MEMO

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

From: Tammy Seale

Cc: Lew Nelson, Public Works Director

Date: August 27, 2010

Re: Tulare's Community-Wide Greenhouse Gas Emissions Inventory

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 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.

[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 fall 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.

- 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:

- Propane, wind, or solar energy consumed by the community at large; and

- Recreational off-road equipment and vehicles

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.

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.

- **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 498,583 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 54.2%), producing approximately 270,299 metric tons of CO_2e in 2006. Emissions from the transportation sector were the next largest contributor, accounting for 27.5% of the total emissions, producing approximately 137,343 metric tons of CO_2e. The

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

residential sector accounted for 15.7% of the total emissions (78,139 metric tons of CO_2e) and emissions from solid waste comprised 2.5% of the total (12,466 metric tons of CO_2e). Emissions from agricultural activities contribute less than 1.0% of total emissions within the city (337 metric tons of CO_2e).

When the Inventory is expanded to include the Planning Area, increases total GHG emissions increase by 39.0%. When accounting for the Planning Area, emissions from agricultural activities (accounted for in the Other Sector) increase from 337 metric tons of CO_2e by 30,093% to 101,713 metric tons of CO_2e, comprising 14.7% of total emissions. In this scenario, the proportional contribution of other sectors to total emissions is approximately equivalent to those in the city limits.

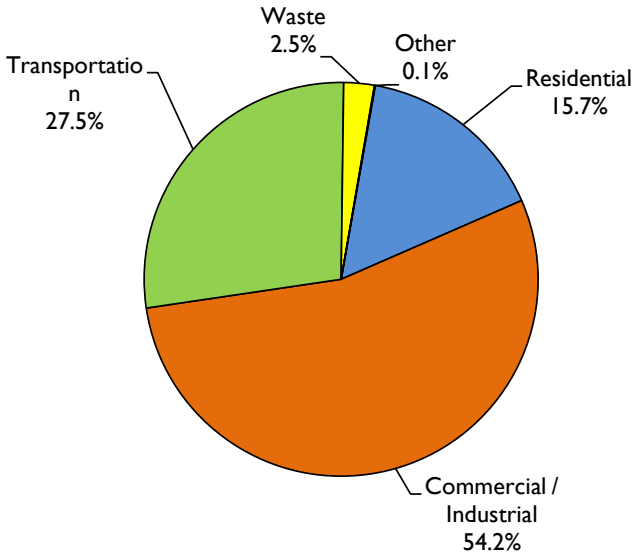
By calculating emissions within the existing Planning Area in addition to within the city limits, the City is able to establish a more accurate baseline emissions inventory that accounts for anticipated incorporation of county land. This approach facilitates integration with the General Plan Update and 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.

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

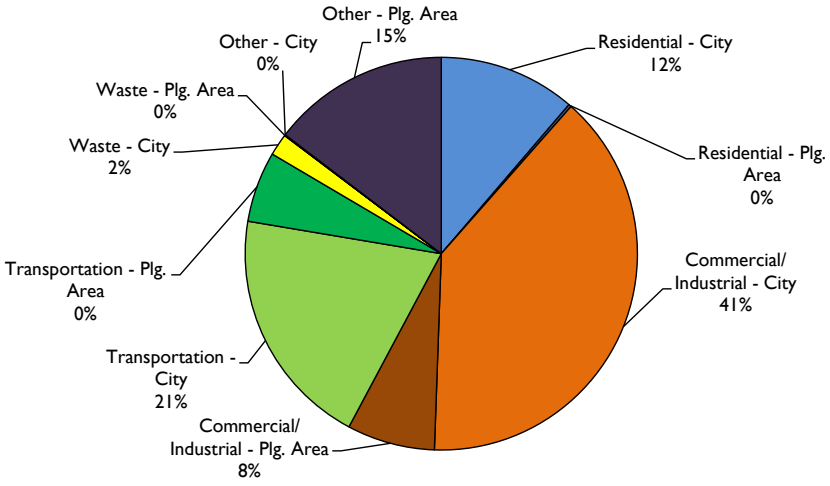
	City Limits		Planning Area Only		City Limits & Planning Area		
2006 Baseline Green-house Gas Emissions	**Metric Tons CO_2e**	**Percentage of Total**	**Metric Tons CO_2e**	**Percentage of Total**	**Metric Tons CO_2e**	**Percentage of Total**	**% Increase from City Limits Only**
Residential	78,139	15.7%	1,518	0.8%	79,656	11.5%	1.9%
Commercial/ Industrial	270,299	54.2%	50,143	25.9%	320,442	46.3%	18.6%
Transportation	137,343	27.5%	40,286	20.8%	177,628	25.7%	29.3%
Waste	12,466	2.5%	242	0.1%	12,708	1.8%	1.9%
Other	337	0.1%	101,376	52.4%	101,713	14.7%	30093%
Total	**498,583**	**100%**	**193,565**	**100%**	**692,148**	**100%**	**39%**

Figure 1: Community Emissions by Sector

Emissions in City Limits



Emissions in City Limits & the Planning Area

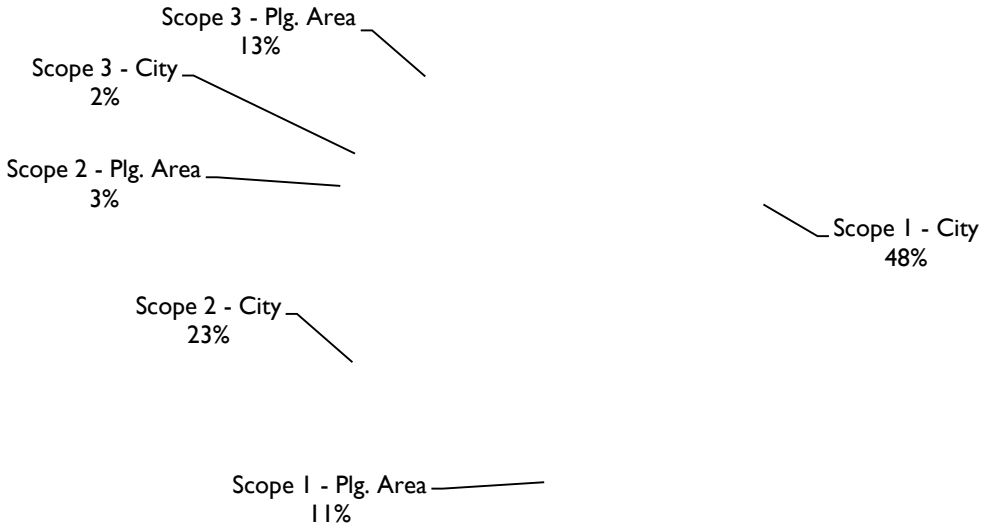


The largest portion of Scope 1 emissions within city limits and the Planning Area came from the commercial and industrial sectors (refer to **Figure 2** and **Table 2**). These emissions are considered Scope 1 because they involve the direct combustion of fuel within the jurisdictional boundary of the 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	38,438	39,700	0	78,139	39,185	40,471	0	79,656
Commercial/ Industrial	152,324	117,975	0	270,299	180,582	139,860	0	320,442
Transportation	137,343	0	0	137,343	177,628	0	0	177,628
Waste	0	0	12,466	12,466	0	0	12,708	12,708
Other	337	0	0	337	9,609	0	92,104	101,713
Total	**328,443**	**157,675**	**12,466**	**498,583**	**407,005**	**180,331**	**104,812**	**692,148**
Percentage of Total	**65.88%**	**31.62%**	**2.50%**	**100.0%**	**58.80%**	**26.05%**	**15.14%**	**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

THE BUILT ENVIRONMENT (RESIDENTIAL, COMMERCIAL, INDUSTRIAL)

With all scopes and sectors aggregated, 57.8% 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, 69.9% 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.[4] Natural gas and electricity coefficients are provided by the Local Government Operations Protocol v.1.1.[5] 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 per acre within city limits is applied to land acreages in the Planning Area, using data from the General Update Draft Environmental Impact Report.[6]

TRANSPORTATION

Travel by on-road motorized vehicles constitutes 25.7% of GHG emissions in city limits and the Planning Area (177,628 metric tons of CO_2e), and 27.5% of emissions in just the city limits (137,343 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 local roads (57.79% in the Planning Area and city limits, and 63.96% in the city). Within the Planning Area and city limits, approximately 42.21% of the GHG emissions in the transportation sector resulted from travel on highways, whereas as in the city highway travel accounts for approximately 36.04% 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.[7] Vehicle miles traveled 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. Emissions coefficients for gasoline and diesel vehicles in Tulare County were calculated using the California Air Resources Board's vehicle emissions model, EMFAC2007.

WASTE

Solid waste disposed of at managed landfills was responsible for 1.8% of total emissions in the Planning Area and city limits, and 2.5% 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

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[4] Coronel 2010; Morrow 2010.

[5] California Air Resources Board 2010c.

[6] City of Tulare 2007.

[7] Caltrans 2006.

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.

Disaggregated tons of waste generated within the city was provided by the Tulare County Resource Management Agency (RMA) Solid Waste Division.[8] It was assumed that the proportion of waste emissions attributed to the city out of all Consolidated Waste Management Authority (CWMA) entities is indicative of the proportion of emissions from city waste generated at each landfill that receives aggregated CWMA waste. The California Air Resources Board (ARB) Landfill Emissions Tool was used to calculate emissions released into the atmosphere 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% (ARB protocol).[9] This tool applies the IPCC's First Order Decay Model independently for each landfill based on historical data trends. Emissions for waste in the Planning Area was calculated using the waste tons and emissions/resident ratio, assuming an annexation population of approximately 1,000.[10]

OTHER – EMISSIONS FROM AGRICULTURAL ACTIVITIES

Emissions from agricultural activities in the Planning Area and city limits contribute 14.7% of total emissions (101,713 metric tons of CO_2e); when excluding the Planning Area, agricultural activities within city limits only contribute 0.1% of total emissions (337 metric tons of CO_2e) (see Table A1-5 and Figure AI-3 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 General Plan Update Draft Environmental Impact Report[11] and countywide acreages and crop types provided by the Tulare County Agricultural Commissioner's Office.[12] Local practices and assumptions were confirmed by Dennis Haines, the Agricultural Staff Biologist for the Tulare County Agricultural Commissioner.[13]

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[8] Akins 2010.

[9] 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.

[10] Nelson 2010c.

[11] City of Tulare 2007.

[12] Tulare County Agricultural Commissioner 2007.

[13] Haines 2010.

The California Air Resources Board OFFROAD2007 model generates emissions inventories by equipment type for off-road agricultural equipment at the county-wide 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.[14]

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.[15] 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.[16] 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 country-wide 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.[17]

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.[18] 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, 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

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

[15] 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.

[16] USEPA 2010.

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

[18] ARB 2010b.

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 692,148 metric tons CO_2e by approximately 111.68% by the year 2020 to 1,465,171 metric tons CO_2e. By 2030, emissions will grow by approximately 301.77% to 2,780,828 metric tons CO_2e. The results of the forecast are shown in **Table 4** and **Figure 3** below. Forecasts for 2010, 2020, and 2035 are premised on growth projections established in the City's Draft General Plan Update for jobs, housing, and population.[19] Refer to Tables A1-6 through A1-8 in Appendix 1 for additional details on the forecast.

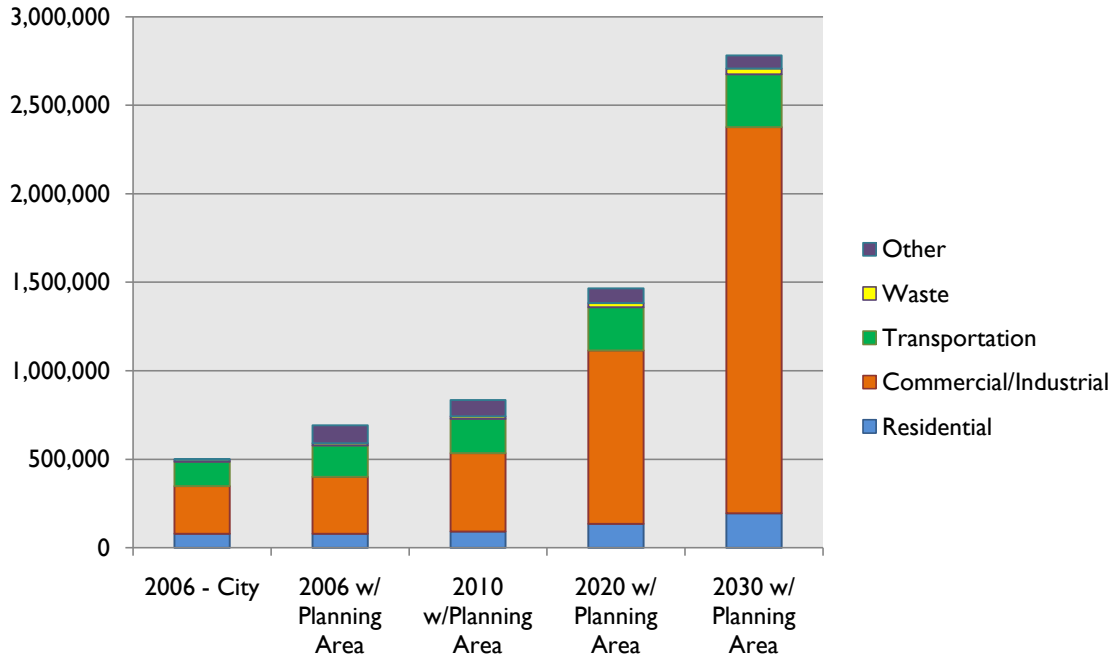
Table 4: Business-As-Usual Projected Growth in Community-Wide Emissions, 2005–2030 (Metric Tons CO_2e)

		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	40,471	46,987	68,242	99,111
	Natural Gas	38,438	39,185	45,494	66,073	95,962
Commercial/ Industrial	Electricity	117,975	139,860	192,548	428,209	952,294
	Natural Gas	152,324	180,582	248,611	552,887	1,229,565
Transportation	VMT	137,343	177,628	194,534	244,175	298,498
Waste	Landfilled Tons	12,466	12,708	14,824	21,787	32,021
Other	Agriculture	337	101,713	90,725	83,798	73,377
Total		**498,583**	**692,148**	**833,724**	**1,465,171**	**2,780,828**
% Change from 2006		**0.00%**		**20.45%**	**111.68%**	**301.77%**

** 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 General Plan Update, and are premised on compound annual growth rates that will achieve the City's target buildout population.*

[19] City of Tulare 2007.

Figure 3: Business-As- Usual Projected Growth in Community-Wide Emissions, 2005–2035 (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)	498,583	692,148	833,724	1,465,171	2,780,828
Pavley I Reductions ($MTCO_2e$)	n/a	n/a	n/a	-29,423	-53,304
LCFS ($MTCO_2e$)	n/a	n/a	n/a	-13,561	-14,700
RPS Reductions ($MTCO_2e$)	n/a	n/a	-3,712	-58,580	-211,785
CalGreen 2008 Title 24 Reductions ($MTCO_2e$)	n/a	n/a	n/a	-45,353	-132,310
Total State Reductions ($MTCO_2e$)	n/a	n/a	-3,712	-146,917	-412,098
Adjusted Growth Projection ($MTCO_2e$)	n/a	n/a	830,012	1,318,254	2,368,730
Percentage Change with Adjusted Forecast From City Only Baseline 2006	n/a	38.82%	66.47%	164.40%	375.09%
Percentage Change with Adjusted Forecast From City & Planning Area Baseline 2006	-27.97%	n/a	19.92%	90.46%	242.23%

** 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.

- **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.[20]

- **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.[21] 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 than a 15% decrease; rather, it it will require a 59.85% reduction from 2020 emissions levels, or business as usual. By 2035, the gap between business-as-usual growth and target reduction levels increases to 87%. Once state reductions are accounted for, the reduction necessary at the local level to achieve targets drops to 55.37% below the adjusted business-as-usual forecast by 2020 and 82.95% below the adjusted business-as-usual forecast by 2035. **Figure 4** 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 6**.

[20] California Public Utilities Commission 2009.

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

Figure 4: GHG Forecast in Relation to Reduction Targets

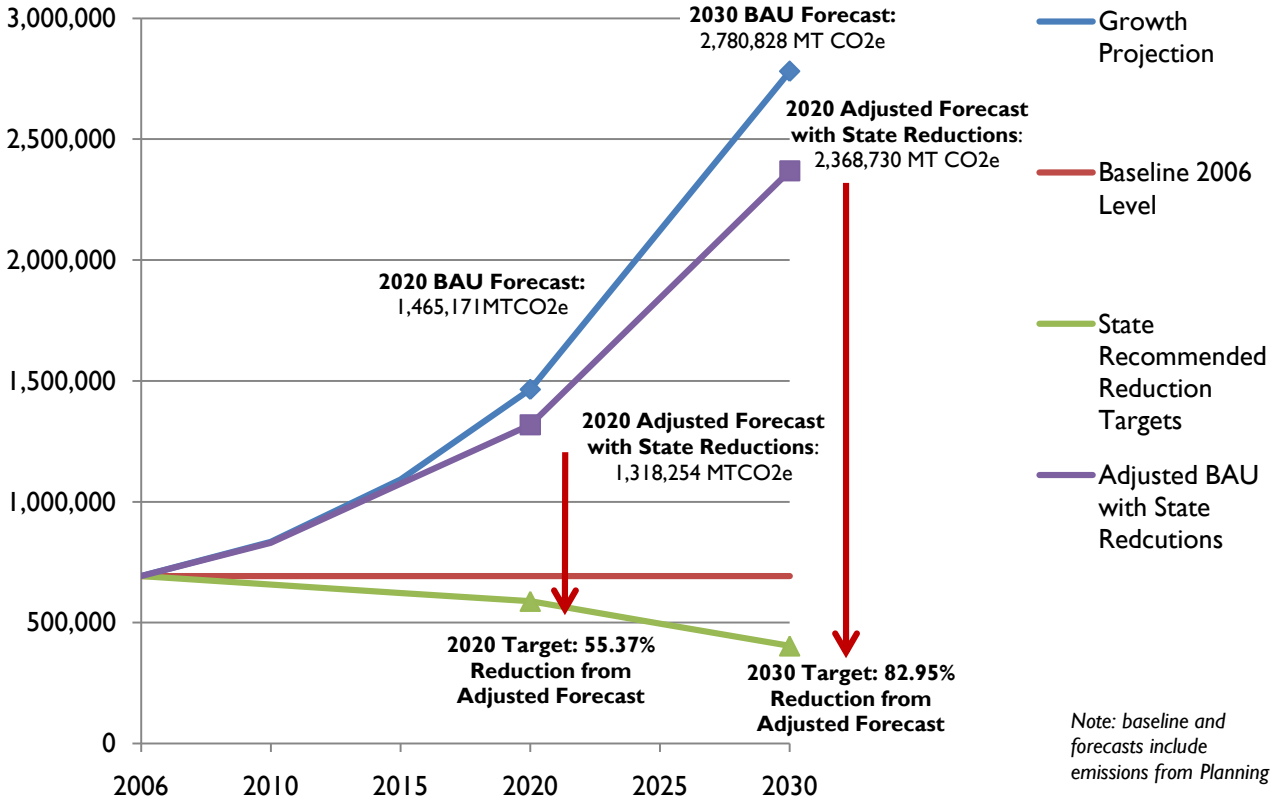


Table 6: Comparison of Business-As-Usual and Adjusted Forecasts to Reduction Targets

	2020	2030
Target reduction	15.00%	41.67%
Local level needed to achieve target	588,326.17	403,753.25
Local % reduction from BAU forecast to achieve target	-59.85%	-85.48%
Local reduction needed from BAU forecast ($MTCO_2e$)	876,845.13	2,377,074.85
Local reduction needed from adjusted forecast ($MTCO_2e$)	729,928.24	1,964,976.42
Local % reduction needed from adjusted BAU	-55.37%	-82.95%
% Contribution of state actions to targets	-4.48%	-2.53%

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 A1-1: Summary of Community-Wide Emissions by Sector

2006 Baseline Greenhouse 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	78,139	15.7%	1,518	0.8%	79,656	11.5%	1.9%
Commercial/ Industrial	270,299	54.2%	50,143	25.9%	320,442	46.3%	18.6%
Transportation	137,343	27.5%	40,286	20.8%	177,628	25.7%	29.3%
Waste	12,466	2.5%	242	0.1%	12,708	1.8%	1.9%
Other	337	0.1%	101,376	52.4%	101,713	14.7%	30093%
Total	**498,583**	**100%**	**193,565**	**100%**	**692,148**	**100%**	**39%**

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	38,438	78,139	22.4%
	Commercial/ Industrial	403,419,801	117,975	28,707,946	152,324	270,299	77.6%
	Total	**539,175,894**	**157,675**	**35,952,291**	**190,763**	**348,437**	**100.0%**
Planning Area Only*	Residential	2,637,218	771	140,730	747	1,518	2.9%
	Commercial/ Industrial	74,838,580	21,886	5,325,623	28,258	50,143	97.1%
	Total	**77,475,798**	**22,657**	**5,466,353**	**29,004**	**51,661**	**100.0%**

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 & Planning Area	Residential	138,393,311	40,471	7,385,075	39,185	79,656	19.9%
	Commercial/ Industrial	478,258,381	139,860	34,033,569	180,582	320,442	80.1%
	Total	**616,651,692**	**180,331**	**41,418,644**	**219,767**	**400,099**	**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 1,000 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.

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)	103,607,502	49,498	36.04%	53,327,391	25,477	156,934,892	74,975	42.21%
Local Road	Vehicle Miles Traveled (Annual VMT)	126,125,750	87,845	63.96%	21,261,756	14,808	147,387,506	102,653	57.79%
Total	Vehicle Miles Traveled (Annual VMT)	**229,733,252**	**137,343**	100.00%	**74,589,147**	**40,286**	**304,322,398**	**177,628**	100.00%

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.
- Emissions coefficients for CH_4 and CO_2 were obtained from EMFAC for the average humidity (49%) and temperature (62.9 degrees Fahrenheit) for the city. Highway emissions coefficients were modeled at an average speed of 50 MPH. Local road emissions coefficients were modeled at an average speed of 20 MPH.
- EMFAC does not provide nitrous oxide emissions; therefore alternative, nationwide coefficients were obtained from the Local Government Operations Protocol (California Air Resources Board 2010c). VMT per vehicle class was multiplied by a g/mi coefficient, assuming emissions for Inventory Year 2006.

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

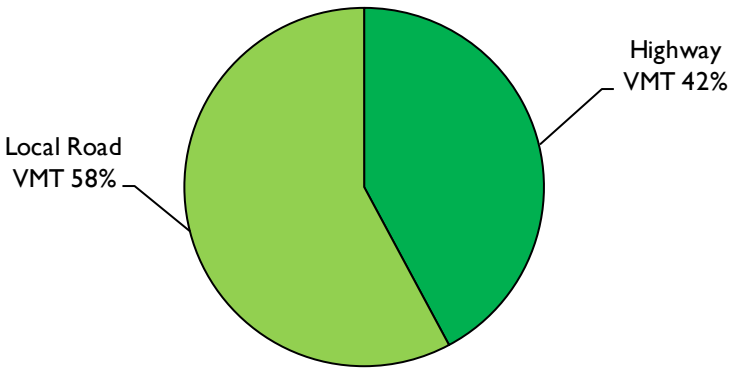

Figure A1-2: Transportation Emissions in City Limits and Planning Area by Fuel Type ($MTCO_2e$)

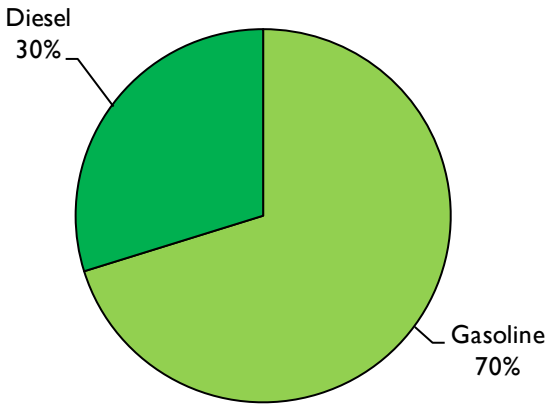

Table A1-4: Waste by Landfill

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	Visalia	24,429	5,944	48%	475	115	24,903	6,060	47.69%
	Woodville	15,582	3,731	30%	303	72	15,884	3,803	29.93%
	Teapot Dome	16,541	2,790	22%	321	54	16,862	2,845	22.38%
	Total	**56,551**	**12,466**	**100%**	**1,099**	**242**	**57,650**	**12,708**	**100%**

Citations:

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

Notes on Methodology:

- City Limits:
  - Total waste sent to landfill was retrieved from the CalRecycle Disposal Reporting System for Visalia, Woodville, and Teapot Dome Landfills (CalRecycle 2010).
  - 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.
  - The ARB Landfill Emissions Tool (2010a) calculated emissions released into the atmosphere from all waste in place in a landfill with an average of 75% methane capture according to ARB protocol : http://www.arb.ca.gov/cc/protocols/localgov/localgov.htm
  - The ARB Landfill Emissions Tool to determine the First Order Decay Model was used independently for each landfill based on historical data trends. Tool utilizes the following methodology:
    - Tool equations were derived from IPCC's Mathematically Exact First-Order Decay Model. See section 3A1.6.3 of the 2006 IPCC Guidelines available online at: http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/5_Volume5/V5_3_Ch3_SWDS.pdf
    - The anaerobic rate of decomposition (k-value) k=0.02, was selected based on average annual rainfall, as suggested from the U.S. EPA.
    - The IPCC default value of 10% was used for the percentage of methane oxidized while passing through the landfill to atmosphere .
    - The U.S. EPA default value of 75%was used for the percentage of methane captured by a landfill gas collection system .
    - The U.S. EPA value of 1,012btu/scf was used for heat content of methane .
  - 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 Planning Area 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 Planning Area. 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 Planning Area.

  - Approximate population to be annexed is 1,000, per Lew Nelson (pers. communication).

Table A1-5: 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	87.1%
Other Livestock	NA	0	0.0%	5,569 livestock	3,525	5,569 livestock	3,525	3.5%
Off-Road Agricultural Equipment	15 pieces of off-road ag equipment	131	38.8%	423 pieces of off-road ag equipment	3,593	438 pieces of off-road ag equipment	3,724	3.7%
Agricultural Fertilization	93,465 lbs of nitrogen	206	61.2%	2,572,540 lbs of nitrogen	5,679	2,666,005 lbs of nitrogen	5,886	5.8%
		337	100.0%		101,376		101,713	100.0%

Off-road agricultural equipment

Citations:

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

Notes on Methodology:

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

- Assumes a percentage of county-wide emissions based on proportion of county-wide crop land within the city and Planning Area, based on existing crop acreage in 2006 in the Planning Area and city limits (City of Tulare 2007, page 3-1), in comparison with county-wide crop totals provided in the Tulare County 2006 Annual Crop and Livestock Report (Tulare County Agricultural Commissioner 2007).

- Due to infeasibility of estimating projected agricultural land county-wide in 2030 or 2020, assumes that the proportion of emissions in the city and Planning Area versus the county from agricultural land remains constant in the target years (unlike projections for agricultural crop types, in which the Draft General Plan EIR provides detailed assumptions about conversion of land within the Planning Area). No comparable data was available at the county-wide level, including agricultural acreages from both incorporated and unincorporated sources.

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:

- County-wide crop emissions. Crop data was gathered from the Tulare County 2006 Annual Crop and Livestock Report. For each crop category (i.e., fruit and nut, vegetables, and field crops), the top three crops in acreage were identified, and appropriate crop types for the City of Tulare's Planning Area were confirmed with Dennis Haines, Agricultural Staff Biologist at the Tulare County Agricultural Commissioner/Sealer's Office (June 7, 2010). An average nitrogen fertilizer use for each crop was identified using University of California Cooperative Extension cost reports and the local Farm Advisor's Office. A weighted average of nitrogen fertilizer was calculated for each crop category and assumed to apply to all other crop land not within the top three crops for each category. 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 Planning Area and city limits. According to the Draft General Plan Update Environmental Impact Report, Chapter 3, page 3-1 (2007), in August of 2006 there were 24,930 acres of agricultural land in the Planning Area, including 874 acres of agricultural land within city limits. In total, the amount of agricultural acreage within the Planning Area (including acreage from within city limits) equals approximately 1.575% of all agricultural land in the county

(1,582,684 acres for all field crops, fruit and nut crops, and vegetables, according to the 2006 Crop Report). Assumes this proportion of agricultural land as the uniform distribution of acreage of each crop category between the City of Tulare Planning Area and the county and that therefore all emissions from this land can be attributed to the city. The impact of organic crops was assumed to be negligible; county-wide, organic crops account for only 3,068 acres, including acreage for crops not applicable to the Tulare area (such as citrus) (refer to 2006 Crop Report for details).

- 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.

- Projections:

  - For 2030 projections, assumes that 16,372 acres would be converted from agricultural uses to non-agricultural uses (City of Tulare 2007). Assumes a constant proportion of land per crop type as the baseline year and that the agricultural practices would remain constant.

  - For 2020 projections, assumes the Compound Annual Growth Rate (CAGR) of agricultural land conversion from 2006–2030.

- 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: County-wide 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 Planning Area, the following assumptions were made:
  - Dairy cows based on number of dairies within the Planning Area, determined by comparison of a map of all county dairies (Tulare County RMA GIS Mapping Division 2006) and the City Planning Area (City of Tulare 2007). Percentage of dairy cows in the Planning Area was assumed to equal the percentage of dairies within the county that fall in the Planning Area. In 2006, there were 24 active dairies within the Tulare Planning Area, accounting for 8% of the total dairies within the county.
- All other cattle, lambs, and hogs and pigs attributed to the City of Tulare and Planning Area were determined by ratio of agricultural land within the city limits and Planning Area boundary to the rest of the county, or 1.575%.
- Projections
  - To determine the livestock population in 2030, reductions were made based on proposed land use changes determined by the General Plan. Number of dairies in 2030 within the Planning Area will be at 75% of current numbers, based on proposed General Plan land uses and distribution of existing dairies.
  - All other cattle, lambs, and hogs and pigs attributed to the City of Tulare in 2030 will be at 34% of current numbers, assuming that proportion of livestock to agricultural land remains constant as agricultural land decreases with General Plan buildout.

- For 2020 projections, assumes the CAGR of agricultural land conversion from 2006–2030.

- 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 country-wide 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.

Figure A1-3: Agricultural Emissions by Activity

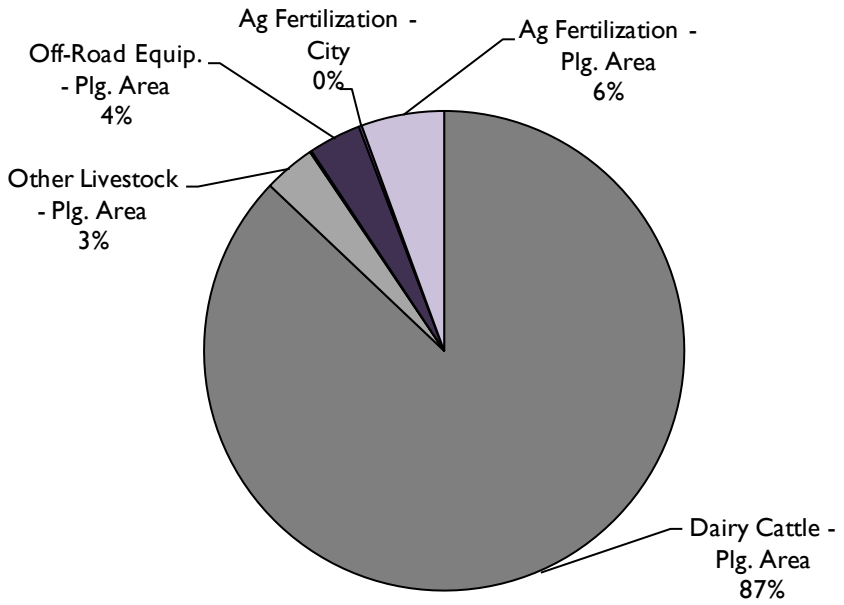

Table A1-6: Forecast Transportation Reductions

GHG Emissions Summary					
Year	**Annual VMT**	**CO_2 Emissions ($MTCO_2e$)**	**CH_4 Emissions ($MTCO_2e$**	**N20 Emissions ($MTCO_2e$)**	**Total $MTCO_2e$**
2006	304,322,398	174,068	336	3,225	177,628
2020	418,334,062	238,831	139	4,418	243,388
2030	511,402,087	289,931	110	5,362	295,403

Pavley I Emissions Reduction		LCFS Emissions Reduction	
Year	**Emissions Reduction ($MTCO_2e$)**	**Year**	**Emissions Reduction ($MTCO_2e$)**
2020	29,423	2020	13,561
2030	53,304	2030	14,700

GHG Emissions Summary with Pavley I & LCFS	
Year	Total MT CO_2e
2006	n/a
2020	200,404
2030	227,399

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 Planning Area VMT.
- Applies the county emissions growth rate from EMFAC to the city's emissions.
- 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.

Table A1-7: Reductions from Renewable Portfolio Standard (RPS) (MT CO_2e)

	2010	2020	2030
Residential $MTCO_2e$	728	8,052	19,964
Commercial $MTCO_2e$	2,983	50,528	191,821
Total $MTCO_2e$	**3,712**	**58,580**	**211,785**

Table A1-8: Title 24 Reductions

Sector (Energy Type)	2020 Reduction Attributed to Title 24	Adjusted 2020 Forecast	2030 Reduction Attributed to Title 24	Adjusted 2030 Forecast
Residential NC (electricity	3,036.86	57,152	7,169.70	71,977.58
Residential NC (natural gas)	2,020.90	64,052	4,955.97	91,005.92
NonResidential (electricity)	11,693.54	416,515	27,974.49	732,498.41
NonResidential (natural gas)	28,601.90	524,285	92,209.69	1,137,355.79
Total	**45,353.20**	**1,062,004.88**	**132,309.85**	**2,032,837.70**

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.

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:

- Assumes 2008 Title 24 Energy Efficiency Improvements in comparison to 2005 baseline Title efficiency standards (California Energy Commission November 2007).

- 2008 update to the California Energy Efficiency Standards for Residential and Non-Residential Buildings went into effect January 1, 2010.

- Reductions in energy use due to Title 24 apply to all buildings constructed after 2010.

- 2020 and 2030 forecasted $MTCO_2e$ for electricity only include adjustments for Renewable Portfolio Standards.

- Assumes impact of updated standards on new construction initiated in 2011.