5 Evaluate the benefits of becoming a designated Bicycle Friendly Community through the League of American Bicyclists.

An integrated, multimodal land use system facilitates the use of bicycle travel as an effective alternative to traditional vehicles. In 2010, the City had approximately 38 miles of bicycle lanes, including 8 miles of off-road bicycle lanes (Class I facilities) and 30.13 miles of marked on-road bicycle lanes (Class II facilities). According to the 2010 Draft Bicycle Master Plan, the current bicycle-commuting rate in the city is 1.1%. The Santa Fe Trail is an exemplary multi-use trail that runs east to west across the city, supporting bicycle use. This measure establishes a comprehensive approach to reduce transportation emissions by providing expanded bicycle facilities.

The City will work to increase bicycle use throughout the community by implementing the Bicycle Master Plan and adopting new standards for the provision of bicycle support facilities, including showers, lockers, and bicycle racks. The City will install an additional 162 miles of bicycle lanes by 2030, for a total of approximately 200 miles of bicycle lanes by 2030. This total will include 45 miles of Class I bicycle lanes, 94 miles of Class II bicycle

GOAL 3:

SHIFT SINGLE-OCCUPANCY VEHICLE TRIPS TO ALTERNATIVE MODES

TM 3.2: Bicycle Trips

GHG Reductions per Year ($MT\ CO_2e$)

To Date:	0
2020:	-168
2030:	-285

Vehicle Miles Traveled (VMT) Reductions per Year

To Date:	0
2020:	-385,013
2030:	-700,554

Goal 3:

Shift single-occupancy vehicle trips to alternative modes

lanes, and 22 miles of Class III bicycle lanes. The City will implement the minimum CALGreen standards to require the provision of bicycle parking at nonresidential facilities and adopt additional standards to require the provision of bicycle facilities for additional medium- and high-density residential uses. The City will also work to update zoning provisions that may no longer effectively achieve the City's intent, such as Zoning Code Section 9.52.020, which requires a licensing fee. The City will investigate effective means to track bicycle ownership and protect against bicycle theft while also minimizing barriers to bicycle use.

This measure builds on the City's proactive efforts to promote pedestrian and bicycle travel for schoolchildren through involved education. Caltrans awarded the City two grants to implement Community-Based Transportation Plans to foster non-motorized transit. The first plan, the West Tulare Target Area Community-Based Transportation Plan, targeted a portion of the West Tulare Redevelopment Area, encompassing Tulare, Roosevelt Elementary School, and Mulcahy Middle School. This area lacked critical infrastructure to support safe routes to and from school, including sidewalks, crosswalks, and bike lanes. Using grant funds, the City involved schoolchildren in a Walk to School Day event, during which the project team administered a survey. The project team also assessed bicycle and pedestrian facilities. The final product of the project was the West Tulare Area Community-Based Transportation Plan, which includes a prioritized list of projects for funding, such as bicycle routes.

The City recognizes the importance of education in promoting bicycle use. The City recognizes that community perception, and not the actual existence of facilities, may sometimes serve as the primary determining factor in local bicycle commute patterns. The City will pursue additional funding for creative programs to overcome perceived barriers to bicycle use.

MEASURE TM 3.3: COMPLETE STREETS

Improve mobility by implementing a citywide Complete Streets ordinance and program.

ACTIONS FOR MEASURE TM 3.3:

TM 3.3.1 Partner with local schools to implement and expand Community-Based Transportation Plans and pursue Safe Routes to School programs.

TM 3.3.2 Adopt a Complete Streets Ordinance that directs the City to meet the needs of all transportation users.

This measure supports alternative transportation through the adoption of and creation of a Complete Streets approach to transportation. Complete Streets refer to an integrated, multimodal transportation system that equally supports all types of transportation, including pedestrian, bicycle, and vehicular traffic.

The California Complete Streets Act, adopted with Assembly Bill 1358, requires local jurisdictions to plan for multimodal transportation and all users. Any substantial revision of the circulation element of a general plan is to plan for a "balanced, multimodal transportation network that meets the needs of all users of the streets, roads, and highways for safe and convenient travel in a manner that is suitable to the rural, suburban, or urban context of the general plan."[6] Through a Complete Streets approach to transportation, the City will elevate the dominance of non-motorized transportation throughout the city's transportation network. Strategies include traffic calming features, multimodal lanes, landscaping, planter strips with trees, raised crosswalks, median islands, and other features. Additional strategies the City may consider are car-free zones and bicycle boulevards.

Safe Routes to School programs are another complete streets strategy. This strategy will pair existing Community-Based Transportation Plan efforts with a Safe Routes to School program to actively promote walking as a safe mode of local travel, particularly for children attending local schools, by employing traffic calming methods such as median landscaping and provision of sidewalk or bike lanes to slow traffic, improving roadway capacity, and addressing safety issues.

[6] Governor's Office of Planning and Research 2010

GOAL 3:

SHIFT SINGLE-OCCUPANCY VEHICLE TRIPS TO ALTERNATIVE MODES

TM 3.3: Complete Streets

GHG Reductions per Year (MT CO_2e)

To Date:	0
2020:	-2,346
2030:	-3,184

Vehicle Miles Traveled (VMT) Reductions per Year

To Date:	0
2020:	-5,373,426
2030:	-7,814,658

Complete Streets programs will yield 46% of Goal 3 reductions in 2020.

Goal 3:

Shift single-occupancy vehicle trips to alternative modes

The City has procured over $100,000 in grant funds from Caltrans to assess and remedy barriers to school children bicycling and pedestrian activity.

According to the most recent census data, approximately 25% of the population consists of school-age children in Tulare, 13,348 children between the ages of 6 and 18 in 2000.[7] Travel to school represents 10–15% of peak period motor vehicle trips in many urban areas. Chauffeuring children to school often results in two vehicle trips, one to the school and one returning home, or four additional trips per day. There are currently few detailed studies of the effectiveness of school transport management programs, but anecdotal evidence indicates that total reductions in automobile trips of 10–20% or more are possible at a particular school, and much greater reductions are possible when schools are sited and designed for good accessibility. School transport management can provide financial savings to schools and parents, help reduce parking and traffic problems, reduce pollution, and provide safety and health benefits.

The City has already successfully advocated for the right to alternative transportation options for Tulare students: the City has procured over $100,000 in grant funds from Caltrans to assess and remedy barriers to schoolchildren bicycling and pedestrian activity. Increasing opportunities for healthy, active transportation choices that are not reliant on cars reduces GHG emissions and supports the lifestyles that the students in Tulare desire: 37% of surveyed students would prefer to walk to school, 30% would prefer to bicycle to school, while only 17% would prefer to travel to school by car.

One of Tulare's traditional neighborhood tree-lined streets

[7] U.S. Census 2000.

MEASURE TM 3.4: PUBLIC TRANSIT

Expand public transit routes and provide light rail transit options.

ACTIONS FOR MEASURE TM 3.4:

TM 3.4.1 Expand public transit routes of the Tulare Intermodal Express (TIME) to provide convenient transit options throughout the city for enhanced intracity service as feasible.

TM 3.4.2 In cooperation with the Smart Valley Places Consortium, facilitate a light rail line between Visalia and Tulare for enhanced intercity travel.

TM 3.4.3 Continue to investigate feasible regional transit options.

TM 3.4.4 Continue to conduct regular studies on the adequacy of existing bus stops throughout the city.

The City of Tulare will work to reduce single-occupancy vehicle use through expanded public bus routes and a new light rail line that is planned between the cities of Tulare and Visalia. Currently, the Tulare Intermodal Express (TIME) serves the city's residents through fixed routes and Dial-A-Ride service. Where available, public transit service primarily serves the transit-dependent population, including the elderly, students, low-income residents, and the physically handicapped. This measure calls for the expansion of service to support the daily transportation needs of a greater proportion of the population. Increased ridership will be achieved through a combination of additional fixed routes, bus stops, and land uses that are designed to integrate public transit.

The City is also in the process of supporting the planning of a light rail line that would connect downtown Tulare, the City of Visalia, and Porterville. This public transit route is one of the primary strategies identified in the Tulare County Regional Blueprint to achieve the 25% density increase scenario that was adopted by all jurisdictions in Tulare County through the San Joaquin Valley Regional Blueprint process. With the award of funds from the U.S. Department of Housing and Urban Development (HUD), valley communities are now equipped to plan for the infrastructure necessary to achieve this scenario. A sizeable portion of the award is allocated to conduct corridor planning for the light rail line through a coordinated effort between the cities of Tulare, Visalia, and Porterville and the Tulare County Association of Governments (TCAG). This measure quantifies the impact of the light rail line as forecast by the 2007 feasibility study that was prepared by TCAG, assuming the forecast impact on work

GOAL 3:

SHIFT SINGLE-OCCUPANCY VEHICLE TRIPS TO ALTERNATIVE MODES

TM 3.4: Public Transit

GHG Reductions per Year ($MT\ CO_2e$)

To Date:	0
2020:	-264
2030:	-4,477

Vehicle Miles Traveled (VMT) Reductions per Year

To Date:	0
2020:	-2,476,015
2030:	-13,022,357

Goal 3:

Shift single-occupancy vehicle trips to alternative modes

commute patterns.[8] The project is anticipated to result in transit-oriented land uses and densities along identified corridors, the design of shared streets, future light railroad geometry, and coordinated light rail planning between jurisdictions.

TCAG has forecast that the light rail line will generate between 834 and 4,148 riders between Tulare and Visalia each weekday by 2030. Construction of the light rail line is dependent upon the acquisition of additional funding: TCAG estimates that construction of the light rail line would cost between $503 and $644 million.[9] Completion of the light rail corridor planning will equip valley communities to pursue funding for completion of the light rail line. This measure assumes that the light rail line is funded and fully operational by 2030. Reductions provided under this measure result from the change in work commute trip modes between Tulare and Visalia.

Clean Trucking for Heavy-Duty Trucks: What's in it for Tulare?

- Cost savings for trucking fleets. LNG fuels save from $0.35 to $1.73 per gallon compared to diesel on an energy equivalent basis.
- Potential to establish Tulare as an alternative fuel economic cluster with enhanced jobs and revue potential.

See page 6-41 of this Chapter for more details.

[8] 2007

[9] 2007.

MEASURE TM 3.5: LOCAL TRANSPORTATION MANAGEMENT

Reduce work-related vehicle miles traveled through support of transportation demand management programs.

ACTIONS FOR MEASURE TM 3.5:

TM 3.5.1 Support local employer-based trip reductions consistent with the San Joaquin Valley Air Pollution Control District's Employer-Based Trip Reduction Program (Rule 9410).

TM 3.5.2 Encourage transportation management associations or transportation demand management in new commercial and mixed-use developments even when they do not meet the thresholds of compliance for the San Joaquin Valley Air Pollution Control District's Rule 9410.

This measure takes credit for the impact of Rule 9410 on employees in Tulare. The San Joaquin Valley Air Pollution Control District has established Rule 9410 to require proactive transportation management strategies that reduce vehicular use. By 2013, all employers with 100 or more eligible employees will be required to submit a strategy for employee trip reductions (the Employer Trip Reduction Implementation Plan, or ETRIP). Eligible employees generally exclude part-time, seasonal, or emergency employees. The ETRIP must satisfy a minimum threshold of points for three phases: marketing and program support strategy, services and facilities strategy, and transportation, alternative schedule, and incentives strategy. Initials strategy for marketing strategy and program support strategy must be submitted to SJVAPCD by September 1, 2011. ETRIP implementation will commence on January 1, 2014.

Consistent with local employment trends in the year 2006, a minimum of approximately 21% of employees in the City of Tulare work for employers with over 100 employees. This measure assumes the impact of Rule 9410 in reducing work commutes of all employees who would likely be impacted by the rule. Employers will be required to submit annual ETRIPs and conduct annual commute verification assessments for ongoing compliance.

GOAL 3:

SHIFT SINGLE-OCCUPANCY VEHICLE TRIPS TO ALTERNATIVE MODES

TM 3.5: Local Transportation Management

GHG Reductions per Year (MT CO_2e)

To Date:	0
2020:	-1,379
2030:	-2,134

Vehicle Miles Traveled (VMT) Reductions per Year

To Date:	0
2020:	-3,157,781
2030:	-5,236,309

Goal 3:

Shift single-occupancy vehicle trips to alternative modes

TM 3.6: Regional Transportation Management

GHG Reductions per Year ($MT\ CO_2e$)

To Date:	0
2020:	-954
2030:	-1,582

Vehicle Miles Traveled (VMT) Reductions per Year

To Date:	0
2020:	-1,718,633
2030:	-2,849,879

2020 emissions reductions are equivalent to saving 133,165 gallons of fuel.

MEASURE TM 3.6: REGIONAL TRANSPORTATION MANAGEMENT

Support regional transportation management programs to shift single-occupancy vehicle trips to other modes.

ACTIONS FOR MEASURE TM 3.6:

TM 3.6.1 Continue to support and facilitate implementation of the Tulare County Regional Blueprint to generate regional alternatives to single-occupancy vehicle commutes.

TM 3.6.2 In partnership with TCAG, promote the establishment of Transportation Management Associations (TMAs) to coordinate small-business rideshare programs.

TM 3.6.3 Promote Valley Rides to encourage carpooling and rideshare options in collaboration with the Tulare Council of Governments and the Council of Fresno County Governments.

TM 3.6.4 Pursuant to Senate Bill (SB) 375, support the development of a regional Sustainable Communities Strategy and support its implementation through local plans and programs.

TM 3.6.5 Support regional planning initiatives through the Smart Valley Places Consortium.

According to the 2007 American Communities Survey, approximately 9% of local residents commuted out of the City of Tulare for work. Similar to measure TM 3-5, this measure takes credit for the impact of transportation management strategies that Rule 9410 establishes; however, this measure focuses specifically on the impact on residents that commute out of town for employment. Regional programs that will facilitate implementation of this measure include the regional Valley Rides program. Recognizing that the existing Rule 9410 only establishes mandatory transportation management compliance for employers with over 100 employees, the City will also work with regional partners to coordinate efforts of small businesses to reduce employee commutes.

Goal 4. Reduce emissions from vehicles.

Goal 4:

Reduce Emissions from Vehicles

For vehicular trips that cannot be shifted to alternative forms, the City has established strategies to optimize vehicle operating efficiencies. Similar to Goal 3, this goal targets vehicle emissions for reduction. These measures include the deployment of clean fuel vehicles at both the local scale and regional scale and enhancement of the circulation network. A supportive infrastructure facilitates the deployment of clean fuel vehicles throughout the community as viable alternatives to traditional vehicles. Rather than traditional gas stations, these clean fuel vehicles require alternative fueling stations and charging station facilities. The City recognizes that both supportive and regulatory strategies are necessary for clean fuel vehicles to flourish in the city.

Measures in Goal 4 also recognize that traditional vehicles can operate more efficiently in a circulation system that allows for direct and effective vehicle flow. Vehicles emit higher concentrations of greenhouse gases (GHGs) while idling at stop signs and traffic signals. Roundabouts and synchronized traffic signals help to move traffic and minimize high-impact idling trends.

The City of Tulare's transportation characteristics are unlike other areas throughout the state; Tulare is a central node for statewide trucking routes and manufacturing activity, with a much higher proportion of heavy-duty trucking activity than jurisdictions outside of the Central Valley. Heavy-duty trucks are high-emitting contributors to GHG emissions. However, this Plan recognizes this factor as a unique asset for the city rather than a liability.

Goal 4 includes several key measures that highlight the importance of the trucking industry in Tulare and establish strategies to capitalize on its unique assets. These measures also facilitate enhanced economic competitiveness and specialization in the deployment of new technologies that can bring jobs to Tulare.

Goal 4 includes measures that highlight the importance of the trucking industry in Tulare and establish strategies to capitalize on its unique assets.

Measure VE 4.3 (Clean Fuel Node) contributes the majority of emissions reductions for Goal 4 in both 2020 (**Figure 6-12**) and 2030 (**Figure 6-13**), representing 79% and 81%, respectively. This goal includes reductions from the conversion of the City's fleet to clean fuel vehicles (Measure VE 4.1), which is discussed in further detail in **Chapter 5**.

Goal 4:

Reduce Emissions from Vehicles

Figure 6-13: 2020 Goal 4 Reductions by Measure

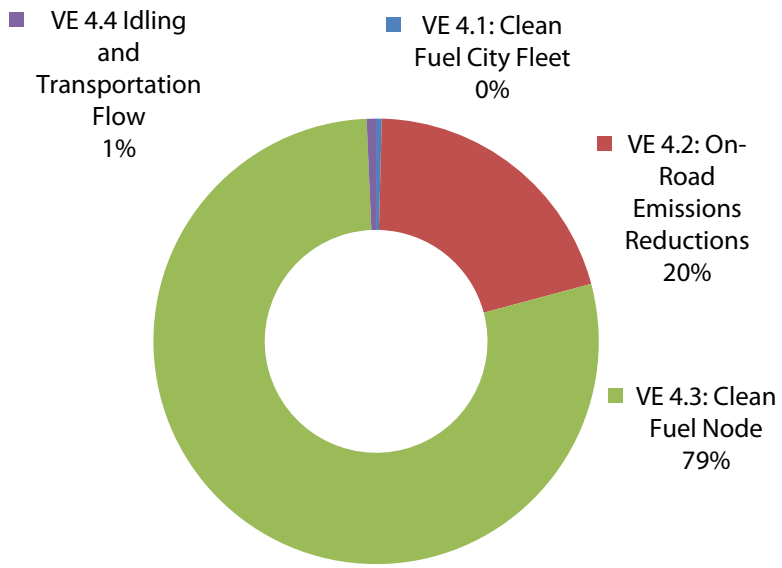
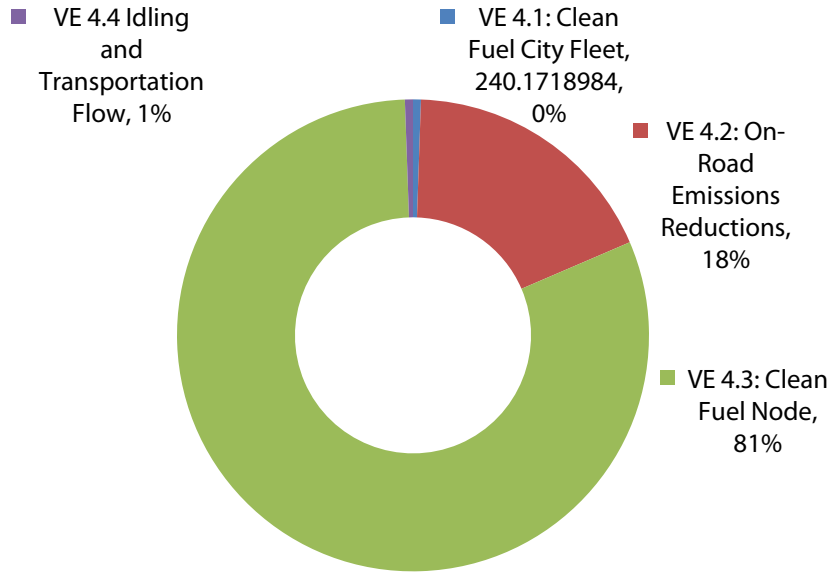


Figure 6-14: 2030 Goal 4 Reductions by Measure



MEASURE VE 4.2: ON-ROAD VEHICLE EMISSIONS REDUCTIONS

Reduce emissions from on-road vehicle sources.

ACTIONS FOR MEASURE VE 4.2:

VE 4.2.1 Update standards to require electric vehicle charging facilities at new large commercial developments and require parking for low-emitting and fuel-efficient vehicles as required by CALGreen.

[At this time, CALGreen nonresidential Tier 1 mandatory measure A5.106.5.1 requires designated parking for any combination of low emitting, fuel-efficient and carpool/van pool vehicles as shown in Table A5.106.5.1.1 for Tier 1 at 10% of total spaces.]

VE 4.2.2 Continue to pursue funding for local electric vehicle pilot programs for programs such as the Tulare Electric Vehicle Charging Station Project.

VE 4.2.3 Partner with local employers to conduct clean fuel education and outreach.

VE 4.2.4 Pursue funding and partnerships to establish a local car-share program as supported by the objectives of the Clean Air Committee's focus in Section 1.68.030 of the Municipal Code.

The City recognizes the importance of establishing a transportation infrastructure that will support the competitive vehicle class of the future. This measure seeks to expand the clean vehicle fleet through new regulatory standards, incentives, a car-share program, and proactive outreach and education. New development standards will defer to the statewide requirements for electric vehicle charging established by CALGreen and create additional incentives with parking reductions that can be achieved through the provision of charging stations beyond the minimum requisite amount. Through this approach, the City will spur the deployment of cost-effective clean fuel vehicles that benefit local economic enterprise and residents at large. Establishing the smart transportation infrastructure of tomorrow will also further strengthen the City's role as an economic node in the statewide transportation distribution chain. Clean vehicles will provide further opportunity to spur the expansion of innovations in the local economic sector while benefiting the population at large.

GOAL 4:

REDUCE EMISSIONS FROM VEHICLES

VE 4.2: On-Road Vehicle Emissions Reductions

GHG Reductions per Year (MT CO_2e)

To Date:	0
2020:	-2,410
2030:	-639

Vehicle Miles Traveled (VMT) Reductions per Year

To Date:	0
2020:	-6,474
2030:	-8,004

Increased Electricity per Year (kWh)

To Date:	0
2020:	19,288
2030:	28,331

Goal 4:

Reduce Emissions from Vehicles

In addition to the innovations of a clean vehicle economy, the City recognizes the value of these strategies in empowering residents to achieve cost savings and more effective vehicle use. Car-share programs throughout the country have demonstrated that participants can achieve significant cost savings; they provide a viable alternative for an income-restricted population to benefit from the option of traditional vehicular use without the burden of traditional vehicular ownership costs.

The City has initiated this measure through its pursuit of funding for the Tulare Electric Vehicle (TEV) Charging Station application through a California Energy Commission Program. The California Energy Commission did not award the City funds for the TEV project, but gave the City honorable mention in case additional funds should arise. The City will continue to pursue funding to implement this measure. In the award application, the City investigated partnership potential. The City identified the Tulare Public Library and the Preferred Outlet Mall as prime areas for the initial installation of electric vehicle infrastructure. The AgTac center is also another prime location to deploy electric vehicle infrastructure partnered with proactive educational efforts. AgTac currently hosts many of the City's and Edison's educational events and displays, and is the location of the City's sole existing electric vehicle charging station. The City's efforts to pursue funding for the TEV project also recognized that an extensive community outreach and education component would be necessary.

Electric Vehicles: Equipping Tulare's Residents to Save Money. Plug-in electric vehicles can reduce fuel costs by 80%.

Electric and other clean fuel vehicles provide long-term cost savings that more than justify up-front investment.

Costs to drive 100 miles by vehicle type:

- Battery electric vehicle: $2.50
- Plug-in hybrid electric vehicle: $5.75
- Conventional hybrid vehicle: $6.50
- Conventional gasoline vehicle: $11.00
- Assuming gasoline prices of $3.00/gallon, electricity costs of $0.10/kWh and plug-in electric vehicles with 20 miles of all-electric range.

California Plug-In Electric Vehicle Collaborative 2010.

MEASURE VE 4.3: CLEAN FUEL NETWORK

Establish Tulare as a key node in local and regional commercial and industrial clean fuel infrastructure that demonstrates statewide leadership in supporting a clean heavy-duty fleet.

ACTIONS FOR MEASURE VE 4.3:

VE 4.3.1 Expand alternative fuel infrastructure to promote conversion of industrial fleets to alternative fuel vehicles.

VE 4.3.2 Remove barriers to co-location of alternative fuels at existing service stations.

VE 4.3.3 Ensure adequate standards to facilitate new opportunities for alternative fuel infrastructure.

VE 4.3.4 Support conversion of the commercial fleets to alternative fuel vehicles as local, state, or federal funding sources become available.

The City of Tulare is located along State Route 99 and serves as a primary distributional and trucking center for regional and statewide routes. The City will capitalize on this unique asset and position itself to further strengthen its leadership in the trucking distribution industry, by taking proactive actions to facilitate the conversion of heavy-duty trucks to clean fuels while also encouraging the provision of alternative fuel infrastructure. These actions will equip the local trucking sector to realize the full benefits of clean fuels, while also catalyzing the City of Tulare's clean fuel economy as a dominant point of service for emerging, statewide, clean fuel trucking operations.

The City will work to remove regulatory hurdles to the provision of new clean fueling stations and will identify incentives and possibilities to encourage the co-location of multiple fueling facilities. The City is currently in the process of reviewing plans to allow CleanEnergy, a private fueling company, to operate the City's alternative fuel station. CleanEnergy has successfully partnered with private and public entities to obtain funding for the conversion of heavy-duty trucks to alternative fuels. The intersection of this company's interests with the City's intent in reducing heavy-duty trucking emissions is just one of many strategies that the City will employ to achieve this measure.

GOAL 4:

REDUCE EMISSIONS FROM VEHICLES

VE 4.3: Clean Fuel Network

GHG Reductions per Year (MT CO_2e)

To Date:	0
2020:	-24,850
2030:	-35,980

Vehicle Miles Traveled (VMT) Reductions per Year

To Date:	0
2020:	0
2030:	0

Increased Electricity per Year (kWh)

To Date:	0
2020:	0
2030:	0

Fuel Reductions per Year (gallons)

To Date:	0
2020:	-5,771,475
2030:	-8,356,314

Captures net reductions that account for increased consumption of compressed natural gas.

Goal 4:

Reduce Emissions from Vehicles

The City will actively support efforts to upgrade the local heavy-duty fleet to enhance cost savings and industrial profitability.

Tulare's CNG/LNG station

In addition, numerous financial programs are available that the City can pursue alone or in partnership with public and private entities to spur the development of clean fuel infrastructure for the trucking community. State incentive programs include the California Energy Commission-administered Alternative and Renewable Fuel and Vehicle Technology Program, which provides grants and loans for the expansion of alternative fuel infrastructure, vehicles, and equipment, including new training programs and public outreach.

The San Joaquin Valley Air Pollution Control District administers a similar program, the REMOVE II program, which provides between $1,000 and $3,000 to offset the costs of low-emission passenger vehicles, light-duty trucks, small buses, and trucks with gross vehicle weight ratings of 14,000 pounds or less. Credits can only be provided for alternative fuel, electric, and hybrid electric engines/motors. This program also provides funds for education related to the maintenance, operations, and tools for alternative fuel technologies.

In addition, the California Air Resources Board offers a Providing Loan Assistance for California Equipment (PLACE) Program for On-Road Vehicles to support compliance with the Heavy-Duty Vehicle Greenhouse Gas Emission Reduction Regulation. Through programs such as the U.S. EPA's SmartWay Finance Program, the City can also apply for funding to establish a finance program to assist the private sector in reducing diesel emissions through retrofit devices, emission control technologies, idle reduction technologies, and vehicle or equipment replacements.

Closer link to spur the domestic economy:

- LNG and CNG fuels are primarily produced domestically in North America.
- Cleaner vehicles are better for air quality and emit less GHGs.

Clean Energy 2008.

MEASURE VE 4.4: VEHICLE IDLING AND FLOW

Reduce emissions from on-road commercial and industrial transportation sources through reduced vehicle idling and efficient vehicle flow.

ACTIONS FOR MEASURE VE 4.4:

VE 4.4.1 Adopt and enforce an anti-idling ordinance.

VE 4.4.2 Investigate opportunities to encourage use of electrified loading docks, zero emission vehicles (ZEV), and/or plug-in electric vehicles (PHEV) for on-site industrial use.

VE 4.4.3 Implement a traffic signal synchronization program that reduces idling along heavy-duty truck routes throughout the City of Tulare.

The City will promote enhanced efficiencies for industrial vehicle operations and flow. Completing traffic signal synchronization (TSS) program along primary trucking routes in the city will more effectively move heavy-duty trucking throughout the city and reduce emissions from these trucking operations. Increased enforcement of state idling laws will further support the GHG emissions reductions outlined in this measure. As appropriate, the City will also encourage the supportive actions of site-specific actions at industrial facilities, including the electrification of loading docks at industrial facilities or the use of other idling-reducing systems. Typically, heavy-duty trucks with refrigerated goods idle at loading docks and during layovers so that the engine continues to power cab cooling elements. The installation of the appropriate technology allows for continued refrigeration performance without engine idling.[10]

Heavy duty truck at one of Tulare's industrial sites

[10] California Air Pollution Control Officers Association 2010.

GOAL 4:

REDUCE EMISSIONS FROM VEHICLES

VE 4.4: Vehicle Idling and Flow

GHG Reductions per Year (MT CO_2e)

To Date:	0
2020:	-215
2030:	-242

Vehicle Miles Traveled (VMT) Reductions per Year

To Date:	0
2020:	0
2030:	0

Increased Electricity per Year (kWh)

To Date:	0
2020:	0
2030:	0

Fuel Reductions per Year (gallons)

To Date:	0
2020:	-23,438
2030:	-28,332

GOAL 5:

INCREASE ACCESSIBLE LAND USE TO REDUCE VEHICULAR TRIPS

One of Tulare's centrally located older homes near Downtown

GOAL 5. INCREASE ACCESSIBLE LAND USE TO REDUCE VEHICULAR TRIPS.

The creation of integrated or mixed land use patterns that promote walking, bicycling, and the use of alternative transportation is another approach to reducing transportation emissions. These strategies support other goals contained in this Climate Action Plan that specifically target transportation actions.

The City of Tulare is a rural community characterized by traditional urban and suburban neighborhoods with a distinct and historic downtown core. The historic downtown serves as the city's central business district, replete with a variety of offices and boutiques. Downtown is also home to City Hall, the city's oldest historic neighborhoods, one of the city's high schools, and several of the city's largest industrial and manufacturing employers. Newer shopping centers provide a variety of stores, including the region's only factory-outlet center. In addition to the local road network that link the city's land uses, State Route 99 runs through the community, carrying a high proportion of heavy-duty vehicle trucking activity. Heavy-duty traffic also runs in and out of the city to link the city's manufacturing industry to the statewide distribution system. On a smaller scale, the city's primary pedestrian-scale transit route is the Santa Fe Trail, a trail that runs east to west across the entire span of the city. The trail is a popular multi-use trail for bicycle, pedestrian, and horse activity.

Measure 5.1 yields all reductions that the City attains through this goal (**Figure 6-1 and Figure 6-2**). Additional detail concerning this measure is provided below.

Complete Streets are designed and operated to enable safe access for all users. Pedestrians, bicyclists, motorists, and transit riders of all ages and abilities must be able to safely move along and across a complete street.

National Complete Streets Coalition, www.completestreets.org

MEASURE LU 5.1: ACCESSIBLE HOUSING

Promote accessible housing near transit and services to reduce vehicular trips.

ACTIONS FOR MEASURE LU 5.1:

LU 5.1.1 Encourage compact, higher-density housing near commercial services, employment centers, principal arterial routes, and public transportation, characterized by vertical and horizontal mixed uses.

LU 5.1.2 Support vibrant, mixed-use neighborhoods characterized by a mix of land uses, pedestrian and transit accessibility, and neighborhood identity.

LU 5.1.3 Ensure that affordable housing has access to services, transit, and alternative modes of travel.

LU 5.1.4 Support infill development throughout the city as supported by CALGreen measures.

LU 5.1.5 Evaluate the feasibility of increasing densities allowed by the General Plan to exceed 29 dwelling units per acre in target mixed-use areas.

LU 5.1.6 Improve the jobs-housing balance within the city.

LU 5.1.7 Develop a transit-oriented (TOD) specific plan with location and design standards to support a light rail line between Tulare and Visalia.

The City will reduce transportation emissions through strategies to develop a transit-oriented development (TOD) at the planned light rail station, improving the local jobs-housing mix, and achieving forecast buildout densities.

The City has initiated a TOD Study using U.S. Department of Housing and Urban Development (HUD) grant funds. The TOD project will provide a minimum of 2,000 housing units to support the densities that the Tulare County Association of Governments (TCAG) has found would be necessary for the viability of the light rail line that will connect Tulare and Visalia. The TOD Study will inform a General Plan Amendment, building on the Tulare Blueprint. This project will increase the city's affordable housing stock and mixed uses that are transit-accessible. The densities and mix of land uses

GOAL 5:

INCREASE ACCESSIBLE LAND USE TO REDUCE VEHICULAR TRIPS

LU 5.1: Accessible Housing

GHG Reductions per Year (MT CO_2e)

To Date:	-1,668
2020:	-5,793
2030:	-11,303

Vehicle Miles Traveled (VMT) Reductions per Year

To Date:	-3,004,575
2020:	-13,269,307
2030:	-27,739,839

2020 emissions reductions are equivalent to saving 559,571 gallons of fuel.

Goal 5:

Increase Accessible Land Use to Reduce Vehicular Trips

From 2003 to 2008, all approved high-density residential land uses in the city were located within a quarter-mile walking distance of shopping and daily services.

High-density housing in Tulare

will be designed to support light rail in the long term and rapid bus transit in the short term. This project builds on the City's success to date in providing housing in optimum locations. From 2003 to 2008, all approved high-density residential land uses were located within a quarter-mile walking distance of shopping and daily services.

The implementation of this measure will position the City for implementation of SB 375 through the alignment of housing and transportation options that reduce the need to drive, and in turn, reduce emissions from the transportation sector. Full implementation of this measure is dependent upon implementation of the General Plan with the full range of high-density housing options. The City will also undertake a review of existing development standards to allow for mixed uses by right. Currently, mixed uses are only available through application for an overlay zone. The City will identify appropriate strategies to address concerns with mixed use while also removing obstacles to achieving the mixed uses that are envisioned by this measure.

What is SB 375?

The primary legislative vehicle driving California's climate change efforts:

- It establishes the greatest foundation for local jurisdiction to understand their role in implementing AB 32.
- Local governments will work to achieve per capita transportation greenhouse gas emissions established by the Regional Targets Advisory Committee and assigned to local governments by Metropolitan Planning Organizations.
- Local governments will achieve these reductions by aligning housing and transportation planning, including adoption of housing elements that achieve new Regional Housing Needs Allocation (RHNA) targets that will now be aligned with the SB 375 planning process.
- This Climate Action Plan prepares the City for implementation of SB 375 by directing the City to strategies that will be implemented through the General Plan to integrate housing and transportation to reduce greenhouse gas emissions.

MEASURE LU 5.2: REGIONAL BLUEPRINT

Work with partners to implement Blueprint Principles and create a regional setting that supports smart land use decisions in Tulare.

ACTIONS FOR MEASURE LU 5.2:

LU 5.2.1 Work with the San Joaquin Valley Partnership to support and implement smart land use projects.

LU 5.2.2 Continue to investigate and contribute to regional opportunities for collaboration to fund cooperative land use planning.

LU 5.2.3 Adopt and work to implement the Regional Housing Needs Allocation in support of SB 375 implementation.

The City of Tulare is a partner with 14 other Valley cities and California State University-Fresno in the California Partnership for the San Joaquin Valley (the SJV Partnership), which jointly applied as the Smart Valley Places Consortium to the Sustainable Communities Regional Planning Grant Program established by the U.S. Department of Housing and Urban Development (HUD). The Consortium was awarded approximately $4.5 million to implement numerous smart growth projects throughout the Valley.

The Consortium will administer funding to implement an integrated Regional Plan for Sustainable Development in the San Joaquin Valley. This single plan will guide coordinated development throughout the San Joaquin Valley for the next 20-plus years. The project will facilitate implementation of the regional San Joaquin Valley Blueprint (Blueprint). The Blueprint was created through an extensive process initiated in 2006 and involved representatives from all of the Valley's counties. Because of this process, 12 smart growth principles were adopted and will now be integrated into local planning through the Consortium's administration of the HUD grant funds.

HUD grant money will have a direct impact on the City of Tulare through the following projects:

- Light rail corridor study and route planning with the City of Visalia and TCAG.
- Transit-oriented development study for a village master plan integrated with the planned light rail line.

GOAL 5:

INCREASE ACCESSIBLE LAND USE TO REDUCE VEHICULAR TRIPS

LU 5.2: Regional Blueprint

Supportive Measure

Goal 6:

Reduce Solid Waste

The City will achieve a 65% waste diversion rate by 2020.

Goal 6. Reduce solid waste.

Both the consumption and disposal of resources consumes energy and emits GHGs. Decomposition of waste at landfills causes GHG emissions. By reversing disposal trends within the community, the City is able to reduce its impact on GHG emissions. Further, the City has recognized that by treating even waste as a resource, there is a large potential to expand the City's economic base.

This goal quantifies the impact of 65% and 75% waste diversion rates by 2020 and 2030, respectively. The City is a member of the Consolidated Waste Management Authority (CWMA) for state diversion reporting requirements. The City has jointly achieved state mandated diversion targets with other CWMA members. The City will initiate initiating new programs to surpass existing local existing efforts and contribute a greater diversion rate to the Consolidated Waste Management Authority.

Industrial products produced in Tulare

MEASURE SW 6.1: SOLID WASTE DIVERSION

Achieve a 65% diversion of landfilled waste by 2020 and a 75% diversion by 2030 to reduce landfill emissions.

ACTIONS FOR MEASURE SW 6.1:

SW 6.1.1 Continue to implement and expand waste reduction programs, providing full recycling and composting for residential and nonresidential customers by 2020.

SW 6.1.2 Promote waste reduction education throughout the community.

SW 6.1.3 Implement the innovative reuse of industrial landfilled waste if feasible opportunities arise.

SW 6.1.4 Continue to investigate feasibility of a waste-to-energy plant in Tulare for landfilled waste.

SW 6.1.5 Continue to implement the adopted Construction and Demolition Debris Ordinance requirements (Section 7.18 of the Municipal Code).

The City of Tulare will work to reduce emissions from solid waste, primarily by seeking to reduce waste that is landfilled. The City of Tulare is a member of the Consolidated Waste Management Authority (CWMA), a joint power authority that consists of several other local jurisdictions that have joined for purposes of waste disposal and state reporting. As a joint entity, the CWMA achieved a diversion rate of 54% in 2006. However, as an individual entity, in 2006 the City achieved a diversion rate of 30.5%. Since 2006, the City has proactively increased waste diversion programs. As of 2009, the City has more than doubled its diversion rate to achieve 69% diversion rate. As established by this measure, the City will achieve a 75% diversion rate by 2030 through enhanced recycling and composting programs. These waste targets will be supported by the new CALGreen standards, which establish minimum requirements for the use of recycled content and salvaging of construction waste for nonresidential projects. Diversion targets are also supported by the City's adopted Construction and Demolition Ordinance, which requires a 50% diversion of debris for all construction and demolition projects.

As supportive actions in this measure, the City will also continue to investigate the potential of a waste-to-energy plan and other

GOAL 6:

REDUCE SOLID WASTE

SW 6.1: Solid Waste Diversion

GHG Reductions per Year (MT CO_2e)

To Date:	0
2020:	-32,507
2030:	-57,977

Waste Reductions per Year (Tons)

To Date:	0
2020:	-43,777
2030:	-78,077

Goal 6:

Reduce Solid Waste

opportunities to encourage the resourceful reuse of waste generated within the city. The City has explored initial opportunities to attract a waste-to-energy firm to the city that would convert landfilled waste which could not otherwise be recycled or composted into a usable form of energy, whether a biofuel or other form of productive energy. Currently, there are only three permitted waste-to-energy facilities in California. These facilities act as revenue generators and provide a potential waste diversion credit available to jurisdictions. Several waste-to-energy technologies exist, ranging from the conversion of traditional waste to green waste into fuel. Through the conversion of waste into fuel, these facilities provide the potential to drastically reduce GHG emissions that would otherwise take place through waste decomposition. This measure excludes the reduction potential of a waste-to-energy facility, due to the varying technological approaches and emissions impacts that will be finalized once a waste-to-energy firm enters into the permit process to relocate to the city.

The County of Tulare is the top county in the United States for total value of livestock, poultry, and their products. Total gross production value in the county was $5,018,022,800 in 2008.

USDA 2002

Goal 7. Promote low emissions in agriculture.

Goal 7:

Promote Low Emissions in Agriculture

Tulare County is the top county in the nation in terms of value of livestock, poultry, and their products, the second most valuable county in the nation in terms of the value of all agricultural products sold, and the fourth largest valuable county in terms of the value of all crops.[11] The City of Tulare and the unincorporated Planning Area include a variety of agricultural and agricultural industrial activities. The city is home to the International Agri-Center, the site of the World Ag Expo, an annual event that draws a diverse crowd of thousands from all over the world. The city's industry is based on dairy processing, agricultural industrial uses, and food processing operations. Among these industries are some of the largest employers within the city, including Land O'Lakes, Ice Cream Partners, Ruiz Food Products, and more.

The City recognizes that agriculture is one of its most important resources. These measures seek to enhance and strengthen Tulare's agricultural operations to excel while mitigating their impact on emissions. Primarily, these measures seek to identify incentive-based programs that reduce emissions while equipping producers to reduce operational costs.

Agricultural activities create GHG emissions through multiple processes. Accounting for all agricultural activity within Tulare's unincorporated Planning Area, several agricultural activities cause GHG emissions, including fuel combustion in agricultural off-road equipment, soil fertilization, and emissions from cattle and other livestock. Off-road agricultural equipment includes tractors, mowers, balers, combines, tillers, and other machinery. The application of nitrogen to the soil in the process of fertilization emits direct and indirect GHG emissions. Ruminant animals, such as cattle and sheep, release large amounts of methane, a highly potent GHG. Their special digestive systems have the ability to convert otherwise unusable plant materials into nutritious food and fiber; however, this same helpful digestive system produces methane, a greenhouse gas with 21 times the global warming potential of carbon dioxide.

Goal 7 contributes 98% of Goal 7 reductions in 2020 (**Figure 6-14**) and 96% in 2030 (**Figure 6-15**). Remaining reductions in this measure result from the conversion of agricultural equipment to clean emission vehicles.

[11] USDA 2002.

Goal 7:

Promote Low Emissions in Agriculture

Figure 6-15: 2020 Goal 7 Reductions by Measure

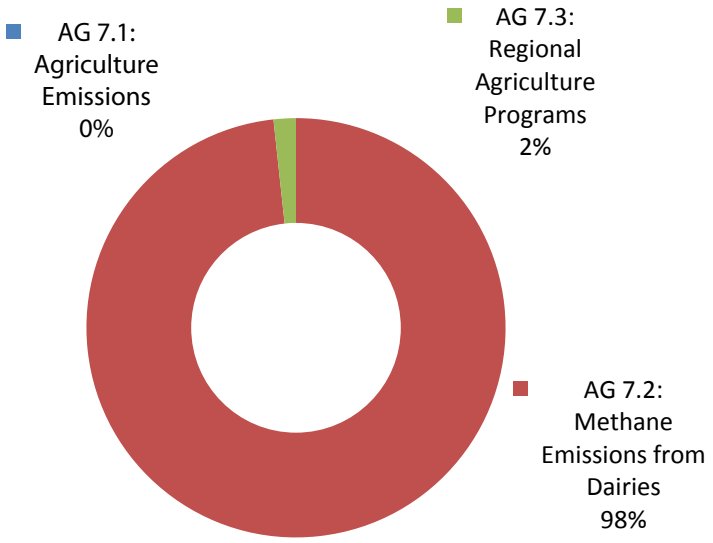
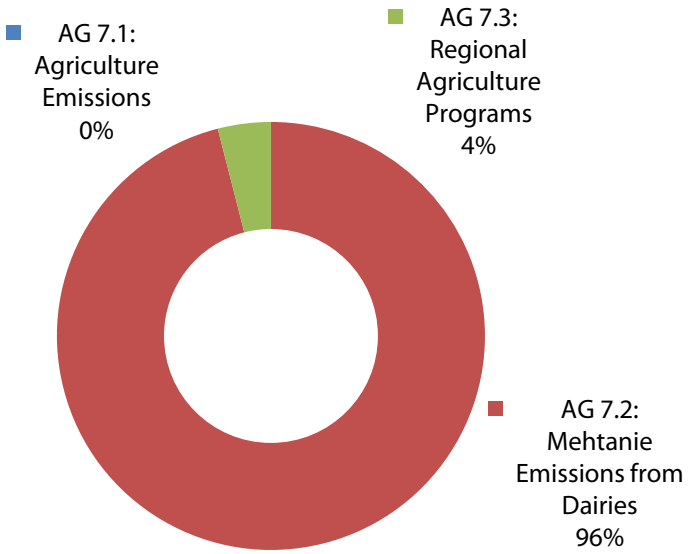


Figure 6-16: 2030 Goal 7 Reductions by Measure



MEASURE AG 7.1: AGRICULTURE EMISSIONS

Identify strategies to promote low-emissions agricultural practice that strengthen Tulare's role as an international agricultural leader.

ACTIONS FOR MEASURE AG 7.1:

AG 7.1.1 Support a local farmers market.

AG 7.1.2 Identify and promote local leaders in low-emission agricultural innovation through such forums as the AgTac center and the World Ag Expo.

The City will seek to promote and capitalize on its existing local agricultural industry through support of private initiatives to reduce emissions in agriculture. The City recognizes this as a vital strategy in protecting our agricultural heritage and equipping the local economy to remain competitive and gain footing in new, niche markets that are developing in the low-carbon economy. This measure is a supportive action that will seek to promote local leaders and agricultural industry through such forums as the educational AgTac events. The World Ag Expo is also another important opportunity to promote low-emissions leaders. The City will consider partnering with the local Chamber of Commerce or other economic associations to determine if a voluntary marketing program for low-emissions agriculture activities would be desirable and beneficial for local business. Such a program could benefit from the technical support of the local University of California Cooperative Extension Program. In summary, low-emissions activities are a marketable strategy that businesses can employ in expanding revenue.

The City also recognizes that encouraging closed-loop supply relationships between local producers and consumers is an important component of maintaining a vibrant local economy and in building on our agricultural assets. The City recognizes that local and accessible farmers markets are a valuable strategy to build community identity, provide opportunities for local entertainment, and encourage healthier eating. Farmers markets or other agricultural-based events will strengthen the local identity with the local agricultural heritage; these forums also provide an important opportunity for educational and outreach programs outlined elsewhere in this Plan.

GOAL 7:

PROMOTE LOW EMISSIONS IN AGRICULTURE

AG 7.2: Methane Emissions from Dairies

GHG Reductions per Year (MT CO_2e)

To Date:	0
2020:	-18,564
2030:	-7,113

Direct Methane Reductions per Year (MT CO_2e)*

To Date:	0
2020:	-18,564
2030:	-7,113

2020 emissions reductions are equivalent to saving 1,793,282 gallons of fuel.

MEASURE AG 7.2 METHANE EMISSIONS FROM DAIRIES

Support the use of digesters in local dairy operations to reduce methane emissions from dairy cattle.

ACTIONS FOR MEASURE AG 7.2:

AG 7.2.1 Support streamlined review of manure digesters with the San Joaquin Valley Air Pollution Control District and the Central Valley Water Quality Control Board.

AG 7.2.2 Encourage the pursuit of funding and technical resources for manure digester projects through the U.S. EPA AgStar Program and other grant programs.

AG 7.2.3 Promote available resources and incentives to the dairy industry with partners from the University of California Cooperative Extension Program and local dairy industry groups as opportunities arise.

Dairy digesters capture biogas from enclosed manure ponds, which is then combusted in engines and turned into energy. CalRecycle and the Central Valley Regional Water Quality Control Board are developing a Program Environmental Impact Report for anaerobic digestion facilities that are intended to streamline review and reduce the costs and time frame to permit new anaerobic digester projects in California. Related to these efforts, the Central Valley Water Board adopted a Final Program EIR to assess effects of dairy manure digesters and co-digesters within the Central Valley Region. [12]

The potential for methane reductions from dairy digesters is based on U.S. EPA AgStar reports for all dairy digesters in California. These averages were used in the Dairy Manure Digester and Co-Digester Facilities Draft Programmatic Environmental Impact Report (Draft PEIR).[13] The Draft PEIR forecasts that 200 digesters will be installed in Region 5 by 2020, compliant with SJVAPCD thresholds. The City of Tulare has approximately 1.74% of all dairy cows in Region 5. This measure assumes that the city's digesters will represent 2.0% of all digester capacity outlined by the Draft PEIR. Costs for manure digesters are estimated to range from $1 million to $6 million per at least 1,000 head of cattle. However, implementation of AB 32 includes state efforts to address and reduce financial barriers to

[12] California Regional Water Quality Control Board, Central Valley Region 2010b.

[13] California Regional Water Quality Control Board, Central Valley Region 2010a

digester implementation. The AB 32 Scoping Plan establishes digesters as a viable strategy to achieve renewable energy, and strategies to overcome financial barriers include actions at the state level through mechanisms such as the Feed-In Tariff program.

Industrial agriculture uses in Tulare

GOAL 7:

PROMOTE LOW EMISSIONS IN AGRICULTURE

AG 7.3: Regional Agriculture Programs

GHG Reductions per Year (MT CO_2e)

To Date:	0
2020:	-325
2030:	-296

Direct Methane Reductions per Year (MT CO_2e)

To Date:	0
2020:	-325
2030:	-296

2020 emissions reductions are equivalent to saving 1,399 gallons of fuel.

MEASURE AG 7.3: REGIONAL AGRICULTURE PROGRAMS

Support regional partnerships to promote reduced agricultural emissions and link the farming community with resources to achieve reductions in emissions.

ACTIONS FOR MEASURE AG 7.3:

AG 7.3.1 Support SJVAPCD and state programs to fund equipment upgrades, retrofits, and replacement through the Carl Moyer heavy-duty vehicle and equipment program or other funding mechanisms.

AG 7.3.2 Encourage the creation of new requirements by the San Joaquin Valley Air Pollution Control District that will reduce emissions from dairies.

AG 7.3.3 Support regional partnerships and research efforts to promote innovative agricultural industrial technology that reduces reliance on traditional energy sources and reduces overall costs.

AG 7.3.4 Partner with the University of California Cooperative Extension Program of Tulare County and California State University Fresno to promote research on soil management practices that benefit local farmers with enhanced crop productivity and the efficient use of fertilizers to reduce emissions from fertilizer applications.

AG 7.3.5 Work with local partners to promote efficient agricultural vehicle maintenance resources, including low/correct tire inflation described in the California Energy Commission guide How to Get the Most from Radial Ply Tractor Tires, a Guide to Selecting the Correct Inflation Pressure.

AG 7.3.6 Promote state and SJVAPCD programs that facilitate the adoption of clean, renewable, farm-based energy sources in equipment, such as biomethane for use in vehicles.

In this measure, the City of Tulare seeks to support the agricultural community in upgrading agricultural equipment and enhancing agricultural practices. Based on the widespread availability of incentive programs that reduce barriers to purchase new equipment, the City will work to support a turnover of local agricultural equipment to low-emissions models.

The City recognizes that due to issues of feasibility and jurisdiction, it is not practicable to impose additional requirements or targets for the

agricultural community. Rather, the City will take a proactive approach to support the development of regional standards and to promote new best practices programs, as they are available. The City will rely on local partners with agricultural expertise such as the University of California Cooperative Extension Program to promote enhanced agricultural practices that reduce emissions while improving revenues.

The City also recognizes that new technology, rebates, and cost incentives are responsible for the conversion of inefficient equipment to more fuel-efficient options. Programs such as the Carl Moyer program incentivize the voluntary purchase of clean engines, equipment, and emissions reduction technologies. Other options for lower agriculture emissions include conversion of dairy waste into biofuel for vehicles and equipment, such as the Hilarides Dairy in Tulare County is currently implementing. The City will also work with local partners to ensure that research programs and new advances in agricultural practice benefit local farmers.

Goal 7:

Promote Low Emissions in Agriculture

Milk: It Does the Local Economy Good.

Milk is the county's leading agricultural commodity (36% of total crop and livestock value, yielding total value of $1,796,425,000).*

The City of Tulare has the nation's largest dairy processing facility: Land O'Lakes.

**Tulare County Agricultural Commissioner 2009*

Goal 7:

Promote Low Emissions in Agriculture

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7. Implementation Program

7.1 Introduction

The City recognizes that a clear and practical implementation program is necessary to achieve our 2020 and 2030 goals and reduction targets. Overcoming climate change will require everyone—government agencies, nonprofit organizations, businesses, residents, and staff—to work together to implement this Plan collaboratively with regional, state, and national activities.

This Implementation Program provides a strategy for action with specific measures and steps to achieve the identified reduction targets. The program identifies responsible departments, potential costs, cost savings, and time frames for action. The Implementation Program is provided separately for municipal and community-wide measures below in **Table 7-3** and **Table 7-4**, respectively. Community-wide measures note consistency with CALGreen and San Joaquin Valley Air Pollution Control District (SJVAPCD) best performance standards. This Chapter concludes with Goal 8 (Implement the Climate Action Plan), which includes measures and actions to achive Climate Action Plan reduction targets (see **Table 7-5**).

These matrices allow staff, the City Council, and interested parties to track measures of interest and to monitor progress. Each reduction measure is prepared with the best intentions; however, implementation requires oversight and political, organizational, and financial commitment. The table also notes consistency between measures and 2010 CALGreen standards established in the 2010 California Green Building Standards Code[1] and in the San Joaquin Valley Air Pollution Control District best performance standards.[2] City costs, City cost savings/payback, and community-wide savings/payback are presented as metrics for simplicity. Details on Implementation Program metrics are listed below.

Actions: Abbreviated actions for each reduction measure.

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[1] California Building Standards Commission 2010.

[2] San Joaquin Valley Air Pollution Control District 2009.

Action Steps: Primary indicators of progress for achieving measure reductions, including quantitative targets for tasks to be completed (e.g., number of streetlights retrofitted) and qualitative steps that are necessary to achieve quantitative targets and supportive measures (e.g., necessary Zoning Code updates).

Responsible City Department(s): City department responsible for implementation.

Cost to City: Estimated overall cost to the City for implementation of the measure. Costs represent the full anticipated City costs for measure implementation through 2030 and in current (2010) dollars (see **Table 7-1**).

Table 7-1: City Costs Metrics for Implementation Program

City Cost Metric	Equivalent Cost	Impact on Staff Time
Negligible	0	Requires no investment or generates a profit
Low	$1–$25,000	Uses existing staff
Low-Mid	$25,000 –$100,000	Existing staff can implement but will require reprioritization of workload
Medium	$100,000–$200,000	Requires new staff or contracts to implement
Medium-High	$200,000–$500,000	Requires new staff or contract(s) to implement
High	Over $500,000	Requires new staff or contract(s) to implement

Savings/Payback: Due to the nature of variation in costs between municipal programs and community-wide programs, for purposes of simplicity, City costs for community-wide programs are presented on a separate scale than municipal costs (see **Table 7-2**).

Table 7-2: Savings/Payback Metrics for Implementation Program

Savings/Payback	Equivalent Cost
Minimal	$1–$25,000
Low	$25,000–$500,000
Low-Mid	$500,000–$1 million
Medium	$1 million –$10 million
Medium-High	$10 million–$30 million
High	Over $30 million

Abbreviations and References in the Implementation Program. Additional topics in the Implementation Program use the following abbreviations and references:

- **Sectors.** All sectors are designated as follows: C = Commercial, I = Industrial, R = Residential, RG = Regional
- **Consistency with CALGreen.** All reference to CALGreen measures cites the 2010 California Green Building Standards Code[3] (accessible at http://www.bsc.ca.gov/CALGreen/default.htm).
- **Consistency with SJVAPCD**
  - References to the San Joaquin Valley Air Pollution Control District are abbreviated (SJVAPCD).
  - Best performance standards refer to measures in the 2009 Final Staff Report: Addressing Greenhouse Gas Emissions Impacts Under the California Environmental Quality Act.[4] Other technology-specific best performance standards without a numeric refrence are available on the District's website: www.valleyair.org.

[3] California Building Standards Commission 2010.

[4] San Joaquin Valley Air Pollution Control District 2009.

Table 7-3: Implementation Program: Municipal Measures

Measure		Actions	Action Steps	Responsible City Department	City Costs	Savings/ Payback	Time Frame
EE 1.1	Increase energy efficiency in existing City buildings and facilities through Facility Improvement Measures and by retrofitting Edison-owned streetlights.	EE 1.1.1: Energy-efficient upgrades EE 1.1.2: Edison-owned streetlights EE 1.1.3: Financing	• Johnson Controls Facility Improvement Measures 15 (completed) • Upgrade Edison's 4,310 streetlights to energy-efficient models	Public Works	Negligible	Low	Immediate
EE 1.2	Design new City buildings and facilities to exceed California Energy Code requirements by 15%.	EE 1.2.1: New facilities EE 1.2.2: Public education EE 1.2.3: Built It Green for RDA projects	• Certified LEED Gold City of Tulare Public Library, exceeds Title 24 energy use standards by 21.3% (completed) • Adopt CALGreen Tier 1 energy efficiency requirements • Construct new facilities to achieve CALGreen • Tier 1 energy efficiency standards to exceed Title 24 energy use requirements by 15%	Planning & Building	Negligible	Low	Mid-Term
RE 2.1	Continue to utilize renewable and alternative energy sources at the wastewater treatment plant (the Tulare Water Pollution Control Facility (TWPCF)).	RE 2.1.1: Solar carport RE 2.1.2: Solar plant RE 2.1.3: Biogas fuel cell RE 2.1.4: Sewage treatment RE 2.1.5: Public education	• Continue to implement existing alternative energy programs at the TWPCF • 3 MW solar plant operational by 2020 • Full four-cell biogas fuel cell project operational by 2020 • Provide public tours of the wastewater treatment plant • Publicize energy achievements	Public Works	Negligible	Medium	Immediate

Measure		Actions	Action Steps	Responsible City Department	City Costs	Savings/ Payback	Time Frame
TM 3.1	Increase staff's use of alternative transit modes for work-related commutes and City business travel.	TM 3.1.1: Alternative transit incentives TM 3.1.2: Employee ride-match program TM 3.1.3: Alternative work schedules TM 3.1.4: Telecommuting TM 3.1.5: Web conferencing TM 3.1.6: Employee bike travel	• Establish a transit subsidy for City employees, with 8% of City employees participating by 2030 • Bicycle support facilities at all new and renovated public facilities • By 2020, institute a 9/80 work schedule • By 2030, at least 25% of employees with 9/80 work schedule • By 2020, provide ride matching for employees	Administrative Services	Low-Mid	Low	Near-Term
VE 4.1	Continue use of clean and alternative fuels in the City's fleet.	VE 4.1.1: Alternative-fuel fleet VE 4.1.2: Alternative fleet expansion VE 4.1.3: Clean Air Committee	• Maintain existing CNG and flex fuel fleet • Provide public education using municipal lessons learned	Public Works	Low	Low-Mid	Near-Term

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Table 7-4: Implementation Program: Community-Wide Measures

Measure		Actions	2020 Reduction ($MTCO_2e$)	Sector(s)	Action Steps	Responsible City Department	City Costs	Savings/ Payback	Time Frame	Consistency with CALGreen	Consistency with SJVAPCD
EE 1.3	Increase energy efficiency in new commercial and residential development and require new residential and commercial development to achieve enhanced energy efficiency and exceed California Energy Code requirements by 15%.	EE 1.3.1: Minimum CALGreen standards EE 1.3.2: CALGreen Tier 1 EE 1.3.3: Smart grid	-26,775	C&R	• Implement the minimum CALGreen standards for energy efficiency contained in 2008 Title 24 standards (under way, quantified in adjusted forecast) • Adopt CALGreen Tier 1 energy efficiency standards for new development to exceed Title 24 energy use requirements by 15% • Smart meters to be installed in all new development, with 95% monitoring program participation by 2020	Planning & Building	Low	Medium	Long-Term	• Residential mandatory measure 4.201.1 & Nonresidential mandatory measure 5.201.1 • Residential Tier 1 prerequisite measure A4.203.1 and Nonresidential Tier 1 prerequisite A.5.203.1.1 (City to adopt as mandatory)	-Measure 27 (Exceed Title 24)
EE 1.4	Reduce the urban heat island effect to cool the local climate and reduce energy consumption by maintaining current rates of public tree planting and increased shading on private property, high albedo surfaces, and cool surfaces.	EE 1.4.1: Trees for existing neighborhoods EE 1.4.2: Wall shading EE 1.4.3: Public tree planting EE 1.4.4: Cool paving	-6,702	C&R	• 11,381 trees planted by 2030 in existing neighborhoods where they do not exist, at an annual average planting of 599 trees per year • Maintain ratio of .25 new public trees/new resident, to achieve 9,923 new public trees by 2030, at an average annual planting of 523 trees per year • New standards to require the use of high albedo material for new and renovated public spaces adopted by 2020, achieving 80% of all pavements by 2030 • Adopt CALGreen Tier 1 measures	Recreation & Parks	High	Medium High	Long-Term	• Residential Tier 1 voluntary measure A4.106.1 (City to adopt as mandatory) • Nonresidential Tier 1 voluntary measures A5.106.7 A5.106.9 (City to adopt as mandatory) • Nonresidential Tier 1 voluntary measure A5.106.11.1 (City to adopt as mandatory)	-Measure 29 (Non-Roof Surfaces) -Measure 30 (Green Roof)
EE 1.5	Achieve a 20% reduction in water use by 2020 (20x2020) to reduce energy consumed for groundwater pumping.	EE 1.5.1: Outdoor water reduction incentives EE 1.5.2: Water reduction education EE 1.5.3: Indoor water reduction incentives EE 1.5.4: Water meters in existing development EE 1.5.5: Water conservation in new development	-903	C&R	• Water meters installed on all existing water accounts (completed) • Establish incentive program • Adopt CALGreen Tier 1 residential and nonresidential measures • New residential uses: indoor water use reduced by 20% • New nonresidential uses: indoor water use reduced by 30% • Implement a tiered rate water structure. • Reduce communitywide consumption by 12.5 million gallons by 2020 and 16.5 million gallons by 2030	Public Works	Low-Mid	Medium	Near-Term	• Mandatory residential measures 4.303.1; 4.303.2; 4.303.3; 4.304.1 • Mandatory commercial measures: 5.303.1; 5.303.2.20; 5.303.4; 5.303.6; 5.304.1; 5.304.2; 5.304.3 • Residential Tier 1 prerequisite measures A4.303.1 and A4.304.4 (City to adopt as mandatory) • Nonresidential Tier 1 prerequisite measures A5.303.2.3.1 and A5.304.4 to be adopted as mandatory	NA

Measure		Actions	2020 Reduction ($MTCO_2e$)	Sector(s)	Action Steps	Responsible City Department	City Costs	Savings/ Payback	Time Frame	Consistency with CALGreen	Consistency with SJVAPCD
EE 1.6	Facilitate energy efficiency improvements within the residential building stock.	EE 1.6.1: Energy Upgrade California EE 1.6.2: Public education EE 1.6.3: Partnerships EE 1.6.4: RECO EE 1.6.5: Energy efficiency audit EE 1.6.4: California PACE Program	-12,819	R	• 3,191 existing homes retrofitted 2006–2010 (completed) • Adoption of a mandatory Residential Energy Conservation Ordinance (RECO) • 100% of existing homes with smart meters by 2020, with 80% participation in monitoring programs and 8% appliance integration by 2030 • 9,668 homes to undergo energy efficiency retrofits through a RECO by 2030 • Public education to spur minor energy behavior changes in 6,600 households by 2020 • 1,900 owner-occupied single-family homes to undergo energy efficiency retrofits by 2030 through the California PACE Program, to achieve minimum of 10% electricity savings and 25% natural gas savings before renewable energy is installed • Complete a community-wide audit to use to prioritize outreach	Planning & Building	Low-Mid	Medium	Mid-Term	• Mandatory CALGreen standards applied to remodels, per Building Code thresholds	NA
EE 1.7	Support commercial and industrial profitability and energy efficiency through programs and partnerships.	EE 1.7.1: Energy performance reports EE 1.7.2: Smart grid EE 1.7.3: Identify barriers to industrial efficiency	-52,631	C	• 100% of existing businesses with smart meters by 2020, with 80% monitoring program participation and 4% of customers with integrated appliances by 2030 • Establishment of Energy Performance Ordinance, with mandatory participation by 2018 • Industrial and business upgrades to yield a reduction of 58.959 million kWh and 6.979 million therms by 2020	Planning & Building	Low-Mid	Medium High	Mid-Term	• Mandatory CALGreen standards applied to remodels, per Building Code thresholds	NA
EE 1.8	Promote voluntary energy efficiency retrofits in the commercial and industrial sectors through finance and incentive programs.	EE 1.8.1: Energy management solutions EE 1.8.2: Energy Upgrade California EE 1.8.3: Green Business program EE 1.8.4: Direct Install Program EE 1.8.5: Energy efficiency benchmarking	-30,162	C	• California PACE and Edison programs to finance energy efficiency improvements that yield a 76 million reduction in kWhs and 1.5 million therms by 2020 • Encourage formation of a local partnership to promote natural capitalism practices	Economic Development/ Redevelopment	Negligible	Low	Immediate	• Mandatory CALGreen standards applied to remodels, per Building Code thresholds	NA

Measure		Actions	2020 Reduction ($MTCO_2e$)	Sector(s)	Action Steps	Responsible City Department	City Costs	Savings/ Payback	Time Frame	Consistency with CALGreen	Consistency with SJVAPCD
EE 1.9	Require stationary equipment in new industrial development to comply with best practice energy efficiency standards.	EE 1.9.1: Boilers for agricultural industrial users EE 1.9.2: Electrical internal combustion engines EE 1.9.3: Reciprocating engines	-6,727	I	• By 2020, all new liquefied petroleum gas boilers shall operate with a minimum 85.9% efficiency • By 2020, all new reciprocating engines shall achieve a minimum efficiency of 60% • By 2020, all new internal combustion engines shall be powered by an electric motor with 95% efficiency	Planning & Building	Low	Low-Mid	Mid-Term		Industrial uses: Adopted SJVAPCD Best Performance Standards, as applicable, including -New Boilers with Rated Steam Pressure Less Than 75 psig, Fired Exclusively on Natural Gas or LPG -->75psig - Fired Exclusively on Natural Gas or LPG (Draft 2)
EE 1.10	Continue to partner in regional initiatives that encourage achievement of regional energy efficiency targets.	EE 1.10.1: VIEW & SJVCEO EE 1.10.2: SJV Partnership EE 1.10.3: Tulare County Regional Blueprint EE 1.10.4: SJVAPCD	-2,027	RG	• Approximately 4,000 homes to reduce energy consumption as a result of regional educational initiatives and events to eliminate 3.6 million kWh and 202,000 therms by 2020	Planning & Building	Low	Medium	Long-Term	NA	NA
RE 2.2	Increase reliance on local renewable energy sources through provision of a minimum of 30% of commercial and industrial energy needs from on-site renewable energy sources by 2030.	RE 2.2.1: Renewable energy strategy RE 2.2.2: AB 811 RE 2.2.3: Energy Star RE 2.2.4: Mandatory renewable systems for nonresidential uses RE 2.2.5: Solar group buy	-29,736	C&I	• By 2020, commercial and industrial uses to supply approximately 113 million kWh from on-site renewable sources • Update Zoning Code definitions and exemptions to allow solar facilities by right or with limited administrative review to encourage expedited installation of on-site energy facilities • General Plan to address and outline strategies for partnership to implement community solar programs	Planning & Building	Low	Medium High	Mid-Term	• Nonresidential Tier 1 voluntary measures A5.211.1, A5.211.3, and A5.211.4	-Measure 25 (Energy Star Roof) -Measure 26 (On-site Renewable Energy System) -Measure 28 (Solar Orientation)
RE 2.3	Support deployment of manure digesters at dairies capture and convert biogas for on- and off-site electricity needs.	RE 2.3.1: Digester permit review RE 2.3.2: Encourage resources for digesters RE 2.3.3: Leadership in bioenergy RE 2.3.4: Pilot programs RE 2.3.5: Expedite local standards for digesters RE 2.3.6: Partnership with SJVAPCD	-2,410	C	• By 2020, 2.3 million kWh of electricity generated by manure digesters at dairy facilities	Planning & Building	Negligible	Medium	Near-Term	NA	-Measure 25 (Energy Star Roof) '-Measure 26 (On-site Renewable Energy System) -Measure 28 (Solar Orientation)

Measure		Actions	2020 Reduction ($MTCO_2e$)	Sector(s)	Action Steps	Responsible City Department	City Costs	Savings/ Payback	Time Frame	Consistency with CALGreen	Consistency with SJVAPCD
RE 2.4	Increase reliance on local renewable energy sources through provision of a minimum of 15% of baseline residential energy needs from on-site renewable energy sources by 2030.	RE 2.4.1: TASP RE 2.4.2: Expanded TASP RE 2.4.3: Build It Green for Redevelopment Agency projects RE 2.4.4: Identify barriers to residential renewables RE 2.4.5: Residential renewable energy strategy RE 2.4.6: AB 811 RE 2.4.7: Homebuyer solar option	-4,774	R	• 7,419 homes by 2030 with solar systems offsetting on-site electricity use, including: o 4,496 homes funded through the PACE program o 22 loans dispersed through the Tulare Affordable Solar Program (TASP) o Expansion of the TASP to fund an additional 1,046 affordable housing units by 2030 o 228 multi-family units developed by 2030 with total electricity needs supplied by renewables o 1,627 homeowners in subdivision homes to participate in the Solar Homebuyer Option by 2030 • Update Zoning Code to allow renewable facilities by right in residential zones • Homebuyer Solar Option to apply to all new subdivisions and new multi-family projects over 4 units • Continue to apply Build It Green standards to Redevelopment Agency projects and promote impacts of standards to the local development community • Monitor state ordinances, best practices, and local conditions to overcome barriers to on-site renewable energy installations • Continue to display new renewable technologies and promote widespread replication throughout the city	Planning & Building	Low	Medium	Mid-Term	• Residential Tier 1 voluntary measures A4.211.1, A4.211.2, A4.211.3, and A4.211.4	-Measure 25 (Energy Star Roof) -Measure 26 (On-site Renewable Energy System)
RE 2.5	Support regional initiatives in expansion of the Valley's renewable energy supplies.	RE 2.5.1: Regional initiatives RE 2.5.2: Regional Blueprint RE 2.5.3: San Joaquin Valley Clean Cities Coalition	N/A	RG	• Ongoing participation in regional initiatives to expand regional renewable energy supplies	Planning & Building	Negligible	Minimal	Long-Term	NA	NA

Measure		Actions	2020 Reduction ($MTCO_2e$)	Sector(s)	Action Steps	Responsible City Department	City Costs	Savings/ Payback	Time Frame	Consistency with CALGreen	Consistency with SJVAPCD
TM 3.2	Increase transportation-related bicycle trips to reduce vehicle miles traveled.	TM 3.2.1: Bicycle support facilities TM 3.2.2: Bicycle Plan TM 3.2.3: Bicycle racks TM 3.2.4: Barriers to bicycle use TM 3.2.5: Bicycle Friendly Community	-168	R&C	• Implement minimum CALGreen standards • Modify regulatory hindrances to bicycle riding and determine appropriate means to track bicycle ownership • For all new construction and expansion of over 10% of medium-density and high-density residential, commercial, industrial, public/quasi-public, and parks and recreation use: require the provision of a flat rate of short- and long-term bicycle parking at a ratio of 1 bicycle parking space per 20 vehicle parking spaces, with projects exceeding certain thresholds or meeting certain criteria also providing other adequate support facilities such as showers, lockers, and bicycle lockers • Implement the Bicycle Master Plan to achieve a total of 53 miles of Class I bike lanes, 124 miles of Class II bike lanes, and 22 miles of Class III bike lanes, for a total of 200 miles of bike lanes • Pursue funding for creative means to assess and respond to perceived barriers to bicycle use, including smart technologies such as a local smart phone application	Planning & Building	Medium-High	Medium	Mid-Term	• Nonresidential mandatory measures 5.106.4, 5.106.4.2, and 5.106.4.3 • Nonresidential Tier 1 voluntary measure A5.106.4.3	-Measure 1 (Bike Parking) -Measure 2 (End of Trip Facilities) -Measure 3 (Bike Parking at Multi-unit Residential) -Measure 4 (Proximity to Bike Lanes)
TM 3.3	Improve mobility by implementing a citywide Complete Streets ordinance and program.	TM 3.3.1: Community-Based Transportation Plans and Safe Routes to School TM 3.3.2: Complete Streets Ordinance	-2,346	R&C	• Adopt a Safe Routes to School Program, shifting approximately 23,000 students to alternative modes of travel by 2030 • Continue CBTP programs • Adopt a Complete Streets ordinance and development standards to require traffic calming for new streets projects • Update General Plan and standards to require new development to incorporate traffic calming efforts, as applicable	Planning & Building	Medium-High	Low-Mid	Long-Term	NA	-Measure 5 (Pedestrian Network) -Measure 6 (Pedestrian Barriers Minimized) -Measure 9 (Traffic Calming) -Measure 13 (Pedestrian Pathway Through Parking)
TM 3.4	Expand public transit routes and provide light rail transit options.	TM 3.4.1: TIME routes TM 3.4.2: Light rail TM 3.4.3: Regional transit TM 3.4.4: Bus stops	-264	R&C	• Light rail line between Visalia and Tulare by 2030, with an average annual weekday ridership of approximately 780,000 • By 2020, Transit-Oriented Development Specific Plan at light rail station, with minimum of 2,000 units to support light rail projections • Achieve annual ridership of approximately 900,000 on Tulare Intermodal Express by 2030, a 147% increase from baseline levels • Continue to evaluate bus stops every three years with TCAG	Planning & Building	Medium-High	Medium	Mid-Term	NA	-Measure 7-8 (Bus shelter for existing transit & planned transit service)

Measure		Actions	2020 Reduction ($MTCO_2e$)	Sector(s)	Action Steps	Responsible City Department	City Costs	Savings/ Payback	Time Frame	Consistency with CALGreen	Consistency with SJVAPCD
TM 3.5	Reduce work-related vehicle miles traveled through support of transportation demand management programs.	TM 3.5.1: Rule 9410 M 3.5.2: Transportation Management Associations	-1,379	R&C	• 16,000 locally employed residents to participate in new transportation demand management programs by 2030 as facilitated by Rule 9410 (or approximately 19% of employees)	Planning & Building	Medium	Medium	Near-Term	• Nonresidential Tier 1 voluntary measure A5.106.6.1	NA
TM 3.6	Support regional programs to shift single-occupancy vehicle trips to other modes.	TM 3.6.1: Blueprint TM 3.6.2: TMAs with TCAG TM 3.6.3: Valley Rides TM 3.6.4: Sustainable Communities Strategy	-954	C	• 6,200 residents that work outside the city to participate in transportation demand management programs or Transportation Management Associations by 2030 through regional programs such as Valley Rides or as facilitated by Rule 9410 (approximately 7% of employees)	Planning & Building	Low	Low	Long-Term	• Nonresidential Tier 1 voluntary measure A5.106.6.1	NA
VE 4.2	Reduce emissions from on-road vehicle sources.	VE 4.2.1: Low-emitting and fuel-efficient vehicles VE 4.2.2: Funding for Tulare Electric Vehicle Project VE 4.2.3: Clean fuel education VE 4.2.4: Car share	-6,474	R&C	• Apply mandatory CALGreen standards • 1,738 electrical vehicle charging stations by 2020 in private development as follows: o Update Zoning Code Section 10.192.050 (parking lot design standards) to require the provision of electrical vehicle charging stations at specified land uses with facilities exceeding 5,000 square feet, to count toward the total number of required parking spaces, and shall not be in addition to total required parking spaces o Provide a 5% reduction in the total number of parking spaces required for every 1 charging station provided, beyond that required, up to a 20% reduction, encouraging developers to go above the Zoning Code requirements o Investigate the provision of on-street charging spaces in the public right-of-way through a feasibility study to be conducted by Public Works in order to provide new regulations allowing for the provision of required charging spaces offsite through the Zoning Code by 2015 • Provide a subsidy or public procurement sufficient to ensure two-year startup of a public, private, or nonprofit car-sharing organization to provide one car per 2,000 inhabitants by 2020 and one car per 4,000 inhabitants by 2030 • Provide public education on clean vehicles using municipal lessons learned	Planning & Building	Medium	Medium	Long-Term	• Nonresidential mandatory measures 5.106.5.2 • Nonresidential Tier 1 mandatory measure A5.106.5.1 (City to adopt as mandatory) • Nonresidential Tier 1 voluntary measures A5.106.6.1 and A5.106.5.3.1	NA

Measure		Actions	2020 Reduction ($MTCO_2e$)	Sector(s)	Action Steps	Responsible City Department	City Costs	Savings/ Payback	Time Frame	Consistency with CALGreen	Consistency with SJVAPCD
VE 4.3	Establish Tulare as a key node in local and regional commercial and industrial clean fuel infrastructure. that demonstrates statewide leadership in supporting a clean heavy-duty fleet.	VE 4.3.1: Alternative fuel infrastructure VE 4.3.2: Fuel co-location VE 4.3.3: Standards for alternative fuel infrastructure VE 4.3.4: Fleet conversion funding	-24,850	C&I	• Support private efforts to supply CNG to local and regional trucking fleets • Approximately 1,300 heavy-duty trucks in the regional fleet that operate throughout the city to be upgraded with CNG heavy-duty trucks by 2020	Public Works	Negligible	Medium	Near-Term	NA	NA
VE 4.4	Reduce emissions from on-road commercial and industrial transportation sources through reduced vehicle idling and efficient vehicle flow.	VE 4.4.1: Anti-idling ordinance VE 4.4.2: Loading docks VE 4.4.3: Traffic signal synchronization	-215	C&I	• Implement a traffic signal synchronization program along 8 miles of major trucking routes through the city by 2020 and 15 miles by 2030	Public Works	Medium	Low	Immediate	NA	NA
LU 5.1	Promote accessible housing near transit and services to reduce vehicular trips.	LU 5.1.1: Compact mixed uses LU 5.1.2: Mixed-use neighborhoods LU 5.1.3: Accessible affordable housing LU 5.1.4: Infill LU 5.1.5: Increased density LU 5.1.6: Jobs-housing balance LU 5.1.7: TOD Specific Plan	-5,793	R&C	• Achieve 70% of buildout jobs and housing targets by 2030 • A TOD Specific Plan and 2,000 housing units in light rail transit-oriented development by 2030 • 2,600 new affordable households in city by 2030 • All new high-density housing to be located within a quarter mile of daily needs • Achieve at least average buildout density of 0.70 units/acre by 2030, with ultimate aim of achieving average forecast density under buildout of 0.80 units/acre	Planning & Building	Low-Mid	Medium High	Long-Term	NA	-Measure 15 (Office/Mixed Use Proximate to Transit) -Measure 15a (Office/Mixed Use Proximate to Planned Light Rail Transit -Measure 18a (Residential Density with Planned Light Rail Transit) -Measure 21 (Affordable Housing Component) -Measure 23 (Suburban Mixed Use)
LU 5.2	Work with partners to implement Blueprint Principles and create a regional setting that support smart land use decisions in Tulare.	LU 5.2.1: San Joaquin Valley Partnership LU 5.2.2: Cooperative land use planning LU 5.2.3: RHNA	0	R&C	• Continue regional partnerships to implement Blueprint Principles, pursue grant funding, and SB 375	Planning & Building	Negligible	Low	Long-Term	NA	NA

Measure		Actions	2020 Reduction ($MTCO_2e$)	Sector(s)	Action Steps	Responsible City Department	City Costs	Savings/ Payback	Time Frame	Consistency with CALGreen	Consistency with SJVAPCD
SW 6.1	Achieve a 65% diversion of landfilled waste by 2020 and a 75% diversion by 2030 to reduce landfill emissions.	SW 6.1.1: Waste reduction programs SW 6.1.2: Waste reduction education SW 6.1.3: Waste reuse SW6.1.4: Waste to energy SW 6.1.5: C&D Ordinance	-32,507	R&C	• Achieve a diversion rate of 60% for the City by 2030, with landfilled waste not to exceed a ratio of 0.26 tons of annual waste/resident, equivalent to a reduction of approximately 14,200 tons from forecast trends	Public Works	Medium	Minimal	Near-Term	• Residential mandatory measure 4.408.1 • Residential Tier 1 mandatory measures A4.403.2 and A4.408.1 to be adopted as mandatory • Nonresidential Tier 1 mandatory measure A5.405.4 to be adopted as mandatory	NA
AG 7.1	Identify strategies to promote low-emissions agricultural practices that strengthen Tulare's role as an international agricultural leader.	AG 7.1:.1 Farmers market AG 7.1.2: Promote leaders	NA	C	• Investigate economically attractive options with the Tulare Chamber	Economic Development/ Redevelopment	Negligible	Low	Immediate	NA	NA
AG 7.2	Promote the use of digesters in local dairy operations to reduce methane emissions from dairy cattle.	AG 7.2.1: Streamlined digester review AG 7.2.3. Promote digester resources with partners AG 7.2.3: Promote resources	-18,564	C	• By 2020, new dairy digesters to capture approximately 60% of Tulare's dairy cow manure to eliminate 18,564 metric tons of methane (equivalent to capturing the waste of 8,280 cows)	Planning & Building	Negligible	Low	Mid-Term	NA	NA
AG 7.3	Support regional partnerships to promote reduced agricultural emissions and link the farming community with resources to achieve reductions in emissions.	AG 7.3.1: Equipment rebates AG 7.3.2: Dairy emissions AG 7.3.3: Regional agriculture AG 7.3.4: Fertilizer use AG 7.3.5: Agricultural vehicle maintenance AG 7.3.6: Clean energy sources	-325	RG	• 38 tractors or similar agricultural operating vehicles replaced with zero-emission vehicles by 2020	Planning & Building	Negligible	Low-Mid	Mid-Term	NA	NA

Goal 8. Implement the Climate Action Plan

The Climate Action Plan will be implemented to reduce Tulare's greenhouse gas emissions by a minimum of 15% from the 2006 baseline by 2020.

The following implementation measures are intended to accompany the reduction measures presented in Chapters 5 and 6.

MEASURE 8.1:

Annually monitor and report on the City's progress toward the reduction target.

ACTION 1.1:

Prepare an annual progress report for review and consideration by the City Council.

MEASURE 8.2:

Update the baseline greenhouse gas emissions inventory every five years.

ACTION 8.2.1:

Initiate the 2010 baseline GHG inventory in 2011.

MEASURE 8.3:

Continue and expand partnerships that support implementation of the Climate Action Plan.

ACTION 8.3.1:

Continue formal memberships in organizations that provide tools and support for implementation of the CAP.

MEASURE 8.4:

Maintain funding to implement the Climate Action Plan.

Goal 8:

Implement the Climate Action Plan

ACTION 8.4.1:

Identify funding sources for all reduction measures.

ACTION 8.5.1:

Include reduction measures in department budgets, capital improvement programs, and other plans as appropriate.

ACTION 8.6.1:

Pursue local, regional, state, and federal grants as appropriate to support implementation.

MEASURE 8.5:

Integrate climate action planning with other activities and programs in the city.

ACTION 8.5.1:

Integrate the CAP measures into the General Plan, the Capital Improvement Plan, and department work plans as appropriate.

MEASURE 8.6:

Review and update the Climate Action Plan regularly, at a minimum of every five years.

ACTION 8.6.1:

Review and update the CAP as appropriate following the adoption of the City's General Plan Update.

ACTION 8.6.2:

Update the CAP as necessary to ensure progress toward the City's reduction target and to comply with state regulations.

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Final Community-Wide 2006 Baseline Greenhouse Gas Emissions Inventory

Appendix 1

MEMO

To: Mark Kielty, Planning & Building Director
CITY OF TULARE

From: Tammy Seale

Cc: Lew Nelson, Public Works Director

Date: January 24, 2011

Re: Final Community-Wide Greenhouse Gas Emissions Inventory

Following staff's review and subsequent meetings to discuss staff comments concerning the draft Community-wide Inventory, PMC revised the Inventory in February 2011 to incorporate stationary source greenhouse gas emissions. The following memo provides the most recent revisions to the Inventory and forecast. Stationary source emissions increased total baseline emissions in city limits and the Planning Area by 16.6%; nearly all of this increase results from wastewater treatment process-based emissions (98.3% of the total increase from stationary source emissions).

1. INTRODUCTION

PURPOSE

The purpose of this greenhouse gas (GHG) emissions inventory memo (Inventory) is to identify the major sources of GHG emissions within the city from community-wide activities and provide a baseline against which future progress can be measured.[1] The Inventory provides the foundation for development of the City's Climate Action Plan (CAP). This memo provides the summary of the community-wide GHG emission inventory only; a summary of emissions from City government operations will be provided in a separate memo.

Specifically, this Inventory does the following:

- Calculates GHGs from community-wide activities within the City's jurisdictional boundary in calendar year 2006. Community-wide emissions include all emissions from community-wide

[1] In this report, the term "city" refers to the area inside the jurisdictional boundary of the City of Tulare, whereas "City government" or "City" refers to those activities that are under the operational control of City agencies. "Planning Area" refers to the area within the City's Planning Area or Urban Area Boundary that fall outside city limits.

activities taking place in the Planning Area (also referred to as the Urban Area Boundary) as discussed in further detail below.[2]

- Forecasts how emissions will increase in the community if no behavioral changes are made, accounting for all reasonably foreseeable state reductions to clearly identify emissions reduction targets within the City government's control.

- Provides City decision-makers with adequate information to direct development of the Climate Action Plan (CAP) and establish an appropriate emissions reduction target.

This Inventory captures the major sources of greenhouse gases (GHGs) caused by activities within the city per best practices and protocols, including protocols preferred by the California Air Resources Board and ICLEI – Local Governments for Sustainability (ICLEI). It is estimated that the sources not included in the Inventory due to privacy laws, lack of data, or a lack of reasonable methodology for calculating emissions comprise less than 5.0% of total emissions in the city. As GHG inventories become more common, it is likely that methodology and accessibility to data will improve. The sources that could not be included due to privacy laws, lack of data availability, and/or a reasonable methodology include the following:

- Wind or solar energy consumed by the community at large;

- Recreational off-road equipment and vehicles; and

- Fugitive emissions from stationary sources.

The City has exceeded standard industry practice to capture all available stationary source emissions within the community-wide inventory, including wastewater treatment biomass emissions and stationary source fuel combustion emissions at facilities permitted by the San Joaquin Valley Air Pollution Control district. The City has made a best-faith effort to represent all stationary source emissions with available data, tools, and protocols. As discussed in further detail below, the City was unable to capture all permitted stationary sources that generate greenhouse gas emissions due to an absence of protocols or methodologies.

The emissions identified in this report are primarily GHGs that the community has directly caused and has the ability to reduce through implementation of conservation actions, a Climate Action Plan, or corresponding efforts. This Inventory is supplemented with Appendix 1, which provides detailed summaries of community-wide baseline emissions by sector.

SCOPE OF THE INVENTORY IN RELATIONSHIP TO THE CLIMATE ACTION PLAN

The Inventory focuses specifically on baseline emissions from community-wide activities in the city and the Planning Area, and business-as-usual forecasts for community-wide emissions that account for anticipated statewide actions.

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[2] "Community-wide" or "community" refers to all activities within the city (as defined above), including those from businesses, industrial processes, residents, vehicles, and City government operations.

KEY TERMS AND TIMELINES

The following terms are used throughout the Inventory. These are concepts fundamental to understanding the contents of the Inventory.

- **Baseline year:** Emissions are quantified for the baseline year of 2006, due to the availability of reliable data. The 2006 baseline is also before the initiation of the majority of City actions that are anticipated to have reduced GHG emissions. This baseline year allows the City to track and observe the impact of its actions taken to date on GHG emissions and better inform future strategies.

- **Carbon dioxide equivalent (CO_2e):** The universal unit for comparing emissions of different GHGs expressed in terms of the global warming potential of one unit of carbon dioxide.

- **Greenhouse gas (GHG) emissions:** Gases that trap heat in the earth's atmosphere are called greenhouse gases, or GHGs. GHGs include carbon dioxide, methane, nitrous oxide, and fluorinated gases. While many of these gases occur naturally in the atmosphere, modern human activity has led to a steep increase in the amount of GHGs released into the atmosphere over the last 100 years. Collectively, these gases intensify the natural greenhouse effect, thus causing global average surface temperatures to rise, which in turn affects global climate patterns. GHGs are often quantified in terms of CO_2 equivalent, or CO_2e, a unit of measurement that equalizes the potency of GHGs.[3]

- **Scope:** Emissions sources are also categorized by scope to help identify where emissions originate from and what entity retains regulatory control and the ability to implement efficiency measures. Scopes are discussed in further detail below.

  - **Scope 1.** Direct emissions sources located within the community, primarily from the combustion of fuels. Examples of Scope 1 sources include use of fuels such as gasoline and natural gas.

  - **Scope 2.** Indirect emissions that result because of activities within the community, limited to electricity, district heating, steam, and cooling consumption. An example of a Scope 2 source is purchased electricity used within the community. These emissions should be included in the community-wide analysis, as they are the result of the community's electricity consumption.

  - **Scope 3.** All other indirect emissions that occur as a result of activity within the community. Examples of Scope 3 emissions include methane emissions from solid waste generated within the community that decomposes at landfills either inside or outside of the community.

- **Sector:** Emissions are grouped by the type of activity that generated the emissions, such as transportation, residential energy use, commercial energy use, and more.

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[3] Refer to the IPCC website for more information (http://www.ipcc.ch/).

- **City Limits vs. Planning Area:** Throughout this memo, emissions within the city's existing geopolitical boundary are designated as emissions in "city limits," whereas all emissions within the Planning Area (including the existing geopolitical boundary) are designated as "city limits and Planning Area." Unless specifically noted, any references to the Planning Area refer to land that falls outside city limits but is within the Planning Area. This approach is necessary to distinguish between methodologies for calculating emissions within city limits and outside of city limits.

II. COMMUNITY-WIDE INVENTORY

This Inventory includes Scope 1, Scope 2, and Scope 3 sources from the following sectors, consistent with industry protocol: residential, commercial/industrial, transportation, waste, and other (agricultural emissions). Point source emitters are not captured at the community-wide scale in GHG emissions inventories.

The City of Tulare emitted approximately 636,414 metric tons of carbon dioxide equivalent (CO_2e) in the baseline year 2006. As shown in **Table 1** and **Figure 1**, the commercial and industrial sectors were by far the largest contributor to emissions (a combined 42.6%), producing approximately 270,575 metric tons of CO_2e in 2006. Emissions from the transportation sector were the next largest contributor, accounting for 19.6% of the total emissions, producing approximately 124,167 metric tons of CO_2e. The Other Sector accounted for 18.8% of the total emissions (119,471 metric tons of CO_2e). The other sector includes agricultural activities, wastewater treatment processes, and stationary combustion of fuels that are not supplied by utility companies but permitted by the San Joaquin Valley Air District.[4] The residential sector comprised 12.3% of the total emissions (78,208 metric tons of CO_2e) and emissions from solid waste comprised 6.6% of the total (41,994 metric tons of CO_2e).

When the Inventory is expanded to include the Planning Area, total GHG emissions increase by 29.0%. When accounting for the Planning Area, emissions from agricultural activities (accounted for in the Other Sector) increase from 820 metric tons of CO_2e to 96,228 metric tons of CO_2e, increasing total Other Sector emissions by 80.0% and comprising 26.2% of total emissions. In this scenario, only the commercial and industrial sectors exceed the Other Sector's percentage contribution to total emissions; the relative contribution of the other sectors is roughly proportional in both scenarios.

By calculating emissions within the existing Planning Area in addition to within the city limits, the City is able to establish a more accurate baseline emissions inventory that accounts for anticipated incorporation of county land. This approach facilitates integration with the General Plan Update and Environmental Impact Report (EIR) by accounting for expansion of city limits. Additional information on the methodology for determining emissions in the Planning Area is detailed below.

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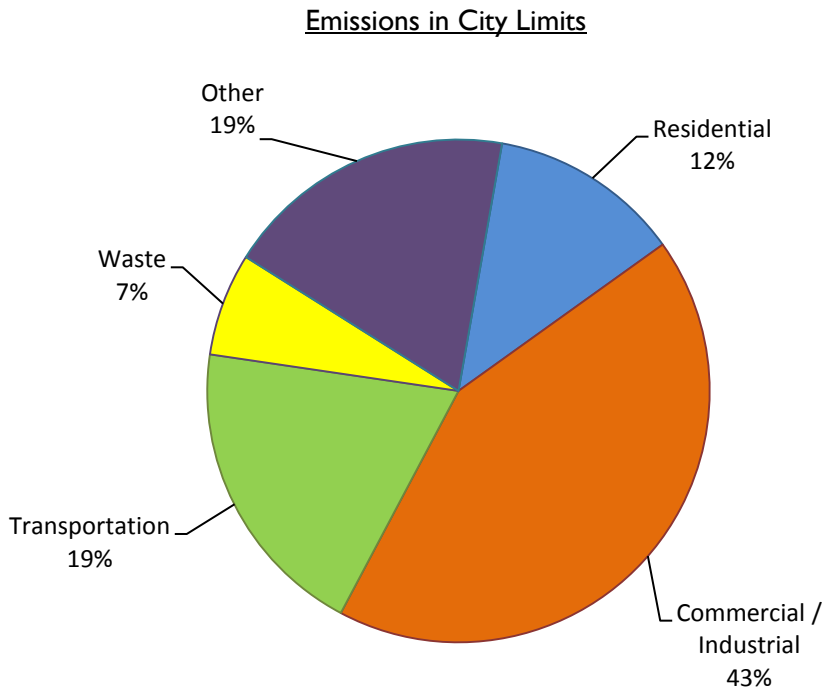
[4] Stationary source emissions capture combustion of distillate oil, propane, and liquefied petroleum gas that the San Joaquin Valley Air District permits. The commercial and industrial sectors capture natural gas consumption that is reported by utility companies.

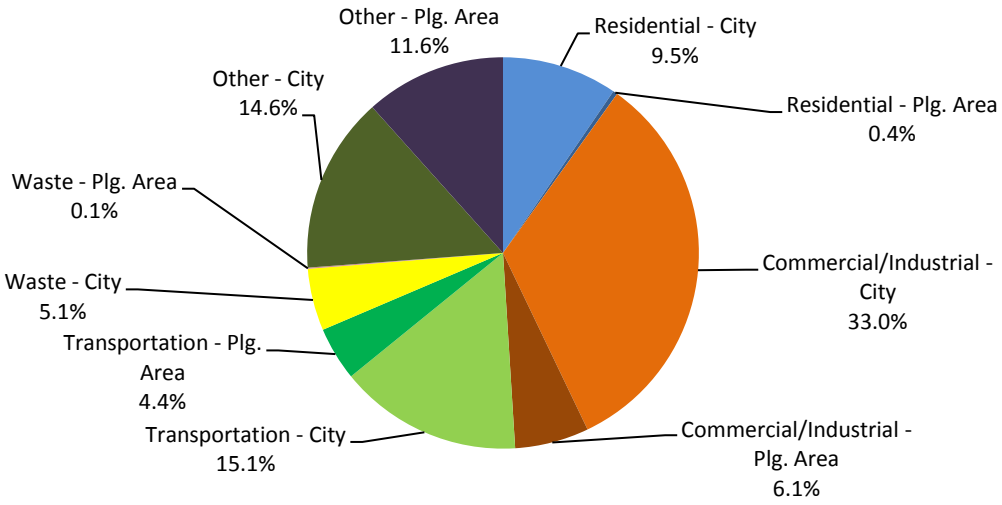
Table 1: Summary of Community Emissions by Sector (Metric Tons of CO_2e)

2006 Baseline Green-house Gas Emissions	City Limits		Planning Area Only		City Limits & Planning Area		
	Metric Tons CO_2e	Percentage of Total	Metric Tons CO_2e	Percentage of Total	Metric Tons CO_2e	Percentage of Total	% Increase from City Limits Only
Residential	78,208	12.3%	3,039	1.6%	81,247	9.9%	3.9%
Commercial/ Industrial	270,575	42.6%	50,194	27.0%	320,769	39.1%	18.6%
Transportation	124,167	19.6%	36,421	19.6%	160,587	19.6%	29.3%
Waste	41,994	6.6%	815	0.4%	42,809	5.2%	1.9%
Other	119,471	18.8%	95,408	51.3%	214,897	26.2%	80%
Total	**634,414**	**100%**	**185,877**	**100%**	**820,291**	**100%**	**296%**

Figure 1: Community Emissions by Sector



Emissions in City Limits & the Planning Area

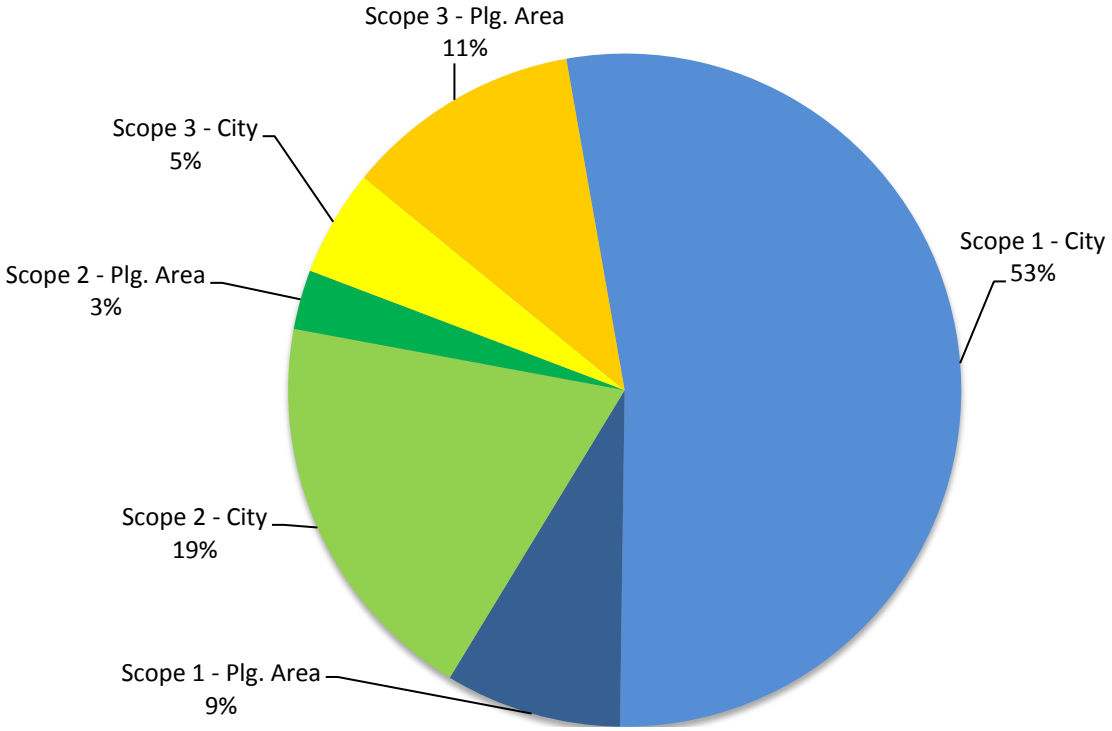


The largest portion of Scope 1 emissions within city limits and the Planning Area came from the commercial and industrial sectors (refer to **Figure 2** and **Table 2**). These emissions are considered Scope 1 because they involve the direct combustion of fuel within the jurisdictional boundary of the city. The second largest source of Scope 1 emissions was transportation. Commercial/industrial uses generated the largest percentage of Scope 2 emissions. Emissions from waste operations and emissions from livestock account for all Scope 3 emissions.

Table 2: Community Emissions per Sector and Scope (Metric Tons of CO_2e)

Sector	City Limits				City Limits & Planning Area			
	Scope 1 Emissions	Scope 2 Emissions	Scope 3 Emissions	Total Emissions	Scope 1 Emissions	Scope 2 Emissions	Scope 3 Emissions	Total Emissions
Residential	38,508	39,700	0	78,208	40,004	41,242	0	81,247
Commercial/ Industrial	152,600	117,975	0	270,575	180,909	139,860	0	320,769
Transportation	124,167	0	0	124,167	160,587	0	0	160,587
Waste	0	0	41,994	41,994	0	0	42,809	42,809
Other	119,471	0	0	119,471	122,775	0	92,104	214,879
Total	434,746	157,675	41,994	634,414	504,275	181,103	134,913	820,291
Percentage of Total	**68.53%**	**24.58%**	**6.62%**	**100.0%**	**61.48%**	**22.08%**	**16.45%**	**100.0%**

Figure 2: Community Emissions by Scope (Metric Tons of CO_2e)



Additional details on the activities represented in the Inventory are provided in **Table 3** below. The table summarizes activity data units, data sources, and emissions scopes for each sector. Refer to Appendix 1 for additional descriptions of methodology by sector, emissions coefficients, assumptions, and data sources that were used to calculate community-wide emissions.

Table 3: Community-Wide Data Sources and Scopes

Sector	Information	Unit of Measurement	Emissions Scope	Activity Data Source	Emissions Coefficients Source
Residential	Electricity consumption	kWh	Scope 2	Southern California Edison	ARB & CEC
	Natural gas consumption	Therms	Scope 1	SoCal Gas Co.	CEC & SoCal Gas Co.
Commercial/ Industrial	Electricity consumption	kWh	Scope 2	Southern California Edison	ARB & CEC
	Natural gas consumption	Therms	Scope 1	SoCal Gas Co.	CEC & SoCal Gas Co.
Transportation	Local road VMT	Annual average VMT	Scope 1	Caltrans HPMS data, County and City of Tulare GIS shape files analyzed by PMC staff	EMFAC 2007
	Highway and interstate VMT	Annual average VMT	Scope 1	Caltrans HPMS data, County and City of Tulare GIS shape files analyzed by PMC staff	EMFAC 2007 LGOP v1.1
Solid Waste	Solid waste tonnage sent to landfill from activities in City of Tulare	Short tons	Scope 3	Tulare County RMA Solid Waste and CalRecycle (formerly the California Integrated Waste Management Board, or CIWMB)	California Air Resources Board Landfill Emissions Tool
Other	Agricultural Fertilization	Pounds of nitrogen	Scope 1	City of Tulare General Plan GIS files, Tulare County Agricultural Commissioner's Office,	U.C. Davis 2010
	Livestock enteric emissions	Heads of livestock	Scope 3	, San Joaquin Valley Air Pollution Control District, Tulare County RMA GIS Mapping	U.S. EPA Greenhouse Gas Inventory Report 2010, Intergovernmen

Sector	Information	Unit of Measurement	Emissions Scope	Activity Data Source	Emissions Coefficients Source
				Division, Tulare County Agricultural Commissioner 's Office	tal Panel on Climate Change 2006
	Off-road agricultural equipment	Pieces of equipment	Scope 1	California Air Resources Board, Tulare County Agricultural Commissioner 's Office	EMFAC 2007
	Stationary combustion of distillate oil, propane, and liquefied petroleum gas	Gallons of combusted fuel	Scope 1	San Joaquin Valley Air Pollution Control District	LGOP v1.1
	Wastewater treatment biomass processes	Pounds of methane	Scope 1	City of Tulare	LGOP v1.1

THE BUILT ENVIRONMENT (RESIDENTIAL, COMMERCIAL, INDUSTRIAL)

With all scopes and sectors aggregated, 55.0% of total community-wide emissions in city limits and the Planning Area in the year 2006 came from the built environment; with all scopes and sectors aggregated for emissions within city limits only, 49.0% of total community-wide emissions came from the built environment. The built environment comprises residential, commercial, and industrial natural gas and electricity consumption (see Tables A1-1 and A1-2 in Appendix 1). This analysis does not include emissions from other types of energy such as propane, solar, and wind due to lack of reliable sales, construction, or consumption data. The commercial and industrial sectors are combined in this Inventory due to the California Public Utility Commission (CPUC) 15/15 rule that requires data be aggregated to protect customer confidentiality.

Southern California Edison and Southern California Gas Company (SoCal Gas Co.) provided residential and nonresidential energy consumption data within city limits.[5] Natural gas and electricity coefficients are provided by the Local Government Operations Protocol v.1.1.[6] To estimate energy consumption in the Planning Area, the rate of average residential energy consumption within city limits is applied to the residential population in the planning area, and the average rate of nonresidential energy consumption

[5] Coronel 2010; Morrow 2010.

[6] California Air Resources Board 2010c.

per acre within city limits is applied to land acreages in the Planning Area, using data from the General Update Draft Environmental Impact Report.[7]

TRANSPORTATION

Travel by on-road motorized vehicles constitutes 19.6% of GHG emissions in city limits and the Planning Area (160,587 metric tons of CO_2e), and 19.6% of emissions in just the city limits (124,167 metric tons of CO_2e). This Inventory does not include trains or off-road recreational vehicles, as there is no feasible methodology for calculating emissions from these sources as part of a community-wide inventory. The majority of the emissions in the transportation sector came from travel on highways (51.57% in the Planning Area and city limits whereas as travel on local roads accounts for approximately 48.43% of emissions in this sector (refer to Table A1-3, Figure A1-1, and Figure A1-2 in Appendix 1 for more details).

Vehicle miles traveled (VMT) on local roads and highways within both the city limits and the Planning Area was determined using data from the California Department of Transportation (Caltrans) Highway Performance Maintenance System (HPMS) 2006.[8] Vehicle miles traveled (VMT) for unincorporated local roads and highways both in the Planning Area and city limits is only provided in aggregated form. An annual VMT per highway mile figure was calculated for all of Tulare County assuming constant VMT across all state highways and interstates; the figure was applied to the number of highway miles in city limits and the Planning Area using GIS data provided by the City.

Transportation-related greenhouse gas emissions were calculated using the California Air Resources Board (CARB) Emissions Factor (EMFAC) 2007 software. EMFAC2007 provides carbon dioxide and methane emissions according to the unique vehicle and speed composition of each County in California. Nitrous oxide (N20) emissions were calculated using an off-model adjustment provided by CARB in the Assembly Bill (AB) 32 Technical Appendices. The off-model adjustment uses a linear regression correlating N20 with NOx. Weekday VMT and emissions are converted to annual figures using a conversion factor of 347 days/year to account for lessened travel on weekends, per the AB 32 Technical Appendix.

WASTE

Solid waste disposed of at managed landfills was responsible for 5.2% of total emissions in the Planning Area and city limits, and 6.6% of total emissions in just the city limits (see Table A1-4 in Appendix 1). The City is a member of the Consolidated Waste Management Authority, which sends waste to multiple landfills, including the Visalia, Teapot Dome, and Woodville landfills. This category includes only those emissions that result from waste generated within city limits or within the city limits and Planning Area. Waste emissions are considered Scope 3 emissions because they are not generated in the base year, but will result from the decomposition of waste generated in 2006 over the full life cycle of decomposition.

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[7] City of Tulare 2007.

[8] Caltrans 2006.

Disaggregated tons of waste generated within the city was provided by the Tulare County Resource Management Agency (RMA) Solid Waste Division.[9] GHG emissions were calculated using the methane commitment method and the California Air Resources Board Landfill Emissions Tool v1.2 (June 2010). The methane commitment method attributes the lifetime of methane emissions from a given amount of waste to the year in which the waste was disposed. An average methane capture rate of 75% (ARB protocol)[10] was assumed. This tool applies the IPCC's First Order Decay Model Methane emissions are represented as CO2e; carbon dioxide emissions are considered biogenic in origin and are excluded from the waste inventory. Emissions for waste in the Planning Area was calculated using the waste tons and emissions/resident ratio, assuming an annexation population of approximately 2,000.[11]

OTHER – STATIONARY SOURCE EMISSIONS

Other stationary source emissions not captured elsewhere in the Inventory contributed 14.5% of total emissions in the Planning Area and city limits, and 18.7% of total emissions in just the city limits (see Table A1-5 and Figure A1-3 in Appendix 1). The City's Other Sector primarily consists of process-based emissions at the wastewater treatment plant (98.3% of total Other Sector emissions) and stationary fuel combustion of other fuels not captured in the Inventory that the San Joaquin Valley Air Pollution Control (District) permits, such as fuel used to power backup power generators. The District regulates many activities that generate greenhouse gas emissions for stationary sources, some of which are captured elsewhere in the Inventory in commercial and industrial natural gas consumption. Stationary sources included in the Other Sector include fuel combustion of distillate oil, liquefied petroleum gas, and propane. Emissions from wastewater treatment processes contributed 98.3% of the Other Sectors emissions. Distillate oil combustion comprised 1.4% of the Other Sector's emissions, while both liquefied petroleum gas and propane each contributed less than 1.0%.

Wastewater treatment causes process-based emissions due to temporary aerobic conditions or incomplete combustion of captured biogas from anaerobic digesters. Wastewater treatment plant characteristics were provided by Lew Nelson, Public Works Director for the City of Tulare. Process-based emissions from the treatment of wastewater were calculated using ICLEI's Wastewater Treatment Plant Emissions Excel-based calculator and the Local Government Operations Protocol v.1.1.[12] Energy consumption for facilities, lifts, and pumps at the wastewater treatment plant are captured in the commercial and industrial sectors of this Inventory.

The District provided stationary source data for all District-permitted activities within city limits.[13] This Inventory includes stationary source data from the District that could be accurately quantified into greenhouse gas emissions not captured elsewhere in the Inventory using the Local Government Operations Protocol v1.1[14] and the model methodologies of the U.S. Inventory of Greenhouse Gas and

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[9] Akins 2010.

[10] See the California Air Resources Board Local Government Protocol for Greenhouse Gas Assessments (http://www.arb.ca.gov/cc/protocols/localgov/localgov.htm) for more information.

[11] Nelson 2010c.

[12] California Air Resources Board 2010c.

[13] Christi 2011 and Villalvazo 2011.

[14] California Air Resources Board 2010c.

Sinks[15] and California's 1990-2004 Greenhouse Gas Emissions Inventory and 1990 Emissions Level Technical Support Document.[16] Sources that are captured in the City's Inventory include fuel combustion of distillates, propane, and liquefied petroleum gas at commercial and industrial facilities for powering on-site generators, turbines, reciprocating engines, and more. Emissions were calculated using gallons of fuel provided by the District and emissions coefficients from the Local Government Operations Protocol v 1.1.[17]Excluded stationary sources include gasoline storage, solvent use, mineral production, soil remediation, and other activities that do not generate greenhouse gas emissions. Additional detail on excluded stationary sources is provided in Appendix 1.

At this time, stationary source data in the Planning Area can only be retrieved with a detailed, parcel-level request and cannot be feasibly incorporated into the Inventory. Based on existing land use distributions, it is anticipated that the bulk of stationary emissions are already captured by the stationary sources in city limits.

OTHER – EMISSIONS FROM AGRICULTURAL ACTIVITIES

Emissions from agricultural activities in the Planning Area and city limits contribute 11.7% of total emissions (96,228 metric tons of CO_2e); when excluding the Planning Area, agricultural activities within city limits only contribute 0.1% of total emissions (820 metric tons of CO_2e) (see Table A1-6 and Figure AI-4 in Appendix 1). Agricultural activities yield GHG emissions through multiple processes; based on local practice and available data, this Inventory accounts from emissions that result from fuel combustion of agricultural off-road equipment, soil fertilization, and emissions from cattle and other livestock. Off-road agricultural equipment includes tractors, mowers, balers, combines, tillers, and other machinery. The application of nitrogen to the soil in the process of fertilization emits direct and indirect GHG emissions. Ruminant animals, such as cattle and sheep, release large amounts of methane, a highly potent GHG. Their special digestive systems have the ability to convert otherwise unusable plant materials into nutritious food and fiber; however this same helpful digestive system produces methane.

All calculations of agricultural emissions are premised on acreage of agricultural land in city limits and the Planning Area provided by the City from the GIS database and data from the County Assessor's Office. Information was also used from the General Plan Update Draft Environmental Impact Report[18] and countywide acreages and crop types provided by the Tulare County Agricultural Commissioner's Office.[19] Local practices and assumptions were confirmed by Dennis Haines, the Agricultural Staff Biologist for the Tulare County Agricultural Commissioner.[20] Fertilizer emissions account for direct and indirect emissions of nitrous oxides, consistent with the California Air Resources Board[21] approach,

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15 U.S. EPA 2010.

16 2009.

17 California Air Resources Board 2010c

[18] City of Tulare 2007.

[19] Tulare County Agricultural Commissioner 2007.

[20] Haines 2010.

[21] 2009.

which was based on US EPA Emission Inventory Improvement Program (EIIP) guidance and the Tier 1 IPCC methodology of the 2006 IPCC guidelines.

The California Air Resources Board OFFROAD2007 model generates emissions inventories by equipment type for off-road agricultural equipment at the countywide level. Emissions were attributed to agricultural land in city limits and the Planning Area based on acreages. Emissions for soil fertilization were calculated based on average rates of fertilizer application to farmland for locally appropriate crop types, determined based on the data from the Tulare County Agricultural Commissioner's Office, conversation with Dennis Haines, and UC Davis Cost Return Studies.[22]

Livestock emissions were calculated using multiple sources. The local livestock population and prevalence of dairies was determined using data from the Tulare County Agricultural Commissioner's Office, the San Joaquin Valley Air Pollution Control District, the Tulare County RMA GIS Mapping Division, and the Tulare County RMA Dairy Monitoring Program.[23] Emissions from dairy cattle were calculated using IPCC Tier 2 emissions factors derived by the U.S. Environmental Protection Agency (EPA) in the 2010 U.S. Greenhouse Gas Inventory Report.[24] Methane emissions coefficients were developed using the Cattle Enteric Fermentation Model (CEFM), which is based on recommendations provided in IPCC (1997), IPCC (2000), and IPCC (2006), uses information on population, energy requirements, digestible energy, and methane conversion rates to estimate methane emissions. These are nationwide emissions factors. Emissions factors for other cattle were calculated using the average of Tier 2 emissions factors of all age groups of beef (all non-dairy cattle) derived by the U.S. EPA in the 2010 U.S. Greenhouse Gas Inventory Report. To determine the emissions factor for all other livestock (including sheep and swine), the Inventory assumes IPCC Tier 1 emissions factors, which are cited by both the U.S. EPA in the 2010 U.S. Greenhouse Gas Inventory Report and the California Air Resources Board in California's 2004 Greenhouse Gas Emissions Inventory.[25]

III. INVENTORY FORECAST

COMMUNITY-WIDE BUSINESS-AS-USUAL FORECAST

To illustrate the potential emissions growth in the community-wide inventory based on projected trends in energy use, driving habits, job growth, and population growth from the baseline year going forward, the Inventory provides an emissions forecast for the years 2020 and 2030. The year 2020 is consistent with the State of California GHG Inventory forecast year and Assembly Bill (AB) 32 target, both of which reference 2020.[26] The year 2030 is consistent with the buildout date established in the General Plan Update. Forecasts also allow for the assessment of the effectiveness of various reduction strategies in the CAP. Forecasting is completed by adjusting baseline levels of emissions consistent with household,

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[22] Tulare County Agricultural Commissioner 2007; Haines 2010; UC Davis Agricultural & Resource Economics 2010.

[23] Tulare County Agricultural Commissioner 2007; San Joaquin Valley Air Pollution Control District 2010; Tulare County RMA GIS Mapping Division 2006; Tulare County RMA Dairy Monitoring Program 2007.

[24] USEPA 2010.

[25] IPCC 2006; U.S. EPA 2010; CARB 2009.

[26] ARB 2010b.

population, and transportation growth. For purposes of consistency with the proposed buildout scenario in the General Plan Update, forecasts for each target year are premised on the compound annual growth rates necessary to achieve General Plan buildout in 2030. In order to ensure that forecasted emissions are comparable to baseline emissions, all forecasts are based on emissions that occur within city limits and the Planning Area. This approach ensures a consistent and accurate approach for a consistent geographic scope that supports the assumptions proposed in the General Plan Update.

The basis for all growth scenarios is a "business-as-usual" projection. A business-as-usual (BAU) projection identifies how GHG emissions will increase if behaviors and efficiencies do not change from baseline levels, yet population, households, and vehicle miles traveled continue to increase.

Under a business-as-usual scenario, the City of Tulare and the City of Tulare's Planning Area emissions will grow from 820,291 metric tons CO_2e by approximately 53.9% by the year 2020 to 1,262,252 metric tons CO_2e. By 2030, emissions will grow by approximately 123.8% to 1,835,455 metric tons CO_2e. The results of the forecast are shown in **Table 4** and **Figure 3** below. Forecasts for 2010, 2020, and 2030 are premised on achieving 70% of growth projections established in the City's 2030 General Plan Update for jobs, housing, population, and infill land use acreages.[27] (Refer to Tables A1-6 through A1-8 in Appendix 1 for additional details on the forecast.) The anticipated development is consistent with recent development trends and the 2030 General Plan. Anticipated buildout would result in the following:

- 90,796 residents by 2030 (average compound annual growth rate of 2.23% from 2006-2030)
- 59,889 jobs by 2030 (average compound annual growth rate of 5.19% from 2006-2030)
- 27,623 households by 2030 (average compound annual growth rate of 2.27% from 2006-2030)
- 3,327 acres of infill industrial land uses (average compound annual growth rate of 3.49% from 2006-2030)
- 3,924 acres of infill commercial and public/quasi-public land uses (average compound annual growth rate of 1.12% from 2006-2030)

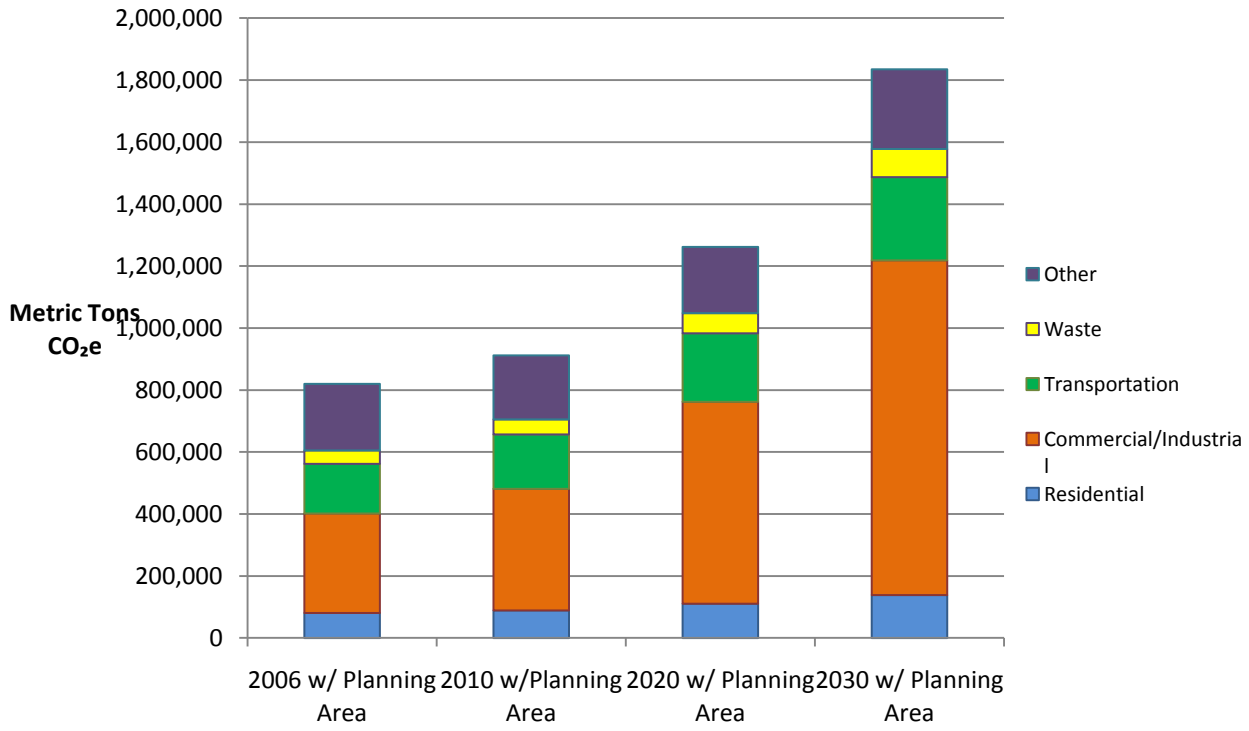
[27] City of Tulare 2007. Excludes industrial and commercial reserve acreages; reserve acreages are designated by the General Plan for additional growth after 2030.

Table 4: Business-As-Usual Projected Growth in Community-Wide Emissions, 2006–2030 (Metric Tons CO_2e)

		2006		2010*	2020*	2030*
		City Limits	City Limits & Planning Area	City Limits & Planning Area	City Limits & Planning Area	City Limits & Planning Area
Residential	Electricity	39,700	41,242	45,118	56,479	70,699
	Natural Gas	38,508	40,004	43,764	54,783	68,577
Commercial/ Industrial	Electricity	117,975	139,860	171,219	283,919	470,801
	Natural Gas	152,6000	180,909	221,471	367,249	608,981
Transportation	VMT	124,167	160,587	175,871	220,750	268,282
Waste	Landfilled Tons	41,994	42,809	48,168	65,438	90,513
Other	Agriculture	820	96,228	66,455	25,946	10,330
	Stationary Sources	118,651	118,651	140,240	187,485	247,085
Total		**634,414**	**820,291**	**912,414**	**1,262,252**	**1,835,455**
% Change from 2006		**0.00%**	**0.00%**	**11.23%**	**53.88%**	**123.76%**

** Note that while Southern California Edison provided 2009 electricity consumption data for uses within city limits, this data was excluded from the forecast. For purposes of consistency, all forecasts are tied to the growth projections established by the 2030 General Plan Update, and are premised on compound annual growth rates that will achieve the City's target buildout population.*

Figure 3: Business-As-Usual Projected Growth in Community-Wide Emissions, 2006–2030 (Metric Tons CO_2e)



ADJUSTED COMMUNITY-WIDE FORECAST WITH STATE ACTIONS

State-led or state-induced reduction strategies included in the AB 32 Scoping Plan are accounted for in the adjusted business-as-usual forecast. This includes all State of California actions that are approved, programmed, and/or adopted. These programs require no additional local action. Incorporating them into the forecast and reduction assessment provides a more accurate picture of future emissions growth and the responsibility of local governments once state measures to reduce GHG emissions have been implemented. A brief description of each of these items is provided below. The impact of these actions on the BAU forecast is shown in **Table 5**.

Table 5: Comparison of Business-as-Usual Growth in Community-Wide Emissions with State Actions (Metric Tons CO_2e)

	2006		2010	2020	2030
	City Limits	City Limits & Planning Area	City Limits & Planning Area	City Limits & Planning Area	City Limits & Planning Area
Growth Projection ($MTCO_2e$) (BAU Forecast)	634,414	820,291	912,414	1,262,252	1,835,455
Pavley I Reductions ($MTCO_2e$)	n/a	n/a	n/a	-26,334	-47,568
LCFS ($MTCO_2e$)	n/a	n/a	n/a	-19,522	-22,071
Heavy-Duty Vehicle Reductions (MTCO2e)	n/a	n/a	n/a	-1,278	-1,698
RPS Reductions ($MTCO_2e$)	n/a	n/a	-2,812	-33,699	-91,514
CalGreen 2008 Title 24 Reductions ($MTCO_2e$)	n/a	n/a	n/a	-32,510	-112,699
Total State Reductions ($MTCO_2e$)	n/a	n/a	-2,812	-113,343	-275,550
Adjusted Growth Projection ($MTCO_2e$)	n/a	n/a	909,602	1,148,909	1,559,905
Percentage Change with Adjusted Forecast From City & Planning Area Baseline 2006		n/a	10.89%	40.06%	90.16%

** Note: While Southern California Edison provided 2009 electricity consumption data for uses within city limits, this data was excluded from the forecast. For purposes of consistency, all forecasts are tied to the growth projections established by the General Plan Update, and are premised on compound annual growth rates that will achieve the City's target buildout population.*

- **Assembly Bill 1493 (Pavley),** signed into law in 2002, will require carmakers to reduce GHG emissions from new passenger cars and light trucks beginning in 2011. Regulations were adopted by the California Air Resources Board (ARB). It is expected that new vehicles sold in California will create an average of 16% fewer GHG emissions than current models.

- **Low Carbon Fuel Standard.** The State is proposing to reduce the carbon intensity of transportation fuels consumed in California through a Low Carbon Fuel Standard (LCFS) being developed by ARB. Standards would reduce the carbon intensity of California's transportation fuels by at least 10% by 2020 and 20% by 2035 as called for by Governor Schwarzenegger in Executive Order S-01-07.

- **Heavy-Duty Vehicle Emission Reduction (Aerodynamic Efficiency) Standard.** CARB approved this regulation in December 2008. This measure is outlined in the AB 32 Scoping Plan. The reduction requires heavy-duty trucks and trailers to be retrofitted with the best available technology and/or CARB approved technology to improve fuel efficiency, including devices that reduce aerodynamic drag and rolling resistance. The requirements apply to California and out-of-state registered trucks that travel to California. The cost of these retrofits would be

recovered over the life of the vehicle through reduced fuel use. This measure would require in-use trucks and trailers to comply through a phase-in schedule starting in 2010 and achieve 100 percent compliance by 2014. Additionally, new 2011 and later tractors and trailers that are sold in or service California would need to be certified for aerodynamic efficiency requirements. The 2020 estimated GHG reductions could be up to 6.4 MMTCO2E nationwide, of which about 0.93 MMTCO2E or about 15 percent would occur within California. Per the reductions outlined in the AB 32 Scoping Plan, this action will reduce emissions from heavy-duty vehicles by approximately 2% by 2020, affecting all heavy-duty vehicle emissions in Tulare (approximately 25% of vehicle emissions). Throughout the Central Valley, emissions from heavy-duty vehicles comprise a larger percentage of total vehicle emissions. On average throughout the state, heavy-duty vehicles comprise less than 10% of vehicle emissions, compared to 25% in Tulare County, 30% in Fresno County and 35% in the San Joaquin Valley Air Basin (EMFAC 2007).

- **Renewable Portfolio Standard.** Established in 2002 in Senate Bill 1078, the Renewable Portfolio Standard (RPS) targets utility providers to increase the portion of energy that comes from renewable sources to 20% by 2010 and to 33% by 2020. A June 2009 report from the California Public Utilities Commission indicated that it is unlikely that the State and its investor-owned utilities will be able to reach the RPS goal of 33% by 2020; according to State assessments, the forecast assumes that energy providers will achieve 26% renewable sources by 2020, 33% by 2030, and 35% by 2035.[28]

- **Title 24 (CalGreen) – 2008 Standards.** The 2008 Title 24 update went into effect on January 1, 2010. The energy reductions quantified in the forecast are the mandatory improvements over the 2005 Title 24 code that were established by the 2010 update. These are statewide standards applied at the local level by city agencies through project review. The revamped CalGreen standards that go into effect January 1, 2011, do not provide additional mandatory reductions in energy consumption that can be quantified as an anticipated alteration to business-as-usual trends; rather, CalGreen establishes optional tiers for enhanced energy efficiency and conservation that can be implemented at the discretion of local governments.

AB 32 establishes an emissions reduction target of 15% below current baseline levels by 2020, which is consistent with the State's direction to local governments in the AB 32 Scoping Plan. Executive Order S-3-05 calls for a target reduction of 80% below 1990 levels by 2050.[29] The chart below (**Figure 4**) provides a comparison of the business-as-usual forecasts for 2020 and 2030 to the 2006 baseline year and reduction targets. The chart also depicts the challenge that Tulare will face meeting its reduction target. Emissions will continue to increase along the business-as-usual scenario while reduction efforts are initiated. Because of this, achieving the target is will require more than a 15% decrease; rather, it will require a 44.8% reduction from 2020 emissions levels, or business as usual. By 2030, the gap between business-as-usual growth and target reduction levels increases to 73.9%. Once state reductions are accounted for, the reduction necessary at the local level to achieve targets drops to 39.3% below the adjusted business-as-usual forecast by 2020 and 69.3% below the adjusted business-as-usual forecast by 2030. **Figure 4** demonstrates projected increases and the total emissions reductions that will be

[28] California Public Utilities Commission 2009.

[29] "Current year" is defined in the AB 32 scoping plan as any baseline year between 2005 and 2008.

necessary to achieve City targets. Reduction targets and the changes in emission levels required to achieve them are detailed further in **Table 6**.

Figure 4: GHG Forecast in Relation to Reduction Targets (MT CO_2e)

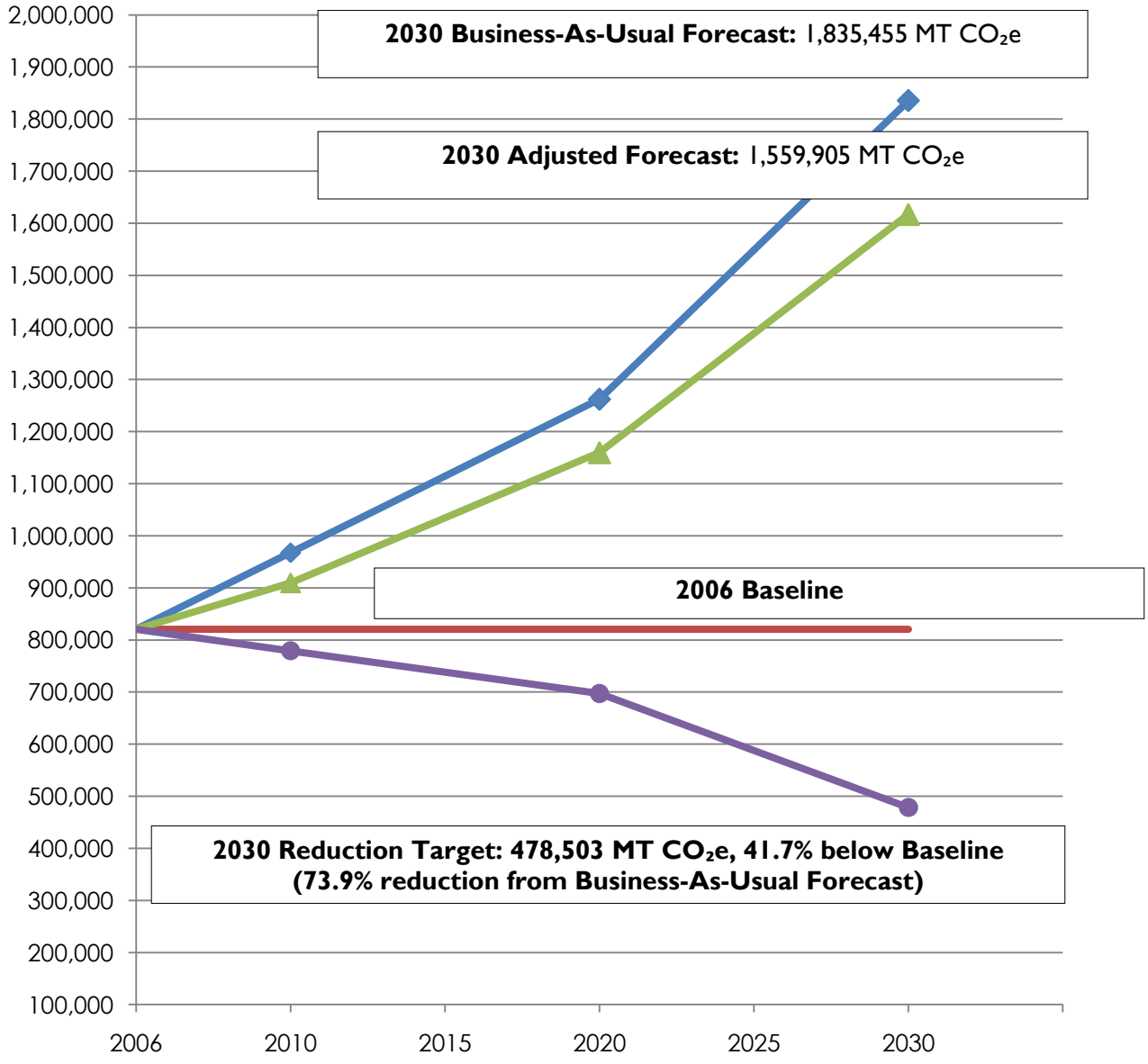


Table 6: Comparison of Business-As-Usual and Adjusted Forecasts to Reduction Targets

	2020	2030
Target reduction	15.00%	41.67%
Local level needed to achieve target	697,247	478,503
Local % reduction from BAU forecast to achieve target	-44.8%	-73.9%
Local reduction needed from BAU forecast ($MTCO_2e$)	565,005	1,356,952
Local reduction needed from adjusted forecast ($MTCO_2e$)	451,662	1,081,403
Local % reduction needed from adjusted BAU	-39.3%	-69.3%
% Contribution of state actions to targets	-5.5%	-4.6%

IV. CONCLUSION AND NEXT STEPS

The Inventory is an important milestone for the City in assessing and mitigating its impact on climate change from both government operations and activities within the community at large. The Inventory yields data that will shape the development of the Climate Action Plan. Data calculated in the Inventory forms the foundation of the Climate Action Plan and provides a justifiable basis for the City's analysis of its impact on climate change.

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APPENDIX 1: DETAILED EMISSIONS BY SECTOR FROM COMMUNITY-WIDE ACTIVITIES

CITY OF TULARE GHG INVENTORY SUMMARY MEMO

COMMUNITY-WIDE BASELINE EMISSIONS

Table 1: Summary of Community Emissions by Sector (Metric Tons of CO_2e)

2006 Baseline Green-house Gas Emissions	City Limits		Planning Area Only		City Limits & Planning Area		
	Metric Tons CO_2e	Percentage of Total	Metric Tons CO_2e	Percentage of Total	Metric Tons CO_2e	Percentage of Total	% Increase from City Limits Only
Residential	78,208	12.3%	3,039	1.6%	81,247	9.9%	3.9%
Commercial/ Industrial	270,575	42.6%	50,194	27.0%	320,769	39.1%	18.6%
Transportation	124,167	19.6%	36,421	19.6%	160,587	19.6%	29.3%
Waste	41,994	6.6%	815	0.4%	42,809	5.2%	1.9%
Other	119,471	18.8%	95,408	51.3%	214,879	26.2%	79.9%
Total	**634,414**	**100%**	**185,877**	**100%**	**820,291**	**100%**	**29%**

Table A1-2: Energy Use and the Built Environment: Consumption and Emissions by Sector and Source

Emissions from the Built Environment		Electricity		Natural Gas		Total Emissions	% of Total Energy Emissions by Sector
		Input Data (kWh/yr)	Emissions Output ($MTCO_2e/yr$)	Input Data (therms/yr)	Emissions Output ($MTCO_2e/yr$)		
City Limits	Residential	135,756,093	39,700	7,244,345	38,508	**78,208**	**22.4%**
	Commercial/ Industrial	403,419,801	117,975	28,707,946	152,600	**270,575**	**77.6%**
	Total	**539,175,894**	**157,675**	**35,952,291**	**191,108**	**348,783**	**100.0%**
Planning Area Only*	Residential	5,274,437	1,542	281,459	1,496	**3,039**	**5.7%**
	Commercial/ Industrial	74,838,580	21,886	5,325,623	28,309	**50,194**	**94.3%**
	Total	**80,113,017**	**23,428**	**5,607,083**	**29,805**	**53,233**	**100.0%**
City Limits & Planning Area	Residential	141,030,530	41,242	7,525,804	40,004	**81,247**	**20.2%**
	Commercial/ Industrial	478,258,381	139,860	34,033,569	180,909	**320,769**	**79.8%**
	Total	**616,651,692**	**180,331**	**41,418,644**	**220,165**	**400,496**	**100.0%**

** Planning Area refers to the area within the City's Planning Area or Urban Area Boundary that fall outside city limits.*

Citations:

- Coronel 2010.
- California Air Resources Board 2008.

Notes on Methodology:

- City Limits
  - Electricity data for the calendar year of 2006 was obtained from Southern California Edison, in Electricity Use Report for City of Tulare, Year 2006. Provided by Chris Coronel, Account Manager, on August 12, 2010.
  - Assumes the following to attribute electricity consumption, by sector, as confirmed by Hans Elgayar (Southern California Edison): Commercial and industrial energy use is represented by the rate groups AG TOU, GS-1, GS-2, PA-1, Streetlighting, and TOU-8; single-family and multi-family residential is represented by the rate group Domestic.
  - Electricity consumption was converted to CO_2e using coefficients provided by LGOP v.1.1 (May 2010).

  - Natural gas data provided by Colby Morrow, Southern California Gas Company.

- Planning Area

  - For residential consumption: Assumes an annexation population of 2,000 for Planning Area land that is outside city limits. Applies the ratio of city residential consumption/city resident to annexation population. Assumes the ratio of $MTCO_2e$/kWh or therm within city limits holds constant for the Planning Area.

  - For nonresidential consumption: Assumes the acreages of existing land uses provided by the General Plan Update Draft Environmental Impact Report (page 3-1) for commercial and industrial land uses within the city and within the Planning Area. Assumes that the ratio of energy consumption per commercial and industrial acreage within the city holds constant in the Planning Area, and assumes the ratio of $MTCO_2e$/kWh or therm within city limits holds constant for the Planning Area.

Transportation Citations:

- Caltrans 2006.
- California Air Resources Board 2007.
- California Air Resources Board 2010c.
- City of Tulare 2010.

Notes on Methodology:

- Annual VMT calculated by multiplying daily VMT provided in Caltrans HPMS Reports by 365.
- An annual VMT per highway mile figure was calculated for all of Tulare County assuming constant VMT across all state highways and interstates, and local roads in unincorporated areas. This figure was applied to the number of highway miles in the City of Tulare boundary and the highway and local roads miles in the Planning Area using GIS data provided by the City.

- Transportation-related greenhouse gas emissions were calculated using the California Air Resources Board (CARB) Emissions Factor (EMFAC) 2007 software. EMFAC2007 provides carbon dioxide and methane emissions according to the unique vehicle and speed composition of each County in California. Nitrous oxide (N_20) emissions were calculated using an off-model adjustment provided by CARB in the Assembly Bill (AB) 32 Technical Appendices (http://www.arb.ca.gov/cc/inventory/doc/methods_v1/ghg_inventory_technical_support_document.pdf). The off-model adjustment uses a linear regression correlating N20 with NOx. Weekday VMT and emissions are converted to annual figures using a conversion factor of 347 days/year to account for lessened travel on weekends, per the AB 32 Technical Appendix.

Table A1-3: Transportation Emissions by Road Type

Sector	Emissions Source	City Limits			Planning Area Only		City Limits & Planning Area		
		Input Data	Emissions Output ($MTCO_2e/yr$)	% of Trans-portation Emissions	Input Data	Emissions Output ($MTCO_2e/yr$)	Input Data	Emissions Output ($MTCO_2e/yr$)	% of Trans-portation Emissions
Highway	Vehicle Miles Traveled (AnnualVMT)	98,498,091	44,750	36.04%	50,697,547	38,063	149,195,637	82,813	51.57%
Local Road	Vehicle Miles Traveled (Annual VMT)	119,905,850	79,417	63.96%	20,213,231	-1,642	140,119,081	77,775	48.43%
Total	Vehicle Miles Traveled (Annual VMT)	**218,403,941**	**124,167**	**100.00%**	**70,910,778**	**36,421**	**289,314,718**	**160,587**	**100.00%**

Table A1-4: Waste by Source

Sector	Emissions Source (Landfill)	City Limits			Planning Area Only		City Limits & Planning Area		
		Input Data (Tons Landfilled)	Emissions Output ($MTCO_2e/yr$)	% of Total Waste Emissions	Input Data (Tons Landfilled)	Emissions Output ($MTCO_2e/yr$)	Input Data (Tons Landfilled)	Emissions Output ($MTCO_2e/yr$)	% of Total Waste Emissions
Waste	Landfilled	30,679	22,782	54%	8,493	442	31,275	23,224	54.25%
	Residual	12,358	9,177	22%	3,421	178	12,598	9,355	21.85%
	Self-Haul	13,514	10,035	24%	3,741	195	13,776	10,230	23.90%
	Total	**56,551**	**41,994**	**100%**	**15,656**	**815**	**57,650**	**42,809**	**100%**

Figure A1-1: Transportation Emissions in City Limits and Planning Area by Road Type ($MTCO_2e$)

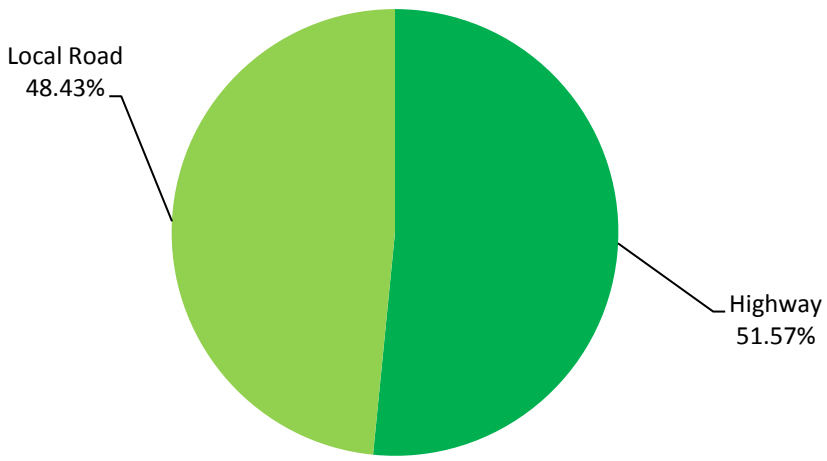
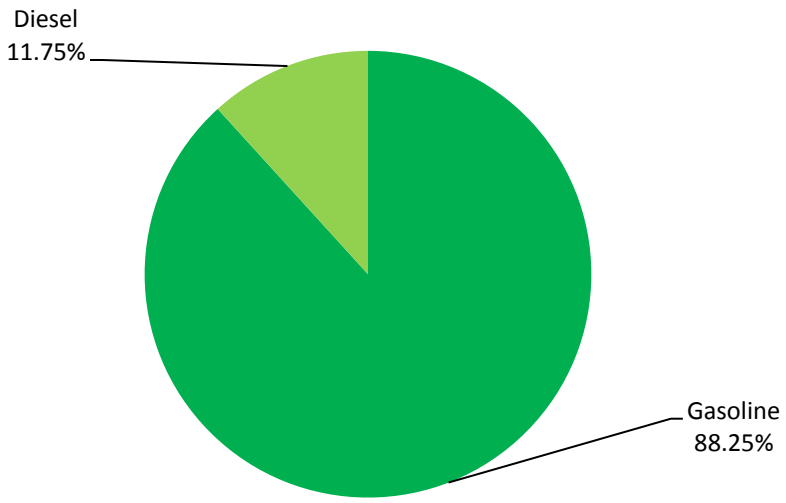


Figure A1-2: Transportation Emissions in City Limits and Planning Area by Fuel Type ($MTCO_2e$)



Appendix 1: Communitywide Inventory - Detailed Emissions by Sector
Revised January 24, 2011

Citations:

- Akins 2010.
- California Air Resources Board 2010a.
- CalRecycle 2010.

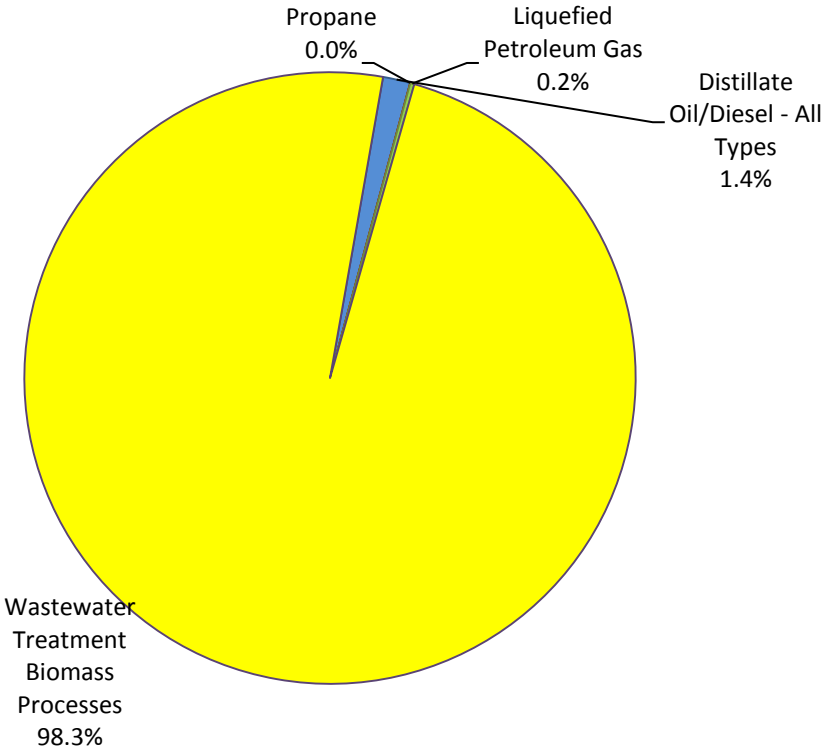
Notes on Methodology:

- City Limits:
  - Waste tonnages attributed to the City of Tulare out of all CWMA waste obtained from Denise Akins, Tulare County RMA Solid Waste Division, June 9, 2010. Assumes that emissions attributed to the City of Tulare equate to the percentage of waste sent to each landfill attributed to the City of Tulare.
  - Greenhouse gas emissions were calculated using the methane commitment method and the California Air Resources Board Landfill Emissions Tool v1.2 (June 2010). The methane commitment method attributes the lifetime of methane emissions from a given amount of waste to the year in which the waste was disposed. The CARB Landfill Emissions Tool uses the IPCC First Order Decay Model. Methane emissions are represented as CO2e; carbon dioxide emissions are considered biogenic in origin and are excluded from the waste inventory. Uses an ANDOC of 7.5 and a k value of 0.020. Assumes average methane recovery factor of 0.75.
  - Excludes waste totals provided by Denise Akins that were transformed to energy in Long Beach (Waste-to-Energy, or WTE) and composted waste. Both used for sustainable purposes and count as a diversion credit.
- Planning Area:
  - Per the General Plan Draft Environmental Impact Report (2007), 64% of the Urban Area Boundary acreage is currently agricultural uses, 11% is residential uses, and less than 6% is commercial or industrial uses. Assumes that the rate of tons landfilled waste in 2006 per resident in existing city limits applies to residents in the Urban Area Boundary. Assumes that ratio of generation of emissions per ton of waste remains constant.
  - Assumes rate of MTCO2e generated per ton of landfilled waste generated within the city applies to the residents in the Urban Area Boundary.
  - Approximate population to be annexed is 2,000, per Lew Nelson (pers. communication).

Table A1-5: Stationary Emissions by Activity

Emissions Sector	Emissions Sub Sector	City Limits	
		Emissions Output (MT CO_2e/yr)	% of Stationary Emissions
Commercial/Institutional	Governmental/ Institutional	97	0.1%
	Other Commercial	425	0.4%
	Telecommunications	35	0.0%
	Wastewater Treatment Biomass Processes	116,668	98.3%
Industrial	Agricultural Processing	260	0.2%
	Dairy Manufacturing	901	0.8%
	Energy Transmission	1	0.0%
	Fertilizer Production	244	0.2%
	Trucking Operations	20	0.0%
Total		**118,651**	**100.00%**

Figure AI-3: Stationary Emissions by Activity



Stationary source emissions

Citations:

- Christi 2011.
- Villalvazo 2011.
- Nelson 2010.
- California Air Resources Board 2009.
- California Air Resources Board 2010c.
- U.S. EPA 2010.

Appendix 1: Communitywide Inventory - Detailed Emissions by Sector
Revised January 24, 2011

Notes on Methodology:

- Stationary source emissions data capture process-based emissions from the City's wastewater treatment plant and stationary source emissions permitted by the San Joaquin Valley Air Pollution Control District.

- Wastewater treatment plant emissions: captures process-based emissions that result from the treatment of wastewater, and exclude energy consumption used to power the plant (captured elsewhere in the Inventory). Wastewater treatment plant characteristics were provided by Lew Nelson, Public Works Director for the City of Tulare. Process-based emissions from the treatment of wastewater were calculated using ICLEI's Wastewater Treatment Plant Emissions Excel-based calculator and the Local Government Operations Protocol v.1.1 (California Air Resources Board 2010c).

- Other stationary source emissions : the San Joaquin Valley Air Pollution Control District (District) provided stationary source data for all activities that the District permits within city limits; at this time, to obtain stationary source data for activities in the Planning Area, the City would have to coordinate a data request with the District using GIS data. At this point, such a detailed data request is not feasible, and it is anticipated that the bulk of the City's stationary emissions are already captured within city limits., based on land use Details by source are provided below; note that not all activities that the District reported are relevant for the Inventory; details on excluded stationary sources are also provided below.

  - Excluded District stationary sources :

    - Chemical use: excludes the use of permitted chemicals that are not GHGs and do not involve chemical production, fuel consumption, or other release of GHGs (including ethylene oxide and ammonium phosphates).

    - Sodium carbonate (pot ash)production: Per Villalvazo (2011), excluded per statewide methodology. These stationary sources reflect the production of soda ash. According to the California Air Resources Board (2009) , citing the U.S. EPA, in "California, soda ash is manufactured using sodium-carbonate bearing brines instead of ore...Although CO2 is generated as a by-product, the CO2 is recovered and recycled for use in the carbonation stage and is not emitted ...For this reason, there is no "Soda ash production section...in the CA GHG Inventory."

    - Excludes all sources already captured in the Inventory, including wastewater treatment plant operations and the combustion of natural gas. Emissions for wastewater treatment plant operations were calculated based on data provided by City staff, which is consistent with other sectors of this Inventory and assumed to be more accurate. Per confirmation of Villalvazo (2011), the utilities provide all natural gas that is reflected in District activity data., which is already captured in the Inventory as commercial and industrial natural gas consumption.

    - Concrete production: Per Villalvazo (2011), activities in the Valley only reflect concrete production (the mixing of cement and other finished materials).

Cement is not produced in the San Joaquin Valley; therefore, local concrete activities do not reflect the generation of GHGs. The California Air Resources Board (2009) only calculates GHGs from the production of cement, based on the CO2 emissions associated with the production of clinker that emits cement kiln dust (CKD).

- Fugitive emissions for fuel storage, gasoline activity, and fuel vapors: Non-combusted fugitive emissions from gasoline distribution and storage are excluded. While the Air Resources Board provides data on total organic gases of fugitive emissions at a City scale, (see the CEIDARIS database http://www.arb.ca.gov/app/emsinv/facinfo/factox.php?dd=&grp=1&sort=FacilityNameA&dbyr=2006&ab_=SJV&dis_=SJU&co_=54&fname_=&city_=Tulare&fzip_=&fsic_=&facid_=&displayit=on&showpol=TOG&showpol2=), at this time there is no documented methodology for the City to accurately calculate GHGs from these emissions. For more information, refer to California Air Resources Board 2009.

- Solvents, painting, and other painting-related activities: the District reported the use of paint and solvents in the City (e.g., activity at auto body shops), and not the combustion of fuels or other activity to produce paints. No GHGs result from painting activities; all emissions associated with painting production do not take place in city limits or the Planning Area (Villalvazo 2011).

- Soil remediation: this activity may release methane. However, no methodology is currently available for estimating these emissions (U.S. EPA 2010).

- Excludes all stationary sources with no fuel, process, or activity designated .

- Other permitted stationary activities that do not generate GHGs: activities that only create particulate matter or do not otherwise result in fuel combustion or other GHGs are excluded, including the movement of minerals , tons of milk, tons of mineral crushing, pellet and grain storage, metal storage, and other bulk storage. Assume that fuel burning or other energy to complete these processes is already captured elsewhere in stationary activities or other emissions sources in the Inventory.

- Animal incineration: excludes all emissions from animal incineration; no methodology is available to quantify these emission.

- Included District stationary sources:

  - Distillate fuel combustion: For CO_2 emissions, assumes average of Distillate Oil 1, 2, and 4 for diesel fuel from Table G.1 (California Air Resources Board 2010c). Per the U.S. EPA (2010 A-63), distillate fuel is a general classification for diesel fuels and fuel oils, including distillates No. 1, No. 2, and No. 4 diesel fuel . For CH_4 and N_2O emissions, assumes Commercial/institutional or industrial emissions factors as appropriate for Distillate Fuel No. 2 emissions, the closest available proxy, in Table G.4 (California Air Resources Board 2010c).

- Commercial/Institutional propane combustion: For CO_2 emissions, assumes propane emissions factors from Table G.1 (California Air Resources Board 2010c). For CH_4 and N_2O, assumes propane emissions coefficients for commercial/institutional uses.

- Industrial liquefied petroleum (LPG) combustion: For CO_2 emissions, assumes propane emissions factors from Table G.1 (California Air Resources Board 2010c). For CH_4 and N_2O, assumes LPG emissions coefficients for industrial uses from Table G.4 (California Air Resources Board 2010c).

Table A1-6: Agricultural Emissions by Activity

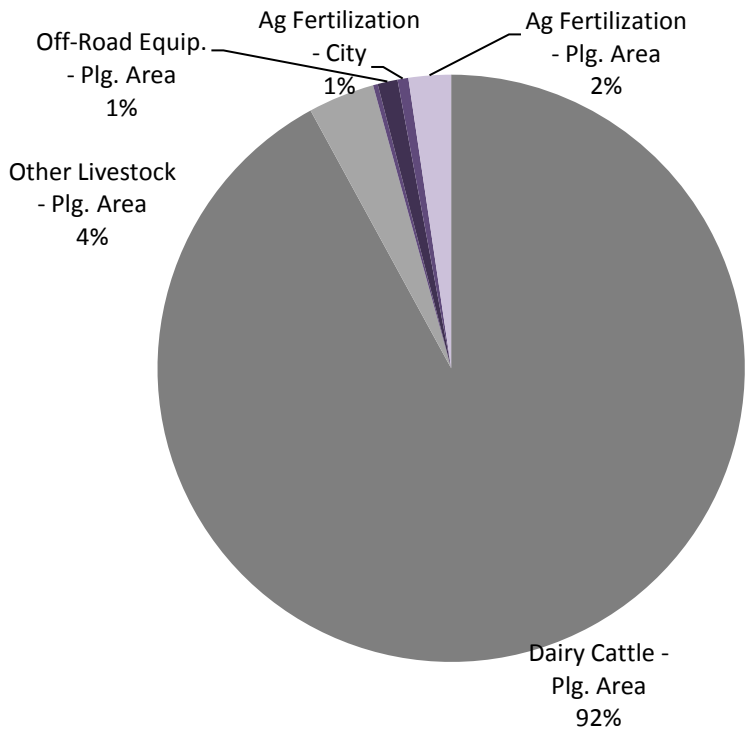
Emissions Source	City Limits			Planning Area Only		City Limits & Planning Area		
	Input Data	Emissions Output (MT CO_2e/yr)	% of Agricultural Emissions	Input Data	Emissions Output (MT CO_2e/yr)	Input Data	Emissions Output (MT CO_2e/yr)	% of Agricultural Emissions
Dairy Cattle	NA	0	0.0%	40,808 dairy cattle	88,579	40,808 dairy cattle	88,579	92.1%
Other Livestock	NA	0	0.0%	5,569 livestock	3,525	5,569 livestock	3,525	3.7%
Off-Road Agricultural Equipment	29 pieces of off-road ag equipment	248	30.2%	125 pieces of off-road ag equipment	1,059	154 pieces of off-road ag equipment	1,306	1.4%
Agricultural Fertilization	259,411 lbs of nitrogen	573	69.8%	1,017,051 lbs of nitrogen	2,245	1,267,462 lbs of nitrogen	2,818	2.9%
		820	100.0%		95,408		96,228	100.0%

Off-road agricultural equipment

Citations:

- California Air Resources Board 2007.
- City of Tulare 2007.
- Tulare County Agricultural Commissioner 2007.

Figure AI-4: Agricultural Emissions by Activity



Off-road agricultural equipment

Notes on Methodology:

- CO2, CH4, and N2O emissions calculated using the California Air Resources Board OFFROAD2007 modeling tool. Emissions calculated on a countywide basis.

- Takes a percentage of countywide emissions based on proportion of county-wide crop land within the City and Planning Area (i.e., Urban Area Boundary), based on existing crop acreage in 2006 reported by the City from GIS files and the County Assessor's database, in comparison with county-wide crop totals provided in the 2006 County Crop Report (Tulare County Agricultural Commissioner 2007). This includes 1,657 acres in the City only in 2006, 8,745 acres in the City and in 2006, and 2,648 acres in the City and at build out conditions in 2030.

Agricultural Soil Fertilization

Citations:

- UC Davis Agricultural & Resource Economics 2010.

- Tulare County Agricultural Commissioner 2007.

- City of Tulare 2007.
- Haines 2010.
- California Air Resources Board 2008.

Notes on Methodology:

- Crop data was gathered from the Tulare County 2006 Annual Crop and Livestock Report. Crop categories relevant to agricultural activity in the City of Tulare were identified. A weighted average of nitrogen fertilizer was calculated for each crop category relevant to City agricultural practice. An equation provided by the California Air Resources Board was used to calculate grams of N_2O. Grams of N_2O were converted into metric tons of CO_2e using factors provided in the Local Government Operations Protocol Version 1.0 (California Air Resources Board 2008).

- Crop emissions in Tulare Urban Area Boundary. Assumes crop activity from the county assessor's office and the City's GIS database provided by the City for agricultural activity the City has determined are relevant to General Plan area. According to the City's GIS database, assumes that there are 1,657 acres of agricultural land with fertilized crop activity within City limits, and another 7,156 acres outside of City limits but within the City's annexation area, for a total of 8,313 acres. The City has projected that of this land, accounting for conversions taking place to date since the baseline year, 6,167 acres of agricultural land will be converted out of agricultural uses by 2030. Agriculture activity identified by the City that would receive fertilizer applications, including average rates of fertilizer application, is as follows.

    - Grapes (wine and table grapes, land use code 7500): 417.61 acres in City limits in 2006; 477.38 acres outside City limits in 2006; 550.44 total acres by 2010 accounting for land conversions taken place to date; and 73.06 acres in 2030 accounting for forecasted land changes. Average rate of 27.5 lbs of nitrogen applied per year for average lifespan fertilizer rates.

    - Nuts and fruit trees (assumes land use code 7200 for nuts and 7300 for deciduous trees to represent nut and fruit trees): 68.66 existing acres in City limits in 2006; 1,014 acres outside City limits in 2006; 1,082 total acres in 2006; 1,028 total acres by 2010 accounting for land conversions; and 14.41 projected acres for 2030 based on forecasted land use changes. Average rate of 110.67 lbs of nitrogen applied per year for average lifespan of nut and fruit trees

    - Total acres for Row and Field crops (land use code 6300): : 1,571.03 acres in City limits in 2006; 5,525 acres outside City limits in 2006; 7,095.45 total acres in 2006; 8,085 total acres accounting land use changes; 2,560 acres forecasted for 2030 based on projected land use changes.

        - Row crops: (land use code 6300): assume half of row and field crops for 2,762.21 existing acres, average rate of 172 lbs of nitrogen applied per year

        - Field crops (land use code 6300): assume half of row and field crops for 2,762.21 existing acres, average rate of 147.95 lbs of nitrogen applied per year.

    - Aggregated, all fertilizer emissions will reduce at a CAGR of -4.59% under the buildout scenario and projected conversions of agricultural land.

- The impact of organic crops on each crop category was not accounted for and assumed de minimus, based on acreage of each organic crop compared to total acreage.

- Emissions from fertilizer application and soil management were categorized as Scope 1 emissions as identified in ICLEI's International Emissions Analysis Protocol.

Dairy Cattle & Other Livestock

Citations:

- City of Tulare 2007.
- Tulare County 2006 & 2007.
- California Air Resources Board 2009.
- IPCC 1997.
- IPCC 2006.
- IPCC 2000.
- Tulare County Agricultural Commissioner 2007.
- San Joaquin Valley Air Pollution Control District 2010.
- U.S. EPA 2010.

Notes on Methodology:

- Species sub-populations: Countywide livestock population from Tulare County 2006 Annual Crop and Livestock Report (Tulare County Agricultural Commissioner 2007).
    - To determine amount of dairy versus other cattle in 2006, assumes the ratio of dairy to non-dairy cattle in Tulare County in proxy year 2005, due to unavailability of data for 2006. 2005 ratio derived assuming projected population of dairy cattle in 2005 (San Joaquin Valley Air Pollution Control District 2010) to the total number of cattle in Tulare County in 2005 (Tulare County Agricultural Commissioner 2007); the difference was assumed to be the number of all other cattle excluding dairy. The population of dairy cattle in 2005 excludes heifers that have not calved or calves; to account for this absence, calculation takes 107% to account for the ratio of support cattle to milker cattle. This adjustment is assumed to account for all other dairy cattle.

  - While the County of Tulare has noted that there were reportedly 432,777 milking cows in the county in 2006, utilizing the Air District figures was assumed to yield a more accurate methodology, by accounting for non-reported cattle that the County acknowledges could be omitted from the self-reporting process imposed on dairymen (2007).

  - To determine the population of each age category of dairy cattle, assumed the ratio by age group calculated by the Air District (San Joaquin Valley Air Pollution Control District 2010) for dairies district-wide. These ratios were developed using 216 dairy applications submitted to the Air District.

- To determine the number of livestock in the Tulare Urban Area Boundary, the following assumptions were made:

  - Dairy cows based on number of dairies within the Urban Area Boundary, determined by comparison of a map of all county dairies (Tulare County RMA GIS Mapping Division 2006) and the City Urban Area Boundary (City of Tulare 2007). Percentage of dairy cows in the Urban Area Boundary was assumed to equal the percentage of dairies within the county that fall in the Urban Area Boundary. In 2006, there were 24 active dairies within the City's Urban Area Boundary, accounting for 8% of the total dairies within the county.

- All other cattle, lambs, and hogs and pigs attributed to the City's Urban Area Boundary were determined by ratio of agricultural land within the Urban Area Boundary to the rest of the county, or 1.575%.

- Projections

  - To determine the livestock population of 2030, reductions were made based on proposed land use changes determined by the General Plan, City GIS files, and information from the County Assessor's Office. According to General Plan buildiout projections, 35 acres and dairies and feedlots will remain in 2030. For a conservative estimate, assume 90% elimination of livestock by 2030.

  - For 2020 projections, assumes the CAGR to achieve the reduction of livestock land forecasted by the City for 2030 (a CAGR of -9.15%).

- To determine the emissions factor for dairy cattle, utilizes the Tier 2 emissions factors derived by the U.S. EPA in the 2010 U.S. Greenhouse Gas Inventory Report (2010). For the U.S. EPA report, methane emissions coefficients were developed using the Cattle Enteric Fermentation Model (CEFM), which is based on recommendations provided in IPCC/UNEP/OECD/IEA (1997), IPCC (2000), and IPCC (2006), uses information on population, energy requirements, digestible energy, and methane conversion rates to estimate methane emissions. These are nationwide emissions factors.

  - Assumed that the age groups provided by the Air District (San Joaquin Valley Air Pollution Control District 2010) would roughly parallel those provided by the U.S. EPA (2010).

- To determine the emissions factor for other cattle, utilized the average of Tier 2 emissions factors of all age groups of beef (all non-dairy cattle) derived by the U.S. EPA (2010) using the same methodology described above.

- To determine the emissions factor for all other livestock (sheep and swine) assumes IPCC (2006) Tier 1 emissions factors, which are cited by both the U.S. EPA in the 2010 U.S. Greenhouse Gas Inventory Report (2010) and ARB in California's 2004 GHG Inventory (2009).

- To determine emission factors for manure management, assumes IPCC Tier 1 factors for average temperature of 62.9 degrees Fahrenheit or 17.66 degrees Celsius. For swine, assumes default of market swine emissions, as this category reflects swine that are bred and slaughtered throughout the year. For dairy replacements and calves, assumes half the coefficient of dairy cows.

Table A1-6: Forecast Transportation Reductions

GHG Emissions Summary			Pavley I Emissions Reduction	
Year	**Annual VMT**	**Total $MTCO_2e$**	**Year**	**Emissions Reduction ($MTCO_2e$)**
2006	289,314,718	160,587	2020	-26,334
2020	397,703,889	220,750	2030	-47,568
2030	483,338,549	268,282		
Heavy-Duty Vehicle Reductions			**LCFS Emissions Reduction**	
Year	**Emissions Reduction ($MTCO_2e$)**		**Year**	**Emissions Reduction ($MTCO_2e$)**
2020	-1,278		2020	-19,522
2030	-1,698		2030	-22,071
Transportation GHG Emissions Summary with Pavley I, HDV Actions, & LCFS				
Year	Total MT CO_2e			
2006	n/a			
2020	173,616			
2030	196,945			

Citations:

- Caltrans 2006.

- California Air Resources Board 2007.

- City of Tulare 2010.

Notes on Methodology:

- Utilizes EMFAC Burden Model Run for years 2006, 2020, and 2030.

- Applies county VMT growth rate from EMFAC to city and Urban Area Boundary VMT.
- Applies the county emissions growth rate from EMFAC to the city's emissions.
- County EMFAC datasets were used due to lack of city-specific data per correspondence with staff at Tulare County Association of Governments.
- EMFAC does not provide nitrous oxide emissions; therefore, alternative, nationwide coefficients were obtained from California Air Resources Board (2010c). VMT per vehicle class was multiplied by a g/mi coefficient. Applied total emissions growth rate from EMFAC to City's N_2O emissions.
- Calculates the percent change from state actions from EMFAC Post-Processor Tool and apply to City's emissions for PC and LDT vehicles.
- Low Carbon Fuel Standard reductions were applied to City's emissions after Pavley I was applied.
- For heavy duty vehicle upgrades, applies the statewide percentage reduction in heavy duty vehicle fleet emissions (1.93%) to heavy duty vehicle emissions that EMFAC forecasts. Reductions were applied after Low Carbon Fuel Standard was applied.

Table A1-7: State Reductions

Emissions (MTCO2e)	2006	2010	2020	2030
Pavley I Reductions	0	0	-26,334	-47,568
LCFS Reductions	0	0	-19,522	-22,071
Heavy-Duty Vehicle Reductions	0	0	-1,278	-1,698
RPS Reduction -Residential	0	-587	-5,591	-11,948
RPS Reduction - Commercial	0	-2,226	-28,108	-79,565
Title 24 - Residential	0	0	-4,311	-11,738
Title 24 - Commercial	0	0	-28,199	-100,961
Total	**0**	**-2,812**	**-113,343**	**-275,550**
Adjusted Growth Forecast	**0**	**909,602**	**1,148,909**	**1,559,905**

Renewable Portfolio Standard Citations:

- California Public Utilities Commission 2008, 2009, 2010.

Notes on Methodology

- Senate Bill 1078, the Renewable Portfolio Standard (RPS), requires electricity providers to increase the portion of energy that comes from renewable sources to 20% by 2010 and to 33% by 2020.

- 16.1% of SCE's energy mix qualified under the Renewable Portfolio Standard in 2006 (California Public Utilities Commission 2008).

- 17.4% of SCE's energy mix qualified under the Renewable Portfolio Standard by the end of 2009 (California Public Utilities Commission 2010).

- According to a report by the California Public Utilities Commission in June 2009, it is clear that the state will not reach 33% by 2020. A more realistic estimate of renewable energy in 2020, according to the report, is 26% by 2020. Assumes 33% by 2030 and 35% by 2035, according to the report's projections.

Title 24 Citations:

- California Energy Commission, Impact Analysis: 2008 Update to the California Energy Efficiency Standards for Residential and Nonresidential Buildings, November 2007.

- California Energy Commission. (2010). Title 24 Energy Efficiency Standards Website. http://www.energy.ca.gov/title24/2008standards/.

Notes on Methodology:

- All energy increases between base and forecast years is due to new building construction. Residential energy increases are separated by single-family and multi-family based on the percentage of single-family households in the jurisdiction and a factor for the lower energy consumption in multi-family homes. According to the CEC 2009 California Residential Appliance Saturation Study, multi-family homes use 51.6% of the electricity and 67.2% of the natural gas of single-family homes (California Energy Commission 2010).

- The AB 32 Scoping Plan calls for a triennial update to Title 24. To be conservative, we estimate that updated Title 24 Standards will become effective every four years in 2010 (current version), 2014, 2018, and 2022. This analysis does not take into consideration any updates past 2022 due to lack of certainty.

- Past updates to Title 24 have shown equal if not higher increases in efficiency as a result of the update. To be conservative, calculation estimates that each update to the Title 24 Standards will have 70% of the effectiveness of the 2008 vs. 2005 standards.

- The energy impact of 2008 Title 24 Standards for non-residential alterations is modeled. Future updates to non-residential alteration standards are not taken into consideration for lack of data and certainty.

- Per the California Energy Commission Impact Analysis (2007), non-residential facilities are anticipated to be renovated once every 20 years.

Final City Government Operations 2006 Baseline Greenhouse Gas Emissions Inventory

Appendix 2

MEMO

To: Mark Kielty, Planning & Building Director
CITY OF TULARE

From: Tammy Seale

Cc: Lew Nelson, Public Works Director

Date: January 24, 2011

Re: Final City Government Operations Greenhouse Gas Emissions Inventory

Following staff's review and subsequent meetings to discuss staff comments concerning the draft Community-wide Inventory, PMC revised the Inventory to incorporate stationary source greenhouse gas emissions and more accurately account for acreages of agricultural land uses. The following memo integrates these updates to more accurately address the City's contribution to community-wide greenhouse gas emissions.

1. INTRODUCTION

PURPOSE

The purpose of this greenhouse gas (GHG) emissions inventory (Inventory) is to identify the major sources of GHG emissions from City government operations and provide a baseline against which future progress can be measured.[1] This Inventory supplements the community-wide inventory dated January 1, 2011. Government operations occur within the City of Tulare; therefore these government operations emissions are a subset of the community-wide inventory, meaning that all City government operations are included in the commercial/industrial, transportation, waste, or "other" categories of the community-wide inventory.[2] However, similar to the way in which businesses and factories perform their own facility-scale GHG inventories, this Inventory analyzes City emissions in more detail in order to help the City assess and identify emissions-reducing strategies for the Climate Action Plan (CAP) that responds to local emission trends and positions the City for long-term success.

Specifically, this Inventory does the following:

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[1] In this report, the term "city" refers to the area inside the jurisdictional boundary of the City of Tulare, whereas "City government" or "City" refers to those activities which are under the operational control of City agencies. "Planning Area" refers to the area within the City's Planning Area or Urban Area Boundary that falls outside city limits.

[2] "Community-wide" or "community" refers to all activities within the city (as defined above), including those from businesses, industrial processes, residents, vehicles, and City government operations.

- Calculates GHGs from City government operations in calendar year 2006.
- Details the contribution of City government operations to overall community-wide emissions in order to identify inefficiencies and create an example for other organizations to identify their operational emissions.
- Forecasts how emissions from City government operations will increase if no behavioral changes are made.
- Provides City decision-makers with adequate information to direct development of the Climate Action Plan (CAP) and establish an appropriate emissions reduction target.

This Inventory captures the major sources of greenhouse gases (GHGs) caused by City government activities within the city per best practice and International Council for Local Environmental Initiatives (ICLEI) California Air Resources Board protocol.[3] The Inventory does not include refrigerants from City government operations, facilities, and vehicles, due to a lack of data. It is estimated that the sources not included in the Inventory comprise less than 5.0% of total City emissions. As GHG inventories become more common, it is likely that methodology and accessibility to data will improve.

The emissions identified in this report are primarily GHGs that the City has directly caused and has the ability to reduce through implementation of conservation actions, a Climate Action Plan, or corresponding efforts. The Appendix provides additional summaries of government operation emissions by sector.

II. SCOPE OF THE INVENTORY IN RELATIONSHIP TO THE CLIMATE ACTION PLAN

The Inventory focuses specifically on baseline emissions from City government operations and business-as-usual forecasts for these emissions.

City government actions that have taken place since the baseline year of 2006 and that will directly reduce GHG emissions (such as upgrades to the City's wastewater treatment plant) will be accounted for in the Climate Action Plan. Crediting City government actions in the Climate Action Plan will highlight the City's leadership and efforts to date, more clearly depicting the value of the City's voluntary actions. This approach will emphasize the important role of the City in reaching targets that will be established in the CAP.

KEY TERMS AND TIMELINES

The following terms are used throughout the Inventory. These are concepts fundamental to understanding the contents of the Inventory.

- **Baseline year:** Emissions are quantified for the baseline year of 2006, due to the availability of reliable data. The 2006 baseline is also before the initiation of the majority of City actions that

[3] California Air Resources Board 2010.

are anticipated to have reduced GHG emissions. This baseline year allows the City to track and observe the impact of its actions taken to date on GHG emissions and better inform future strategies.

- **Carbon dioxide equivalent (CO_2e):** The universal unit for comparing emissions of different GHGs expressed in terms of the global warming potential of one unit of carbon dioxide.

- **Greenhouse gas (GHG) emissions:** Gases that trap heat in the earth's atmosphere are called greenhouse gases, or GHGs. GHGs include carbon dioxide, methane, nitrous oxide, and fluorinated gases. While many of these gases occur naturally in the atmosphere, modern human activity has led to a steep increase in the amount of GHGs released into the atmosphere over the last 100 years. Collectively, these gases intensify the natural greenhouse effect, thus causing global average surface temperatures to rise, which in turn affects global climate patterns. GHGs are often quantified in terms of CO_2 equivalent, or CO_2e, a unit of measurement that equalizes the potency of GHGs.[4]

- **Sector:** Emissions are grouped by the type of activity that generated the emissions, such as transportation, residential energy use, commercial energy use, and more.

- **City Limits vs. Planning Area:** Throughout this memo, emissions within the city's existing geopolitical boundary are designated as emissions in "city limits," whereas all emissions within the Planning Area (including the existing geopolitical boundary) are designated as "city limits & Planning Area." Unless specifically noted, any references to the Planning Area refer to land that falls outside city limits but is within the Planning Area. This approach is necessary to distinguish between methodologies for calculating emissions within city limits and outside of city limits.

III. CITY GOVERNMENT OPERATIONS GHG INVENTORY RESULTS

Consistent with protocol established by the California Air Resources Board, this Inventory supplements the assessment of activities throughout the community providing a more detailed analysis of City government operations including streetlights, building energy use, fleet vehicles, and more.[5] The City government operations inventory was conducted consistent with the Local Government Operations Protocol developed by the California Air Resources Board (ARB), ICLEI, The Climate Registry, and the California Climate Action Registry (CCAR). City government emissions result from solid waste, energy consumption from water facilities, buildings, streetlights and other facilities, fuel consumption by the vehicle fleet, employee commutes, and the wastewater treatment plant. It is important to note that the City government operations inventory is a subset of the community-wide inventory, meaning that City government operations are generally included in the commercial/industrial, transportation, waste, or "other" categories of the community-wide inventory. However, point-source emissions such as the City's wastewater treatment plant that are accounted for in this Inventory are *excluded* from the community-wide Inventory. It is also acknowledged that some of the emissions generated by City employee commutes may have occurred outside of the City's jurisdiction. Because these emissions are the result of City actions, they are included in the City government operations inventory per standard

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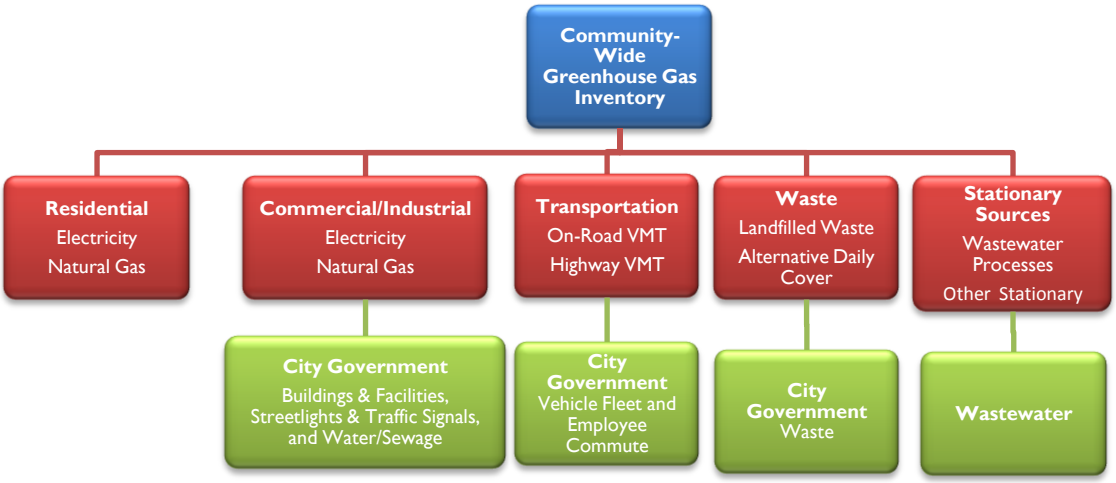
[4] Refer to the IPCC website for more information (http://www.ipcc.ch/).

5 Refer to Seale 2010.

practice and Protocol guidance. Therefore, the City's government operations inventory should not be added to the community analysis; rather it should be looked at as a slice of the complete picture as illustrated in Figure 1.

Figure 1: Relationship Between the Community-Wide GHG Inventory and City Government Operations GHG Inventory



City government operations and facilities produced approximately 132,380 metric tons of GHG emissions in 2006. As displayed in Figure 2, this amount represents approximately 16.1% of total emissions in city limits and the Planning Area. Community-wide emissions include the process-based wastewater treatment emissions and other permitted stationary sources in the city.

Figure 2: City Government Portion of Community-Wide GHG Emissions in City Limits

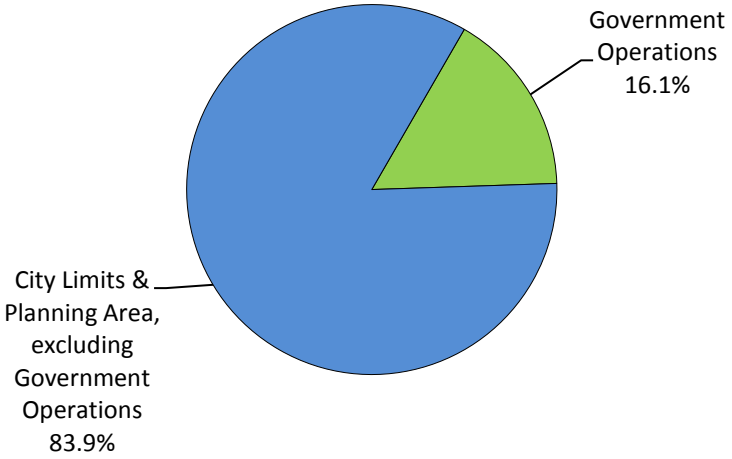


Figure 3: City Government Operations Emissions by Sector, Including Wastewater Treatment Plant Emissions

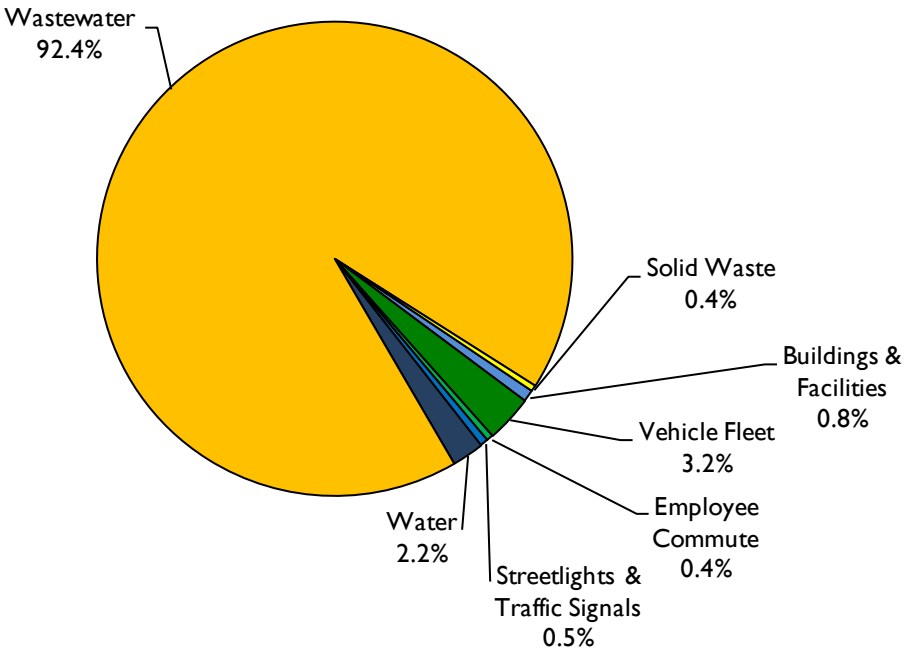
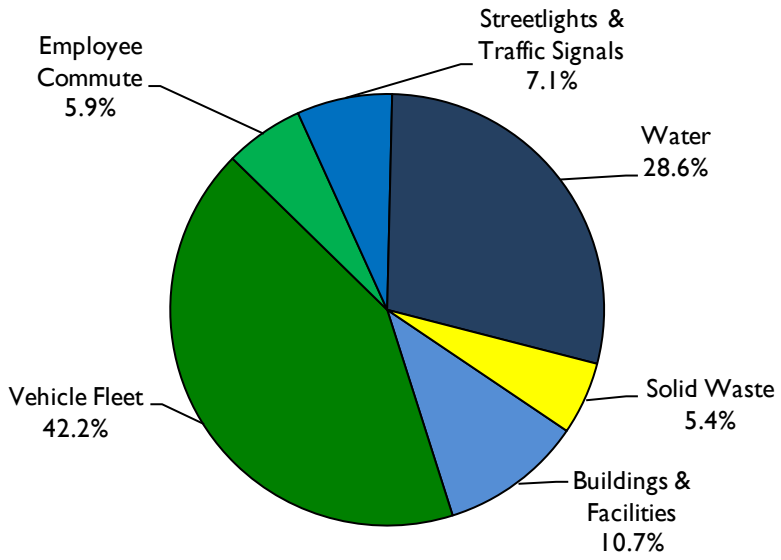


Figure 4: City Government Operations Emissions by Sector, Excluding Wastewater Treatment Plant Emissions



As shown in Figure 3 and Table 1**,** the City's wastewater treatment plant was the largest contributor to the City's emissions (92.4%), producing 122,308 metric tons of carbon dioxide equivalent. The second largest contributor was fuel consumption from the vehicle fleet (3.2%). Every other sector contributed individually less than 10.0% to City emissions, including (in order of contribution) water-related energy consumption (2.2%), buildings and facilities (0.8%), streetlights and traffic signals (0.5%), fuel consumption from employee commutes (0.4%), and solid waste (0.4%). Figure 4 excludes emissions from the wastewater treatment plant to depict the relative proportion of all other sectors to the City's emissions.

Table 1: City Government Emissions by Sector

2006 Municipal Emissions by Sector	Buildings & Facilities	Vehicle Fleet	Employee Commute	Street-lights & Traffic Signals	Water	Waste-water	Solid Waste	TOTAL
CO_2e (metric tons)	1,073	4,254	594	719	2,885	122,308	547	132,380
Percentage of Total CO_2e	0.8%	3.2%	0.4%	0.5%	2.2%	92.4%	0.4%	100.0%

It can also be helpful to view overall City government emissions by source. As shown in Table 2, the majority of emissions are the result of wastewater treatment plant processes (88.13%); and electricity consumption in City-owned buildings, streetlights, and water facilities (7.40%); and compressed natural gas consumed by the vehicle fleet (1.85%),. Gasoline, diesel, solid waste decomposition, natural gas, and ethanol contributed in decreasing amounts to the remaining 2.61% of the overall City GHG emissions.

Table 2: City Government Emissions by Source

City Emissions 2006 by Source	CO_2e (metric tons)	CO_2e (percentage of total)
Electricity[1]	9,796	7.40%
Natural Gas	520	0.39%
Gasoline	1,385	1.05%
Diesel	997	0.75%
CNG	2,455	1.85%
Ethanol[2]	12	0.01%
Wastewater Treatment Processes	116,669	88.13%
Solid Waste	547	0.41%
TOTAL	132,380	100.0%

Notes:
1. Note: Electricity includes electricity consumed at the wastewater treatment plant.
2. Ethanol emissions represent only that portion of flex fuel combustion in the employee commute that is attributed to ethanol (i.e., assumes that flex fuel consumption in the employee commute is E85 blend, and hence excludes 15% of flex fuel consumption that is assumed to be gasoline fuel consumption; see details on the employee commute below for additional information). Ethanol contributes approximately 0.001% of total City emissions.

Table 3 provides information on activity data and data sources and for all sources of City emissions. A summary of the methodology used to obtain and calculate emissions for each sector follows. Refer to the Appendix for additional descriptions of detailed emissions outputs, emissions coefficients, assumptions, and data sources that were used to calculate emissions from City government operations.

Table 3: City Government Operations Data Sources

Sector	Information	Unit of Measurement	Activity Data Source	Emissions Coefficients Source
Buildings & Facilities	Electricity consumption	kWh	Southern California Edison	Local Government Operations Protocol
	Natural gas consumption	Therms	SoCal Gas Co.	Local Government Operations Protocol
Vehicle Fleet	Diesel consumption & diesel vehicle fleet	Gallons	City of Tulare	Local Government Operations Protocol & EMFAC 2007
	Gasoline consumption & gasoline vehicle fleet	Gallons	City of Tulare	Local Government Operations Protocol & EMFAC 2007
	Compressed natural gas consumption & corresponding vehicle fleet	Gallons	City of Tulare	Local Government Operations Protocol
Employee Commute	Sample of employee commuting patterns	Annual VMT	Commuter survey (June 2010)	Local Government Operations Protocol & EMFAC2007
Streetlights & Traffic Signals	Electricity consumption	kWh	Southern California Edison	Local Government Operations Protocol
Water Delivery	Electricity consumption	kWh	Southern California Edison	Local Government Operations Protocol

Sector	Information	Unit of Measurement	Activity Data Source	Emissions Coefficients Source
Waste	Rates of waste generation, pick-up, number, and size of waste bins at all City facilities	Short tons	Tulare County RMA Solid Waste Division and City of Tulare	California Air Resources Board Landfill Emissions Tool
Wastewater Treatment Plant	Electricity consumption for buildings, facilities, lifts and pumps and process-based emissions	kWh used, and methane and nitrous oxide process emissions	Southern California Edison and City of Tulare	ICLEI's Wastewater Treatment Plant Emissions excel-based calculator, and Local Government Operations Protocol

WASTEWATER TREATMENT PLANT

In 2006, the City's wastewater treatment plant contributed a combined total of 122,308 metric tons of CO_2e that resulted from electricity consumption and process-based emissions at the plant. Electricity consumption from water and wastewater facilities operated by the City emitted approximately 4.61% of emissions at the wastewater treatment plant, or 5,640 metric tons of CO_2e. This category includes energy use at the wastewater treatment facilities and water yard, as well as the numerous lift stations and pumps that are necessary to convey water to serve all city residents. Point-source emissions that arise from the wastewater treatment system due to temporary aerobic conditions or incomplete combustion of captured biogas from anaerobic digesters resulted in an additional 116,674 metric tons of CO_2e, contributing approximately 95.40% of emissions from this category (see Table 2 in the Appendix).

Energy consumption data was provided by the City's Southern California Edison Account Manager online portal and converted into emissions using coefficients from the Local Government Operations Protocol v.1.1.[6] Wastewater treatment plant characteristics were provided by Lew Nelson, Public Works Director for the City of Tulare. Process-based emissions from the treatment of wastewater were calculated using ICLEI's Wastewater Treatment Plant Emissions Excel-based calculator and the Local Government Operations Protocol v.1.1.[7]

VEHICLE FLEET

Fuel consumption from the City's fleet comprised 3.2%of total City emissions (4,524 metric tons of CO_2e). This sector includes gasoline, diesel, and compressed natural gas consumption from all departments in the City operating vehicles (refer to Table 3 and Figures 1 and 2 in the Appendix).

Aggregate fuel consumption by fuel type was provided by the City, in addition to a list of vehicle types. Per Protocol guidance, national emissions coefficients provided by the Local Government Operations Protocol v1.0 for gasoline, diesel, and compressed natural gas vehicles were utilized.[8] Since fuel consumption by vehicle type was not available, average emissions coefficients for relevant vehicle classes were assumed. In order to comply with Protocol guidance, average fuel efficiencies for each relevant

[6] California Air Resources Board 2010.

[7] California Air Resources Board 2010.

[8] 2010.

vehicle category were calculated using averages for Tulare County from the California Air Resources Board's vehicle emissions model EMFAC2007.[9]

WATER

This sector contributed 2.2% of City emissions (2,885 metric tons of CO_2e). This category includes energy use for the City's miscellaneous pumps and irrigation facilities that are necessary to convey water to serve all city residents and maintain City facilities. It excludes pumps and related facilities at the City's wastewater treatment plant. Energy consumption data was provided by the City's Southern California Edison Account Manager online portal and converted into emissions using coefficients from the Local Government Operations Protocol v.1.1.[10]

BUILDING SECTOR

This sector contributed 0.8% of City emissions (1,073 metric tons of CO_2e). The building sector includes GHG emissions from energy consumption in facilities owned and operated by the City. The facilities included in this analysis include the Civic Building, the Corporation Yard, the Parks Department, the Police modular, parks, public activity centers, and numerous other facilities (see Table 4 and Figure 3 in the Appendix). Energy consumed at the wastewater treatment plant and for streetlights and traffic signals and facilities associated with the treatment and conveyance of water is analyzed separately.

Electricity consumption data was provided by the City's Southern California Edison Account Manager online portal. Natural gas consumption was provided by Southern California Gas Company (SoCal Gas Co).[11] Natural gas and electricity coefficients are provided by the Local Government Operations Protocol v.1.1.[12]

STREETLIGHTS AND TRAFFIC SIGNALS

Streetlights and traffic signals comprised 0.5% of City emissions (719 metric tons of CO_2e). Information regarding the electricity consumed by City streetlights and traffic signals in calendar year 2006 was provided by the City's Southern California Edison Account Manager online portal and converted into emissions using coefficients from the Local Government Operations Protocol v.1.1.[13] This Inventory accounts for all traffic signals included in the 48 traffic signal service accounts and 27 streetlight service accounts for which the Southern California Edison Account Manager provided records.

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[9] California Air Resources Board 2008.

[10] California Air Resources Board 2010.

[11] Colby Morrow 22 July 2010.

[12] California Air Resources Board 2010.

[13] California Air Resources Board 2010.

EMPLOYEE COMMUTE

This sector includes GHG emissions from City employees traveling to and from work in 2006, which contributed 0.4% to total City emissions (594 metric tons of CO_2e) The estimate is based on a June 2010 online survey conducted by the City (a blank version is included as Figure 4 in the Appendix). Respondents also completed and submitted hard copies of the survey, which were then electronically entered into the survey database. Approximately 103 employees responded to the survey with usable information, meaning that all essential questions were answered, for an approximate 31.5% response rate, the results of which were applied to the City employment total for 2006 (578 employees in 2006).

The survey found that 92.3% of City employees travel to and from work alone by car (see Table 5 in the Appendix). Employees were asked how many days of the week they travel by each commute mode, including driving alone (which includes motorcycles), carpooling, vanpooling, public transit, bicycling, walking, telecommuting, and other. These figures for commute mode were combined with each respondent's travel distance to work, car model (if any), and fuel type (if any). The results yield vehicle miles traveled (VMT) annually per vehicle type and fuel type (see Table 6 in the Appendix). These VMT numbers were then adjusted for the total employee population in 2006.

Consistent with Protocol guidance, national emissions coefficients provided by the Local Government Operations Protocol v1.0 for gasoline, diesel, and ethanol vehicles were utilized.[14] Average emissions coefficients for relevant vehicle classes were assumed. In order to comply with Protocol guidance, average fuel efficiencies for each relevant vehicle category were calculated using averages for Tulare County from the California Air Resources Board's vehicle emissions model EMFAC2007.[15] Flex fuel vehicles were assumed to represent consumption of E85 fuel blend (of the 6 survey responses designating use of flex fuel, only 2 respondents indicated fuel type E85) and assumed to have similar fuel efficiencies as gasoline vehicles. The rate of consumption of flex fuel was assumed to be 85% ethanol and 15% gasoline, per the definition of E85 fuel provided by the Protocol; therefore, 85% of flex fuel mileage was assumed to release biogenic emissions from ethanol combustion and 15% of flex fuel mileage was assumed to release fossil emissions from gasoline consumption.[16] Compressed natural gas (CNG) vehicle mileage was excluded as de minimus (CNG commutes contributed less than 1% of total miles). Additional data would be needed to quantify emissions from CNG commute trips (including cubic feet of natural gas consumed).

WASTE

Waste from City operations generated 547 metric tons of CO_2e (0.4% of City emissions). Municipal waste is not tracked by the City of Tulare, the Consolidated Waste Management Authority (CWMA), or Tulare County Solid Waste. Therefore, waste tonnages were calculated based on assumptions provided by Lew Nelson, including the number and size of waste bins at City facilities and frequency of pickup, adjusted to account for the number of municipal facilities operating in 2006.[17] To calculate

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[14] 2010.

[15] California Air Resources Board 2007.

[16] For additional information on calculating emissions from alternative fuel vehicles, refer to sections 7.1.2 and 7.1.3 of California Air Resources Board 2010.

[17] June 15, 2010.

emissions, the Inventory assumes a proportional ratio of waste generation to emissions and calculates the proportion of community-wide waste emissions that can be attributed to the City by applying the ratio of waste to emissions for each landfill to waste generated by the City. The emissions for this sector capture life-cycle emissions that result from the decomposition of waste. Emissions were calculated using the California Air Resources Board (ARB) Landfill Emissions Tool from all waste in place, assuming the characteristics of the top three landfills receiving waste from the CWMA and an average methane capture rate of 75%, as recommended by the Local Government Operations Protocol (ARB protocol).[18] This tool applies the IPCC's First Order Decay Model independently for each landfill based on historical data trends. Details on the methodology used to determine emissions from community-wide waste in the city are described earlier in this Inventory.

IV. INVENTORY FORECAST

To illustrate municipal emissions growth for the forecast years 2020 and 2030, existing trends, planned expansions, and levels of service were taken into account to create a municipal business-as-usual forecast. Municipal forecasts and reductions will be captured under the umbrella of community-wide reductions. Note that any improvements the City has completed since 2006 that would reduce emissions are excluded from the business-as-usual forecast. Most changes in municipal emissions trends will ultimately contribute to the achievement of community-wide targets and will be credited as community-wide progress toward reduction goals, yet forecasting City emissions over time helps the City to better understand the impact of municipal efforts to reduce GHG emissions.[19] All City actions taken since the baseline year of 2006 that would impact emissions will be accounted for in the Climate Action Plan to better highlight the impact of City initiatives taken to date, including upgrades to the wastewater treatment plant and expansion of the City's flex fuel fleet.

Numerous factors informed municipal forecasts. City staff provided data on planned facility expansion. In general, the size of municipal facilities was correlated with energy consumption and waste generation to determine rates of change. The size of City staff was expected to expand proportional to service population growth, which was translated into increased emissions from the employee commute. Emissions from the wastewater treatment plant are expected to grow based on the wastewater service capacity established in the General Plan Update Draft Environmental Impact Report.[20] Emissions from water delivery were expected to increase proportionally with wastewater treatment plant capacity. Emissions from the vehicle fleet in 2010 are based on proxy data for 2009 provided by the City and are assumed to remain constant through 2020 and 2030. Emissions from streetlights and traffic signals are not expected to change significantly, as existing facilities and equipment are sized to meet future needs.

As shown in Table 4, forecasts show emissions from City government operations increasing by approximately 101.9% by 2030. The majority of forecast increases in emissions result from business-as-usual growth at the wastewater treatment plant to meet service capacity established by the Draft General Plan. Figure 5 depicts the business-as-usual forecast for all sectors; Figure 6 depicts the business-as-usual forecast without emissions from the wastewater treatment. Excluding emissions from

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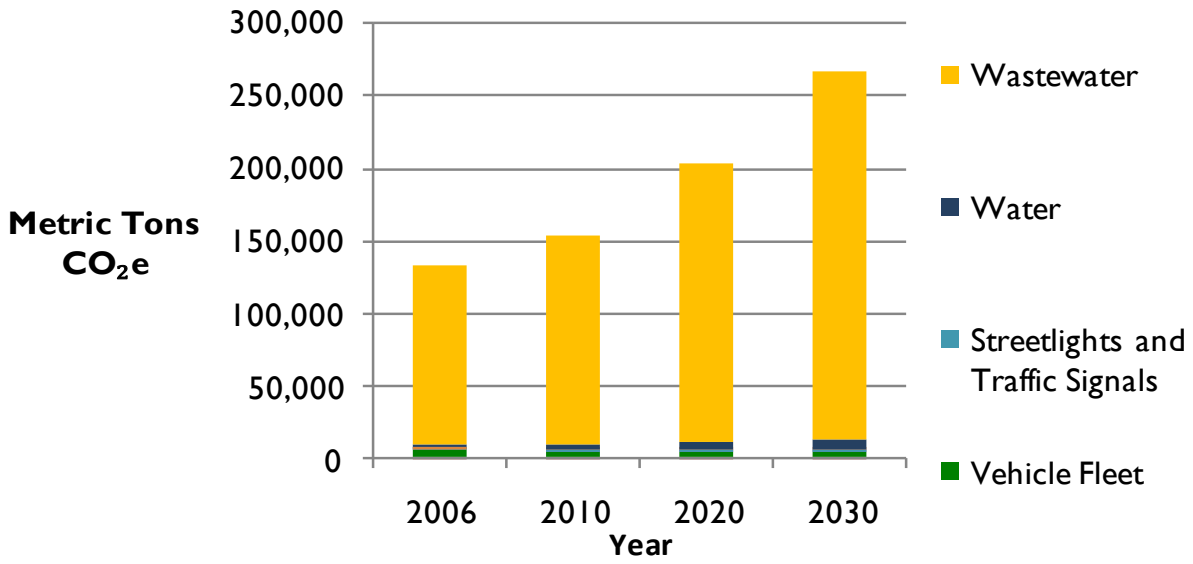
[18] California Air Resources Board 2010.

[19] Appropriate sector for crediting reductions that result from wastewater treatment plant improvements since the baseline year is to be determined during completion of the Climate Action Plan.

[20] City of Tulare 2007.

the wastewater treatment plant, emissions are expected to only increase by 22.8% by 2030. The business-as-usual forecast assumes the impact of reduced emissions coefficients for electricity and mobile fuel combustion.[21]

Figure 5: City Government Operations Emissions Forecast, with Wastewater Treatment Plant Emissions



[21] Anticipated reduction in emissions coefficients for electricity and mobile fuel combustion that will result from statewide actions is accounted for consistency with community-wide forecasts and to facilitate the calculation of municipal reduction measures. See details on the Renewable Portfolio Standard and Pavley 1 and 2 in the community-wide forecast of the memo dated August 27, 2010, for additional information.

Figure 6: City Government Operations Emissions Forecast, Excluding Wastewater Treatment Plant Emissions

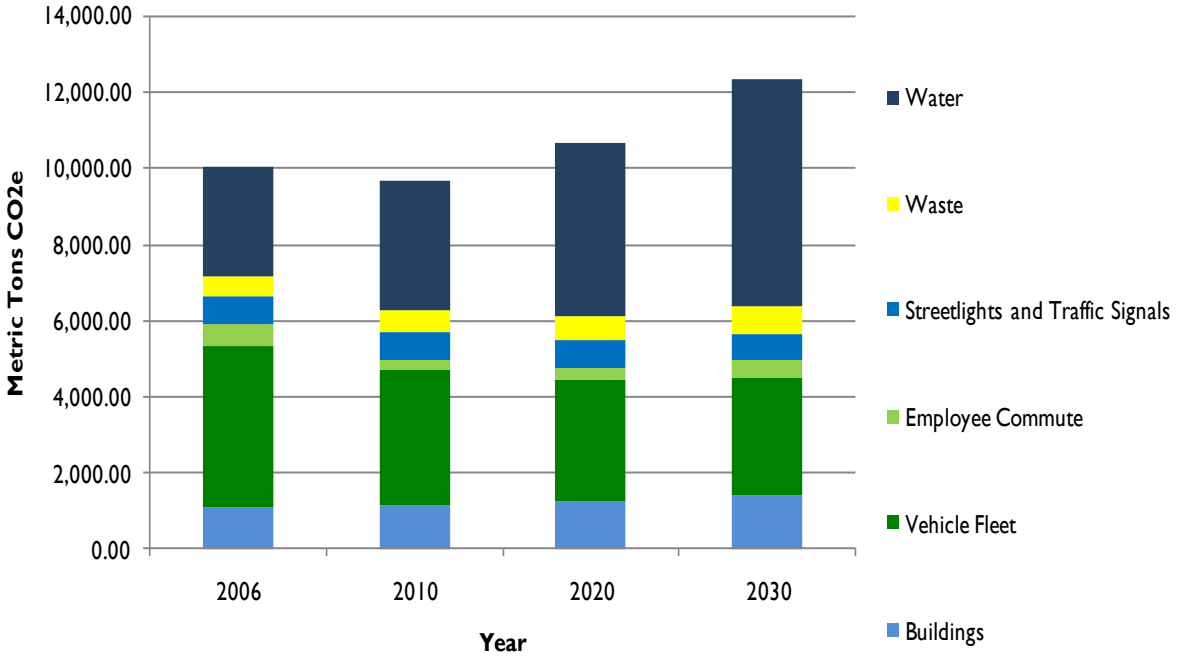


Table 4: City Government Operations Emissions by Sector, Metric Tons CO_2e

Sector	2006	2010	2020	2030	Total % Increase by Sector
Buildings	1,072.75	1,120.78	1,250.39	1,394.98	30.0%
Vehicle Fleet	4,253.84	3,600.11	3,209.40	3,079.17	-27.6%
Employee Commute	594.48	255.70	283.45	462.27	-22.2%
Streetlights and Traffic Signals	719.22	719.22	719.22	719.22	0.0%
Waste	547.35	571.84	637.97	711.74	30.0%
Water	2,884.70	3,410.99	4,557.25	6,001.06	108.0%
Wastewater Treatment Plant (WWTP)	122,307.98	144,693.60	193,449.15	254,860.65	108.4%
Total	132,380.33	154,372.24	204,106.83	267,229.08	101.9%
Percentage Increase from Baseline for all Sectors	---	16.6%	54.2%	101.9%	---
Percentage Increase from Baseline for all Sectors Excluding WWTP	---	-3.9%	5.8%	22.8%	---

V. CONCLUSION AND NEXT STEPS

The Inventory is an important milestone for the City in assessing and mitigating its impact on climate change from government operations. The Inventory yields data that will shape the development of the Climate Action Plan. Data calculated in the Inventory forms the foundation of the Climate Action Plan and provides a justifiable basis for the City's analysis of its impact on climate change; it is the necessary starting point from which far-reaching municipal initiatives taken since 2006 can be calculated and their impact quantified.

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APPENDIX I: GOVERNMENT OPERATION INVENTORY - DETAILED EMISSIONS BY SECTOR

CITY OF TULARE: CITY GOVERNMENT OPERATIONS GREENHOUSE GAS EMISSIONS INVENTORY

Table 1: Municipal Emissions by Sector

2006 Municipal Emissions by Sector	Buildings & Facilities	Vehicle Fleet	Employee Commute	Streetlights & Traffic Signals	Water	Waste-water	Solid Waste	TOTAL
CO_2e (metric tons)	1,073	4,254	594	719	2,885	122,308	547	132,380
Percentage of Total CO_2e	**0.8%**	**3.2%**	**0.4%**	**0.5%**	**2.2%**	**92.4%**	**0.4%**	**100.0%**

Table 2: Wastewater Total Emissions by Source

Total Emissions by Source (Metric Tons CO_2e)				
	CO_2	CH_4	N_2O	% of WWTP Emissions
Lift Stations	93.06	0.09	0.40	0.076%
Miscellaneous Pumps	56.32	0.06	0.25	0.046%
Stormwater Pumps	36.45	0.04	0.16	0.030%
WWTP – Energy	5,423.80	5.51	23.60	4.458%
WWTP – Processes	0.00	116,668.25	0.00	95.389%
Subtotal	5,609.63	116,673.94	24.41	100.000%
	Total			**122,307.98**

Table 3: Vehicle Fleet Fuel Consumption

	Gallons	% of Total	CO2e (metric tons)	% of Total CO2e (metric tons)
Gasoline	89,345	14.88%	809	19.03%
Diesel	96,748	16.12%	990	23.27%
CNG/LNG	414,200	69.00%	2,455	57.70%
Total	**600,293**	**100.00%**	**4,254**	**100.00%**

Citations:

- California Air Resources Board 2010.
- California Air Resources Board 2007.
- City of Tulare 2010.
- Nelson 2010a.

Notes on methodology:

- Total fuel consumption by fuel type provided by Lew Nelson (2010a). Fuel consumption by department or vehicle for 2006 was unavailable. It was necessary to deviate from the recommended Protocol guidance to calculate emissions for methane (CH_4) and nitrous oxide (N_2O). Average fuel efficiency was assumed in lieu of mileage to complete calculations, using county-wide data supplied by EMFAC2007 (California Air Resources Board 2007). Assumes that all fuel consumption reported by the City is attributed to fleet vehicles, as opposed to equipment. No data available with which to make assumptions about consumption quantity by equipment type.

- Emissions coefficients are national averages provided in the Local Government Operations Protocol v1.1 (California Air Resources Board 2010). Note that EMFAC2007 provides county-wide averages which are relevant at an aggregated, community-wide scale, but inaccurate for a facility-scale inventory (e.g., for certain vehicle populations in the City fleet that are not prevalent at the county scale such as heavy-duty vehicles, no emissions coefficients are provided in EMFAC2007). Relying on nationwide defaults ensures relevant emissions factors that accurately correspond to vehicles in the City's fleet.

  - Carbon dioxide (CO_2) emissions taken from Protocol Table G.11 for gasoline, diesel, and LNG. Note that while the City produces compressed natural gas (CNG) for consumption in vehicles from liquefied natural gas (LNG), emissions coefficients in LNG are available in units of kg/gallon, consistent with units of fuel consumption provided by the City (per the Protocol's recommended approach for CO_2). Therefore, emissions coefficients for LNG fuel in units of kg/gallon are assumed, rather than emissions coefficients for CNG fuel (only available in units of kg/standard cubic foot).

- CH_4 and N_2O: Applies factors of emissions in grams/mile to total gallons consumed. Mileage by vehicle and fuel type was not available; therefore, assumes average fuel efficiencies to apply emissions coefficients and utilizes the Protocol's approach to calculate CH_4 and N_2O. For gasoline, assumes average emissions for all model years through 2006 of passenger cars and light trucks from Protocol Table G.12. For diesel vehicles, assumes the average of all model years for diesel light-duty trucks and diesel heavy-duty vehicles. For LNG consumption, assumes the average of light-duty vehicles, heavy-duty vehicles, and buses. Note that the Protocol only provides LNG emissions coefficients for the heavy-duty category, which are equivalent to emissions factors of CNG. Therefore, it was assumed that CNG emissions coefficients for other categories would apply to the consumption of LNG fuel.

- Fuel efficiencies were determined using county-wide averages provided by EMFAC2007 (California Air Resources Board 2007). For gasoline fuel efficiencies, assumes the average of light-duty autos, light-duty trucks (up to–5,750 lbs) (20.6591 MPG on average). For diesel emissions, assumes the average of emissions for light-duty trucks (3,751–5,750 lbs), medium-duty trucks, light heavy-duty trucks (8,501–10,000 lbs), and medium heavy-duty trucks (10,001–14,000 lbs) (20.8505 MPG on average). Assumes the average fuel economy for CNG vehicles is comparable to traditional gasoline fuel vehicles, as represented by the average of light-duty autos, light-duty trucks, light heavy-duty trucks (up to 14,000 lbs), and urban buses (18.466 MPG on average).

Figure 1: Vehicle Fleet Fuel Consumption by Fuel Type (Gallons)

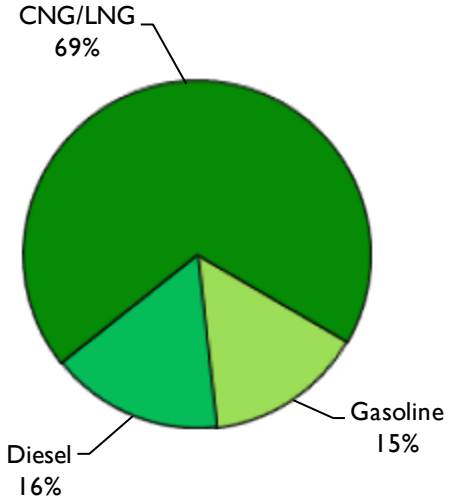

Figure 2: Emissions from Vehicle Fleet by Fuel Type

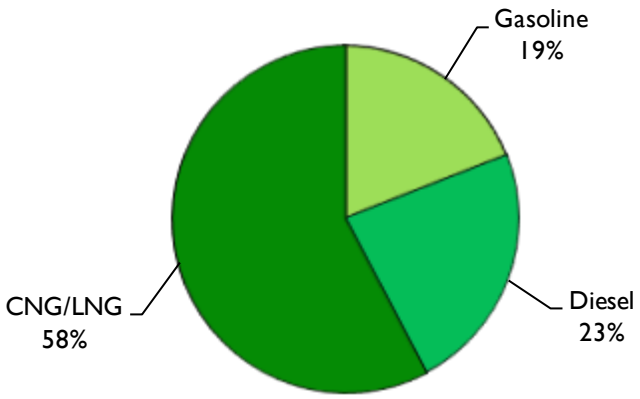

Table 4: Buildings & Facilities Electricity & Natural Gas Emissions

2006 Municipal Emissions by Sector	Electricity	Natural Gas	Total
CO_2e (metric tons)	553	520	1,073
Percentage of Total CO_2e	51.6%	48.4%	100.0%
Energy Use (kWh or Therms)	1,891,058	97,776	1,988,834

Citations:

- California Air Resources Board 2010.
- Nelson 2010a.
- Morrow 2010.

Notes on Methodology:

- Electricity data for buildings and facilities, streetlights, and water delivery was obtained from Southern California Edison billing statements for the baseline year; system access was facilitated by Lew Nelson. Confirmation of facilities and accounts provided by Lew Nelson.
- Natural gas consumption provided by Colby L. Morrow, Air Quality Manager, Customer Programs Environmental Affairs, Southern California Gas Company and San Diego Gas and Electric Company.

- Energy consumption was converted to CO2e using coefficients provided by California Air Resources Board (2010). For CO_2 emissions from electricity, assumes Southern California Edison's verified electricity emission factor for 2006 (Protocol Table G.6). For CH_4 and N_2O emissions from electricity, assumes the California Grid Average for 2006 (Protocol Table G.7). For CO_2 emissions of natural gas, assumes the weighted US average (Protocol Table G.1). For CH_4 and N_2O emissions from natural gas, assumes rates for commercial natural gas consumption (Protocol Table G.3).

Figure 3: Buildings & Facilities Electricity & Natural Gas Emissions

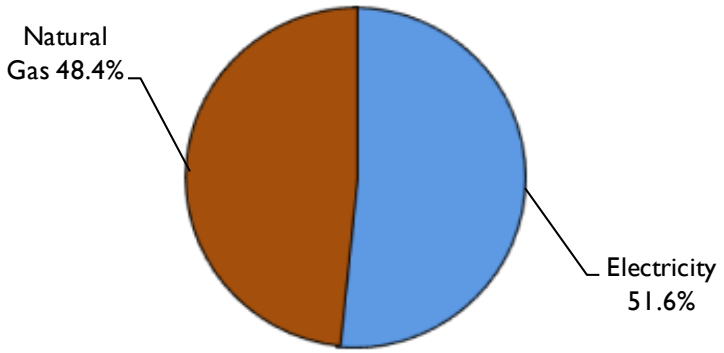

Table 5: Commute Survey Responses

	Days Traveled by Commute Mode (per Week)	Percentage of Total
Drive Alone	893	92.3%
Carpool with Employees	14	1.4%
Carpool with Others	20	2.1%
Vanpool	0	
Public transit	10	1.0%
Bicycle	7	0.7%
Walk	0	0.0%
Telecommute	0	0.0%
Other	24	2.5%
Total	**968**	**100.0%**

Table 6: Adjusted Vehicle Miles Traveled (VMT) from Employee Commute Survey Responses

		2005		2010	
		Annual VMT	Emissions ($MTCO_2e$)	Annual VMT	Emissions ($MTCO_2e$)
Passenger cars	Gas	704,052.74	348.93	222,756.42	110.40
	Flex Fuel	13,492.18	4.59	7,983.54	2.71
	Diesel	–	–	–	–
	Total	717,544.92	353.52	230,739.96	113.11
Light-duty trucks Category 1 (e.g., Toyota RAV4, Chevrolet Tracker, Chevrolet S10 Pickup (4 cylinder), Chrysler PT Cruiser, or similar)	Gas	40,829.28	22.16	24,159.34	13.11
	Flex Fuel	–	–	–	–
	Diesel	–	–	–	–
	Total	**40,829.28**	**22.16**	**24,159.34**	**13.11**
Minivans and light-duty truck/SUV/pickup, Category 2 (e.g., minivans, Ford Explorer, GMC Sonoma Pickup Truck, Chevrolet Astro Cargo Van, or similar)	Gas	107,937.46	66.80	63,868.32	39.53
	Flex Fuel	–	–	–	–
	Diesel	4,409.21	0.90	2,609.00	0.53
	Total	**112,346.67**	**67.71**	**66,477.32**	**40.06**
Medium-duty truck/SUV/pickups (e.g., Chevy Suburban, Ford Expedition, Lincoln Navigator, Ford E250/350/450, or similar)	Gas	185,583.65	137.90	109,812.81	81.60
	Flex Fuel	14,241.75	7.44	8,427.07	4.40
	Diesel	23,809.73	5.76	14,088.60	3.41
	Total	**223,635.13**	**151.10**	**132,328.48**	**89.41**
Total		**1,094,356.01**	**594.48**	**453,705.10**	**255.70**

Citations:

- California Air Resources Board 2007.
- California Air Resources Board 2010.

Notes on Methodology:

- Approximately 103 employees out of 327 current employees responded to the survey with usable information, meaning that all essential questions were answered. Answers with mileage left blank or with highly inconsistent data (ex: saying they walked three days to work, biked two, and drove five) were omitted. In addition, if a respondent did not describe their "other" category of transportation, the entry was omitted.

- Following calculations were completed to convert 2010 reported commute patterns for baseline activity:
  - Entries were separated by vehicle and fuel type.
  - For each group of vehicle and fuel type, miles driven to work were multiplied by 2 (to get round-trip estimate) and then by the number of "drive alone" days. Number of miles to work were then multiplied by the number of "carpool" days, which assumes another City employee in the car (half of the "drive alone" emissions). (Note: If a respondent entered that they motorcycle to work, but own a car as well, the motorcycle miles were moved to the motorcycle category.) Adjust for hybrids (see below).
  - Adjust daily miles per vehicle and fuel type for annual travel by multiplying by 52.18 work weeks/year.
  - Calculate the multiplier to adjust survey response data to the 2006 employee population. In 2006, there were 578 employees. This number, divided by the 103 survey entries, provides a multiplier of 3.17.
  - Multiply the mileage per vehicle and fuel type by the multiplier.
  - Because no hybrids were reported in the survey, no adjustments were made to account for the large increase in hybrid sales between 2006 and present day.
- Alternative Fuels: Additional data is necessary to quantify CNG vehicle emissions, including cubic feet of natural gas consumed. CNG vehicle miles excluded as de minimus (less than 1% of total miles). Flex fuel vehicles were assumed to represent consumption of E85 blend (of the 6 responses designating use of flex fuel, only 2 respondents indicated fuel type E85). Rate of consumption of flex fuel was assumed to be 85% ethanol and 15% gasoline, per the Protocol definition. For biofuel blends, combustion releases both emissions of fossil and biogenic CO_2e, as discussed by the Protocol (see California Air Resources Board 2010, section 7.1.2 for additional information).
  - Emissions coefficients are national averages taken from Local Government Operations Protocol v1.1, per Protocol guidance (California Air Resources Board 2010), consistent with those used in the fleet inventory. Note that EMFAC2007 provides county-wide averages that are relevant at an aggregated, community-wide scale, but inaccurate for a facility-scale inventory.
  - CO_2 emissions taken from Protocol Table G.11 for gasoline and diesel in units of kg/gallon. In order to utilize recommended Protocol calculations for CO_2, mileage was converted into gallons of fuel using county-wide average fuel efficiencies for each vehicle class from EMFAC2007 (as described below). For 85% of flex fuel mileage, assumes the emissions for ethanol (E100), the only ethanol default for emissions of CO_2 provided by the Protocol. Remaining 15% of flex fuels mileage was assumed to be attributed to gasoline emissions.

- CH_4 and N_2O: Applies factors of emissions in grams/mile to total gallons consumed. Assumes average fuel efficiencies to apply emissions coefficients and utilize the Protocol's approach to calculate CH_4 and N_2O, and emissions coefficients provided in Protocol Tables G.12. and G.13. For gasoline passenger cars, assumes average emissions for all model years through 2006 of passenger cars. For the ethanol portion of flex fuel mileage, assumes the emissions of ethanol light-duty vehicles. For gasoline and diesel light-duty trucks Categories 1 and 2, assumes average emissions for all model years through 2006 for light trucks for each fuel category, respectively. For gasoline and diesel medium heavy-duty trucks, assumes the average of heavy-duty vehicles for heavy-duty vehicles for each fuel category, respectively. For the ethanol portion of medium heavy-duty flex fuel mileage, assumes the emissions of ethanol heavy-duty vehicles.

- Fuel efficiencies determined using county-wide averages provided by EMFAC2007. Unlike assumptions for the fleet (in which detailed fleet lists directed exclusion of irrelevant vehicle categories), assumes more aggregated averages that account for all available vehicle populations, so as to more accurately reflect the vehicle stock of City employees at large. For gasoline and diesel passenger vehicles, assumes the average of light-duty autos (19.07 MPG and 33.33 MPG respectively). For flex fuel passenger vehicles, assumes the same fuel efficiency as gasoline passenger vehicles. For light-duty truck/SUV/pickup Category 1 for gasoline and diesel vehicles, assumes the average of light-duty trucks (3,751–5,750 lbs) (16.98 MPG and 29.17 MPG, respectively). For minivans and light-duty truck/SUV/pickup Category 2 gasoline and diesel, assumes the average of light heavy-duty trucks (8,501–10,000 lbs) (15.48 MPG and 50 MPG, respectively). For gasoline medium-duty trucks, assumes the average of medium heavy-duty trucks (10,001–14,000 lbs) (12.56 MPG on average). County-wide data on medium heavy-duty diesel trucks not available; therefore, assumes the same ratio of fuel efficiency in comparison with medium heavy-duty gasoline trucks as results when comparing fuel efficiencies of light-duty gasoline and diesel trucks (40.58 MPG). Assumes the average fuel economy for flex fuel vehicles assumed to be comparable to traditional gasoline fuel vehicles

Figure 4: Employee Commute Survey Questions

1. What is your approximate one way distance to work (in miles)? Please indicate the most direct distance to work, discounting midway destinations that would be taken whether or not you drove to work each day (i.e., dropping off children at school).

   _____ Miles

2. What type of transportation do you take to work? Please indicate the type of transportation you take to work each day in a typical two-week period. This question is intended to account for special work schedules, including those of the fire department, police department, and 9/80 or 8/80 work weeks.

Week One

	Mon	Tues	Wed	Thurs	Fri	Sat	Sun
I do not work this day							
Drive Alone							
Carpool with fellow City employees							
Carpool with other drivers not employed by the City							
Vanpool							
Public Transit							
Bicycle							
Walk							
Telecommute							
Other*							

3. Week 2

	Mon	Tues	Wed	Thurs	Fri	Sat	Sun
I do not work this day							
Drive Alone							
Carpool with fellow City employees							
Carpool with other drivers not employed by the City							
Vanpool							
Public Transit							
Bicycle							
Walk							
Telecommute							
Other*							

4. What type of vehicle do you drive?
   - Passenger Cars – Subcompact/compact, mid-size, and full-size autos, including:
     - Honda Civic, Accord
     - Toyota Corolla, Camry
     - Ford Focus, Taurus, Crown Victoria
     - Dodge Neon, Intrepid
     - Chevrolet Cavalier, Monte Carlo, Impala
     - Volkswagen Jetta, Passat

- Light-Duty Truck/SUV/Pickup Category 1 – Examples:
  - Toyota RAV4
  - Chevrolet Tracker
  - Chevrolet S10 Pickup (4 cylinder)
  - Chrysler PT Cruiser
- Minivans and Light-Duty Truck/SUV/Pickup Category 2 – Examples:
  - All minivans
  - Ford Explorer
  - GMC Sonoma Pickup Truck
  - Chevrolet Astro Cargo Van
- Medium-Duty Truck/SUV/Pickup – Examples:
  - Chevy Suburban
  - Ford Expedition
  - Lincoln Navigator
  - Ford E250/350/450

5. What type of fuel or fuel technology does your vehicle from Question 3 use?

   ☐ Gasoline
   ☐ Diesel
   ☐ Biodiesel
   ☐ Hybrid
   ☐ Electric
   ☐ Other (please specify): _____

6. If you carpool or vanpool with fellow City employees, how many City employees ride with you? If you carpool with a different number each day, please indicate the average. If 'not applicable' please enter 0.

   _____ City employees

Table 7: Municipal Waste by Landfill

	Visalia	Woodville	Teapot	TOTAL
Municipal waste (tons)	318.41	203.09	215.60	737.10
$MTCO_2e$ from Municipal Waste by landfill	**77.4809**	**48.6308**	**36.3708**	**162.4825**

Citations:

- CalRecycle 2009.
- Nelson 2010b.
- CalRecycle 2009.

Notes on Methodology:

- Municipal waste is not tracked by the City of Tulare, the Consolidated Waste Management Authority, or Tulare County Solid Waste. To determine municipal waste, calculated average tonnage based on assumptions provided by Lew Nelson (2010b). Each City facility has one waste bin that is 6 cubic yards in size. Although there is variation in waste generated by department and frequency of pickup, an assumption of a weekly average pickup accounts for such variation (52 pickups per year).
- All 21 City facilities in operation in 2006 identified by the City include City Hall, Civic Affairs, Meitz Community Center, Meitz Pool, Activity Center, Womens Club, Tulare Library, Senior Center, Police Headquarters, PD Cedar Modular, Props. Club House, Corp. Yard Complex, Tulare Youth Center, Airport Hangars, Tulare Ag Flying Service, Tulare Mosquito Abatement, Blue Sky Aviation, Johnson Aircraft, Fire Station 1, Fire Station 2, and Fire Station 3.
- A volume-to-weight conversion factor was provided by CalRecycle 2009.
- Assumes that municipal waste emissions reflect the portion of community-wide waste generated by municipal facilities (refer to Memorandum dated August 27, 2010 (Seale 2010) for additional details).

Quantification of Municipal and Community-wide GHG Reduction Measures

Appendix 3

Appendix 3: Quantification of Municipal and Community-Wide GHG Reduction Measures

EE 1.1

Increase energy efficiency in existing City buildings and facilities through Facility Improvement Measures and by retrofitting Edison-owned streetlights.

Methodology: Johnson Controls Facility Improvement Measures: Assumes the verified reductions in kWh and therms measured by Johnson Controls (2010) in Year 2 (3/31/2009 through 4/1/2010) equals average annual reduction and applies to calendar year of 2010 (Nelson 2010). Assumes annual reduction remains constant. Cost savings to the City assumes the Year 2 savings provided by Johnson Controls represent average annual cost savings.

Edison streetlights: Assumes the reductions in electricity for all 4,310 Southern California Edison streetlights within the city, provided in the City's Energy Efficiency and Conservation Strategy (City of Tulare 2009), as confirmed by Lew Nelson (2010), for the difference in annual electricity consumption between the existing average of 100-watt pressure sodium lamps and LED lamps. Assumes the energy savings with LED lamps, as LED is the technology that Edison is willing to own and maintain (City of Tulare 2009).

Sources:

Johnson Controls. 2010. City of Tulare Energy Performance Contract Year 2 Annual Measurement & Verification Report April 1, 2009, through March 30, 2010. Personal e-mail communication. Provided by personal e-mail communication with Lew Nelson, July 31.

Nelson, Lew. 2010. City of Tulare Public Works. Phone conversation, September 16.

City of Tulare. 2009. Energy Efficiency and Conservation Strategy. Provided by personal e-mail communication with Betsy McGovern-Garcia, May 11, 2010.

EE 1.2

Design new City buildings and facilities to exceed California Energy Code requirements by 15%.

Methodology: Library exceeds current Title 24 by 21.3%. Estimated by Edison to save the City $23,000 annually in utility bills and reduce CO_2 emissions by 98,807 pounds annually (Lieberman 2009).

New facilities assumed to achieve CALGreen Tier 1 energy efficiency standards, with 70% of development between 2010 and 2020 assumed to occur after adoption of Tier 1 energy efficiency requirement (72% of development between 2010 and 2030). Assumes the reductions specific to Tulare's climate zone (13) by energy type, following CAPCOA guidance (2010). All growth in energy and natural gas consumption is assumed to be from new facilities. All growth in natural gas and electricity sectors assumed to be from new construction. Calculates energy savings specific to Tulare's climate zone. Energy efficiency actions to achieve Tier 1 outlined in CALGreen include: All equipment and appliances to be Energy Star, if applicable.

Provide pre-programmed demand response strategies for HVAC systems with DDC and centralized lighting systems.

Provide controls to reduce energy demand during part of the day when no traffic is detected.

Design steel framing to avoid thermal bridging.

Costs assumed to be negligible and premiums for green construction offset with utility incentives, such as Edison's Savings by Design program, which offset library costs and provided nearly $600,000 in credits for the project.

In California, a conservative estimate for the premium of green construction costs over conventional building is 2%, or, assuming a conservative estimate based on commercial construction costs, this premium is equal to $3–$5 per square foot. It is assumed here to cost $4 per square foot (Kats et al. 2003). Based on a life-cycle costing estimate, which accounts for the costs and benefits over the life of a particular product, technology, or system (unlike the life-cycle assessment, which includes all upstream and downstream costs of a particular activity). This allows for more clearly documenting the benefits of green building versus conventional building. Based on case studies of the costs of 33 green buildings constructed in California, through information from building representatives and architects.

Note that there are one-time costs for construction and entitlement fees; while larger than the annual cost savings for the target years, the life-cycle costs of the structure will greatly offset initial premiums. As stated by Kats (2003): The financial benefits of 30% reduced consumption at an electricity price of $0.11/kWh are about $0.44 square foot per year, with a 20-year present value of $5.48 per square foot. The additional value of peak demand reduction from green buildings is estimated at $0.025 per square foot per year, with 20-year present value of $0.31 per square foot. Together, the total 20-year present value of financial energy benefits from a typical green building is $5.79 per square foot. Thus, on the basis of energy savings alone, investing in green buildings appears to be cost-effective. The projected $5.79 per square foot in savings will offset the initial $4 premium, leading to an actual savings of $1.79 per square foot over the life cycle of the building. These savings are reflected in annual savings to the community, but savings shown here are only annual savings and do not reflect the entire life-cycle savings that would result from this measure and save developers money. Cost savings is calculated here solely as reduced electricity costs, and the net benefit per square footage green construction that accounts for the initial premium is assumed to be negligible.

Sources:

California Air Pollution Control Officers Association (CAPCOA). 2010. Quantifying Greenhouse Gas Mitigation Measures.

California Energy Commission. 2008. Impact Analysis: 2008 Update to the California Energy Efficiency Standards for Residential and Nonresidential Buildings,.

Garcia, Val. 2010. City of Tulare. Personal e-mail communication, October 11.

Kats, G. et al. 2003. The Costs and Financial Benefits of Green Buildings: A Report to California's Sustainable Building Task Force. Funded by the California Integrated Waste Management Board (CIWMB), Department of Finance (DOF), Department of General Services (DGS), Department of Transportation (Caltrans), Department of Water Resources (DWR), and Division of the State Architect (DSA). http: //www.ciwmb.ca.gov/GreenBuilding/Design/ CostBenefit/Report.pdf.

Lieberman, Rosemary. 2009. Southern California Edison, Savings by Design Owner Agreement to Library Director. Personal e-mail communication, June 8. Provided by Lew Nelson.

City of Tulare Electric. n.d. Vehicle Charging Project Application, PON-006. Personal e-mail communication with Betsy McGovern-Garcia.

EE 1.3

Increase energy efficiency in new commercial and residential development and require new residential and commercial development to achieve enhanced energy efficiency and exceed California Energy Code requirements by 15%.

Methodology: CALGreen standards: New development assumed to achieve CALGreen Tier 1 energy efficiency standards, with 60% of development between 2010 and 2020 assumed to occur after adoption of Tier 1 energy efficiency requirement (72.5% of development between 2010 and 2030). Assumes the reductions specific to Tulare's climate zone (13) by energy type, following CAPCOA guidance (2010). All growth in energy and natural gas consumption is assumed to be from new facilities. All growth in natural gas and electricity sectors assumed to be from new construction. Calculates energy savings specific to Tulare's climate zone. Energy efficiency actions to achieve Tier 1 outlined in CALGreen include: All equipment and appliances to be Energy Star, if applicable.

Smart Grids: 100% of customers with smart meter installation by target years. By 2020, assume 95% of nonresidential customers and 95% of households to participate in monitoring programs, with yields of 7% in energy savings per residential customer and 5% savings per nonresidential customer, based on real-time feedback. Participation rates based on market penetration of the Energy Star program. Southern California Edison will complete smart grid installation by 2012.

Costs and savings: Cost to the City: It will cost the City time to train staff in applying the new building code.

Assumes that each project will cost $1,400 in entitlement fees (including City staff review time) to review and process each application. Based on rate assumed by City of Los Angeles (2009). Assumes that residential homes will be exempt from this entitlement fee.

Costs incurred for new development only, and captures the average cost anticipated to offset entitlement review.

Costs assumed to be negligible and premiums for green construction offset with utility incentives, such as Edison's Savings by Design program, which offset library costs and provided nearly $

Annual cost savings to the community result from reduced electricity and natural gas utility bills. Cost savings to the library projected by Southern California Edison.

Sources:

California Air Pollution Control Officers Association (CAPCOA). 2010. Quantifying Greenhouse Gas Mitigation Measures.

California Building Standards Commission. 2010. California 2010 Green Building Standards Code. CalGreen. California Code of Regulations Title 24. Part 11.

California Energy Commission. 2008. Impact Analysis: 2008 Update to the California Energy Efficiency Standards for Residential and Nonresidential Buildings.

Ehrhardt-Martinez, K., K. Donnelly, and J. Laitner. 2010. Advanced Metering Initiatives and Residential Feedback Programs: A Meta-Review for Household Electricity-Saving Opportunities. American Council for an Energy-Efficient Economy. Report Number E105. http://www.aceee.org/sites/default/files/publications/researchreports/e105.pdf.

Energy Star. 2008. Clothes Washer Product Snapshot. http://www.energystar.gov/ia/partners/reps/pt_reps_res_retail/files/CW_ProductSnapshot_May08.pdf.

Energy Star. n.d. Residential New Construction: An Overview of Energy Use and Energy Efficiency Opportunities. http://www.energystar.gov/ia/business/challenge/learn_more/ResidentialNewConstruction.pdf

Global Sustainability Initiative. 2008. 2020: Enabling the low carbon economy in the information age. United States report addendum. http://www.smart2020.org/_assets/files/Smart2020UnitedStatesReportAddendum.pdf.

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Pikes Research. 2010. Smart Appliance Sales. http://www.smartgridnews.com/artman/publish/Smart-Grid-Press-Releases/Smart-appliance-sales-to-start-off-slow-but-118-million-units-will-be-sold-worldwide-by-2019-forecasts-Pike-Research-3290.html and http: //www.pikeresearch.com/.

Southern California Edison. n.d. Smart Grid Strategy and Roadmap. Advanced Technology Transmission & Distribution Business Unit. http: //www.sce.com/NR/rdonlyres/B4A56998-97E6-4380-9993-B3A54D9B2A0B/0/100712_SCE_SmartGridStrategyandRoadmap.pdf

EE 1.4

Reduce the urban heat island effect to cool the local climate and reduce energy consumption by maintaining current rates of public tree planting and increased shading on private property, high albedo surfaces, and cool surfaces.

Methodology: Urban forest: Assumes creation of a program to implement General Plan policy LU 13.15.

Assumes distribution of 80% deciduous and 20% evergreen trees planted through this program.

Assumes 27-65-8 distribution of large, medium, small trees, based on estimates from aerial maps. Distribution of trees is proportional to the distribution of the age of the city's building stock based on regional averages.

Assumes existing tree cover is 20%, based on typical California trends.

Total emissions reductions includes annual sequestration during a 40-year life cycle of a forestry program, avoided emissions from the reduction in electricity consumption as a result of direct shading, and overall climate cooling.

To estimate incremental trees that will be planted in existing neighborhoods from tree planting program, assumes that 40% of existing single-family attached and detached units will receive a new tree and that 30% of existing multi-family structures will receive three new trees, phased in with 50% achievement of this goal by 2020. (Trees planted on single-family and multi-family lots by 2020: 3,414; trees planted on single-family and multi-family lots between 2020 and 2030: 2,658; total trees planted through program by 2030: 6,072.)

Public trees: 1,221 park and street trees planted by the City between 2006 and 2010. Assume the City maintains this standard of provision per the incremental number of population for each target year, for 4,018 new public trees planted between 2010 and 2020, and 5,905 new public trees planted between 2010 and 2030, for a total of 9,923 public trees.

Costs will be incurred through planting new trees, as required through the entitlement process established by the Zoning Code (once amended). Based on a survey of tree plantings throughout the United States, McPherson et al. (2003) estimated that the cost of tree plantings can vary from $100 to $1,000, based on the size of the tree, with a $300–$1,000 range for a large tree (2- to 5-inch caliper). It is assumed that trees will cost $300, for a medium to large tree. Cost is assumed to remain constant. By partnering with a local non profit or tree-planting advocate, the City could work to offset this cost

and provide trees at a subsidized rate that is funded by outside sources or obtained through creative partnerships.

Annual cost savings to the community: represents savings in reduced energy bills.

Annual cost savings to the community: represents savings in reduced energy bills.

Albedo: The urban area is assumed to be approximately 40% pavement, based on sources cited below. Assumes 100% of existing pavement will be replaced with high albedo content by 2030, phased in to achieve 80% by 2020. Replacing existing pavement will increase total albedo by 30%, as supported by the literature. A 30% increase in total albedo can result in a 1 degree Celsius temperature change.

Annual cost savings to the community: represents savings in reduced energy bills.

Cost to the City: Installation of high albedo materials is cheaper than traditional materials. Studies have shown that high albedo materials reduce the required lights per unit length of roadway or parking area to achieve specified levels of illumination. Darker (asphalt) roadways require 24% more light poles than roadways with high albedo materials simply to maintain the same level of lighting, which increases construction costs by approximately $30,000 (Ashley 2008). Costs assumed to be negligible to the City.

Studies have also documented that the use of cooler materials incur no additional cost if color changes are incorporated into routine re-surfacing schedules (Heat Island Group 2000). Assumes no additional cost to the City, due to routine integration of upgrading traditional materials to high albedo materials.

Sources:

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Ashley, Erin. 2008. Concrete InFocus. Environmental and Cost Benefits of High Albedo Concrete. http://www.nrmca.org/research/CIF%20Sept-Oct%2008%20High%20Albedo.pdf

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Levinson Ronnen. 2009. Cool Roofs. The Cool Colors Project. http: //coolcolors.lbl.gov/.

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Rosenfeld, Arthur. 2008. Energy Efficiency: The first and most profitable way to delay Climate Change, July 12, 2008. http://www.energy.ca.gov/2008publications/CEC-999-2008-015/CEC-999-2008-015.ppt#264

U.S. Environmental Protection Agency (U.S. EPA). 2003. Heat Island Brochure. http://www.epa.gov/heatisland/resources/pdf/ HIRIbrochure.pdf.

———. n.d. Reducing Urban Heat Islands: Compendium of Strategies Cool Roofs. http://www.epa.gov/heatisland/resources/ pdf/CoolRoofsCompendium.pdf

EE 1.5

Achieve a 20% reduction in water use by 2020 (20x2020) to reduce energy consumed for groundwater pumping.

Methodology: Utilizing groundwater pumping records of the number of gallons pumped and data on the energy used for pumping by the municipality, it is possible to determine the ratio of kWh from groundwater pumping per gallon of water pumped. Because the City provides all water to residents from groundwater pumping, a 20% reduction in water use would result in an equivalent reduction in energy used for pumps. A constant ratio of gallons of water consumed per person per year is assumed.

Assume that cost savings in reduced energy for pumping reduce City electricity costs. For Year 2, FIMs 7 and 8 also provide $212,903 in other energy-related operational and management cost savings, and a billable usage increase of $42,815, for total cost savings of $255,718. Assumes this represents average annual savings that are in addition to reduced energy for pumping with reduced water consumption.

Sources:

City of Tulare Water Division Pumping Record, provided by Lew Nelson, Public Works Director.

EE 1.6

Facilitate energy efficiency improvements within the residential building stock.

Methodology: For reductions achieved since baseline: On average, 10–15% in energy savings per retrofitted home, with average annual cost savings of $730. These programs generally include weatherization, replacement of appliances, minor home repairs, caulking, and replacement of items such as showerheads (Fajardo 2010; Rivera 2010). Assumes the baseline trends of energy consumption per household to determine impact on electricity versus natural gas consumption and that energy savings are equally split between each energy type. Electricity reductions that have resulted from Edison programs provided by Langley (2010), including the Appliance Recycling, Single-Family Rebate, Multi-Family Rebate, Residential Upstream Lighting, and Low- Income Program. Assumes that these programs exceed baseline trends, captured in BAU forecast, due to ramped up efforts in recent years.

Smart Grids: Smart grid integration for consumer awareness and real-time pricing yields a 5–10% reduction in electricity consumption (Global Sustainability Initiative 2008). Assumes baseline electricity consumption for residential uses remains constant. 100% of customers with smart meter installation by target years. By 2020, assumes 50% of customers participate in monitoring programs, and by 2030, 80% customer participation, with yields of 7% in electricity savings per customer, based on real-time feedback. Additional electricity savings of 7% to be realized through appliance integration with smart grid. Additional 1% in natural gas savings for improved tracking of natural gas leaks with new technology, plus an additional 1% in savings for enhanced monitoring with appliance integration. By 2020, assumes 2% of households with integrated appliances, and by 2030, 8% of customers with integrated appliances. Participation rates based on market penetration of the Energy Star program. Southern California Edison will complete smart grid installation by 2012.

Energy financing: Program will only include existing housing units

76% of the City's housing stock is detached single-family homes (General Plan buildout model). Overall, 61% of all homes are owner-occupied (Housing Element); assumes that 61% of all detached single-family units are owner-occupied.

5% of households will participate by 2020, 15% by 2030.

10% electricity savings and 25% natural gas savings will occur before any renewable energy is installed (NRDC 2010). These savings are assumed to include the impact of more efficient hot water heaters.

Sources:

California Energy Commission (CEC). 2007. Impact Analysis 2008 Update to the California Energy Efficiency Standards for Residential and Nonresidential Buildings.

Ehrhardt-Martinez, K., K. Donnelly, and J. Laitner. 2010. Advanced Metering Initiatives and Residential Feedback Programs: A Meta-Review for Household Electricity-Saving Opportunities. American Council for an Energy-Efficient Economy. Report Number E105. http://www.aceee.org/sites/default/files/publications/researchreports/e105.pdf

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EE 1.7

Support commercial and industrial profitability and energy efficiency through programs and partnerships.

Methodology: Smart grid: Assume baseline electricity consumption for commercial uses remains constant. 100% of customers with smart meter installation by target years. By 2020, assume 50% of customers participate in monitoring programs, and by 2030, 80% customer participation, with yields of 7% in electricity savings per customer, based on real-time feedback. Additional electricity savings of 7% to be realized through appliance integration with smart grid. Additional 1% in natural gas savings for improved tracking of natural gas leaks with new technology, plus an additional 1% in savings for enhanced monitoring with appliance integration. By 2020, assumes 1% of customers with integrated appliances, and by 2030, 4% of customers with integrated appliances. Participation rates based on market penetration of the Energy Star program.

Energy Performance: This measure accounts for likely energy reductions to be achieved through energy financing programs, by requiring all businesses to participate in mandatory energy performance benchmarking. Measure requires building owners and tenants to annually report energy consumption using such tools as the Energy Star Portfolio Manager, a free, online tool offered by the U.S. Environmental Protection Agency that compares a building's energy use to comparable buildings to benchmark energy use. City will phase in laws, with voluntary participation through 2018. Assumes energy reduction of 10% reduction in electricity and 25% reduction in natural gas per business.

Sources:

California Energy Commission (CEC). 2007. Impact Analysis 2008 Update to the California Energy Efficiency Standards for Residential and Nonresidential Buildings.

Ehrhardt-Martinez, K., K. Donnely, and J. Laitner. 2010. Advanced Metering Initiatives and Residential Feedback Programs: A Meta-Review for Household Electricity-Saving Opportunities. American Council for an Energy-Efficient Economy. Report Number E105. http://www.aceee.org/sites/default/files/publications/researchreports/e105.pdf

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Vine, E. 2010. A Conceptual Framework for Integrating Behavior and Behavioral Change in the Energy Efficiency Program Cycle. From People-Centered Initiatives for Increasing Energy Savings. American Council for an Energy-Efficient Economy.

EE 1.8

Promote voluntary energy efficiency retrofits in the commercial and industrial sectors through finance and incentive programs.

Methodology: Southern California Edison Energy Management Solutions Program: Assume that 30 food processing/refrigeration places undergo similar upgrades to case study for a 125,000-square-foot food processing business, with 35,000 square feet of refrigerated space. Through SCE's Technical Audit & Technology Incentive (TA&TI) program, they upgraded equipment and participated in a demand response program. Upgrades included floating head pressure, variable set point control and condenser fan VFD, VFD on evaporator fans, compressor control automation + VFD on compressors, evaporator defrost automation, and EMS installation. Improvements, including demand response strategies, resulted in annual reductions of approximately 2.3 million kWh. All growth in energy and natural gas consumption in 2020 and 2030 is assumed to be from new uses.

For reductions to date, based on electricity reduction data provided by Langley (2010), for annual energy efficiency results from 2006 to 2010.

Additional food processing and industrial retrofits: Assume that PACE will target energy efficiency in the industrial processing sector before renewable energy. Based on findings from California industrial surveys (Save Energy Now program assessments (or ESAs))completed by the California Energy Commission between 2005 and 2007. Assumes the average reductions found for cheese processing plants and the creamery plant that were found. Note that to estimate the energy consumption attributed to these industrial uses and navigate data privacy laws, average natural gas and electricity consumption for small plants found in the survey was assumed to apply to 70% of nonresidential energy consumption and averaged to determine a number of small plants.

Upgrades outlined through the ESAs to achieve the reductions provided by the case studies include improved insulation, blow-down energy recovery, reducing boiler blow-down, O_2 trim controls, increasing condensate recovery, backup turbine for PRV, steam leak and maintenance, use of flash/vent steam, feed water economizer, and reducing steam usage. Many of these are items that are covered by rebates provided by Southern California Edison.

Sources:

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EE 1.9

Require stationary equipment in new industrial development to comply with best practice energy efficiency standards.

Methodology: Upgrading liquefied petroleum gas boilers to thermal efficiency of 89% or greater: Applies increased efficiencies in forecast LPG boilers. Assumes the baseline conditions for the City's boilers consistent with 2002–2004 boiler technology as described by SJVAPCD (2009), with 150 psig boilers not equipped with an economizer, with thermal efficiencies of 80.6%. Quantifies the reduction in LPG consumption that will result with requiring all new boilers to achieve a minimum thermal operating efficiency of 89% and other design criteria outlined in the District's approved hot-water boiler best performance standard. Reductions quantified based on the case study provided by the District in the Climate Change Action Plan (SJVAPCD 2009), assuming a selective catalytic reduction (SCR) system has been installed for NOx emission control. Reduction includes the emissions associated with the production of ammonia required for the SCR operation and the impact of reduced electric power requirement for fans associate with this standard.

To forecast business-as-usual LPG boilers: Assumes that baseline boilers will grow with industrial land use acreages. For a conservative estimate, assumes that all new LPG boilers will be installed with thermal efficiency of 85.9%. Assumes standard emissions of boiler engines quantified in the Inventory (141 lbs CO_2/MMBtu), and the emissions for efficient boilers provided by the SJVAPCD (137 lb CO_2/MMBtu, yielding a 2.92% reduction in emissions). Anticipated that this measure will be implemented in the agricultural industrial food processing sector, consistent with baseline conditions. Note that while the District provides approximately a 6.0% GHG emission reduction relative to baseline emissions for boiler compliance with the approved best practice performance standard, reductions provided by this measure assume the baseline conditions calculated in the Inventory and are focused on general GHG emissions reductions through enhanced technologies rather than CEQA significance.

Reciprocating engines: Emissions from stationary distillates are caused by reciprocating engines (SJVAPCD 2011), inclusion of large bore engines assumed to yield a de minimus impact on the reduction measure (these engines contribute less than 0.5% of distillate emissions). According to the California Energy Commission, typical distillate engines have an operating efficiency of 25–45%. Assumes all reciprocating engines have an average operational efficiency of 35%. Targeted efficiency for 2010 is 50%. Assumes that the City will require all new reciprocating engines to achieve best practice operating standards by 2020, with an operating efficiency of 60% by 2020. Assumes that this will yield an equivalent reduction in greenhouse gas emissions.

High efficiency natural gas internal combustion engines: Requires a minimum 95% efficiency for natural gas internal combustion engines achieved through an electric motor powered by electricity; this is a technology available to any fossil-fuel-fired equipment driver. Credits natural gas boilers for higher energy efficiency to result through new standards. Applies to forecast natural-gas-powered internal combustion (IC) engines in use after the baseline year in private development. To forecast IC engines, assumes the baseline proportion of private IC engine natural gas consumption, as reported by the District, relative to total commercial and industrial natural gas consumption in the Inventory (1.54% of total consumption). For emissions of business-as-usual engines, assumes the typical heat rate of natural-gas-fired IC engines with a heat rate of 9500 Btu/hp-hr. Per the District's notation, assumes a 10% improvement in efficiency for present-day engines that is assumed to grow to a 15% improvement in efficiency by 2030. Premium efficiency motors are powered by electricity instead of fossil fuel, and these reductions are achieved by offsetting natural gas consumption with more efficient electricity consumption.

Fossil-fuel-fired process heaters at milk processing and manufacturing facilities: Assumes the natural gas consumption for 60% of the milk processing activity reported by the District. By 2020, the City will require that all new fossil fuel process heaters installed at these facilities implement process heater best practices to achieve a minimum thermal efficiency of 82.3%. Reduction takes credit for the default baseline thermal efficiencies of process heaters outlined by the San Joaquin Valley Air Pollution Control District (2009), with a thermal efficiency of 80.0%. The difference in thermal technologies between baseline and best practice standards yields a 3.38% reduction in emissions. Measure assumes that the baseline proportion of natural gas consumption for cheese production reported by the District remains constant (SJVAPCD 2009). While this reduction can apply to all fossil-fuel-fired process heaters, District data was only conducive to accurately quantifying this reduction for natural gas process heaters at cheese production facilities.

Sources:

California Energy Commission. 2002. Distributed Energy Resource Guide. http://www.energy.ca.gov/distgen/equipment/ reciprocating_engines/reciprocating_engines.html

Christie, Vicki. 2011. Senior Office Assistant, San Joaquin Valley Air Pollution Control District. Personal communication, January 17.

San Joaquin Valley Air Pollution Control District. 2009. Final Staff Report: Addressing Greenhouse Gas Emissions Impacts Under the California Environmental Quality Act. www.valleyair.org.

Villalvazo, Leland. 2011. San Joaquin Valley Air Pollution Control District. Personal communication, January.

EE 1.10

Continue to partner in regional initiatives that encourage achievement of regional energy efficiency targets.

Methodology: This measure is based on empirical data from a public education campaign designed to reduce emissions of criteria air pollutants in the Sacramento region (i.e., the Spare the Air program). This is one of the few public outreach campaigns that conducted an analysis of the effectiveness of the program as it relates to emission reductions. We use its findings for market penetration. It is assumed that the City's proactive education and outreach would impact 10% of households by 2020 and 15% by 2030. We assume a 20% reduction is achieved by businesses impacted by the City's efforts.

Assumes households are education through VIEW outreach and educational events, such as the holiday light exchange at the Tulare Corporation Yard, events for families and children at the Tulare Public Library, and the Southern California Edison Mobile Education Unit.

Sources:

California Energy Commission (CEC). 2003. Impact Analysis 2005 Update to the California Energy Efficiency Standards for Residential and Nonresidential Buildings.

———. 2007. Impact Analysis 2008 Update to the California Energy Efficiency Standards for Residential and Nonresidential Buildings.

California Public Utilities Commission (CPUC). 2008. California Long Term Energy Efficiency Strategic Plan. http://www.californiaenergy efficiency.com/docs/EEStrategicPlan.pdf.

Sacramento Metropolitan Air Quality Management District (SMAQMD). 2009. Spare the Air Control Measure Program; Revision to State Implementation Plan Staff Report. http://www.airquality.org/notices/CAPUpdate/STA-revisiontoSIP-StaffRpt23April2009.pdf

The VIEW. n.d. http: //www.viewthesavings.com/.

RE 2.1

Continue to utilize renewable and alternative energy sources at the wastewater treatment plant (the Tulare Water Pollution Control Facility (TWPCF)).

Methodology: For solar carport (FIM 9), assumes energy and costs savings provided by Johnson Controls.

For solar plant and biogas fuel cell, assumes energy and cost savings provided by Lew Nelson and City of Tulare.

Business-as-usual emissions from treatment processes assumed to increase linearly with expanded water treatment capacity, as established in Draft General Plan (2007), to approximately 23 million gallons per day, or 8,524 gallons annually, by 2030. Ratio of MT CO_2e/million gallons treated assumed to remain constant.

Impact of upgrades on emissions of nitrous oxide and methane from wastewater treatment in 2010 calculated using ICLEI's Wastewater Treatment Plant Emissions Excel-based calculator, provided by ICLEI as a supplement to the Local Government Operations Protocol (CARB 2010).

Assumes total emissions in 2010 after plant upgrades increase linearly as water treatment capacity expands, based on projected capacity established by the General Plan (City of Tulare 2007).

All costs have already been incurred, justified on cost savings. Long term cost savings realized through reduced energy demand and enhanced operational capacities.

Sources:

California Air Resources Board (CARB). 2010. Local Government Operations Protocol Version 1.1. http://www.arb.ca.gov/cc/ protocols/localgov/pubs/lgo_protocol_v1_1_2010-05-03.pdf.

Johnson Controls. 2010. City of Tulare Energy Performance Contract Year 2 Annual Measurement & Verification Report April 1, 2009, through March 30, 2010. Provided by personal e-mail communication with Lew Nelson, July 31.

Nelson, Lew. 2009. City of Tulare Public Works. Personal e-mail communication, provided May 2010.

———. 2010a. City of Tulare Public Works. Personal e-mail communication, May 4.

———. 2010b. City of Tulare Public Works. Phone conversation, September 16.

City of Tulare. 2007. General Plan Draft Environmental Impact Report. http: //www.westplanning.com/cityoftulare/index.htm.

———. 2009. Energy Efficiency and Conservation Strategy. Provided by personal e-mail communication with Betsy McGovern-Garcia, May 11, 2010.

RE 2.2

Increase reliance on local renewable energy sources through provision of a minimum of 30% of commercial and industrial energy needs from on-site renewable energy sources by 2030.

Methodology: Assumes 20% achievement by 2020 and 30% achievement by 2030. Assumes that all growth in electricity is from new businesses and that on-site energy will offset electricity consumption.

Includes reductions achieved to date through the California Solar Initiative for commercial projects installed 2007–2010.

Sources:

California Solar Initiative. 2010. http://www.californiasolarstatistics.ca.gov/

City of Berkeley. Berkely FIRST Initial Evaluation. http://www.cityofberkeley.info/uploadedFiles/Planning_and_Development/Level_3_-_Energy_and_Sustainable_Development/Berkeley%20FIRST%20Initial%20%20Evaluation%20%20final%20(2).pdf

City of Tulare. 2007. General Plan Draft Environmental Impact Report. http://www.westplanning.com/cityoftulare/index.htm.

---2010. Housing Element 2007-2014.

Natural Resource Defense Council. (May 2010) Property Assessed Clean Energy Programs White Paper. Retrieved from http://pacenow.org/documents/PACE%20White%20Paper%20May%203%20update.pdf

Neidich, Sherrill, Anthony Ng. 2010. Solar Offset Program Express Terms15-Day Language.

California Energy Commission, Energy Efficiency and Renewable Energy Office. Publication number: CEC-300-2010-009-15DAY.

RE 2.3

Support deployment of manure digesters at dairies capture and convert biogas for on- and off-site electricity needs.

Methodology:

Assumes methane capture and electricity generate capacity reported by US EPA AgStar reports for all dairy digesters in California. These averages were used in the Dairy Manure Digester and Co-Digester Facilities Draft Programmatic Environmental Impact Report (Draft PEIR) (California Regional Water Quality Control Board, Central Valley Region, July 2010). Assumes the average direct methane reductions and electricity generating capacity for storage lagoon digesters that exist in Tulare. Forecasted cows calculated assuming a constant proportion of cows to dairy acreage established in the General Plan buildout model, based on County Assessor Parcel data and City GIS data (10,652 dairy cows by 2020 and 4,081 cows by 2030). Average digester operational data and dairy cattle herd size necessary to support digesters based on the Tulare case studies provided by AgStar, including average dairy herd of 2,070 cows, average methane emissions reduction of 4,641 MT CO2e.

The Draft PEIR forecasts that 200 digesters will be installed in Region 5 by 2020, compliant with SJVAPCD thresholds. According to Draft PEIR data, the City of Tulare has approximately 1.74% of all dairy cows in Region 5. Assumes City will achieve 2.0% of all digesters targeted in the Draft PEIR. Assumes 4 new digesters will be installed in the City of Tulare by 2020 at the average operating capacity. By 2030, assumes that only 1 digester will be in operation, based on forecasted General Plan buildout and conversion of agricultural land. According to the Draft PEIR, 180 of the 200 new digesters are anticipated to use digesters to create electricity (90% of new facilities with digesters). Assume that 90% of methane captured in Tulare digesters will be used to create electricity for on- or off-site use, based on statewide average electricity generation capacity per digester facility reported by US EPA AgStar of 2,286,360, assuming ~350 hp. These electricity capacities are supplied, on average, by systems of 261 kW.

Costs for manure digesters are estimated to range from $1 million to $6 million per at least 1,000 head of cattle. Assumes an average cost of $3.5 million per facility, which is anticipated to be offset through the Feed in Tariff and other financial incentives that will be developed to achieve RPS goals. Cost savings include offset electricity use.

Sources:

California Regional Water Quality Control Board, Central Valley Region. 2010. Dairy manure Digester and Co-Digester Facilities. Draft Program Environmental Impact Report.

http://www.waterboards.ca.gov/centralvalley/press_room/announcements/dairy_digester_draft_peir.pdf.

Dairy Cares. 2010. 2010 Sustainability Report. A progress report to the community on California dairy initiatives. http://www.dairycares.com/pdf%20files/2010SustainabilityReport.pdf.

U.S. Environmental Protection Agency (U.S. EPA) AgStar. 2010. Market Opportunities for Biogas Recovery Systems at U.S. Livestock Facilities.
http://www.epa.gov/agstar/documents/biogas_recovery_systems_screenres.pdf

RE 2.4

Increase reliance on local renewable energy sources through provision of a minimum of 15% of baseline residential energy needs from on-site renewable energy sources by 2030.

Methodology: TASP & TASP expansion: Assumes all 22 loans dispersed by 2020, with 2 loans dispersed by end of 2010. Average installation of 2.3 kW, as outlined by the Energy Efficiency and Conservation Strategy. TASP program covers all costs of installation, leveraging City awards with statewide rebates.

Assumes establishment of a self-funded revolving loan program as additional funds become available with same scope as TASP to target the affordable housing outlined in the 2007–2014 RHNA by 2030, phased in with 30% achievement by 2020 and 50% achievement by 2030. This action targets affordable housing demographics to ensure that renewable energy programs equitably benefit all of the City's population.

PACE: 76% of the City's housing stock is detached single-family homes (General Plan buildout model). Overall, 61% of all homes are owner-occupied (Housing Element). Assumes that 61% of all detached single-family units are owner-occupied.

Assumes 25% of households will participate in PACE for renewable energy by 2020 and 35% by 2030. Assumes 60% of existing households participating in PACE will install renewable energy to cover 100% of their electricity consumption (will require an installation that is larger than the average size assumed by TASP).According to Berkeley, 70% of its pilot program participants offset 70% of total electricity consumption and 30% offset all of total electricity consumption. Assumes that with enhanced finance options through PACE and improving technology, participants in Tulare will be able to offset all of electricity consumption through on-site solar.

Solar Homebuyer Option: See California Code of Regulations, Title 20, Division 2, Chapter 9, Article 1, Sections 2700–2704. The regulation outlines assumed participation of 20% of homebuyers within subdivisions and expected annual kWh by climate zone (3,987 kWh for climate zone 14). Assumes that 70% of all new homes will be built on subdivided land, with the participation rates outlined by the California Energy Commission (20%) and that the City requires developers of projects with more than four units to provide at least 20% of the total project's electricity use with renewable solar, allowing for offsets consistent with the Homebuyer Solar option. Assumes a constant proportion of multi-family housing compared to total new housing stock as documented by the General Plan in the baseline year (11%) and that 20% of multi-family units will elect to participate with consistent energy savings.

The impact of this measure excludes all PACE impact on energy efficiency. See EE 1.6.

Cost savings are net cost savings after estimated cost of installation of PV. Note that PV costs assume costs of small systems less than 10 kW in size, typical of residential homes.

Includes reductions achieved to date through the California Solar Initiative for residential projects installed 2007–2010.

Sources:

City of Berkeley. n.d. Berkeley FIRST Initial Evaluation. http: //www.cityofberkeley.info/uploadedFiles/Planning_and_Development/Level_3_-_Energy_and_Sustainable_Development/ Berkeley%20FIRST%20Initial%20%20Evaluation%20%20final%20 (2).pdf.

California Energy Commission, Energy Efficiency and Renewable Energy Office. Publication number: CEC-300-2010-009-15DAY.

California Solar Initiative. 2010. http://www.californiasolarstatistics.ca.gov/

Natural Resource Defense Council. 2010. Property Assessed Clean Energy Programs White Paper. http://pacenow.org/documents/ PACE%20White%20Paper%20May%203%20update.pdf.

Neidich, Sherrill, and Anthony Ng. 2010. Solar Offset Program Express Terms15-Day Language.

City of Tulare. 2007. General Plan Draft Environmental Impact Report. http: //www.westplanning.com/cityoftulare/index.htm.

———. 2010. Housing Element 2007–2014.

TM 3.1

Increase staff's use of alternative transit modes for work-related commutes and City business travel.

Methodology: Assumes City of Tulare will provide a parking subsidy of $2 per day. According to Victoria Transport Policy Institute, a $2 per day parking subsidy in a low-density, travel-mode-neutral setting, a 7.9% decrease in annual VMT attributed to employee commute is achieved. Cambridge Systematic finds a 4.5% decrease in VMT from parking cash-out programs. Assumes a 4.5% decrease for a $2 subsidy.

Impact of a 9-day/80-hour work week with 10% of staff participating by 2020 and 25% of staff participating by 2030 will yield a 0.7% and 1.75% reduction in VMT, respectively.

Sources:

Cambridge Systematic. 2009. Moving Cooler: An Analysis of Transportation Strategies for Reducing Greenhouse Gas Emissions. Technical Appendices. Prepared for the Urban Land Institute. (p. B-54). http://www.movingcooler.info/Library/Documents/Moving%20Cooler_Appendix%20B_Effectiveness_102209.pdf.

Victoria Transport Policy Institute. n.d. http://www.vtpi.org/tdm/tdm8.htm.

TM 3.2

Increase transportation-related bicycle trips to reduce vehicle miles traveled.

Methodology: Bike lanes: Assumes a current 1.1% bicycle riding rate for the City of Tulare, from the Draft Bike Plan (City of Tulare 2010). Assumes that development of bike lanes will be phased in, with 70% of improvements in the Bicycle Plan completed by 2020 and 100% completed by 2030. In 2010, the City had 7.97 miles of Class I lanes, 30.13 miles of Class II lanes, and 0 miles of Class III lanes. By 2030, City aims to have total of 53.33 miles of Class I lanes, 124.39 miles of Class II lanes, and 21.98 miles of Class III lanes.

Assumes that the percentage of people commuting by bicycle increases by 1% for each additional mile of bike lanes per square mile (CAPCOA 2010, citing a study by Dill and Car (2003)). Requires standards to be implemented before target years

Bike parking: The reduction for transportation emissions was provided by the CAPCOA 2010 and the SJVAPCD Climate Change Action Plan, which outlines the impact of a bike parking at 1:20 vehicle spaces, assumed to impact new VMT, for both short- and long-term parking.

Provision of short- and long-term bike parking at the rate of 1:20 vehicle spaces supports a 0.625% reduction in emissions. Assumes reduced emissions are attributed equally to short- and long-term bicycle parking spaces.

According to the 2001 National Household Travel Survey, average annual VMT per household is 21,187 and the to or from work subcategory is 5,724 (27.0%). Shopping is 3,062 (14.5%). Other Family and Personal Business is 3,956 (18.7%). Social and Recreational driving is 5,186 (24.5%). Therefore, VMT attributed to commercial businesses is 27% + 14.5% = 41.5%, and VMT attributed to residents is 18.7% +24.5% = 43.5.

For 2020 and 2030, assumes proportion of residential acreage designated for medium- and high-density residential in the General Plan model, 10.53%, with 2020 proportion to reach only 75% of this buildout proportion of acreage.

New standards to apply to all new construction and expansion of over 10% of commercial , industrial, public/quasi-public, and parks and recreation uses, in addition to all new construction and expansion of over 10% of medium-density and high-density residential uses.

Sources:

California Air Pollution Control Officers Association (CAPCOA). 2010. Quantifying Greenhouse Gas Mitigation Measures.

Center for Clean Air Policy (CCAP) Transportation Emission Guidebook. http://www.ccap.org/safe/guidebook/ guide_complete.html. Based on results of 2005 literature search conducted by TIAX on behalf of SMAQMD.

Dill, Jennifer, and Theresa Carr. 2003. Bicycle Commuting and Facilities in Major U.S. Cities: If You Build Tem, Commuters Will Use Them – Another Look. TRB 2003 Annual Meeting CD-ROM.

Miller, Michael, 2010. City of Tulare Department of Engineering. Personal e-mail communication.

City of Tulare. 2010. Draft Bicycle Plan.

TM 3.3

Improve mobility by implementing a citywide Complete Streets ordinance and program.

Methodology: Measure looks at the impact of a Complete Streets approach through traffic calming, pedestrian activity, and Safe Routes to School programs.

Safe Routes to School: According to most recent census, 24.96% of the city's population is school age (5–18). Assumes number of school-age children increases evenly with population growth.

The National Center for Safe Routes to School Baseline Survey indicated that 62% of elementary and middle school children live within 2 miles of school.

According to VTPI, there are currently few detailed studies of the effectiveness of School Transport Management programs, but anecdotal evidence indicates that total reductions in automobile trips of 10–20% or more are possible at a particular school under programs such as a walking school bus. For the purposes of this study, we will assume a 15% reduction in automobile trips.

Assumes average round-trip drop-off distance for parents is 4 miles.

Traffic calming: Assumes that 50% of new streets have traffic calming improvements and 50% of intersections have traffic calming improvements. Update development standards to require traffic calming measures by 2020 for nonresidential projects and capital improvement projects.

Project design will include pedestrian/bicycle safety and traffic calming measures, and roadways will be designed to reduce motor vehicle speeds and encourage pedestrian and bicycle trips with traffic calming features. Traffic calming features may include marked crosswalks, countdown signal timers, curb extensions, speed tables, raised crosswalks, raised intersections, median islands, tight corner radii, roundabouts or mini-circles, on-street parking, planter strips with street trees, chicanes/chokers, and others.

Pedestrian activity: Providing a pedestrian access network encourages people to walk instead of drive. This mode shift results in people driving less and thus a reduction in VMT. Assumes internal links for new development and connects to all existing or planned external streets and pedestrian facilities contiguous with the project site. Assumes removal of barriers to pedestrian access and interconnectivity. Physical barriers such as walls, landscaping, and slopes that impede pedestrian circulation will be eliminated. New development will include the removal of physical barriers between residential and nonresidential uses that impede bicycle or pedestrian circulation and that

updated standards will require pedestrian orientation. Consistent with emphasis on pedestrian uses provided in Draft General Plan.

Costs estimated based on costs provided by City in the West Tulare Community-Based Transportation Plan to complete improvements to the West Tulare area, for all three project priorities (approximately $14.3 million for a variety of pedestrian and bicycle improvements in areas that are not conducive to pedestrian or bicycle activity). Based on existing development patterns, assumes that the project area represents approximately 10% of existing development and represents average trends throughout the community for pedestrian and bicycle ease of use. Assumes that 10 times the projected cost for this project would be needed to complete this measure. Assumes half the cost for 2030 and that new development will fund improvements in newly developed areas. Note that some of these costs can be offset with grant funds or innovative partnerships with school districts and funding through Safe Routes to School, consistent with the City's approach for the Community-Based Transportation Plan.

Sources:

California Air Pollution Control Officers Association (CAPCOA). 2010. Quantifying Greenhouse Gas Mitigation Measures.

Cambridge Systematics. 2009. Moving Cooler: An Analysis of Transportation Strategies for Reducing Greenhouse Gas Emissions. (p. B-25). http://www.movingcooler.info/Library/Documents/Moving%20Cooler_Appendices _Complete_102209.pdf

CCAP Transportation Emission Guidebook; TIAX Results of 2005 Literature Search Conducted by TIAX on behalf of SMAQMD, as cited in CEQA and Climate Change: Evaluating and Addressing Greenhouse Gas Emissions from Projects Subject to the California Environmental Quality Act, January 2008. California Air Pollution Control Officers Association. (CAPCOA Appendix B)

National Center for Safe Routes to School. 2010. Safe Routes to School Travel Data: A Look at the Baseline Results from Parent Surveys and Student Travel Tallies. http://www.saferoutesinfo.org/resources/ collateral/srts_talkingpoints.doc

Sacramento Metropolitan Air Quality Management District (SMAQMD). 2010. Recommended Guidance for Land Use Emission Reductions. (p.13). http://www.airquality.org/ceqa/GuidanceLUEmissionReductions.pdf.

San Joaquin Valley Air Pollution Control District. 2009. Climate Change Action Plan: Addressing Greenhouse Gas Emissions Under the California Environmental Quality Act; Draft Staff Report.

City of Tulare. 2009. West Tulare Target Area Community-Based Transportation Plan.

U.S. Census Bureau. http: //factfinder.census.gov.

TM 3.4

Expand public transit routes and provide light rail transit options.

Methodology: Local transit reduction: Total ridership for the Tulare Intermodal Express (TIME), for ridership within city limits. Assumes on average every bus ride offsets 4 miles of round trip intracity travel, based on several driving scenarios modeled through Google Maps. Aims to achieve the 2006 level of service by 2020 and to achieve additional growth in 2030. Level of service defined as the annual total rides on TIME per resident in the city. 2006 Level of service equals 7.15 rides on TIME per person, and by 2010 this level dropped to 5.78 rides per person. By 2030, aim to achieve 8.5 rides per person through expanded routes that are supported by more concentrated land use patterns. Excludes the impact of Dial-A- Ride, as these rides likely do not offset single-occupancy VMT. Excludes 2010 reduction from bus rides, since this measure is predicated on an expansion beyond 2010 levels of service. Ridership data provided by City of Tulare.

Light rail line: TCAG's Light Rail Report forms the basis of this measure. TCAG light rail report, page 22, gives assumptions. Mooney Route has highest forecast volume of the three scenarios, and it serves both Visalia and Tulare city centers. Both Visalia and Tulare would need to provide TOD centers around the stations to provide 2,000 housing units to support this level of ridership. Annual weekday ridership would be 80% of total annual ridership, with annual weekend ridership being 20% of annual ridership. Assumes the impact on weekday travel only, which is assumed to represent work trips, on average. With only two stations at each city center, it can be assumed that each trip has an impact on transport in the City of Tulare. Emissions generated by the light rail line assumed the average of national trends for 2006 data and 2050 forecasts, assuming routes equivalent to total projected VMT divided.

Modeling common trips between the two city centers, mileage that falls within City of Tulare city limits equals 4.8 miles. Assume that for each trip, 9.6 (round trip) vehicle miles traveled within city limits is offset.

Sources:

Cambridge Systematics. 2009. Moving Cooler: An Analysis of Transportation Strategies for Reducing Greenhouse Gas Emissions. Technical Appendices. Prepared for the Urban Land Institute. http://www.movingcooler.info/Library/Documents/Moving%20Cooler_Appendices_Complete_102209.pdf.

Thompson, Darlene. 2010. City of Tulare Finance Department. Personal e-mail and phone conservation, September 29.

Tulare County Association of Governments. 2007. Final Report Tulare County Regional Light Rail Feasibility Study. http://www.tularecog.org/rail.php

U.S. Census Bureau. American Communities Survey 2006–2008. Available at: http: //factfinder.census.gov

TM 3.5

Reduce work-related vehicle miles traveled through support of transportation demand management programs.

Methodology: Focuses on employers within the city. Average round-trip local work length in miles assumed to be 8.5 miles, from various local driving scenarios modeled through Google Maps driving directions. This represents average round-trip mileage for residents employed within the city. Assumes 52.18 workweeks per year and 5 workdays per week, minus 14 holidays /sick days per year (247 work days per year).

The literature supports a range of 4–30% reduction in overall VMT through the implementation of a local TDM program. Effectiveness of a TDM program will be incremental, with the full VMT reduction potential being reached by 2030. Assumes the reduction of 20% achieved by the participation of those working for the city's major employers. In 2008, 4,537 employees worked for the top employers listed in the Housing Element (2010), all of which have over 100 employees and will have to comply with SVAPCD Rule 9410. Assumes that the proportion of local employees that work for companies over 100 employees in size is equal to the proportion working for the city's top employers in 2008 plus approximately 70% of employees from new heavy industrial uses, which are anticipated to have over 100 employees and be subject to Rule 9410.

Sources:

California Air Pollution Control Officers Association (CAPCOA). 2010. Quantifying Greenhouse Gas Mitigation Measures.

Cambridge Systematics. 2009. Moving Cooler: An Analysis of Transportation Strategies for Reducing Greenhouse Gas Emissions. Technical Appendices. Prepared for the Urban Land Institute. (Table 5.13). http://www.movingcooler.info/Library/Documents/Moving%20Cooler_Appendix%20B_Effectiveness_102209.pdf.

Victoria Transport Policy Institute (VTPI). n.d. Transportation Management Programs. http://www.vtpi.org/tdm/tdm42.htm.

TM 3.6

Support regional programs to shift single-occupancy vehicle trips to other modes.

Methodology: Focuses on residents employed outside of the city. From American Community Survey 2006–2008 survey, 11% of residents worked outside of the city. Assumes 8.5-mile round trip for work commute for employees working outside city limits. Adjusts forecast employees based on increasing jobs-housing ratio. Assumes that for every factor increase in the jobs-housing ratio, number of residents commuting outside of town for work decreases by 20% (for a total working population that commutes out of Tulare for work in 2030 of 7%, compared to baseline trends of 11%). Assumes 52.18 workweeks per year and 5 workdays per week, minus 14 holidays/sick days per year (247 work days per year).

The literature supports a range of 4–30% reduction in overall VMT through the implementation of a local TDM program. Assumes only VMT on local roads will be affected by TDM program. Effectiveness of a TDM program will be incremental, with the full VMT reduction potential being reached by 2030. Assumes the reduction of 20% will impact the 4,537 employees for the top employers listed in the Housing Element (2010), all of which have over 100 employees and will have to comply with SVAPCD Rule 9410. Assumes that the proportion of local employees that work for companies over 100 employees in size is equal to the proportion working for the city's top employers in 2008.

Sources:

California Air Pollution Control Officers Association (CAPCOA). 2010. Quantifying Greenhouse Gas Mitigation Measures.

Cambridge Systematics. 2009. Moving Cooler: An Analysis of Transportation Strategies for Reducing Greenhouse Gas Emissions. Technical Appendices. Prepared for the Urban Land Institute. (Table 5.13). http://www.movingcooler.info/Library/Documents/Moving%20Cooler_Appendix%20B_Effectiveness_102209.pdf

Rimpo and Associates. 2007. Urbemis 2007 Version 9.2.4.

Sacramento Metropolitan Air Quality Management District (SMAQMD). 2010. Recommended Guidance for Land Use Emission Reductions. http://www.airquality.org/ceqa/GuidanceLUEmissionReductions.pdf.

U.S. Census Bureau. American Communities Survey 2006–2008. Available at: http://factfinder.census.gov

Victoria Transport Policy Institute (VTPI). n.d. Transportation Management Programs. http://www.vtpi.org/tdm/tdm42.htm

Supportive Action Items and Time Frame: Continue to support and facilitate implementation of the Tulare County Regional Blueprint to generate regional solutions to single-occupancy vehicle commutes.

In partnership with TCAG, promote the establishment of transportation management associations (TMAs) to coordinate small-business rideshare programs.

Promote Valley Rides to encourage carpooling and rideshare options in collaboration with the Tulare Council of Governments and the Council of Fresno County Governments.

Pursuant to SB 375, support the development of a regional Sustainable Communities Strategy and support its implementation through local plans and programs.

VE 4.1

Continue use of clean and alternative fuels in the City's fleet.

Methodology: Total fuel consumption and listing of flex fuel vehicle fleet provided by Lew Nelson (2010). Assumed average fuel efficiency in lieu of mileage to complete calculations and provided by the protocol as described below, using countywide data supplied by Emfac. Assumes that all fuel consumption reported by the City is attributed to passenger cars and light-duty trucks, based on flex fuel vehicle types.

Flex fuel vehicles consume E85 blend (confirmed by Lew Nelson). Rate of consumption of flex fuel was assumed to be 85% ethanol and 15% gasoline, per the protocol definition. For biofuel blends, combustion releases both emissions of fossil and biogenic CO_2, as discussed by the protocol (see Section 7.1.2 of the protocol for additional information).

CO_2 emissions taken from Table G.11 of the protocol.

CH_4 and N_2O: Applies factors of emissions in grams/mile to total gallons consumed. Mileage by vehicle and fuel type was not available; therefore, assumed average fuel efficiencies as described below to apply emissions coefficients and utilize the protocol's approach to calculate CH_4 and N_2O. For gasoline, assumes average emissions all model years through 2006 of passenger cars and light trucks from Tables G.12 and G.13.

Fuel efficiencies determined using countywide averages provided by Emfac. For flex fuel vehicle fuel efficiencies, assumes 75% of the average of gasoline efficiencies for light-duty autos, light-duty trucks (1–5,750 lbs) (15.5 MPG for flex fuel on average). Flex fuel efficiency premised on comparison to gasoline fuel efficiencies, according to those reported by CEC (2010).

To determine reduction from BAU forecast from flexf emissions: Assumes that flex fuel consumption displaces gasoline consumption and that the proportion of gasoline gallons offset by flex fuel in 2009 remains constant.

Assumes the net reduction between emissions from the BAU forecast and emissions accounting for flex fuel vehicle expansion.

Adjusts emissions to account for increasing fuel efficiencies.

Costs have already been incurred. Assumes ongoing cost savings for maintenance of alternative fuel fleet.

Sources:

California Air Resources Board (ARB). 2010. Local Government Operations Protocol Version 1.1. http://www.arb.ca.gov/cc/ protocols/localgov/pubs/lgo_protocol_v1_1_2010-05-03.pdf.

California Energy Commission (CEC). 2010. Transportation Energy Statistics. http://energyalmanac.ca.gov/transportation/.

Nelson, Lew. 2010. City of Tulare Public Works. Personal e-mail communication, May 21.

VE 4.2

Reduce emissions from on-road vehicle sources.

Methodology: Electric vehicle infrastructure: Electric vehicles (EV) are much more efficient than standard internal combustion engine vehicles. The performance of this measure is related to the replacement of standard vehicles with EVs once the necessary infrastructure is available, assuming the provision of Level 3, High Power charging stations when available. The literature supports the fuel use reduction equivalent to one 10-mile trip for every charging station available. The energy use needed to service the charging stations was then calculated to discount the emissions reductions.

Require the provision of charging stations in parking facilities at the rate of 10% of the required automobile parking spaces for all nonresidential facilities over 5,000 square feet. Each parking space with a charging station counts toward the total number of required parking spaces and shall not be in addition to total required parking spaces.

Assumes average parking ratio for all nonresidential land uses according to commercial or industrial category, as provided by Section 10.192.040 of the Zoning Code: for commercial uses, average of 1 parking space per 280 square feet of floor space; for industrial uses, average of 1 parking space per 1,250 square feet of floor space. Excludes requirements for land uses that are provided on a per employee or other metric basis (e.g., per golf hole, etc.). To calculate new square footage by target year, assumes 70% of the forecast buildout acreages for all nonresidential land. Excludes reserve acreages, since this is land anticipated for development beyond the 2030 horizon. Assumes the 2006–2030 Compound Annual Growth Rate to determine 2010 and 2020 acreages. (Existing acres = total designated acres - available (vacant) acres; new acres = available acres). Assumes the floor area ratios by General Plan land use designation to determine square feet of nonresidential space. On average, 10% of total forecast parking spaces assumes EV (1,140 commercial EV spaces by 2020 and 597 industrial EV spaces by 2020, for a total of 1,738 EV spaces in the city).

Assumes that stations will be installed through civic and private development at the rate of 50 per year, as ensured by updating development standards.

Calculated assuming parking spaces were used for commuting 365 work days per year.

Accounts for increased electricity use associated with hybrid and electric vehicles.

Costs: Assumes that the City can work with local partners to determine appropriate incentives to offset burden of installation (e.g., continued pursuit of funding opportunities, such as past applications to the California Energy Commission).

Car share: Measure requires that the City provide a subsidy or public procurement sufficient to ensure two-year start-up of a public, private, or nonprofit car-sharing organization. Provide free or subsidized lease usage of convenient public street parking for car-sharing vehicles. Ten-year goal of one car per 2,000 inhabitants, and 20-year goal of one car per 4,000 inhabitants. Based on the TCRP report, across the United States, an average 37% reduction in VMT for car-share participants was reported for car-share participants in comparison to when they drove their own personal vehicles. Assumes an even distribution of projected VMT for all residents to determine baseline VMT for -hare participants.

Sources:

California Air Pollution Control Officers Association (CAPCOA). 2010. Quantifying Greenhouse Gas Mitigation Measures.

Cambridge Systematics. 2009. Moving Cooler: An Analysis of Transportation Strategies for Reducing Greenhouse Gas Emissions. Technical Appendices. Prepared for the Urban Land Institute. http://www.movingcooler.info/Library/Documents/Moving%20Cooler_Appendices_Complete_102209.pdf.

Millard-Ball Adam. 2005. Car-Sharing: Where and How it Succeeds. Transit Cooperative Research Program (108). P 4-22.

Victoria Transportation Planning Institute (VTPI). 2009. Car Share. http: //www.vtpi.org/tdm/tdm7.htm.

VE 4.3

Establish Tulare as a key node in local and regional commercial and industrial clean fuel infrastructure. that demonstrates statewide leadership in supporting a clean heavy-duty fleet.

Methodology: Assumes the total emissions of MT CO_2e per gallon of diesel and CNG fuel from the City's comparable fleet, as provided in the City's baseline government operations inventory, and the proportion of heavy-duty vehicle trucking VMT provided by EMFAC. Calculates the reduction in emissions from turnover to the target CNG fleet by extrapolating city-specific heavy-duty diesel truck VMT from EMFAC for highway and local road travel. This VMT is then averaged for the city's heavy-duty diesel population, also provided by EMFAC. Assumes the percentage reduction in emissions observed in the City's fleet for CNG fuel use, as it would apply to the average VMT per heavy-duty truck, for the target truck population.

Assumes that grant funding will be pursued and facilitated in partnership with federal and state funding opportunities and with private entities, per the strategy of Clean Energy fuels, which has applied to take over the City's CNG/LNG station to service the local and regional trucking population. Assumes the joint funding and creative partnerships will be used to offset the incremental cost of CNG purchase, as has been demonstrated and achieved by Clean Energy in other California areas.

Assumes cost savings of average CNG fuel costs/gallon in comparison to diesel, as provided by Clean Energy Fuels Corp.

Sources:

California Energy Commission (CEC). 2010. Transportation Energy Forecasts and Analyses for the 2009 Integrated Energy Policy Report. Final Staff Report. CEC-600-2010-002-SF. http://www.energy.ca.gov/ 2010publications/CEC-600-2010-002/CEC-600-2010-002-SF.PDF

Clean Energy Fuels Corp. 2009. Summary Annual Report and Form 10-K.

Shaunt, Hartounian. 2010. Business Development Manager Ports and Regional Trucking Clean Energy. Personal communication.

VE 4.4

Reduce emissions from on-road commercial and industrial transportation sources through reduced vehicle idling and efficient vehicle flow.

Methodology: Traffic signal synchronization: Cost to the City: Assumes the cost from a Portland case study. According to the Climate Leadership Group (2009), the City of Portland spent $533,000 to synchronize 135 intersections and 16 streets. This was the amount the City received in a grant, and it was not able to synchronize all signals. Costs to re-time a single intersection range from $1,000 to $3,000 per intersection. For this measure, it was assumed the City would spend $533,000 to synchronize an equivalent amount of signals and streets. The City can pursue grant funding to finance this effort and may be able to allocate more funds than anticipated here, depending on amounts awarded.

Average local trip length in miles and minutes derived from various local driving scenarios modeled through Google Maps and Yahoo driving directions, assumed to be 10 miles for trucking operations (round trip).

Percentage of VMT attributed to local roads calculated by dividing baseline local road travel by total travel. Assumed to be constant in 2020 and 2030. Average number of local trips calculated by dividing the local road VMT by the average trip length.

Truck population: Consistent with proportion of countywide VMT within the city and Planning Area, it is assumed that 30% of the county's heavy-duty truck population is in Tulare, provided by EMFAC. Assume that this anti-idling enforcement successfully targets half of the city's heavy-duty trucks by 2020 and all trucks by 2030.

Assume average heavy-duty truck idling Fuel efficiencies determined using countywide averages provided by EMFAC

Sources:

Bloomekatz, Ari B. 2009. 82% of L.A.'s signal-controlled intersections are now synchronized, mayor will announce. Los Angeles Times, October 8. http://latimesblogs.latimes.com/lanow/2009/10/82-of-las-streets-now-covered-by-synchronized-traffic-lights.html.

Cambridge Systematics. 2009. Moving Cooler: An Analysis of Transportation Strategies for Reducing Greenhouse Gas Emissions. Technical Appendices. Prepared for the Urban Land Institute.

http://www.movingcooler.info/Library/Documents/Moving%20Cooler_Appendices_Complete_102209.pdf.

Climate Leadership Group - Clinton Foundation (2009). Transport: Portland, United States of America. http: //www.c40cities.org/bestpractices/transport/portland_traffic.jsp.

LU 5.1

Promote accessible housing near transit and services to reduce vehicular trips.

Methodology: Reduction for increased density and access to services: The performance of this measure is related to the elasticity of increased density and reduced travel associated with the increased mixture of uses. The literature supports a 5% reduction in vehicle miles traveled for every 100% increase in density and increase in convenience. To calculate the net increase in density in the city between 2006 and the target years, the following variables were manipulated.

Population density from residents and employees citywide in 2006, 2010, 2020, and 2025. All high-density developments approved since 2003 have been within a quarter-mile of services (City of Tulare 2010).

Affordable housing: Affordable housing units for low- and very low-income units are those permitted after the baseline year as provided by General Plan Annual Reports and counted as fulfillment toward the 2007–2014 RHNA. Assumes that Tulare meets the 2014 RHNA for low- and very low-income houses by 2020 and that by 2030 the City maintains the 2020 proportion of new affordable houses added to total new housing stock.

URBEMIS provides a 4% reduction in vehicle trips for each deed-restricted below-market-rate (BMR) unit. Thus, the total reduction is as follows: Trip reduction = % of units that are BMR * 0.04. Percentage reduction is applied to all new VMT.

Sources:

California Air Pollution Control Officers Association (CAPCOA). 2008. CEQA and Climate Change: Evaluating and Addressing Greenhouse Gas Emissions from Projects Subject to the California Environmental Quality Act. (Appendix B).

Nelson/Nygaard. 2005. Creating Low-Traffic Developments: Adjusting Site-Level Vehicle Trip Generation Using URBEMIS. pg. 12. (trip reduction = (1-(ABS(1.5*h-e)/(1.5*h+e))-0.25)/0.25*0.03) where h = study area housing units, e = study area employment, and ABS = absolute value (Criterion & Fehr & Peers, 2001). Assumes total of 9% reduction, and an ideal 1.5 jobs per household. Note: these point reductions were taken from URBEMIS 2007 9.2.458 data according to sample jobs to housing ratio.

Oak Ridge National Lab (ONL). 2004. Transportation Energy Book. Department of Energy. http://cta.ornl.gov/data/index.shtml.

Rimpo and Associates. 2007. Urbemis 2007 Version 9.2.4.

Sacramento Metropolitan Air Quality Management District (SMAQMD). 2010. Recommended Guidance for Land Use Emission Reductions. (p.13). http://www.airquality.org/ceqa/GuidanceLUEmissionReductions.pdf.

San Joaquin Valley Air Pollution Control District (SJVAPCD). 2009. Climate Change Action Plan: Addressing Greenhouse Gas Emissions Under the California Environmental Quality Act; Draft Staff Report, June 30, 2009. CCAP Transportation Emission Guidebook.

SW 6.1

Achieve a 65% diversion of landfilled waste by 2020 and a 75% diversion by 2030 to reduce landfill emissions.

Methodology: Tulare's 2006 reported diversion rate is 54% as reported by CalRecycle (2010). This is a diversion rate that has been achieved through partnership with the Consolidated Waste Management Authority (CWMA); in actuality, the City itself only achieved a 30.45% diversion rate in 2009, despite the fact that it is able to claim overall progress with other CWMA members toward the CWMA's aggregated diversion target (Akins 2010).

Waste diversion goal assumed to achieve a 60% diversion rate by 2030, phased in with 45% diversion achieved in 2020. 2006 and 2010 disposal tons and diversion rates provided by Akins (2010).

Current composting methods are understood to produce greenhouse gas emissions; however, commercial composting methods are expected to improve to negate these emissions by 2020 and 2030.

2009 data proxy for 2010. Diverted wasted in 2009 included recycled waste and green waste. In 2006, diverted waste included waste-to-energy, recycled, and green waste. Assumes achievement of 60% reduction is phased in, with 45% achievement in 2020.

Sources:

Akins, Denise. 2010. County of Tulare RMA, Solid Waste Division. Personal communications.

CalRecycle. 2010. Jurisdiction Profiles.
http://www.calrecycle.ca.gov/Profiles/Juris/JurProfile2.asp?RG=C&JURID=609&JUR=Tulare.

AG 7.2

Promote the use of digesters in local dairy operations to reduce methane emissions from dairy cattle.

Methodology: Methane capture from dairy digesters is based on U.S. EPA AgStar reports for all dairy digesters in California. These averages were used in the Dairy Manure Digester and Co-Digester Facilities Draft Programmatic Environmental Impact Report (Draft PEIR) (July 2010). Assumes the average direct methane reductions and electricity generating capacity for storage lagoon digesters that exist in Tulare. Forecast cows were calculated assuming a constant proportion of cows to dairy acreage established in the General Plan buildout model, based on County Assessor parcel data and City GIS data (10,652 dairy cows by 2020 and 4,081 cows by 2030). Average digester operational data and dairy cattle herd size necessary to support digesters based on the Tulare case studies provided by AgStar, including average dairy herd of 2,070 cows, average methane emissions reduction of 4,641 MT CO_2e.

The Draft PEIR forecasts that 200 digesters will be installed in Region 5 by 2020, compliant with SJVAPCD thresholds. According to Draft PEIR data, the City of Tulare has approximately 1.74% of all dairy cows in Region 5. Measure assumes that the City will achieve 2.0% of all digesters targeted by the Draft PEIR. By 2020, equivalent of four new digesters at average statewide methane capture capacity installed. By 2030, assumes that only one digester will be in operation, based on forecast General Plan buildout and conversion of agricultural land.

Costs for manure digesters are estimated to range from $1 million to $6 million per at least 1,000 head of cattle. Assumes an average cost of $3.5 million, which is anticipated to be offset through the Feed in Tariff and other financial incentives that will be developed to achieve RPS goals. Cost benefits for manure digesters for offset electricity use are provided in Measure RE 2.3.

Sources:

California Regional Water Quality Control Board, Central Valley Region. 2010. Dairy Manure Digester and Co-Digester Facilities. Draft Program Environmental Impact Report. http://www.waterboards.ca.gov/centralvalley/press_room/announcements/dairy_digester_draft_peir.pdf.

Dairy Cares. 2010. 2010 Sustainability Report. A progress report to the community on California dairy initiatives. http://www.dairycares.com/pdf%20files/2010SustainabilityReport.pdf.

U.S. EPA AgStar. 2010. Market Opportunities for Biogas Recovery Systems at U.S. Livestock Facilities. http://www.epa.gov/agstar/ documents/biogas_recovery_systems_screenres.pdf

AG 7.3

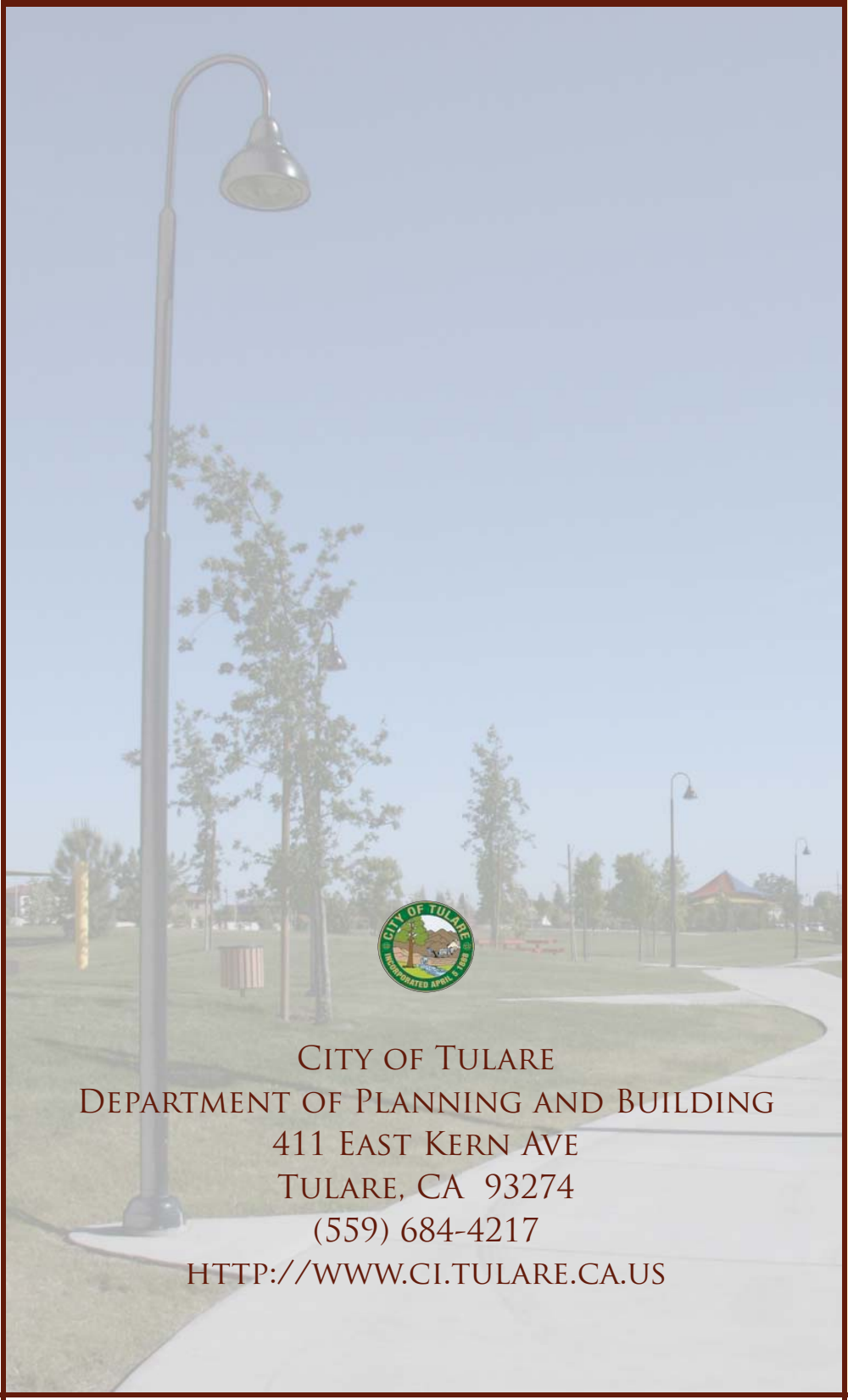
Support regional partnerships to promote reduced agricultural emissions and link the farming community with resources to achieve reductions in emissions.

Methodology: Zero emissions agricultural terrain vehicles: Assumes the countywide average of annual MT CO_2e per piece of agricultural equipment, and the number of pieces of agricultural equipment in the city and Planning Area from the Inventory, based on the proportion of county crop land. 50% of the 2020 population is targeted for replacement with zero emissions equipment by 2020 and 75% of the 2020 vehicle population by 2030. Assumes that additional funding and programs will become available to support this effort.

Based on programs such as the California Zero Emission Agricultural UTV Rebate Program. Funded by CARB and administered statewide by the SJVAPCD. Established to promote zero-emission agricultural utility terrain vehicles. Rebates are on a first-come, first-served basis. The Agricultural UTV Rebate Program provides rebates up to a maximum of $2,500 or 15% of the MSRP per zero-emission vehicle to qualified individuals, businesses, public agencies and entities, and non profit organizations involved in California agricultural operations. Similar programs include the Carl Moyer Memorial Air Quality Standards Attainment Program, which funds cleaner on-road, off-road, marine, locomotive, and agricultural sources. The program achieves near-term reductions in emissions of oxides of nitrogen (NOx), particulate matter (PM), and reactive organic gas (ROG); it does not directly target greenhouse gas emissions, but indirectly achieves lowered greenhouse gas emissions through funding upgrades to cleaner agricultural equipment.

Sources:

San Joaquin Valley Air Pollution Control District. n.d. California Zero Emission Agricultural UTV Rebate Program. http: //www.valleyair.org/grant_programs/utv/utvweb.htm.



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